

Does FDI constrain long-term development?*

Outflows matter more than inflows

Jannis Müller-Hester

University of Bremen

University of Groningen

janmuell@uni-bremen.de

Dirk Bezemer

University of Groningen

d.j.bezemer@rug.nl

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ABSTRACT

We extend Thirlwall's Balance-of-Payments-constrained Growth model to examine whether foreign direct investment (FDI) constrains long-term economic growth through profit repatriation. Using a panel of 42 countries over 1992-2023, we find that FDI income outflows tighten the balance-of-payments constraint more than FDI inflows loosen it. A model-based counterfactual implies that output in 2023 would have been 3.7 percent higher in high income countries and 2.4 percent higher in middle income countries without this net drain of foreign exchange. Only 14 out of 42 countries satisfy the financial sustainability conditions. These countries are characterized primarily by structurally lower yields on their FDI liabilities rather than stronger export growth. The findings highlight the importance of profit repatriation and the cost of external finance when assessing the developmental potential of FDI.

Keywords: Foreign Direct Investment, Balance of Payments, Global Currency Hierarchy

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Correspondence to janmuell@uni-bremen.de

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1. Introduction

Foreign direct investment (FDI) inflows over time elicit foreign-exchange outflows of investor income. This dynamic bears on a question that is central to the capital flows literature. How beneficial are capital flows to economic development? In this paper we estimate for a panel of 42 countries from 1992 to 2023 the long-term growth rate consistent with the balance-of-payments (BoP) equilibrium. We find that in real terms, the outflow of foreign exchange due to repatriated FDI income on average outweighs FDI-related inflows due to investment and growth in export revenues. Over the sample duration, FDI reduced the BoP-consistent output in 2023 by 3.7 percent in high-income countries (HICs) and 2.4 percent in middle-income countries (MICs), compared to a counterfactual where net FDI flows do not constrain economic growth over the sample period. The yield on FDI liabilities is a key determinant. This highlights the centrality of the non-trade part of the current account and sheds light on the drivers of global imbalances.

Of all capital flows, FDI is especially relevant to developmental impacts due to its volume and real-sector developmental benefits, both of which are larger than those of debt and other equity.

First, FDI looms increasingly large both as a share of all liabilities and relative to the size of the economy. In our sample the share of FDI in total liabilities of MICs increased from 18.3 to 51.2 percent during 1992–2023, while the debt share fell from 76.3 to 37.1 percent. The GDP ratio of FDI liabilities rose from 7.7 to 44.7 percent. Figures 1 and 2 illustrate that in HICs, the share of FDI in all liabilities was more stable, rising from 25.3 to 29.8 percent, while the FDI-to-GDP ratio rose strongly from 15.5 to 69.5 percent (Milesi-Ferretti 2026). The trends are consistent with those reported by Lane and Milesi-Ferretti (2007, 2018) and Joyce (2021).

Figure 1 - Disaggregated Gross External Liability Positions

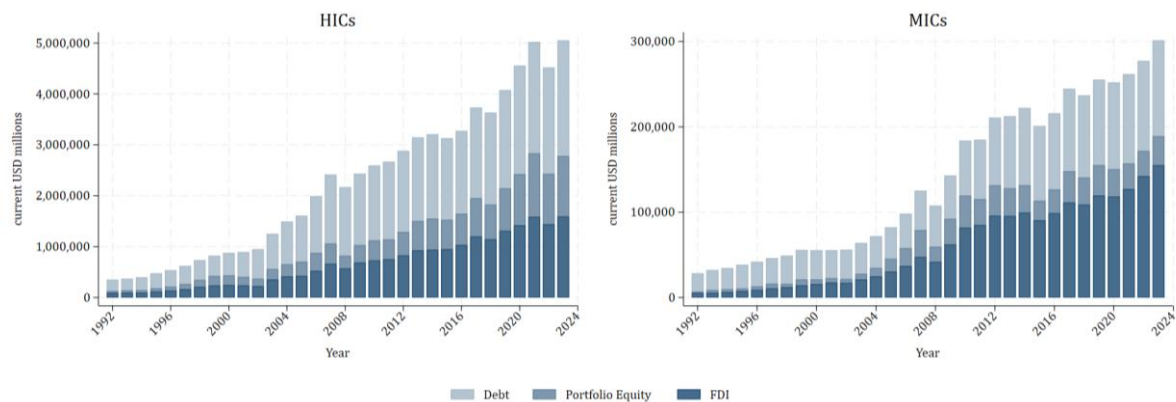


Figure 2 - Gross External Liability Composition



Source: EWN Database (Milesi-Ferretti 2026).

Second, the effect of these trends needs to be set in the context of extensive macro- and micro-level evidence on FDI impacts. Positive country-level effects on exports, GDP growth and per capita incomes are identified in many studies, but they are conditional on a wide range of factors such as absorptive capacity, domestic institutions and capability thresholds (Borensztein et al. 1998; Alfaro 2017; Alfaro and Chauvin 2020; Tan et al. 2023). Kastratović (2020) concludes from an overview study that FDI increases host-country exports, particularly in developing countries. Sahoo and Dash (2022) show that for 93 developing countries over 2000–2017, those effects depend on infrastructure, human capital, financial development, institutions and trade openness.

Also firm-level and plant-level studies generally show that FDI increases the probability of exporting and export performance, both in host firms (Boddin et al., 2017) and through spillovers (Fu, 2011). Many firm-level studies report positive effects of FDI on productivity and innovation, conditional on factors such as technology transfer, intermediate-input linkages, knowledge spillovers, competition and labour mobility. Ahn et al. (2025) provide a recent overview of the literature. They also undertake a study of a large number of FDI deals across countries over 2003–2021 and distinguish greenfield FDI from cross-border M&A. Ahn et al. (2025) present evidence that FDI originating in high-income countries leads to backward productivity spillovers in emerging and developing economies, based on their demand for inputs. There are forward productivity spillovers in high-income countries.

In these literatures, FDI is viewed through the lens of production, income formation and distribution. FDI is thought of as investment in the sense of capital-goods formation and the more efficient management of production processes, which—given the right circumstances—lead to productivity increases and income growth.

We complement this real-sector understanding of FDI by analyzing its financial nature (Hennart and Sutherland, 2022). Other literature has noted that much FDI is ownership rearrangement within an MNE structure (Amberger and Kohlhase 2023), or cross-border engagement to obtain financial resources (Brouthers et al., 2022), rather than capital-goods formation.

From a financial perspective FDI is linked to BoP constraints. FDI financial inflows modify the recipient country's balance sheets by adding assets, typically in the form of foreign currency, and simultaneously adding liabilities, typically in the form of future profit claims, also in foreign currency. This matters to developmental goals such as income growth, productivity

gains and export capacity, to the extent that these goals require spending on capital goods and expertise in foreign currency (dollars and other currencies; from here on, ‘dollars’ for short). This is a constraint, especially for current-account deficit economies (Mehrling 2013b).

The key idea in this paper is that while FDI inflows and any future exports loosen this constraint, they imply a simultaneous rise in FDI liabilities and future imports, leading to outflows that reduce future dollar availability, threatening to harden the future constraint. We ask what the balance of these two impacts is in the longer term and thus, what the developmental potential of FDI is if viewed as a balance-sheet change that modifies financial flows now and in the future.

This adds to the literature by identifying additional conditions for realizing the beneficial effects of FDI, beyond productivity-driven growth in value added. It extends the analysis of FDI impacts from the realization of value added to its distribution. Most of the FDI literature is concerned with the investment, production and sales stages in which value added is realized. We study the distribution stage, where value added is distributed over wages and profit, and profit is allocated over consumption, capital-goods formation and profit repatriation. In both stages, currency matters. FDI may yield real-sector benefits such as productivity spillovers, capital formation and improved management and marketing. The additional question we ask is how FDI affects foreign-exchange availability across all stages. FDI dollar inflows and increased dollar-earning capacity in exports must be large enough to finance increased FDI-induced dollar spending on inputs and, especially, dollar outflows as repatriated profit—otherwise, the balance-of-payments (BoP) constraint on growth will tighten due to FDI, with negative effects on growth. This is particularly the case as foreign firms often have a higher import content of production than domestic firms and require rates of return that are often higher than those paid on other forms of external finance (Akyüz 2017; Kregel 2014). This is how distribution of income has an impact on growth of income. There may, of course, also be positive effects through the BoP channel if dollar export revenues exceed dollar outflows due to imports and profit repatriation.

The BoP framework may help explain some of the heterogeneity between the firm-level evidence on positive FDI effects cited above and macroeconomic studies showing ambiguous aggregate effects of FDI (see for example Herzer 2012). Part of the explanation may be that firm-level value-added gains may come at the cost of a tighter country-level foreign-exchange constraint. The overall developmental effect of FDI may then be negative, but this is not observable in firm-level studies.

The international monetary literature discusses how currencies can be ranked in a ‘global currency hierarchy’ (Cohen 1998), depending on their international acceptability, or liquidity, indicated by the currency’s use as an international settlement medium, store of wealth, and debt instrument (e.g. in local-currency bond markets) (Alami et al. 2023; Kaltenbrunner 2015). BoP dynamics are not so constraining for the U.S. and for issuers of other ‘core’ currencies—the euro, the British pound, the yen, the Canadian and Australian dollars, the renminbi, and the Swiss franc—which are traded internationally against the US dollar in deep markets and are held as stores of wealth. Many other high-income economies have access to core currencies through central-bank swap lines. For other deficit open economies whose domestic currencies

are not accepted in international settlement and that face larger barriers to accessing core currencies, the BoP constraint is acutely relevant (Mehrling 2017; Murau et al. 2020; Murau et al. 2023). Given this heterogeneity, the BoP constraint binds more in some countries than in others, and countries situated lower in the hierarchy must offer higher rates of return on their liabilities (Kaltenbrunner 2015), worsening the BoP effect of their liability growth, including inward FDI. As we shall see, liability yields are a quantitatively large part of the explanation. All this warrants the analysis of different effects of FDI on the current accounts of high-income countries and other economies.

The BoP perspective also speaks to the long-standing literature on imbalances (Chinn and Prasad 2003; Cooper 2008). Obstfeld (2012) shows that not only net but especially gross external assets and liabilities have risen across many countries in the globalization era since the start of the nineties. Most recently, Gourinchas et al. (2026) show that global imbalances have grown and persisted, among other reasons, due to industrial and trade policies. The BoP perspective suggests that part of the explanation may also be a procyclical dynamic of external liability accumulation as FDI investments increase, subsequently leading to current-account outflows. For given import needs, this increases dependence on external finance, entrenching global imbalances.

So far, the BoP perspective has remained relatively under-researched. The seminal contribution is Thirlwall's (1979; 2011a) Balance-of-Payments-Constrained Growth (BPCG) model. This spells out how the long-term growth rate of an open economy is constrained by its ability to generate the foreign exchange that finances the imports necessary to make growth-enhancing investments and to satisfy import consumption demand (see Alencar et al. 2019 for an application to Latin America). We augment this model by explicitly modelling FDI as a source of foreign exchange and estimate in ARDL models how FDI contributes to the BoP-consistent long-term growth rate, building on McCombie (1997). We develop criteria based on Bhering et al. (2019) for the financial sustainability of FDI and test these criteria for each country.

We find that the outflow of foreign exchange due to repatriated FDI income on average outweighs FDI inflows due to the initial investment and subsequent growth in export revenues. FDI reduced economic output in 2023 by 3.7 percent in the HICs and 2.4 percent in the MICs in our sample, compared to a counterfactual where net FDI flows do not constrain economic growth over the sample period.

Also, 14 of 42 countries satisfy the sustainability criteria, with the results depending on the model's lag structure. It is noteworthy that countries that satisfy the sustainability criteria are characterized not by structurally higher export growth but by structurally lower yields on their FDI liabilities (4.2 percent on average, compared with 9.4 percent yields for countries that fail the criteria). This suggests that the financial sustainability of FDI is determined primarily by the cost of FDI rather than by export performance. To the best of our knowledge, this paper is the first to provide this type of evidence on the long-term effects of FDI, viewed as a financial net flow¹.

¹ Alencar et al. (2019) also include FDI in their BPCG model. However, as discussed in Section 3, their specification suffers from a lack of precision, that, in our view, makes their results unreliable.

In the next section we review the literature on FDI and the current account. Section 3 develops an FDI-amended BPCG model and derives sustainability criteria. Section 4 introduces the empirical methodology and data. Section 5 presents the results, Section 6 discusses the findings, and Section 7 concludes.

2. Literature review on FDI and the current account

The growth and compositional change in external liabilities noted in Figures 1 and 2 translate into the investment-income balance of EDEs. Many EDEs run a primary-income deficit of 2 to 3 percent of GDP (Joyce 2021; Langhammer 2012). It is the largest current-account component for a number of large deficit economies (Forbes et al. 2017), with large heterogeneity depending on trade profile and geographic clusters (Langhammer 2012). Joyce (2021) finds for 26 EDEs between 1998 and 2015 that deficits are increasingly driven by FDI income outflows, in line with FDI's increased share in external liabilities and with higher payments on FDI compared to other liabilities. Akkermans (2017) analyses a global sample over 1980–2009 and finds that net profit flows (net of investment inflows) are positive for high-income economies and negative for EMEs. Latorre et al. (2009) and Zélity (2022) construct computable general equilibrium models for Central European economies and evaluate welfare effects of FDI conditional on profit repatriation. They report that the negative effects of profit repatriation are sizeable and can potentially offset the positive effects associated with MNE entry. For instance, decreasing the reinvestment rate by 10 percentage points increases welfare by about 1.06% on average (Zélity, 2022).

Contributing to these outflows is the fact that FDI liabilities are expensive (Artner 2017; Joyce 2021; Mencinger 2008a). Kregel (2014, 67) notes that “most international companies carrying out FDI apply implicit hurdle rates of return in the range of 20 to 25 per cent per annum over relatively short capital recoupment periods.” Strauss (2017) finds that the net investment-income deficit in South Africa was the largest contributor to the current-account deficit from 1994 to 2013, even though the majority of South Africa's external finance is non-FDI. Akyüz (2021) reports that the average imputed yield on EDE FDI liabilities was 7.5 percent from 2000 to 2016, whilst EDEs received 4 percent on their FDI assets. Advanced economies, in turn, received 7 percent on their assets and paid 4 percent on their liabilities. Other factors contributing to FDI-related outflows are the high import intensity of production in affiliates (Akyüz 2017) and profit shifting (Damgaard et al. 2024; Fhouti and Ghardallou 2020; Guvenen et al. 2022; Tørsløv et al. 2023). Overall, profit repatriation is substantial. Globally repatriated profits equal 4.2% of the global FDI outward stock (UNCTAD 2023, quoted in Parnreiter et al. 2024) and 181% of reinvested earnings; that is, 64% of equity earnings were distributed rather than reinvested (Parnreiter et al. 2024).

Outflows are larger for horizontal or market-seeking FDI due to domestic sales, few backward linkages and high import content. Resource- and efficiency-seeking FDI, on the other hand, is more likely to improve the trade balance due to its export-oriented focus (Akyüz 2017; Ali et al. 2019; Ballesteros and Goda 2017; Gheorghe and Vasile 2012; Yalta 2012). Likewise, greenfield FDI rather than brownfield FDI in mergers and acquisitions facilitates more capital

formation and technology spillovers and does not replace domestic firms with income-repatriating foreign firms (Herzer 2012; Yalta 2012). FDI in non-tradable services such as retail, real estate and financial services creates fewer positive spillovers, production linkages and exports (Akyüz 2017; Gheorghe and Vasile 2012; Mencinger 2008a). De Leeuw and Wacker (2026) report for 12 Central and Eastern European countries over 1997–2019 that the financial sector is the primary recipient of FDI. In a study by Amendolagine et al. (2024) of 7,338 European foreign investment deals over 2003–14, financial and insurance activities account for 17% of all observations, the largest individual service category in the data.

To date, a limited body of literature has empirically analyzed the relationship between FDI and the current account. Yalta (2012) finds that FDI worsened Turkey's current account through increases in imports and profit repatriation that outweighed export increases. Mencinger (2008a) and Gheorghe and Vasile (2012) document similar dynamics in Eastern Europe. In all three cases, FDI was concentrated in non-tradable sectors with little export and spillover potential. Ballesteros and Goda (2017), observing 31 commodity-exporting nations, and Jansen (1995), studying Thailand, find negative current-account effects for export-oriented FDI, driven by high import content and profit repatriation.

These are medium-term effects (e.g. over a three-year horizon in Ballesteros and Goda, 2017). Potentially, longer-term effects may be different. Mencinger (2008b) emphasizes that longer-term analysis is important given the distinct phases of the FDI cycle: foreign-exchange inflows upon entry, sizeable profit reinvestment during the growth phase, followed by a repatriation phase. As the inward FDI stock grows relative to new inflows, annual income outflows begin to dominate (Akyüz, 2017). As an illustration, Table A.1.1 in Appendix A.1 reports the ratio of cumulative FDI income outflows to cumulative FDI liability inflows for countries that have at least 15 observations over the sample period for equity FDI flows excluding reinvested earnings (RIE). The ratio exceeds unity for 60 of 121 countries; geographic clustering of the cumulative ratios is significant (as in Akkermans 2017; Parnreiter et al. 2024).

Country-level causality studies corroborate these results, with unidirectional positive Granger causality from FDI inflows to profit outflows (Seabra and Flach 2005) and unidirectional negative Granger causality from FDI to the current account (Kaur et al. 2012; Siddiqui and Ahmad 2012). Jaffri et al. (2012) report a negative long-run relationship in an ARDL framework between FDI inflows and the current account (excluding transfers). We could locate only one study finding a positive effect of inward FDI on the current account. Ali et al. (2019) apply a System GMM model to five East Asian economies from 2000 to 2016. China and South Korea account for 58.4 percent of the 2016 FDI inflows in this panel (Ali et al. 2019).

One conclusion from this literature review is that a better understanding of current-account effects is needed, given the still small literature on the topic. Further, a long-term analysis of FDI impacts on the current account is important, given the FDI investment and repatriation stages. Also important is the fact that much of the action in the relationship under scrutiny is outside the trade balance, in profit flows and the costs of liabilities rather than in net export effects. An important feature of the literature is the great diversity in FDI impacts, depending on sectoral, policy, structural and temporal variation. Many studies delve into one of these channels or highlight their differences. This is useful, but it also appears important to assess the

overall effects and to focus on macrofinancial dynamics. Spillovers and increased capital formation and exports, the focus of the majority of studies, occur within a financial architecture that imposes constraints not considered in real-sector analysis.

3. An augmented Balance-of-Payments Constrained Growth model

The seminal model to analyze how increased import demand and profit repatriation may create a ‘binding constraint’ (Hausmann et al. 2008) on economic growth is Thirlwall’s Balance-of-Payments Constrained Growth (BPCG) model. The original model considers only the trade balance, resulting in ‘Thirlwall’s law’ that long-term economic growth is constrained by the growth rate of exports relative to the income elasticity of imports.

3.1 The benchmark model

In this benchmark model, the long-run equilibrium condition on the current account abstracts from capital flows:

$$P_d X = P_f M E, \quad (1)$$

where X is the quantity of exports, M the quantity of imports, P_d and P_f are the domestic and foreign price levels and E is the exchange rate expressed as domestic currency per unit of foreign currency. In line with the BPCG model’s focus on long-term growth, the subscript t for time is dropped. Import and export demand functions with constant elasticities are given by

$$M = a \left(\frac{P_f E}{P_d} \right)^\psi Y^\pi, \quad (2)$$

$$X = b \left(\frac{P_d}{P_f E} \right)^\eta Z^\varepsilon, \quad (3)$$

where Y is domestic income and Z is foreign income. $\psi < 0$ is the price elasticity of import demand, $\pi > 0$ the income elasticity of import demand, $\eta < 0$ the price elasticity of export demand and $\varepsilon > 0$ the foreign income elasticity of export demand. a and b are constants. Taking natural logs of Eq. (2) and (3) and differentiating with respect to time gives:

$$m = \psi(p_f + e - p_d) + \pi y, \quad (4)$$

$$x = \eta(p_d - p_f - e) + \varepsilon z, \quad (5)$$

Where lower case letters stand for growth rates. Eq. (4) and (5) can be substituted into the log-differentiated form of Eq. (1) to give:

$$y_{TH} = \frac{(1+\eta+\psi)(p_d - p_f - e) + \varepsilon z}{\pi}. \quad (6)$$

Eq. (6) is the solution to the baseline model with y_{TH} representing the BoP-consistent growth rate interpretable as the upper bound of long-term average growth (Thirlwall 2011a). The empirical application is that if the BoP-consistent growth rate is observed, this is evidence that

the economy's growth was BoP-constrained (namely, demand-constrained). That is, higher growth will increase import demand in excess of export earnings growth, leading to long-term BoP-imbalances (McCombie 1997; Thirlwall 2011a). If the external finance constraint binds, this can permanently push economic activity below the production possibility frontier. The resulting dynamic may include capacity under-utilization and declines in capital formation, technological advancement and in product quality and hence, world market demand. As noted above, in fact since the 1990s, the ample supply of international finance has increased growth, leading to chronic external imbalances and the need to finance them.

The BPCG model can be simplified assuming either a constant real exchange rate in the long run ($p_d - p_f - e = 0$) or that the Marshall-Lerner conditions are just satisfied ($\eta + \psi = -1$). Under either of these assumptions Eq. (6) reduces to

$$y_{TH} = \frac{\varepsilon z}{\pi}, \quad (7)$$

and plugging $(p_d - p_f - e) = 0$ into Eq. (5) and substituting into Eq. (7) gives:

$$y_{TH} = \frac{x}{\pi}. \quad (8)$$

which obviates the need to estimating ε , so avoiding additional estimation errors in the export demand function, though at the cost of insights into BoP adjustment mechanisms (Lanzafame 2014).

From Eq. (6) it follows that a higher (lower) income elasticity of imports decreases (raises) long-term economic growth. Structural change changes the BoP-consistent growth rate due to different sector- and quality-specific elasticities, as Araujo and Lima (2007) show. Dutt (2003) further finds that developing economies face a higher income elasticity of imports than industrial economies. Countries that achieved economic convergence are those that transitioned from exporting homogeneous primary commodities and less sophisticated export goods with greater substitutability, toward sectors with higher income elasticities of export demand, in technologically advanced sectors, with higher nonprice competitiveness and technological differentiation with favorable income elasticities of export demand. Therefore, heterogeneous demand elasticities are one important extension that highlight the importance of structural change (Thirlwall 2011b; 2019).

3.2. Incorporating capital flows

Capital flows are integrated into the model by allowing for a sustainable level of current account deficits in the long run (Moreno-Brid 1998, 2003; Thirlwall and Hussain 1982), given by a stable current account-to-GDP ratio (Moreno-Brid (1998, 2003; Moreno-Brid et al. (2022), or a stable external liabilities-to-exports ratio (Bhering et al. 2019). Long-term BoP equilibrium with capital flows means that the interest rate on external liabilities must not be greater than the nominal long-term average export growth rate, so that the liabilities-to-export ratio does not grow due to accruing interest payments alone. Further, as in the baseline model, the ratio of nominal imports to nominal exports must not increase in the long run so that a deteriorating trade balance does not lead to a growing stock of external liabilities relative to export earnings.

This implies that imports must not grow faster than exports in the long run. With these conditions, the long-term growth rate is still determined by the growth rate of exports and the income elasticity of imports, but capital inflows can increase the long-run output level (Bhering et al. 2019).

To date, only the Alencar et al. (2019) study integrates FDI flows into a BPCG model for Brazil, Argentina and Mexico from 1990 to 2014. The interpretation of their findings is however problematic, and their study illustrates that the impact of FDI on exports, imports and productivity is difficult to integrate explicitly. Therefore, below we apply sustainability criteria developed by Bhering et al. (2019). We construct a closed-form test assessing whether FDI coincided with long-run financial sustainability. An amended version of Eq. (1), following Alencar et al. (2019), is

$$P_d X + FFDI - IFDI + RES = P_f ME, \quad (9)$$

where P_d and P_f are domestic and foreign price levels, X is the real quantity of exports, M the real quantity of imports and E the nominal exchange rate expressed in local currency per foreign currency. $FFDI$ are the nominal FDI inflows and $IFDI$ the FDI income outflows both in domestic currency. We focus on FDI equity liabilities and the corresponding income outflows. RES is a residual category calculated as the difference between the left and right side to ensure that the identity holds and to assess to what degree other capital flows contribute to the current account equilibrium condition. By construction, this includes the asset side of FDI as well as intercompany debt.

By taking natural logarithms, differentiating with respect to time and assigning weights θ_i to each of the financing flows in Eq. (9), we obtain the current account equilibrium condition in growth rates²:

$$\theta_1(p_d + x) + \theta_2(ffdi) - \theta_3(ifdi) + \theta_{RES}(res) = p_f + m + e, \quad (10)$$

with:

$$\theta_1 = \frac{\sum_{t=1}^T X_t}{\sum_{t=1}^T M_t}, \quad \theta_2 = \frac{\sum_{t=1}^T FFDI_t}{\sum_{t=1}^T M_t}, \quad \theta_3 = \frac{\sum_{t=1}^T IFDI_t}{\sum_{t=1}^T M_t},$$

$$\theta_{RES} = 1 - \theta_1 - \theta_2 + \theta_3.$$

Lower case letters again represent growth rates. X_t and M_t are nominal exports and imports expressed in current dollars in period t . Extending each term on the left-hand side of Eq. (10) with $\theta_i(p_d - p_d)$ and factoring out gives:

$$\theta_1 x + \theta_2(ffdi - p_d) - \theta_3(ifdi - p_d) + \theta_{RES}(res - p_d) + p_d = p_f + m + e. \quad (11)$$

By plugging in Eq. (4) and (5) we obtain

$$\theta_1 \eta(p_d - e - p_f) + \theta_1 \varepsilon z + \theta_2(ffdi - p_d) - \theta_3(ifdi - p_d) + \theta_{RES}(res - p_d) + p_d = p_f + \psi(p_f + e - p_d) + \pi y + e. \quad (12)$$

² Based on Thirlwall and Hussain (1982) and Alencar et al. (2019), this approach focuses on import finance. As a result, other expenditures that are not netted out by incomes of equal size will show up in the residual category.

Rearranging yields

$$y_{FDI} = \frac{(1+\theta_1\eta+\psi)(p_d-p_f-e)+\theta_1\epsilon z+\theta_2(ffdi-p_d)-\theta_3(ifdi-p_d)+\theta_{RES}(res-p_d)}{\pi}, \quad (13)$$

which reduces to the baseline BPCG model in Eq. (6) under the assumption of no capital flows. Eq. (13) shows how income growth is a function of income outflows. Compared to Alencar et al. (2019), this model includes the *RES* term. This ensures that the current account accounting identity is satisfied and gives FDI flows appropriate weights θ_{RES} weights. Without this, other flows that do not net out over the sample period, such as high net remittance payments (Alencar et al. 2019), distort the weight placed on FDI inflows.

3.3 Is FDI financially sustainable? A test

Following Bhering et al. (2019) two conditions are derived from the following transformation of the current account equilibrium condition³:

$$d_t^{FDI} = \frac{M_t}{X_t} - 1 + \frac{(1+\bar{r}_{FDI})}{(1+x_n)} \cdot d_{t-1}^{FDI}, \quad (14)$$

Where d_t^{FDI} is the ratio of FDI liabilities to exports at time t and $\bar{r}_{FDI} = \frac{1}{T} \sum_{t=1}^T \frac{IFDI_t}{D_{t-1}^{FDI}}$ is the average imputed nominal yield on the FDI liability stock. X_t and M_t again represent nominal exports and imports and x_n is the long-term growth rate of nominal exports. Unlike in Bhering et al. (2019) which includes external debt with a fixed interest, we include a variable FDI yield, determined endogenously by FDI project performance. In this framework, the Financial Sustainability Condition is that the long-term growth rate of nominal exports x_n is equal or greater than the imputed nominal yield on the outstanding FDI liability stock:

$$x_n \geq \bar{r}_{FDI}, \quad (C1)$$

While the Trade Sustainability Condition is that the ratio of nominal imports M_t to exports X_t does not increase in the long run:

$$x_n \geq m_n, \quad (C2)$$

where x_n and m_n are the long-term growth rates of nominal exports and imports. Since $\bar{r}_{FDI}$ is endogenous to export performance and exchange rate movements, (C1) and (C2) are not structural relations with a predetermined yield, but closed-form tests of the overall condition that FDI net finance is consistent with net export dynamics that maintain external financial balance.

To see the logic of Eq. (14), assume M_t/X_t is constant. Then, for a given increase in the ratio d_{t-1}^{FDI} , and constant yield, FDI income outflows increase, so that the stability of d_t^{FDI} is determined the export growth rate. With the export growth rate just equal to the imputed FDI yield, income outflows can be just serviced from increased export earnings. For export growth below FDI yield and constant M_t/X_t the external FDI liability-to-exports ratio must increase, or import demand must fall by the amount of FDI income outflows, leading to lower income growth as the BoP constraint bites. If we relax the assumption that M_t/X_t is constant, then the long-term growth rate of imports could (say) be lower than the growth rate of exports so that

³ Appendix A.3 shows the derivation in detail. For brevity, other capital flows are assumed away.

foreign exchange accrues that could service FDI income outflows even if (C1) is not satisfied. This highlights the role demand elasticities play in achieving external liability stability.

Failure of (C1) indicates a Ponzi-finance profile (Kregel 2004), where rising external liabilities must be serviced by either import contraction or additional capital inflows. This creates a procyclical dynamic of increasing external liabilities serviced by more capital inflows, and so on – consistent with the persistent global imbalances reviewed above. The investment income balance can exert persistent downward pressure on the current account even as the trade balance improves. Given that yields on FDI are often higher than on other external finance⁴, this effect is likely stronger for FDI.

This conceptual framework leads us to expect that the contribution of FDI to the BoP-consistent long-term average growth rate is negative for many countries, which fail to satisfy (C1) and (C2), and that the export growth rate and high rates of return on FDI are central determinants of the decline in BoP sustainability.. Also, we expect that this is more often the case for MICs than for HICs. We now turn to the empirical framework and data we will use to test these hypotheses.

4. Methodology and Data

4.1 Estimation Approach

We follow McCombie (1997) and test whether an estimated income elasticity of import demand $\hat{\pi}$ differs from a hypothetical import elasticity π_{FDI} derived from eq. (13)

$$\pi_{FDI} = \frac{(1+\theta_1\eta+\psi)(p_d-p_f-e)+\theta_1\epsilon z+\theta_2(ffdi-p_d)-\theta_3(ifdi-p_d)+\theta_{RES}(res-p_d)}{y}. \quad (15)$$

The appropriate estimator is the ARDL estimators, where the dependent variable is explained by its own lags as well as the contemporaneous and lagged values of the regressors, with both short- and long-run coefficients (Blackburne and Frank 2007; Pesaran et al. 1999). By identifying the long-run parameters separately, the estimator corresponds to the BPCG model focus on long-term growth. We use the Mean-Group (MG) and Pooled Mean-Group (PMG) estimators (Pesaran and Smith 1995; Pesaran et al. 1999) as in Alencar et al. (2019) and Lanzaframe (2014), given plausible heterogeneity in the short run (Loayza and Rancière 2006). We test for long-run homogeneity, in which case the PMG estimator is consistent and efficient, else the MG estimator is consistent.

The baseline specification for an ARDL ($p, q, \dots, q_k$) model with $i = 1, \dots, N$ cross-sections and $t = 1, \dots, T$ periods is:

$$y_{it} = \sum_{j=1}^p \lambda_{ij} y_{i,t-j} + \sum_{j=0}^q \delta'_{ij} x_{i,t-j} + \mu_i + \varepsilon_{it}, \quad (16)$$

with p the number of lags on the dependent variable and q the number of lags on the regressors. x_{it} is a $(k \times 1)$ vector of explanatory variables, μ_i are fixed effects, λ_{ij} the coefficients on the

⁴ See also UNCTAD (2026).

lagged dependent variable and δ_{ij} is a $(k \times 1)$ coefficient vector of regressors (Blackburne and Frank 2007; Pesaran et al. 1999). Cointegration is tested using the error correction term in the error correction model. If the variables share a long-run relationship, the error correction term that captures deviations from long-run equilibrium is statistically significant and negative, implying that the variables respond to shocks by returning to their equilibrium relationship (Blackburne and Frank 2007). If the variables are $I(1)$ and cointegrated, the model can be rewritten (Blackburne and Frank 2007; Lanzafoame (2014), so that the error correction model is given by

$$\Delta y_{it} = \phi_i(y_{i,t-1} - \theta'_i x_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta'_{ij} \Delta x_{i,t-j} + \mu_i + \varepsilon_{it}, \quad (17)$$

where $\phi_i = -(1 - \sum_{j=1}^p \lambda_{ij})$, $\theta_i = \sum_{j=0}^q \delta'_{ij} / (1 - \sum_k \lambda_{ik})$, $\lambda_{ij}^* = -\sum_{m=j+1}^p \lambda_{im}$ with $j = 1, 2, \dots, p-1$, and $\delta_{ij}^* = -\sum_{m=j+1}^q \delta_{im}$ with $j = 1, 2, \dots, q-1$.

The error-correction coefficient ϕ_i captures the adjustment speed toward the long-run equilibrium. If $\phi_i > 0$ or the term is statistically insignificant, no evidence of a long-run relationship is found. The vector θ'_i contains the long-run coefficients whilst the vector δ'_{ij} captures the short-run coefficients (Blackburne and Frank 2007; Pesaran et al. 1999)⁵.

The import and export demand functions (2) and (3) are also estimated in ARDL models as

$$\ln M_{it} = \sum_{j=1}^p \lambda_{ij} \ln M_{i,t-j} + \sum_{j=0}^q \delta'_{ij} x_{i,t-j} + \mu_i + \varepsilon_{it}, \quad (18)$$

for the import equation, where x_{it} is a (2×1) vector containing the regressors $\ln Y_{it}$ and $\ln(P_{fit} E_{it} / P_{dit})$. Assuming that the variables are $I(1)$, the error correction model is

$$\Delta \ln M_{it} = \phi_i(\ln M_{i,t-1} - \theta'_i x_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta \ln M_{i,t-j} + \sum_{j=0}^{q-1} \delta'_{ij} \Delta x_{i,t-j} + \mu_i + \varepsilon_{it}. \quad (19)$$

The ARDL model for the export equation is:

$$\ln X_{it} = \sum_{j=1}^p \lambda_{ij} \ln X_{i,t-j} + \sum_{j=0}^q \delta'_{ij} w_{i,t-j} + \mu_i + \varepsilon_{it}, \quad (20)$$

with w_{it} a (2×1) vector containing the regressors $\ln Z_{it}$ and the real exchange rate term $\ln(P_{dit} / P_{fit} E_{it})$ and the corresponding error correction model is:

$$\Delta \ln X_{it} = \phi_i(\ln X_{i,t-1} - \theta'_i w_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta \ln X_{i,t-j} + \sum_{j=0}^{q-1} \delta'_{ij} \Delta w_{i,t-j} + \mu_i + \varepsilon_{it}. \quad (21)$$

⁵ Loayza and Rancière (2006) establish four conditions for the ARDL estimators to produce consistent estimates. First, the residuals need to be serially uncorrelated and exogenous to the explanatory variables. Second, country-specific and cross-country common factors need to be accounted for to eliminate the risk of cross-sectionally dependent residuals. Third, a long-run relationship must exist. Fourth, the long-run homogeneity condition must be tested to select the appropriate estimator. The first condition can be achieved through the inclusion of sufficient lags. The third and fourth conditions are directly testable by the sign and significance of ϕ_i and the Hausman test. The second is more difficult to ensure. To address omitted common factors, Loayza and Rancière (2006) recommend to allow for country-specific intercepts and to account for time-specific effects by demeaning the data. The MG and PMG estimators already allow for country-specific intercepts. The BPCG literature has so far not tested for cross-sectional dependence when estimating the demand equations in an ARDL framework (Alencar et al. 2019; Lanzafoame 2014). To achieve comparability with other studies, this paper will not demean the data in the baseline estimation but includes a robustness check with demeaned data.

Appendix A.4 details the estimation and test procedure.

4.2. Data Exploration

Table A.2.1 in Appendix A.2 describes the variables and data on exports, imports, GDP, the real effective exchange rate (REER) and FDI flows, in real domestic currency units and excluding firm-level retained earnings attributable to the foreign investor. The REER is inverted to let a decrease represent an appreciation of the domestic currency so that the estimated elasticities reflect the specifications in Eq. (4) and (5).

We impose a minimum of 30 consecutive observations over 1992-2023 on the country-level data. Except for the Czech Republic (31 observations) and Colombia (30 observations), all economies have complete data. The two subsamples consist of 18 HICs and 24 MICs. All countries and their cumulative flow ratios are presented in Table A.1.2 in Appendix A.1. Tables 1 and 2 below give summary statistics of key variables.

Table 1 – Summary Statistics (levels)

	N	Mean	Std. Dev.	Min	Max
GDP	1,341	698,917	2,468,893	672.09	21,955,252
Exports	1,341	137,085	306,025	173.42	2,510,040
Imports	1,341	147,450	374,019	225.27	3,542,496
World GDP	1,341	62,330,965	16,920,943	37,149,004	93,798,840
REER	1,341	102.89	20.16	34.73	203.19
FDI Inflows	1,341	7,428	35,529	-319,599	381,610
FDI Income	1,341	6,587	18,974	-337.26	220,104

All monetary variables in USD millions. GDP, exports, imports and world GDP in constant 2015 USD are taken from the *World Bank WDI* (World Bank 2026b). REER index (2007 = 100) from *Bruegel REER Dataset* (Darvas 2026). FDI inflows are the net incurrence of FDI equity liabilities and FDI income is income payments and withdrawals from FDI equity liabilities in current USD from the *IMF BoP Statistics* (IMF 2026a) both excluding RIE. Numbers above 1000 rounded to the nearest integer. Sample: 42 countries, 1992-2023.

Financial flows are more volatile than trade and GDP variables, and are subject to sizable outliers (Table 2). The volatility is larger in the HIC subsample for all variables except REERs (Tables A.5.1 and A.5.2 in Appendix A.5). Even after winsorization, financial flows remain more volatile and right-skewed, indicating persistent outliers influence (Table A.5.3, A.5.4 and A.5.5). Therefore, in the analysis, we first winsorize at the 5th and 95th percentile and then use the median growth rates of financial flows. For both versions of the test, the mean trade and GDP growth rates are used.

Table 2 – Summary Statistics (growth rates, %)

	N	Mean	Median	Std. Dev.	Min	Max
FDI Inflow Growth	1,286	220.7	6.0	2,129	-2,056	61,804
FDI Income Growth	1,279	24,338	7.4	864,920	-515.4	30,932,006
BoP Residual Growth	1,299	-0.2	5.0	2,712	-83,513	32,680
GDP Growth	1,299	3.2	3.4	3.4	-15.7	16.5
Import Growth	1,299	5.1	5.5	9.9	-46.3	61.4
Export Growth	1,299	4.7	5.0	8.6	-38.6	61.8

Data before winsorization. GDP, import and export growth derived from the *World Bank WDI* (World Bank 2026b) constant local currency series. Nominal FDI variables and residual variable converted into domestic currency using data on the *Official Exchange Rate* from the *World Bank WDI* (World Bank 2026b) and deflated by domestic price change p_d from the *IMF CPI Statistics* (IMF 2026b). Numbers above 1000 rounded to the nearest integer. Growth rates missing for some observations with lagged value of 0. Sample: 42 countries, 1992-2023.

Figure 3 shows the trajectory of cumulative nominal FDI liability inflows and cumulative nominal FDI income outflows from 1992 to 2023. There is considerable heterogeneity across countries. The countries where cumulative income outflows exceed liability inflows are mostly outside Western Europe and North America, except Finland with a cumulative ratio of 1.070, and Switzerland and the Netherlands where much FDI activity is driven by tax optimization (Damgaard et al. 2024). There is a large gap between the mean ratio of 0.877 for HICs and those of 1.409 for MICs (with little difference between lower-middle-income countries and upper-middle-income countries). Consistent with this, for the 18 HICs the mean share of repatriated FDI income outflows in total FDI income outflows is 58.4 percent whilst the mean share is 75.6 percent for the MICs. These numbers differ from the cumulative ratios presented in Table A.1.1 in Appendix A.1 and highlight the heterogeneity within subsamples. Nonetheless, 17 out of 42 countries have a cumulative ratio greater than unity, not unlike the larger sample where 60 out of 121 countries have a ratio above unity (Table A.1.1). It is noteworthy that in the larger sample, HICs with high cumulative ratios including Belgium (3.863), Austria (2.865) and Denmark (2.399) all have missing early observations and are not included.

Figure 3 – Cumulative FDI Liability Inflows and FDI Income Outflows



Dark Blue: Cumulative FDI Inflows. Light Blue: Cumulative Income Outflows. y-axis: Millions of current USD. x-axis: Years. Source: *IMF BoP Statistics* (IMF 2026a).

5. Results

5.1. Panel ARDL Estimates

Tables 3 and 4 present estimation results of the import equation (columns 1 and 2) and export equation (columns 3 and 4), after testing for units roots and selecting a lag length^{6 7}. We relegate an outlier sensitivity analyses discussion to Appendix A.6. Unless stated otherwise, we consider long-run elasticities when discussing the results below.

Table 3 – HIC Import and Export Demand Estimation – Main Specification

Model Estimator & lag	Import equation		Export equation	
	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (1,1,1)	(4) MG (1,1,1)
Long-run				
lnY	1.134*** (0.054)	1.704*** (0.119)		
lnREER_inv	-0.484*** (0.114)	-0.226 (0.146)		
lnZ			1.355*** (0.034)	0.900*** (0.296)
lnREER			-0.858*** (0.150)	-0.006 (0.924)
Short-run				
ECT	-0.116*** (0.034)	-0.354*** (0.052)	-0.124*** (0.025)	-0.205*** (0.035)
D.lnY	1.965*** (0.164)	1.556*** (0.181)		
D.lnREER_inv	-0.050 (0.057)	-0.057 (0.052)		
D.lnZ			2.369*** (0.213)	2.148*** (0.212)
D.lnREER			-0.008 (0.070)	0.052 (0.058)
_cons	-0.609*** (0.179)	-3.977*** (0.925)	-0.967*** (0.214)	-1.860* (1.045)
N	495	495	557	557
Hausman chi2	17.907		2.400	
p-value	0.000		0.301	
Log Likelihood	890.818	934.617	991.522	1059.158

(1) and (2): Import function estimation on the 16-country subsample excluding Portugal and the Netherlands. (3) and (4): Export function estimation on the full 18-country subsample. ECT: error correction term. D. represents first differences of variables.

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

⁶ The panel IPS test using the BIC does not reject the null hypothesis that all panels contain unit roots for lnM, lnX and lnY. The null hypothesis is rejected for lnZ and lnREER. The panel IPS test for the first differences rejects the null hypothesis that all panels contain unit roots for all variables with a p-value of 0.000. lnZ and lnREER are, therefore, found to be I(0) whilst lnM, lnX and lnY are found to be I(1). Most countries have an optimal lag length of one and the AIC and BIC select a lag length of one for all variables in the panel regressions. The Hausman tests suggests that the HICs subsamples features heterogeneous long-run import elasticities.

⁷ For the 16-country HIC subsample, (excluding Portugal and the Netherlands), the export elasticity is robust to the inclusion of these countries and the main specification uses the 18-country regression. For the MICs subsample both equations are estimated using the full 24-country subsample. We checked that this does not bias the McCombie test results by running different specifications.

This estimated income elasticity of imports for HICs is 1.704; the price elasticity is -0.226, but not significant. The average income elasticity of exports is 1.355 and a price elasticity of -0.858. Table 4 presents the results for the MICs subsample⁸. The long-run parameters for the income elasticities are 1.175 for imports and 1.401 for exports. The price elasticities are smaller in absolute value compared to the HIC subsample; the import demand elasticity is positive and statistically insignificant. This is not driven by the inclusion of countries with imprecise country-level ARDLs and likely stems from measurement error. In both subsamples, the error correction terms are significant at the 0.1 percent level.

Table 4 – MICs Import and Export Demand Estimation – Main Specification

Model Estimator & lag	Import equation		Export equation	
	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (1,1,1)	(4) MG (1,1,1)
Long-run				
lnY	1.175*** (0.031)	1.401*** (0.110)		
lnREER_inv	0.099 (0.063)	0.167 (0.308)		
lnZ			1.103*** (0.049)	1.242*** (0.377)
lnREER			-0.374*** (0.103)	0.205 (0.777)
Short-run				
ECT	-0.238*** (0.037)	-0.394*** (0.036)	-0.154*** (0.025)	-0.311*** (0.035)
D.lnY	2.046*** (0.355)	1.828*** (0.355)		
D.lnREER_inv	0.005 (0.063)	-0.079 (0.066)		
D.lnZ			2.643*** (0.249)	2.236*** (0.249)
D.lnREER			-0.163 (0.100)	-0.045 (0.104)
_cons	-0.782*** (0.122)	-2.753*** (0.669)	-0.824*** (0.142)	-4.212*** (1.589)
N	742	742	742	742
Hausman chi2	3.669		3.727	
p-value	0.160		0.155	
Log Likelihood	1038.542	1113.450	1066.282	1136.557

(1) and (2): Import function estimation on the full 24-country subpanel. (3) and (4): Export function estimation on the full 24-country subpanel. Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The lower income elasticity of imports in MICs differ from Dutt (2003) cited in Thirlwall 2011b, 338), who finds an income elasticity of imports of 1.08 for industrial economies and an income elasticity of imports of 1.67 for developing economies. The difference is likely due to structural changes and sample selection. It is noteworthy that the sum of the price elasticities in HICs equals -1.084 so that the Marshall-Lerner condition is (just) satisfied, but not in MICs,

⁸ The demand functions are estimated on the entire subsample. Tables A.6.8 and A.6.11 in Appendix A.6 report the panel demand estimates excluding Kenya and the Solomon Islands. These countries have imprecise country-level estimates, but their exclusion provides similar estimates to the full-sample regression. The Hausman test selects the PMG estimator as the appropriate estimator for both equations. The assumption that the MICs countries share common long-run parameters is not rejected.

where the sum of the two elasticities is -0.275. This suggests that exchange rates do not induce external balance, consistent with continued imbalances due to net FDI flows.

5.2. Panel McCombie Tests

The results for the HIC McCombie test are reported in Table 5. As shown in Tables A.6.13 in Appendix A.6, the mean growth rates of FDI are an unreliable predictor of the income elasticity of import demand even after winsorization, highlighting the sensitivity of the panel mean to outliers. The sizable difference between the baseline elasticity and the mean FDI-amended elasticity indicates that right-skewed observations pull up the panel mean resulting in a biased BoP-consistent elasticity. An alternative specification with a lower estimate of the income elasticity of exports (0.554) obtained from the exclusion of the Netherlands and Portugal also rejects the null hypothesis. These results are also reported in Table A.6.13. The main results below exclusively use the median growth rates of *FFDI*, *IFDI* and *RES*.

HIC18 is the main specification and applies the estimates reported in Table 3 to the whole 18-country subsample. HIC16 uses the same elasticities for the 16-country subsample. Due to the exclusion of Portugal and the Netherlands, the panel weights θ_i and growth rates differ.

Table 5 – Panel McCombie Test for High Income Countries

	HIC18	HIC16
Estimated $\hat{\pi}$	1.704	1.704
π_{Th}	1.658	1.559
π_{FDI} median	1.660	1.567
Difference $\hat{\pi} - \pi_{Th}$	0.046	0.145
Difference $\hat{\pi} - \pi_{FDI}$ median	0.044	0.137
Wald χ^2 $\hat{\pi} - \pi_{Th}$	0.147	1.482
Wald χ^2 $\hat{\pi} - \pi_{FDI}$ median	0.137	1.326
p-value $H_0: \hat{\pi} = \pi_{Th}$	0.702	0.223
p-value $H_0: \hat{\pi} = \pi_{FDI}$ median	0.711	0.249

π estimated via MG ARDL (1,1,1). 'HIC16' is excluding Portugal and the Netherlands. Standard errors = 0.119 for all Wald tests.

HIC18: 18-country weights; 16-country import elasticities ($\pi = 1.704$, $\psi = -0.226$), 18-country export elasticities ($\epsilon = 1.355$, $\eta = -0.858$).

HIC16: Weights excluding Portugal and Netherlands; 16-country import elasticities ($\pi = 1.704$, $\psi = -0.226$), 18-country export elasticities ($\epsilon = 1.355$, $\eta = -0.858$).

For both specifications, the baseline model and the FDI-amended model using median financial growth rates closely predict the income elasticity of import demand and the Wald test does not reject the null hypothesis. For both specifications, the FDI-amended version marginally outperforms the baseline model in the prediction of the income elasticity of import demand. The difference between the estimated and the BoP-consistent elasticity is smaller and the p-values are higher.

The HIC18 specification outperforms the HIC16 specification. Although Portugal and the Netherlands distort the estimation of the import function, their inclusion improves the prediction of the BoP-consistent growth rate and the McCombie test through their influence on the financing weights and growth rates.

Table 6 reports the results for the MICs subsample. Again, the model with mean growth rates overpredicts the income elasticity of imports and the null hypothesis is rejected. Table A.6.14 in Appendix A.6 presents these results as well as a third specification that excludes Kenya and

the Solomon Islands from the sample entirely. The results below again refer exclusively to the models using the median growth rates for the FDI-amended model.

MIC24 Spec. 1 is the main specification. It uses the estimates from Table 4 and calculates weights and growth rates from the full sample. As an outlier sensitivity check, MIC 24 Spec. 2 uses the same parameters except for the export elasticities, which are taken from the regression excluding the Solomon Islands and Kenya (Table A.6.11). This changes the income elasticity of exports from 1.103 to 1.086 and the price elasticity from -0.374 to -0.322.

Table 6 – Panel McCombie Test for Middle Income Countries

	MIC24 Spec. 1	MIC24 Spec. 2
Estimated $\hat{\pi}$	1.175	1.175
π_{Th}	1.028	1.016
π_{FDI} median	1.114	1.102
Difference $\hat{\pi} - \pi_{Th}$	0.147	0.159
Difference $\hat{\pi} - \pi_{FDI}$ median	0.061	0.073
Wald $\chi^2 \hat{\pi} - \pi_{Th}$	22.408	26.446
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ median	3.862	5.474
p-value $H_0: \hat{\pi} = \pi_{Th}$	0.000	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ median	0.049	0.019

π estimated via PMG ARDL (1,1,1) on the 24-country sample. Standard errors = 0.031 for all Wald tests.

MIC 24 Spec. 1: 24-country weights and elasticities ($\pi = 1.175$, $\psi = 0.099$, $\varepsilon = 1.103$, $\eta = -0.374$).

MIC 24 Spec. 2: 24-country weights and import elasticities ($\pi = 1.175$, $\psi = 0.099$); export elasticities from 22-country sample excluding Solomon Islands and Kenya ($\varepsilon = 1.086$, $\eta = -0.322$).

Again, both the baseline model and the median version of the FDI-amended model produce reasonably close estimates of the import elasticity, particularly for the FDI-amended version where the difference between the elasticities is 0.061 and 0.073, respectively. The FDI-amended version outperforms the baseline model and accepts the null hypothesis at the 1 percent level for both MIC24 specifications. The rejection of the null hypothesis at the 5 percent level highlights the McCombie test's sensitivity to the standard errors. These standard errors are, with a value of 0.031, very precisely estimated and even slight differences between the estimated and the BoP-consistent income elasticity of imports lead to the mechanical rejection of the model by the Wald test. Less precise estimates, in turn, accept the null hypothesis despite a bigger difference between the estimated and the BoP-consistent elasticities (Alencar et al. 2019).

Conditional on the acceptance of the median growth rates as the appropriate specification for financial flows, the findings in Tables 5 and 6 indicate that both subsamples are constrained in their economic growth by the BoP – although this result is more statistically secure for the HIC subsample as indicated by the higher p-values on the null hypothesis that $\hat{\pi} = \pi_{FDI}$.

This finding is consistent with Lanzafame (2014), who finds that the BoP-constraint binds for the majority of 22 Organisation for Economic Co-operation and Development (OECD) economies from 1960 to 2010. The finding is also not surprising if one considers that the sample used in this study does not capture the entire global economy. The HIC subsample includes former transition economies and Latin American economies that experienced currency and exchange rate crises, whilst major net exporters like Germany or China are missing from the sample. As Thirlwall and Hussain (1982, 498) state:

“[T]he world as a whole cannot be balance of payments constrained, but it only requires one country or bloc of countries not to be constrained, for all the rest to be so.”

Using the values from HIC18 and MICs24 Spec. 1, growth decompositions using the median growth rates of financial flows based on Eq. (13) are reported in Table 7. For the HIC subsample, Hungary and the United States are detected as outliers for the $\theta_{RES}(res - p_d)$ component and excluded from the decomposition⁹. For the MICs subsample, Mauritius is identified as the top outlier for the $\theta_2(ffdi - p_d)$ and the $\theta_3(ifdi - p_d)$ term as well as the bottom outlier for the $\theta_{RES}(res - p_d)$ term. As one of the major recipients of ‘Phantom FDI’ tied to TNC tax optimization (Damgaard et al. 2024), Mauritius is dropped.

Additionally, Bangladesh, Kenya, Pakistan, the Philippines and Senegal are identified as top outliers in the $\theta_{RES}(res - p_d)$ term, pointing to the higher importance of external funding for MICs. Three out of these five countries ran trade deficits in every year between 1992 and 2023 and none had fewer than 29 trade deficit years. The average trade deficit relative to GDP ranges from -14.9 percent for Senegal to -4.8 percent for the Philippines and residual financial flows have financed between 42.8 percent (Senegal) and 18.7 percent (Philippines) of total imports over the sample duration. As shown in Table A.7.1 in Appendix A.7, excluding these countries primarily affects the contribution of the residual variable. As the primary focus of this paper lies on the growth contribution of FDI, these countries are not excluded.

Table 7 – Panel Growth Decompositions

HICs							
	y _{FDI}	Observed Growth	REER	Exports	FFDI	IFDI	RES
Contribution	2.483	2.698	-0.025	2.423	0.141	-0.261	0.204
MICs							
	y _{FDI}	Observed Growth	REER	Exports	FFDI	IFDI	RES
Contribution	3.260	3.524	0.154	2.427	0.231	-0.310	0.758

All values in percent. The United States and Hungary are dropped for the HICs. Mauritius is dropped for the MICs. HICs: $\pi=1.704$, $\psi=-0.226$, $\varepsilon=1.355$, $\eta=-0.858$. MICs: $\pi=1.175$, $\psi=0.099$, $\varepsilon=1.103$, $\eta=-0.374$.

As expected, exports are the most important contributor to long-term growth. Despite different income elasticities of import demand combined with the same growth rate of world GDP, their contribution is almost identical for both HICs and MICs. This is driven by a higher weight θ_1 for HICs, which, together with the higher income elasticity of exports, offsets the larger income elasticity of imports. The REER contributes the least in both decompositions¹⁰. The large contribution of the residual for MICs is almost entirely attributable to the five outliers listed above and drops to 0.096 without them (Table A.7.1). In both cases the BoP-consistent growth rate underpredicts the actual growth rate. This is likely the result of estimation imprecision. The export elasticity estimate underpredicts export growth for both subsamples when multiplied

⁹ The finding that the United States is the top outlier on the residual flows is particularly interesting from the perspective of the global currency hierarchy. The United States are the issuer of the world reserve currency implying that they cannot be BoP-constrained as economic agents wish to hold dollars. Thus, the large residual component seems to capture the reinvestment of dollars earned from trade with the United States into US financial markets. This argument is a central feature of the key currency approach (Mehrling 2013b; Murau et al. 2020; Murau et al. 2023).

¹⁰ For the MICs the positive contribution is not driven by successful devaluation as the Marshall-Lerner conditions are unsatisfied. Instead, it shows that price increases of MIC products contributed positively.

with world GDP growth. This is addressed in the robustness checks where the weak version of Thirlwall's law is estimated.

Alternatively, the finding that observed growth is larger than the BoP-consistent growth rate could also stem from the problem discussed in Appendix A.4. If the accumulation of external liabilities has facilitated economic expansion, but the repayment has not yet occurred, the BPCG model is bound to overestimate the BoP-consistent growth rate even if the parameters of the model are estimated and measured without error.

Regarding the first research question, the negative contribution of FDI income outweighs the positive contribution of FDI inflows for both subsamples. In line with the expected results, the foreign exchange drain from FDI income outflows has reduced the BoP-consistent growth rate. Contrary to expectations, this effect is more pronounced for the HIC subsample where the net effect is 0.120 percent less economic growth per annum. For the MICs, the net effect is 0.079 percent less economic growth per annum.

This pattern reverses when Switzerland and the Netherlands as the two financial hubs with large FDI income outflows are excluded. Then, the net effect roughly halves to 0.061 percent (Table A.7.2 in Appendix A.7) and the expected result that economic growth is constrained more for the MICs subsample is obtained. Recall that both the Netherlands and Switzerland are major recipients of Phantom FDI tied to tax optimization. The Netherlands serve as an illustrative example. According to Damgaard et al. (2024) the Netherlands have the highest inward Phantom FDI stock as of 2017. This type of FDI does not contribute to production and is instead used to exploit tax loopholes. As tax optimization occurred via royalty payments recorded in the trade balance and via FDI income outflows recorded in the primary income balance (Lejour et al. 2022), the heavy presence of tax-optimizing TNCs explains its unreliable import demand estimates as well as the strong contribution of FDI income outflows in the growth decomposition.

Although the growth effect of the FDI income drain is small, a counterfactual exercise reveals that the cumulative effect is economically meaningful¹¹. GDP in 2023 is 3.7 percent lower for HICs than it would have been without the net constraining effect of FDI. For MICs, the effect is less pronounced but still sizable with a 2.4 percent reduction in output.

As alluded to above, this growth decomposition is blind to potential positive trade balance effects of FDI, however. To properly assess the sustainability of FDI, the criteria based on Bhering et al. (2019) must be combined with these results.

5.3. Sustainability Criteria Assessment

Table 8 provides the list of countries that satisfy both (C1) and (C2) for the baseline estimate of $\bar{r}_{FDI}$ together with the average nominal export growth rate x_n and the nominal import growth rate m_n . An alternative specification of $\bar{r}_{FDI}$ with $k = 5$ additional lags in the denominator is also reported. In line with the expectations formulated in Section 3, only 14 out of the 42

¹¹ The cumulative effect is calculated using a standard cumulative growth formula:

$$Y_{2023} = Y_{1992} * (1 + y_{obs} - \frac{\theta_2(ffdi-p_d) - \theta_3(ifdi-p_d)}{\hat{\pi}})^{31} \text{ with } Y_{1992} = 100$$

countries in the sample satisfy both criteria. Contrary to expectations, there exists no clear split between HICs and MICs. The satisfaction of the sustainability criteria is not primarily driven by income status.

The value of $\bar{r}_{FDI}$ is sensitive to the lag selection. The mean value increases from 4.2 to 7.0 percent when $k = 5$ lags are applied. For the lagged $\bar{r}_{FDI}$ only seven out of 42 countries (Bolivia, Morocco, Canada, Mexico, Israel, Turkey and the Seychelles) satisfy (C1) and (C2).

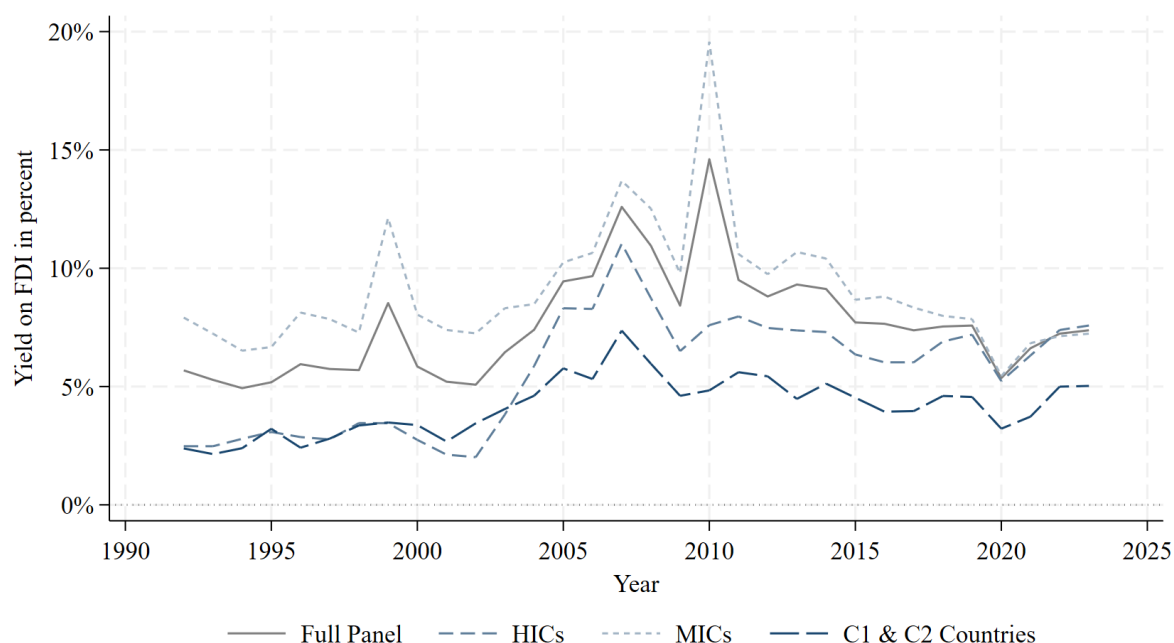
Table 8 – Yields and Growth Rates for Countries that Satisfy both (C1) and (C2) in Percent

Country	$\bar{r}_{FDI}$	Lagged $\bar{r}_{FDI}$	x_n	m_n	Income Group
Korea, Rep.	6.3	8.5	7.1	6.9	HIC
Hungary	6.2	13.4	9.0	8.8	HIC
Bolivia	6.0	7.1	7.5	7.0	MIC
Australia	5.9	7.2	6.9	6.4	HIC
Colombia	5.8	9.0	5.8	5.4	MIC
Romania	5.6	17.3	9.6	9.1	HIC
Portugal	5.3	7.2	5.3	4.4	HIC
Morocco	4.0	6.1	6.8	6.6	MIC
Canada	2.8	3.4	5.0	4.9	HIC
Iceland	2.5	6.3	6.1	6.0	HIC
Mexico	2.5	3.3	7.9	7.1	MIC
Israel	2.3	3.7	6.7	5.7	HIC
Turkey	2.2	3.8	8.9	8.5	MIC
Seychelles	1.2	1.6	11.6	7.8	HIC

(C1) is satisfied if $x_n \geq \bar{r}_{FDI}$. (C2) is satisfied if $x_n \geq m_n$. $\bar{r}_{FDI}$ is the imputed yield on FDI liabilities, x_n and m_n are the nominal growth rates of exports and imports. Lagged $\bar{r}_{FDI}$ calculated with $k = 5$ additional lags on the FDI liability stock. Calculations based on the *World Bank WDI* (2026b), the *IMF BoP Statistics* (IMF 2026a) and the *EWN Database* (Milesi-Ferretti 2026). Income groups from the *World Bank income classifications* (2026a).

Figure 4 plots the mean of r_{FDI} for HICs, MICs and countries that satisfy (C1) and (C2). Switzerland is excluded from the visualization as its 2021 observation heavily distorts the graph. The figure reveals two interesting patterns. First, it reaffirms the findings by Akyüz (2021) and Joyce (2021) that the yield on FDI was higher for MICs than for HICs. For this sample, the yield differential closed in 2019, however. Second, the mean yield on FDI for countries that satisfy (C1) and (C2) continues to be structurally lower even as the differential between income groups has closed. These structurally lower yields seem to be the crucial contributing factor to FDI sustainability in these countries.

Figure 4 – Imputed Yields on FDI by Income Group excluding Switzerland



Source: Calculations based on *EWN Dataset* (Milesi-Ferretti 2026) and *IMF BoP Statistics* (2026a). Income Groups from *World Bank income classification* (World Bank 2026a).

As shown in Table 9, both countries that fail the sustainability criteria and those that satisfy them have similar mean export and import growth rates. The differences between the growth rates for exports and imports are small, indicating that there is little scope to offset a failure of (C1) by concessions in the import demand without causing the violation of (C2).

The mean yield on FDI liabilities for countries that satisfy the criteria is, with 4.2 percent, less than half the mean yield of 9.4 percent for the other countries. The same pattern holds for the median. The standard deviation of the yield on FDI is also substantially higher for countries failing the sustainability criteria. Combined with Figure 4, this suggests that countries that satisfy both (C1) and (C2) were able to constrain FDI income outflows, reaching rates of return more stable and below those realized by other countries.

Table 9 – Summary Statistics by Sustainability Status

(C1) or (C2) unsatisfied	Mean	Median	Std. Dev.	Min	Max	N
x_n	6.1	6.8	13.0	-47.5	52.5	836
m_n	6.3	6.8	14.4	-46.5	55.0	836
r_{FDI}	9.4	6.7	12.2	-20.7	247.7	862
(C1) and (C2) satisfied	Mean	Median	Std. Dev.	Min	Max	N
x_n	7.5	7.9	14.9	-51.4	116.3	432
m_n	6.8	8.2	14.3	-40.6	48.6	432
r_{FDI}	4.2	3.2	3.4	0.0	18.6	445

x_n and m_n are the nominal growth rates of exports and imports. r_{FDI} is the imputed yield on FDI. All values in percent. Switzerland excluded. Negative rates of return arise from BPM6 Accounting Conventions where losses of the foreign investment firm are treated as negative income attributed to the foreign investor (IMF 2026a). Calculations based on the *World Bank WDI* (2026b), the *IMF BoP Statistics* (IMF 2026a) and the *EWN Database* (Milesi-Ferretti 2026).

Two counterfactual exercises confirm that financial sustainability is primarily determined by the structurally lower yield on FDI. The first applies the mean rates of the 28 failing countries to the 14 countries that satisfy (C1) and (C2). Of these 14 countries, only two countries would still satisfy (C1) and (C2) under a mean yield of 9.4 percent. By contrast, five countries would

still satisfy both criteria if a mean export growth rate of 6.1 percent is applied. The second exercise applies the rates realized by the 14 satisfying countries to the countries failing only one condition. Of the 10 countries that fail only (C1), all 10 would accept (C1) if they had incurred a mean yield of 4.2 percent. Of the six countries that fail only (C2), four would satisfy the condition if they had achieved a mean export growth rate of 7.5 percent (see Table A.7.3 in Appendix A.7 for more detail on country-level rates). In both directions, inserting the yield has a bigger impact on the countries' financial sustainability.

To ensure that this is not solely driven by the bigger differential of the yields compared to the export growth rates, two further counterfactuals investigate the sensitivity of (C1) and (C2). To do so, the country-specific average export growth rates and yields are adjusted by one-tenth of a standard deviation of the countries failing either condition. (C2) failure seems to occur on the margin whilst failure of (C1) is characterized by larger differences between the yield and the export growth rate. Adding one-tenth of a standard deviation (1.3) to the export growth rate leads to the satisfaction of (C2) for all 18 countries that previously failed it. Subtracting one-tenth of a standard deviation (1.2) from the yield on FDI, in turn, leads to the acceptance of (C1) for only five of the 22 economies which had previously failed (C1) (see Table A.7.4 for a full list).

5.4. Robustness Checks

Appendix A.8 contains the results for the robustness checks. Four robustness checks are conducted.

First, demeaned data is used to address potential common factors (Appendix A.8.1). The results are difficult to reconcile with theory and other empirical investigations. The long-run coefficients are lower than for the main results and in the case of the HIC subsample provide either negative (-0.299) or insignificant (0.018) income elasticities of exports. The Hausman test selects the negative estimate and the McCombie test rejects the null hypothesis. The MICs elasticities are also lower but more interpretable. The McCombie test again accepts the null hypothesis for the two main specifications – now also at the 5 percent level. This is not driven by improved predictive power, but by larger standard errors. The increased standard errors as well as the dubious long-run coefficients suggest that demeaning removes economically meaningful variation rather than correcting for common factors. As it is not common practice in the BPCG literature to demean the data, this robustness check might not be appropriate in the context of cross-country trade data where common factors reflect genuine economic interdependencies.

Second, the MICs subsample is disaggregated into UMICs and MICs to check for the stability of the estimates (Appendix A.8.2). For the UMICs the income elasticities remain close to the MICs estimate with differences of less than 0.1. The McCombie test mirrors the baseline findings. For the MICs, both the import income elasticity (1.402) and the export income elasticity (1.429) are larger. A second specification excluding Kenya and the Solomon Islands is also reported. Only one specification of the baseline model with full-sample import and export elasticity estimates still accepts the null hypothesis for the MICs. The disaggregation

further shows that the positive price elasticity of imports is driven by the MICs, which feature a long-run coefficient above 0.4 for both regressions of the import demand function. The LMIC subsamples with 10 and 8 cross-sections are at the lower bound of what the MG and PMG estimators can handle (Pesaran et al. 1999) and the results should be interpreted with caution.

Third, the McCombie test is applied to two versions of Thirlwall's law using $\ln X$ instead of εz in Eq. (15). One version includes the price term, the other assumes $(p_d - p_f - e) = 0$. For the HIC subsample, all models consistently overpredict the income elasticity of import demand and the differences between the estimated elasticity and the BoP-consistent elasticity increase compared to the main results. Only the HIC16 specification still accepts the null hypothesis at the 1 percent level for both models. The FDI-amended model produces marginally better results. The exclusion of the price term only has a marginal effect. This is expected given its small impact in the growth decomposition. For the MICs subsample, the FDI-amended version now overpredicts the income elasticity whilst the baseline model is accepted at the 1 percent level. This asymmetry suggests that FDI might have contributed positively to exports – an effect that is absorbed into the country-specific intercept or the error term when the export demand function is estimated.

Fourth, due to the potential distortions caused by the disruption of international trade and finance, the Covid-19 pandemic is excluded. The ARDL regressions, McCombie test and the growth decomposition are rerun for the data from 1992 to 2019. For the HIC subsample, the McCombie test continues to accept the null hypothesis for both models using the preferred estimates. The baseline model now outperforms the FDI-amended version. For the MICs subsample, the null hypothesis is consistently rejected across all specifications. The BoP-consistent elasticity is larger than the estimated elasticity. This indicates that other factors have constrained economic growth for the MICs subsample prior to the Covid-19 pandemic. Only a higher income elasticity of imports is compatible with the inflows of foreign exchange and the realized growth rate. The finding that the BoP binds over the entire sample duration seems to be driven by strong outflows of foreign exchange in the period from 2020 to 2023. This finding provides support for Moreno-Brid et al.'s (2022) argument that sudden changes in global risk appetite can trigger enforcement of the BoP-constraint.

As expected, the growth decompositions find that observed growth is sizably smaller for the MICs subsample compared to the BoP-consistent growth rate. The growth decomposition for the HIC subsample provides a precise estimate of the average growth rate with an error of only 0.003 percentage points. The net contribution of FDI remains negative for both subsamples but is now less negative, providing support for the hypothesis that FDI constrains economic growth, particularly in the long run.

6. Discussion

Conditional on the acceptance of the median growth rates as the appropriate measure for the FDI-amended BPCG model, the results in Section 5.2 show that the FDI-amended model accurately predicts the long-term income elasticity of import demand for both subsamples. It outperforms the baseline model for both subsamples across the main results and is mostly stable

across the robustness checks in Section 5.4. Although the null hypothesis for the MICs subsample is barely accepted, this is driven mechanically by the small standard errors and not by poor predictive power.

The growth decomposition provides a clear answer to Research Question 1. The net contribution of FDI-related flows to the BoP-consistent long-term growth rate is negative for both subsamples. FDI income outflows on average constrain the BoP-consistent growth rate more than FDI inflows loosen it. The cumulative effect is economically meaningful. The level of economic output in 2023 consistent with the BoP is 3.7 percent lower for HICs and 2.4 percent lower for MICs compared to a counterfactual scenario where FDI-related foreign exchange flows did not constrain economic growth.

Surprisingly, the constraining effect is larger for the HIC subsample – a finding at odds with the literature review as well as the higher repatriation ratio for the MICs (75.6 percent) compared to the HICs (58.4 percent). This result is driven by outlier countries like the Netherlands or Switzerland. Further, Section 4.2 has shown that multiple HICs with high cumulative flow ratios are missing from the sample and that the cumulative ratio within the sample is lower than for all HICs with at least 15 observations. Therefore, the results presented here may not be representative of the global economy.

The finding that the negative effect of income outflows outweighs the positive effect of FDI inflows is robust to the exclusion of the Covid-19 pandemic. Nonetheless, Figure 3 suggests considerable within-sample heterogeneity that the panel tests of this paper cannot capture. As a result, it is possible that a fraction of the countries within each subsample might not have been BoP-constrained. Similarly, the panel level results that FDI income outflows have constrained growth more than FDI inflows loosened it must not hold for all countries individually. Further, the MICs residual term in the growth decomposition indicates a higher reliance on non-FDI external finance for a fraction of the subsample. A disaggregation of this term could yield important insights into the composition of the residual within and the distribution between countries. Data constraints prevent this paper from conducting the disaggregations necessary to assess the extent of these heterogeneities.

The results of the sustainability criteria reveal that only 14 out of 42 countries satisfy both (C1) and (C2) under the baseline calculation of $\bar{r}_{FDI}$. This number drops to seven under the more conservative lag structure. These 14 countries outperform those that fail either (C1) or (C2) primarily via a lower yield on FDI. The mean value of r_{FDI} with 4.2 percent is less than half of those that fail (C1) or (C2) (9.4 percent) whilst the mean and median values for export and import growth are comparatively close. Small changes in the export growth rate, therefore, lead to the acceptance of (C2) for all economies whilst larger improvements in the yield would be needed for the satisfaction of (C1).

The failure of (C1) for 22 out of 42 countries reveals that FDI constitutes a Ponzi-finance profile in the Minskyan sense for over 50 percent of the countries in the sample. FDI income obligations were not serviceable from export earnings without requiring import curtailment or additional liability accumulation. For these countries, the accumulation of additional liabilities to support import demand may start a procyclical dynamic between investment income outflows and external liability accumulation that has the potential to perpetuate global imbalances.

Figure 4 shows that the structural yield differential is robust throughout the Covid-19 pandemic and remains stable even as the yield differential between HICs and MICs closes. The 14 countries that satisfy (C1) and (C2) seemingly were able to constrain the FDI yield even as the yields across income groups converge.

Taken together, these results indicate that FDI has reduced long-term economic growth in the majority of countries through the pressure that FDI income outflows place on the BoP. The sustainability of FDI, in turn, is primarily determined by a country's ability to depress the costs of FDI below the international average – a finding that has important implications for economic policy as well as the broader debate about capital account liberalization.

7. Conclusion

The aim of this paper was to answer the question whether financial flows tied to FDI constrain long-term economic growth and whether FDI income outflows crowd out other foreign exchange uses. The integration of FDI into the BPCG model allows this paper to test the research questions whether FDI contributes positively or negatively to the BoP-consistent growth rate and whether FDI coincides with sustainable export dynamics. The inclusion of the residual term improves past attempts to integrate FDI into the BPCG model. Due to this improvement, this paper provides the first reliable estimates of the impact of FDI on the BoP-consistent growth rate. By integrating FDI income outflows into the BPCG model, this paper also presents a new angle through which the persistence of global imbalances may be understood.

The test of the FDI-amended version of Thirlwall's law indicates that FDI inflows on average contribute negatively to the BoP-consistent growth rate through income outflows. The closed-form test applying the sustainability criteria shows that the majority of countries are not able to generate sufficient export growth to finance income outflows without crowding out other foreign exchange uses. Contrary to the expectations formulated in this paper, the rejection of the sustainability criteria is not driven primarily by the income level, with both MICs and HIC countries failing and satisfying the sustainability criteria.

The finding that the financial sustainability of FDI is primarily driven by income outflow mitigation instead of extraordinary export performance aligns with the literature on FDI and the current account reviewed in Section 2. The finding that FDI on average is likely to negatively affect long-term economic growth, or at least the achievable growth rate, has important implications for economic policy. Both Akyüz (2017) and Thirlwall (2019) argue through their respective lenses that an active role of the state is needed to facilitate positive economic effects from FDI and to transform the domestic economy towards BoP-sustainability. This paper reinforces their assessment by showing that FDI does not inherently coincide with the foreign exchange accumulation dynamics needed to ensure its sustainability.

The results of this paper, therefore, call into question the policy prescriptions centered around capital account liberalization. If the positive effects of FDI depend on the type of FDI inflow and the economic and institutional characteristics of the host country, then capital account

liberalization may have adverse effects on long-term economic growth. Whilst this argument is by no means new, the results of this paper indicate an additional channel through which capital account liberalization can constrain economic development. Rational economic behavior by foreign investors and financial markets can constrain economic growth of open economies through income repatriation and the differing use of domestic currencies.

As the literature on FDI and the BoP remains limited, this paper has only addressed a fraction of the relevant questions. Several relevant aspects of the relationship between FDI and the BoP remain untested and provide avenues for further research.

First, the use of the World Bank's income group classification might be inadequate to capture the heterogeneity within and across country groups. This is particularly plausible as the income classification serves as a proxy for multiple factors, namely the position in the global currency hierarchy, the yield differential and export complexity. Further research using different criteria that explicitly address each of these dimensions is needed.

Second, although the sustainability criteria test for the trajectory of exports relative to the yield, no attempt has been made in this paper to explicitly model or estimate the effect of FDI on the trade balance. As the literature on FDI and the current account is fragmented and remains small, further research into the impact of FDI on the trade balance is needed to fill this gap.

Third, by looking only at foreign exchange flows within the BPCG model, this paper has not taken wealth effects into account. Increased foreign investor presence has the potential to lead to wealth effects through the revaluation of assets on domestic balance sheets (Lane and Milesi-Ferretti 2007), potentially leading to changes in import demand independent of income effects. Studies incorporating the effects of asset price changes are needed to quantify this additional channel through which FDI affects import demand.

Fourth and in a similar vein, this study only looks at the liability side of FDI. This is motivated by the framing of FDI as a source of external finance to fill BoP shortfalls. To fully assess the impact of FDI on the BoP, studies incorporating the asset side of FDI flows are needed. In line with the geographic dimension of FDI income distribution and the long history of yield differentials, the results may differ drastically.

Fifth, whilst the panel methods used in this model improve precision, they cloud considerable country-level heterogeneity – especially pertaining to FDI flows. Ideally, the empirical work of this paper should be combined with country-level McCombie tests and growth decompositions. Due to a lack of data and the estimation imprecision on the country-level, this comparison is not conducted here.

Sixth, whilst the finding that FDI sustainability is driven largely by FDI yield containment is an important contribution to the understanding of FDI sustainability in its own right, further research directed at the determinants of the lower FDI yield is desirable for policy advice. The possibility that satisfaction of (C1) is caused by unsuccessful FDI projects should also be considered. If countries with unsuccessful FDI projects exhibit lower yields simply because of lower profitability rather than active yield containment, a reconsideration of FDI policy would become more pressing.

To conclude, this paper has shown that FDI, when understood as a financial flow, is likely to constrain long-term economic development through the drain of foreign exchange. The question of what enables some economies to attract FDI at structurally lower yields – whether through industrial policy, institutional quality, their position in the currency hierarchy or the structural composition of FDI – needs to be answered to assess which conditions turn FDI into a sustainable source of external finance. As it stands, the results of this paper highlight that an analysis that abstracts from the financial nature of FDI is likely to miss important effects of FDI and produce a biased portrayal of the benefits and risks of FDI.

References

- Ahn, JaeBin, Shekhar Aiyar and Andrea F. Presbitero. 2025. "Productivity spillovers from FDI: A firm-level cross-country analysis." *The World Economy* 48(12): 2486-506. <https://doi.org/10.1111/twec.13708>.
- Akkermans, Dirk H. M. 2017. "Net profit flow per country from 1980 to 2009: The long-term effects of foreign direct investment." *PLoS ONE* 12(6): 1-28. <https://doi.org/10.1371/journal.pone.0179244>.
- Akyüz, Yilmaz. 2017. *Playing with Fire. Deepened Financial Integration and Changing Vulnerabilities of the Global South*. Oxford University Press.
- Akyüz, Yilmaz. 2021. "External balance sheets of emerging economies: low-yielding assets, high-yielding liabilities." *Review of Keynesian Economics* 9(2): 232-52. <https://doi.org/10.4337/roke.2021.02.04>.
- Alami, Ilias, Carolina Alves, Bruno Bonizzi, Annina Kaltenbrunner, Kai Koddenbrock, Ingrid Kvangraven and Jeff Powell. 2023. "International financial subordination: a critical research agenda." *Review of International Political Economy* 30(4): 1360-86. <https://doi.org/10.1080/09692290.2022.2098359>.
- Alencar, Douglas, Eduardo Strachman, Lúcio O.S. Barbosa and Claudio A.C.B. Puty. 2019. "On foreign direct investments and the balance of payments constrained growth model in Latin America, 1990-2014." *PSL Quarterly Review* 72(290): 207-21. https://doi.org/10.13133/2037-3643_72.290_3.
- Alfaro, Laura. 2017. "Gains from Foreign Direct Investment: Macro and Micro Approaches." *The World Bank Economic Review* 30(S1): 2-15. <https://doi.org/10.1093/wber/lhw007>.
- Alfaro, Laura and Jasmina Chauvin. 2020. "Foreign Direct Investment, Finance, and Economic Development." In *Encyclopedia of International Economics and Global Trade, Vol. 1: Foreign Direct Investment and the Multinational Enterprise*, edited by Mariana Spatareanu, 231-58. World Scientific.
- Ali, Mahnaz M., Tusawar I. Ahmad and Rozina Sadiq. 2019. "Empirical Investigation of Foreign Direct Investment and Current Account Balance in East Asian Economies." *Pakistan Journal of Commerce and Social Sciences* 13(3): 779-95. <https://jes.ac.pk/index.php/jes/article/view/220>.
- Amberger, Harald J. and Saskia Kohlhase. 2023. "International taxation and the organizational form of foreign direct investment." *Journal of International Business Studies* 54: 1529-61. <https://doi.org/10.1057/s41267-023-00614-1>.
- Amendolagine, Vito, Riccardo Crescenzi and Roberta Rabellotti. 2024. "The geography of acquisitions and greenfield investments: Firm heterogeneity and regional institutional conditions." *Journal of Regional Science* 64(4): 1476-505. <https://doi.org/10.1111/jors.12705>.

- Araujo, Ricardo A. and Gilberto T. Lima. 2007. "A structural economic dynamics approach to balance-of-payments-constrained growth." *Cambridge Journal of Economics* 31(5): 755-74. <https://doi.org/10.1093/cje/bem006>.
- Artner, Annamaria. 2017. "Inequalities of Accumulation: The Case of Central and Eastern Europe." In *Foreign Direct Investment in Central and Eastern Europe*, edited by Balázs Szent-Iványi, 151-69. Palgrave Macmillan.
- Ballesteros, Nathalia R. and Thomas Goda. 2017. "Natural resource-seeking FDI inflows and current account deficits in commodity-producing developing economies." *CIEF Working Papers* 17-02. <https://dx.doi.org/10.2139/ssrn.2910608>.
- Belotti, Federico, Giulia Mancini and Giovanni Vecchi. 2024. "Outlier detection for inequality and poverty analysis." *The Stata Journal* 24(4): 630-65. <https://doi.org/10.1177/1536867X241297918>.
- Bhering, Gustavo, Franklin Serrano and Fabio Freitas. 2019. "Thirlwall's law, external debt sustainability, and the balance-of-payments-constrained level and growth rates of output." *Review of Keynesian Economics* 7(4): 486-97. <https://doi.org/10.4337/roke.2019.04.05>.
- Blackburne, Edward F. and Mark W. Frank. 2007. "Estimation of nonstationarity in heterogeneous panels." *The Stata Journal* 7(2): 197-208. <https://doi.org/10.1177/1536867X0700700204>.
- Blecker, Robert A. 2022. "New advances and controversies in the framework of balance-of-payments-constrained growth." *Journal of Economic Surveys* 36(2): 429-67. <https://doi.org/10.1111/joes.12463>.
- Bluedorn, John, Rupa Duttgupta, Jaime Guajardo and Petia Topalova. 2013. "Capital Flows are Fickle: Anytime, Anywhere." *IMF Working Paper* 13/183. <https://doi.org/10.5089/9781484389041.001>.
- Boddin, Dominik, Horst Raff and Natalia Trofimenko. 2017. "Foreign ownership and the export and import propensities of developing-country firms." *The World Economy* 40(12): 2543-63. <https://doi.org/10.1111/twec.12547>.
- Bofinger, Peter. 2020. "Reviving Keynesianism: the modelling of the financial system makes the difference." *Review of Keynesian Economics* 8(1): 61-83. <https://doi.org/10.4337/roke.2020.01.06>.
- Borensztein, Eduardo, José De Gregorio and Jong-Wha Lee. 1998. "How does foreign direct investment affect economic growth?" *Journal of International Economics* 45(1): 115-35. [https://doi.org/10.1016/S0022-1996\(97\)00033-0](https://doi.org/10.1016/S0022-1996(97)00033-0).
- Borio, Claudio. 2016. "On the centrality of the current account in international economics." *Journal of International Money and Finance* 68: 266-74. <https://doi.org/10.1016/j.jimonfin.2016.02.006>.

- Borio, Claudio and Piti Disyatat. 2010. "Global Imbalances and the Financial Crisis: Reassessing the Role of International Finance." *Asian Economic Policy Review* 5(2): 198-216. <https://doi.org/10.1111/j.1748-3131.2010.01163.x>.
- Borio, Claudio and Piti Disyatat. 2015. "Capital flows and the current account: Taking financing (more) seriously." *BIS Working Papers No 525*. <https://www.bis.org/publ/work525.htm>.
- Brouthers, Keith D., Liang Chen, Sali Li and Noman Shaheer. 2022. "Charting new courses to enter foreign markets: Conceptualization, theoretical framework, and research directions on non-traditional entry modes." *Journal of International Business Studies* 53: 2088-115. <https://doi.org/10.1057/s41267-022-00521-x>.
- Chinn, Menzie D. and Eswar S Prasad. 2003. "Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration." *Journal of International Economics* 59(1): 47-76. [https://doi.org/10.1016/S0022-1996\(02\)00089-2](https://doi.org/10.1016/S0022-1996(02)00089-2).
- Cohen, Benjamin. 1998. *The Geography of Money*. Cornell University Press.
- Cooper, Richard N. 2008. "Global Imbalances: Globalization, Demography, and Sustainability." *Journal of Economic Perspectives* 22(3): 93-112. <https://doi.org/10.1257/jep.22.3.93>.
- Damgaard, Jannick, Thomas Elkjaer and Niels Johannesen. 2024. "What is real and what is not in the global FDI network?" *Journal of International Money and Finance* 140: 1-25. <https://doi.org/10.1016/j.jimonfin.2023.102971>.
- Darvas, Zsolt. 2021. "Timely measurement of real effective exchange rates." *Bruegel Working Paper 15/2021*. <https://www.bruegel.org/working-paper/timely-measurement-real-effective-exchange-rates>. Last accessed June 8 2026.
- Darvas, Zsolt. 2026. *Real effective exchange rates for 178 countries*. Bruegel Dataset, last updated March 11 2026. <https://doi.org/10.64153/SZCG6180>. Last accessed June 8 2026.
- De Leeuw, Tim and Konstantin M. Wacker. 2026. "How does FDI transmit into domestic investment? Exploring intra-industry and financial channels." *Journal of Comparative Economics* 54(2): 554-77. <https://doi.org/10.1016/j.jce.2026.01.004>.
- Dutt, Amitava K. 2003. "Income elasticities of imports, North-South trade, and uneven development." In *Development Economics and Structuralist Macroeconomics*, edited by Amitava K. Dutt. Edward Elgar. Cited in Thirlwall 2011b.
- Eichengreen, Barry, Poonam Gupta and Oliver Masetti. 2018. "Are Capital Flows Fickle? Increasingly? And Does the Answer Still Depend on Type?" *Asian Economic Papers* 17(1): 22-41. https://doi.org/10.1162/asep_a_00583.
- Fazzari, Steven M. 2009. "Keynesian macroeconomics as the rejection of classical axioms." *Journal of Post Keynesian Economics* 32(1): 3-18. <https://doi.org/10.2753/PKE0160-3477320101>.

- Fhouti, Khaoula and Wafa Ghardallou. 2020. "International tax planning techniques: a review of the literature." *Journal of Applied Accounting Research* 21(2): 329-43. <https://doi.org/10.1108/JAAR-05-2019-0080>.
- Flassbeck, Heiner. 2018. "Exchange rate determination and the flaws of mainstream monetary theory." *Brazilian Journal of Political Economy* 38(1): 99-114. <https://doi.org/10.1590/0101-31572018v38n01a06>.
- Forbes, Kristin, Ida Hjortsoe and Tsvetelina Nenova. 2017. "Current Account Deficits During Heightened Risk: Menacing or Mitigating." *The Economic Journal* 127(601): 571-623. <https://doi.org/10.1111/ecoj.12482>.
- Fu, Xiaolan. 2011. "Processing Trade, FDI and the Exports of Indigenous Firms: Firm-Level Evidence from Technology-Intensive Industries in China." *Oxford Bulletin of Economics and Statistics* 73(6): 792-817. <https://doi.org/10.1111/j.1468-0084.2011.00673.x>.
- Gheorghe, Zaman and Valentina Vasile. 2012. "Macroeconomic Impact of FDI in Romania." *Procedia Economics and Finance* 3: 3-11. [https://doi.org/10.1016/S2212-5671\(12\)00113-X](https://doi.org/10.1016/S2212-5671(12)00113-X).
- Görg, Holger and David Greenaway. 2004. "Much Ado about Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?" *The World Bank Research Observer* 19(2): 171-97. <https://doi.org/10.1093/wbro/lkh019>.
- Gourinchas, Pierre-Olivier, Gene Kindberg-Hanlon, Manasa Patnam, Lorenzo Rotunno and Michele Ruta. 2026. "Global Imbalances, Tariffs, and Industrial Policy." *Journal of Economic Perspectives* 40(3): 145-70. <https://doi.org/10.1257/jep.20261507>.
- Gouvea, Raphael R. and Gilberto T. Lima. 2010. "Structural change, balance-of-payments constraint, and economic growth: evidence from the multisectoral Thirlwall's law." *Journal of Post Keynesian Economics* 33(1): 169-204. <https://doi.org/10.2753/PKE0160-3477330109>.
- Guvenen, Fatih, Raymond J. Mataloni Jr., Dylan G. Rassier and Kim J. Ruhl. 2022. "Offshore Profit Shifting and Aggregate Measurement: Balance of Payments, Foreign Investment, Productivity, and the Labor Share." *American Economic Review* 112(6): 1848-84. <https://doi.org/10.1257/aer.20190285>.
- Hansen, Erwin and Rodrigo A. Wagner. 2021. "The Reinvestment of Multinationals as a Capital Flow: Crises, Imbalances and the Cash-Based Current Account." *SSRN Working Paper* 2631246. <https://dx.doi.org/10.2139/ssrn.2631246>.
- Harms, Philipp and Pierre-Guillaume Méon. 2018. "Good and useless FDI: The growth effects of greenfield investment and mergers and acquisitions." *Review of International Economics* 26(1): 37-59. <https://doi.org/10.1111/roie.12302>.
- Hausmann, Ricardo, Jason Hwang and Dani Rodrik. 2007. "What you export matters." *Journal of Economic Growth* 12(1): 1-25. <https://doi.org/10.1007/s10887-006-9009-4>.
- Hausmann, Ricardo, Dani Rodrik and Andrés Velasco. 2008. "Growth Diagnostics." In *The Washington Consensus reconsidered: Towards a new global governance*, edited by Narcís Serra and Joseph E. Stiglitz, 324-355. Oxford University Press.

- Hennart, Jean-François and Dylan Sutherland. 2022. "International business research: The real challenges are data and theory." *Journal of International Business Studies* 53: 2068-87. <https://doi.org/10.1057/s41267-022-00566-y>.
- Herzer, Dierk. 2012. "How Does Foreign Direct Investment Really Affect Developing Countries' Growth?" *Review of International Economics* 20(2): 396-414. <https://doi.org/10.1111/j.1467-9396.2012.01029.x>.
- Imbs, Jean and Isabelle Mejean. 2015. "Elasticity Optimism." *American Economic Journal: Macroeconomics* 7(3): 43-83. <https://www.jstor.org/stable/24739330>.
- International Monetary Fund (IMF). 2009. *Balance of Payments and International Investment Manual*, Sixth Edition (BPM6). IMF.
- International Monetary Fund (IMF). 2026a. *Balance of Payments Statistics (BOP6)*, <https://data.imf.org/en/datasets/IMF.STA:BOP>. Last accessed June 8 2026.
- International Monetary Fund (IMF). 2026b. *Consumer Price Index Statistics*, <https://data.imf.org/en/datasets/IMF.STA:CPI>. Last accessed June 8 2026.
- International Monetary Fund (IMF). 2026c. *International Investment Position Statistics*, <https://data.imf.org/Datasets/IIP>. Last accessed June 8 2026.
- Ito, Hiro and Robert N. McCauley. 2018. "A key currency view of global imbalances." *BIS Working Papers No 762*. <https://www.bis.org/publ/work762.htm>.
- Jaffri, Atif A., Nabila Asghar, Mahnaz M. Ali and Rooma Asjed. 2012. "Foreign Direct Investment and Current Account Balance of Pakistan." *Pakistan Economic and Social Review* 50(2): 207-22. <https://www.jstor.org/stable/43855781>.
- Jansen, Karel. 1995. "The macroeconomic effects of direct foreign investment: The case of Thailand." *World Development* 23(2): 193-210. [https://doi.org/10.1016/0305-750X\(94\)00125-I](https://doi.org/10.1016/0305-750X(94)00125-I).
- Joyce, Joseph P. 2021. "The sources of international investment income in emerging market economies." *Review of International Economics* 29(3): 606-25. <https://doi.org/10.1111/roie.12523>.
- Kaltenbrunner, Annina. 2015. "A post Keynesian framework of exchange rate determination: a Minskyan approach." *Journal of Post Keynesian Economics* 38(3): 426-48. <https://doi.org/10.1080/01603477.2015.1065678>.
- Kastratović, Radovan. 2020. "The impact of foreign direct investment on host country exports: A meta-analysis." *The World Economy* 43(12): 3142-83. <https://doi.org/10.1111/twec.13011>.
- Kaur, Manpreet, Surendra S. Yadav and Vinayshil Gautam. 2012. "Foreign Direct Investment and Current Account Deficit – A Causality Analysis in Context of India." *Journal of International Business and Economy* 13(2): 85-106. <https://doi.org/10.51240/jibe.2012.2.4>.

- Kregel, Jan. 2004. "Can we create a stable international financial environment that ensures net resource transfers to developing countries?" *Journal of Post Keynesian Economics* 26(4): 573-90. <https://www.tandfonline.com/doi/abs/10.1080/01603477.2004.11051418>.
- Kregel, Jan A. 2014. "Some Risks and Implications of Financial Globalization for National Policy Autonomy." In *Economic Development and Financial Instability: Selected Essays*, edited by Rainer Kattel, 63-74. Anthem Press.
- Lane, Philip R. and Gian M. Milesi-Ferretti. 2007. "The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004." *Journal of International Economics* 73(2): 223-50. <https://doi.org/10.1016/j.jinteco.2007.02.003>.
- Lane, Philip R. and Gian M. Milesi-Ferretti. 2018. "The External Wealth of Nations Revisited." *IMF Economic Review* 66(1): 189-222. <https://doi.org/10.1057/s41308-017-0048-y>.
- Langhammer, Rolf J. 2012. "The Importance of Investment Income and Transfers in the Current Account: A New Look on Imbalances." *Kiel Policy Brief No. 48*. <https://www.kielinstitut.de/de/publikationen/the-importance-of-investment-income-and-transfers-in-the-current-account-a-new-look-on-imbalances-13997/>.
- Lanzafame, Matteo. 2014. "The balance of payments-constrained growth rate and the natural rate of growth: new empirical evidence." *Cambridge Journal of Economics* 38(4): 817-38. <https://doi.org/10.1093/cje/bet058>.
- Latorre, María, C., Oscar Bajo-Rubio and Antonio G. Gómez-Plana. 2009. "The effects of multinationals on host economies: A CGE approach." *Economic Modelling* 26(5): 851-64. <https://doi.org/10.1016/j.econmod.2009.02.008>.
- Lavoie, Marc. 2014. *Post-Keynesian Economics: New Foundations*. Edward Elgar.
- Lejour, Arjan, Jan Möhlmann and Maarten van't Riet. 2022. "The immeasurable tax gains by Dutch shell companies." *International Tax and Public Finance* 29(2): 316-57. <https://doi.org/10.1007/s10797-021-09669-y>.
- Lipsey, Robert E. 2004. "Home- and Host-Country Effects of Foreign Direct Investment." In *Challenges to Globalization: Analyzing the Economics*, edited by Robert E. Baldwin and L. Alan Winters. 333-82. University of Chicago Press.
- Loayza, Norman and Romain Rancière. 2006. "Financial Development, Financial Fragility, and Growth." *Journal of Money, Credit and Banking* 38(4): 1051-76. <https://doi.org/10.1353/mcb.2006.0060>.
- Löscher, Anne and Annina Kaltenbrunner. 2023. "Climate change and macroeconomic policy space in developing and emerging economies." *Journal of Post Keynesian Economics* 46(1): 113-141. <https://doi.org/10.1080/01603477.2022.2084630>.
- McCombie, John S.L. 1997. "On the Empirics of Balance-of-Payments-Constrained Growth." *Journal of Post Keynesian Economics* 19(3): 345-75. <https://doi.org/10.1080/01603477.1997.11490116>.

- Mehrling, Perry. 2013a. "The inherent hierarchy of money." In *Social Fairness and Economics: Economic Essays in the Spirit of Duncan Foley*, edited by Lance Taylor, Armon Rezai and Thomas Michl, 394-404. Routledge.
- Mehrling, Perry. 2013b. "Essential hybridity: A money view of FX." *Journal of Comparative Economics* 41(2): 355-63. <https://doi.org/10.1016/j.jce.2013.03.007>.
- Mehrling, Perry. 2017. "Financialization and its discontents." *Finance and Society* 3(1): 1-10. <https://doi.org/10.2218/finsoc.v3i1.1935>.
- Mehrling, Perry. 2022. *Money and Empire: Charles P. Kindleberger and the Dollar System*. Cambridge University Press.
- Mencinger, Joze. 2008a. "Addiction to FDI and current Account Balance." In *Dollarization, Euroization and Financial Stability*, edited by Joachim Becker and Rudy Weissenbacher, 109-28. Metropolis.
- Mencinger, Joze. 2008b. "The "Addiction" with FDI and Current Account Balance." *ICER Working Papers No.16/2008*. <https://www.bemservizi.unito.it/repec/icr/wp2008/ICERwp16-08.pdf>.
- Milesi-Ferretti, Gian M. 2026. "The External Wealth of Nations Database." *The Brookings Institution* (based on Lane, Philip R. and Gian Maria Milesi-Ferretti. 2018. "The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis." *IMF Economic Review* 66(1): 189-222). <https://www.brookings.edu/articles/the-external-wealth-of-nations-database/>. Last accessed June 8 2026.
- Moreno-Brid, Juan Carlos. 1998. "On Capital Flows and the Balance-of-Payments-Constrained Growth Model." *Journal of Post Keynesian Economics* 21(2): 283-98. <https://doi.org/10.1080/01603477.1998.11490194>.
- Moreno-Brid, Juan Carlos. 2003. "Capital Flows, Interest Payments and the Balance-of-Payments Constrained Growth Model: A Theoretical and Empirical Analysis." *Metroeconomica* 54(2-3): 346-65. <https://doi.org/10.1111/1467-999X.00170>.
- Moreno-Brid, Juan C., Lorenzo Nalin and Edgar Pérez-Medina. 2022. "External challenges to the economic expansion of emerging markets in the post-Covid 19 and post-COP26 era: A balance-of-payments constrained growth (BPCG) perspective." *PSL Quarterly Review* 75(303): 313-54. <https://doi.org/10.13133/2037-3643/17974>.
- Murau, Steffen, Joe Rini and Armin Haas. 2020. "The evolution of the Offshore US-Dollar System: past, present and four possible futures." *Journal of Institutional Economics* 16(6): 767-83. <https://doi.org/10.1017/S1744137420000168>.
- Murau, Steffen, Fabian Pape and Tobias Pforr. 2023. "International monetary hierarchy through emergency US-dollar liquidity: A key currency approach." *Competition & Change* 27(3-4): 495-515. <https://doi.org/10.1177/10245294221118661>.

- Obstfeld, Maurice. 2012. "Does the Current Account Still Matter?" *American Economic Review* 102(3): 1-23. <https://doi.org/10.1257/aer.102.3.1>.
- Obstfeld, Maurice. 2018. "Twenty-Five Years of Global Imbalances." In *Sustaining Economic Growth in Asia*, edited by Jérémie Cohen-Setton, Thomas Helbling, Adam S. Posen and Changyong Rhee, 269-84. Peterson Institute for International Economics.
- Organisation for Economic Co-operation and Development (OECD). 2008. *OECD Benchmark Definition of Foreign Direct Investment 2008*. OECD Publishing. <https://doi.org/10.1787/9789264045743-en>.
- Parnreiter, Christof, Laszlo Steinwärdner and Klara Kolhoff. 2024. "Uneven Development through Profit Repatriation: How Capitalism's Class and Geographical Antagonisms Intertwine." *Antipode* 56(6): 2343-67. <https://doi.org/10.1111/anti.13089>.
- Pesaran, M.H. and Ron Smith. 1995. "Estimating long-run relationships from dynamic heterogeneous panels." *Journal of Econometrics* 68(1): 79-113. [https://doi.org/10.1016/0304-4076\(94\)01644-F](https://doi.org/10.1016/0304-4076(94)01644-F).
- Pesaran, M.H., Yongcheol Shin and Ron Smith. 1999. "Pooled Mean Group Estimation of Dynamic Heterogeneous Panels." *Journal of the American Statistical Association* 94(446): 621-34. <https://doi.org/10.1080/01621459.1999.10474156>.
- Prasad, Eswar, Kenneth Rogoff, Shang-Jin Wei and M. Ayhan Kose. 2003. "Effects of Financial Globalisation on Developing Countries: Some Empirical Evidence." *Economic and Political Weekly* 38(41):4319-30. <https://www.jstor.org/stable/4414133>.
- Rodrik, Dani. 1998. *Who Needs Capital-Account Convertibility*. Harvard University. Available at: <https://drodrik.scholars.harvard.edu/publications/who-needs-capital-account-convertibility>.
- Sahoo, Pravakar and Ranjan K. Dash. 2022. "Does FDI have differential impacts on exports? Evidence from developing countries." *International Economics* 172: 227-237. <https://doi.org/10.1016/j.inteco.2022.10.002>.
- Seabra, Fernando and Lisandra Flach. 2005. "Foreign direct investment and profit outflows: a causality analysis for the Brazilian economy." *Economics Bulletin* 6(1): 1-15. <https://ideas.repec.org/a/ebl/ecbull/eb-04f30012.html>.
- Setterfield, Mark. 2011. "The remarkable durability of Thirlwall's Law." *PSL Quarterly Review* 64(259): 393-427. <https://doi.org/10.13133/2037-3643/9406>.
- Siddiqui, Danish A. and Mohsin H. Ahmad. 2012. "The Causal Relationship between Foreign Direct Investment and Current Account: An Empirical Investigation for Pakistan Economy." *European Journal of Economics, Finance and Administrative Sciences* 44: 107-17. <https://ssrn.com/abstract=3533738>.
- Strauss, Ilan. 2017. "Understanding South Africa's current account deficit: The role of foreign direct investment income." *Transnational Corporations* 23(2): 49-80. <https://doi.org/10.18356/3f281087-en>.

- Tan, Man, Dengyu Yang and Qijing Yang. 2023. "Institutional quality, asset specificity, and foreign direct investment." *Journal of International Money and Finance* 134: 102845. <https://doi.org/10.1016/j.jimonfin.2023.102845>.
- Thirlwall, Anthony P. 1993. "The Renaissance of Keynesian Economics." *BNL Quarterly Review* 46(186): 327-37. <https://doi.org/10.13133/2037-3643/14058>.
- Thirlwall, Anthony P. 2011a. "The Balance of Payments Constraint as an Explanation of International Growth Rate Differences." *PSL Quarterly Review* 64 (259): 429-438. <https://doi.org/10.13133/2037-3643/12804>. Originally published 1979 in *BNL Quarterly Review* 32(128): 45-53.
- Thirlwall, Anthony P. 2011b. "Balance of payments constrained growth models: history and overview." *PSL Quarterly Review* 64(259): 307-51. <https://doi.org/10.13133/2037-3643/9404>.
- Thirlwall, Anthony P. 2019. "Thoughts on balance-of-payments-constrained growth after 40 years." *Review of Keynesian Economics* 7(4): 554-67. <https://doi.org/10.4337/roke.2019.04.09>.
- Thirlwall, Anthony P. and M. Nureldin Hussain. 1982. "The Balance of Payments Constraint, Capital Flows and Growth Rate Differences between Developing Countries." *Oxford Economic Papers* 34(3): 498-510. <https://doi.org/10.1093/oxfordjournals.oep.a041565>.
- Tørsløv, Thomas, Ludvig Wier and Gabriel Zucman. 2023. "The Missing Profits of Nations." *Review of Economic Studies* 90(3): 1499-534. <https://doi.org/10.1093/restud/rdac049>.
- United Nations Conference on Trade and Development. (UNCTAD). 2026. *Financing development: external flows of financial capital to developing countries and their cost*. United Nations. <https://unctad.org/publication/financing-development-external-flows-financial-capital-developing-countries-and-their>.
- United Nations Conference on Trade and Development. (UNCTAD). 2023. *Foreign Direct Investment: Inward and Outward Stock*. United Nations. <https://unctadstat.unctad.org/datacentre/dataviewer/US.FdiFlowsStock>
- United States Department of State. (US Department of State). 2019. *2019 Investment Climate Statements: Switzerland and Liechtenstein*. <https://www.state.gov/reports/2019-investment-climate-statements/switzerland-and-liechtenstein/>. Last accessed May 15 2026.
- Williamson, John. 1990. "What Washington Means by Policy Reform." In *Latin American Adjustment: How Much Has Happened?*, edited by John Williamson, 5-38. Peterson Institute for International Economics. Chapter taken from: <https://www.piie.com/commentary/speeches-papers/what-washington-means-policy-reform>. Last accessed June 8 2026.
- World Bank. 2026a. *World Bank Country and Lending Groups*. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>. Last accessed June 8 2026.

World Bank. 2026b. *World Development Indicators*.

<https://databank.worldbank.org/source/world-development-indicators>. Last accessed June 8 2026.

Yalta, A. Yasemin. 2012. “Uncovering the channels through which FDI affects current account: the case of Turkey.” *International Journal of Economic Policy in Emerging Economies* 5(2): 158-67. <https://doi.org/10.1504/IJEPEE.2012.048500>.

Zélity, Balázs. 2022. “The welfare effects of FDI: A quantitative analysis.” *Journal of Comparative Economics* 50(1): 293-320. <https://doi.org/10.1016/j.jce.2021.09.007>.

Appendix A.1. Cumulative Ratios

Table A.1.1 – Cumulative Liability – Income Ratio Full Dataset

Country	Cumulative Ratio	Last Year	T
High Income Countries			
Trinidad and Tobago	34.119	2023	16
Hong Kong SAR, China	4.498	2023	26
Belgium	3.863	2023	21
Czechia	3.379	2023	31
Bahrain	3.300	2023	27
Russian Federation	2.915	2021	28
Slovak Republic	2.915	2023	26
Austria	2.865	2023	19
Netherlands	2.849	2023	32
Denmark	2.399	2023	27
Norway	1.934	2023	27
Uruguay	1.904	2023	32
Panama	1.793	2023	26
Japan	1.660	2023	28
Kuwait	1.628	2023	15
Malta	1.520	2023	27
Poland	1.310	2023	30
Chile	1.216	2023	32
Korea, Rep.	1.157	2023	32
Lithuania	1.141	2023	23
Oman	1.115	2023	18
Latvia	1.094	2023	18
Cyprus	1.085	2023	28
Finland	1.070	2023	32
Sweden	1.068	2023	30
Australia	0.996	2023	32
Portugal	0.914	2023	32
Bulgaria	0.898	2023	28
Slovenia	0.874	2023	32
Hungary	0.860	2023	32
United Kingdom	0.834	2023	28
Luxembourg	0.824	2023	22
Estonia	0.821	2023	27
Romania	0.792	2023	32
Barbados	0.769	2017	26
France	0.753	2023	32
Germany	0.692	2023	25
Italy	0.649	2023	23
St. Kitts and Nevis	0.636	2023	24
Canada	0.575	2023	32
Spain	0.535	2023	15
Croatia	0.403	2023	31
United States	0.346	2023	32
Antigua and Barbuda	0.320	2023	24
Greece	0.317	2023	25
Israel	0.192	2023	32
Iceland	0.111	2023	32
Switzerland	-2.425	2023	32

Table A.1.1 continued

Mean Value	1.989		
Mean Value excl. Trinidad and Tobago	1.306		
Upper-Middle Income Countries			
Kazakhstan	8.214	2023	25
Botswana	6.933	2023	32
Malaysia	4.193	2023	15
Algeria	3.911	2023	19
Libya	3.656	2023	27
Thailand	2.415	2023	15
Guatemala	2.037	2023	30
Azerbaijan	1.618	2023	17
Paraguay	1.608	2023	30
El Salvador	1.577	2023	25
South Africa	1.454	2023	32
Tonga	1.275	2023	19
North Macedonia	1.105	2023	26
Belarus	0.969	2023	25
Costa Rica	0.956	2023	32
Moldova	0.884	2023	19
Dominican Republic	0.793	2023	15
Bosnia and Herzegovina	0.729	2023	18
Belize	0.695	2023	32
Colombia	0.684	2023	30
Maldives	0.652	2023	32
St. Lucia	0.648	2023	24
Fiji	0.635	2023	32
Ecuador	0.623	2023	24
Ukraine	0.589	2023	24
Namibia	0.585	2023	22
Serbia	0.584	2023	17
Brazil	0.563	2023	32
Georgia	0.473	2023	24
Jamaica	0.445	2011	20
Mauritius	0.437	2023	32
Mongolia	0.421	2023	17
Mexico	0.418	2023	32
Grenada	0.222	2023	29
Turkey	0.190	2023	32
Dominica	0.164	2023	24
St. Vincent and the Grenadines	0.105	2023	24
Albania	0.089	2023	30
Iraq	-0.485	2023	19
Mean Value	1.361		
Lower-Middle Income Countries			
Eswatini	30.673	2019	27
Congo, Rep.	14.418	2021	15
Papua New Guinea	7.820	2023	30
Nigeria	5.045	2023	21
Samoa	2.945	2023	21
Côte d'Ivoire	2.686	2023	19
Honduras	2.362	2023	30

Table A.1.1 continued

Bolivia	2.253	2023	29
Cameroon	2.232	2023	32
Solomon Islands	1.710	2023	31
Vanuatu	1.604	2022	22
Sri Lanka	1.529	2023	30
Kyrgyz Republic	1.444	2022	15
Bangladesh	1.209	2023	32
Philippines	1.178	2023	32
Pakistan	1.142	2023	29
Benin	1.096	2023	30
Tunisia	0.989	2023	32
Kenya	0.907	2023	28
Senegal	0.871	2023	32
Morocco	0.585	2023	32
India	0.341	2023	23
Cambodia	0.325	2023	26
Cabo Verde	0.184	2023	20
Lebanon	0.109	2023	16
Lao PDR	0.106	2023	28
Angola	-1.841	2023	29
Mean Value	3.108		
Mean Value excl. Eswatini	2.048		
Low Income Countries			
Burkina Faso	3.169	2023	19
Mali	1.540	2023	30
Togo	1.326	2020	29
Madagascar	1.258	2023	19
Burundi	1.112	2023	18
Niger	0.330	2023	23
Uganda	0.219	2023	27
Mean Value	1.279		

Calculations based on the *IMF BoP Statistics* (IMF 2026a). Income Groups from the *World Bank Income Classifications* (World Bank 2026a).

Figure A.1.1 - World Map with Cumulative Flow Ratios

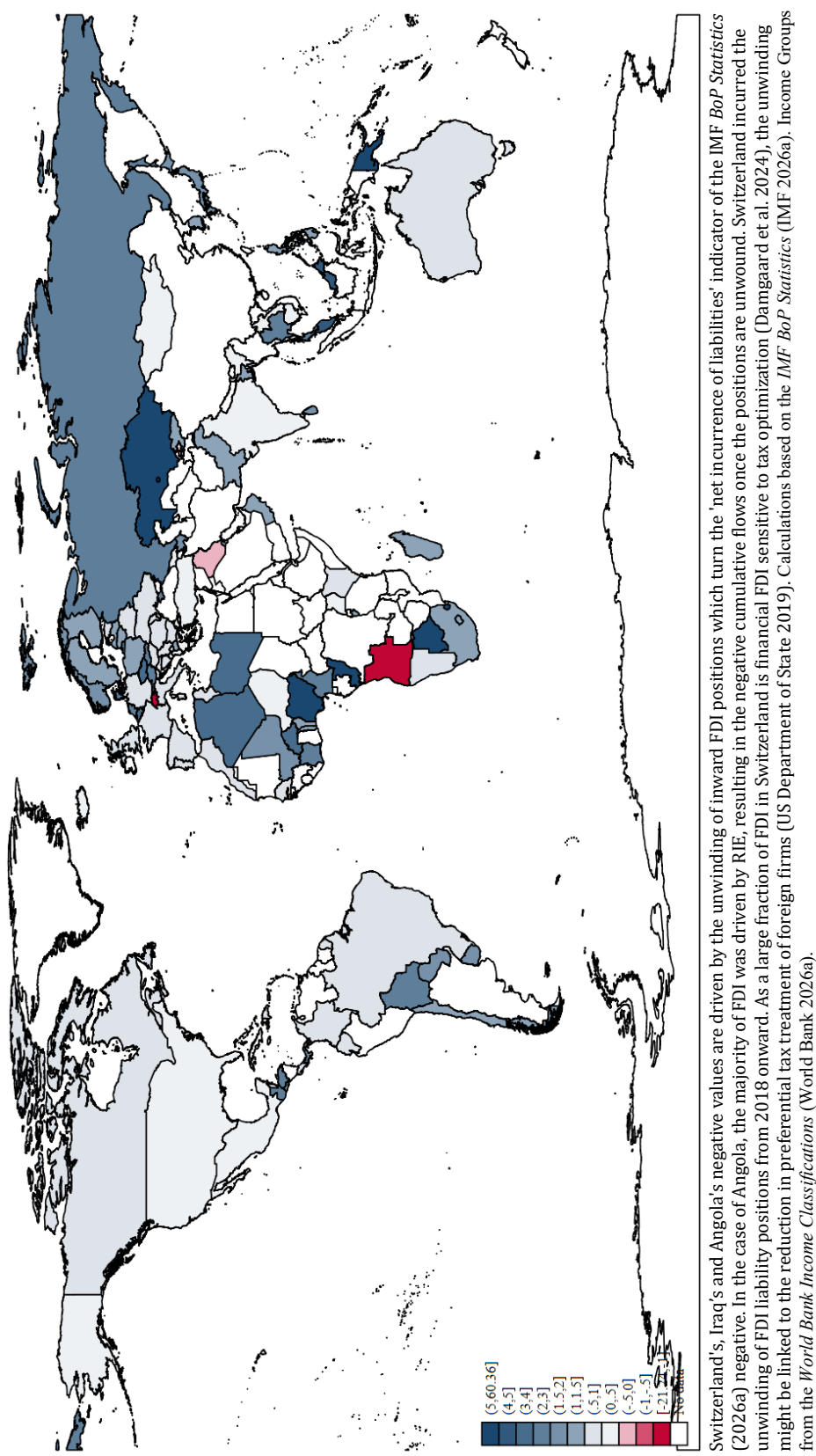


Table A.1.2 – Cumulative Liability – Income Ratio 42 Country Panel

Country	Cumulative Ratio
High Income Countries	
Czechia	3.379
Netherlands	2.849
Uruguay	1.904
Chile	1.216
Korea, Rep.	1.157
Finland	1.070
Australia	0.996
Portugal	0.914
Slovenia	0.874
Hungary	0.860
Romania	0.792
France	0.753
Canada	0.575
United States	0.346
Seychelles	0.225
Israel	0.192
Iceland	0.111
Switzerland	-2.425
Mean Value	0.877
Upper-Middle Income Countries	
Botswana	6.933
Peru	2.037
Guatemala	2.031
Paraguay	1.582
South Africa	1.454
Dominican Republic	0.977
Costa Rica	0.956
Belize	0.695
Colombia	0.684
Ecuador	0.675
Brazil	0.563
Mauritius	0.437
Mexico	0.418
Turkey	0.190
Mean Value	1.402
Lower-Middle Income Countries	
Bolivia	3.565
Cameroon	2.232
Solomon Islands	1.799
Bangladesh	1.209
Philippines	1.178
Pakistan	1.130
Tunisia	0.989
Senegal	0.871
Kenya	0.625
Morocco	0.585
Mean Value	1.418

Calculations based on the *IMF BoP Statistics* (IMF 2026a). Income groups from the *World Bank Income Classifications* (World Bank 2026a).

Appendix A.2. Data Description

GDP is taken from the *World Development Indicators (WDI)* (World Bank 2026b). Data on FDI equity liability inflows and income outflows is taken from the *International Monetary Fund (IMF) BoP Statistics* (IMF 2026a). Data on FDI debt instruments is excluded. Data for the real effective exchange rate (REER) is taken from the *Bruegel Real Effective Exchange Rate Dataset* (Darvas 2026). To convert the FDI flows from nominal US dollars (USD) into domestic real currency units, the official exchange rate from the *WDI* (World Bank 2026b) and the domestic consumer price level from the *IMF Consumer Price Index (CPI) Statistics* (IMF 2026b) are used.

Equity FDI flows excluding RIE are chosen to accurately reflect foreign exchange flows. RIE are an imputed quantity of firm-level retained earnings attributable to the foreign investor. RIE can be very liquid (Hansen and Wagner 2021) and, as they are fueled by firm profits, procyclical (Akyüz 2017). Under the Balance of Payments Manual (BPM6) accounting conventions of the IMF, RIE are simultaneously reported as outflows in the primary income balance and as inflows in the financial account – although no cross-border flows occur (Akyüz 2017; IMF 2009). Both aggregate FDI inflow and FDI income outflow statistics are, thus, upward biased by a statistical entry that does not represent foreign exchange flows. This bias was removed in our data

Table A.2.1 – Sources and Definitions

Variable	Source	Indicator	Description
X	World Bank WDI	Exports of goods and services (constant LCU)	Real export volume for construction of $\ln X$
M	World Bank WDI	Imports of goods and services (constant LCU)	Real import volume for construction of $\ln M$
Y	World Bank WDI	GDP (constant LCU)	Real domestic output for construction of $\ln Y$
Z	World Bank WDI	GDP (constant 2015 USD)	Real global output for construction of $\ln Z$
E	World Bank WDI	Official exchange rate (LCU per USD, period average)	Nominal exchange rate for conversion of FDI flows
X_t	World Bank WDI	Exports of goods and services (current USD)	Nominal export receipts for BoP weight construction
M_t	World Bank WDI	Imports of goods and services (current USD)	Nominal import payments for BoP weight construction
REER	Bruegel REER Dataset	Real Effective Exchange Rate, 170-country basket (2007=100)	Used for $(p_d - p_f - e)$
FFDI	IMF BoP Statistics	Direct Investment, Equity and Investment fund shares/units: other than reinvestment of earnings, Net incurrence of liabilities	Nominal FDI Equity inflows excl. RIE, current USD. Net incurrence implies that FDI inflows can be negative when liability positions are unwound
IFDI	IMF BoP Statistics	Direct investment, Equity and investment fund shares, Investment	Nominal FDI Equity income outflows excl. RIE, current USD.

		income on dividends and withdrawals from income of quasi corporations and income distributed to investment fund shareholders (excluding RIE), Expenditure	
RES	Own Calculation	-	Residual of the current account Identity in Eq. (9) capturing the net contribution of all remaining cross-border flows. Calculated on an annual basis.
IFDI with RIE	IMF BoP Statistics	Direct investment, Equity and investment fund shares, Investment income on investment income attributable to shareholders, including income on if, including rie	Nominal FDI Equity income outflows incl. RIE, current USD. Used to calculate the share of repatriated FDI income
P _d	IMF CPI Statistics	Consumer price index (CPI) Standard reference period (2010=100), Index; All Items	Domestic price index used for deflation of nominal flows.
FDI Liability Stock	EWN Database	FDI liabilities	Stock of foreign direct investment in the reporting economy.
Portfolio Equity Liability Stock	EWN Database	Portfolio equity liabilities	Stock of financial liabilities to nonresidents in portfolio equity securities
Debt Liability Stock	EWN Database	Debt liabilities	Sum of the stocks of portfolio debt claims and other investment claims to nonresidents
Total Liability Stock	EWN Database	Total liabilities	Total financial liabilities to nonresidents

Sources: *World Bank WDI* (World Bank 2026b); *IMF BoP Statistics* (IMF 2026a); *IMF CPI Statistics* (IMF 2026b); *Bruegel REER Dataset* (Darvas 2026); *EWN Database* (Milesi-Ferretti 2026).

Appendix A.3. Derivation of Sustainability Criteria for FDI

(available on request)

Appendix A.4. Estimation and Test Procedure

To test the ARDL models developed in Section 4.1, three preliminary steps are taken. First, although the estimators can handle both I(0) and I(1) variables, I(2) or higher-order stationarity must be ruled out. We test the stationarity of the dependent and independent variables using a panel Im-Pesaran-Shin (IPS) test with the Bayesian Information Criterion (BIC) and a maximum lag of four years for both the levels and the first differences of the logged variables. Second, the correct lag specification must be chosen to eliminate potential serial correlation. The Akaike Information Criterion (AIC) and the BIC are employed to select the optimal lag length. Third, to avoid biasing the estimates by the inclusion of outlier countries, alternative

specifications are estimated to test the stability of the estimates. These alternative specifications are based on country-level ARDLs where countries with implausible or imprecise coefficients are excluded. Based on the results of the PMG and MG estimation, a Hausman test is used to select the appropriate estimator.

Using the long-run coefficients obtained from the panel ARDLs, we conduct the McCombie test. Aggregate nominal exports, imports, FDI inflows and income outflows are used to calculate the weights θ_i on the country level. These are multiplied with the average growth rates of the corresponding flows. *FFDI*, *IFDI* and *RES* are transformed into domestic currency before inserting them into Eq. (13) and (15).

Given the high volatility of financial flows, both the mean (after winsorization) and the median growth rates of *FFDI*, *IFDI* and *RES* are used. Both the baseline model in Eq. (6) and the FDI-amended version in Eq. (13) are tested to compare the predictive power of the models. A Wald test is used to test the null hypotheses that $\hat{\pi} = \pi_{Th}$ and $\hat{\pi} = \pi_{FDI}$. After assessing the predictive power of these models, a growth decomposition is conducted by inserting the calculated and estimated parameters into Eq. (13). To avoid distortions stemming from individual countries, outliers are identified following Belotti et al. (2024). The Yeo-Johnson transformation is applied to each component in the numerator of Eq. (13) and outliers are flagged using a robust z-score with the threshold set at 3.

For the sustainability criteria the yield on FDI equity liabilities is calculated following Akyüz (2021):

$$r_{FDI} = \frac{IFDI_t}{D_{t-1}^{FDI}}, \quad (22)$$

where $D_t^{FDI} = \sum_{t=1}^T FFDI_t$ is the stock of FDI equity liabilities. Due to incomplete coverage in the *IMF International Investment Position Statistics* (IMF 2026c), the FDI liability position in the *EWN Database* (Milesi-Ferretti 2026) in 1991 is taken as a proxy for the cumulative liability inflows prior to the sample period¹². Subsequent FDI equity liability inflows recorded in the *IMF BoP Statistics* are added to the 1991 stock to proxy the cumulative position. In line with Mencinger's (2008b) argument that FDI inflows only lead to income outflows in the last phase of the FDI cycle, Eq. (22) will also be calculated with $k = 5$ additional lags in the denominator.

Two potential problems exist in using aggregate data over 32 years. First, the data likely captures multiple FDI cycles in different stages. Thus, this approach cannot ascertain the impact of an individual FDI project but relies on treating FDI as a homogeneous source of external finance. Second, within the logic of the BPCG model, countries may temporarily go into BoP disequilibrium and accrue even unsustainable debt levels, allowing them to grow faster. The build-up of external debt will, in turn, lead to lower economic growth once these debts are repaid and foreign exchange outflows lead to a tighter BoP-constraint (Moreno-Brid 1998,

¹² The *EWN* FDI positions do not differentiate between debt and equity liability. However, the limited coverage in the *IMF BoP Statistics* prior to 1992 suggests that FDI debt liability flows were relatively small. For the countries with data in the 42-country sample, the share of FDI debt in total FDI inflows between 1985 and 1991 based on 248 observations was 22.6 percent. As a result, the proxy will overstate the FDI equity liability position in 1991, biasing the test in favor of accepting (C1).

2003). If these repayments have not yet occurred, the results may indicate that countries realized a higher long-term growth rate than achievable within the BoP-constraint.

Appendix A.5. Summary Statistics for Subsamples and after Winsorization

Table A.5.1 – Summary Statistics: HICs

	N	Mean	Std. Dev.	Min	Max
GDP constant \$	575	1,354,795	3,646,047	672.09	21,955,252
Exports constant \$	575	262,980	427,696	333.63	2,510,040
Imports constant \$	575	280,468	535,056	318.82	3,542,496
World GDP constant \$	575	62,318,976	16,933,703	37,149,004	93,798,840
REER	575	99.07	18.88	34.73	191.46
FDI Liability Inflows	575	13,427	52,990	-319,599	381,610
FDI Income Outflows	575	12,892	27,328	-337.26	220,104

All monetary variables in USD millions. GDP, exports, imports and world GDP in constant 2015 USD from *World Bank WDI* (World Bank 2026b). REER index (2007=100) from *Bruegel REER Dataset* (Darvas 2026). FDI inflows are the net incurrence of equity liabilities and FDI income are income on equity liabilities in current USD from *IMF BoP Statistics* (IMF 2026a) both excluding RIE. Numbers above 1000 are rounded to the nearest integer. Sample: 18 countries, 1992-2023.

Table A.5.2 – Summary Statistics: MICs

	N	Mean	Std. Dev.	Min	Max
GDP constant \$	766	206,580	369,228	688.72	1,961,081
Exports constant \$	766	42,582	77,032	173.42	518,041
Imports constant \$	766	47,600	83,349	225.27	570,977
World GDP constant \$	766	62,339,965	16,922,419	37,149,004	93,798,840
REER	766	105.76	20.62	49.31	203.19
FDI Liability Inflows	766	2,925	7,543	-10,583	54,782
FDI Income Outflows	766	1,854	4,239	-6.02	41,086

All monetary variables in USD millions. GDP, exports, imports and world GDP in constant 2015 USD from *World Bank WDI* (World Bank 2026b). REER index (2007=100) from *Bruegel REER Dataset* (Darvas 2026). FDI inflows are the net incurrence of equity liabilities and FDI income are income on equity liabilities in current USD from *IMF BoP Statistics* (IMF 2026a) both excluding RIE. Numbers above 1000 are rounded to the nearest integer. Sample: 24 countries, 1992-2023.

Table A.5.3 – Summary Statistics: Growth Rates in Percent after Winsorization

	N	Mean	Median	Std. Dev.	Min	Max
FDI Inflow Growth	1,286	56.1	6.0	164.9	-110.1	585.9
FDI Income Outflow Growth	1,279	19.9	7.4	54.6	-52.4	178.0
BoP Residual Growth	1,299	9.7	5.0	144.2	-309.5	367.4
GDP Growth	1,299	3.2	3.4	3.4	-15.7	16.5
Import Growth	1,299	5.1	5.5	9.9	-46.3	61.4
Export Growth	1,299	4.7	5.0	8.6	-38.6	61.8

GDP, import and export growth derived from constant local currency series of the *World Bank WDI* (World Bank 2026b). Nominal FDI variables and residual variables from the *IMF BoP Statistics* (IMF 2026a) deflated by domestic inflation taken from the *IMF CPI Statistics* (IMF 2026b). Winsorization undertaken for the 5th and 95th percentile. Sample: 42-country panel, 1992-2023.

Table A.5.4 – Summary Statistics: HIC Growth Rates in Percent after Winsorization

	N	Mean	Median	Std. Dev.	Min	Max
FDI Inflow Growth	556	49.9	6.0	152.6	-116.9	535.7
FDI Income Outflow Growth	545	21.6	9.2	54.3	-47.1	186.1
BoP Residual Growth	557	8.2	3.2	155.2	-324.0	392.2
GDP Growth	557	2.7	2.8	3.2	-12.5	12.0
Import Growth	557	5.4	5.7	8.5	-29.6	34.6
Export Growth	557	5.1	5.1	7.3	-36.2	31.1

GDP, import and export growth derived from constant local currency series of the *World Bank WDI* (World Bank 2026b). Nominal FDI variables and residual variables from the *IMF BoP Statistics* (IMF 2026a) deflated by domestic inflation taken from the *IMF CPI Statistics* (IMF 2026b). Winsorization undertaken for the 5th and 95th percentile. Sample: 18-country panel, 1992-2023.

Table A.5.5 – Summary Statistics: MICs Growth Rates in Percent after Winsorization

	N	Mean	Median	Std. Dev.	Min	Max
FDI Inflow Growth	730	60.4	6.0	172.6	-104.7	610.9
FDI Income Outflow Growth	734	18.8	6.5	55.1	-55.5	173.1
BoP Residual Growth	742	11.6	5.8	132.7	-276.8	341.6
GDP Growth	742	3.5	3.9	3.5	-15.7	16.5
Import Growth	742	4.9	5.0	10.8	-46.3	61.4
Export Growth	742	4.4	4.8	9.5	-38.6	61.8

GDP, import and export growth derived from constant local currency series of the *World Bank WDI* (World Bank 2026b). Nominal FDI variables and residual variables from the *IMF BoP Statistics* (IMF 2026a) deflated by domestic inflation taken from the *IMF CPI Statistics* (IMF 2026b). Winsorization undertaken for the 5th and 95th percentile. Sample: 24-country panel, 1992-2023.

Appendix A.6. Alternative Regression Specifications for the baseline results

For the HIC subsample, the individual country ARDLs in the MG estimation reveal that the import data for Portugal and the Netherlands is subject to estimation imprecision. Further, the panel point estimates are sensitive to the lag order chosen. For the Netherlands, the error correction term on the import estimation is negative but features a p-value of 0.501 and the standard errors on the independent variables are 0.868 (lnY) and 2.459 (lnREER_inv). For Portugal, the error correction term is positive and the p-value is 0.570, indicating no long-run relationship between imports, income and the real exchange rate. The income and price elasticities of imports are disproportionately large (5.489 for income and 7.180 for the REER and the standard errors sit at 4.647 and 12.196, respectively. Finland, South Korea, Switzerland and the United States also feature slightly insignificant error correction terms.

Similarly, the export data for Australia, Chile, Czechia, Hungary, South Korea and Slovenia also feature large standard errors and/or no long-run relationship as indicated by the error correction term. The estimation of the long-run parameters is tested for sensitivity to the inclusion of these countries (Tables A.6.1 to A.6.6).

The HIC import estimation is sensitive to the inclusion of Portugal and the Netherlands. The point estimate of the preferred estimator (MG) for the income elasticity of imports changes from 1.928 to 1.704 and the point estimate for the price elasticity flips from 0.265 to -0.226 (Tables A.6.1 and A.6.2). For both parameters, the standard errors are significantly smaller.

Excluding the countries with slightly insignificant error correction terms does not lead to further improvements in precision (Table A.6.3). Therefore, the import estimates without the Netherlands and Portugal are chosen as this paper's main specification. The point estimates of the export parameters are robust to the exclusion of the countries listed above, although the Hausman test selects the MG estimator for the reduced sample (Tables A.6.4 to A.6.6). As the limited degrees of freedom imply imprecise estimation on the country-level, the full-sample estimates are used for the export parameters. This is supported by the statistically significant error correction term on the panel level and the smaller standard errors for the full sample estimation.

The country-level ARDL (1,1,1) estimates reveal a similar pattern for the MICs. Belize, the Dominican Republic, Guatemala, Pakistan and the Philippines all feature negative but

insignificant error correction terms for the import demand estimation. Botswana features a price elasticity of imports of 6.306 with a standard error of 4.551. For the exports, Belize, Brazil, Colombia, Kenya and Mexico feature negative but insignificant error correction terms. Further, Kenya features an income elasticity of exports of 5.240 (standard errors = 2.920) and a price elasticity of -3.795 (standard errors = 2.712) and the Solomon Islands have an income elasticity of exports of -5.741 (standard errors = 29.190) and a price elasticity of 17.428 (standard errors = 71.373) in addition to a positive and insignificant error correction term.

The estimates are again compared across specifications (Tables A.6.7 to A.6.12). Surprisingly, both the import and export elasticity estimates are very stable across specifications, indicating that the Solomon Islands and Kenya are offsetting their respective distortive contributions. This stability further highlights the PMG estimator's robustness to outliers (Lanzafame 2014; Pesaran et al. 1999). Thus, the full sample estimates are chosen for the main MICs specification.

Tables A.6.13 and A.6.14 report the full McCombie tests. HIC18 and HIC16 Spec. 1 are the specifications also reported in the main results in Table 5. HIC16 Spec. 2 utilizes the export elasticities from Table A.6.5. MIC24 Spec. 1 and Spec. 2 are the specifications used in the main results in Table 6. MIC22 uses the estimates, weights and growth rates from the 22-country sample excluding Kenya and the Solomon Islands to report the sensitivity of the McCombie test to these countries. Both Tables also report the results for the FDI-amended model using mean growth rates.

Table A.6.1 – HIC Import Demand Equation

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.132*** (0.054)	1.928*** (0.235)	1.066*** (0.056)	1.799*** (0.606)
lnREER_inv	-0.485*** (0.114)	0.265 (0.434)	-0.721*** (0.136)	0.931 (1.110)
Short-run				
ECT	-0.107*** (0.030)	-0.317*** (0.053)	-0.110*** (0.030)	-0.289*** (0.055)
D.lnY	1.916*** (0.150)	1.560*** (0.163)	1.860*** (0.130)	1.571*** (0.151)
LD.lnY			0.268 (0.178)	0.288 (0.180)
D.lnREER_inv	-0.009 (0.059)	-0.019 (0.054)	-0.028 (0.053)	0.005 (0.058)
LD.lnREER_inv			0.113* (0.063)	0.098 (0.072)
LD.lnM			-0.152*** (0.048)	-0.107** (0.049)
_cons	-0.553*** (0.162)	-3.520*** (0.879)	-0.584*** (0.155)	-3.082*** (0.939)
N	557	557	539	539
Hausman chi2	10.130		2.337	
p-value	0.006		0.311	
Log Likelihood	1022.661	1068.170	1056.973	1092.784

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.2 – HIC Import Demand Equation (excluding Portugal and the Netherlands)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.134*** (0.054)	1.704*** (0.119)	1.067*** (0.056)	1.651*** (0.129)
lnREER_inv	-0.484*** (0.114)	-0.226 (0.146)	-0.725*** (0.136)	-0.626** (0.310)
Short-run				
ECT	-0.116*** (0.034)	-0.354*** (0.052)	-0.118*** (0.033)	-0.325*** (0.056)
D.lnY	1.965*** (0.164)	1.556*** (0.181)	1.901*** (0.142)	1.566*** (0.168)
LD.lnY			0.349* (0.190)	0.360* (0.195)
D.lnREER_inv	-0.050 (0.057)	-0.057 (0.052)	-0.071 (0.049)	-0.029 (0.060)
LD.lnREER_inv			0.115 (0.071)	0.103 (0.081)
LD.lnM			-0.169*** (0.051)	-0.111** (0.055)
_cons	-0.609*** (0.179)	-3.977*** (0.925)	-0.636*** (0.172)	-3.620*** (0.975)
N	495	495	479	479
Hausman chi2	17.907		23.427	
p-value	0.000		0.000	
Log Likelihood	890.818	934.617	922.738	957.031

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.3 – HIC Import Demand Equation (excluding Portugal, the Netherlands, Finland, Korea, Switzerland and the United States)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.131*** (0.054)	1.697*** (0.150)	1.069*** (0.057)	1.636*** (0.131)
lnREER_inv	-0.512*** (0.117)	-0.232 (0.171)	-0.735*** (0.142)	-0.431* (0.249)
Short-run				
ECT	-0.142*** (0.041)	-0.421*** (0.056)	-0.134*** (0.041)	-0.380*** (0.066)
D.lnY	1.882*** (0.190)	1.382*** (0.192)	1.832*** (0.149)	1.417*** (0.178)
LD.lnY			0.309 (0.223)	0.254 (0.226)
D.lnREER_inv	-0.054 (0.071)	-0.082 (0.067)	-0.091 (0.059)	-0.062 (0.073)
LD.lnREER_inv			0.135 (0.094)	0.102 (0.108)
LD.lnM			-0.145*** (0.050)	-0.068 (0.045)
_cons	-0.753*** (0.221)	-4.575*** (1.175)	-0.727*** (0.222)	-4.000*** (1.256)
N	371	371	359	359
Hausman chi2	9.496		15.751	
p-value	0.009		0.000	
Log Likelihood	633.131	670.745	664.173	690.772

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.4 – HIC Export Demand Equation

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	1.355*** (0.034)	0.900*** (0.296)	1.405*** (0.024)	1.135*** (0.209)
lnREER	-0.858*** (0.150)	-0.006 (0.924)	-0.448*** (0.100)	-1.010** (0.409)
Short-run				
ECT	-0.124*** (0.025)	-0.205*** (0.035)	-0.170*** (0.034)	-0.247*** (0.032)
D.lnZ	2.369*** (0.213)	2.148*** (0.212)	2.286*** (0.232)	2.129*** (0.230)
LD.lnZ			0.435** (0.214)	0.742*** (0.194)
D.lnREER	-0.008 (0.070)	0.052 (0.058)	0.022 (0.070)	0.073 (0.062)
LD.lnREER			-0.175*** (0.047)	-0.160*** (0.056)
LD.lnX			0.125** (0.055)	0.000 (0.042)
_cons	-0.967*** (0.214)	-1.860* (1.045)	-1.821*** (0.411)	-2.694** (1.104)
N	557	557	539	539
Hausman chi2	2.400		2.040	
p-value	0.301		0.361	
Log Likelihood	991.522	1059.158	1033.886	1100.203

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.5 – HIC Export Demand Equation (excluding Portugal and the Netherlands)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.554*** (0.100)	0.839** (0.331)	0.585*** (0.086)	1.103*** (0.235)
lnREER	-1.156*** (0.280)	0.144 (1.037)	-0.829*** (0.243)	-1.008** (0.461)
Short-run				
ECT	-0.064*** (0.012)	-0.196*** (0.038)	-0.060*** (0.014)	-0.230*** (0.032)
D.lnZ	2.462*** (0.233)	2.155*** (0.234)	2.522*** (0.288)	2.150*** (0.256)
LD.lnZ			0.706*** (0.263)	0.718*** (0.217)
D.lnREER	-0.032 (0.050)	0.022 (0.047)	-0.004 (0.062)	0.048 (0.060)
LD.lnREER			-0.234*** (0.062)	-0.185*** (0.061)
LD.lnX			0.006 (0.042)	0.017 (0.045)
_cons	0.542*** (0.109)	-1.792 (1.169)	0.395*** (0.123)	-2.589** (1.227)
N	495	495	479	479
Hausman chi2	1.720		4.625	
p-value	0.423		0.099	
Log Likelihood	867.653	911.621	900.011	949.406

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.6 – HIC Export Demand Equation (excluding Australia, Chile, the Czechia, Hungary, Korea and Slovenia)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.715*** (0.092)	1.369*** (0.190)	0.765*** (0.068)	1.414*** (0.187)
lnREER	-1.859*** (0.432)	-1.081*** (0.321)	-1.345*** (0.312)	-0.929*** (0.282)
Short-run				
ECT	-0.069*** (0.015)	-0.283*** (0.033)	-0.069*** (0.018)	-0.308*** (0.032)
D.lnZ	2.691*** (0.199)	2.199*** (0.178)	2.822*** (0.287)	2.291*** (0.261)
LD.lnZ			0.716** (0.310)	0.812*** (0.263)
D.lnREER	-0.003 (0.071)	0.093 (0.082)	0.029 (0.074)	0.137* (0.079)
LD.lnREER			-0.233*** (0.073)	-0.113* (0.061)
LD.lnX			-0.041 (0.046)	-0.025 (0.046)
_cons	0.526*** (0.117)	-3.282** (1.386)	0.273*** (0.099)	-3.897*** (1.483)
N	372	372	360	360
Hausman chi2	8.817		6.477	
p-value	0.012		0.039	
Log Likelihood	674.132	716.617	689.101	733.092

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.7 – MICs Import Demand Equation

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.175*** (0.031)	1.401*** (0.110)	1.411*** (0.025)	1.498*** (0.138)
lnREER_inv	0.099 (0.063)	0.167 (0.308)	0.440*** (0.064)	0.355 (0.313)
Short-run				
ECT	-0.238*** (0.037)	-0.394*** (0.036)	-0.263*** (0.045)	-0.453*** (0.047)
D.lnY	2.046*** (0.355)	1.828*** (0.355)	2.040*** (0.323)	1.817*** (0.381)
LD.lnY			-0.170 (0.203)	0.121 (0.208)
D.lnREER_inv	0.005 (0.063)	-0.079 (0.066)	-0.151*** (0.051)	-0.178** (0.077)
LD.lnREER_inv			0.024 (0.101)	-0.039 (0.069)
LD.lnM			0.031 (0.044)	0.032 (0.036)
_cons	-0.782*** (0.122)	-2.753*** (0.669)	-1.306*** (0.228)	-3.038*** (0.778)
N	742	742	718	718
Hausman chi2	3.669		0.315	
p-value	0.160		0.854	
Log Likelihood	1038.542	1113.450	1076.084	1155.542

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.8 – MICs Import Demand Equation (excluding Solomon Islands and Kenya)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.176*** (0.031)	1.415*** (0.119)	1.406*** (0.025)	1.475*** (0.148)
lnREER_inv	0.116* (0.063)	0.186 (0.336)	0.442*** (0.066)	0.302 (0.336)
Short-run				
ECT	-0.226*** (0.038)	-0.392*** (0.039)	-0.248*** (0.045)	-0.454*** (0.050)
D.lnY	2.072*** (0.389)	1.831*** (0.388)	2.039*** (0.353)	1.830*** (0.416)
LD.lnY			-0.161 (0.217)	0.198 (0.209)
D.lnREER_inv	0.016 (0.067)	-0.070 (0.071)	-0.119** (0.049)	-0.143* (0.078)
LD.lnREER_inv			0.070 (0.101)	0.001 (0.062)
LD.lnM			0.033 (0.047)	0.033 (0.039)
_cons	-0.753*** (0.131)	-2.831*** (0.728)	-1.284*** (0.245)	-3.168*** (0.845)
N	680	680	658	658
Hausman chi2	3.134		0.223	
p-value	0.209		0.894	
Log Likelihood	984.375	1058.520	1017.114	1095.641

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.9 – MICs Import Demand Equation (excluding Solomon Islands, Kenya, Botswana, Dominican Republic, Pakistan, the Philippines, Guatemala and Belize)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.366*** (0.028)	1.488*** (0.118)	1.419*** (0.025)	1.487*** (0.111)
lnREER_inv	0.396*** (0.066)	-0.040 (0.161)	0.444*** (0.074)	0.182 (0.256)
Short-run				
ECT	-0.264*** (0.054)	-0.472*** (0.037)	-0.286*** (0.058)	-0.559*** (0.044)
D.lnY	2.274*** (0.517)	1.938*** (0.515)	2.250*** (0.459)	1.937*** (0.557)
LD.lnY			-0.157 (0.235)	0.263 (0.212)
D.lnREER_inv	-0.078 (0.069)	-0.083 (0.086)	-0.132** (0.063)	-0.142 (0.100)
LD.lnREER_inv			-0.005 (0.109)	-0.039 (0.071)
LD.lnM			0.002 (0.049)	0.027 (0.042)
_cons	-1.292*** (0.258)	-4.024*** (0.797)	-1.569*** (0.326)	-4.532*** (0.924)
N	494	494	478	478
Hausman chi2	5.871		1.057	
p-value	0.053		0.589	
Log Likelihood	729.844	794.378	755.729	822.815

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.10 – MICs Export Demand Equation

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	1.103*** (0.049)	1.242*** (0.377)	1.137*** (0.052)	1.528*** (0.172)
lnREER	-0.374*** (0.103)	0.205 (0.777)	-0.274*** (0.083)	0.096 (0.389)
Short-run				
ECT	-0.154*** (0.025)	-0.311*** (0.035)	-0.162*** (0.024)	-0.402*** (0.042)
D.lnZ	2.643*** (0.249)	2.236*** (0.249)	2.677*** (0.255)	2.148*** (0.246)
LD.lnZ			-0.085 (0.219)	-0.181 (0.213)
D.lnREER	-0.163 (0.100)	-0.045 (0.104)	-0.170 (0.108)	-0.031 (0.118)
LD.lnREER			-0.122 (0.084)	-0.090 (0.126)
LD.lnX			0.103** (0.044)	0.158*** (0.050)
_cons	-0.824*** (0.142)	-4.212*** (1.589)	-1.066*** (0.169)	-6.080*** (1.984)
N	742	742	718	718
Hausman chi2	3.727		4.263	
p-value	0.155		0.119	
Log Likelihood	1066.282	1136.557	1089.813	1167.000

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.11 – MICs Export Demand Equation (excluding Solomon Islands and Kenya)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	1.086*** (0.048)	1.377*** (0.171)	1.103*** (0.050)	1.470*** (0.178)
lnREER	-0.322*** (0.095)	-0.396** (0.168)	-0.264*** (0.086)	0.168 (0.419)
Short-run				
ECT	-0.165*** (0.027)	-0.334*** (0.034)	-0.167*** (0.027)	-0.412*** (0.045)
D.lnZ	2.708*** (0.257)	2.317*** (0.251)	2.774*** (0.253)	2.212*** (0.251)
LD.lnZ			-0.055 (0.238)	-0.137 (0.230)
D.lnREER	-0.110 (0.100)	0.006 (0.104)	-0.089 (0.098)	0.041 (0.111)
LD.lnREER			-0.153* (0.084)	-0.134 (0.129)
LD.lnX			0.067* (0.038)	0.121*** (0.043)
_cons	-0.855*** (0.153)	-4.098** (1.710)	-0.969*** (0.174)	-6.017*** (2.169)
N	680	680	658	658
Hausman chi2	2.023		3.501	
p-value	0.364		0.174	
Log Likelihood	1003.741	1067.831	1017.243	1088.503

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.12 – MICs Export Demand Equation (excluding Solomon Islands, Kenya, Belize, Brazil, Mexico and Colombia)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.877*** (0.045)	1.428*** (0.205)	0.897*** (0.043)	1.464*** (0.212)
lnREER	-0.059 (0.080)	-0.373** (0.189)	-0.034 (0.076)	-0.189 (0.237)
Short-run				
ECT	-0.184*** (0.036)	-0.379*** (0.033)	-0.192*** (0.041)	-0.468*** (0.045)
D.lnZ	2.646*** (0.299)	2.189*** (0.285)	2.698*** (0.294)	2.096*** (0.283)
LD.lnZ			-0.104 (0.288)	-0.176 (0.261)
D.lnREER	-0.187 (0.114)	-0.021 (0.123)	-0.157 (0.106)	0.016 (0.132)
LD.lnREER			-0.150* (0.081)	-0.076 (0.127)
LD.lnX			0.065 (0.044)	0.138*** (0.045)
_cons	-0.488*** (0.155)	-4.810** (2.056)	-0.621*** (0.183)	-6.745*** (2.613)
N	558	558	540	540
Hausman chi2	4.817		4.601	
p-value	0.090		0.100	
Log Likelihood	818.790	877.169	830.916	893.987

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6.13 – Panel McCombie Test for High Income Countries

	HIC18	HIC16 Spec. 1	HIC16 Spec. 2
Estimated $\hat{\pi}$	1.704	1.704	1.704
π_{Th}	1.658	1.559	0.558
π_{FDI} mean	2.285	2.214	1.203
π_{FDI} median	1.660	1.567	0.556
Difference $\hat{\pi} - \pi_{Th}$	0.046	0.145	1.146
Difference $\hat{\pi} - \pi_{FDI}$ mean	-0.581	-0.510	0.501
Difference $\hat{\pi} - \pi_{FDI}$ median	0.044	0.137	1.148
Wald χ^2 $\hat{\pi} - \pi_{Th}$	0.147	1.482	92.733
Wald χ^2 $\hat{\pi} - \pi_{FDI}$ mean	23.872	18.354	17.733
Wald χ^2 $\hat{\pi} - \pi_{FDI}$ median	0.137	1.326	93.061
p-value $H_0: \hat{\pi} = \pi_{Th}$	0.702	0.223	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ mean	0.000	0.000	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ median	0.711	0.249	0.000

π estimated via MG ARDL (1,1,1) excluding Portugal and the Netherlands. Standard errors = 0.119 for all Wald tests.

HIC18: Full 18-country weights; 16-country import elasticities ($\pi = 1.704$, $\psi = -0.226$), 18-country export elasticities ($\varepsilon = 1.355$, $\eta = -0.858$).

HIC16 Spec. 1: Weights excluding Portugal and Netherlands; 16-country import elasticities ($\pi = 1.704$, $\psi = -0.226$), 18-country export

elasticities ($\varepsilon = 1.355$, $\eta = -0.858$).

HIC16 Spec. 2: Weights and elasticities from 16-country sample excluding Portugal and Netherlands ($\pi = 1.704$, $\psi = -0.226$, $\varepsilon = 0.554$, $\eta = -1.156$).

Table A.6.14 – Panel McCombie Test for Middle Income Countries

	MIC24 Spec. 1	MIC24 Spec. 2	MIC22
Estimated $\hat{\pi}$	1.175	1.175	1.176
π_{Th}	1.028	1.016	0.964
π_{FDI} mean	2.874	2.862	2.622
π_{FDI} median	1.114	1.102	1.045
Difference $\hat{\pi} - \pi_{Th}$	0.147	0.159	0.212
Difference $\hat{\pi} - \pi_{FDI}$ mean	-1.699	-1.687	-1.446
Difference $\hat{\pi} - \pi_{FDI}$ median	0.061	0.073	0.131
Wald χ^2 $\hat{\pi} - \pi_{Th}$	22.408	26.446	46.792
Wald χ^2 $\hat{\pi} - \pi_{FDI}$ mean	3003.277	2962.396	2174.813
Wald χ^2 $\hat{\pi} - \pi_{FDI}$ median	3.862	5.474	17.828
p-value H0: $\hat{\pi} = \pi_{Th}$	0.000	0.000	0.000
p-value H0: $\hat{\pi} = \pi_{FDI}$ mean	0.000	0.000	0.000
p-value H0: $\hat{\pi} = \pi_{FDI}$ median	0.049	0.019	0.000

π estimated via PMG ARDL (1,1,1) on the 24-country sample. Standard errors = 0.031 for all Wald tests.

MIC24 Spec. 1: Full 24-country weights and elasticities ($\pi = 1.175$, $\psi = 0.099$, $\varepsilon = 1.103$, $\eta = -0.374$).

MIC24 Spec. 2: Full 24-country weights and import elasticities ($\pi = 1.175$, $\psi = 0.099$); export elasticities from 22-country sample excluding Solomon Islands and Kenya ($\varepsilon = 1.086$, $\eta = -0.322$).

MIC22: Weights and elasticities from 22-country sample excluding Solomon Islands and Kenya ($\pi = 1.176$, $\psi = 0.116$, $\varepsilon = 1.086$, $\eta = -0.322$).

Appendix A.7. Alternative Growth Decomposition and Summary of Sustainability Criteria

Table A.7.1 – Growth Decomposition MIC18

	y_{FDI}	Observed Growth	REER	Exports	FFDI	IFDI	RES
Contribution	2.692	3.310	0.140	2.582	0.249	-0.374	0.096

All values in percent. Bangladesh, Kenya, Mauritius, Pakistan, the Philippines and Senegal are dropped as they were consistently identified as an outlier. $\pi=1.175$, $\psi=0.099$, $\varepsilon=1.103$, $\eta=-0.374$. Median aggregation for FDI flow terms.

Table A.7.2 – Growth Decomposition HIC16

	y_{FDI}	Observed Growth	REER	Exports	FFDI	IFDI	RES
Contribution	2.536	2.761	-0.022	2.401	0.153	-0.214	0.218

All values in percent. The United States and Hungary are dropped as they were identified as outliers. The Netherlands and Switzerland were dropped due to their status as financial centers with large cumulative ratios. $\pi=1.704$, $\psi=-0.226$, $\varepsilon=1.355$, $\eta=-0.858$. Median aggregation for FDI flow terms.

Table A.7.3 – (C1) and (C2) Status by Country

Country	Income Group	r_{FDI}	x_n	m_n	C1	C2	Status
Australia	HIC	5.9	6.9	6.4	Satisfied	Satisfied	Both C1 and C2
Bolivia	MIC	6.0	7.5	7.0	Satisfied	Satisfied	Both C1 and C2
Canada	HIC	2.8	5.0	4.9	Satisfied	Satisfied	Both C1 and C2
Colombia	MIC	5.8	5.8	5.4	Satisfied	Satisfied	Both C1 and C2
Hungary	HIC	6.2	9.0	8.8	Satisfied	Satisfied	Both C1 and C2
Iceland	HIC	2.5	6.1	6.0	Satisfied	Satisfied	Both C1 and C2
Israel	HIC	2.3	6.7	5.7	Satisfied	Satisfied	Both C1 and C2
Korea, Rep.	HIC	6.3	7.1	6.9	Satisfied	Satisfied	Both C1 and C2
Mexico	MIC	2.5	7.9	7.1	Satisfied	Satisfied	Both C1 and C2
Morocco	MIC	4.0	6.8	6.6	Satisfied	Satisfied	Both C1 and C2
Portugal	HIC	5.3	5.3	4.4	Satisfied	Satisfied	Both C1 and C2
Romania	HIC	5.6	9.6	9.1	Satisfied	Satisfied	Both C1 and C2
Seychelles	HIC	1.2	11.6	7.8	Satisfied	Satisfied	Both C1 and C2
Turkey	MIC	2.2	8.9	8.5	Satisfied	Satisfied	Both C1 and C2
Brazil	MIC	5.0	7.7	8.1	Satisfied	Violated	C1 only
Ecuador	MIC	6.5	6.7	7.2	Satisfied	Violated	C1 only
France	HIC	2.8	3.9	4.2	Satisfied	Violated	C1 only
Kenya	MIC	4.3	6.9	8.0	Satisfied	Violated	C1 only
Slovenia	HIC	5.0	6.6	6.7	Satisfied	Violated	C1 only
United States	HIC	1.9	5.1	5.7	Satisfied	Violated	C1 only
Bangladesh	MIC	10.7	10.2	9.7	Violated	Satisfied	C2 only
Belize	MIC	7.0	5.7	5.6	Violated	Satisfied	C2 only
Costa Rica	MIC	11.8	7.8	6.8	Violated	Satisfied	C2 only
Czechia	HIC	13.9	8.9	8.8	Violated	Satisfied	C2 only
Netherlands	HIC	9.5	5.2	5.2	Violated	Satisfied	C2 only
Peru	MIC	10.5	9.0	7.8	Violated	Satisfied	C2 only
Solomon Islands	MIC	8.2	4.3	4.3	Violated	Satisfied	C2 only
Switzerland	HIC	28.8	5.6	5.3	Violated	Satisfied	C2 only
Tunisia	MIC	4.7	4.6	4.4	Violated	Satisfied	C2 only
Uruguay	HIC	8.6	6.8	6.6	Violated	Satisfied	C2 only
Botswana	MIC	25.9	3.7	4.6	Violated	Violated	Neither
Cameroon	MIC	9.4	3.9	5.0	Violated	Violated	Neither
Chile	HIC	9.0	6.6	6.7	Violated	Violated	Neither
Dominican Republic	MIC	19.4	5.8	6.2	Violated	Violated	Neither
Finland	HIC	7.1	4.8	4.9	Violated	Violated	Neither
Guatemala	MIC	10.6	7.2	7.9	Violated	Violated	Neither
Mauritius	MIC	12.7	5.2	5.5	Violated	Violated	Neither
Pakistan	MIC	8.9	4.6	5.8	Violated	Violated	Neither
Paraguay	MIC	14.4	5.2	5.8	Violated	Violated	Neither
Philippines	MIC	7.5	7.2	8.1	Violated	Violated	Neither
Senegal	MIC	7.0	5.8	6.4	Violated	Violated	Neither
South Africa	MIC	12.2	4.9	5.5	Violated	Violated	Neither

x_n , m_n and $\bar{r}_{FDI}$ in percent. (C1) satisfied if $x_n \geq \bar{r}_{FDI}$. (C2) satisfied if $x_n \geq m_n$. Calculations based on the *World Bank WDI* (2026b), the *IMF BoP Statistics* (IMF 2026a) and the *EWN Database* (Milesi-Ferretti 2026). Income groups from the *World Bank income classifications* (2026a).

Table A.7.4 – Counterfactual Sustainability Criteria Test

Country	Income Group	r_{FDI}	r_{FDI_sd}	x_n	x_n_sd	m_n	New (C1)	New (C2)
Philippines	MIC	7.5	6.3	7.2	8.5	8.1	Yes	Yes
Senegal	MIC	7.0	5.8	5.8	7.1	6.4	Yes	Yes
Bangladesh	MIC	10.7	9.5	10.2	11.5	9.7	Yes	Already
Belize	MIC	7.0	5.7	5.7	7.0	5.6	Yes	Already
Tunisia	MIC	4.7	3.4	4.6	5.9	4.4	Yes	Already
Botswana	MIC	25.9	24.7	3.7	5.0	4.6	No	Yes
Brazil	MIC	5.0	3.8	7.7	9.0	8.1	Already	Yes
Cameroon	MIC	9.4	8.2	3.9	5.2	5.0	No	Yes
Chile	HIC	9.0	7.8	6.6	7.9	6.7	No	Yes
Dominican Republic	MIC	19.4	18.1	5.8	7.1	6.2	No	Yes
Ecuador	MIC	6.5	5.3	6.7	8.0	7.2	Already	Yes
Finland	HIC	7.1	5.9	4.8	6.1	4.9	No	Yes
France	HIC	2.8	1.6	3.9	5.2	4.2	Already	Yes
Guatemala	MIC	10.6	9.3	7.2	8.5	7.9	No	Yes
Kenya	MIC	4.3	3.1	6.9	8.2	8.0	Already	Yes
Mauritius	MIC	12.7	11.5	5.2	6.5	5.5	No	Yes
Pakistan	MIC	8.9	7.7	4.6	5.9	5.8	No	Yes
Paraguay	MIC	14.4	13.1	5.2	6.5	5.8	No	Yes
Slovenia	HIC	5.0	3.8	6.6	7.9	6.7	Already	Yes
South Africa	MIC	12.2	11.0	4.9	6.2	5.5	No	Yes
United States	HIC	1.9	0.6	5.1	6.4	5.7	Already	Yes
Costa Rica	MIC	11.8	10.6	7.8	9.1	6.8	No	Already
Czechia	HIC	13.9	12.7	8.9	10.2	8.8	No	Already
Netherlands	HIC	9.5	8.3	5.2	6.5	5.2	No	Already
Peru	MIC	10.5	9.3	9.0	10.3	7.8	No	Already
Solomon Islands	MIC	8.2	7.0	4.3	5.6	4.3	No	Already
Switzerland	HIC	28.8	27.6	5.6	6.9	5.3	No	Already
Uruguay	HIC	8.6	7.4	6.8	8.1	6.6	No	Already

The suffix *_sd* is attached to parameters that were amended using one-tenth of their standard deviation. In the case of exports, an increase of one-tenth (1.30). In the case of the yield a decrease of one-tenth (1.22). The two columns at the right report whether (C1) and (C2) have changed status toward being accepted or whether they already were accepted before. Calculations based on the *World Bank WDI* (2026b), the *IMF BoP Statistics* (IMF 2026a) and the *EWN Database* (Milesi-Ferretti 2026). Income groups from the *World Bank income classifications* (2026a).

Appendix A.8. Robustness Checks

Appendix A.8.1. Estimation Results with demeaned Data

The first robustness check demeans the logged variables used in the regression. The only exception is world GDP which is constant across all countries and cannot be demeaned if the income elasticity of exports is of interest.

The regressions of the import and export demand functions using demeaned data provide results that are difficult to reconcile with theory and other empirical investigations (Tables A.8.1.1 to A.8.1.3). For the HIC subsample the error correction term remains negative and statistically significant but the Hausman test flips for both demand functions compared to the main results. The point estimates also change considerably. For import demand, the PMG point estimates sit at 0.990 (dm_lnY) and -0.046 (dm_lnREER). The import demand function is again sensitive to the exclusion of the Netherlands and Portugal. The point estimate of the price elasticity turns positive and insignificant. Therefore, only the import estimates excluding Portugal and the Netherlands are used.

The point estimates for the export demand elasticities lack economic interpretability. For the 18-country sample, the MG estimator provides an income elasticity of exports of -0.299 and a price elasticity of -0.965. Without the Netherlands and Portugal, the PMG estimator with point estimates of 0.018 (lnZ) and -0.228 (dm_lnREER) is chosen. The values for the income elasticity of exports suggest that demeaning strips away important variations in the data or that the necessity to use undemeaned data for world GDP creates estimation difficulties when combined with demeaned variables.

The dubious results from the panel regressions translate to the McCombie tests (Table A.8.1.4). Here, the estimates from the estimators selected by the Hausman test result in a negative BoP-consistent income elasticity of imports, driven by the negative income elasticity of world income. Using the estimators selected in Section 5.2, the estimated elasticity is 1.069 and the BoP-consistent elasticities range between 0.208 and 0.298. Driven by large standard errors (0.646), the McCombie test does not reject the null hypothesis, however.

For the MICs, the estimates are also lower, but more interpretable (Tables A.8.1.5 to A.8.1.7). The error correction term continues to identify a long-run relationship and the PMG estimator continues to be chosen across all specifications. Interestingly, the price elasticity of exports now is significant and takes the expected sign. The McCombie test again does not reject the null hypothesis at the 5 percent level for the two MIC24 specifications using the FDI-amended version of Thirlwall's law (Table A.8.1.8). These findings highlight that there are multiple combinations of parameters that bring about an acceptance of Thirlwall's law via the McCombie test.

Consequently, the parameters of each individual estimate should be interpreted with caution. The robustness of Thirlwall's law across specifications (and study samples) suggests, however, that the estimation does not procure random results and that the relationship between imports, exports, incomes, real price movements and financial flows determined economic growth for the MICs subsample. Nonetheless, the estimates obtained from the baseline regressions in Section 5 are closer to the estimates obtained in other studies and align better with economic

theory. The demeaning of the data, therefore, seems to distort the estimates rather than correct distortions arising from cross-sectional dependence.

Table A.8.1.1 – HIC18 Import and Export Demand, Demeaned

	(1) PMG Import	(2) MG Import	(3) PMG Export	(4) MG Export
Long-run				
dm_lnY	0.990*** (0.087)	1.069* (0.646)		
dm_lnREER_inv	-0.046 (0.084)	0.090 (0.361)		
lnZ			0.236*** (0.058)	-0.299 (0.215)
dm_lnREER			-1.057*** (0.269)	-0.965*** (0.304)
Short-run				
ECT	-0.187*** (0.049)	-0.325*** (0.052)	-0.074*** (0.021)	-0.278*** (0.032)
D.dm_lnY	1.227*** (0.117)	1.144*** (0.127)		
D.dm_lnREER_inv	-0.146*** (0.056)	-0.107* (0.062)		
D.lnZ			0.005 (0.235)	-0.031 (0.203)
D.dm_lnREER			-0.052 (0.060)	0.066 (0.061)
_cons	0.035 (0.045)	-0.018 (0.183)	-0.393** (0.157)	0.291 (0.929)
N	495	495	557	557
Hausman chi2	0.116		8.069	
p-value	0.944		0.018	
Log Likelihood	936.934	985.154	1023.870	1088.480

Import estimates excluding Portugal and the Netherlands. Export estimates on full 18-country subsample. ECT: error correction term. D. represents first differences of variables. dm_ represents demeaned variables.

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.1.2 – HIC16 Spec. 1 Import and Export Demand, Demeaned

	(1) PMG Import	(2) MG Import	(3) PMG Export	(4) MG Export
Long-run				
dm_lnY	0.990*** (0.087)	1.069* (0.646)		
dm_lnREER_inv	-0.046 (0.084)	0.090 (0.361)		
lnZ			0.236*** (0.058)	-0.299 (0.215)
dm_lnREER			-1.057*** (0.269)	-0.965*** (0.304)
Short-run				
ECT	-0.187*** (0.049)	-0.325*** (0.052)	-0.074*** (0.021)	-0.278*** (0.032)
D.dm_lnY	1.227*** (0.117)	1.144*** (0.127)		
D.dm_lnREER_inv	-0.146*** (0.056)	-0.107* (0.062)		
D.lnZ			0.005 (0.235)	-0.031 (0.203)
D.dm_lnREER			-0.052 (0.060)	0.066 (0.061)
_cons	0.035 (0.045)	-0.018 (0.183)	-0.393** (0.157)	0.291 (0.929)
N	495	495	557	557
Hausman chi2	0.116		8.069	
p-value	0.944		0.018	
Log Likelihood	936.934	985.154	1023.870	1088.480

Import estimates excluding Portugal and the Netherlands. Export estimates on full 18-country subsample. ECT: error correction term. D. represents first differences of variables. dm_ represents demeaned variables.

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.1.3 – HIC16 Spec. 2 Import and Export Demand, Demeaned

	(1) PMG Import	(2) MG Import	(3) PMG Export	(4) MG Export
Long-run				
dm_lnY	0.990*** (0.087)	1.069* (0.646)		
dm_lnREER_inv	-0.046 (0.084)	0.090 (0.361)		
lnZ			0.018 (0.052)	-0.259 (0.226)
dm_lnREER			-0.228** (0.090)	-0.744** (0.302)
Short-run				
ECT	-0.187*** (0.049)	-0.325*** (0.052)	-0.120*** (0.036)	-0.274*** (0.034)
D.dm_lnY	1.227*** (0.117)	1.144*** (0.127)		
D.dm_lnREER_inv	-0.146*** (0.056)	-0.107* (0.062)		
D.lnZ			-0.050 (0.233)	-0.036 (0.219)
D.dm_lnREER			-0.095* (0.057)	0.023 (0.042)
_cons	0.035 (0.045)	-0.018 (0.183)	-0.208 (0.133)	0.125 (1.042)
N	495	495	495	495
Hausman chi2	0.116		2.659	
p-value	0.944		0.265	
Log Likelihood	936.934	985.154	882.903	934.328

All estimates excluding Portugal and the Netherlands. ECT: error correction term. D. represents first differences of variables. dm_ represents demeaned variables.

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8.1.4 – McCombie Test Results HICs, Demeaned

	HIC18	HIC16 Spec. 1	HIC16 Spec. 2	HIC18 Alt	HIC16 Spec. 1 Alt
Estimated $\hat{\pi}$	1.069	1.069	1.069	0.990	0.990
π_{Th}	0.298	0.282	0.218	-0.372	-0.351
π_{FDI} median	0.289	0.276	0.208	-0.386	-0.364
Difference $\hat{\pi} - \pi_{Th}$	0.771	0.787	0.851	1.362	1.341
Difference $\hat{\pi} - \pi_{FDI}$ median	0.780	0.793	0.861	1.376	1.354
Wald $\chi^2 \hat{\pi} - \pi_{Th}$	1.423	1.483	1.736	245.050	237.510
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ median	1.457	1.506	1.778	250.240	242.224
p-value H0: $\hat{\pi} = \pi_{Th}$	0.233	0.223	0.188	0.000	0.000
p-value H0: $\hat{\pi} = \pi_{FDI}$ median	0.227	0.220	0.182	0.000	0.000

Baseline estimators mirrored in the first three columns. The Alternative specifications use the estimates for the PMG import elasticity estimates and the MG export elasticity estimates that are the preferred estimates after demeaning.

HIC18: $\pi=1.069$, $\psi=0.090$, $\varepsilon=0.236$, $\eta=-1.057$, Standard errors = 0.646. Full 18-country weights and growth rates, 16-country import elasticities, 18-country export elasticities.

HIC16 Spec. 1: $\pi=1.069$, $\psi=0.090$, $\varepsilon=0.236$, $\eta=-1.057$, Standard errors = 0.646. 16-country weights and growth rates, 16-country import elasticities, 18-country export elasticities.

HIC16 Spec. 2: $\pi=1.069$, $\psi=0.090$, $\varepsilon=0.018$, $\eta=-0.228$, Standard errors = 0.646. 16-country weights, growth rates and elasticities.

HIC18 Alt: $\pi=0.990$, $\psi=-0.046$, $\varepsilon=-0.299$, $\eta=-0.965$, Standard errors = 0.087. Full 18-country weights and growth rates.

HIC16 Spec. 1 Alt: $\pi=0.990$, $\psi=-0.046$, $\varepsilon=-0.299$, $\eta=-0.965$, Standard errors = 0.087. 16-country weights and growth rates, 16-country import elasticities, 18-country export elasticities.

Table A8.1.5 – MIC24 Spec. 1 Import and Export Demand, Demeaned

	(1) PMG Import	(2) MG Import	(3) PMG Export	(4) MG Export
Long-run				
dm_lnY	0.670*** (0.114)	0.728** (0.291)		
dm_lnREER_inv	-0.287*** (0.063)	-0.050 (0.241)		
lnZ			0.311*** (0.053)	0.483 (0.471)
dm_lnREER			-0.265** (0.118)	-1.628 (1.378)
Short-run				
ECT	-0.181*** (0.025)	-0.292*** (0.035)	-0.153*** (0.019)	-0.363*** (0.037)
D.dm_lnY	1.015*** (0.124)	0.896*** (0.140)		
D.dm_lnREER_inv	0.006 (0.077)	-0.095 (0.076)		
D.lnZ			-0.133 (0.250)	-0.304 (0.240)
D.dm_lnREER			-0.244*** (0.079)	-0.143* (0.078)
_cons	-0.031 (0.029)	-0.189 (0.168)	-0.858*** (0.124)	-1.049 (1.706)
N	742	742	742	742
Hausman chi2	0.847		3.053	
p-value	0.655		0.217	
Log Likelihood	1056.549	1110.915	961.641	1034.248

All estimates on full 24-country subsample. ECT: error correction term. D. represents first differences of variables. dm_ represents demeaned variables.

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8.1.6 – MIC24 Spec. 2 Import and Export Demand, Demeaned

	(1) PMG Import	(2) MG Import	(3) PMG Export	(4) MG Export
Long-run				
dm_lnY	0.670*** (0.114)	0.728** (0.291)		
dm_lnREER_inv	-0.287*** (0.063)	-0.050 (0.241)		
lnZ			0.301*** (0.051)	0.070 (0.157)
dm_lnREER			-0.309** (0.123)	-0.295* (0.164)
Short-run				
ECT	-0.181*** (0.025)	-0.292*** (0.035)	-0.161*** (0.022)	-0.394*** (0.036)
D.dm_lnY	1.015*** (0.124)	0.896*** (0.140)		
D.dm_lnREER_inv	0.006 (0.077)	-0.095 (0.076)		
D.lnZ			-0.155 (0.256)	-0.307 (0.250)
D.dm_lnREER			-0.222*** (0.070)	-0.117* (0.071)
_cons	-0.031 (0.029)	-0.189 (0.168)	-0.883*** (0.147)	-1.082 (1.819)
N	742	742	680	680
Hausman chi2	0.847		1.564	
p-value	0.655		0.457	
Log Likelihood	1056.549	1110.915	889.949	957.443

Import elasticities estimated on full 24-country sample. Export elasticities excluding the Solomon Islands and Kenya. ECT: error correction term. D. represents first differences of variables. dm_ represents demeaned variables.

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8.1.7 – MIC22 Import and Export Demand, Demeaned

	(1) PMG Import	(2) MG Import	(3) PMG Export	(4) MG Export
Long-run				
dm_lnY	0.691*** (0.112)	1.034*** (0.299)		
dm_lnREER_inv	-0.281*** (0.070)	0.185 (0.275)		
lnZ			0.301*** (0.051)	0.070 (0.157)
dm_lnREER			-0.309** (0.123)	-0.295* (0.164)
Short-run				
ECT	-0.170*** (0.026)	-0.288*** (0.039)	-0.161*** (0.022)	-0.394*** (0.036)
D.dm_lnY	1.025*** (0.133)	0.899*** (0.148)		
D.dm_lnREER_inv	-0.015 (0.080)	-0.119 (0.082)		
D.lnZ			-0.155 (0.256)	-0.307 (0.250)
D.dm_lnREER			-0.222*** (0.070)	-0.117* (0.071)
_cons	-0.031 (0.028)	-0.216 (0.176)	-0.883*** (0.147)	-1.082 (1.819)
N	680	680	680	680
Hausman chi2	3.403		1.564	
p-value	0.182		0.457	
Log Likelihood	1000.331	1054.277	889.949	957.443

All estimates on 22-country subsample excluding the Solomon Islands and Kenya. ECT: error correction term. D. represents first differences of variables. dm_ represents demeaned variables.

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8.1.8 – McCombie Test Results MICs, Demeaned

	MIC24 Spec. 1	MIC24 Spec. 2	MIC22
Estimated $\hat{\pi}$	0.670	0.670	0.691
π_{Th}	0.302	0.291	0.268
π_{FDI} median	0.473	0.464	0.421
Difference $\hat{\pi} - \pi_{Th}$	0.368	0.379	0.423
Difference $\hat{\pi} - \pi_{FDI}$ median	0.197	0.206	0.270
Wald $\chi^2 \hat{\pi} - \pi_{Th}$	10.412	11.055	14.277
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ median	2.981	3.273	5.796
p-value $H_0: \hat{\pi} = \pi_{Th}$	0.001	0.001	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ median	0.084	0.070	0.016

All estimators consistent with baseline (PMG throughout; demeaned Hausman tests all confirm PMG).

MIC24 Spec. 1: $\pi=0.670$, $\psi=-0.287$, $\varepsilon=0.311$, $\eta=-0.265$, Standard errors = 0.114. Full 24-country weights and growth rates

MIC24 Spec. 2: $\pi=0.670$, $\psi=-0.287$, $\varepsilon=0.301$, $\eta=-0.309$, Standard errors = 0.114. Full 24-country weights and rates, 24-country import elasticities, 22-country export elasticities.

MIC22: $\pi=0.691$, $\psi=-0.281$, $\varepsilon=0.301$, $\eta=-0.309$, Standard errors = 0.112. 22-country weights, rates and elasticities.

Appendix A.8.2. Disaggregation of the MICs Subsample

The second robustness check disaggregates the MICs subsample into 10 MICs and 14 UMICs. For the UMICs the Hausman test selects the PMG estimator and the income elasticities are estimated at 1.082 for the imports and 1.116 for the exports. The price elasticities are both negative and larger in absolute value than at the aggregate level (Table A.8.2.1 and A.8.2.2). For the MICs the demand functions are estimated both with and without Kenya and the Solomon Islands. The import demand function is consistently estimated across both specifications, featuring the same point estimate (1.402) and standard error (0.029) for the income elasticity. The price elasticity, in turn, is statistically significant and positive, sitting above 0.4 for both subsamples (Tables A.8.2.3 and A.8.2.5).

This indicates significant differences between the UMICs and the MICs and further indicates that some underlying factor drives a “perverse” price elasticity of import demand for MICs. For the full LMIC subsample, the MG estimator is chosen for export demand, but the point estimate of the world income elasticity (1.429) and the point estimate of the price elasticity (0.848) are insignificant. This is caused by the large standard errors of Kenya and the Solomon Islands. Without these two countries the PMG estimator is selected and the point estimates sit at 1.230 and -2.078 (Tables A.8.2.4 and A.8.2.6). These large differences are likely driven by the small sample size and the increased influence of outliers in small samples. Pesaran et al. (1999) show that the PMG and MG estimator can handle a sample with 10 cross-sections. The estimates for the MICs are right at this lower bound and the results should be interpreted with caution. Nonetheless, the income elasticities still yield comparable values and are in line with the MICs results. For completeness, both the 10-country and 8-country estimates are included in the McCombie test.

The McCombie test for the UMIC subsample accepts the baseline model at the common confidence levels and the FDI-amended version is not rejected at the 1 percent level. The difference between the estimated elasticity and the π_{FDI} is 0.078, indicating that the rejection of Thirlwall’s law is again driven by small standard errors instead of poor predictive power. The LMIC specification is rejected for all models except the 10-country baseline BPCG model. The FDI-amended version with median growth rates still produces a reasonable approximation but is rejected due to the small standard errors. The version using mean growth rates produces implausible results, highlighting the distortive contribution of outlier growth rates (Table A.8.2.7).

All in all, the findings of this robustness check mirror the findings of the baseline estimates in Section 5.1 and 5.2 although the baseline model now outperforms the FDI-amended model on the McCombie test.

Table A.8.2.1 – UMIC Import Demand Equation

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.082*** (0.034)	1.412*** (0.177)	1.089*** (0.031)	1.320*** (0.168)
lnREER_inv	-0.151* (0.086)	0.372 (0.479)	-0.083 (0.074)	0.348 (0.381)
Short-run				
ECT	-0.190*** (0.047)	-0.360*** (0.031)	-0.224*** (0.057)	-0.425*** (0.045)
D.lnY	1.949*** (0.217)	1.659*** (0.208)	1.909*** (0.219)	1.563*** (0.187)
LD.lnY			-0.045 (0.185)	0.065 (0.165)
D.lnREER_inv	-0.065 (0.076)	-0.107* (0.062)	-0.107* (0.059)	-0.106 (0.066)
LD.lnREER_inv			0.051 (0.135)	-0.012 (0.080)
LD.lnM			-0.021 (0.064)	0.006 (0.051)
_cons	-0.600*** (0.154)	-2.575** (1.061)	-0.651*** (0.180)	-2.908** (1.158)
N	432	432	418	418
Hausman chi2	2.589		2.136	
p-value	0.274		0.344	
Log Likelihood	665.154	708.763	687.501	735.593

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.2.2 – UMIC Export Demand Equation

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	1.116*** (0.060)	1.108*** (0.126)	0.900*** (0.049)	1.201*** (0.155)
lnREER	-0.334*** (0.108)	-0.254 (0.166)	-0.042 (0.082)	0.545 (0.596)
Short-run				
ECT	-0.165*** (0.033)	-0.305*** (0.045)	-0.196*** (0.045)	-0.369*** (0.057)
D.lnZ	2.805*** (0.351)	2.574*** (0.344)	2.813*** (0.324)	2.516*** (0.331)
LD.lnZ			-0.016 (0.284)	-0.038 (0.285)
D.lnREER	0.051 (0.070)	0.063 (0.070)	0.044 (0.085)	0.054 (0.066)
LD.lnREER			-0.137 (0.115)	-0.198 (0.178)
LD.lnX			0.056 (0.053)	0.101* (0.060)
_cons	-0.980*** (0.221)	-1.841** (0.807)	-0.680*** (0.227)	-3.384** (1.402)
N	432	432	418	418
Hausman chi2	0.260		3.143	
p-value	0.878		0.208	
Log Likelihood	682.848	715.524	697.246	730.865

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.2.3 – LMIC Import Demand Equation

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.402*** (0.029)	1.386*** (0.103)	1.402*** (0.029)	1.746*** (0.219)
lnREER_inv	0.448*** (0.074)	-0.121 (0.319)	0.391*** (0.084)	0.364 (0.555)
Short-run				
ECT	-0.348*** (0.073)	-0.442*** (0.076)	-0.392*** (0.077)	-0.492*** (0.096)
D.lnY	2.187*** (0.828)	2.064** (0.822)	2.212*** (0.723)	2.172** (0.892)
LD.lnY			-0.275 (0.436)	0.201 (0.456)
D.lnREER_inv	0.027 (0.069)	-0.041 (0.136)	-0.119 (0.081)	-0.280* (0.160)
LD.lnREER_inv			0.044 (0.185)	-0.077 (0.126)
LD.lnM			0.110 (0.069)	0.070 (0.050)
_cons	-1.676*** (0.353)	-3.002*** (0.676)	-1.945*** (0.371)	-3.221*** (0.999)
N	310	310	300	300
Hausman chi2	3.928		2.227	
p-value	0.140		0.328	
Log Likelihood	380.802	404.688	399.087	419.949

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.2.4 – LMIC Export Demand Equation

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	1.272*** (0.133)	1.429 (0.914)	1.281*** (0.093)	1.985*** (0.305)
lnREER	-2.275*** (0.613)	0.848 (1.890)	-2.251*** (0.436)	-0.531 (0.369)
Short-run				
ECT	-0.083*** (0.029)	-0.320*** (0.059)	-0.125* (0.067)	-0.447*** (0.061)
D.lnZ	2.434*** (0.341)	1.762*** (0.313)	2.322*** (0.415)	1.632*** (0.316)
LD.lnZ			-0.120 (0.385)	-0.381 (0.325)
D.lnREER	-0.428** (0.187)	-0.197 (0.227)	-0.372 (0.237)	-0.151 (0.271)
LD.lnREER			-0.114 (0.125)	0.060 (0.169)
LD.lnX			0.106 (0.074)	0.238*** (0.083)
_cons	0.088 (0.093)	-7.530** (3.474)	0.181 (0.164)	-9.855** (4.179)
N	310	310	300	300
Hausman chi2	21.820		89.696	
p-value	0.000		0.000	
Log Likelihood	389.686	421.032	400.278	436.135

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.2.5 – LMIC Import Demand Equation excluding Kenya and Solomon Islands

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.402*** (0.029)	1.420*** (0.122)	1.395*** (0.030)	1.745*** (0.269)
lnREER_inv	0.469*** (0.076)	-0.138 (0.402)	0.393*** (0.087)	0.220 (0.677)
Short-run				
ECT	-0.343*** (0.089)	-0.450*** (0.094)	-0.381*** (0.084)	-0.506*** (0.115)
D.lnY	2.336** (1.052)	2.133** (1.039)	2.248** (0.920)	2.298** (1.125)
LD.lnY			-0.278 (0.537)	0.431 (0.510)
D.lnREER_inv	0.068 (0.075)	-0.006 (0.168)	-0.027 (0.062)	-0.208 (0.187)
LD.lnREER_inv			0.174 (0.189)	0.023 (0.104)
LD.lnM			0.135* (0.080)	0.082 (0.059)
_cons	-1.755*** (0.429)	-3.279*** (0.815)	-2.025*** (0.440)	-3.623*** (1.221)
N	248	248	240	240
Hausman chi2	3.162		1.262	
p-value	0.206		0.532	
Log Likelihood	326.979	349.757	339.918	360.047

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.2.6 – LMIC Export Demand Equation excluding Kenya and Solomon Islands

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	1.230*** (0.123)	1.849*** (0.373)	1.278*** (0.093)	1.941*** (0.364)
lnREER	-2.078*** (0.548)	-0.645* (0.358)	-2.256*** (0.437)	-0.491 (0.447)
Short-run				
ECT	-0.100*** (0.037)	-0.385*** (0.048)	-0.151* (0.082)	-0.487*** (0.068)
D.lnZ	2.575*** (0.371)	1.868*** (0.301)	2.467*** (0.464)	1.681*** (0.316)
LD.lnZ			-0.113 (0.488)	-0.311 (0.407)
D.lnREER	-0.345 (0.228)	-0.092 (0.267)	-0.180 (0.239)	0.018 (0.297)
LD.lnREER			-0.166 (0.136)	-0.021 (0.180)
LD.lnX			0.036 (0.062)	0.156*** (0.055)
_cons	0.156 (0.099)	-8.048* (4.302)	0.270 (0.201)	-10.626** (5.258)
N	248	248	240	240
Hausman chi2	-27.070		22.413	
p-value	1.000		0.000	
Log Likelihood	326.823	352.307	328.256	357.638

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.2.7 – McCombie Test Results: UMICs and MICs

	UMIC	LMIC (PMG)	LMIC (MG)	LMIC drop (PMG)
Estimated $\hat{\pi}$	1.082	1.402	1.402	1.402
π_{Th}	1.067	1.028	1.351	1.019
π_{FDI} mean	5.255	-994.926	-994.672	-1246.039
π_{FDI} median	1.004	1.310	1.564	1.278
Difference $\hat{\pi} - \pi_{Th}$	0.015	0.374	0.051	0.383
Difference $\hat{\pi} - \pi_{FDI}$ mean	-4.173	996.328	996.074	1247.441
Difference $\hat{\pi} - \pi_{FDI}$ median	0.078	0.092	-0.162	0.124
Wald $\chi^2 \hat{\pi} - \pi_{Th}$	0.204	166.577	3.088	174.709
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ mean	15063.918	1.18e+09	1.18e+09	1.85e+09
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ median	5.326	10.097	31.231	18.407
p-value $H_0: \hat{\pi} = \pi_{Th}$	0.652	0.000	0.079	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ mean	0.000	0.000	0.000	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ median	0.021	0.001	0.000	0.000

π estimated via PMG ARDL(1,1,1). Mean and median aggregation reported for FDI flow terms.

UM: $\pi=1.082$, $\psi=-0.151$, $\varepsilon=1.116$, $\eta=-0.334$. Standard errors = 0.034.

LM (PMG): $\pi=1.402$, $\psi=0.448$, $\varepsilon=1.272$, $\eta=-2.275$. Standard errors = 0.029.

LM (MG): $\pi=1.402$, $\psi=0.448$, $\varepsilon=1.429$, $\eta=0.848$. Standard errors = 0.029.

LM drop (PMG): excl. KEN & SLB. $\pi=1.402$, $\psi=0.469$, $\varepsilon=1.230$, $\eta=-2.078$. Standard errors = 0.029.

Appendix A.8.3. McCombie Test of Weak Thirlwall's Law

The third robustness check estimates the weak version of Thirlwall's law. Here, two versions are estimated using the elasticities from Section 5.1. Usually, the weak version of Thirlwall's law is estimated by assuming ($p_d - p_f - e = 0$) so Eq. (6) simplifies to Eq. (8). Yet, the ARDL estimates so far show that relative price movements are at times significant and sizable. Therefore, one version conducts the McCombie test using Eq. (8) and another estimates an intermediate approach where $\ln X$ is used but the price term is not excluded.

For the HICs, all models in Table A.8.3.1 consistently overpredict the income elasticity and the differences between the BoP-consistent elasticities and the estimated elasticity are larger. Only the HIC16 specification still accepts the null hypothesis at the 1 percent level for both the baseline and the FDI-amended model – with the FDI-amended model producing marginally better results. The differences arising from the exclusion of the price term are marginal as expected from the small impact of the REER in the growth decomposition.

For the MICs, the null hypothesis is not rejected at the 1 percent level for the baseline model across all specifications and the BoP-consistent elasticity is slightly below the estimated one. The FDI-amended version, in turn, overpredicts the income elasticity consistently and is rejected (Table A.8.3.2). This asymmetry is not found for the HIC subsample and also does not occur in Section 5.2.

A possible interpretation could be that FDI has on average contributed positively to exports in the MICs subsample. When estimating the world income elasticity with country-specific intercepts, the effect of FDI on exports might be shifted into the intercept or the error term and the income elasticity is correctly identified. If $\ln X$ is used, however, the positive effect of FDI on exports now appears in the export term as well, overstating the effect that world income growth had on the BoP-constraint. The test of the weak version seems to pick up positive effects from FDI on the export volume that the model in Section 5.1 filters out through the estimation of the income elasticity. If this is the case, the finding that only the MICs subsample features this overestimation suggests that FDI did not on average improve export performance for the HIC subsample.

Table A.8.3.1 – McCombie Test Results HICs, Weak Thirlwall's law

	HIC18 (price)	HIC18 (no price)	HIC16 (price)	HIC16 (no price)
Estimated $\hat{\pi}$	1.704	1.704	1.704	1.704
π_{Th}	2.034	2.051	1.961	1.979
π_{FDI} mean	2.648	2.665	2.597	2.615
π_{FDI} median	2.023	2.039	1.950	1.968
Difference $\hat{\pi} - \pi_{Th}$	-0.330	-0.347	-0.257	-0.275
Difference $\hat{\pi} - \pi_{FDI}$ mean	-0.944	-0.961	-0.893	-0.911
Difference $\hat{\pi} - \pi_{FDI}$ median	-0.319	-0.335	-0.246	-0.264
Wald $\chi^2 \hat{\pi} - \pi_{Th}$	7.713	8.508	4.672	5.348
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ mean	62.941	65.178	56.354	58.644
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ median	7.172	7.940	4.289	4.938
p-value $H_0: \hat{\pi} = \pi_{Th}$	0.005	0.004	0.031	0.021
p-value $H_0: \hat{\pi} = \pi_{FDI}$ mean	0.000	0.000	0.000	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ median	0.007	0.005	0.038	0.026

Observed export growth rates replace estimated export demand.

$H_0: \hat{\pi} = \pi_{Th}$. (price) still includes the price term. (no price) assumes ($p_d - p_f - e = 0$)

Estimates taken from Table 4: $\pi=1.704$, $\psi=-0.226$, $\eta=-0.858$, Standard errors = 0.119

Table A.8.3.2 – McCombie Test Results MIC, Weak Thirlwall's law

	MIC24 (price)	MIC24 (no price)	MIC22 (price)	MIC22 (no price)
Estimated $\hat{\pi}$	1.175	1.175	1.176	1.176
π_{Th}	1.138	1.096	1.107	1.104
π_{FDI} mean	3.099	3.057	2.865	2.861
π_{FDI} median	1.339	1.297	1.288	1.285
Difference $\hat{\pi} - \pi_{Th}$	0.037	0.079	0.069	0.072
Difference $\hat{\pi} - \pi_{FDI}$ mean	-1.924	-1.882	-1.689	-1.685
Difference $\hat{\pi} - \pi_{FDI}$ median	-0.164	-0.122	-0.112	-0.109
Wald $\chi^2 \hat{\pi} - \pi_{Th}$	1.408	6.474	4.954	5.401
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ mean	3852.486	3685.784	2966.821	2956.131
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ median	28.100	15.549	13.042	12.342
p-value H0: $\hat{\pi} = \pi_{Th}$	0.235	0.011	0.026	0.020
p-value H0: $\hat{\pi} = \pi_{FDI}$ mean	0.000	0.000	0.000	0.000
p-value H0: $\hat{\pi} = \pi_{FDI}$ median	0.000	0.000	0.000	0.000

Observed export growth rates replace estimated export demand.

H0: $\hat{\pi} = \pi_{Th}$. (price) still includes the price term. (no price) assumes $(p_d - p_f - e = 0)$

MIC24: $\pi=1.175$, $\psi=0.099$, $\eta=-0.374$, Standard errors = 0.031. Full 24-country weights and observed export growth rates.

MIC22: $\pi=1.176$, $\psi=0.116$, $\eta=-0.322$, Standard errors = 0.031. Weights and observed export growth rates excl. SLB & KEN.

MIC24 (price) uses Spec. 1 $\eta=-0.374$; Spec. 2 ($\eta=-0.322$) gives near-identical results and is not reported separately.

Appendix A.8.4. Results excluding Covid-19 Pandemic

Lastly, a robustness check excluding the Covid-19 pandemic is conducted. Australia's export demand, the Philippines' import demand and Mexico's export demand function now feature a statistically significant error correction term despite fewer observations and lower estimation precision. The Covid-19 pandemic and the accompanying disruptions to trade, income and consumption patterns likely caused the estimation imprecision not found in the reduced time series.

The updated ARDL regressions produce similar import elasticity estimates compared to the ones obtained in Section 5.1. The export elasticities, however, are more heavily affected by the exclusion of the Covid years. The HIC estimates are now sensitive to the inclusion of the outlier countries discussed in Section 5.1 and the coefficients of the income elasticity of exports in Tables A.8.4.4 and A.8.4.5 are implausibly low. Therefore, a third regression based on the 12-country subsample is run (Table A.8.4.6). The MG estimator is selected and finds a world income elasticity of 1.474 and a price elasticity of -0.863. The MICs regression of the export demand function, in turn, return higher estimates of the income elasticity for both the 24- and 22-country subsamples (Tables A.8.4.9 to A.8.4.11). The exclusion of Kenya and the Solomon Islands again reduces the standard errors substantively and reduces the point estimate from 1.836 to 1.426.

The HIC McCombie test, therefore, uses the 12-country export elasticities instead of the 18-country elasticities. Thirlwall's law is again accepted for both the baseline and FDI-amended median version of the HIC18 and HIC16 Spec. 1 although the baseline version now outperforms the FDI-amended version (Table A.8.4.12). The MICs McCombie test now consistently rejects the null hypothesis for all specifications and the BoP-consistent income elasticity is consistently greater than the estimated one, indicating that the MICs subsample was not BoP-constrained prior to the Covid-19 pandemic (Table A.8.4.13). This provides support for Moreno-Brid et al.'s (2022) argument that sudden changes in global risk appetite can lead to a sudden tightening and enforcement of the BoP-constraint.

The findings from the McCombie test also translate to the growth decompositions where the BoP-consistent MICs average growth rate is larger than the observed growth rate for both the 24- and 22-country export elasticities (Table A.8.4.15 and A.8.4.16). The HIC growth decomposition, again excluding the United States and Hungary, in turn, predicts the long-term average growth rate with an error of 0.003 percentage points (Table A.8.4.14). For both subsamples, the net contribution of FDI is again negative but closer to zero in line with the hypothesis that FDI constrains economic growth, particularly in the long run.

Table A.8.4.1 – HIC Import Demand Equation excl. Covid

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.188*** (0.069)	2.336*** (0.621)	1.100*** (0.073)	1.648*** (0.263)
lnREER_inv	-0.653*** (0.136)	1.812 (2.020)	-0.871*** (0.147)	-0.087 (1.027)
Short-run				
ECT	-0.104*** (0.029)	-0.344*** (0.055)	-0.103*** (0.030)	-0.305*** (0.064)
D.lnY	2.048*** (0.150)	1.687*** (0.186)	2.137*** (0.191)	1.774*** (0.231)
LD.lnY			-0.114 (0.187)	-0.079 (0.187)
D.lnREER_inv	0.002 (0.060)	-0.026 (0.057)	-0.027 (0.055)	-0.011 (0.058)
LD.lnREER_inv			0.112 (0.070)	0.082 (0.072)
LD.lnM			-0.101* (0.054)	-0.051 (0.054)
_cons	-0.703*** (0.195)	-4.163*** (1.086)	-0.661*** (0.191)	-3.599*** (1.298)
N	485	485	467	467
Hausman chi2	7.185		8.707	
p-value	0.028		0.013	
Log Likelihood	909.150	961.557	963.214	1002.476

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.2 – HIC Import Demand Equation excl. Covid (excluding Portugal and the Netherlands)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.188*** (0.069)	1.685*** (0.137)	1.101*** (0.073)	1.808*** (0.235)
lnREER_inv	-0.644*** (0.135)	-0.222 (0.165)	-0.869*** (0.147)	-0.972** (0.392)
Short-run				
ECT	-0.116*** (0.032)	-0.379*** (0.055)	-0.114*** (0.033)	-0.342*** (0.066)
D.lnY	2.081*** (0.167)	1.664*** (0.206)	2.115*** (0.213)	1.710*** (0.255)
LD.lnY			-0.034 (0.197)	0.013 (0.195)
D.lnREER_inv	-0.034 (0.061)	-0.069 (0.055)	-0.057 (0.057)	-0.036 (0.062)
LD.lnREER_inv			0.122 (0.079)	0.091 (0.081)
LD.lnM			-0.100* (0.058)	-0.046 (0.058)
_cons	-0.779*** (0.212)	-4.514*** (1.191)	-0.737*** (0.209)	-4.077*** (1.417)
N	431	431	415	415
Hausman chi2	10.198		6.389	
p-value	0.006		0.041	
Log Likelihood	794.395	844.953	839.275	877.902

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.3 – HIC Import Demand Equation excl. Covid (excluding Portugal, the Netherlands, Finland, Korea, Switzerland and the United States)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.182*** (0.072)	1.663*** (0.179)	1.101*** (0.074)	1.594*** (0.177)
lnREER_inv	-0.698*** (0.145)	-0.225 (0.196)	-0.895*** (0.151)	-0.496* (0.284)
Short-run				
ECT	-0.135*** (0.037)	-0.451*** (0.059)	-0.128*** (0.042)	-0.413*** (0.076)
D.lnY	1.996*** (0.193)	1.486*** (0.226)	2.040*** (0.249)	1.521*** (0.286)
LD.lnY			-0.021 (0.226)	-0.033 (0.236)
D.lnREER_inv	-0.039 (0.077)	-0.106 (0.068)	-0.072 (0.073)	-0.068 (0.079)
LD.lnREER_inv			0.163 (0.102)	0.103 (0.107)
LD.lnM			-0.090 (0.061)	-0.008 (0.053)
_cons	-0.928*** (0.255)	-5.222*** (1.534)	-0.840*** (0.269)	-4.790*** (1.813)
N	323	323	311	311
Hausman chi2	5.312		4.969	
p-value	0.070		0.083	
Log Likelihood	562.927	608.361	606.632	638.563

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.4 – HIC Export Demand Equation excl. Covid

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.823*** (0.081)	0.445 (0.918)	1.455*** (0.022)	4.447 (3.210)
lnREER	-1.702*** (0.293)	-0.833 (0.610)	-0.966*** (0.141)	0.101 (0.735)
Short-run				
ECT	-0.067*** (0.013)	-0.237*** (0.050)	-0.120*** (0.028)	-0.276*** (0.059)
D.lnZ	2.823*** (0.348)	2.477*** (0.431)	2.656*** (0.316)	2.171*** (0.400)
LD.lnZ			-0.130 (0.308)	0.173 (0.225)
D.lnREER	-0.017 (0.048)	0.052 (0.068)	0.019 (0.069)	0.065 (0.068)
LD.lnREER			-0.090* (0.051)	-0.083* (0.047)
LD.lnX			0.109* (0.062)	0.016 (0.053)
_cons	0.404*** (0.090)	-2.727* (1.549)	-1.089*** (0.302)	-3.813* (1.958)
N	485	485	467	467
Hausman chi2	6.576		1.457	
p-value	0.037		0.483	
Log Likelihood	944.522	1019.169	963.147	1029.949

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.5 – HIC Export Demand Equation excl. Covid (excluding Portugal and the Netherlands)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.794*** (0.086)	0.317 (1.032)	0.773*** (0.070)	4.819 (3.613)
lnREER	-1.661*** (0.296)	-0.805 (0.689)	-1.413*** (0.252)	0.249 (0.822)
Short-run				
ECT	-0.069*** (0.014)	-0.225*** (0.055)	-0.066*** (0.015)	-0.262*** (0.065)
D.lnZ	2.824*** (0.393)	2.492*** (0.487)	2.694*** (0.338)	2.172*** (0.452)
LD.lnZ			0.090 (0.324)	0.096 (0.247)
D.lnREER	-0.033 (0.048)	0.007 (0.058)	-0.018 (0.055)	0.017 (0.056)
LD.lnREER			-0.122** (0.059)	-0.102** (0.051)
LD.lnX			0.031 (0.053)	0.043 (0.057)
_cons	0.448*** (0.100)	-2.639 (1.742)	0.397*** (0.116)	-3.809* (2.207)
N	431	431	415	415
Hausman chi2	5.540		3.664	
p-value	0.063		0.160	
Log Likelihood	808.274	862.070	833.403	876.349

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.6 – HIC Export Demand Equation excl. Covid (excluding Chile, the Czechia, Hungary, Korea, Slovenia and the USA)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.829*** (0.075)	1.474*** (0.200)	0.822*** (0.063)	1.494*** (0.205)
lnREER	-1.333*** (0.247)	-0.863*** (0.275)	-1.314*** (0.254)	-0.907*** (0.330)
Short-run				
ECT	-0.080*** (0.018)	-0.343*** (0.042)	-0.066*** (0.020)	-0.373*** (0.068)
D.lnZ	2.354*** (0.406)	1.775*** (0.466)	2.392*** (0.372)	1.603*** (0.488)
LD.lnZ			0.065 (0.371)	0.013 (0.262)
D.lnREER	-0.007 (0.064)	0.085 (0.087)	0.028 (0.071)	0.128 (0.097)
LD.lnREER			-0.149* (0.079)	-0.043 (0.051)
LD.lnX			0.003 (0.059)	0.042 (0.075)
_cons	0.258*** (0.068)	-5.072*** (1.861)	0.206** (0.084)	-6.257** (2.603)
N	324	324	312	312
Hausman chi2	6.540		6.077	
p-value	0.038		0.048	
Log Likelihood	626.743	681.559	641.651	684.833

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.7 – MICs Import Demand Equation excl. Covid

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.136*** (0.031)	1.397*** (0.117)	1.131*** (0.031)	1.317*** (0.141)
lnREER_inv	0.001 (0.065)	0.197 (0.274)	0.011 (0.065)	0.270 (0.268)
Short-run				
ECT	-0.241*** (0.040)	-0.404*** (0.036)	-0.267*** (0.048)	-0.474*** (0.044)
D.lnY	2.141*** (0.395)	1.995*** (0.518)	2.270*** (0.519)	1.969*** (0.580)
LD.lnY			-0.480 (0.540)	0.004 (0.286)
D.lnREER_inv	0.040 (0.074)	-0.075 (0.066)	-0.073 (0.053)	-0.141* (0.075)
LD.lnREER_inv			0.096 (0.118)	-0.031 (0.074)
LD.lnM			0.027 (0.047)	0.051 (0.043)
_cons	-0.775*** (0.123)	-2.781*** (0.718)	-0.779*** (0.132)	-2.985*** (0.866)
N	646	646	622	622
Hausman chi2	3.457		1.250	
p-value	0.178		0.535	
Log Likelihood	932.686	1009.429	994.124	1070.638

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.8 – MICs Import Demand Equation excl. Covid (excluding Solomon Islands and Kenya)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnY	1.132*** (0.031)	1.364*** (0.123)	1.120*** (0.031)	1.340*** (0.129)
lnREER_inv	-0.010 (0.067)	0.140 (0.296)	-0.019 (0.067)	0.218 (0.275)
Short-run				
ECT	-0.231*** (0.042)	-0.409*** (0.038)	-0.250*** (0.050)	-0.487*** (0.045)
D.lnY	2.189*** (0.430)	2.055*** (0.564)	2.313*** (0.568)	2.004*** (0.632)
LD.lnY			-0.557 (0.588)	0.017 (0.304)
D.lnREER_inv	0.056 (0.080)	-0.063 (0.071)	-0.040 (0.055)	-0.103 (0.076)
LD.lnREER_inv			0.156 (0.120)	0.010 (0.069)
LD.lnM			0.029 (0.051)	0.064 (0.045)
_cons	-0.761*** (0.134)	-2.825*** (0.775)	-0.746*** (0.141)	-3.282*** (0.916)
N	592	592	570	570
Hausman chi2	2.263		1.920	
p-value	0.323		0.383	
Log Likelihood	881.546	957.538	937.647	1011.965

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.9 – MICs Export Demand Equation excl. Covid

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.998*** (0.047)	1.836*** (0.494)	1.038*** (0.056)	1.758*** (0.298)
lnREER	-0.425*** (0.115)	-0.625 (0.522)	-0.206* (0.112)	0.483 (0.998)
Short-run				
ECT	-0.165*** (0.033)	-0.312*** (0.040)	-0.167*** (0.033)	-0.391*** (0.048)
D.lnZ	2.284*** (0.308)	1.939*** (0.311)	2.357*** (0.327)	1.866*** (0.333)
LD.lnZ			-0.651** (0.320)	-0.643** (0.317)
D.lnREER	-0.184** (0.089)	-0.076 (0.093)	-0.196** (0.091)	-0.012 (0.104)
LD.lnREER			-0.142 (0.089)	-0.071 (0.125)
LD.lnX			0.117** (0.049)	0.143*** (0.055)
_cons	-0.515*** (0.130)	-4.458*** (1.626)	-0.825*** (0.187)	-6.691*** (2.182)
N	646	646	622	622
Hausman chi2	8.574		4.502	
p-value	0.014		0.105	
Log Likelihood	972.524	1045.626	1009.775	1082.082

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.10 – MICs Export Demand Equation excl. Covid (excluding Solomon Islands and Kenya)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.993*** (0.047)	1.426*** (0.173)	1.026*** (0.055)	1.510*** (0.179)
lnREER	-0.423*** (0.116)	-0.327* (0.196)	-0.204* (0.115)	0.792 (1.045)
Short-run				
ECT	-0.174*** (0.036)	-0.346*** (0.033)	-0.173*** (0.036)	-0.399*** (0.051)
D.lnZ	2.256*** (0.326)	1.989*** (0.329)	2.364*** (0.354)	1.849*** (0.352)
LD.lnZ			-0.558 (0.340)	-0.500 (0.326)
D.lnREER	-0.126 (0.085)	-0.019 (0.083)	-0.121 (0.078)	0.026 (0.101)
LD.lnREER			-0.171* (0.093)	-0.118 (0.130)
LD.lnX			0.083* (0.046)	0.114** (0.049)
_cons	-0.520*** (0.140)	-4.347** (1.689)	-0.796*** (0.199)	-6.202*** (2.347)
N	592	592	570	570
Hausman chi2	7.163		4.944	
p-value	0.028		0.084	
Log Likelihood	915.244	976.783	942.253	1004.433

Standard errors in parentheses. ECT: error correction term. D. represents first differences of variables. LD. represents lagged first differences.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.11 – MICs Export Demand Equation excl. Covid (excluding Solomon Islands, Kenya, Belize, Brazil, Colombia, Mexico and South Africa)

	(1) PMG (1,1,1)	(2) MG (1,1,1)	(3) PMG (2,2,2)	(4) MG (2,2,2)
Long-run				
lnZ	0.951*** (0.051)	1.512*** (0.214)	0.997*** (0.055)	1.562*** (0.215)
lnREER	-0.187* (0.112)	-0.457** (0.198)	-0.128 (0.111)	-0.252 (0.253)
Short-run				
ECT	-0.204*** (0.041)	-0.405*** (0.030)	-0.207*** (0.045)	-0.473*** (0.053)
D.lnZ	2.194*** (0.377)	1.891*** (0.391)	2.258*** (0.407)	1.698*** (0.414)
LD.lnZ			-0.534 (0.402)	-0.521 (0.360)
D.lnREER	-0.182* (0.109)	-0.016 (0.108)	-0.152 (0.099)	0.049 (0.131)
LD.lnREER			-0.146* (0.088)	-0.044 (0.123)
LD.lnX			0.078 (0.048)	0.143*** (0.041)
_cons	-0.660*** (0.185)	-5.349** (2.133)	-0.892*** (0.240)	-7.384** (2.977)
N	459	459	442	442
Hausman chi2	4.281		4.546	
p-value	0.118		0.103	
Log Likelihood	683.086	733.079	696.263	745.575

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8.4.12 – McCombie Test Results HICs, excl. Covid (1992–2019)

	HIC18	HIC16 Spec. 1	HIC16 Spec. 2
Estimated $\hat{\pi}$	1.685	1.685	1.685
π_{Th}	1.774	1.650	0.725
π_{FDI} mean	2.323	2.266	1.334
π_{FDI} median	1.872	1.756	0.823
Difference $\hat{\pi} - \pi_{Th}$	-0.089	0.035	0.960
Difference $\hat{\pi} - \pi_{FDI}$ mean	-0.638	-0.581	0.351
Difference $\hat{\pi} - \pi_{FDI}$ median	-0.187	-0.071	0.862
Wald $\chi^2 \hat{\pi} - \pi_{Th}$	0.423	0.064	49.126
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ mean	21.682	18.014	6.582
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ median	1.871	0.267	39.606
p-value $H_0: \hat{\pi} = \pi_{Th}$	0.516	0.800	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ mean	0.000	0.000	0.010
p-value $H_0: \hat{\pi} = \pi_{FDI}$ median	0.171	0.606	0.000

$\pi=1.685$, $\psi=-0.222$, Standard errors = 0.137 for all tests (import demand estimates excluding Portugal and the Netherlands).

Mean aggregation uses winsorized FDI flow growth rates (5th and 95th percentile).

HIC18: $\varepsilon=1.474$, $\eta=-0.863$ from HIC12 MG.

HIC16 Spec. 1: $\varepsilon=1.474$, $\eta=-0.863$ from HIC12 MG.

HIC16 Spec. 2: $\varepsilon=0.794$, $\eta=-1.661$ from PMG excluding Portugal and the Netherlands.

Table A.8.4.13 – McCombie Test Results MIC, excl. Covid (1992–2019)

	MIC24 Spec. 1	MIC24 Spec. 2	MIC22
Estimated $\hat{\pi}$	1.136	1.136	1.132
π_{Th}	1.628	1.296	1.247
π_{FDI} mean	3.404	3.110	2.840
π_{FDI} median	1.637	1.343	1.278
Difference $\hat{\pi} - \pi_{Th}$	-0.492	-0.160	-0.115
Difference $\hat{\pi} - \pi_{FDI}$ mean	-2.268	-1.974	-1.708
Difference $\hat{\pi} - \pi_{FDI}$ median	-0.501	-0.207	-0.146
Wald $\chi^2 \hat{\pi} - \pi_{Th}$	251.845	26.598	13.767
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ mean	5352.762	4055.132	3037.013
Wald $\chi^2 \hat{\pi} - \pi_{FDI}$ median	260.685	44.397	22.040
p-value $H_0: \hat{\pi} = \pi_{Th}$	0.000	0.000	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ mean	0.000	0.000	0.000
p-value $H_0: \hat{\pi} = \pi_{FDI}$ median	0.000	0.000	0.000

$\pi=1.136$, $\psi=0.001$, Standard errors = 0.031 estimated for all tests (import demand estimates from full sample).

Mean aggregation uses winsorized FDI flow terms (5th and 95th percentile).

MIC24 Spec. 1: $\varepsilon=1.836$, $\eta=-0.625$ from 24-country sample.

MIC24 Spec. 2: $\varepsilon=1.426$, $\eta=-0.327$ from 22-country sample.

MIC22: $\pi=1.132$, $\psi=-0.010$, $\varepsilon=1.426$, $\eta=-0.327$, Standard errors = 0.031 from 22-country sample.

Table A.8.4.14 – Growth Decomposition HICs, excl. Covid (1992–2019)

	y_{FDI}	Observed Growth	REER	Exports	FFDI	IFDI	RES
Contribution	2.854	2.857	-0.023	2.746	0.213	-0.280	0.199

All values in percent. $\pi=1.685$, $\psi=-0.222$, $\varepsilon=1.474$, $\eta=-0.863$. Median aggregation for FDI flow terms. USA and HUN excluded as outliers in residual BOP channel.

Table A.8.4.15 – Growth Decomposition MICs, excl. Covid (1992–2019)

	y_{FDI}	Observed Growth	REER	Exports	FFDI	IFDI	RES
Contribution	5.166	3.706	0.158	4.304	0.304	-0.343	0.743

All values in percent. $\pi=1.136$, $\psi=0.001$, $\varepsilon=1.836$, $\eta=-0.625$. Median aggregation for FDI flow terms. Mauritius excluded as outlier in FDI inflow channel.

Table A.8.4.16 – Growth Decomposition MICs, excl. Covid (1992–2019) Spec. 2

	y_{FDI}	Observed Growth	REER	Exports	FFDI	IFDI	RES
Contribution	4.276	3.706	0.230	3.343	0.304	-0.343	0.743

All values in percent. $\pi=1.136$, $\psi=0.001$, $\varepsilon=1.426$, $\eta=-0.327$. Median aggregation for FDI flow terms. Export elasticities from 22-country sample excluding the Solomon Islands and Kenya. Mauritius excluded as outlier in FDI inflow channel.