

Who Smooths the Shock?

Government and Private Saving in International Risk Sharing

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Abstract

This paper examines the channels through which countries smooth income volatility, emphasizing the distinct roles of public and private saving across levels of development and macroeconomic characteristics. Using a panel of 134 countries over 1990–2023 and an accounting-based decomposition of risk sharing, the paper documents three core findings. First, savings are a central smoothing mechanism but operate very differently across country groups. In advanced economies, government saving absorbs about 14 percent of output shocks—exceeding the contribution of private saving. In emerging markets and developing

economies, however, private saving dominates, smoothing roughly 16 percent of shocks compared with only 6 percent through government saving. Second, primary investment income from abroad has helped smooth income volatility only in advanced economies, while remittances and transfers have helped smooth income volatility in emerging markets and developing economies. Third, fiscal space and capital account openness shift the balance between public and private stabilization. Countries that have more fiscal space and open capital accounts are better able to smooth output volatility through government savings.

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I. Introduction

How economies smooth income and consumption in the face of aggregate shocks is a central question in macroeconomics, with direct implications for welfare, fiscal policy, and financial development. A large literature documents that, despite globalization and deeper financial integration, countries remain only partially insured against domestic income fluctuations.¹ The degree of risk sharing—and, crucially, the mechanisms through which it operates—varies widely across levels of development.

Seminal contributions such as Asdrubali, Sørensen, and Yosha (1996) and Sørensen and Yosha (1998) propose a decomposition of income smoothing into distinct channels—including capital income, transfers, and saving. This paper revisits international income and consumption smoothing with a particular focus on saving behavior as a risk-sharing device, distinguishing between public and private saving. We separately identify smoothing through (i) primary investment income, (ii) remittances and transfers, (iii) government saving, and (iv) private saving.

Our central finding is a stark asymmetry in the savings channel across income groups. In advanced economies, government saving plays a quantitatively important role in smoothing income volatility, accounting for about 40 percent of total smoothing.² By contrast, in emerging markets and developing economies (EMDEs), private saving plays a quantitatively more important role, often dwarfing the contribution of public saving and formal transfer mechanisms. In EMDEs, private saving accounts for nearly 60 percent of total smoothing, while government saving plays a limited role, absorbing only about 5 percent of GDP growth volatility. This pattern is robust across regions and income classifications and holds even when controlling for other smoothing channels such as remittances and transfers. Moreover, fiscal space and capital account openness systematically shift the composition of smoothing between public and private savings. Countries that have more fiscal space and more open capital accounts are better able to smooth output volatility through government savings.

The results contribute to the literature in two important ways. First, while the classic risk-sharing literature emphasizes capital markets as the primary smoothing mechanisms, our findings highlight that savings remains a central stabilizer even in financially integrated countries. Second, by explicitly separating public from private saving, we provide new evidence on how institutional capacity and financial openness shape the way economies absorb shocks.

Our findings are closely related to, and can be interpreted through, the lens of the precautionary saving literature. In environments characterized by incomplete markets, borrowing constraints, and limited access to formal insurance, households and firms rely heavily on buffer-stock saving

¹ Despite increased financial integration, risk sharing remains incomplete, particularly in developing economies (Obstfeld, 1994; Lewis, 1999; Kose, Prasad, and Terrones, 2009).

² Likely reflecting countercyclical fiscal policy, automatic stabilizers, and accumulated fiscal buffers.

to smooth consumption (Deaton, 1991, 1992; Carroll, 1997; Aiyagari, 1994; Gourinchas and Parker, 2002). At the macro level, this behavior aggregates into a prominent role for private saving as a shock absorber.³

By contrast, the stronger role of public saving in advanced economies aligns with evidence that fiscal policy in these countries is more countercyclical and supported by credible institutions and automatic stabilizers (Fatás and Mihov, 2001, 2012). In many EMDEs, fiscal policy is instead procyclical or constrained by limited access to financing, which weakens the capacity of the public sector to smooth aggregate income fluctuations (Ilzetzi and Végh, 2008; Frankel, Végh, and Vuletin, 2013). Our results provide cross-country empirical support for these mechanisms within a unified income-smoothing framework.

Importantly, the prominence of private saving as a smoothing mechanism in developing economies should not be interpreted as welfare optimal. Rather, it likely reflects the absence of effective alternatives—such as deep financial markets, effective fiscal insurance, or credible social safety nets—forcing households and firms to self-insure against aggregate risk. In this sense, our findings complement the literature documenting limited international risk sharing and the dominant role of domestic mechanisms in smoothing consumption.⁴

Methodologically, we build on the established variance-decomposition approach to income and consumption smoothing, applying it to an updated and expanded cross-country dataset. While the analysis is descriptive rather than causal, it provides a comprehensive and systematic accounting of how different economies absorb income shocks, with particular attention to the savings channel that has received comparatively less emphasis in recent cross-country work.

The rest of the paper is organized as follows. Section II reviews the literature. Section III outlines the ASY methodology and our data. Section IV presents baseline results and offers robustness checks. Section V concludes.

II. Literature Review

A large theoretical and empirical literature emphasizes the welfare gains from international consumption risk sharing. By allowing countries to smooth consumption in response to idiosyncratic income shocks, cross-border insurance reduces macroeconomic volatility and raises expected utility. Early theoretical work shows that even partial risk sharing can generate sizable welfare gains (van Wincoop, 1994; Canova and Ravn, 1996), with quantitative estimates

³ The dominance of private saving in EMDEs documented in this paper is therefore consistent with limited financial depth, procyclical fiscal policy, and weak social insurance systems—features that are well documented in the development and fiscal policy literatures.

⁴ See (Obstfeld, 1994; Lewis, 1999; Bai and Zhang, 2012).

suggesting nontrivial permanent consumption gains for advanced economies (van Wincoop, 1999).⁵

Empirically, the benchmark framework for measuring risk sharing is the variance decomposition approach developed by Asdrubali, Sørensen, and Yosha (1996). Using U.S. state-level data, they show that roughly three-quarters of output fluctuations are smoothed, primarily through capital markets and fiscal transfers.⁶ Extensions to international data reveal much lower levels of smoothing. Sørensen and Yosha (1998) find that only about 40 percent of output shocks are absorbed across OECD countries, largely through saving—both corporate and government, rather than cross-border factor income flows. Asdrubali and Kim (2004) confirm that international risk sharing remains far weaker than intranational risk sharing.⁷

The ASY framework has since become the workhorse of the empirical risk-sharing literature. A broad set of studies apply and adapt it to assess the extent and evolution of consumption smoothing, primarily among advanced economies. Kalemli-Ozcan, Sørensen, and Yosha (2003) show that greater industrial specialization is associated with stronger risk sharing, helping explain why consumption smoothing is typically more effective within countries than across them. Despite increased financial integration, substantial heterogeneity persists across countries. Balli et al. (2011) and Asdrubali et al. (2023) report OECD risk-sharing estimates ranging from 10 to 50 percent, depending on the sample and period. Using data for 120 countries over 1970–2014, Gardberg (2019) finds that the share of smoothed output fluctuations varies widely—from 30 to 85 percent in advanced economies and from near zero to 80 percent in emerging and developing economies (EMDEs).

Several recent studies document improvements in risk sharing among advanced economies, particularly within currency unions. Afonso and Furceri (2008) and Balli et al. (2012) find rising levels of smoothing within the Eurozone, driven in part by increased financial integration. Cimadomo, Hauptmeier, and Zimmermann (2020) show that risk sharing among 11 Eurozone countries increased from about one-third before the global financial crisis to nearly 60 percent in the subsequent decade. Islamaj and Kose (2016) report similar gains in a broader sample of advanced economies and attribute them to deeper cross-border capital flows. However, these trends are not uniform. Hoffmann, Krause, and Laubach (2019) document a decline in Eurozone

⁵ van Wincoop (1999) estimates that for OECD economies, moving from observed levels of risk sharing to full consumption smoothing could increase permanent consumption by 1.1 to 3.5 percent over a 50-year horizon.

⁶ They decompose GDP shocks into components absorbed through capital markets, credit markets, and fiscal transfers. For the period 1963–1990, they find that approximately 75 percent of output fluctuations are smoothed, with capital markets accounting for the largest share, followed by credit markets and federal fiscal transfers.

⁷ Asdrubali and Kim (2004) further develop a dynamic VAR-based version of the framework and show that international risk sharing remains markedly weaker than intranational risk sharing, with only about 20 percent of shocks smoothed across OECD and EU countries compared to more than 60 percent across U.S. states.

risk sharing following the global financial crisis, while Furceri and Zdzienicka (2015) show that risk-sharing mechanisms tend to weaken precisely during severe downturns.

A consistent finding in this literature is the central role of saving as a risk-sharing mechanism in advanced economies. Arreaza, Sørensen, and Yosha (1999) show that roughly half of smoothed shocks in OECD countries are absorbed through government saving, with the remainder coming from corporate saving. Balli et al. (2012) confirm the continued dominance of savings channels but also highlight a growing contribution from net factor income flows associated with financial globalization. These results underscore that even in financially integrated economies, domestic saving—public and private—remains a key buffer against income volatility.

By contrast, the literature on international consumption risk sharing in EMDEs is more limited and generally finds substantially weaker smoothing. Kose, Prasad, and Terrones (2009) show that, despite greater financial globalization, EMDEs experienced little improvement in risk sharing between 1960 and 2004. One explanation is that capital inflows to EMDEs are predominantly debt-based, which provides limited insurance relative to equity or foreign direct investment. Their estimates suggest average consumption smoothing of about 17 percent in emerging markets and 30 percent in low-income countries.

Subsequent studies reinforce the view that risk sharing in EMDEs remains both limited and highly heterogeneous. Ventura (2008) finds that for 23 Latin American and Caribbean economies, average smoothing amounts to only 5 percent. Ng and Yarcia (2014) report no improvement in consumption smoothing for nine Asian economies between 1993 and 2011, with an average smoothing rate of 27 percent. Zouri (2021), focusing on 15 West African countries, estimates average smoothing of 22 percent, driven primarily by savings and, to a lesser extent, remittances.

Some regional evidence points to comparatively stronger outcomes. Balli and Balli (2011) document risk-sharing rates of around 40 percent in six Pacific Island economies, largely attributable to saving and international transfers, with evidence of improvement over time. Nevertheless, the broader literature finds that external transfers play only a limited role in EMDEs. Balli et al. (2019) show that foreign aid accounts for a negligible share of smoothing and becomes even less effective during global crises. Gardberg (2019) similarly finds little role for aid but documents a modest smoothing effect of remittances. Islamaj and Kose (2022) confirm that higher remittance and aid inflows are associated with stronger consumption smoothing, though their quantitative contribution remains small relative to savings.

Despite these advances, three gaps remain.

First, existing risk-sharing decompositions rarely distinguish explicitly between government saving and private saving as separate stabilization mechanisms in a globally comparable framework.

Most studies either aggregate saving channels or focus primarily on cross-border capital income flows.

Second, the literature has not systematically examined how the relative importance of public versus private saving differs across levels of development within a unified accounting framework spanning advanced economies and EMDEs over a long sample.

Third, while fiscal space and capital account openness are frequently invoked as determinants of stabilization capacity, their interaction with specific saving channels in cross-country risk sharing has not been quantitatively documented.

This paper addresses these gaps. Using an expanded panel of 134 countries over 1990–2023 and a detailed national-accounts-based decomposition, we isolate four income channels—primary investment income, remittances and transfers, government saving, and private saving—and quantify their contributions to smoothing output fluctuations. The results reveal a sharp asymmetry: government saving is a central stabilizer in advanced economies, whereas private saving dominates in EMDEs, particularly where fiscal space is limited and financial markets are shallow. By explicitly separating public and private saving within a unified international risk-sharing framework, the paper clarifies how institutional capacity and financial openness shape macroeconomic resilience.

III. Data and Methodology

Conceptual framework

We build on the accounting-based framework developed by Asdrubali, Sørensen, and Yosha (1996, hereafter ASY) to quantify the extent to which countries smooth consumption in response to aggregate output shocks. The core insight of this approach is that movements in output need not translate one-for-one into movements in consumption because a sequence of income flows and saving decisions can absorb part of the shock. By tracing these flows through the national accounts, the ASY framework provides a transparent decomposition of risk sharing into economically meaningful channels, thus allowing for an empirical estimate of the channels through which risk is shared internationally.

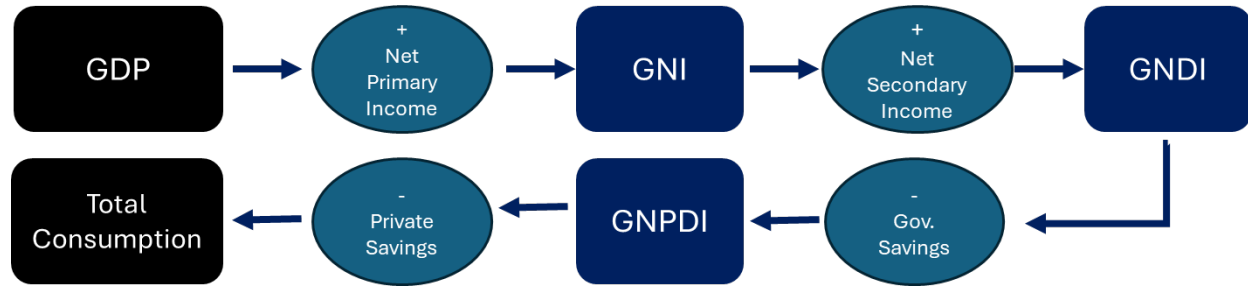
The starting point is the national income identity linking output to consumption through income and saving flows. Total consumption can be expressed as:

$$C^{total} = GDP + NPI + NSI - GS^{gov} - GS^{priv} \quad (1)$$

where NPI denotes net primary income from abroad (net factor income), NSI denotes net secondary income (current transfers), and GS^{gov} and GS^{priv} denote government and private gross saving, respectively.

Figure 1 illustrates this accounting flow. Adding net primary income to GDP yields gross national income (GNI). Net primary income from abroad captures cross-border factor payments, including compensation of employees and investment income. Adding net secondary income from abroad—comprising transfers such as remittances and official development assistance—yields gross national disposable income (GNDI). Finally, subtracting total saving from GNDI gives total consumption, which includes both private and government consumption.

Figure 1: National accounting flow - Linking GDP and consumption



Source: Authors' illustration.

A key feature of this framework is that it allows to disaggregate gross savings into government and private components. We define gross national private disposable income (GNPDI) as GNDI net of government saving, so that private saving captures the residual saving behavior of households and firms. This distinction allows us to separately identify the role of public and private saving in smoothing income shocks.

Variance decomposition

To link output fluctuations to consumption smoothing, we follow ASY and express GDP as a product of successive income and saving ratios:

$$GDP_{it} = \frac{GDP_{it}}{GNI_{it}} \times \frac{GNI_{it}}{GNDI_{it}} \times \frac{GNDI_{it}}{GNPDI_{it}} \times \frac{GNPDI_{it}}{C_{it}^{total}} \times C_{it}^{total} \quad (2)$$

Taking logs and first differences, multiplying both sides by $\Delta \log GDP_{it}$, and taking expectations across countries yields a decomposition of the variance of GDP growth into covariances associated with each channel. After subtracting the cross-sectional mean, this results in:

$$\begin{aligned}
\text{var}(\Delta \log GDP_{it}) = & \text{cov}(\Delta \log GDP_{it} - \Delta \log GNI_{it}, \Delta \log GDP_{it}) \\
& + \text{cov}(\Delta \log GNI_{it} - \Delta \log GNDI_{it}, \Delta \log GDP_{it}) \\
& + \text{cov}(\Delta \log GNDI_{it} - \Delta \log GNPDI_{it}, \Delta \log GDP_{it}) \\
& + \text{cov}(\Delta \log GNPDI_{it} - \Delta \log C_{it}^{total}, \Delta \log GDP_{it}) \\
& + \text{cov}(\Delta \log C_{it}^{total}, \Delta \log GDP_{it})
\end{aligned} \tag{3}$$

Dividing both sides by $\text{var}(\Delta \log GDP_{it})$ yields:

$$1 = \beta_{PI} + \beta_{SI} + \beta_{GS} + \beta_{PS} + \beta_C \tag{4}$$

where each coefficient represents the fraction of GDP growth volatility absorbed by a given channel. Specifically, β_{PI} captures smoothing through net primary income, β_{SI} through net secondary income, β_{GS} through government saving, β_{PS} through private saving, and β_C measures the fraction of output fluctuations transmitted directly to consumption—that is, the unsmoothed component.

Each coefficient can be estimated as the slope from a cross-sectional regression. For example:

$$\beta_{PI} = \frac{\text{cov}(\Delta \log GDP_{it} - \Delta \log GNI_{it}, \Delta \log GDP_{it})}{\text{var}(\Delta \log GDP_{it})} \tag{5}$$

which corresponds to the coefficient from regressing $\Delta \log GDP_{it} - \Delta \log GNI_{it}$ on $\Delta \log GDP_{it}$. Analogous interpretations apply to the remaining coefficients. This framework allows us to interpret the estimated parameters as shares of output volatility absorbed by each channel.

Econometric specification

Operationally, we estimate the following set of panel regressions:

$$\begin{aligned}
\Delta \log GDP_{it} - \Delta \log GNI_{it} &= \beta_{PI} \Delta \log GDP_{it} + \gamma_{PI,t} + u_{it}^{PI}; \\
\Delta \log GNI_{it} - \Delta \log GNDI_{it} &= \beta_{SI} \Delta \log GDP_{it} + \gamma_{SI,t} + u_{it}^{SI}; \\
\Delta \log GNDI_{it} - \Delta \log GNPDI_{it} &= \beta_{GS} \Delta \log GDP_{it} + \gamma_{GS,t} + u_{it}^{GS}; \\
\Delta \log GNPDI_{it} - \Delta \log C_{it}^{total} &= \beta_{PS} \Delta \log GDP_{it} + \gamma_{PS,t} + u_{it}^{PS}; \\
\Delta \log C_{it}^{total} &= \beta_C \Delta \log GDP_{it} + \gamma_{C,t} + u_{it}^C.
\end{aligned} \tag{6}$$

Each equation includes time fixed effects to absorb global shocks common to all countries in a given year. Following Sørensen and Yosha (1998), we estimate the system using generalized least

squares (GLS), allowing for country-specific AR(1) error processes to account for serial correlation. The coefficients from these regressions form the basis of our variance decomposition and jointly sum to one when the accounting identity holds.

Data

Our analysis uses annual cross-country panel data compiled from multiple sources. Real GDP, GNI, and gross national saving are obtained from the World Bank's World Development Indicators (WDI).

Government saving is constructed using two sources depending on data availability. For OECD countries, we use "Net General Government Saving" from the OECD National Accounts. Under the System of National Accounts (SNA 2008), net saving is defined as general government disposable income minus final consumption expenditure, net of consumption of fixed capital. It captures the current balance of the government sector.

For non-OECD countries, we use "General Government Net Lending/Borrowing" from the IMF World Economic Outlook and Government Finance Statistics. Under GFSM 2014, net lending equals total revenue minus total expenditure and can be expressed as the net operating balance minus net acquisition of nonfinancial assets. Accordingly, net lending incorporates capital expenditure, whereas net saving excludes capital formation.

Conceptually, the two measures are related through:

$$\textit{Net Lending} = \textit{Net Saving} - \textit{Net Capital Formation}$$

The difference therefore reflects government investment spending. Because our risk-sharing decomposition is grounded in the national income identity, the relevant concept is the change in the government's net financial position. In practice, capital expenditures represent a modest share of GDP for most countries in our sample, and results are robust to restricting the sample to countries with harmonized definitions. The estimated contribution of the government saving channel is therefore not driven by accounting differences across data sources.

Private saving is computed residually as the difference between total and government saving. Data on net primary and net secondary income are drawn from the IMF's Balance of Payments database. All income aggregates are expressed in real terms and constructed following the accounting relationships illustrated in Figure 1. Gross national disposable income is obtained by

adding real net secondary income to real GNI, while gross national private disposable income is computed by subtracting government saving to GNDI.

The resulting dataset covers 134 countries over the period 1990–2023, substantially expanding the country coverage relative to earlier applications of the ASY framework. To ensure cross-country comparability, we exclude countries with populations below 1.5 million in the baseline specification, consistent with the World Bank’s definition of small states.⁸

Since the variance decomposition relies on the national accounting identity holding approximately in the data, we restrict the sample to observations for which the identity is satisfied within a 10 percent margin of error. This condition is met by 98 percent of observations and yields a rich unbalanced panel used in the baseline regressions. Finally, for each variable, we remove the top and bottom 0.125 percent of observations in the sample and restrict the analysis to countries with at least five observations in the regressions.

For measures of fiscal space and capital account openness we rely on data on general government debt (Kose et al. 2022), and on Chinn-Ito index of financial openness (Chinn and Ito, 2006).

IV. Results

Baseline results

Table 1 reports baseline estimates of international consumption risk sharing for advanced economies (AE) and emerging markets and developing economies (EMDEs) over the period 1990–2023.⁹ Each row summarizes the coefficients from the system of regressions described in Section III, with each coefficient representing the share of GDP growth volatility absorbed by a given channel.

For advanced economies, we estimate that 36 percent of output growth variation is smoothed, with the remaining 64 percent transmitted to consumption. This magnitude is consistent with existing estimates for OECD countries using the ASY framework (Afonso and Furceri, 2008; Furceri and Zdzienicka, 2015). Among the smoothing channels, government saving is the single most important, accounting for roughly 14 percentage points, or about 40 percent of total smoothing. This finding aligns with earlier evidence emphasizing the stabilizing role of fiscal policy and automatic stabilizers in advanced economies (Arreaza et al., 1999). Private saving and the primary

⁸ The baseline sample consists of 30 advanced economies and 104 emerging and developing economies, each with at least ten annual observations. Country groupings are reported in Table A1 in the Appendix.

⁹ Throughout the paper, ‘risk sharing’ refers to the fraction of GDP growth variance not transmitted to consumption, as implied by the ASY decomposition.

income channel, capturing net factor income from abroad, both play a meaningful role, contributing approximately 10 percent of growth variation each. By contrast, the secondary income channel —which reflects international transfers — though statistically significant, contributes only marginally to overall risk sharing.

Risk sharing is lower in EMDEs. Only 28 percent of output growth variation is smoothed, with more than 70 percent transmitted directly to consumption. The composition of smoothing differs sharply from that of advanced economies. Private saving dominates, accounting for nearly 60 percent of total smoothing, while government saving plays a limited role, absorbing only about 6 percent of GDP growth volatility. This pattern is consistent with the well-documented constraints on countercyclical fiscal policy in EMDEs, including limited fiscal space and procyclical policy responses (Frankel, Végh, and Vuletin, 2013; Kose et al., 2022). In contrast to advanced economies, secondary income flows, including transfers and remittances, play a more meaningful role in EMDEs, contributing roughly 15 percent of total smoothing, while the primary income channel is comparatively small.

Robustness

Pre-COVID-19 period

Rows 3 and 4 of Table 1 replicate the baseline analysis for the pre-COVID-19 subsample (1990–2019) to assess whether the post-2019 period materially alters the results. The estimates are remarkably stable across subsamples. For advanced economies, the contribution of primary income declines slightly, while government saving increases modestly, possibly reflecting the substantial government response to the COVID-19 shock in advanced economies. For EMDEs, both the level and composition of risk sharing remain largely unchanged. Overall, the baseline patterns are not driven by the COVID-19 period.

Table 1: International consumption risk sharing – baseline results

	(1) Primary Income Channel	(2) Secondary Income Channel	(3) Government Savings Channel	(4) Private Savings Channel	(5) Consumption Channel	Obs.	Countries
AE (1990-2023)	9.6*** (1.54)	1.2*** (0.40)	13.8*** (2.14)	9.6*** (2.74)	63.6*** (3.02)	880	30
EMDEs (1990-2023)	1.2 (0.83)	3.8*** (0.77)	6.0*** (1.83)	15.6*** (2.75)	72.5*** (2.81)	2574	105
AE (1990-2019)	8.4*** (1.63)	1.0** (0.44)	15.0*** (1.99)	9.2*** (2.82)	63.7*** (2.82)	762	30
EMDEs (1990-2019)	1.0	3.0***	5.6***	15.3***	74.4***	2206	105

(0.89)	(0.82)	(2.03)	(3.03)	(3.00)	
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Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Driscoll and Kraay (1998) standard errors

The results are similar when using Driscoll and Kraay (1998) standard errors (Table 2). While the Generalized Least Squares (GLS) estimation explicitly models the structure of the error term—such as heteroskedasticity and serial correlation, a critique is that it relies on strong assumptions about the error covariance structure and does not account for cross-sectional dependence, which is common in macro panels due to global shocks and spillovers. By contrast, Driscoll and Kraay (1998) estimates provide inference that is robust to heteroskedasticity, serial correlation, and cross-sectional dependence of unknown form. Using Driscoll and Kraay (1998) standard errors as a robustness check ensures that statistical significance is not driven by unmodeled global comovement or misspecification of the error structure.

Table 2: International consumption risk sharing – Driscoll and Kraay (1998) standard errors

	(1) Primary Income Channel	(2) Secondary Income Channel	(3) Government Savings Channel	(4) Private Savings Channel	(5) Consumption Channel	Obs.	Countries
AE (1990-2023)	10.5** (3.98)	1.5** (0.63)	17.8*** (3.37)	10.3 (7.33)	59.9*** (8.82)	880	30
EMDEs (1990-2023)	1.1 (0.97)	3.7*** (1.21)	8.1*** (2.44)	18.2*** (3.89)	68.9*** (5.52)	2574	105

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Decomposing private saving in advanced economies

For advanced economies, OECD data allow us to further decompose private saving into corporate and household components. Appendix Table A2 reports results for the subsample of 26 countries with available data. The overall degree of risk sharing remains close to 37 percent, with total savings accounting for approximately 20 percentage points.

Corporate saving accounts for a substantial degree of smoothing, contributing more than 14 percent of GDP growth variation, while household saving exhibits a dis-smoothing effect, with an average coefficient of about –7 percent.¹⁰ This finding is consistent with evidence that household

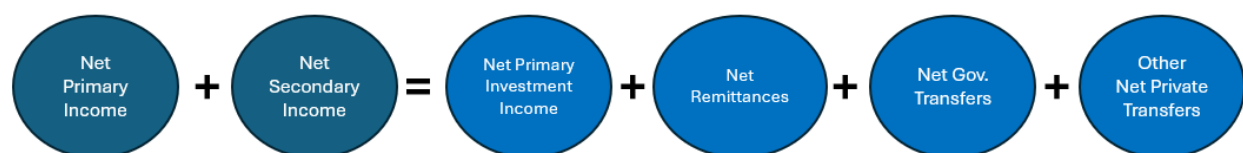
¹⁰ Mody et al. (2012) find that precautionary savings increased in advanced economies during the Great Recession of 2007-2009. Retained corporate earnings appear to play a stabilizing role, particularly in advanced economies with large and profitable corporate sectors.

saving tends to be countercyclical and offers limited consumption insurance outside of severe downturns (Mody et al., 2012; Challe and Ragot, 2016).¹¹

Decomposing international income flows

We further disaggregate primary and secondary income into four components, summarized in Figure 2. Net remittances are constructed following an adjusted version of the IMF’s Balance of Payments and International Investment Position Manual, Sixth Edition (BPM6), consistent with the definition used in the World Development Indicators. Specifically, net remittances are defined as the sum of *compensation of employees* recorded in the primary income account and *personal transfers* recorded in the secondary income account. This measure captures both wages earned abroad by non-resident workers and household-to-household transfers, typically sent by migrants to support family members in their countries of origin.

Figure 2: Decomposing Primary and Secondary Income.



Source: Authors’s illustration.

Net primary investment income is defined as net primary income excluding compensation of employees. It reflects returns earned by residents on financial assets held abroad, net of payments made to nonresidents on their investments in the domestic economy, including interest, dividends, and reinvested earnings from both direct and portfolio investment.

Net government transfers correspond to the secondary income category “general government” in the BPM6 framework. This component includes official development assistance, contributions to international organizations, and other current transfers between governments that do not involve an exchange of goods or services.

Finally, other private transfers, as defined under “other current transfers” in BPM6, encompass cross-border transactions such as taxes on income and wealth, social contributions and benefits, and donations or grants from non-governmental organizations.

Table 3 presents results from a more granular specification in which the primary and secondary income channels are disaggregated into investment income, remittances, government transfers, and other private transfers. This refinement reduces the sample to 26 advanced economies and 97 EMDEs but leaves the main conclusions unchanged.

¹¹ Household saving may still contribute to smoothing during extreme crises; the estimates here reflect average behavior over the full sample.

For advanced economies, overall risk sharing is around 39 percent. Government saving remains the dominant mechanism, smoothing about 13.5 percent of output growth volatility. Primary net investment income emerges as a major contributor, accounting for roughly 12 percent, or one-third of total smoothing. Remittances and transfers play only a minor role.

For EMDEs, overall risk sharing remains close to 30 percent, with private saving accounting for majority of total smoothing. Government savings remain modest, at 7 percent, while remittances and transfers together contribute a small but statistically significant share. These findings are consistent with evidence that EMDEs have benefited less from financial globalization in terms of consumption insurance (Kose et al., 2009), but that remittance flows provide partial buffering against income shocks (Islamaj and Kose, 2022).¹²

Table 3: International consumption risk sharing – Decomposed international income flows

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Obs.	Countries
	Primary Investment Income Channel	Remittance Channel	Government Transfers Channel	Other Private Transfers Channel	Government Savings Channel	Private Savings Channel	Consumption Channel		
AE (1990-2023)	12.2*** (1.51)	0.7* (0.39)	0.8** (0.39)	0.2 (0.25)	13.6*** (1.97)	7.3** (3.04)	61.5*** (2.91)	566	26
EMDEs (1990-2023)	0.7 (0.78)	1.5** (0.64)	1.5*** (0.49)	1.1*** (0.30)	7.1*** (2.07)	17.0*** (3.04)	68.6*** (3.15)	2059	97

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Regional heterogeneity

Table 4 reports baseline results for EMDEs disaggregated by World Bank region. Risk sharing varies widely across regions, ranging from less than 12 percent in Latin America and the Caribbean—consistent with Ventura (2008)—to nearly 50 percent in the Middle East and North Africa (MENA).

Across all regions, private saving is the most important smoothing channel on average, though estimates are imprecise in regions with substantial heterogeneity, such as East Asia and the Pacific. MENA stands out as the only region where government saving plays a dominant role, smoothing roughly 18 percent of GDP growth variation. This likely reflects relatively greater fiscal space, partly supported by natural resource revenues. Secondary income flows are also particularly important in MENA, as well as in Europe and Central Asia, East Asia and Pacific, and South Asia.

¹² Results are similar when applying Driscoll-Kraay standard errors estimation (Table A3).

By contrast, primary income flows play a limited role across regions, reaching statistical significance only in Sub-Saharan Africa, where they account for about 3 percent of GDP growth smoothing.

Table 4: International consumption risk sharing in EMDEs – regional heterogeneity

	(1) Primary Income Channel	(2) Secondary Income Channel	(3) Government Savings Channel	(4) Private Savings Channel	(5) Consumption Channel	Obs.	Countries
East Asia and Pacific	0.5 (2.14)	7.2*** (1.78)	1.4 (3.27)	10.6 (8.62)	80.0*** (9.01)	271	10
Europe and Central Asia	3.3 (2.01)	6.5*** (1.76)	5.4 (3.35)	14.0** (5.71)	70.7*** (6.08)	498	21
Latin America and Caribbean	-1.5 (1.40)	2.6** (1.28)	3.0 (2.15)	7.0* (3.68)	88.2*** (3.85)	546	19
Middle East and North Africa	0.8 (2.63)	11.2*** (2.57)	17.6** (8.61)	17.2* (9.75)	53.9*** (10.20)	371	16
South Asia	-0.4 (1.77)	7.8* (4.16)	6.1 (3.97)	22.9** (9.91)	63.5*** (7.80)	116	4
Sub-Saharan Africa	3.3* (1.83)	-0.3 (1.66)	6.6* (3.61)	32.9*** (6.25)	56.7*** (5.86)	752	34

Standard errors in parentheses

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

Fiscal space, financial development, capital account openness and risk sharing

Table 5 examines channels of risk sharing across differences in fiscal space and capital account openness in EMDEs. The results reveal systematic heterogeneity consistent with institutional constraints. First, fiscal space matters. Among high-debt-to-GDP EMDEs, government saving does not contribute significantly to smoothing, while private saving absorbs more than 20 percent of output shocks. In contrast, low-debt-to-GDP EMDEs exhibit a markedly stronger role for government saving—smoothing about 9 percent of shocks—alongside a similar contribution from private saving. This suggests that fiscal capacity conditions the ability of the public sector to act as a stabilizer.

Second, capital account openness is associated with both higher overall risk sharing and a broader distribution of smoothing across channels. EMDEs with high capital account openness smooth approximately 33.6 percent of output fluctuations, compared to only about 20.5 percent in less

open economies. This difference reflects not only greater smoothing through primary and secondary income flows but also a substantially stronger role for government saving in more open economies – absorbing 8.3 percent of shocks compared with just 2.8 percent in less open economies. The results suggest a greater ability of governments to smooth intertemporally in more financially open economies.

Table 5: International consumption risk sharing – Fiscal space and credit availability

	(1)	(2)	(3)	(4)	(5)	Obs.	Countries
	Primary Income Channel	Secondary Income Channel	Government Savings Channel	Private Savings Channel	Consumption Channel		
High government debt EMDEs	-1.1 (1.29)	3.8*** (1.21)	2.6 (2.21)	21.6*** (4.14)	72.0*** (4.25)	1241	52
Low government debt EMDEs	2.9*** (1.04)	4.4*** (0.95)	8.5*** (2.83)	8.7** (3.68)	75.0*** (3.70)	1312	52
High capital account openness EMDEs	2.1* (1.21)	6.9*** (1.12)	8.3*** (2.62)	15.8*** (3.92)	66.4*** (4.05)	1351	52
Low capital account openness EMDEs	0.8 (1.18)	0.7 (1.04)	2.8 (2.55)	15.6*** (3.93)	79.5*** (3.90)	1192	51

Note: Note: For each country, the average value is calculated over the period 2000–2023. Government debt is measured as the debt-to-GDP ratio, and capital openness is measured using the Chinn–Ito index. “High” and “low” refer to values above and below the 50th percentile, respectively.

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

Finally, capital account openness is associated with a shift in the balance between government and private saving as smoothing mechanisms. In EMDEs with high capital account openness, risk sharing is more evenly distributed across channels: government saving absorbs about 7 percent of output shocks, while private saving contributes roughly 13 percent. By contrast, in less open economies, government saving plays a limited and statistically insignificant role (around 3 percent – and not statistically different from zero), and smoothing relies predominantly on private saving, which accounts for nearly 19 percent of output fluctuations. These patterns suggest that greater external integration not only allows for more smoothing through capital flows, but also strengthens the ability of government savings to smooth against output volatility, reducing the economy’s reliance on private self-insurance.

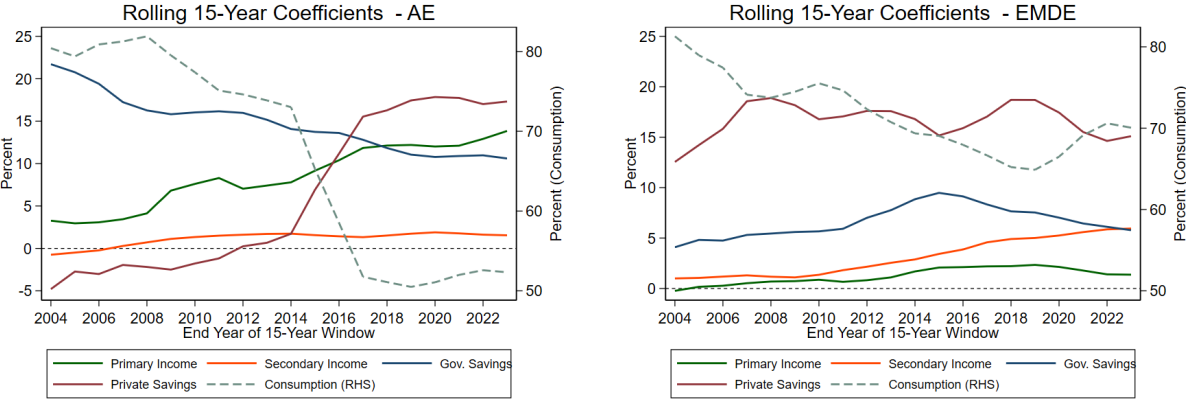
Risk sharing over time

Figure 3 illustrates the evolution of risk sharing using rolling 15-year estimation windows between 1990 and 2023. Risk sharing in advanced economies exhibits a clear upward trend, rising from around 20 percent in the early 1990s to nearly 50 percent in the most recent period. In EMDEs,

risk sharing also increases—from about 20 to 30 percent—but the trend is less pronounced and more volatile.

Notably, risk sharing declines during periods that include the Global Financial Crisis and the COVID-19 pandemic, consistent with evidence that insurance mechanisms weaken during global downturns (Furceri and Zdzienicka, 2015; Hoffmann et al., 2019).

Figure 3: Development of international consumption risk sharing over time

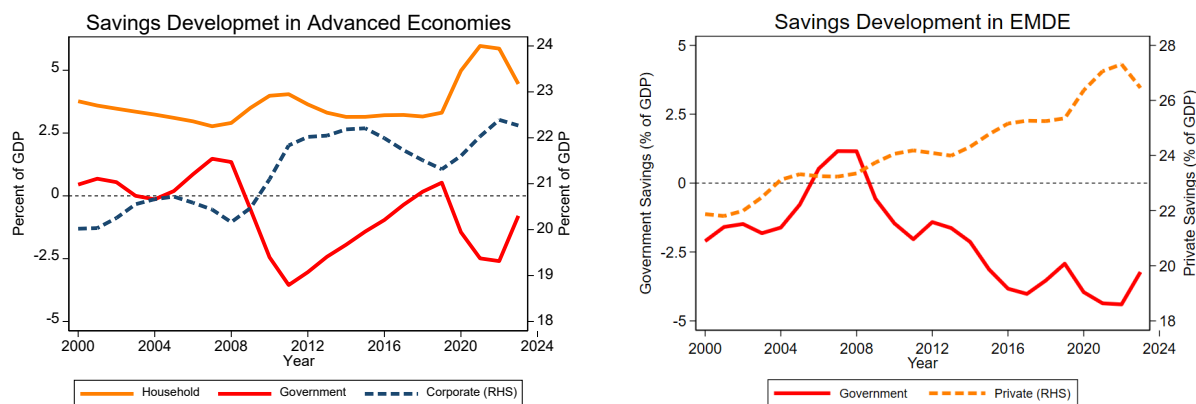


Note: Values are smoothed using a 3-year rolling average. For example, the coefficient for 2008 represents the average from the regression results for the samples ending in 2006, 2007, and 2008.

The composition of smoothing also evolves. In advanced economies, the increase in risk sharing is driven primarily by private saving and primary income channels. Private saving shifts from a dis-smoothing role in the early sample to absorbing nearly 18 percent of GDP growth variation in recent years. Figure 4 suggests that this change coincides with a rising share of corporate saving within total private saving. Government saving, by contrast, declines modestly over time.

In EMDEs, private saving becomes more important in the early 2000s and then stabilizes, while government saving gradually increases, particularly after the Global Financial Crisis. This pattern may reflect a more flexible approach to fiscal adjustment by international financial institutions in recent decades (Ostry et al., 2015, 2016; Gaspar and Mauro, 2020).

Figure 4: Development of savings and external income flows over time



Note: Lines show simple averages for 27 advanced economies and 105 emerging market and developing economies. The series are presented as three-year moving averages.

V. Conclusions

This paper provides a comprehensive reassessment of international consumption risk sharing across advanced economies and emerging markets and developing economies (EMDEs) over the past three decades, with particular emphasis on the relative importance of domestic savings behavior and cross-border income flows. Using a unified accounting framework and newly harmonized data from national accounts and balance of payments statistics, the analysis delivers three main insights with direct implications for both policy and future research.

First, despite substantial financial integration, international risk sharing remains incomplete, especially for EMDEs. Advanced economies smooth roughly 40 percent of output growth fluctuations, compared with only about 30 percent in EMDEs. Second, the results reveal a clear asymmetry in the role of savings as a mechanism for smoothing income volatility across country groups. In advanced economies, government saving emerges as a central stabilizing force, absorbing a sizable share of output fluctuations. By contrast, in emerging markets and developing economies, income smoothing relies overwhelmingly on private saving, which accounts for the bulk of risk absorption. The divergence likely underscores differences in institutional capacity and policy space: while advanced economies are able to deploy fiscal policy to stabilize aggregate income, EMDEs largely depend on self-insurance through private saving in the absence of strong fiscal and financial stabilization mechanisms.

Third, consumption smoothing in advanced economies is driven by corporate savings and primary investment income from abroad. In EMDEs, risk sharing relies predominantly on private savings and, to a lesser extent, remittances and international transfers. Finally, risk sharing has risen steadily since the 1990s, especially in advanced economies, but weakens during global crises such as the Global Financial Crisis and the COVID-19 pandemic.

Taken together, these findings are important for several reasons. They provide an integrated empirical benchmark for assessing the effectiveness of different risk-sharing mechanisms and clarify the role of savings composition—and the growing importance of corporate savings in advanced economies. From a policy perspective, the results suggest that strengthening fiscal institutions, deepening domestic financial markets, and improving the resilience of cross-border income flows could substantially enhance consumption smoothing, especially in EMDEs.

Appendix

Table A1: Country List

	Advanced Economies	EMDEs					
		East Asia and Pacific	Europe and Central Asia	Latin America and Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa
1	Australia*	Cambodia	Albania	Argentina	Algeria	Bangladesh	Angola
2	Austria	China	Armenia	Bolivia	Bahrain*	India	Benin
3	Belgium	Indonesia	Azerbaijan	Brazil	Egypt, Arab Rep.*	Nepal	Botswana
4	Canada	Lao PDR	Belarus	Chile*	Iran, Islamic Rep.	Sri Lanka	Burkina Faso
5	Croatia	Malaysia	Bosnia and Herzegovina	Colombia	Iraq		Burundi
6	Czechia	Mongolia	Bulgaria	Costa Rica	Jordan		Cameroon
7	Denmark*	Papua New Guinea	Georgia	Dominican Republic	Kuwait		Congo, Dem. Rep.
8	Finland	Philippines	Hungary	Ecuador	Lebanon		Congo, Rep.
9	France	Thailand	Kazakhstan	El Salvador	Libya		Côte d'Ivoire
10	Germany	Viet Nam*	Kosovo	Guatemala	Morocco		Ethiopia
11	Greece		Kyrgyz Republic	Haiti*	Oman		Gabon
12	Ireland		Moldova	Honduras	Pakistan		Gambia, The
13	Israel		North Macedonia	Jamaica	Qatar		Ghana*
14	Italy		Poland	Mexico	Saudi Arabia		Guinea
15	Japan		Romania	Nicaragua*	Syrian Arab Republic		Guinea-Bissau
16	Korea, Rep		Russian Federation	Panama	Tunisia		Kenya
17	Latvia		Serbia	Paraguay	Yemen, Rep.		Lesotho
18	Lithuania		Tajikistan	Peru			Madagascar
19	Netherlands		Türkiye	Uruguay			Malawi
20	New Zealand		Ukraine	Venezuela, RB			Mali
21	Norway*		Uzbekistan				Mauritania
22	Portugal						Mozambique
23	Singapore*						Namibia
24	Slovak Republic						Niger
25	Slovenia						Rwanda
26	Spain						Senegal
27	Sweden						Sierra Leone
28	Switzerland						South Africa*
29	United Kingdom						Sudan
30	United States*						Tanzania
31							Togo
32							Uganda
33							Zambia
34							Zimbabwe

Note: * Indicates countries excluded from the detailed regressions in Table 3 due to limited data availability.

Table A2: International consumption risk sharing – Decomposing private savings

(1)	(2)	(3)	(4)	(5)	(6)	Obs.	Countries
Primary Income Channel	Secondary Income Channel	Government Savings Channel	Corporate Savings Channel	Household Savings Channel	Consumption Channel		
AE (1990-2023)							
11.2*** (1.70)	1.5*** (0.44)	13.4*** (2.33)	14.3*** (2.69)	-7.1*** (2.50)	63.3*** (3.31)	788	27

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: International consumption risk sharing – Decomposing private savings, Driscoll and Kraay (1998) standard errors

(1)	(2)	(3)	(4)	(5)	(6)	(7)	Obs.	Countries
Primary Investment Income Channel	Remittance Channel	Government Transfers Channel	Other Private Transfers Channel	Government Savings Channel	Private Savings Channel	Consumption Channel		
AE (1990-2023)								
13.5** (5.00)	0.9 (0.61)	0.9 (0.74)	0.3 (0.21)	18.2*** (2.89)	6.2 (11.60)	59.7*** (12.65)	566	26
EMDEs (1990-2023)								
0.5 (1.04)	2.0*** (0.72)	1.0 (0.67)	1.1*** (0.40)	9.0*** (2.69)	19.3*** (4.37)	65.4*** (5.86)	2059	97

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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