Growth Lab

A Change of Denomination: The Case for CPI-Indexed World Bank Lending

Fernando García and Ricardo Hausmann

Growth Lab Working Paper Series
No. 271

July
2026

GROWTH LAB
HARVARD KENNEDY SCHOOL
79 JFK STREET
CAMBRIDGE, MA 02138

GROWTHLAB.HKS.HARVARD.EDU

This report may be referenced as follows: García, F., Hausmann, R. (2026). "A Change of Denomination: The Case for CPI-Indexed World Bank Lending." Growth Lab Working Paper, John F. Kennedy School of Government, Harvard University.

Table of Contents

Abstract. This paper asks whether the World Bank can change the denomination of its lending without weakening its own financial position. Using monthly CPI and exchange rate data, we construct the dollar returns the Bank would earn on loans indexed to borrowers' domestic inflation and aggregate those returns using current IBRD and IDA portfolio weights. Portfolio returns are less volatile because cross-country correlations are low. The diversification dividend is large enough to make the financially indifferent coupon on a CPI-indexed instrument close to, and in some cases below, current lending rates. The World Bank can reduce one of the core sources of macroeconomic instability in borrowing countries at little or no financial cost to itself.

1. Introduction

The World Bank lends in currencies that most of its borrowers do not issue. The projects, tax bases, and income streams that support repayment are generated in local currency, while debt service is generally fixed in dollars. A depreciation therefore raises the domestic value of the obligation as export earnings, capital inflows, reserves, and fiscal revenues are often weakening. A 30 percent depreciation raises the local-currency value of a dollar obligation by 30 percent before any change in output or revenue.

The literature describes the inability to borrow abroad in one's own currency as "original sin" (Eichengreen and Hausmann, 1999; Eichengreen, Hausmann, and Panizza, 2005a, 2005b). Original sin is distinct from a currency mismatch. The first describes the contracts available to a country; the second is the balance sheet exposure that emerges when a net debtor uses those contracts (Eichengreen, Hausmann, and Panizza, 2007). The phenomenon reaches countries with very different inflation histories, institutions, and policy regimes, while country size remains one of its most robust correlates.

Original sin has also proved persistent. Some middle-income countries have developed deeper domestic bond markets and attracted foreign investors into local currency sovereign debt. These advances have often shifted currency risk to foreign investors, domestic pension funds, banks, or public balance sheets, and low-income countries have made much less progress. The median emerging and developing economy continues to issue nearly all external debt in foreign currency, and part of the improvement recorded around 2008-2011 was subsequently reversed (Eichengreen, Hausmann, and Panizza, 2023).

Foreign currency debt makes the real exchange rate a determinant of solvency. Real exchange rates tend to appreciate during booms and depreciate during downturns, so the burden of debt service rises as domestic capacity to pay weakens. Governments respond by accumulating reserves, intervening in foreign exchange markets, raising interest rates, compressing imports, and limiting external borrowing. Fear of floating narrows the room for countercyclical policy and contributes to higher volatility of output, capital flows, and public debt ratios (Calvo and Reinhart, 2002; Eichengreen, Hausmann, and Panizza, 2005a).

The World Bank sits at the center of this problem. Its mandate is to expand development finance and help countries manage risks that private markets allocate poorly. Dollar lending passes denomination risk to borrowers whose balance sheets are least able to absorb it. IBRD's dollar funding creates a matching problem on the Bank's own balance sheet, while IDA's concessional

funding offers greater flexibility. A diversified multilateral portfolio creates room to pool country-specific inflation and exchange-rate shocks across borrowers.

Hausmann and Rigobon (2003) proposed denominating IDA loans in inflation-indexed domestic currency units, following the logic of Chile's Unidad de Fomento. Disbursements, interest payments, and amortization would continue in dollars, while the value of each obligation would move with the borrower's domestic price level and exchange rate. Their estimates placed annual volatility at 15.6 percent for a typical country's indexed unit and 3.5 percent for an IDA-weighted basket. The historical return gap could have been covered with a coupon increase of nine basis points.

We revisit and extend that proposal using monthly CPI and bilateral exchange-rate data for World Bank borrowers from 1995 to 2024 and current IBRD and IDA exposure weights. We construct the dollar returns the Bank would have earned on CPI-indexed claims, compare country-level risk with portfolio risk, identify the episodes that drive the lower tail, and calculate the coupon that would leave the Bank financially indifferent between indexed and dollar-denominated lending.

Portfolio aggregation changes the economics of the instrument. The combined portfolio has an annual standard deviation of 3.04 percent, compared with an exposure-weighted country average of 8.72 percent, and average cross-country correlation is 0.19. The largest losses are concentrated in abrupt exchange rate corrections, with domestic inflation contributing relatively little to the tail events. Over the sample, indexation of principal generated a positive average return in dollars, lowering the real coupon required to match the Bank's dollar return. Diversification keeps the additional compensation for residual portfolio risk small. For IBRD, the relevant benchmark is the all-in dollar lending rate. For IDA, financial equivalence is better assessed through the present value and grant element of future reflows, which may imply a negative real coupon.

2. Data and Construction of CPI-Indexed Returns

2.1. Return definition

We define the monthly CPI-indexed USD return for country i in month t as:

$$r_{i,t} = \frac{(1 + \pi_{i,t})}{(1 + \varepsilon_{i,t})} - 1$$

where $\pi_{i,t}$ is the domestic CPI inflation rate and $\varepsilon_{i,t}$ is the depreciation of the local currency against the U.S. dollar, both measured month-on-month. This return equals what a dollar-funded lender would earn if principal were indexed to domestic prices. Local-currency purchasing power grows with inflation. The dollar value of that purchasing power falls when the currency depreciates.

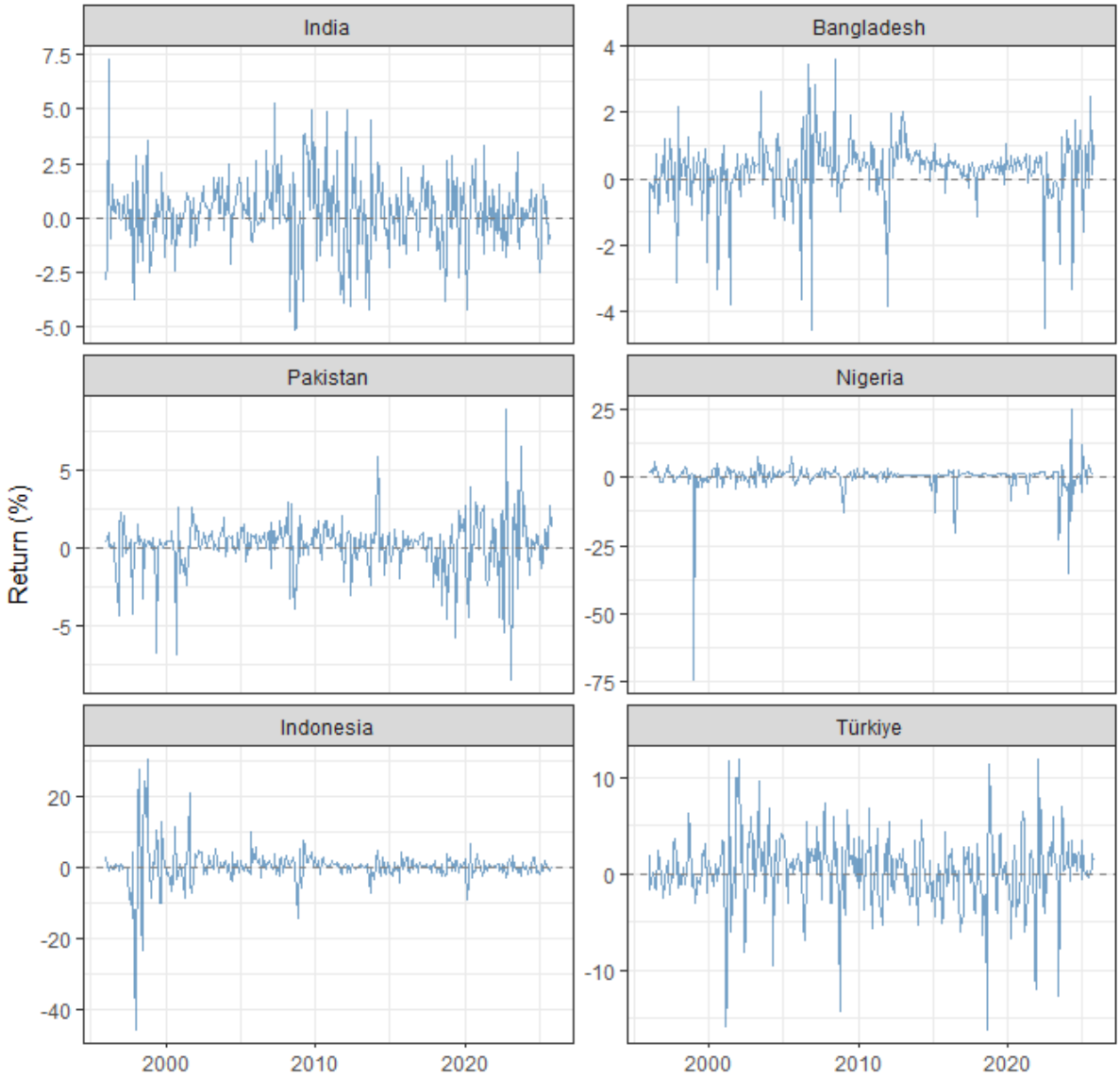
Monthly CPI and bilateral USD exchange-rate data are drawn from the IMF International Financial Statistics and the World Development Indicators for all World Bank borrowers with available data from January 1995 to December 2024. Portfolio weights are constructed from the latest available IBRD Statement of Loans and IDA Statement of Credits, which together define three portfolio variants used throughout: the combined IBRD+IDA portfolio, the IBRD-only portfolio, and the IDA-only portfolio. The top borrowers by exposure under each definition are reported in Appendix A.

Annual statistics throughout this paper use Weber's (2017) correct compounding formula in place of the conventional scaling, which understates volatility when monthly means are non-zero. The formula and a comparison of both approaches are provided in Appendix B.

3. The Diversification Result

The main result is simple: risks that look large in one country become much smaller in a World Bank portfolio. The six charts below show monthly CPI-indexed USD returns for the six largest World Bank borrowers by portfolio weight: India, Bangladesh, Pakistan, Nigeria, Indonesia, and Türkiye. They cover the full sample from January 1995 to December 2024.

Figure 1. Monthly CPI-Indexed USD Returns: Top 6 World Bank Borrowers



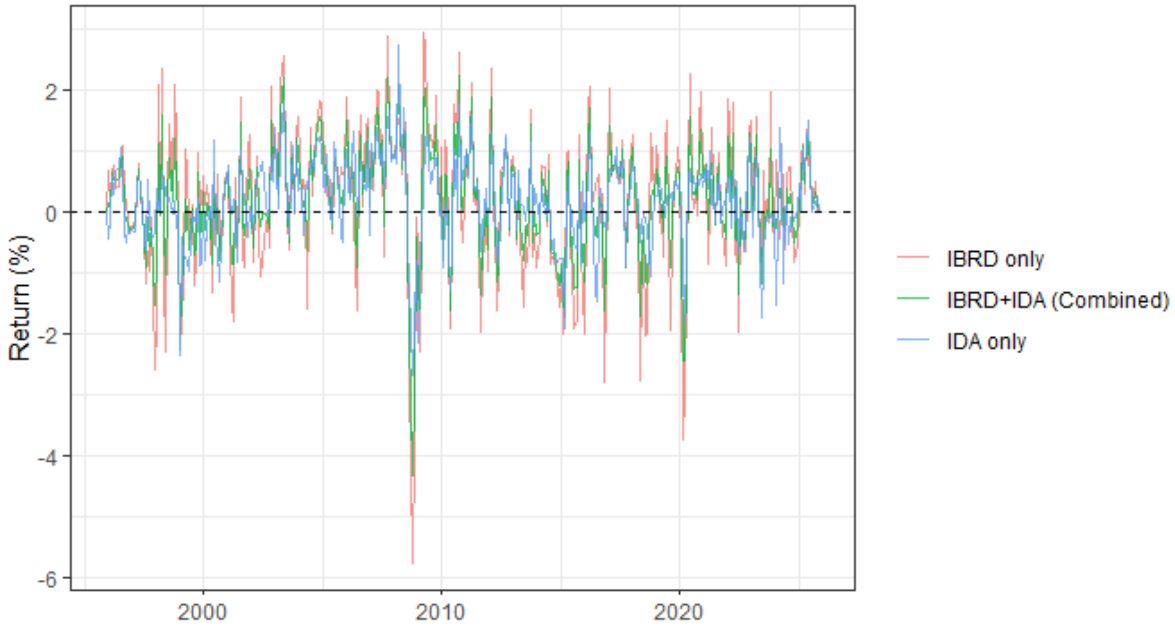
Source: Authors' calculations based on IMF International Financial Statistics, Economist Intelligence Unit, and national statistical agencies.

Each series is volatile. Extended periods of near-zero returns give way to sharp, one-sided spikes, almost always driven by large exchange rate depreciations, with domestic inflation playing a smaller

role, as shown in Section 4. Nigeria shows two dramatic collapses separated by more than two decades. Indonesia experienced a catastrophic drop during the 1997-98 Asian financial crisis. Türkiye has had repeated episodes of sharp lira depreciation. These are exactly the FX-crash events that original-sin theory predicts. Taken individually, any one of these exposures would represent substantial financial risk for a dollar-funded lender. The World Bank holds these positions together, pooled across a portfolio of dozens of countries.

The chart below shows what happens when these individual-country exposures are aggregated into the full portfolio.

Figure 2. Monthly CPI-Indexed USD Return: World Bank Portfolio



Source: Authors' calculations based on IMF International Financial Statistics, Economist Intelligence Unit, and national statistical agencies.

Aggregation changes the picture. The portfolio returns are substantially stable than the individual-country series. Large country-level swings average out across the portfolio because the underlying shocks are largely independent: a devaluation in Nigeria is largely uncorrelated with a devaluation in India. The annual standard deviation of the combined portfolio falls to 3.04 percent, less than one-third of the exposure-weighted country average of 8.72 percent. The same compression holds for IBRD alone, from 9.67 percent to 4.09 percent, and IDA alone, from 7.6 percent to 2.48 percent. Table 1 quantifies this compression across all three portfolio definitions.

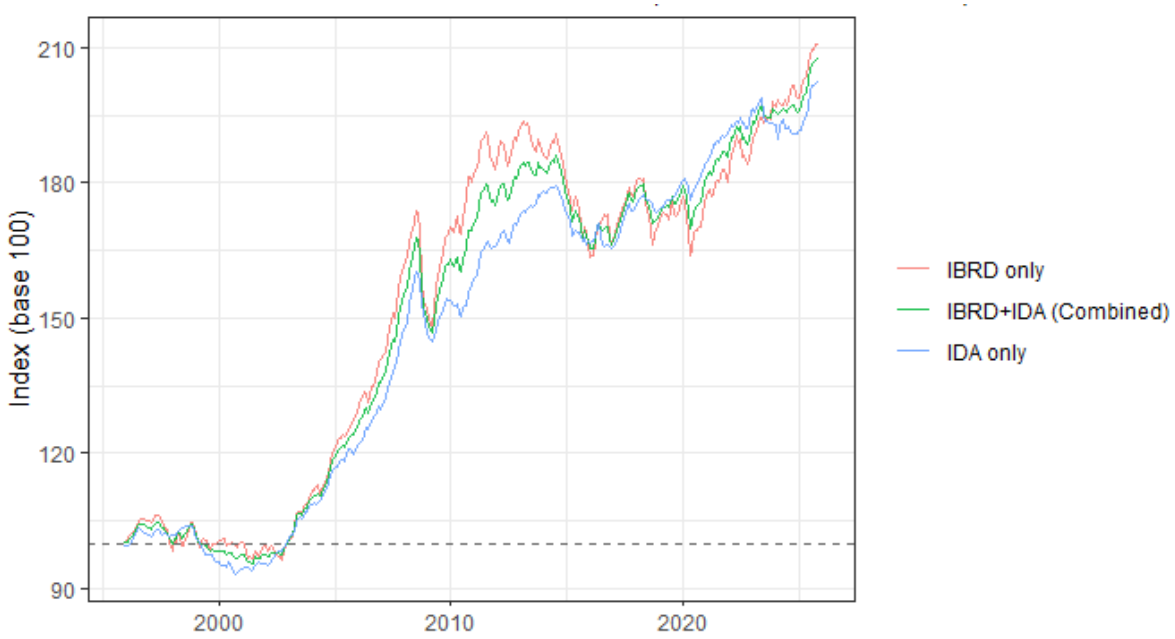
Portfolio Risk vs. Country Volatility: Full Sample 1995-2024

Portfolio	Annual portfolio SD (%)	Wtd avg country SD (%)	Avg cross-country corr
IBRD+IDA (Combined)	3.04	8.72	0.19
IBRD only	4.09	9.67	0.19
IDA only	2.48	7.60	0.19

This diversification comes from low average cross-country correlations. The average pairwise correlation across countries in the combined portfolio is only 0.19. Inflation and exchange-rate shocks are largely idiosyncratic: a currency crisis in Nigeria tells us little about crisis risk in India. This is precisely the condition that allows a multilateral portfolio to warehouse denomination risk that no individual borrower can manage.

Compounding monthly returns from January 1996 (base = 100), the portfolio index shows the long-run trajectory of a hypothetical CPI-indexed loan book.

Figure 3. CPI-Indexed USD Portfolio Value Index (base 100 = Jan-1996)



Source: Authors' calculations based on IMF International Financial Statistics, Economist Intelligence Unit, and national statistical agencies.

Annualised CPI-Indexed USD Returns

Portfolio	Period	Annual mean (%) [W]	Annual SD (%) [W]	Annual Sharpe [W]
IBRD+IDA (Combined)	1995-2025	2.51	3.04	0.827
IBRD only	1995-2025	2.60	4.09	0.636
IDA only	1995-2025	2.41	2.48	0.970

Note: [W] = Weber (2017) correct compounding. Annual statistics derived from monthly data using exact compounding formulas; see Appendix B.

The full bootstrap distribution of annual returns is reported next. For percentiles, no closed form exists under compounding. We draw 12 monthly returns at random (with replacement) from the observed history, compound them into an annual return, and repeat 10,000 times.

Distribution of Annual Returns

Portfolio	Mean [W]	SD [W]	Min	P10	P25	Median	P75	P90	Max
IBRD+IDA (Combined)	2.51	3.04	-12.24	-1.35	0.58	2.63	4.58	6.36	14.50

Portfolio	Mean [W]	SD [W]	Min	P10	P25	Median	P75	P90	Max
IBRD only	2.60	4.09	-13.95	-2.67	-0.06	2.71	5.36	7.77	16.77
IDA only	2.41	2.48	-7.44	-0.81	0.78	2.45	4.09	5.61	11.58

Mean [W] and SD [W]: Weber (2017) closed form. All other columns: bootstrap percentiles from 10,000 replications of 12 compounded monthly returns.

4. Exchange Rate Crashes Drive Bad Outcomes

What drives the large outliers? The worst outcomes in dollar lending portfolios come from abrupt exchange rate adjustments after periods of delayed correction. When a country with dollar liabilities resists depreciation, pressure accumulates and eventually releases in a disorderly move. The correction raises the domestic value of dollar debt, worsens fiscal balances, and destabilizes private and public balance sheets at the same time.

The CPI-indexed portfolio faces this risk through the dollar value of repayments, and the source of the tail events is clear: exchange-rate depreciation dominates local inflation. This finding has two implications. First, portfolio risk is concentrated in a small number of FX-crash events. Second, CPI indexation removes the balance-sheet channel that makes those crashes so costly for borrowers.

We identify the 20-country-month observations that contributed most to portfolio return, applying a selection algorithm that accepts a new episode only if it lies more than 24 months from any previously accepted episode in the same country. This ensures each distinct crisis is counted once and avoids producing multiple entries for the same event.

Top 20 Episodes by Contribution to Monthly Portfolio Return (distinct shocks, ±24-month window per country)

Country	Date	Country return (%)	Portfolio weight	Contribution (pp)	Inflation contrib (%)	FX contrib (%)	Driver
Nigeria	Jan 1999	-73.93	0.0416	-3.078	1.92	-74.42	FX-driven
Indonesia	Jan 1998	-45.56	0.0408	-1.858	7.17	-49.20	FX-driven
Nigeria	Feb 2024	-35.33	0.0416	-1.471	3.12	-37.28	FX-driven
Ethiopia, The Federal Democratic Republic of	Aug 2024	-42.91	0.0283	-1.213	1.18	-43.58	FX-driven
Ukraine	Feb 2015	-32.16	0.0348	-1.121	5.02	-35.41	FX-driven

Country	Date	Country return (%)	Portfolio weight	Contribution (pp)	Inflation contrib (%)	FX contrib (%)	Driver
Indonesia	Aug 2001	21.03	0.0408	0.858	-0.20	21.27	FX-driven
Nigeria	Jul 2016	-20.34	0.0416	-0.847	1.25	-21.32	FX-driven
Egypt, Arab Republic of	Nov 2016	-41.28	0.0200	-0.824	4.82	-43.98	FX-driven
Argentina	Dec 2023	-31.51	0.0228	-0.719	24.44	-44.96	FX-driven
Ukraine	Sep 1998	-19.78	0.0348	-0.689	2.34	-21.61	FX-driven
Uzbekistan, Republic of	Sep 2017	-44.48	0.0154	-0.683	1.32	-45.21	FX-driven
Ukraine	Dec 2008	-19.35	0.0348	-0.674	1.83	-20.80	FX-driven
Brazil	Feb 1999	-20.70	0.0309	-0.639	1.05	-21.53	FX-driven
Türkiye, Republic of	Aug 2018	-16.12	0.0397	-0.639	2.30	-18.00	FX-driven
Türkiye, Republic of	Mar 2001	-15.91	0.0397	-0.631	6.07	-20.72	FX-driven
Egypt, Arab Republic of	Mar 2024	-31.34	0.0200	-0.626	0.98	-32.00	FX-driven
Argentina	Jan 2002	-26.97	0.0228	-0.616	2.30	-28.61	FX-driven
Indonesia	Nov 2008	-14.56	0.0408	-0.594	0.12	-14.67	FX-driven
Türkiye, Republic of	Oct 2008	-14.25	0.0397	-0.565	2.60	-16.42	FX-driven
Nigeria	Jan 2009	-12.77	0.0416	-0.531	0.55	-13.24	FX-driven

The major episodes are Nigeria, Indonesia, Ukraine, Egypt, Argentina, Türkiye, and Brazil. Most are FX-driven and correspond to periods of delayed exchange rate adjustment followed by abrupt correction. Inflation plays a secondary role in most cases: the local CPI rose by too little to offset the depreciation in dollar terms, meaning a real depreciation (usually follow by a slow real appreciation).

This is an endogenous response to the balance sheet effects of a devaluation. Countries postpone adjustment, accumulate dollar denominated obligations, and then experience a disorderly correction that inflates debt burdens and destabilizes balance sheets. CPI-indexed lending leaves currency crises possible. It removes the anti-cyclical debt-service mechanism that amplifies them. Time series charts for each of the top 20 episodes are provided in Appendix C.

5. The Price of the Reform: The Indifference Coupon

5.1. What rate would leave the Bank indifferent?

The pricing question is whether a CPI-indexed loan can preserve the World Bank's financial return while shifting denomination risk away from the borrower. The Bank's dollar return has two components. The indexed principal changes in dollar value with domestic inflation and the exchange rate, and the loan pays a real coupon on that indexed principal. Keeping these components separate clarifies where the lower equivalent coupon comes from and where diversification enters.

Let i index borrowing countries, t index periods, and $j \in \{IBRD, IDA\}$ index the lending window. Section 2 defines $r_{i,t}$ as the dollar return generated by indexing country i's principal to its domestic CPI. Given portfolio weights w_i, the corresponding portfolio return is

$$r_{P,t} = \sum_i w_i \, r_{i,t}.$$

Let $\mu_P = E[r_P]$ and σ_P denote the annual mean and standard deviation of the portfolio return. In the empirical exercise, both are estimated from monthly data using the Weber annualisation described in Appendix B. Let i_j^{USD} denote the annual dollar return that the Bank seeks to match, and let c_j denote the real coupon paid on the CPI-indexed principal. For IBRD, the benchmark can be written as the reference dollar rate plus the applicable funding, operational, and lending spread. For IDA, it is the concessional dollar rate used to value future reflows.

The gross dollar return on the indexed instrument is

$$1 + R_{j,t}^{CPI} = \big(1 + c_j\big)\big(1 + r_{P,t}\big).$$

Under certainty, the equivalent coupon c_j^0 satisfies

$$\big(1 + c_j^0\big)(1 + \mu_P) = 1 + i_j^{USD},$$

which gives

$$c_j^0 = \frac{1 + i_j^{USD}}{1 + \mu_P} - 1 \approx i_j^{USD} - \mu_P.$$

The approximation highlights the economic decomposition. The average dollar return generated by indexation lowers the required real coupon. A risk adjustment is added separately when portfolio returns are uncertain.

5.1. Baseline coupon: the role of the average indexation return

We estimate μ_P with the Weber-annualized historical mean return for each portfolio. The IBRD portfolio generated an average indexation return of 2.60 percent, while the IDA portfolio generated 2.41 percent. Using the illustrative dollar benchmarks in the exercise, the corresponding equivalent real coupons are shown below.

Equivalent Real Coupon Using the Historical Mean Indexation Return

Window	Dollar benchmark (%)	Mean indexation return (%)	Equivalent real coupon (%)
IBRD	5.50	2.60	2.83
IDA	1.00	2.41	-1.38

Notes: The IBRD benchmark is an illustrative all-in annual dollar rate. The IDA benchmark is an illustrative concessional annual dollar rate. The equivalent coupon is a real coupon paid on CPI-indexed principal.

The positive average indexation return accounts for most of the gap between the dollar benchmark and the equivalent real coupon. For IBRD, the 2.83 percent coupon combines with the average 2.60 percent return on indexed principal to match a 5.50 percent dollar return. Under relative purchasing power parity and a stable real exchange rate, μ_P is approximately equal to U.S. inflation, so the equivalent coupon approaches the real all-in dollar rate. Expected real appreciation raises μ_P further, while expected real depreciation lowers it.

The IDA calculation produces a negative equivalent real coupon. This result follows from comparing a 1 percent nominal dollar claim with indexed principal that generated a 2.41 percent average dollar return. Preserving the same expected reflow requires part of the indexation return to be transferred back to the borrower through the financial terms. A negative real coupon is one possible implementation. The same concessionality can be delivered through the grant component, maturity, grace period, amortization profile, or an adjustment to principal.

For IDA, the central equivalence test should therefore compare the present value of future flows and the grant element received by borrowers. This follows the approach in Hausmann and Rigobon (2003), who evaluated whether the indexed portfolio could preserve IDA's lending capacity over time.

5.2. Under uncertainty: diversification limits the risk adjustment

Portfolio returns are uncertain, so the Bank may require compensation for the residual volatility it retains. We represent that compensation with a mean-variance risk adjustment. For risk-aversion coefficient γ, define

$$a_P(\gamma) = \frac{\gamma}{2}\sigma_P^2.$$

The certainty-equivalent indexation return is then

$$\mu_P^{CE}(\gamma) = \mu_P - a_P(\gamma),$$

and the risk-adjusted equivalent coupon becomes

$$c_j^*(\gamma) = \frac{1 + i_j^{USD}}{1 + \mu_P - a_P(\gamma)} - 1.$$

The mean and risk terms play distinct roles. The mean indexation return μ_P lowers the equivalent coupon. The risk adjustment $a_P(\gamma)$ raises it. Diversification operates through σ_P^2 by reducing the volatility of the aggregate portfolio.

To quantify that effect, let the exposure-weighted country-level adjustment be

$$a_C(\gamma) = \frac{\gamma}{2} \sum_i w_i \, \sigma_i^2,$$

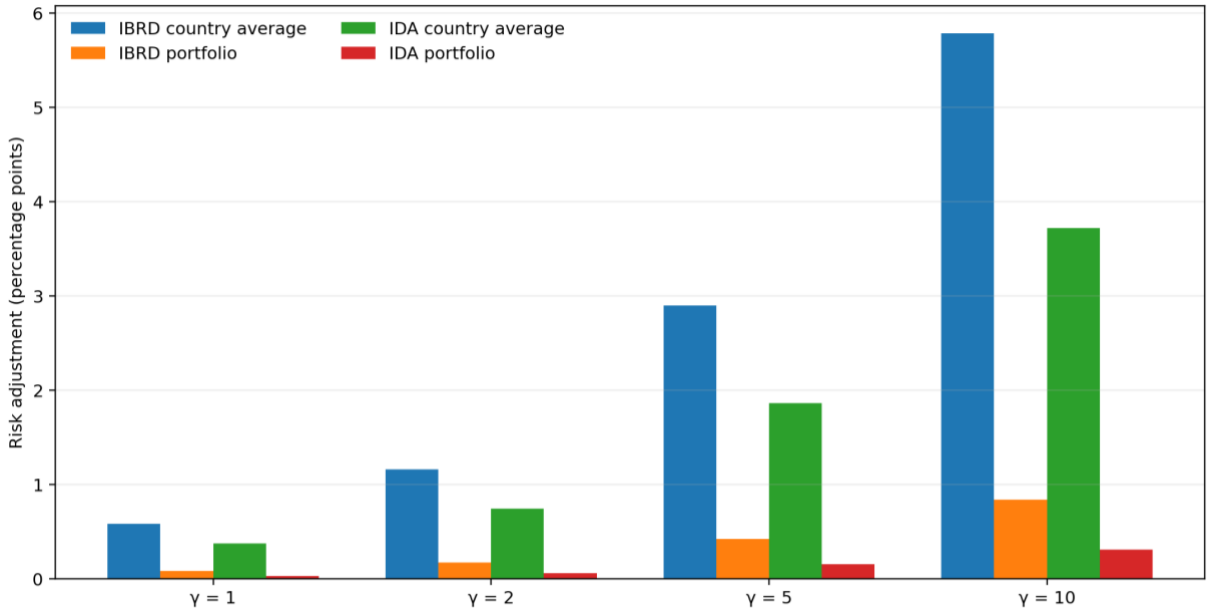
where σ_i is the annual volatility of country i's indexation return. The diversification benefit is $D(\gamma) = a_C(\gamma) - a_P(\gamma)$.

Risk Adjustment With and Without Portfolio Diversification

γ	IBRD country average (pp)	IBRD portfolio (pp)	IBRD diversification benefit (pp)	IDA country average (pp)	IDA portfolio (pp)	IDA diversification benefit (pp)
1	0.58	0.08	0.50	0.37	0.03	0.34
2	1.16	0.17	0.99	0.74	0.06	0.68
5	2.90	0.42	2.48	1.86	0.15	1.71
10	5.79	0.84	4.96	3.72	0.31	3.42

The portfolio adjustment is small relative to the country-level counterfactual. At $\gamma = 1$, diversification reduces the IBRD adjustment from 0.58 to 0.08 percentage points and the IDA adjustment from 0.37 to 0.03 percentage points. At $\gamma = 10$, the corresponding portfolio adjustments remain 0.84 and 0.31 percentage points.

Figure 4. Country-average and portfolio risk adjustments under alternative values of γ.



Source: Authors' calculations based on IMF International Financial Statistics, Economist Intelligence Unit, and national statistical agencies.

The chart isolates the role of diversification. The distance between the country-average and portfolio bars is $D(\gamma)$, the reduction in the risk adjustment achieved by pooling exposures across

borrowers. It should be kept separate from the larger reduction in the baseline coupon generated by the positive average indexation return.

Risk-Adjusted Equivalent Real Coupon

γ	IBRD equivalent coupon (%)	Increase from certainty baseline (pp)	IDA equivalent coupon (%)	Increase from certainty baseline (pp)
1	2.91	0.08	-1.35	0.03
2	2.99	0.17	-1.32	0.06
5	3.25	0.42	-1.23	0.15
10	3.67	0.85	-1.08	0.30

Notes: The IBRD dollar benchmark is 5.50 percent and the IDA dollar benchmark is 1.00 percent. Portfolio means and standard deviations are Weber-annualised estimates for 1995-2024.

For IBRD, the risk adjustment raises the equivalent coupon from 2.83 percent under certainty to 2.91 percent at $\gamma = 1$ and 3.67 percent at $\gamma = 10$. For IDA, the equivalent coupon remains negative throughout the range because the concessional dollar benchmark lies below the average indexation return.

5.3. Interpreting the IBRD and IDA results

For IBRD, the relevant dollar benchmark should be set at origination and updated with the reference rate and applicable spread. The equivalent CPI-indexed coupon is a real rate paid on an inflation-adjusted principal balance, so its numerical level is not directly comparable with a nominal dollar coupon without accounting for the indexation return. The historical estimates serve as a calibration. Pricing at origination should use a forward-looking expected indexation return and a risk adjustment based on the prospective portfolio.

For IDA, the equivalent coupon is one element of a broader concessional package. The operational objective is to preserve an agreed present value of reflows and grant element while reducing the borrower's exposure to exchange-rate movements. IDA can distribute that concessionality across the coupon, principal, grace period, maturity, and grant share. A pilot could specify the expected indexation return, risk parameter, and grant-equivalent target in advance and report realized reflows against both the indexed and dollar benchmarks.

6. Policy Implications

CPI-indexed lending can be implemented within the Bank's current operating model. The Bank lends in dollars at disbursement, as it does today. The outstanding principal is then expressed in local-currency units indexed to the domestic CPI. Amortization payments and interest are computed on the inflation-adjusted local-currency balance and converted back to dollars at the prevailing exchange rate at the time of payment. The borrower's obligation is constant in real domestic terms. The dollar amount varies with inflation and the exchange rate.

New IDA lending is the most tractable entry point. IDA is fiscally funded, faces no matching hard-currency liability constraint, and lends to countries where original sin is most damaging. A pilot with a subset of IDA borrowers, for example those with the deepest dollar debt and the most

volatile exchange-rate histories, would generate real-world evidence on implementation costs and institutional feasibility before a broader rollout.

Hausmann and Rigobon (2003) proposed an additional option: offering existing IDA borrowers a voluntary once-and-for-all conversion of outstanding dollar loans to CPI-indexed local-currency instruments. This is operationally clean. Countries that find the conversion attractive opt in; others keep their existing terms. The Bank's aggregate exposure remains balanced if enough countries participate. The analysis in this paper, consistent with the original UF proposal, suggests that participation by half the IDA membership would provide more than enough risk sharing.

For IBRD, the path is more gradual: begin with new lending to middle-income countries with established inflation frameworks and well-measured CPI series, then expand as data quality and operational experience accumulate.

Governance can address the natural concern that borrowers might manipulate measured inflation to reduce their real debt burden. National statistical agencies already construct CPI series for domestic policy purposes, and the political cost of official data fraud is high. The Bank can also use quarterly or semi-annual CPI averages in place of the most recent monthly print, which further reduces the scope for opportunistic timing.

The reform directly addresses the transmission mechanism from original sin to fear of floating. Under CPI-indexed lending, a currency depreciation leaves the real local-currency burden of multilateral debt unchanged. Governments therefore face fewer balance sheet reasons to resist exchange rate flexibility. Over time this should reduce the systematic tendency toward overvalued exchange rates and delayed adjustment that the original-sin literature documents.

The reform also creates a second-order benefit beyond direct interest rate savings. If CPI-indexed multilateral lending contributed even modestly to greater exchange-rate flexibility among borrowing countries, the reduction in crisis frequency and severity would dwarf the direct coupon savings. That broader benefit lies outside our quantitative exercise, which measures only the Bank's financial position. It remains part of the case for the reform.

Implementation requires country-level CPI series with sufficient quality and frequency. Most IBRD borrowers and a growing share of IDA countries have monthly CPI data of reasonable quality. Where CPI series are short, irregular, or questionable, the Bank could use a basket of regional or comparator prices as a proxy, or defer indexation until data quality is adequate. This defines the sequencing of the reform.

7. Conclusion

The international financial system still imposes a damaging asymmetry on developing countries: they borrow instruments that fail to track their capacity to pay, and exchange-rate movements then make those obligations harder to service. This asymmetry is the essence of original sin. It helps explain why countries fear floating, postponing adjustment, and experience crises that become more disruptive than necessary.

The World Bank can help correct this problem. Risk that is large for an individual borrower becomes much smaller inside a diversified multilateral portfolio. Positive average indexation returns lower the real coupon needed to match the Bank’s dollar return, while portfolio

diversification keeps the additional adjustment for residual currency risk small. For IDA, the reform should be evaluated against the present value and grant element of future reflows.

The extreme episodes show the original-sin mechanism in the data. Bad outcomes are FX-driven. They reflect abrupt corrections after periods of delayed adjustment in countries with dollar liabilities. CPI-indexed lending leaves currency crises possible. It removes the mechanism that makes them so fiscally destructive: the automatic rise in the real debt burden that accompanies depreciation under dollar debt.

The broader implication is institutional. Multilateral development banks were created to solve problems that markets leave unsolved. Private markets have failed to provide developing countries with external instruments that track domestic capacity to pay. Helping countries access such instruments at scale is precisely the kind of problem multilaterals exist to solve. The World Bank can become a solution to original sin.

8. References

Calvo, Guillermo A., and Carmen M. Reinhart. "Fear of Floating." Quarterly Journal of Economics 117, no. 2 (2002): 379-408.

Eichengreen, Barry, and Ricardo Hausmann. 1999. "Exchange Rates and Financial Fragility." NBER Working Paper 7418.

Eichengreen, Barry, Ricardo Hausmann, and Ugo Panizza. 2005a. "The Pain of Original Sin." In *Other People's Money: Debt Denomination and Financial Instability in Emerging Market Economies*, edited by Barry Eichengreen and Ricardo Hausmann, 13–47. Chicago: University of Chicago Press. doi:10.7208/chicago/9780226194578.003.0002.

Eichengreen, Barry, Ricardo Hausmann, and Ugo Panizza. 2005b. "The Mystery of Original Sin." In *Other People's Money: Debt Denomination and Financial Instability in Emerging Market Economies*, edited by Barry Eichengreen and Ricardo Hausmann, 233–265. Chicago: University of Chicago Press. doi:10.7208/chicago/9780226194578.003.0010.

Eichengreen, Barry, Ricardo Hausmann, and Ugo Panizza. 2007. "Currency Mismatches, Debt Intolerance, and Original Sin: Why They Are Not the Same and Why It Matters." In Capital Controls and Capital Flows in Emerging Economies: Policies, Practices and Consequences, edited by Sebastian Edwards, 121-169. Chicago: University of Chicago Press.

Eichengreen, Barry, Ricardo Hausmann, and Ugo Panizza. 2023. "Yet it Endures: The Persistence of Original Sin." *Open Economies Review* 34: 1–42. doi:10.1007/s11079-022-09704-3.

Hausmann, Ricardo, and Roberto Rigobon. 2003. "IDA in UF: On the Benefits of Changing the Currency Denomination of Concessional Lending to Low-Income Countries." World Bank Policy Research Working Paper No. 3077. Washington, DC: World Bank.

Weber, Christian E. "Macroeconomic Measurement vs. Macroeconomic Theory." *Journal of Financial Economics* (2017).

9. Appendix A: World Bank Portfolio Composition

The three tables below report the top 20 borrowers under each portfolio definition, derived from the latest available IBRD Statement of Loans and IDA Statement of Credits.

Top 20 World Bank (IBRD+IDA) Borrowers by Portfolio Exposure

ISO3	Exposure (US$ bn)	Portfolio Weight
IND	48.43	0.067
BGD	31.42	0.044
PAK	30.18	0.042
NGA	29.89	0.042
IDN	29.29	0.041
TUR	28.48	0.040
UKR	25.02	0.035
BRA	22.18	0.031
ETH	20.29	0.028
PHL	20.03	0.028
KEN	19.46	0.027
CHN	18.92	0.026
COL	17.91	0.025
TZA	17.58	0.024
MAR	16.41	0.023
ARG	16.39	0.023
EGY	14.34	0.020
VNM	14.28	0.020
MEX	13.66	0.019
UZB	11.03	0.015

Top 20 IBRD Borrowers by Loans Held

ISO3	Loans Held (US$ bn)	IBRD Weight
IND	35.21	0.091
IDN	29.29	0.076
TUR	28.48	0.074

ISO3	Loans Held (US$ bn)	IBRD Weight
BRA	22.18	0.057
PHL	20.03	0.052
CHN	18.92	0.049
COL	17.91	0.046
UKR	17.88	0.046
MAR	16.41	0.042
ARG	16.39	0.042
EGY	14.26	0.037
MEX	13.66	0.035
AGO	8.78	0.023
ROU	8.36	0.022
ECU	8.07	0.021
JOR	7.94	0.021
ZAF	7.21	0.019
PER	7.06	0.018
POL	6.83	0.018
TUN	6.68	0.017

Top 20 IDA Borrowers by Credits Held

ISO3	Credits Held (US$ bn)	IDA Weight
BGD	31.42	0.095
NGA	26.85	0.081
PAK	24.83	0.075
ETH	20.29	0.061
TZA	17.58	0.053
KEN	17.45	0.053
IND	13.23	0.040
VNM	11.60	0.035
GHA	9.77	0.029
COD	9.01	0.027

ISO3	Credits Held (US$ bn)	IDA Weight
CIV	8.92	0.027
UGA	8.29	0.025
SEN	7.64	0.023
UKR	7.14	0.022
UZB	6.87	0.021
MOZ	6.61	0.020
NPL	6.54	0.020
NER	6.12	0.018
CMR	5.97	0.018
MDG	5.48	0.017

Appendix B: Technical Notes on Annualisation

9.1. Weber (2017) correct compounding

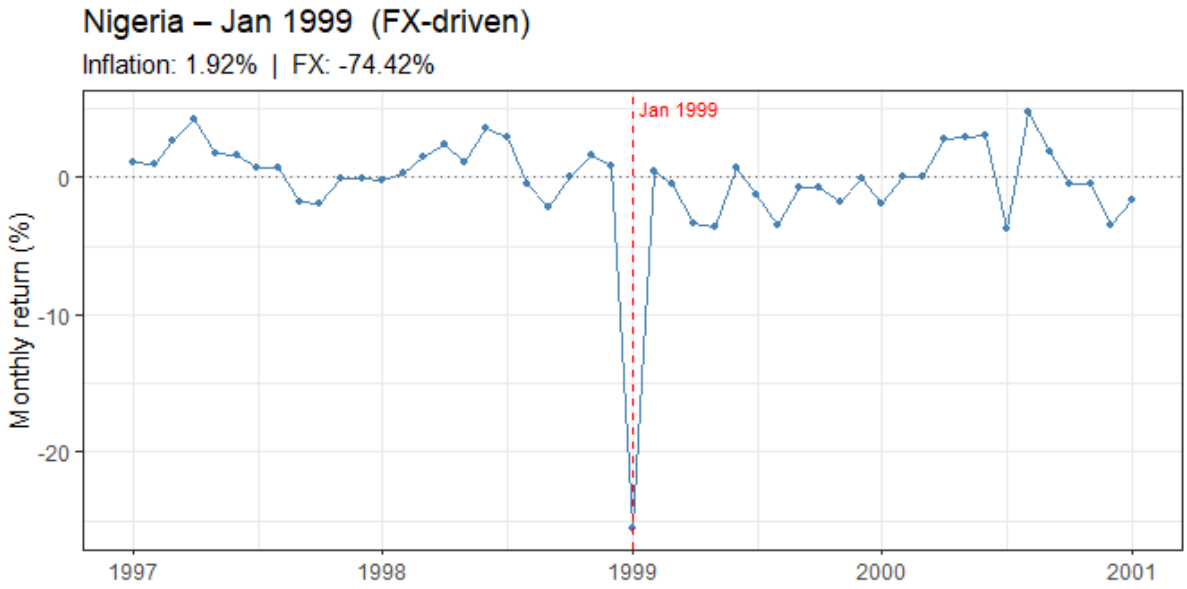
Multiplying the monthly mean by 12 and the monthly standard deviation by $\sqrt{12}$ assumes returns are summed over time, which is incorrect when they compound. Following Weber (2017), the correct annual mean and standard deviation are:

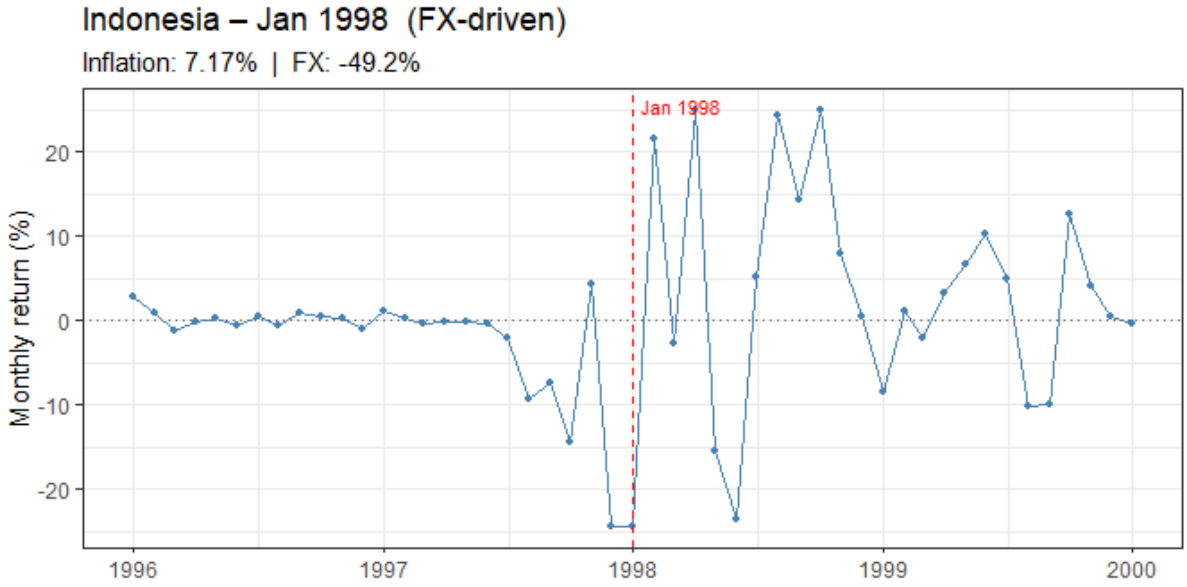
$$\mu_A = (1+\mu_m)^{12} - 1, \qquad \sigma_A = \sqrt{(\sigma_m^2 + (1+\mu_m)^2)^{12} - (1+\mu_m)^{24}}$$

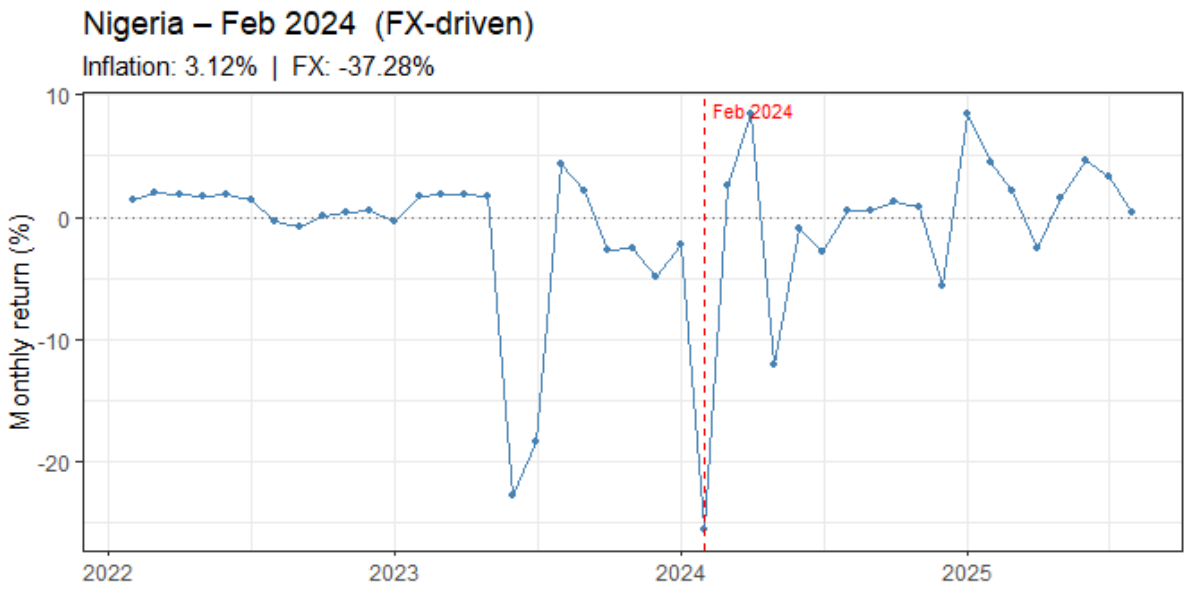
where μ_m and σ_m are expressed as decimals. Summary statistics using these formulas are reported in the main text (Table 1).

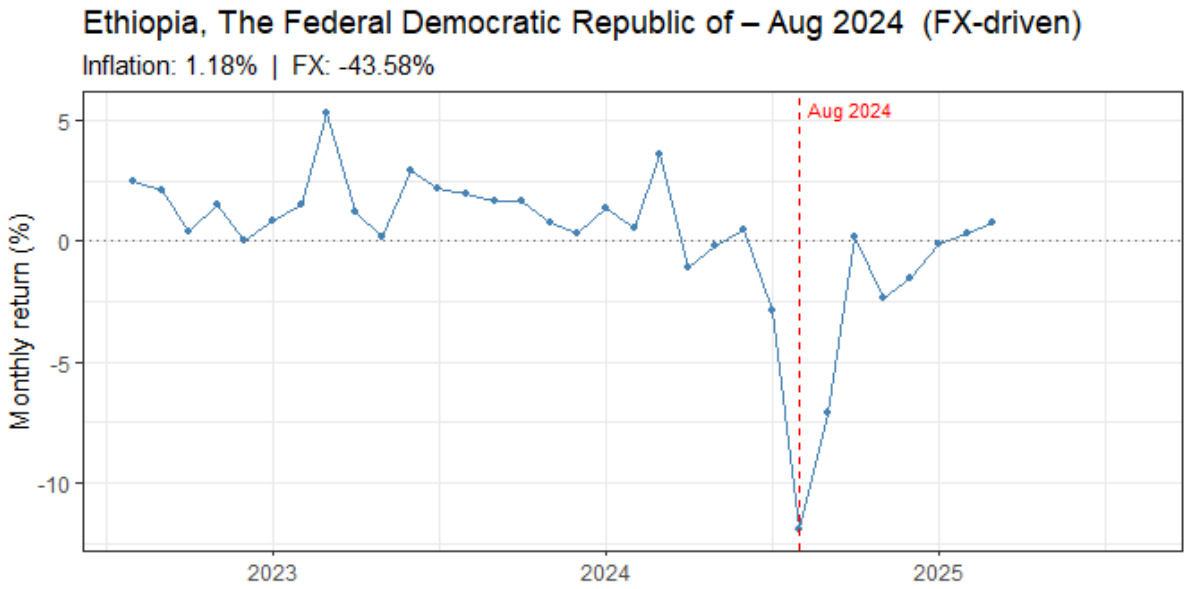
10. Appendix C: Episode Charts

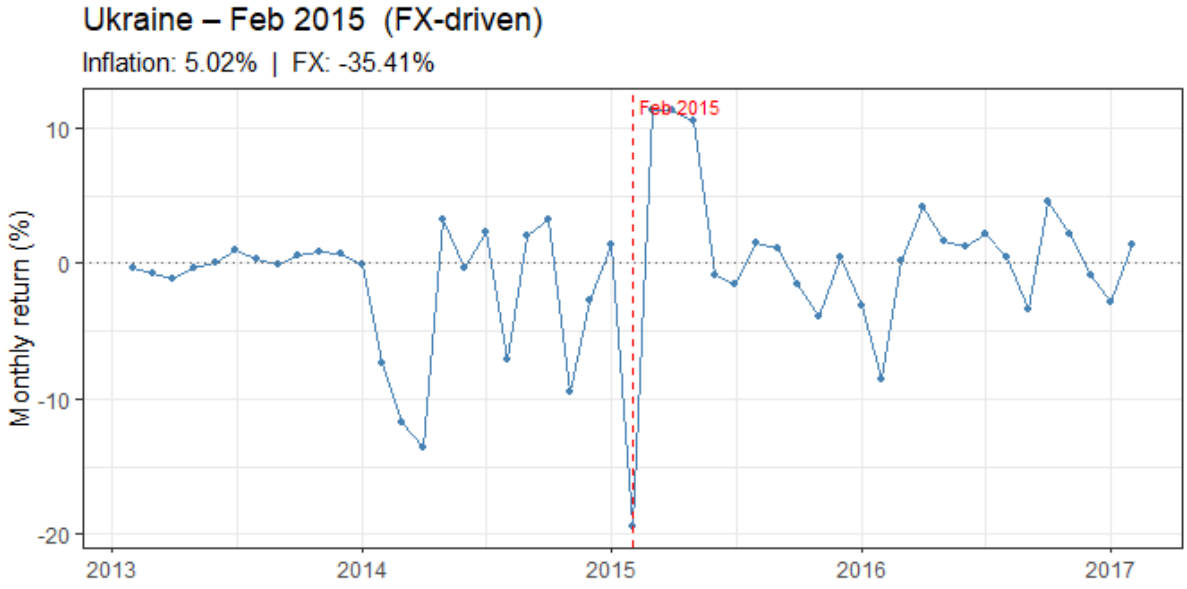
The charts below plot monthly CPI-indexed USD returns in the 24-month window around each of the top 20 episodes identified in Section 5. The red dashed vertical line marks the peak-contribution month; the driver classification (FX or inflation) and the decomposition of the return into its inflation and exchange-rate components are noted in each subtitle.

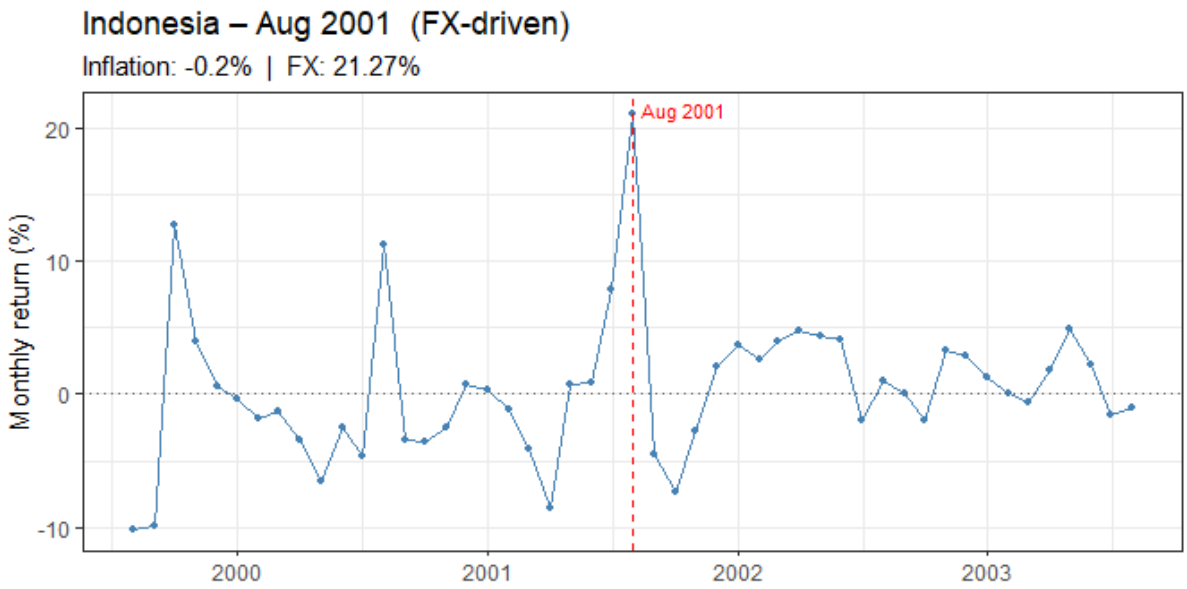


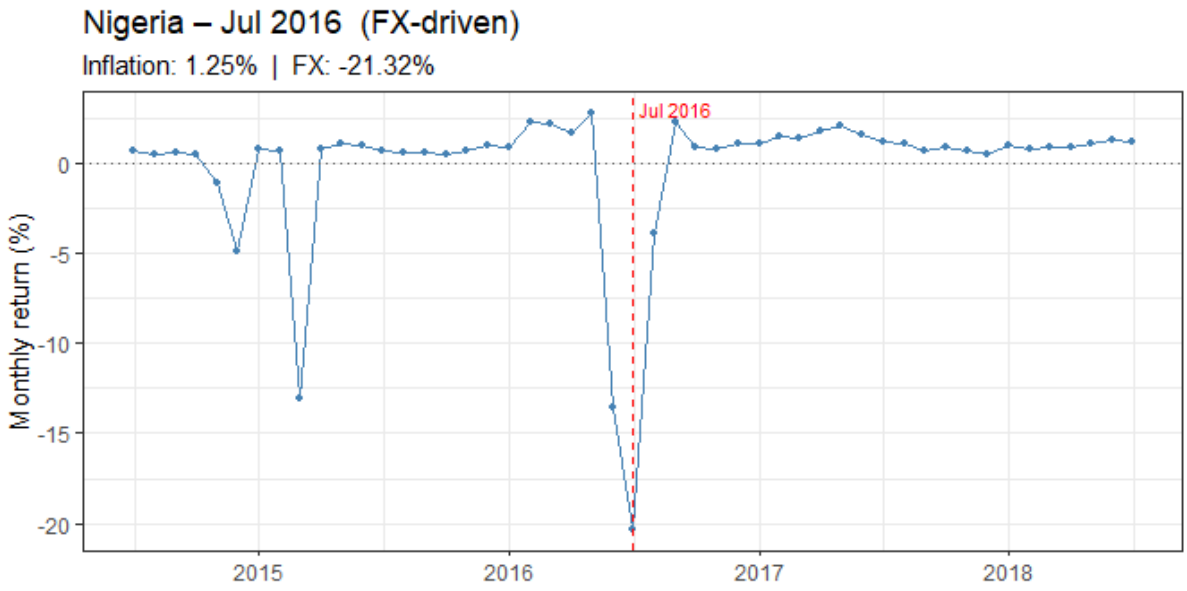


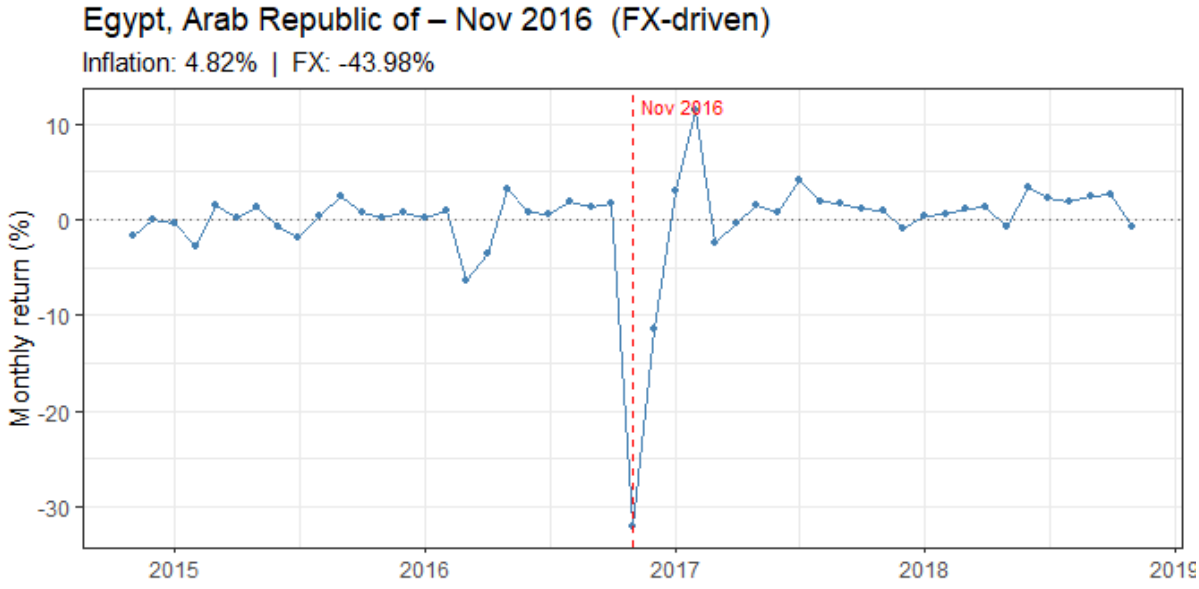

Nigeria – Feb 2024 (FX-driven)
Inflation: 3.12% | FX: -37.28%
Feb 2024
Monthly return (%)
10
0
-10
-20
2022
2023
2024
2025

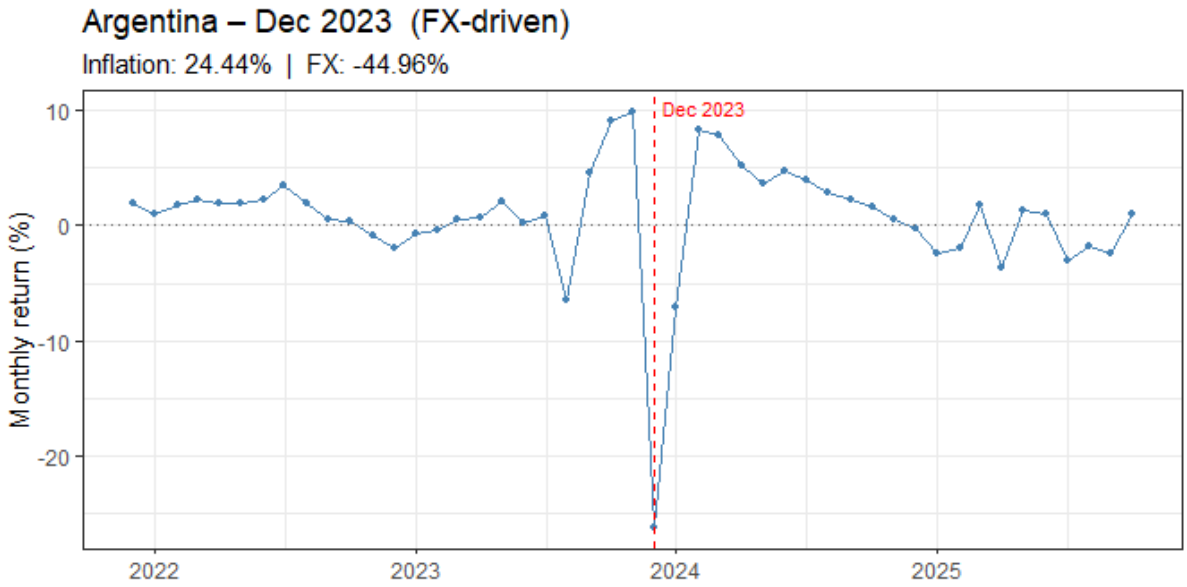

Ethiopia, The Federal Democratic Republic of – Aug 2024 (FX-driven)
Inflation: 1.18% | FX: -43.58%
Aug 2024
Monthly return (%)
5
0
-5
-10
2023
2024
2025

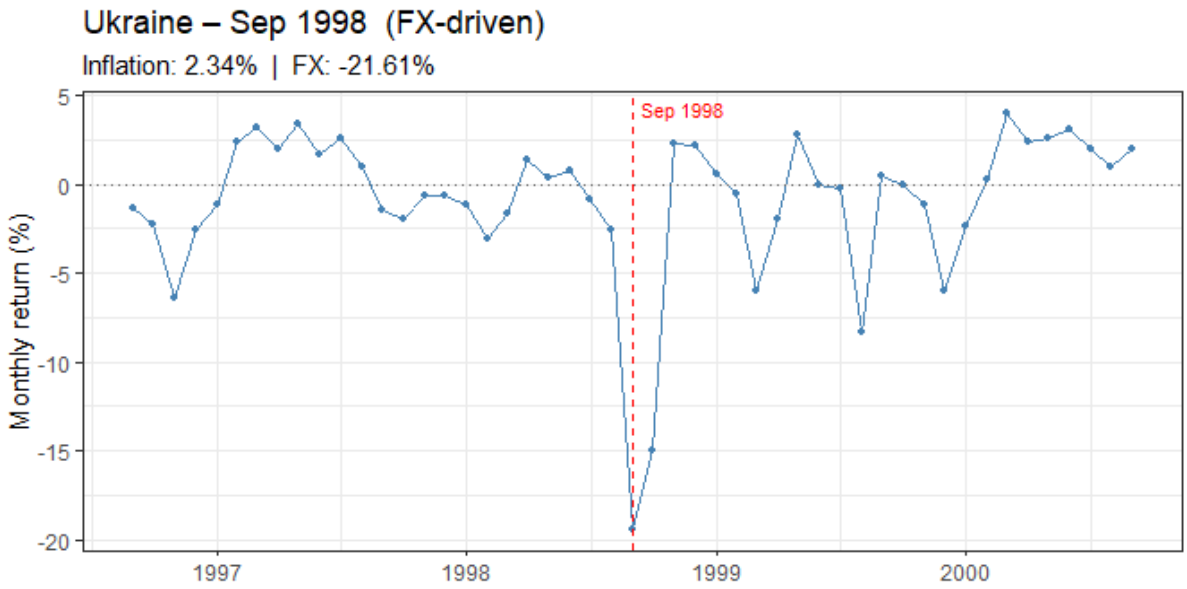

Ukraine – Feb 2015 (FX-driven)
Inflation: 5.02% | FX: -35.41%
Feb 2015
Monthly return (%)
10
0
-10
-20
2013
2014
2015
2016
2017

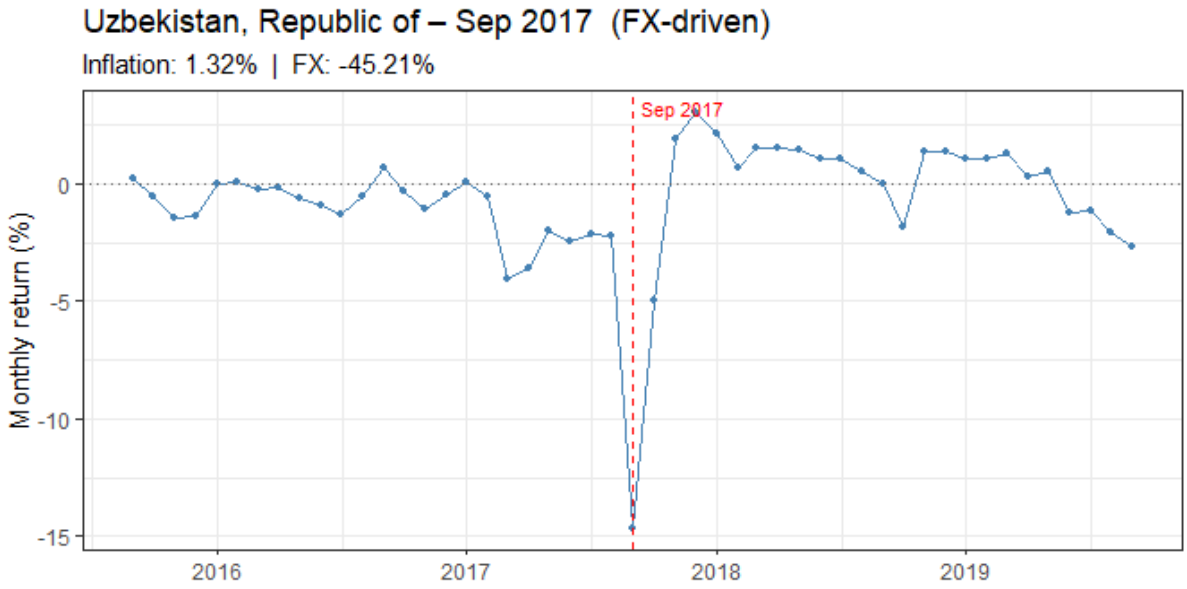

Indonesia – Aug 2001 (FX-driven)
Inflation: -0.2% | FX: 21.27%
Aug 2001
Monthly return (%)
20
10
0
-10
2000
2001
2002
2003

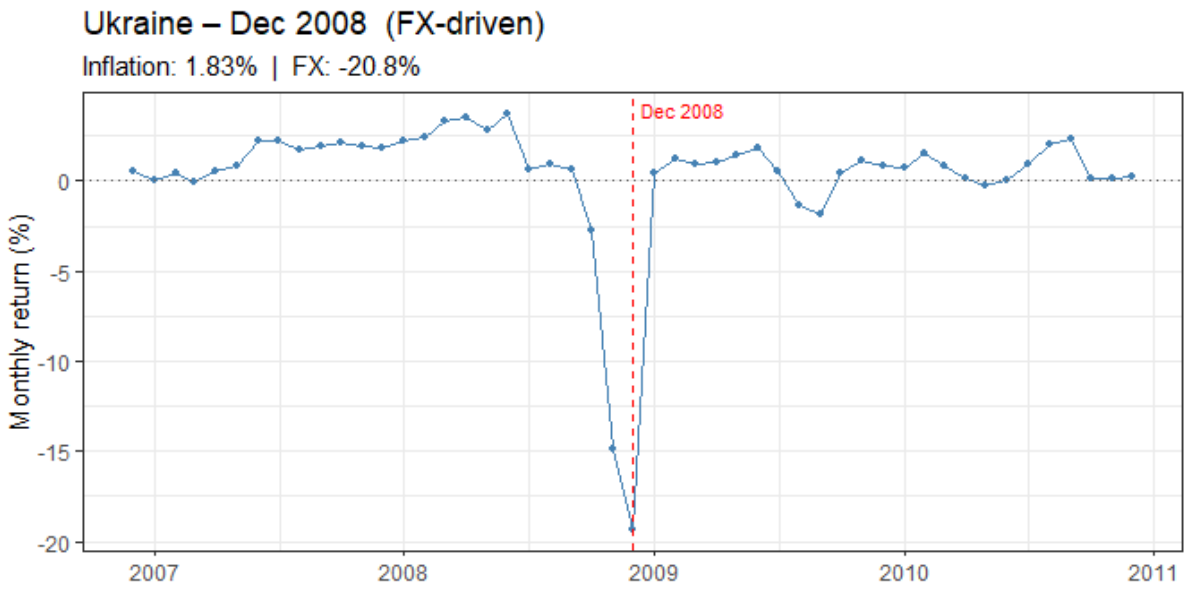

Nigeria – Jul 2016 (FX-driven)
Inflation: 1.25% | FX: -21.32%
Jul 2016
Monthly return (%)
0
-5
-10
-15
-20
2015
2016
2017
2018

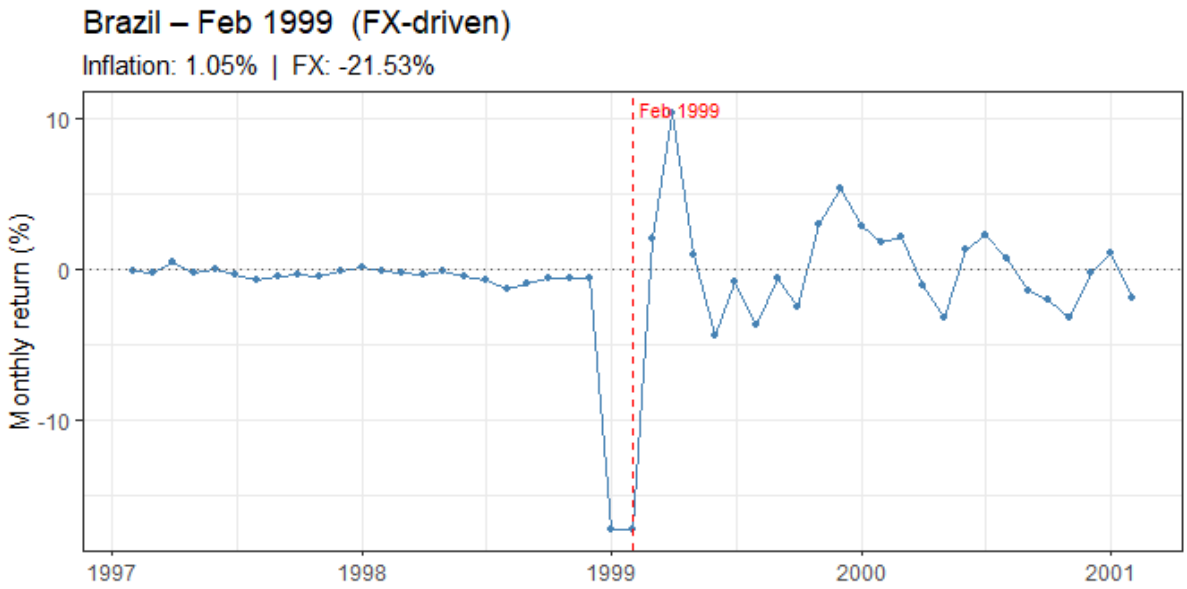

Egypt, Arab Republic of – Nov 2016 (FX-driven)
Inflation: 4.82% | FX: -43.98%
Nov 2016
Monthly return (%)
10
0
-10
-20
-30
2015
2016
2017
2018
2019

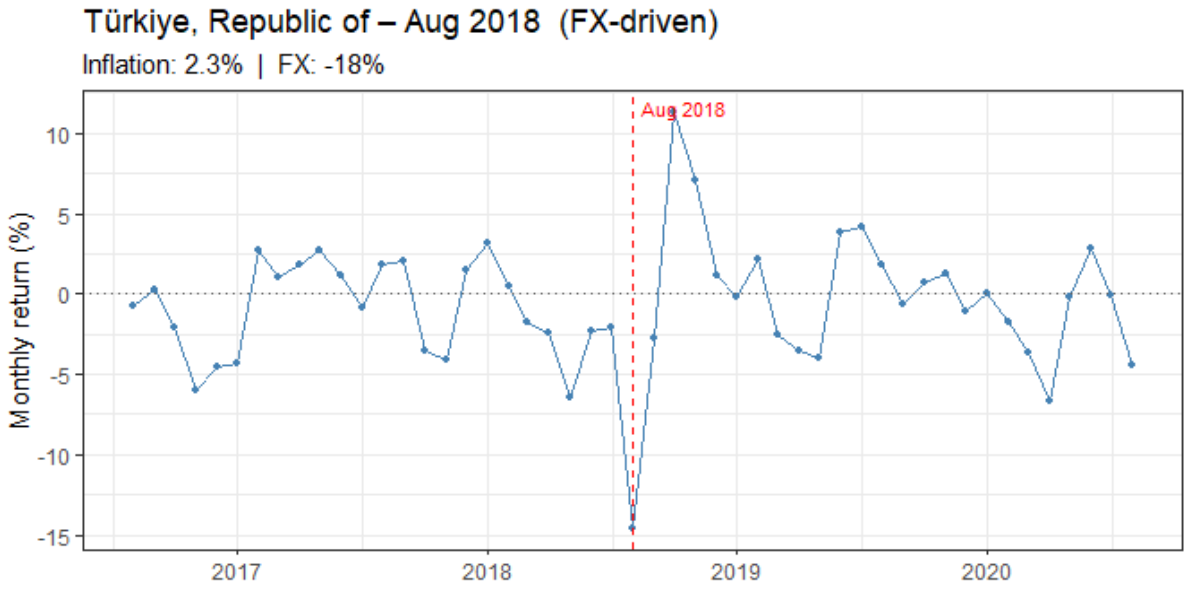

Argentina – Dec 2023 (FX-driven)
Inflation: 24.44% | FX: -44.96%
Dec 2023
Monthly return (%)
10
0
-10
-20
2022
2023
2024
2025

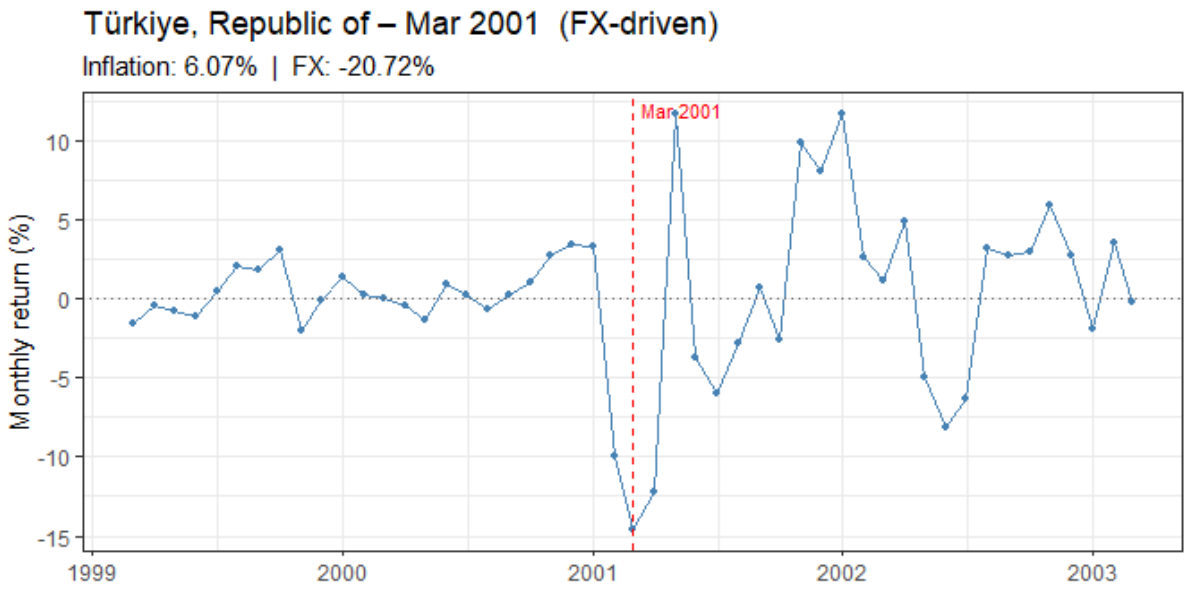

Ukraine – Sep 1998 (FX-driven)
Inflation: 2.34% | FX: -21.61%
Sep 1998
Monthly return (%)
5
0
-5
-10
-15
-20
1997
1998
1999
2000

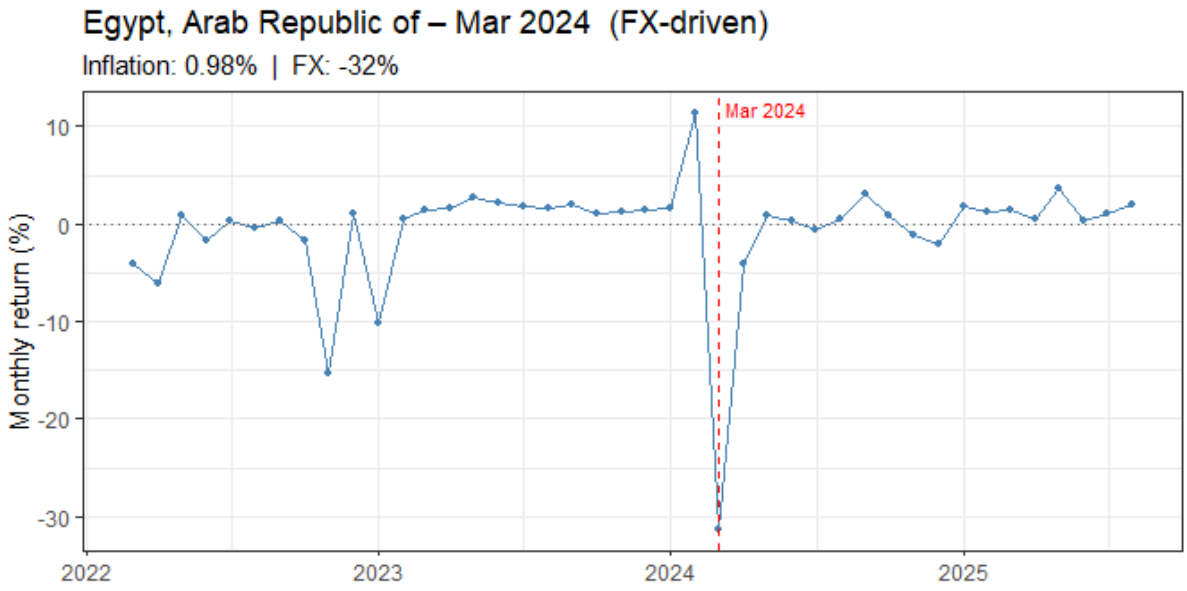

Uzbekistan, Republic of – Sep 2017 (FX-driven)
Inflation: 1.32% | FX: -45.21%
Sep 2017
Monthly return (%)
0
-5
-10
-15
2016
2017
2018
2019

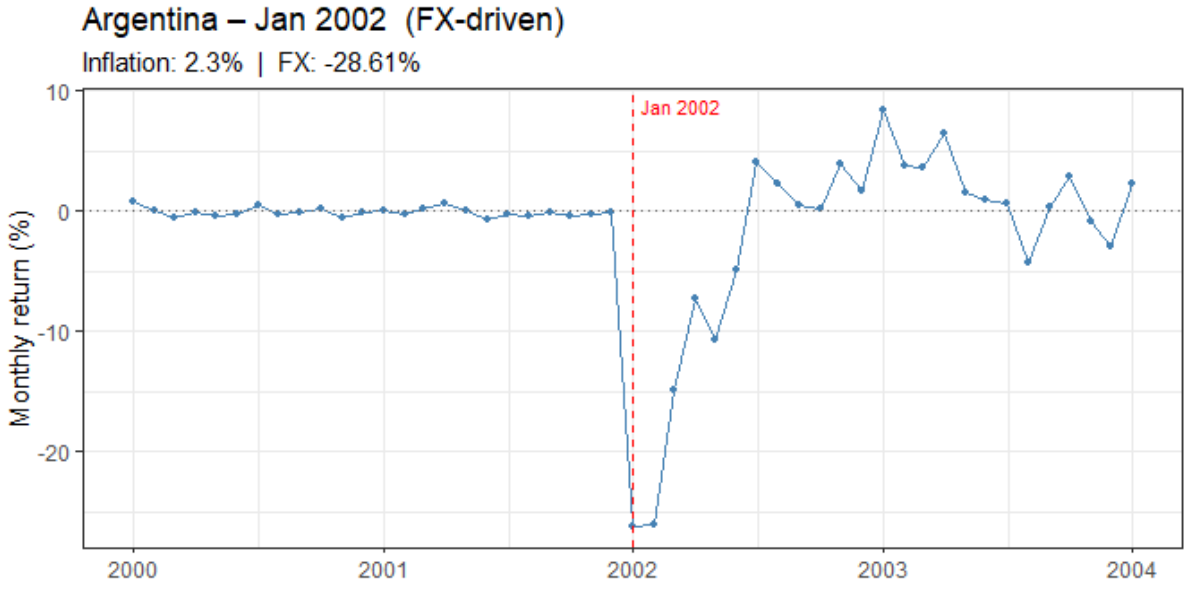

Ukraine – Dec 2008 (FX-driven)
Inflation: 1.83% | FX: -20.8%
Dec 2008
Monthly return (%)
0
-5
-10
-15
-20
2007
2008
2009
2010
2011

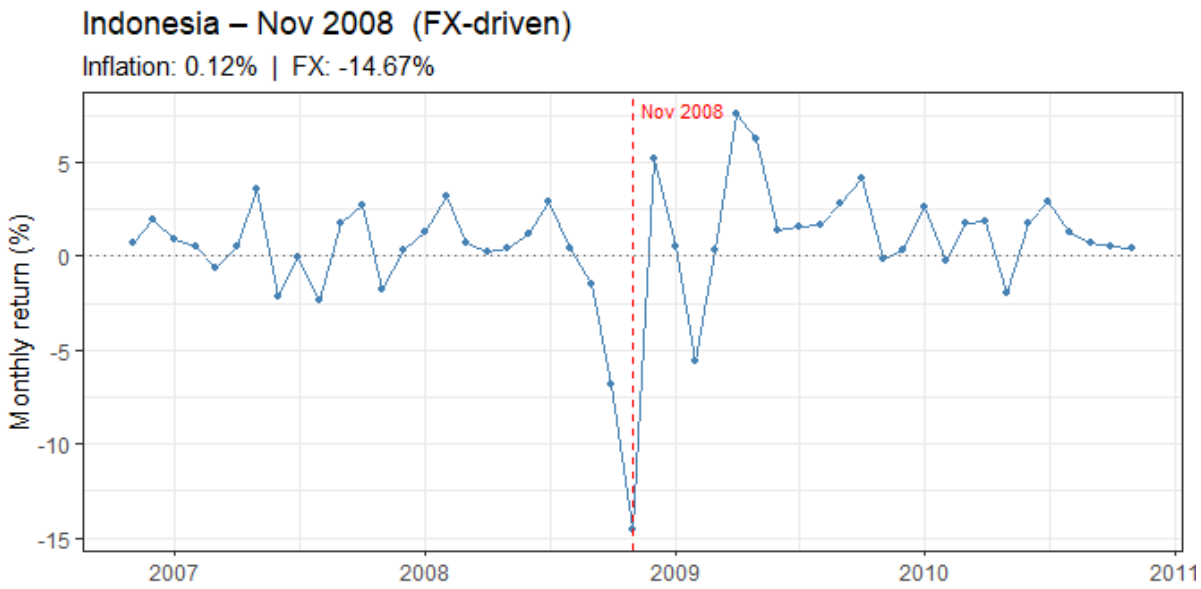

Brazil – Feb 1999 (FX-driven)
Inflation: 1.05% | FX: -21.53%
Feb 1999
Monthly return (%)
10
0
-10
1997
1998
1999
2000
2001

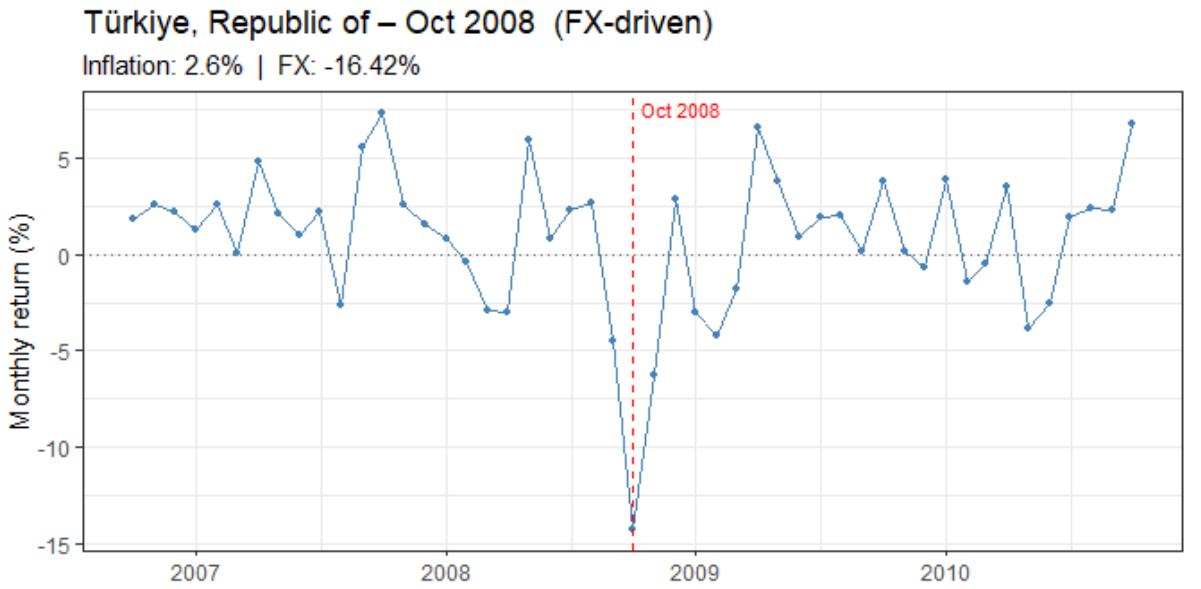

Türkiye, Republic of – Aug 2018 (FX-driven)
Inflation: 2.3% | FX: -18%
Aug 2018
Monthly return (%)
10
5
0
-5
-10
-15
2017
2018
2019
2020

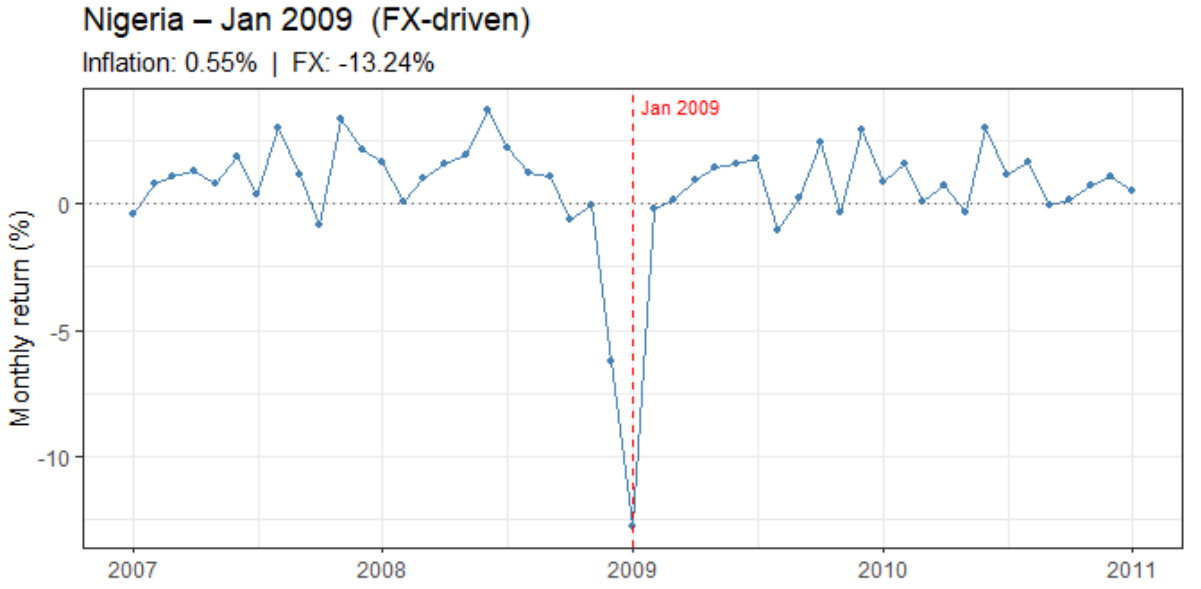

Türkiye, Republic of – Mar 2001 (FX-driven)
Inflation: 6.07% | FX: -20.72%
Mar 2001
Monthly return (%)
10
5
0
-5
-10
-15
1999
2000
2001
2002
2003


Egypt, Arab Republic of – Mar 2024 (FX-driven)
Inflation: 0.98% | FX: -32%
Mar 2024
Monthly return (%)
10
0
-10
-20
-30
2022
2023
2024
2025


Argentina – Jan 2002 (FX-driven)
Inflation: 2.3% | FX: -28.61%
Jan 2002
Monthly return (%)
10
0
-10
-20
2000
2001
2002
2003
2004


Indonesia – Nov 2008 (FX-driven)
Inflation: 0.12% | FX: -14.67%
Nov 2008
Monthly return (%)
5
0
-5
-10
-15
2007
2008
2009
2010
2011


Türkiye, Republic of – Oct 2008 (FX-driven)
Inflation: 2.6% | FX: -16.42%
Oct 2008
Monthly return (%)
5
0
-5
-10
-15
2007
2008
2009
2010


Nigeria – Jan 2009 (FX-driven)
Inflation: 0.55% | FX: -13.24%
Jan 2009
Monthly return (%)
0
-5
-10
2007
2008
2009
2010
2011

Source: Authors' calculations based on IMF International Financial Statistics, Economist Intelligence Unit, and national statistical agencies.