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Inflation and Exchange Rate Pass-Through in Liberia and Sub-Saharan Africa

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Abstract

Exchange rate fluctuations remain an important source of inflationary pressure in many Sub-Saharan African economies. In Liberia, where a large share of consumption goods is imported and foreign currency transactions are common, currency movements are likely to pass through to domestic prices. Yet, high-frequency empirical evidence for Liberia remains limited.

This thesis addresses this gap by providing one of the first high-frequency empirical analyses of exchange rate pass-through to inflation in Liberia within a comparative Sub-Saharan African framework. Using monthly data from 2000 to 2023 and a local projection methodology, the analysis traces the dynamic response of inflation to exchange rate changes over short- and medium-term horizons of up to twelve months. Both symmetric and asymmetric specifications are estimated to distinguish between depreciation and appreciation episodes.

The results indicate that depreciations generate statistically significant short-run effects on inflation, while the magnitude and persistence of pass-through vary across countries. In the symmetric specification, the contemporaneous response is negative and largely drives the cumulative twelve-month estimate, suggesting that pooling depreciation and appreciation episodes may mask important directional differences. The asymmetric results show that depreciation shocks lead to economically meaningful inflation increases over subsequent months, whereas appreciations have weaker effects. Liberia exhibits one of the strongest and most asymmetric responses in the sample, consistent with its high degree of dollarization and import dependence.

These findings suggest that maintaining exchange rate stability and strengthening monetary credibility may help mitigate imported inflation pressures.

Keywords: Exchange rate pass-through (ERPT); Inflation; Local projections; Asymmetric effects; Dollarization; Sub-Saharan Africa; Liberia; Monetary credibility.

Kurzfassung

Wechselkursschwankungen stellen in vielen Volkswirtschaften Subsahara-Afrikas eine bedeutende Quelle von Inflationsdruck dar. In Liberia, wo ein großer Anteil der Konsumgüter importiert wird und Fremdwährungstransaktionen weit verbreitet sind, können Wechselkursbewegungen direkt auf die inländischen Preise durchschlagen. Dennoch bleibt hochfrequente empirische Evidenz zur Wechselkursweitergabe in Liberia bislang begrenzt.

Diese Arbeit schließt diese Forschungslücke, indem sie eine der ersten hochfrequenten empirischen Analysen der Wechselkursweitergabe zur Inflation in Liberia im Rahmen eines vergleichenden Ansatzes für Subsahara-Afrika vorlegt. Auf Basis monatlicher Daten für den Zeitraum 2000 bis 2023 wird mittels der Local-Projection-Methode die dynamische Reaktion der Inflation auf Wechselkursänderungen über kurz- und mittelfristige Horizonte von bis zu zwölf Monaten untersucht. Dabei werden sowohl symmetrische als auch asymmetrische Spezifikationen geschätzt, um Unterschiede zwischen Auf- und Abwertungen zu berücksichtigen.

Die Ergebnisse zeigen, dass Abwertungen statistisch signifikante kurzfristige Inflationseffekte erzeugen, wobei Ausmaß und Persistenz der Weitergabe zwischen den Ländern variieren. In der symmetrischen Spezifikation ist der zeitgleiche Effekt negativ und prägt maßgeblich die kumulierte Zwölfmonatsreaktion, was darauf hindeutet, dass die Zusammenfassung von Auf- und Abwertungen wichtige Richtungsunterschiede verdecken kann. Die asymmetrischen Ergebnisse zeigen, dass Abwertungsschocks zu ökonomisch bedeutsamen Inflationsanstiegen in den Folgemonaten führen, während Aufwertungen deutlich schwächere Effekte aufweisen. Liberia weist im regionalen Vergleich eine der stärksten und ausgeprägtesten asymmetrischen Reaktionen auf, was mit dem hohen Grad an Dollarisierung und der starken Importabhängigkeit der Wirtschaft vereinbar ist.

Diese Ergebnisse legen nahe, dass die Aufrechterhaltung der Wechselkursstabilität und die Stärkung der geldpolitischen Glaubwürdigkeit dazu beitragen können, den durch Importe verursachten Inflationsdruck zu mindern.

Acknowledgements

I would like to take this opportunity to thank my supervisor, Prof. Daniel Garcia, for his guidance and support throughout this thesis. His comments and suggestions have been instrumental in shaping this thesis.

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Contents

List of Figures

List of Tables

Chapter 1

Introduction

Exchange rate movements play a central role in shaping inflation dynamics in open economies, particularly in developing and import-dependent countries. In Sub-Saharan Africa, where imports account for a large share of household consumption and domestic production capacity remains limited, fluctuations in exchange rates can transmit directly into consumer prices. These price effects matter for macroeconomic stability, real incomes, and welfare, especially for low-income households that are disproportionately exposed to increases in the cost of essential goods. Understanding both the magnitude and timing of exchange rate pass-through to inflation is therefore critical for the design of monetary and exchange rate policy in the region.

The theoretical foundations of exchange rate pass-through trace back to Dornbusch (1987), who emphasises the role of nominal rigidities, market structure, and pricing behaviour in determining the speed and completeness of price adjustment following exchange rate movements. Subsequent empirical research demonstrates that pass-through is typically incomplete and varies across countries, inflation environments, and time horizons. Early cross-country evidence in Goldberg and Knetter (1997) and Campa and Goldberg (2005) highlights the importance of pricing-to-market behaviour and import composition in shaping pass-through outcomes. Choudhri et al. (2005) further show that pass-through tends to be lower in low-inflation environments and in countries with more credible monetary policy frameworks.

More recent research focuses on emerging and developing economies, where exchange rate movements often play a more pronounced role in domestic price formation. Country-level evidence for African economies can be found in studies such as Mwase (2006), Sanusi (2010), and Opolot and Isard (2009). Broader regional studies, including Ndiaye (2017) and Asongu and Odhiambo (2019), find considerable variation in exchange rate pass-through across Sub-Saharan Africa. Their results suggest that depreciations tend to have stronger inflationary effects than appreciations. Recent IMF work (International Monetary Fund, 2024) concludes that although pass-through has declined in some settings as policy frameworks improved, exchange rate movements remain an important driver of

inflation in the region.

Despite this growing literature, three gaps remain particularly relevant for Liberia. First, direct empirical evidence on exchange rate pass-through in Liberia is limited, despite the country's high import dependence and recurrent episodes of exchange rate volatility. Second, many cross-country studies emphasise regional averages, providing less insight into country-specific dynamics that are crucial for policy design. Third, much of the existing work relies on empirical frameworks that impose restrictive dynamic assumptions, potentially obscuring the timing and persistence of inflation responses to exchange rate shocks.

This thesis addresses these gaps by examining the magnitude, dynamics, and heterogeneity of exchange rate pass-through to consumer price inflation in Liberia and nine comparator Sub-Saharan African economies over the period 2000 to 2023. Using monthly data and a local projection framework, the analysis estimates inflation responses to exchange rate movements over short- and medium-term horizons. The local projection methodology proposed by Jordà (2005) provides a flexible alternative to traditional vector autoregressive models, allowing the dynamic response to be estimated directly without imposing strong restrictions on the underlying data-generating process.

The empirical results show that exchange rate depreciation remains an important driver of inflation dynamics in the region. At the panel level, depreciation shocks generate an immediate and statistically significant response in inflation, followed by gradual adjustment over subsequent months. Although pass-through is incomplete, the persistence of the response implies effects extending beyond the very short run. At the country level, the estimates reveal substantial heterogeneity. Liberia exhibits relatively strong and asymmetric pass-through compared with several peer economies, while countries characterised by stronger monetary credibility and deeper financial markets display more muted inflation responses.

1.1 Contribution of the Study

This thesis contributes to the exchange rate pass-through literature in three ways. First, it provides one of the first high-frequency monthly empirical analyses of exchange rate pass-through to consumer price inflation in Liberia, addressing a significant gap in the existing evidence. Second, by situating Liberia within a comparative Sub-Saharan African framework, the study highlights how differences in economic structure, policy credibility, and exposure to external shocks shape pass-through dynamics across countries. Third, the use of local projections allows for a flexible characterisation of inflation responses over time, avoiding the restrictive dynamic assumptions commonly imposed by conventional time-series models.

Overall, the thesis provides policy-relevant evidence on the transmission of exchange

rate shocks to inflation in Sub-Saharan Africa and underscores the importance of exchange rate stability, credible macroeconomic frameworks, and structural reforms in supporting price stability in highly import-dependent economies.

Chapter 2

Literature Review

Exchange rate pass-through refers to the extent to which changes in the exchange rate are transmitted into domestic consumer prices. This chapter reviews the theoretical foundations of pass-through, the global empirical evidence, findings specific to Sub-Saharan Africa, and the methodological developments that underpin contemporary empirical analysis. The objective is to situate this thesis within the broader literature while clarifying the specific contribution made with respect to Liberia.

2.1 Theoretical Foundations of Exchange Rate Pass-Through

Early open-economy models provide foundational explanations for why exchange rate pass-through is often incomplete. Dornbusch (1987) demonstrates that under imperfect competition, firms may adjust markups when exchange rates fluctuate, implying that domestic prices do not move one-for-one with exchange rate changes. Goldberg and Knetter (1997) further emphasise pricing-to-market behaviour, market segmentation, menu costs, and distribution margins as mechanisms that attenuate the link between exchange rates and consumer prices. Together, these insights suggest that the degree of pass-through depends on structural characteristics such as market competition, import dependence, price rigidity, and the composition of traded goods.

Monetary policy credibility is also an important determinant of pass-through dynamics. Economies characterised by stable inflation and well-anchored expectations typically exhibit lower pass-through, as firms and households perceive exchange rate movements as less persistent. Conversely, high-inflation environments may amplify both the speed and magnitude of price responses, reinforcing the transmission of exchange rate shocks into domestic inflation.

2.2 Global Empirical Evidence

Empirical evidence from advanced and emerging economies documents substantial cross-country variation in exchange rate pass-through. Campa and Goldberg (2005) find that pass-through into import prices tends to be higher in economies with greater macroeconomic volatility and less stable policy environments. Choudhri et al. (2005) show that the prevailing inflation regime is a key determinant of pass-through, with stronger transmission observed in economies experiencing persistent inflation.

More recent research focuses on the role of the underlying drivers of exchange rate movements. Forbes et al. (2018) show that inflation responds differently depending on the type of shock generating the exchange rate change, including monetary policy shocks and shifts in external demand. Their findings indicate that exchange rate pass-through varies across episodes. Instead, it varies with broader macroeconomic conditions and structural characteristics of the economy.

2.3 Exchange Rate Pass-Through in Sub-Saharan Africa

Sub-Saharan Africa has attracted increasing scholarly attention due to frequent exchange rate fluctuations, shallow financial markets, and persistent structural vulnerabilities. The emerging evidence points to pronounced heterogeneity across countries. Mwase (2006) report moderate pass-through in Tanzania, emphasising the importance of macroeconomic policy and structural characteristics. Asongu and Odhiambo (2019) document asymmetric pass-through across several Sub-Saharan African economies, finding that depreciations tend to raise inflation more strongly than appreciations reduce it.

Country-specific analyses reinforce these findings. Evidence from Nigeria (Sanusi, 2010) and Uganda (Opolot and Isard, 2009), alongside broader regional assessments in Ndiaye (2017), suggests that pass-through is typically stronger in economies characterised by macroeconomic instability, weaker monetary credibility, or high reliance on imported goods. Recent IMF research (International Monetary Fund, 2024) similarly concludes that, although improvements in policy frameworks have reduced pass-through in some countries, exchange rate movements remain a significant driver of inflation across the region.

Despite this growing body of work, empirical evidence specifically focused on Liberia remains limited. Many regional studies either exclude Liberia altogether or incorporate it within broad panels without examining its distinctive institutional context, high degree of dollarisation, and unique monetary structure. This gap is particularly relevant given Liberia's structural exposure to external shocks and recurrent exchange rate volatility.

2.4 Methodological Developments

Traditional pass-through analyses frequently rely on vector autoregressions (VAR) or structural VAR frameworks. While powerful, these approaches can impose restrictive dynamic structures and require strong identifying assumptions. To address these limitations, Jordà (2005) introduces the local projection method, which estimates impulse responses directly by running separate regressions for each forecast horizon.

Local projections offer several advantages. They are generally more robust to model misspecification, allow for flexible dynamic patterns, and facilitate straightforward inference in both time-series and panel contexts. Recent contributions, including Carrière-Swallow et al. (2021), argue that local projections are particularly well-suited for emerging and developing economies, where structural change, policy shifts, and irregular external shocks may undermine the stability assumptions underlying conventional VAR models. These methodological considerations motivate the empirical strategy adopted in this thesis.

2.5 Summary and Contribution

Three central themes emerge from the literature. First, structural characteristics, inflation regimes, and monetary credibility are key determinants of exchange rate pass-through. Second, Sub-Saharan African economies display substantial heterogeneity, with stronger and more asymmetric pass-through typically observed in structurally fragile environments. Third, local projections provide a flexible and transparent framework for estimating dynamic responses, particularly in contexts subject to structural instability.

Building on these insights, this thesis contributes in three ways. It constructs a harmonised monthly macroeconomic dataset for Liberia and nine comparator Sub-Saharan African economies over the period 2000–2023. It estimates exchange rate pass-through using a local projection framework that accommodates dynamic flexibility and asymmetric responses. Finally, it benchmarks Liberia's inflation dynamics against regional peers, thereby providing new empirical evidence relevant for monetary policy formulation and inflation management in a highly dollarised, import-dependent economy.

Chapter 3

Data and Methodology

This chapter describes the data sources, variable construction, and econometric framework used to estimate exchange rate pass-through to consumer price inflation in Liberia and nine comparator economies in Sub-Saharan Africa. The objective is to construct a harmonised monthly macroeconomic panel covering the period 2000–2023 and to quantify the dynamic response of inflation to exchange rate movements using the local projection approach proposed by Jordà (2005).

The remainder of the chapter proceeds as follows. Section 3.1 outlines the data sources and country coverage. Section 3.2 details the construction of the key analytical variables. Section 3.3 presents descriptive statistics and time-series evidence. Section 3.4 introduces the econometric framework, while Section 3.5 describes the empirical implementation. Section 3.6 concludes with diagnostic checks supporting the validity of the analysis.

3.1 Data Sources and Country Selection

The analysis combines monthly, quarterly, and annual macroeconomic series obtained from three primary sources. Consumer price indices, bilateral exchange rates, monetary aggregates, policy interest rates, and selected fiscal indicators are drawn from the IMF International Financial Statistics (IFS) database. External sector variables are obtained from the IMF Balance of Payments (BOP) database. Where necessary, lower-frequency observations are converted to monthly frequency using standard temporal disaggregation procedures.

For Liberia, historical CPI and exchange rate series are cross-validated using publications from the Central Bank of Liberia to ensure consistency and data accuracy.

All raw datasets are harmonised prior to analysis by standardising country names, aligning date formats, and transforming series to a common monthly frequency. The intended calendar coverage spans 2000–2023, corresponding to 288 monthly observations per country. In practice, the effective estimation sample varies across variables and coun-

tries due to differences in data availability and publication start dates. Such constraints are typical in long-span multi-country studies relying on high-frequency macroeconomic data.

The final panel consists of ten Sub-Saharan African economies: Liberia, Nigeria, Ghana, Sierra Leone, Côte d'Ivoire, The Gambia, Kenya, Tanzania, Uganda, and South Africa. Liberia is the focal country in the analysis, given its high level of import dependence, exchange rate volatility, and limited representation in the existing literature. The comparator countries are selected based on their geographical and macroeconomic relevance to Liberia. The sample reflects substantial cross-country heterogeneity in exchange rate regimes, inflation patterns, and monetary policy settings.

3.2 Variable Construction

All macroeconomic series are transformed into consistent monthly measures. When variables are available at lower frequency, observations are mapped to monthly frequency using standard interpolation procedures. Inflation and exchange rate depreciation are constructed using log-difference transformations to ensure comparability across countries and to approximate percentage changes.

Monthly Inflation

$$\pi_{i,t} = 100\left[\ln(\mathrm{CPI}_{i,t}) - \ln(\mathrm{CPI}_{i,t-1})\right]. \tag{3.1}$$

Monthly inflation is computed from the consumer price index and expressed in percentage points. For some countries, including Liberia, monthly CPI data begin later than 2000. In these cases, the estimation sample is determined by the maximum overlapping period across the required variables.

Monthly Exchange Rate Depreciation

$$\Delta e_{i,t} = 100\left[\ln(\mathrm{FX}_{i,t}) - \ln(\mathrm{FX}_{i,t-1})\right]. \tag{3.2}$$

A positive value of $\Delta e_{i,t}$ indicates a depreciation of the domestic currency against the reference currency.

Year-on-Year Inflation

$$\pi^{\mathrm{yoy}}_{i,t} = 100\left[\ln(\mathrm{CPI}_{i,t}) - \ln(\mathrm{CPI}_{i,t-12})\right]. \tag{3.3}$$

All variables are examined for completeness, internal consistency, and the presence of extreme outliers prior to estimation.

3.3 Descriptive Statistics

Before turning to the econometric analysis, this section presents descriptive statistics that characterise the macroeconomic environments of the ten economies included in the study.

3.3.1 Overall Summary Statistics

Table 3.1 presents pooled descriptive statistics for the full sample. By aggregating across countries and time, it provides a concise overview of the typical levels and dispersion of the macroeconomic variables used in the empirical analysis.

Table 3.1: Overall Summary Statistics for Key Macroeconomic Variables

Variable	Country–Months (N)	Mean	SD	P10	P25	Median	P90
Monthly Inflation (%)	2251	0.70229	1.14009	-0.22675	0.16008	0.51233	1.82876
Monthly FX Depreciation (%)	2870	-0.52630	2.84011	-3.11928	-1.32041	-0.22037	1.67318
Year-on-Year Inflation (%)	2243	1.37499	1.93276	-0.32461	0.32495	1.00991	3.36679
Policy Interest Rate (%)	2520	9.19982	3.87235	5.00000	6.47220	8.42734	14.23100
Money Supply (Index)	2534	1120262.29	1464913.14	0.00	0.00	424228.55	3513066.32

Money supply is reported as an index and should therefore be interpreted in relative terms, capturing broad shifts in domestic liquidity rather than absolute levels.

3.3.2 Summary Statistics by Country

Table 3.2 reports summary statistics for the key variables used in the analysis. For each country, the table presents the number of non-missing observations and standard descriptive measures for monthly inflation, monthly exchange rate depreciation, year-on-year inflation, the policy interest rate, and money supply.

Table 3.2: Summary Statistics for Key Variables by Country

country	Variable	Months (N)	Mean	SD	Min	Median	Max
Liberia	Monthly Inflation (%)	216	0.89249	2.04521	-4.87189	0.84263	6.85223
Liberia	Monthly FX Depreciation (%)	287	-0.54630	3.91693	-14.55057	-0.51421	25.52966
Liberia	Year-on-Year Inflation (%)	216	0.89249	2.04521	-4.87189	0.84263	6.85223
Liberia	Policy Interest Rate (%)	208	15.82510	2.85893	12.88000	14.30000	23.34000
Liberia	Money Supply (Index)	169	0.00	0.00	0.00	0.00	0.00
Côte d'Ivoire	Monthly Inflation (%)	287	0.21564	0.69646	-2.43759	0.19861	4.75527
Côte d'Ivoire	Monthly FX Depreciation (%)	287	0.02539	2.21526	-7.56846	-0.01274	6.54919
Côte d'Ivoire	Year-on-Year Inflation (%)	283	0.67873	1.41674	-4.25533	0.52174	6.09388
Côte d'Ivoire	Policy Interest Rate (%)	146	7.78712	0.62925	5.58000	7.84000	8.83000
Côte d'Ivoire	Money Supply (Index)	265	1723663.14	972810.63	532798.55	1496044.90	4018988.69
Ghana	Monthly Inflation (%)	287	1.30817	1.67771	-2.16348	0.92635	8.89525
Ghana	Monthly FX Depreciation (%)	287	-1.21139	3.36854	-24.42383	-0.46606	26.44999
Ghana	Year-on-Year Inflation (%)	287	2.11682	2.88335	-2.77063	1.31758	14.09715
Ghana	Policy Interest Rate (%)	288	7.91840	3.27515	4.05000	7.55000	18.50000
Ghana	Money Supply (Index)	265	48665.08	60380.91	1197.15	22455.75	265810.44
Kenya	Monthly Inflation (%)	178	0.55652	0.60144	-1.20541	0.53275	3.15243
Kenya	Monthly FX Depreciation (%)	287	-0.27156	1.71751	-7.27716	-0.23948	8.23413
Kenya	Year-on-Year Inflation (%)	176	1.50067	1.36833	-1.93786	1.34573	6.74700
Kenya	Policy Interest Rate (%)	288	6.81409	2.16453	2.02000	6.76543	13.70165
Kenya	Money Supply (Index)	265	140940.07	67511.00	44540.30	142133.55	275882.18
Nigeria	Monthly Inflation (%)	227	1.03868	0.95825	-2.52774	0.96840	7.16255
Nigeria	Monthly FX Depreciation (%)	287	-0.77052	3.26562	-27.90322	-0.00151	3.40087
Nigeria	Year-on-Year Inflation (%)	227	2.09536	1.72007	-3.72949	1.86388	10.72667
Nigeria	Policy Interest Rate (%)	288	9.67860	3.47245	2.74149	9.46728	20.30000
Nigeria	Money Supply (Index)	265	1206938.77	703347.55	281151.00	1142176.04	3433932.24
Sierra Leone	Monthly Inflation (%)	203	1.04389	1.12406	-1.89419	0.53035	5.28666
Sierra Leone	Monthly FX Depreciation (%)	287	-0.79434	2.22136	-12.27643	-0.42005	11.22478
Sierra Leone	Year-on-Year Inflation (%)	203	2.71792	2.76542	-2.42351	1.74359	13.14269
Sierra Leone	Policy Interest Rate (%)	288	8.20464	2.36643	4.12000	9.20000	12.11000
Sierra Leone	Money Supply (Index)	265	0.00	0.00	0.00	0.00	0.00
South Africa	Monthly Inflation (%)	287	0.42880	0.43914	-1.14187	0.38273	1.69012
South Africa	Monthly FX Depreciation (%)	287	-0.38838	3.86004	-19.01752	-0.02675	15.17924
South Africa	Year-on-Year Inflation (%)	287	0.87868	0.94442	-1.23876	0.63573	4.65202
South Africa	Policy Interest Rate (%)	265	6.96664	2.01977	3.74000	6.74000	12.25000
South Africa	Money Supply (Index)	265	2514409.86	1249530.69	599521.61	2373335.76	5089013.05
Tanzania	Monthly Inflation (%)	167	0.48300	0.62643	-0.60683	0.45527	2.35631
Tanzania	Monthly FX Depreciation (%)	287	-0.39798	1.28032	-7.51190	-0.12002	6.23851
Tanzania	Year-on-Year Inflation (%)	167	0.97167	1.29559	-1.13532	0.72156	5.64413
Tanzania	Policy Interest Rate (%)	254	7.39391	2.42283	2.45172	7.61647	12.37000
Tanzania	Money Supply (Index)	265	2594643.60	1633516.30	367660.99	2414788.04	6486426.27
The Gambia	Monthly Inflation (%)	232	0.53320	0.52882	-0.87907	0.44688	4.68632
The Gambia	Monthly FX Depreciation (%)	287	-0.59179	2.96387	-14.44083	-0.33902	15.56723
The Gambia	Year-on-Year Inflation (%)	230	1.01648	0.88423	-0.10994	0.83163	7.57129
The Gambia	Policy Interest Rate (%)	264	12.37867	4.28245	4.80000	12.50000	22.00000
The Gambia	Money Supply (Index)	245	0.00	0.00	0.00	0.00	0.00
Uganda	Monthly Inflation (%)	167	0.45848	0.73418	-1.02982	0.35743	5.04313
Uganda	Monthly FX Depreciation (%)	287	-0.31617	2.09502	-11.12917	-0.13557	8.29011
Uganda	Year-on-Year Inflation (%)	167	0.91002	1.30470	-1.38698	0.57512	6.82732
Uganda	Policy Interest Rate (%)	231	10.25753	3.08302	3.54000	9.81753	23.85481
Uganda	Money Supply (Index)	265	2482983.47	1788213.32	372165.32	2074083.43	7045459.74

The summary statistics reveal substantial heterogeneity in inflation dynamics, exchange rate behaviour, and monetary conditions across countries.

3.3.3 Time Series Profiles

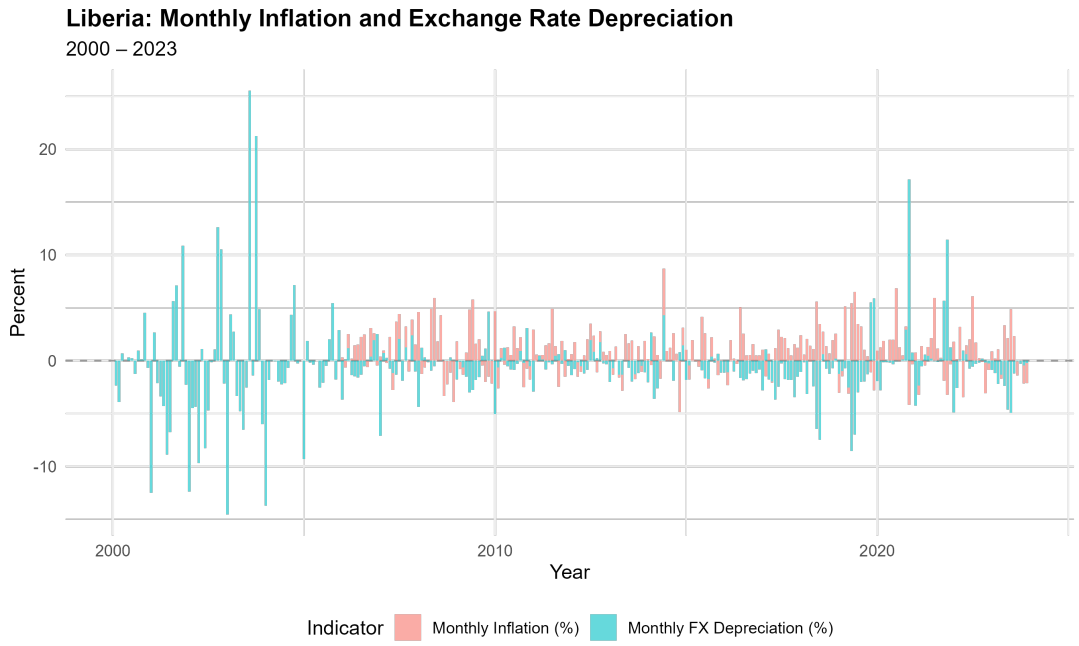

Figure 3.1: Liberia Monthly Inflation and Exchange Rate Depreciation (2000–2023)

Figure 3.1 illustrates the evolution of inflation and exchange rate depreciation in Liberia over the sample period. Episodes of large exchange rate movements are frequently associated with pronounced inflationary responses, providing preliminary evidence consistent with exchange rate pass-through.

Appendix A presents analogous time series plots for all countries in the sample. Money supply is omitted from the figures for clarity, as it is reported as an index and is primarily used as a control variable in the econometric analysis.

3.4 Econometric Framework

To estimate the dynamic effects of exchange rate movements on inflation, this study employs the local projection methodology introduced by Jordà (2005). Local projections provide a flexible alternative to traditional vector autoregressive models by allowing impulse response coefficients to vary freely across horizons without imposing restrictive parametric assumptions on the underlying data-generating process. Unlike VAR-based impulse responses, this approach estimates each forecast horizon directly, thereby reducing sensitivity to model misspecification.

For each projection horizon $h = 0, 1, \ldots, H$, the baseline (pooled) specification is given by

$$\pi_{i,t+h} = \alpha_h + \beta_h \Delta e_{i,t} + \gamma_h' X_{i,t} + \varepsilon_{i,t+h}, \tag{3.4}$$

where $\pi_{i,t+h}$ denotes inflation at horizon $t+h$, $\Delta e_{i,t}$ captures contemporaneous exchange rate depreciation, and $X_{i,t}$ is a vector of control variables including lagged inflation, lagged exchange rate changes, and monetary policy indicators.

The specification pools observations across countries and time, with α_h representing a common intercept for each projection horizon. Standard errors are clustered at the country level to account for within-country serial correlation and the overlapping structure of forecast horizons inherent in local projection estimations.

3.4.1 Asymmetric Local Projections

To allow for potentially different inflation responses to exchange rate depreciations and appreciations, the local projection model is extended to an asymmetric specification. Following common practice, exchange rate changes are decomposed into positive and negative components:

$$\Delta e_{i,t}^{+} = \max(\Delta e_{i,t}, 0), \qquad \Delta e_{i,t}^{-} = \min(\Delta e_{i,t}, 0). \tag{3.5}$$

By construction, $\Delta e_{i,t}^{+} \geq 0$ captures depreciation episodes, while $\Delta e_{i,t}^{-} \leq 0$ captures appreciation episodes.

The asymmetric local projection is then estimated as

$$\pi_{i,t+h} = \alpha_h + \beta_h^{+} \Delta e_{i,t}^{+} + \beta_h^{-} \Delta e_{i,t}^{-} + \gamma_h' X_{i,t} + \varepsilon_{i,t+h}, \tag{3.6}$$

where β_h^{+} measures the pass-through associated with depreciations and β_h^{-} measures the pass-through associated with appreciations, conditional on the same set of lagged macroeconomic controls $X_{i,t}$. As in the baseline model, standard errors are clustered at the country level.

3.5 Empirical Strategy

The empirical strategy traces the dynamic response of inflation to exchange rate movements by estimating equation (3.4) separately for each projection horizon. The coefficient β_0 captures contemporaneous exchange rate pass-through, while the sequence $\{\beta_h\}_{h>0}$ characterises the persistence and medium-term propagation of exchange rate shocks into inflation.

Lagged macroeconomic controls mitigate potential omitted variable bias by account-

ing for concurrent macroeconomic conditions that may jointly influence exchange rate movements and inflation outcomes.

The asymmetric specification in equation (3.6) is estimated in parallel to distinguish between depreciation and appreciation episodes. This decomposition helps assess whether pooling positive and negative exchange rate movements obscures directional differences in pass-through dynamics.

As a robustness check, the local projections are re-estimated including country fixed effects (and, where appropriate, time fixed effects) to control for time-invariant cross-country heterogeneity. The qualitative pattern of exchange rate pass-through remains robust to these alternative specifications.

3.6 Diagnostic Checks

Several diagnostic procedures are conducted to ensure the credibility and internal consistency of the empirical analysis. First, all raw data are examined for completeness and coherence, with particular attention to variable start dates, definitional changes, and potential structural breaks.

Second, all price and exchange rate variables are expressed in log differences, promoting stationarity and reducing the influence of level shifts and trending behaviour. Correlation matrices are inspected to assess potential multicollinearity among regressors, while descriptive statistics and time-series plots are used to identify extreme outliers or anomalous observations.

Finally, robustness checks incorporating alternative lag structures and fixed effects specifications are performed. Taken together, these procedures strengthen confidence in the empirical framework and support the robustness of the results presented in Chapter 4.

Chapter 4

Empirical Results

This chapter presents the empirical findings on exchange rate pass-through to inflation using the local projection framework introduced in the previous chapter. The analysis proceeds in five stages. First, panel-level impulse responses summarise the average dynamics of exchange rate pass-through across the sample of Sub-Saharan African economies. Second, country-specific impulse responses are then presented to illustrate cross-country heterogeneity. Third, Liberia is examined in comparative perspective. Fourth, cumulative pass-through estimates quantify the medium-term magnitude of exchange rate transmission to inflation. Finally, asymmetric local projection estimates assess whether pass-through differs between exchange rate depreciations and appreciations.

Before turning to the results, it is important to emphasise that the empirical analysis in this chapter is reduced-form rather than structural. The local projection framework traces the dynamic response of inflation to exchange rate movements under relatively weak identifying assumptions and does not impose a fully specified macroeconomic model. The estimates should therefore be interpreted as empirical impulse responses reflecting the combined influence of pricing behaviour, monetary policy reactions, and structural characteristics of each economy. This approach is particularly appropriate in the Sub-Saharan African context, where structural breaks, policy regime changes, and data limitations complicate the use of tightly parameterised structural models.

4.1 Panel-Level Exchange Rate Pass-Through

The analysis begins with estimation of a panel local projection model pooling all countries in the sample. This specification provides an average measure of exchange rate pass-through to inflation across Sub-Saharan Africa, while abstracting from country-specific heterogeneity and exploiting both cross-sectional and time-series variation.

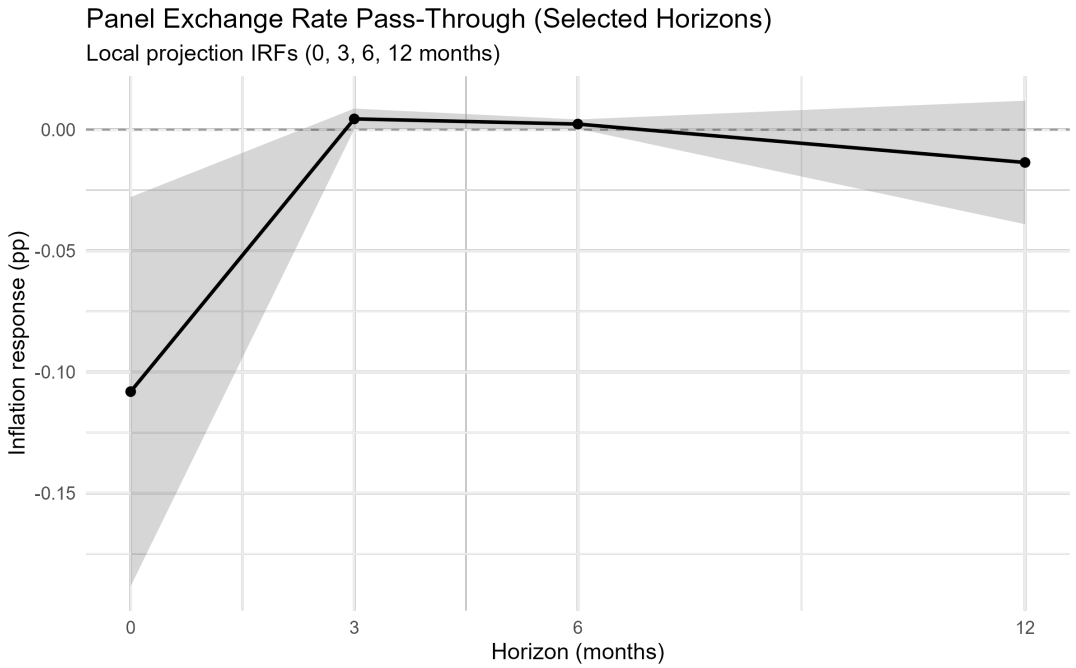

Figure 4.1: Panel local projection impulse responses of inflation to a one percent exchange rate depreciation (selected horizons: 0, 3, 6, and 12 months)

Figure 4.1 displays the panel impulse response of inflation to a one percent exchange rate depreciation at selected horizons. The response exhibits notable short-run dynamics. In the baseline symmetric specification, the contemporaneous estimate is negative, whereas the response at short horizons turns positive before gradually attenuating at longer horizons. Overall, the pattern suggests incomplete but economically meaningful exchange rate pass-through at the regional level.

This dynamic profile is consistent with mechanisms emphasised in the pass-through literature. Under imperfect competition and nominal rigidities, firms may adjust markups or delay price changes, resulting in partial and gradual transmission of exchange rate movements into consumer prices (Dornbusch, 1987; Goldberg and Knetter, 1997). Empirical studies further highlight that inflation persistence and monetary policy credibility shape both the magnitude and timing of pass-through (Campa and Goldberg, 2005; Choudhri et al., 2005). The short-run dynamics observed here are also consistent with evidence that exchange rate shocks often exert their strongest influence at short horizons in emerging and developing economies (Forbes et al., 2018; Carrière-Swallow et al., 2021).

Table 4.1 reinforces the graphical evidence. An unexpected feature of the panel results is the negative coefficient at horizon $h = 0$. While exchange rate depreciation is generally expected to increase inflation, the contemporaneous estimate implies a short-run negative association in the symmetric specification. The magnitude is economically non-trivial. A coefficient of -0.108 implies that a ten percentage point exchange rate depreciation is associated with an approximately 1.08 percentage point decline in monthly inflation on impact. Relative to average monthly inflation in the sample (approximately 0.7 percent),

Table 4.1: Panel Local Projection Estimates of Exchange Rate Pass-Through (Selected Horizons)

Horizon (months)	Coefficient	Std. Error	t-stat	CI (Lower)	CI (Upper)
0	-0.1081	0.0410	-2.638	-0.1884	-0.0278
3	0.0045	0.0022	2.069	0.0002	0.0087
6	0.0024	0.0010	2.424	0.0004	0.0043
12	-0.0135	0.0130	-1.038	-0.0390	0.0120

Notes: This table reports panel local projection estimates of the response of monthly inflation to a one percentage point exchange rate depreciation shock, reported at selected horizons (0, 3, 6, and 12 months). Confidence intervals are constructed at the ninety-five percent level using cluster-robust standard errors. The negative contemporaneous coefficient may reflect aggregation of appreciation and depreciation episodes in the symmetric specification, monetary policy reactions, or the influence of highly dollarised economies. See Section 4.5 for asymmetric estimates.

this effect is sizeable.

Several mechanisms may account for this pattern. First, aggregation across both depreciation and appreciation episodes may bias the symmetric estimate toward zero or negative values if the underlying responses are asymmetric. Second, monetary policy reactions may partially offset depreciation shocks. If central banks tighten policy in response to exchange rate pressures, short-run inflation dynamics may reflect policy adjustments rather than pure pass-through. Third, high levels of dollarisation in some economies may attenuate the immediate CPI response to exchange rate movements.

Importantly, the asymmetric specification confirms that depreciation shocks generate a positive and statistically significant inflation response, whereas appreciations are associated with negative effects. This asymmetry indicates that the negative contemporaneous coefficient in the symmetric model reflects aggregation of heterogeneous effects rather than an absence of exchange rate pass-through.

4.2 Country-Specific Exchange Rate Pass-Through

To examine heterogeneity in exchange rate pass-through dynamics, local projection models are estimated separately for each country. This approach allows inflation responses to exchange rate movements to differ across economies, reflecting variation in trade exposure, monetary frameworks, institutional credibility, and inflation histories.

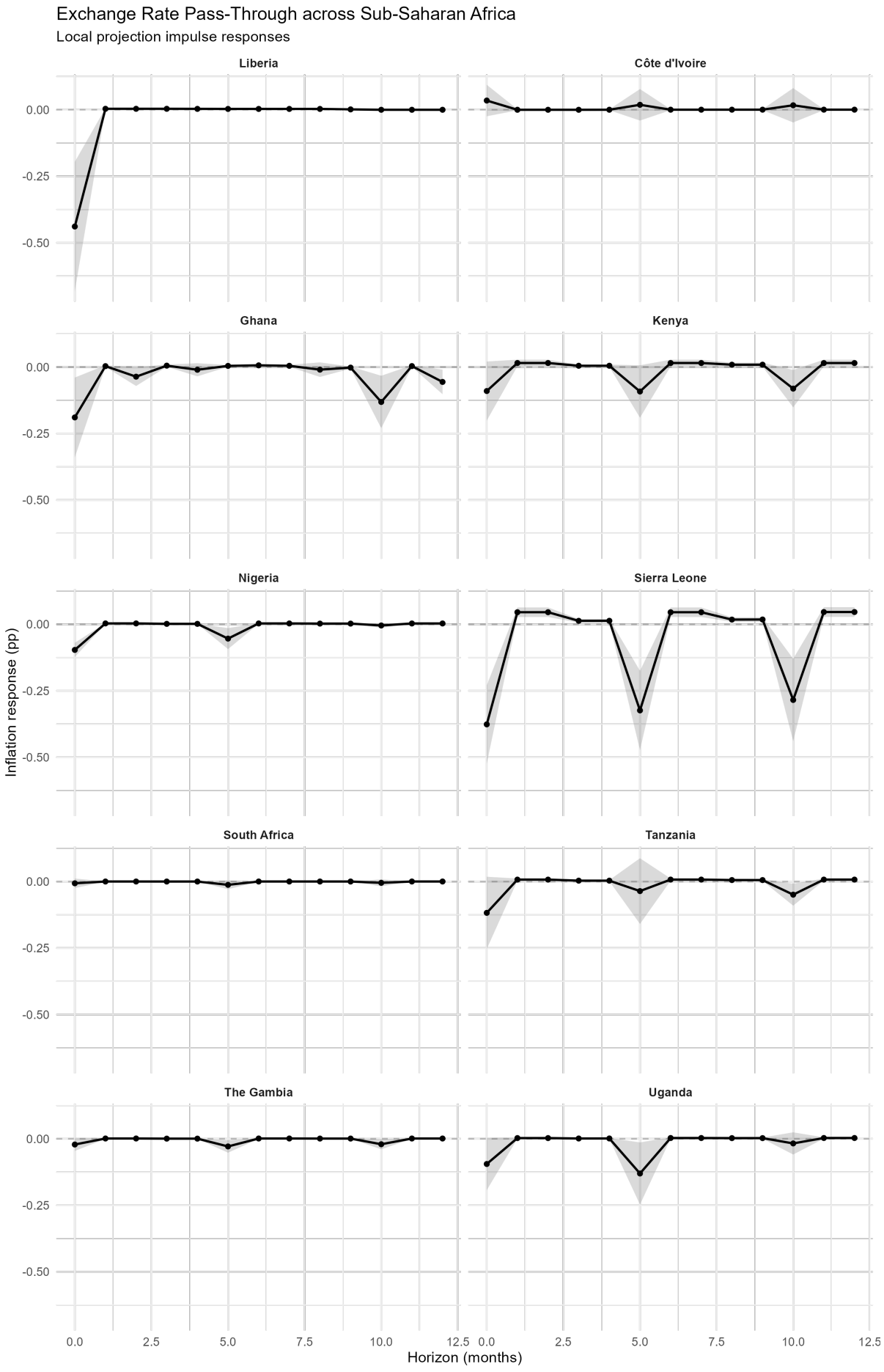

Figure 4.2: Country-specific local projection impulse responses of inflation to a one percent exchange rate depreciation

Figure 4.2 reveals pronounced cross-country heterogeneity in both the magnitude and persistence of exchange rate pass-through. Although inflation generally responds positively to depreciation across countries, the strength and duration of the response vary substantially.

This heterogeneity is consistent with existing evidence for Sub-Saharan Africa, which emphasises that pass-through tends to be stronger in economies with weaker nominal anchors, higher inflation persistence, and greater reliance on imported consumption goods (Ndiaye, 2017; International Monetary Fund, 2024). Conversely, economies with more credible monetary frameworks and deeper financial markets often display more muted responses.

Table 4.2: Country-Specific Local Projection Estimates of Exchange Rate Pass-Through (Selected Horizons)

Country	Horizon	Coefficient	Std. Error	CI (Lower)	CI (Upper)
Liberia	0	-0.4389	0.1241	-0.6823	-0.1956
Liberia	3	0.0036	0.0013	0.0011	0.0062
Liberia	6	0.0031	0.0011	0.0009	0.0053
Liberia	12	-0.0000	0.0005	-0.0009	0.0009
Côte d'Ivoire	0	0.0347	0.0302	-0.0245	0.0938
Côte d'Ivoire	3	-0.0001	0.0009	-0.0019	0.0018
Côte d'Ivoire	6	0.0003	0.0010	-0.0016	0.0022
Côte d'Ivoire	12	0.0004	0.0009	-0.0014	0.0022
Ghana	0	-0.1894	0.0765	-0.3393	-0.0396
Ghana	3	0.0052	0.0022	0.0010	0.0094
Ghana	6	0.0063	0.0031	0.0003	0.0123
Ghana	12	-0.0560	0.0236	-0.1022	-0.0098
Kenya	0	-0.0902	0.0566	-0.2012	0.0207
Kenya	3	0.0048	0.0021	0.0006	0.0089
Kenya	6	0.0151	0.0064	0.0026	0.0276
Kenya	12	0.0150	0.0064	0.0025	0.0276
Nigeria	0	-0.0963	0.0136	-0.1230	-0.0697
Nigeria	3	0.0017	0.0004	0.0010	0.0024
Nigeria	6	0.0032	0.0006	0.0021	0.0043
Nigeria	12	0.0031	0.0005	0.0021	0.0042
Sierra Leone	0	-0.3762	0.0751	-0.5235	-0.2290
Sierra Leone	3	0.0130	0.0034	0.0063	0.0197
Sierra Leone	6	0.0453	0.0092	0.0274	0.0633
Sierra Leone	12	0.0462	0.0094	0.0278	0.0645
South Africa	0	-0.0065	0.0091	-0.0243	0.0113
South Africa	3	0.0001	0.0002	-0.0003	0.0005
South Africa	6	0.0002	0.0003	-0.0005	0.0009
South Africa	12	0.0002	0.0003	-0.0004	0.0009
Tanzania	0	-0.1176	0.0692	-0.2534	0.0181
Tanzania	3	0.0034	0.0011	0.0013	0.0055
Tanzania	6	0.0074	0.0021	0.0033	0.0116
Tanzania	12	0.0074	0.0021	0.0033	0.0115
The Gambia	0	-0.0214	0.0123	-0.0455	0.0027
The Gambia	3	0.0007	0.0004	-0.0000	0.0015
The Gambia	6	0.0012	0.0007	-0.0000	0.0025
The Gambia	12	0.0012	0.0006	-0.0001	0.0025
Uganda	0	-0.0946	0.0502	-0.1929	0.0037
Uganda	3	0.0013	0.0008	-0.0002	0.0027
Uganda	6	0.0030	0.0012	0.0007	0.0054
Uganda	12	0.0031	0.0012	0.0008	0.0054

Notes: This table reports country-specific local projection estimates of the inflation response to a one percentage point exchange rate depreciation shock at selected horizons of 0, 3, 6, and 12 months. Confidence intervals are constructed at the ninety-five percent level.

The results indicate that relying on regional averages may conceal important country-specific differences.

4.3 Liberia in Comparative Perspective

Liberia emerges as one of the economies in the sample exhibiting sizeable exchange rate pass-through dynamics. To examine this pattern in greater detail, Figure 4.3 isolates the local projection impulse response of inflation to exchange rate depreciation for Liberia.

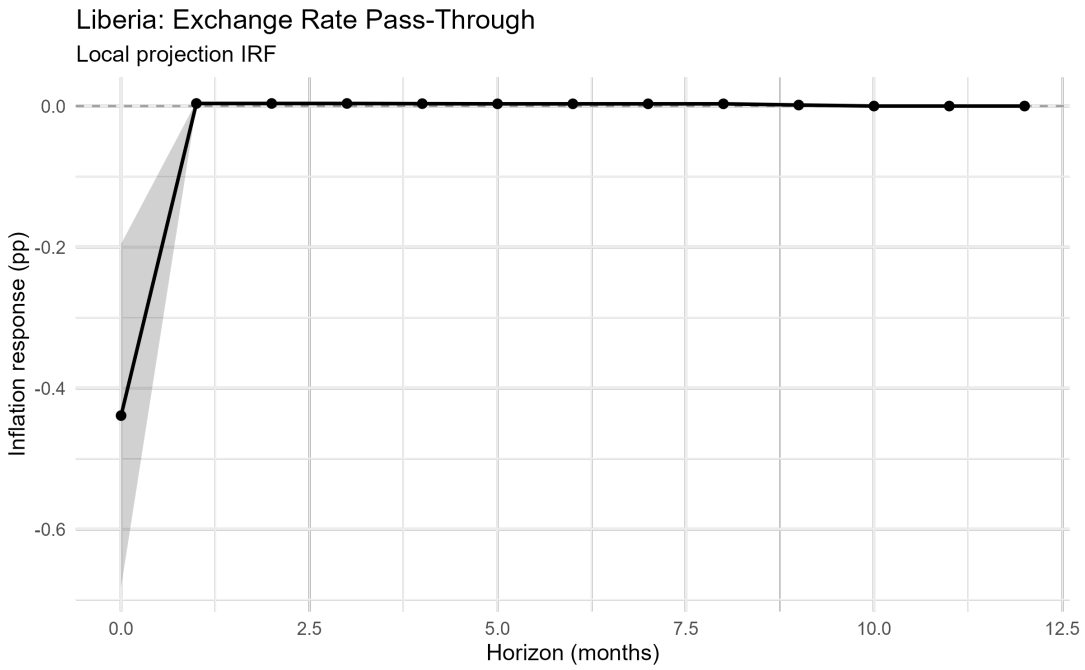

Figure 4.3: Local projection impulse responses of inflation to exchange rate depreciation in Liberia

The symmetric local projection estimates for Liberia indicate a sizeable contemporaneous response of inflation to exchange rate depreciation. However, the sign of the impact coefficient is negative, suggesting that, on average, exchange rate depreciations are associated with a short-run decline in measured monthly inflation. The magnitude of the contemporaneous coefficient is economically meaningful, although the response attenuates rapidly at longer horizons.

This pattern differs from the conventional expectation of positive pass-through from depreciation to inflation. The result suggests that the symmetric specification may be aggregating heterogeneous episodes of exchange rate movements. In particular, if appreciation episodes generate stronger and more precisely estimated disinflationary effects than depreciation episodes generate inflationary effects, the average symmetric coefficient may be pulled downward.

The asymmetric estimates presented later in this chapter provide support for this interpretation. They reveal that appreciation shocks in Liberia exert a large and statistically significant negative effect on inflation, while depreciation shocks generate a positive but statistically less precise response. The symmetric negative coefficient therefore reflects aggregation across asymmetric responses rather than the absence of exchange rate transmission.

From a structural perspective, Liberia's high degree of import dependence and dual-currency structure remain important contextual features. A large share of goods is either directly imported or priced with reference to U.S. dollar values. As a result, appreciation episodes can produce strong and immediate disinflationary effects when converted into Liberian dollars. At the same time, monetary policy reactions and pricing rigidities may dampen or delay the inflationary impact of depreciation episodes, particularly if authorities respond to exchange rate pressures with tightening measures.

Taken together, the results for Liberia suggest that asymmetry plays an important role in exchange rate pass-through in highly dollarized and import-dependent economies.

4.4 Cumulative Exchange Rate Pass-Through

While impulse response functions provide insight into the timing and persistence of inflation adjustment following exchange rate shocks, cumulative exchange rate pass-through offers a compact summary of the total inflationary impact over a policy-relevant horizon. Cumulative pass-through is computed by aggregating the estimated local projection coefficients from zero to twelve months, capturing the overall inflation response within the first year following an exchange rate movement.

Formally, cumulative exchange rate pass-through is defined as

$$\text{Cumulative ERPT}_{0,12} = \sum_{h=0}^{12} \hat{\beta}_h,$$

where $\hat{\beta}_h$ denotes the estimated inflation response at horizon h.

Table 4.3: Cumulative Exchange Rate Pass-Through to Inflation from Zero to Twelve Months

Country	H_{max}	Cumulative ERPT	CI (Lower)	CI (Upper)
Liberia	12	-0.4107	-0.6766	-0.1448
Côte d'Ivoire	12	0.0723	-0.1297	0.2742
Ghana	12	-0.4081	-0.8176	0.0013
Kenya	12	-0.1457	-0.5238	0.2325
Nigeria	12	-0.1267	-0.2117	-0.0417
Sierra Leone	12	-0.6486	-1.2390	-0.0583
South Africa	12	-0.0217	-0.0748	0.0314
Tanzania	12	-0.1403	-0.4762	0.1956
The Gambia	12	-0.0595	-0.1373	0.0182
Uganda	12	-0.2163	-0.4941	0.0615

Notes: This table reports cumulative exchange rate pass-through estimates obtained by summing country-specific local projection coefficients over horizons from zero to twelve months. Confidence intervals are constructed at the ninety-five percent level.

Table 4.3 reveals substantial cross-country variation in the medium-term inflationary effects of exchange rate movements. For Liberia, the cumulative exchange rate pass-through over twelve months is negative, indicating that the average symmetric response implies a net decline in inflation following a depreciation shock over the first year.

While this result appears counterintuitive relative to standard theoretical predictions, it is consistent with the asymmetric evidence presented later in this chapter. In particular, strong disinflationary effects associated with appreciation episodes dominate the aggregated symmetric estimates. The cumulative measure therefore reflects the net effect of asymmetric responses rather than a structural absence of exchange rate transmission.

In contrast, Côte d'Ivoire is the only economy in the sample displaying a positive cumulative pass-through estimate over twelve months, while the remaining countries exhibit negative cumulative responses. This concentration of negative cumulative effects suggests that appreciation episodes exert substantial influence in the symmetric framework, potentially offsetting inflationary pressures arising from depreciation shocks.

These findings align with evidence that cumulative pass-through depends critically on inflation persistence, trade structure, and the strength of nominal anchors (Choudhri et al., 2005; Ndiaye, 2017). By aggregating the dynamic impulse responses, the cumulative estimates provide a policy-relevant summary of medium-term inflation risks associated with exchange rate movements.

The symmetric results presented thus far suggest that averaging across exchange rate movements may obscure important nonlinearities in inflation dynamics. If depreciation

and appreciation shocks affect prices differently, symmetric local projection estimates may provide an incomplete picture of exchange rate pass-through. The following section therefore introduces an asymmetric specification that allows inflation responses to differ between positive and negative exchange rate changes.

4.5 Asymmetric Exchange Rate Pass-Through

This section examines whether inflation responds differently to exchange rate depreciations and appreciations. The baseline analysis assumes symmetric pass-through. However, a growing body of evidence for developing and emerging economies suggests that price adjustment may be asymmetric, with depreciations transmitting more strongly to inflation than appreciations (Asongu and Odhiambo, 2019). Such asymmetries may arise from downward price rigidity, menu costs, limited competition, and importer pricing strategies in environments characterised by volatility and weak competitive pressures (Goldberg and Knetter, 1997; Dornbusch, 1987).

The asymmetric specification is introduced as an extension of the baseline analysis rather than as a replacement. Its objective is to assess whether average pass-through estimates conceal systematic differences between episodes of exchange rate depreciation and appreciation. Given the prevalence of nominal rigidities and import dependence across Sub-Saharan African economies, testing for asymmetry provides an important interpretative and robustness dimension to the empirical results.

To implement this approach, exchange rate changes are decomposed into positive and negative components. Positive changes capture depreciations, while negative changes capture appreciations. These components are included jointly in the local projection framework, allowing the inflationary effects of depreciations and appreciations to be estimated separately at each projection horizon.

4.5.1 Panel-Level Evidence

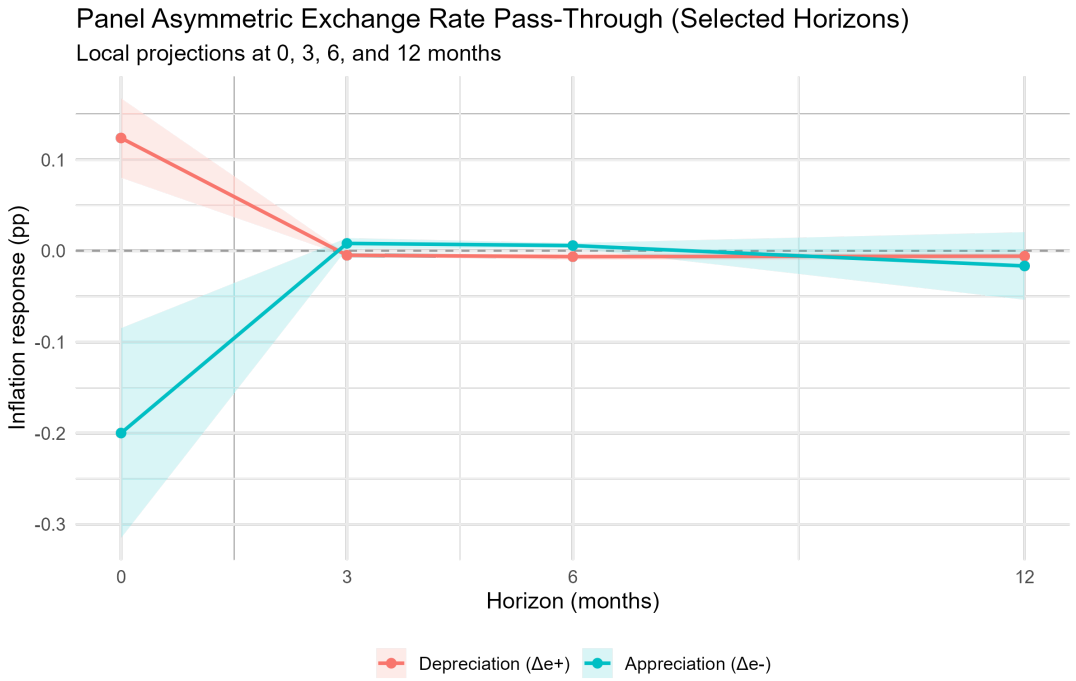

Figure 4.4: Panel asymmetric local projection impulse responses of inflation to exchange rate changes

Table 4.4: Panel Local Projection Estimates: Asymmetric Exchange Rate Pass-Through (Selected Horizons)

	Depreciation (Δe^+)			Appreciation (Δe^-)			
Horizon (months)	Coef.	CI L	CI U	Coef.	CI L	CI U	Countries
0	0.124	0.080	0.167	-0.200	-0.315	-0.085	10
3	-0.005	-0.006	-0.004	0.008	0.002	0.014	10
6	-0.006	-0.010	-0.003	0.006	0.003	0.009	10
12	-0.006	-0.010	-0.002	-0.017	-0.054	0.021	10

Notes: This table reports panel local projection estimates of the inflation response to a one percentage point exchange rate depreciation (Δe^+) and appreciation (Δe^-) at selected horizons. Standard errors are clustered at the country level. Confidence intervals correspond to the 95% level.

Figure 4.4 and Table 4.4 provide clear evidence of asymmetric exchange rate pass-through at the panel level. Depreciations generate stronger and more immediate inflation responses, while appreciations tend to have smaller and often statistically weaker effects across horizons. This result suggests that symmetric specifications may obscure important nonlinearities in inflation adjustment dynamics.

4.5.2 Country-Level Heterogeneity

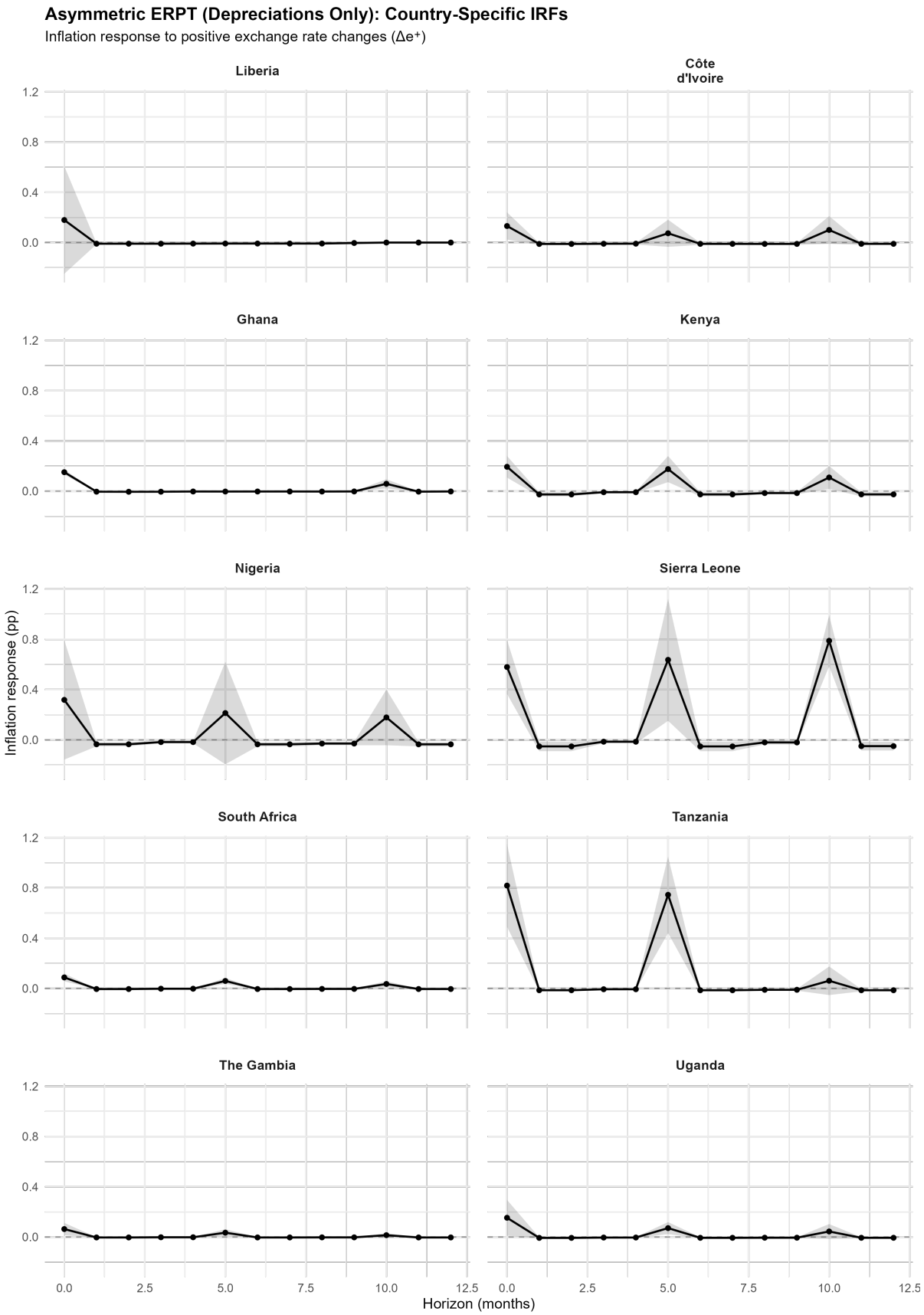

Figure 4.5: Country-specific asymmetric local projection impulse responses to exchange rate depreciations

Table 4.5: Country-Level Local Projection Estimates: Asymmetric Exchange Rate Pass-Through (Selected Horizons)

Country	Horizon	Depreciation (Δe^+)			Appreciation (Δe^-)		
		Coef.	CI L	CI U	Coef.	CI L	CI U
Liberia	0	0.180	-0.248	0.607	-0.666	-0.950	-0.382
Liberia	3	-0.009	-0.014	-0.004	0.008	0.004	0.013
Liberia	6	-0.008	-0.012	-0.003	0.007	0.003	0.011
Liberia	12	0.000	-0.002	0.002	-0.000	-0.002	0.002
Côte d'Ivoire	0	0.132	0.023	0.240	-0.034	-0.096	0.028
Côte d'Ivoire	3	-0.009	-0.016	-0.002	0.006	0.001	0.012
Côte d'Ivoire	6	-0.010	-0.018	-0.002	0.008	0.002	0.013
Côte d'Ivoire	12	-0.010	-0.018	-0.002	0.008	0.002	0.014
Ghana	0	0.151	0.131	0.171	-0.333	-0.452	-0.214
Ghana	3	-0.004	-0.007	-0.002	0.009	0.004	0.014
Ghana	6	-0.003	-0.004	-0.001	0.010	0.002	0.018
Ghana	12	-0.002	-0.005	0.001	-0.079	-0.142	-0.016
Kenya	0	0.194	0.108	0.280	-0.316	-0.389	-0.242
Kenya	3	-0.008	-0.014	-0.002	0.015	0.009	0.021
Kenya	6	-0.026	-0.041	-0.010	0.048	0.034	0.061
Kenya	12	-0.025	-0.041	-0.010	0.048	0.034	0.062
Nigeria	0	0.318	-0.158	0.793	-0.101	-0.130	-0.073
Nigeria	3	-0.018	-0.027	-0.009	0.002	0.001	0.003
Nigeria	6	-0.036	-0.052	-0.019	0.004	0.002	0.005
Nigeria	12	-0.036	-0.052	-0.020	0.004	0.002	0.005
Sierra Leone	0	0.579	0.365	0.794	-0.473	-0.593	-0.352
Sierra Leone	3	-0.015	-0.027	-0.003	0.016	0.008	0.024
Sierra Leone	6	-0.053	-0.090	-0.015	0.055	0.035	0.075
Sierra Leone	12	-0.050	-0.085	-0.016	0.056	0.036	0.076
South Africa	0	0.087	0.057	0.118	-0.074	-0.100	-0.047
South Africa	3	-0.003	-0.003	-0.002	0.002	0.001	0.003
South Africa	6	-0.005	-0.006	-0.003	0.004	0.003	0.005
South Africa	12	-0.005	-0.006	-0.003	0.004	0.003	0.005
Tanzania	0	0.819	0.490	1.147	-0.233	-0.394	-0.071
Tanzania	3	-0.007	-0.011	-0.002	0.005	0.002	0.008
Tanzania	6	-0.014	-0.023	-0.006	0.010	0.004	0.016
Tanzania	12	-0.014	-0.023	-0.006	0.010	0.004	0.016
The Gambia	0	0.063	0.014	0.112	-0.094	-0.138	-0.051
The Gambia	3	-0.002	-0.003	-0.001	0.003	0.001	0.005
The Gambia	6	-0.003	-0.005	-0.002	0.005	0.003	0.008
The Gambia	12	-0.003	-0.005	-0.002	0.005	0.003	0.008
Uganda	0	0.153	0.011	0.295	-0.209	-0.338	-0.080
Uganda	3	-0.004	-0.008	-0.001	0.004	0.002	0.006
Uganda	6	-0.006	-0.011	-0.002	0.007	0.004	0.010
Uganda	12	-0.006	-0.011	-0.002	0.007	0.004	0.010

Notes: This table reports country-level local projection estimates of the inflation response to exchange rate depreciations (Δe^+) and appreciations (Δe^-) at selected horizons. Confidence intervals are constructed at the 95% level.

Figure 4.5 and Table 4.5 reveal substantial cross-country heterogeneity in asymmetric exchange rate pass-through. While several economies exhibit pronounced inflationary responses following depreciations, the magnitude and persistence of these effects vary widely across countries.

A clear cross-country pattern emerges. Asymmetry tends to be more pronounced in economies characterised by higher import dependence and relatively weaker monetary policy frameworks, including Liberia, Sierra Leone, and Tanzania. In these settings, depreciation shocks are associated with sizeable inflation increases, whereas appreciation episodes exert more muted or differently signed effects. By contrast, economies with stronger nominal anchors and more credible policy frameworks, such as South Africa and Côte d'Ivoire, exhibit weaker and less persistent inflation responses overall. This pattern suggests that structural characteristics and policy credibility shape not only the magnitude of pass-through but also the degree of asymmetry in price adjustment (Goldberg and Knetter, 1997; Carrière-Swallow et al., 2021; International Monetary Fund, 2024).

4.5.3 Asymmetric Exchange Rate Pass-Through in Liberia

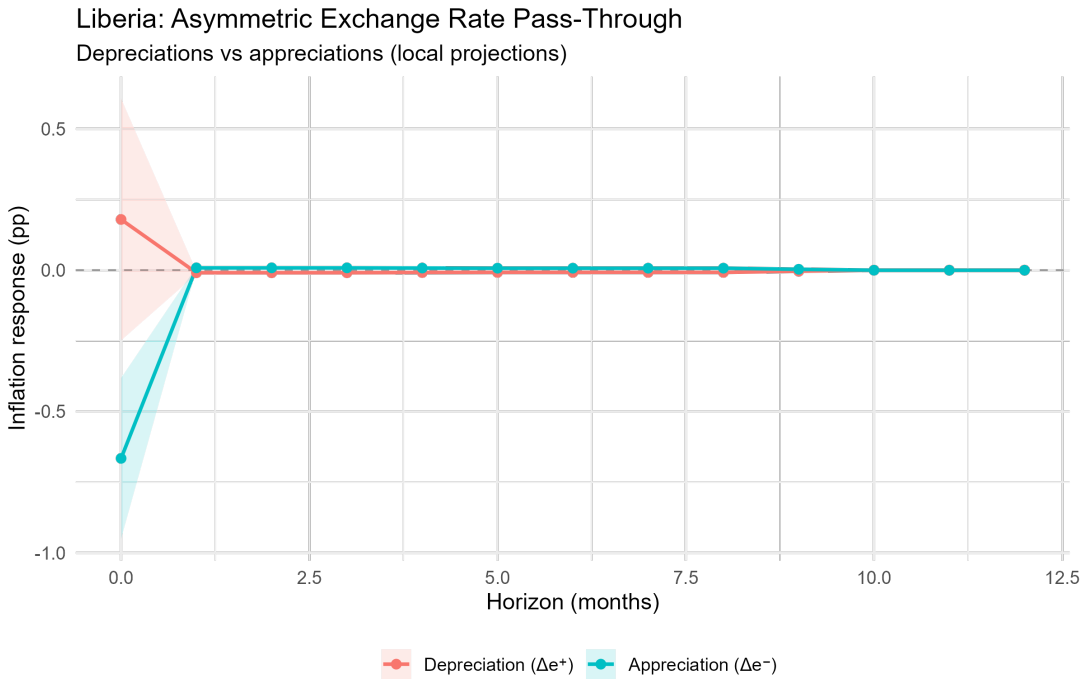

Figure 4.6: Liberia asymmetric local projection impulse responses of inflation to exchange rate changes

Table 4.6: Liberia Local Projection Estimates: Asymmetric Exchange Rate Pass-Through (Selected Horizons)

	Depreciation (Δe^+)			Appreciation (Δe^-)		
Horizon (months)	Coef.	CI L	CI U	Coef.	CI L	CI U
0	0.180	-0.248	0.607	-0.666	-0.950	-0.382
3	-0.009	-0.014	-0.004	0.008	0.004	0.013
6	-0.008	-0.012	-0.003	0.007	0.003	0.011
12	0.000	-0.002	0.002	-0.000	-0.002	0.002

Notes: This table reports Liberia-specific local projection estimates of the inflation response to exchange rate depreciations (Δe^+) and appreciations (Δe^-) at selected horizons. Confidence intervals are constructed at the ninety-five percent level.

Figure 4.6 and Table 4.6 indicate pronounced asymmetry in exchange rate pass-through in Liberia. Inflation responds sharply to depreciations, with effects that persist over multiple months. By contrast, appreciations do not generate a comparable decline in inflation, and estimated effects remain relatively small across horizons.

This pattern aligns with broader evidence that asymmetry is more pronounced in economies with high import exposure and significant pricing frictions, where retail prices adjust upward more readily than downward (Goldberg and Knetter, 1997; Asongu and Odhiambo, 2019). In the Liberian context, the findings are also consistent with the view that exchange rate volatility and weaker nominal anchors can amplify the inflationary risks associated with depreciations (Ndiaye, 2017; International Monetary Fund, 2024).

While the short-run inflation response is precisely estimated, horizon-specific coefficients at longer horizons display greater variability. This reflects a standard feature of the local projection framework, in which each horizon is estimated independently and the effective sample size declines with the projection horizon. As a result, estimates at medium and longer horizons are subject to wider confidence intervals and should be interpreted with caution. Accordingly, the analysis places primary emphasis on short-run dynamics and cumulative pass-through measures, which are more robust and policy-relevant.

4.5.4 Summary of Key Empirical Findings

To consolidate the main results of the baseline, cumulative, and asymmetric specifications, Table 4.7 provides a structured cross-country comparison of exchange rate pass-through. Countries are grouped according to the overall strength of pass-through, combining impact effects, cumulative dynamics, and evidence on asymmetry.

Table 4.7: Summary of Exchange Rate Pass-Through Across Countries

Country	Impact ERPT (h=0)	12-Month Cumulative	Asymmetry	Key Structural Features
Strong Pass-Through				
Sierra Leone	Large (negative)	-0.6486	Strong	Post-conflict, weak institutions
Liberia	Large (negative)	-0.4107	Strong	High import dependence, dollarized economy
Ghana	Large (negative)	-0.4081	Strong	Inflation persistence, import exposure
Moderate Pass-Through				
Uganda	Moderate	-0.2163	Moderate	Shallow financial markets
Kenya	Moderate	-0.1457	Moderate	Open economy structure
Nigeria	Moderate	-0.1267	Moderate	Oil exposure, FX volatility
Tanzania	Moderate	-0.1403	Strong	Import reliance
The Gambia	Small	-0.0595	Moderate	Small open economy
Weak / Near-Zero Pass-Through				
Côte d'Ivoire	Small	0.0723	Weak	CFA monetary framework
South Africa	Very small	-0.0217	Weak	Strong monetary credibility

Notes: Impact ERPT refers to the contemporaneous inflation response to a one percentage point exchange rate change in the symmetric specification. Cumulative pass-through corresponds to the sum of local projection coefficients from zero to twelve months. Asymmetry reflects the relative strength of depreciation versus appreciation effects in the asymmetric specification.

Table 4.7 highlights a clear cross-country pattern. Economies characterised by high import dependence, weaker nominal anchors, and greater structural fragility exhibit larger and more persistent exchange rate pass-through. In contrast, countries with stronger monetary frameworks and higher policy credibility display weaker and less persistent inflation responses to exchange rate movements. The findings therefore indicate that countries with stronger institutions and greater macroeconomic credibility tend to experience more muted transmission of exchange rate shocks to domestic prices.

Chapter 5

Conclusion and Policy Implications

This thesis examined the magnitude, dynamics, and heterogeneity of exchange rate pass-through to consumer price inflation in Liberia and nine comparator economies in Sub-Saharan Africa over the period 2000–2023. Using monthly data and a local projection framework, the analysis quantified both short-run and medium-run inflation responses to exchange rate movements, with particular emphasis on cross-country variation and the structural features that shape pass-through intensity.

The results indicate that exchange rate movements remain an important driver of inflation dynamics in the region. At the panel level, the symmetric specification exhibits a negative contemporaneous association between exchange rate depreciation and inflation, while the response at short horizons becomes positive before attenuating at longer horizons. Taken together, the evidence points to incomplete but economically meaningful pass-through, consistent with mechanisms emphasised in the literature, whereby nominal rigidities, pricing-to-market behaviour, and markup adjustments dampen, but do not eliminate, the transmission of exchange rate shocks into consumer prices (Dornbusch, 1987; Goldberg and Knetter, 1997; Campa and Goldberg, 2005; Choudhri et al., 2005). At the same time, the results confirm that regional averages conceal substantial cross-country differences, a feature repeatedly highlighted in empirical studies of Sub-Saharan Africa and emerging markets (Ndiaye, 2017; Carrière-Swallow et al., 2021; International Monetary Fund, 2024).

At the country level, the evidence points to pronounced heterogeneity in exchange rate pass-through. Liberia exhibits relatively strong and persistent inflation responses compared with several peers, consistent with an economic structure in which imported consumption goods account for a large share of household expenditure, domestic production capacity is limited, and external price shocks are more difficult to absorb. In contrast, economies such as South Africa display substantially weaker pass-through, in line with stronger nominal anchors, deeper financial markets, and greater monetary policy credibility (Choudhri et al., 2005; Ndiaye, 2017; Carrière-Swallow et al., 2021; International Monetary Fund, 2024). The cumulative pass-through estimates reinforce the importance

of medium-run transmission by showing that, in some economies, short-run responses accumulate into persistent pressures over policy-relevant horizons.

A further contribution of the thesis is the identification of asymmetric exchange rate pass-through. In both the panel and Liberia-specific estimates, depreciations transmit more strongly to inflation than appreciations transmit to disinflation. This asymmetry mirrors findings in emerging market and Sub-Saharan African contexts, where downward price rigidity, distribution costs, and market structure limit the extent to which retail prices decline following currency appreciations, even when prices adjust rapidly during depreciation episodes (Asongu and Odhiambo, 2019; Forbes et al., 2018). From a practical perspective, this implies that inflation risks associated with exchange rate movements are tilted toward adverse currency shocks.

The policy discussion that follows is grounded in the reduced-form empirical evidence presented in Chapter 4 and should be interpreted accordingly. While the analysis does not estimate a fully structural model of inflation or monetary policy transmission, the documented pass-through patterns provide informative guidance on how exchange rate dynamics interact with inflation outcomes in import-dependent economies. The policy implications are therefore framed as conditional and indicative rather than prescriptive.

5.1 Policy Implications

The empirical findings carry important implications for macroeconomic policy, particularly for Liberia and other highly import-dependent economies in the region.

First, the presence of economically meaningful and asymmetric exchange rate pass-through implies that limiting excessive exchange rate volatility remains a central component of inflation control. When a large share of the consumption basket is imported, sharp depreciation episodes can transmit rapidly into consumer prices, eroding real incomes and disproportionately affecting vulnerable households. In this context, policies that reduce disorderly exchange rate movements can contribute directly to price stability.

Rather than targeting a fixed exchange rate level, the evidence supports the adoption of a transparent and rule-consistent foreign exchange intervention framework aimed at smoothing excessive short-run volatility. A pre-communicated intervention strategy or managed volatility band could help anchor expectations during periods of stress, provided it is supported by adequate reserve buffers and credible macroeconomic coordination. The objective would not be to defend a specific parity, but to prevent self-reinforcing depreciation episodes that amplify inflationary pressures through strong pass-through mechanisms.

Second, the results highlight the limits of relying solely on monetary tightening to offset exchange rate-driven inflation. Even when policy rate adjustments help anchor expectations, their effectiveness may be constrained by shallow financial markets, par-

tial dollarization, and weak transmission mechanisms. This strengthens the case for a coherent policy mix. Clear forward guidance, consistent policy communication, and fiscal discipline are essential complements to monetary policy. Persistent fiscal imbalances can weaken nominal anchors and intensify exchange rate pressures, thereby amplifying pass-through effects (Ndiaye, 2017; International Monetary Fund, 2024).

Third, the asymmetric findings have direct operational relevance. Because depreciations generate larger inflationary effects than appreciations generate disinflationary gains, inflation risks are inherently skewed toward adverse exchange rate movements. This asymmetry justifies heightened vigilance during periods of currency pressure. In practice, strengthening high-frequency monitoring of essential imported goods, improving liquidity forecasting, and enhancing transparency around foreign exchange operations can improve policy responsiveness and reduce uncertainty.

Fourth, the pronounced cross-country differences also point to the role of structural conditions in determining stabilisation outcomes. Over the medium to long run, reducing structural import dependence remains critical for weakening the exchange rate–inflation nexus. Policies that expand domestic food production, improve logistics and storage infrastructure, enhance competition within import distribution networks, and alleviate supply bottlenecks can gradually dampen the transmission of exchange rate shocks into consumer prices. These structural reforms complement short-run stabilisation policies and align with broader evidence that high import dependence and weaker nominal anchors are associated with stronger exchange rate pass-through (Choudhri et al., 2005; Ndiaye, 2017; International Monetary Fund, 2024).

Finally, it is important to recognise that any exchange rate management framework must remain consistent with Liberia's reserve capacity and institutional constraints. Insufficient foreign exchange buffers or weak fiscal coordination could undermine the credibility of intervention strategies. Accordingly, exchange rate smoothing policies should be gradual, transparent, and embedded within a broader macroeconomic stabilisation framework.

5.2 Limitations and Directions for Future Research

While this study provides systematic evidence on exchange rate pass-through in Liberia and Sub-Saharan Africa using a flexible local projection framework, several data and methodological limitations should be acknowledged.

First, estimation uncertainty increases with the projection horizon in the local projection framework. Because each horizon is estimated separately, the effective sample size declines as the horizon extends due to endpoint constraints, and standard errors naturally widen. As a result, while short-run coefficients are precisely estimated and statistically robust, medium- and longer-horizon responses should be interpreted with appropriate

caution.

In addition, local projections do not impose cross-horizon dynamic restrictions. Although this enhances flexibility and reduces the risk of model misspecification, it may increase variance relative to fully specified vector autoregressive systems. Consequently, individual long-horizon coefficients may appear volatile even when the underlying economic mechanism is stable. For this reason, cumulative pass-through estimates provide a more robust summary of medium-term effects by aggregating responses across horizons and reducing the influence of horizon-specific noise.

Second, although the specification allows for asymmetric responses to depreciations and appreciations, it does not explicitly model regime dependence. Exchange rate pass-through may vary across inflation environments, degrees of exchange rate volatility, or periods of macroeconomic stress. Nonlinear local projections or regime-switching frameworks could provide additional insight into whether transmission differs between stable and crisis periods (Forbes et al., 2018; Carrière-Swallow et al., 2021).

Third, the empirical framework focuses primarily on domestic exchange rate movements and monetary conditions. It does not explicitly incorporate global shocks such as commodity price volatility or international financial conditions. Given the importance of oil and food imports in Sub-Saharan African economies, external factors may jointly influence exchange rates and inflation. Future extensions could incorporate global commodity price indices or measures of external financial stress to better isolate the exchange rate transmission channel.

Fourth, Liberia's dual-currency environment introduces measurement complexities. A substantial share of transactions is conducted in U.S. dollars, while inflation is measured in Liberian dollars. This institutional structure may attenuate or delay the transmission of exchange rate movements into measured consumer prices. Disaggregated CPI data distinguishing between tradable and non-tradable goods, or between locally priced and foreign-currency-denominated goods, would allow for a more granular assessment of transmission mechanisms (Campa and Goldberg, 2005).

Finally, the analysis does not examine distributional consequences. Exchange rate-driven inflation may affect households unevenly depending on income level and consumption patterns. Exploring distributional effects represents a promising avenue for future research, particularly in highly import-dependent economies where food and fuel expenditures constitute a large share of household budgets.

5.3 Concluding Remarks

This thesis provides high-frequency empirical evidence on exchange rate pass-through in Liberia within a comparative Sub-Saharan African framework. Using a flexible local projection approach, the analysis documents that exchange rate movements are associated

with economically meaningful inflation responses in several economies, and that Liberia exhibits among the strongest and most asymmetric pass-through patterns in the sample.

The results show that depreciation episodes are associated with inflationary pressures, particularly in the short run and in the asymmetric specification, where depreciations transmit more strongly than appreciations. At the same time, the symmetric cumulative estimate for Liberia over the first year is negative (approximately -0.41), indicating that, when depreciations and appreciations are aggregated in a single linear specification, the net cumulative response can be dominated by appreciation-driven disinflationary episodes and broader policy responses. This pattern reinforces the importance of modelling asymmetry and of interpreting symmetric cumulative estimates as reduced-form averages rather than structural pass-through parameters.

More broadly, the findings demonstrate substantial cross-country heterogeneity in both the level and asymmetry of pass-through. Economies characterised by higher import dependence, weaker nominal anchors, and shallower financial markets tend to exhibit stronger and more persistent transmission from exchange rates to consumer prices. By contrast, countries with more credible monetary frameworks and deeper markets display smaller and less persistent inflation responses.

These results carry important policy implications. Strengthening monetary policy credibility, improving fiscal discipline, and reducing structural reliance on imported essentials can attenuate the inflationary consequences of exchange rate movements. In the Liberian context, reforms that deepen domestic production, enhance competition in import and distribution networks, and gradually reduce dollarization may help weaken the exchange rate-inflation nexus over time.

Taken together, this study contributes to the growing literature on exchange rate pass-through in developing economies by providing high-frequency evidence, documenting asymmetric dynamics, and highlighting the institutional factors that shape inflation transmission. In doing so, it offers a foundation for future research on nonlinear transmission, distributional effects, and the interaction between exchange rate regimes and monetary credibility in structurally fragile economies.

AI Attribution Statement

Artificial Intelligence (AI) tools were used in a limited and ancillary manner during this thesis. Specifically, they were used for the purpose of data cleaning and language refinement with the objective of enhancing clarity and academic expression in certain parts of the thesis.

All of the AI-generated outputs were reviewed, validated, and extensively edited prior to their inclusion.

The author accepts full responsibility for the content and findings of this thesis.

Appendix A

Additional Figures

This appendix presents supplementary figures that provide descriptive context for the macroeconomic variables used in the analysis. The figures are included for completeness and to visualise cross-country differences in inflation and exchange rate dynamics over the sample period.

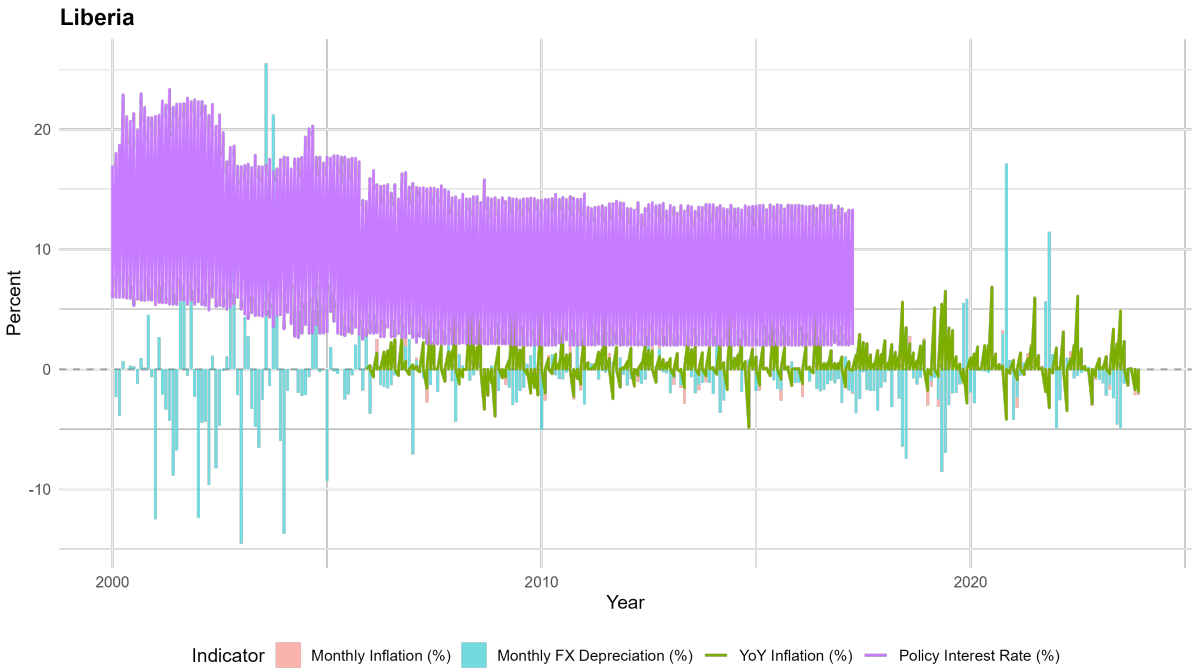

Figure A.1: Liberia: Monthly inflation and exchange rate indicators, 2000 to 2023.

Figure A.2: Côte d'Ivoire: Monthly inflation and exchange rate indicators, 2000 to 2023.

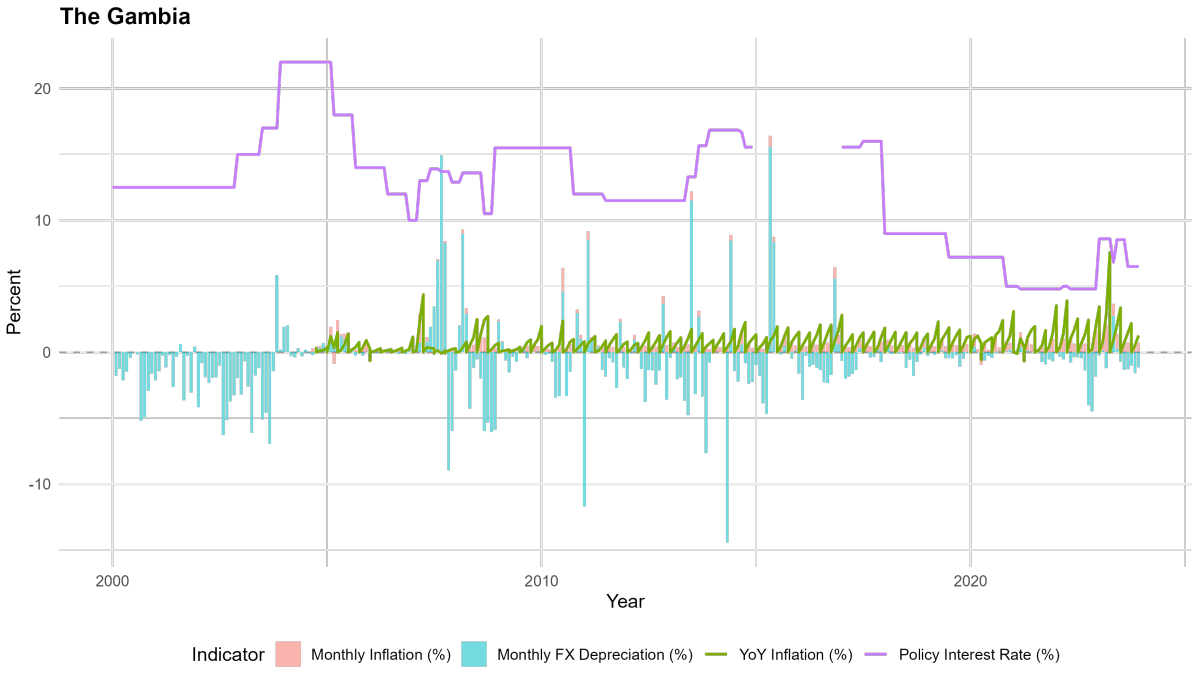

Figure A.3: The Gambia: Monthly inflation and exchange rate indicators, 2000 to 2023.

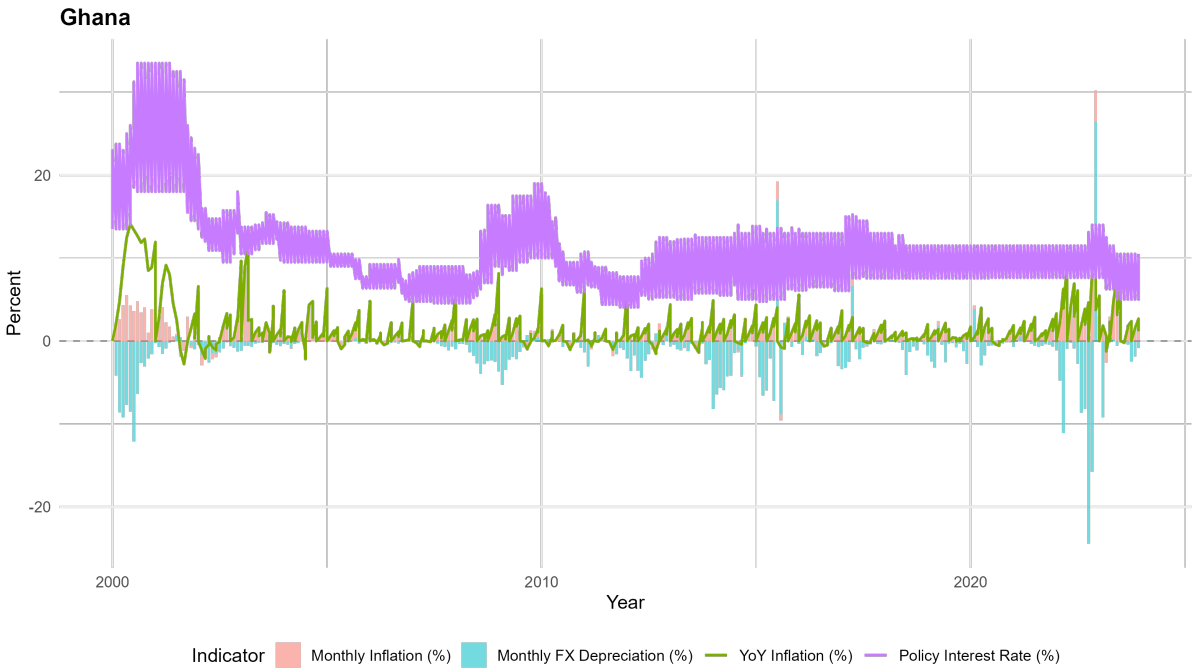

Figure A.4: Ghana: Monthly inflation and exchange rate indicators, 2000 to 2023.

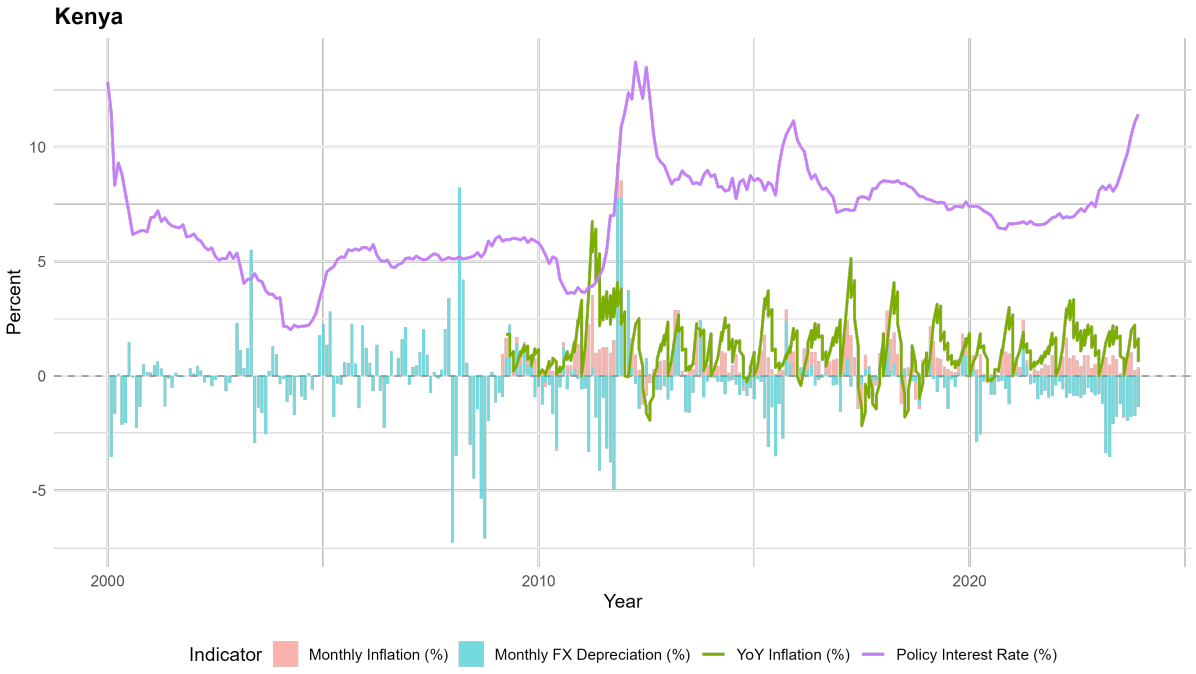

Figure A.5: Kenya: Monthly inflation and exchange rate indicators, 2000 to 2023.

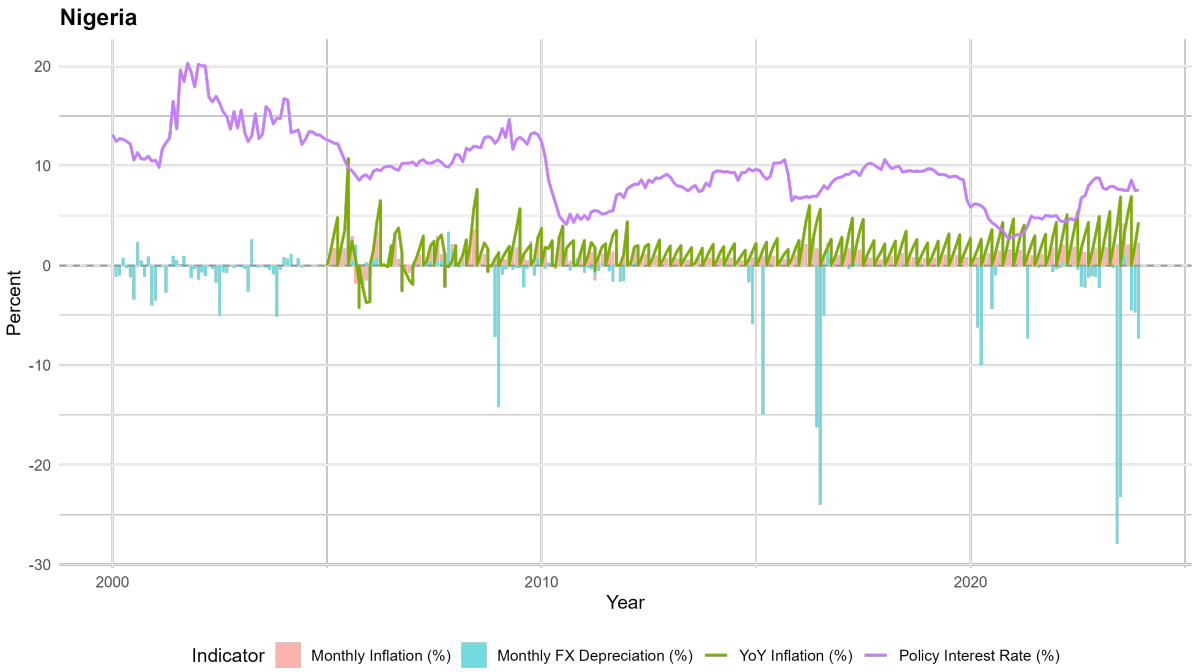

Figure A.6: Nigeria: Monthly inflation and exchange rate indicators, 2000 to 2023.

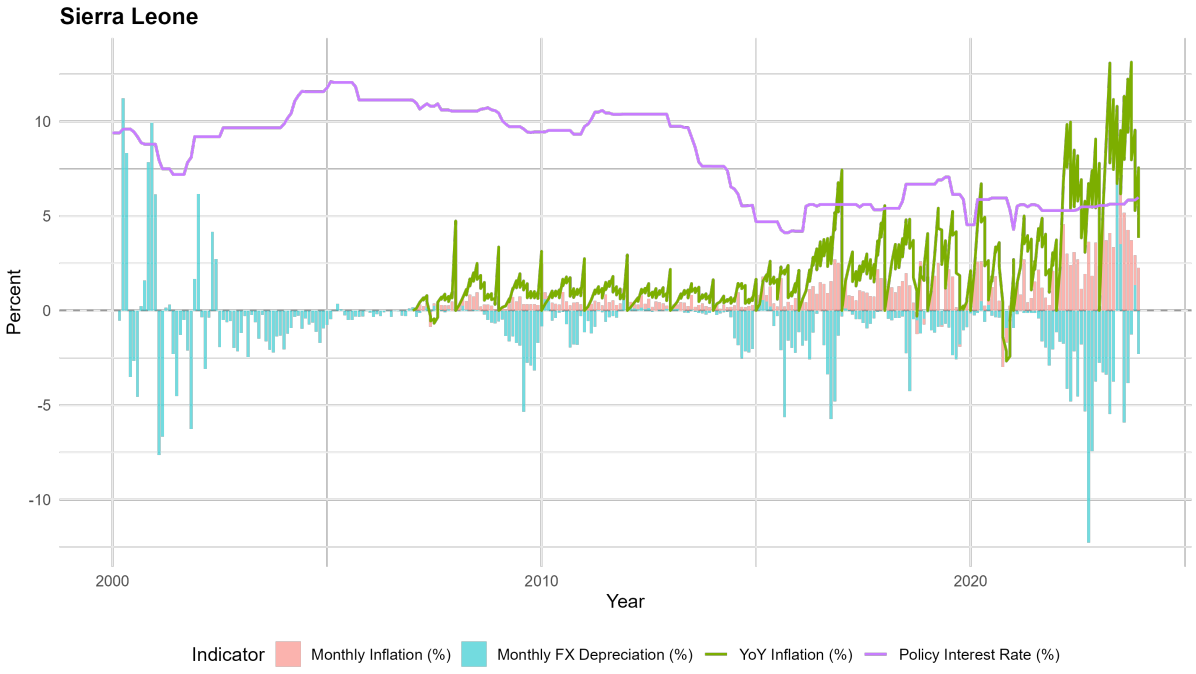

Figure A.7: Sierra Leone: Monthly inflation and exchange rate indicators, 2000 to 2023.

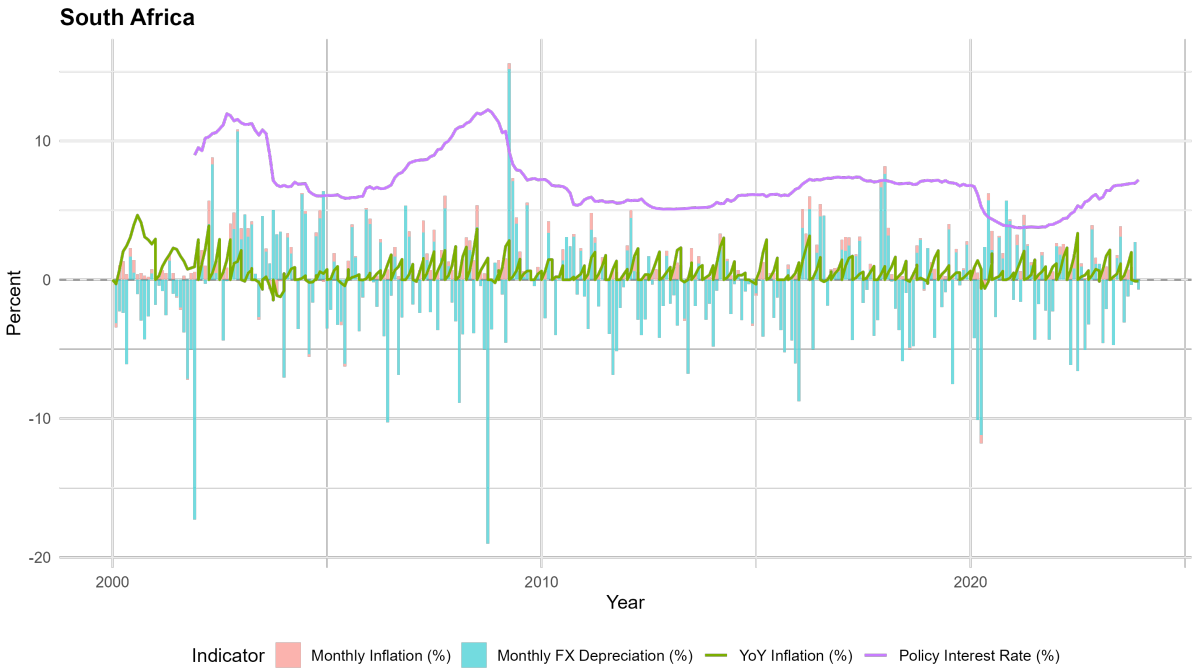

Figure A.8: South Africa: Monthly inflation and exchange rate indicators, 2000 to 2023.

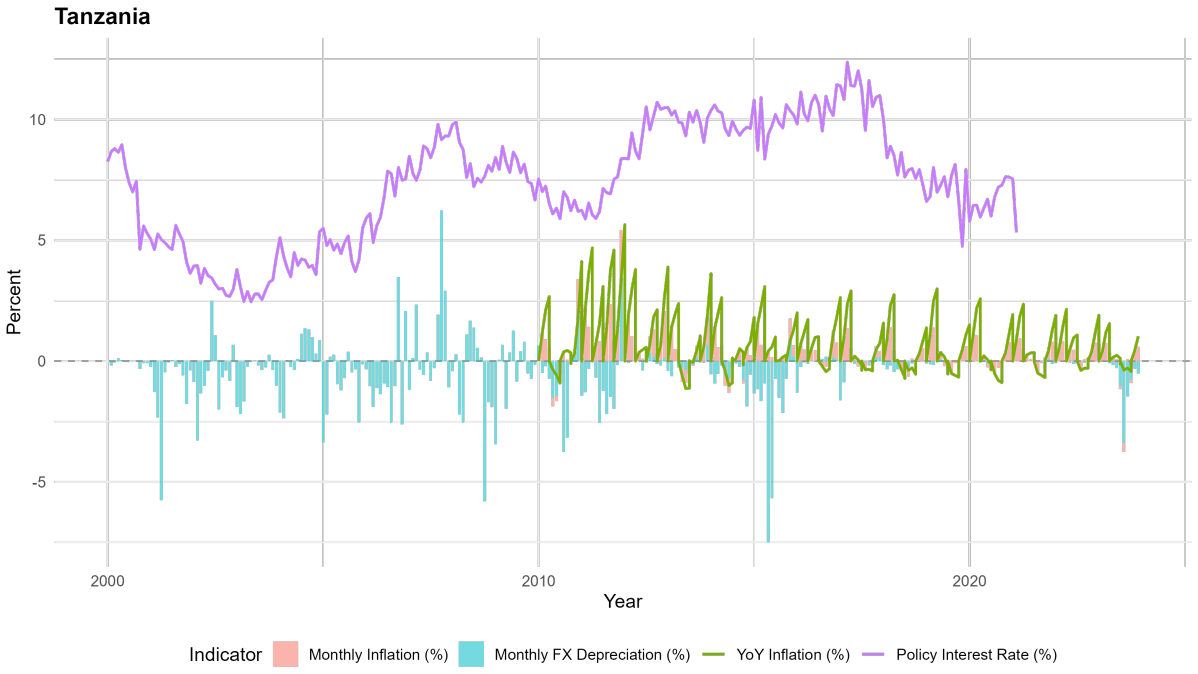

Figure A.9: Tanzania: Monthly inflation and exchange rate indicators, 2000 to 2023.

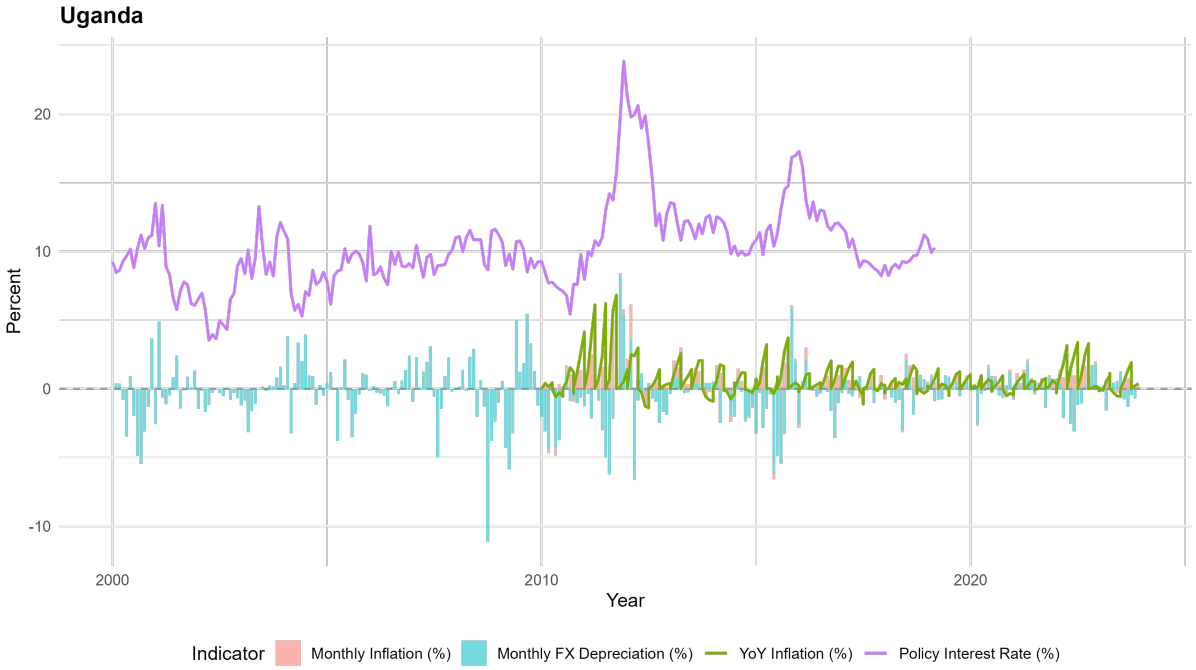

Figure A.10: Uganda: Monthly inflation and exchange rate indicators, 2000 to 2023.

Appendix B

Additional Tables

This appendix reports supplementary tables that support the main empirical results presented in Chapter 4. The appendix includes full-horizon impulse response estimates that are omitted from the main text for brevity.

Table B.1: Panel Local Projection Estimates of Exchange Rate Pass-Through (Full Horizons: 0–12)

Horizon (months)	Coefficient	Std. Error	t-stat	CI (Lower)	CI (Upper)
0	-0.1081	0.0410	-2.638	-0.1884	-0.0278
1	0.0018	0.0008	2.214	0.0002	0.0034
2	-0.0085	0.0089	-0.956	-0.0258	0.0089
3	0.0045	0.0022	2.069	0.0002	0.0087
4	-0.0031	0.0032	-0.953	-0.0094	0.0033
5	-0.0423	0.0229	-1.851	-0.0871	0.0025
6	0.0024	0.0010	2.424	0.0004	0.0043
7	0.0022	0.0009	2.453	0.0004	0.0040
8	-0.0025	0.0034	-0.749	-0.0091	0.0041
9	0.0003	0.0011	0.274	-0.0018	0.0024
10	-0.0572	0.0306	-1.867	-0.1173	0.0028
11	0.0018	0.0007	2.425	0.0003	0.0033
12	-0.0135	0.0130	-1.038	-0.0390	0.0120

Notes: This table reports panel local projection estimates of the response of monthly inflation to a one percentage point exchange rate depreciation shock, reported over horizons from zero to twelve months. Confidence intervals are constructed at the ninety-five percent level using cluster-robust standard errors.

Table B.2: Panel Local Projection Estimates with Asymmetric Exchange Rate Shocks (Full Horizons)

	Depreciation (Δe^+)			Appreciation (Δe^-)			
Horizon (months)	Coef.	CI L	CI U	Coef.	CI L	CI U	Countries
0	0.124	0.080	0.167	-0.200	-0.315	-0.085	10
1	-0.006	-0.010	-0.003	0.005	0.002	0.008	10
2	-0.006	-0.010	-0.003	-0.009	-0.034	0.016	10
3	-0.005	-0.006	-0.004	0.008	0.002	0.014	10
4	-0.004	-0.006	-0.003	-0.003	-0.012	0.007	10
5	0.057	0.018	0.096	-0.082	-0.152	-0.012	10
6	-0.006	-0.010	-0.003	0.006	0.003	0.009	10
7	-0.006	-0.010	-0.003	0.006	0.003	0.008	10
8	-0.005	-0.007	-0.003	-0.002	-0.011	0.008	10
9	-0.005	-0.007	-0.002	0.002	-0.001	0.006	10
10	0.057	0.023	0.092	-0.103	-0.197	-0.008	10
11	-0.006	-0.010	-0.003	0.005	0.003	0.007	10
12	-0.006	-0.010	-0.002	-0.017	-0.054	0.021	10

Notes: The table reports panel local projection estimates of the inflation response to exchange rate depreciations (Δe^+) and appreciations (Δe^-) at different horizons. Confidence intervals are constructed at the ninety-five percent level. The number of countries included in each regression is reported in the final column.

Table B.3: Country-Level Asymmetric Exchange Rate Pass-Through Estimates (Full Horizons)

		Depreciation (Δe^+)			Appreciation (Δe^-)		
Country	Horizon (months)	Coef.	CI L	CI U	Coef.	CI L	CI U
Liberia	0	0.180	-0.248	0.607	-0.666	-0.950	-0.382
Liberia	1	-0.009	-0.014	-0.004	0.008	0.004	0.013
Liberia	2	-0.009	-0.014	-0.004	0.008	0.004	0.013
Liberia	3	-0.009	-0.014	-0.004	0.008	0.004	0.013
Liberia	4	-0.008	-0.013	-0.004	0.008	0.003	0.012
Liberia	5	-0.008	-0.012	-0.003	0.007	0.003	0.011
Liberia	6	-0.008	-0.012	-0.003	0.007	0.003	0.011
Liberia	7	-0.008	-0.012	-0.003	0.007	0.003	0.011
Liberia	8	-0.008	-0.012	-0.003	0.007	0.003	0.011
Liberia	9	-0.004	-0.006	-0.001	0.003	0.001	0.006
Liberia	10	0.000	-0.002	0.002	-0.000	-0.002	0.002
Liberia	11	0.000	-0.002	0.002	-0.000	-0.002	0.002
Liberia	12	0.000	-0.002	0.002	-0.000	-0.002	0.002
Côte d'Ivoire	0	0.132	0.023	0.240	-0.034	-0.096	0.028
Côte d'Ivoire	1	-0.011	-0.019	-0.003	0.008	0.002	0.013
Côte d'Ivoire	2	-0.011	-0.019	-0.003	0.008	0.002	0.013
Côte d'Ivoire	3	-0.009	-0.016	-0.002	0.006	0.001	0.012
Côte d'Ivoire	4	-0.009	-0.016	-0.002	0.006	0.001	0.011
Côte d'Ivoire	5	0.074	-0.034	0.182	-0.020	-0.089	0.048
Côte d'Ivoire	6	-0.010	-0.018	-0.002	0.008	0.002	0.013
Côte d'Ivoire	7	-0.010	-0.018	-0.002	0.008	0.002	0.013
Côte d'Ivoire	8	-0.011	-0.018	-0.003	0.008	0.003	0.014
Côte d'Ivoire	9	-0.011	-0.018	-0.003	0.008	0.003	0.014
Côte d'Ivoire	10	0.100	-0.010	0.210	-0.042	-0.108	0.024
Côte d'Ivoire	11	-0.010	-0.018	-0.002	0.008	0.002	0.014
Côte d'Ivoire	12	-0.010	-0.018	-0.002	0.008	0.002	0.014
Ghana	0	0.151	0.131	0.171	-0.333	-0.452	-0.214
Ghana	1	-0.004	-0.006	-0.002	0.006	0.003	0.010
Ghana	2	-0.005	-0.008	-0.001	-0.050	-0.098	-0.001
Ghana	3	-0.004	-0.007	-0.002	0.009	0.004	0.014
Ghana	4	-0.003	-0.005	0.000	-0.014	-0.048	0.021
Ghana	5	-0.003	-0.005	-0.001	0.007	0.003	0.012
Ghana	6	-0.003	-0.004	-0.001	0.010	0.002	0.018
Ghana	7	-0.002	-0.004	-0.001	0.008	0.002	0.013
Ghana	8	-0.003	-0.006	0.001	-0.013	-0.051	0.026
Ghana	9	-0.002	-0.003	-0.001	-0.002	-0.008	0.003
Ghana	10	0.059	0.023	0.095	-0.211	-0.324	-0.099
Ghana	11	-0.004	-0.006	-0.001	0.007	0.003	0.010
Ghana	12	-0.002	-0.005	0.001	-0.079	-0.142	-0.016
Kenya	0	0.194	0.108	0.280	-0.316	-0.389	-0.242
Kenya	1	-0.026	-0.042	-0.010	0.048	0.034	0.061
Kenya	2	-0.026	-0.042	-0.010	0.048	0.034	0.061
Kenya	3	-0.008	-0.014	-0.002	0.015	0.009	0.021
Kenya	4	-0.008	-0.014	-0.002	0.015	0.009	0.021
Kenya	5	0.176	0.072	0.280	-0.306	-0.388	-0.224
Kenya	6	-0.026	-0.041	-0.010	0.048	0.034	0.061
Kenya	7	-0.026	-0.041	-0.010	0.048	0.034	0.061
Kenya	8	-0.015	-0.025	-0.005	0.028	0.019	0.037
Kenya	9	-0.015	-0.024	-0.005	0.028	0.019	0.037
Kenya	10	0.109	0.018	0.200	-0.235	-0.301	-0.169
Kenya	11	-0.025	-0.041	-0.010	0.048	0.034	0.062
Kenya	12	-0.025	-0.041	-0.010	0.048	0.034	0.062
Nigeria	0	0.318	-0.158	0.793	-0.101	-0.130	-0.073
Nigeria	1	-0.036	-0.052	-0.019	0.004	0.002	0.005
Nigeria	2	-0.036	-0.052	-0.019	0.004	0.002	0.005
Nigeria	3	-0.018	-0.027	-0.009	0.002	0.001	0.003
Nigeria	4	-0.018	-0.027	-0.009	0.002	0.001	0.003
Nigeria	5	0.213	-0.195	0.621	-0.057	-0.097	-0.017
Nigeria	6	-0.036	-0.052	-0.019	0.004	0.002	0.005

Continued on next page

		Depreciation (Δe^+)			Appreciation (Δe^-)		
Country	Horizon (months)	Coef.	CI L	CI U	Coef.	CI L	CI U
Nigeria	7	-0.036	-0.052	-0.019	0.004	0.002	0.005
Nigeria	8	-0.030	-0.043	-0.016	0.003	0.002	0.004
Nigeria	9	-0.030	-0.043	-0.016	0.003	0.002	0.004
Nigeria	10	0.178	-0.043	0.400	-0.007	-0.016	0.003
Nigeria	11	-0.036	-0.052	-0.020	0.004	0.002	0.005
Nigeria	12	-0.036	-0.052	-0.020	0.004	0.002	0.005
Sierra Leone	0	0.579	0.365	0.794	-0.473	-0.593	-0.352
Sierra Leone	1	-0.053	-0.090	-0.015	0.055	0.035	0.075
Sierra Leone	2	-0.053	-0.090	-0.015	0.055	0.035	0.075
Sierra Leone	3	-0.015	-0.027	-0.003	0.016	0.008	0.024
Sierra Leone	4	-0.015	-0.027	-0.003	0.016	0.008	0.024
Sierra Leone	5	0.637	0.151	1.122	-0.421	-0.557	-0.285
Sierra Leone	6	-0.053	-0.090	-0.015	0.055	0.035	0.075
Sierra Leone	7	-0.053	-0.091	-0.015	0.055	0.035	0.075
Sierra Leone	8	-0.021	-0.036	-0.005	0.022	0.012	0.031
Sierra Leone	9	-0.021	-0.037	-0.005	0.022	0.012	0.032
Sierra Leone	10	0.788	0.585	0.991	-0.390	-0.476	-0.304
Sierra Leone	11	-0.050	-0.085	-0.016	0.056	0.036	0.076
Sierra Leone	12	-0.050	-0.085	-0.016	0.056	0.036	0.076
South Africa	0	0.087	0.057	0.118	-0.074	-0.100	-0.047
South Africa	1	-0.005	-0.006	-0.004	0.004	0.003	0.005
South Africa	2	-0.005	-0.006	-0.004	0.004	0.003	0.005
South Africa	3	-0.003	-0.003	-0.002	0.002	0.001	0.003
South Africa	4	-0.003	-0.003	-0.002	0.002	0.001	0.003
South Africa	5	0.059	0.036	0.083	-0.063	-0.092	-0.034
South Africa	6	-0.005	-0.006	-0.003	0.004	0.003	0.005
South Africa	7	-0.005	-0.006	-0.003	0.004	0.003	0.005
South Africa	8	-0.004	-0.005	-0.003	0.003	0.002	0.004
South Africa	9	-0.004	-0.005	-0.003	0.003	0.002	0.004
South Africa	10	0.035	0.013	0.057	-0.033	-0.052	-0.014
South Africa	11	-0.005	-0.006	-0.003	0.004	0.003	0.005
South Africa	12	-0.005	-0.006	-0.003	0.004	0.003	0.005
Tanzania	0	0.819	0.490	1.147	-0.233	-0.394	-0.071
Tanzania	1	-0.014	-0.023	-0.006	0.010	0.004	0.016
Tanzania	2	-0.014	-0.023	-0.006	0.010	0.004	0.016
Tanzania	3	-0.007	-0.011	-0.002	0.005	0.002	0.008
Tanzania	4	-0.007	-0.011	-0.002	0.005	0.002	0.008
Tanzania	5	0.745	0.441	1.049	-0.132	-0.241	-0.023
Tanzania	6	-0.014	-0.023	-0.006	0.010	0.004	0.016
Tanzania	7	-0.014	-0.023	-0.006	0.010	0.004	0.016
Tanzania	8	-0.011	-0.018	-0.004	0.008	0.003	0.012
Tanzania	9	-0.011	-0.018	-0.004	0.008	0.003	0.012
Tanzania	10	0.061	-0.053	0.174	-0.063	-0.111	-0.015
Tanzania	11	-0.014	-0.023	-0.006	0.010	0.004	0.016
Tanzania	12	-0.014	-0.023	-0.006	0.010	0.004	0.016
The Gambia	0	0.063	0.014	0.112	-0.094	-0.138	-0.051
The Gambia	1	-0.003	-0.005	-0.002	0.005	0.003	0.008
The Gambia	2	-0.003	-0.005	-0.002	0.005	0.003	0.008
The Gambia	3	-0.002	-0.003	-0.001	0.003	0.001	0.005
The Gambia	4	-0.002	-0.003	-0.001	0.003	0.001	0.005
The Gambia	5	0.034	0.007	0.062	-0.083	-0.128	-0.039
The Gambia	6	-0.003	-0.005	-0.002	0.005	0.003	0.008
The Gambia	7	-0.003	-0.005	-0.002	0.005	0.003	0.008
The Gambia	8	-0.003	-0.004	-0.002	0.004	0.002	0.006
The Gambia	9	-0.003	-0.004	-0.002	0.004	0.002	0.006
The Gambia	10	0.015	-0.001	0.030	-0.051	-0.080	-0.022
The Gambia	11	-0.003	-0.005	-0.002	0.005	0.003	0.008
The Gambia	12	-0.003	-0.005	-0.002	0.005	0.003	0.008
Uganda	0	0.153	0.011	0.295	-0.209	-0.338	-0.080
Uganda	1	-0.007	-0.011	-0.002	0.007	0.004	0.010
Uganda	2	-0.007	-0.011	-0.002	0.007	0.004	0.010
Uganda	3	-0.004	-0.008	-0.001	0.004	0.002	0.006

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		Depreciation (Δe^+)			Appreciation (Δe^-)		
Country	Horizon (months)	Coef.	CI L	CI U	Coef.	CI L	CI U
Uganda	4	-0.004	-0.007	-0.001	0.004	0.002	0.006
Uganda	5	0.071	0.023	0.119	-0.223	-0.365	-0.081
Uganda	6	-0.006	-0.011	-0.002	0.007	0.004	0.010
Uganda	7	-0.006	-0.011	-0.002	0.007	0.004	0.010
Uganda	8	-0.005	-0.009	-0.001	0.006	0.004	0.009
Uganda	9	-0.005	-0.009	-0.001	0.006	0.004	0.009
Uganda	10	0.044	-0.015	0.103	-0.046	-0.088	-0.003
Uganda	11	-0.006	-0.011	-0.002	0.007	0.004	0.010
Uganda	12	-0.006	-0.011	-0.002	0.007	0.004	0.010

Notes: The table reports country-level local projection estimates of the inflation response to exchange rate depreciations (Δe^+) and appreciations (Δe^-) over horizons from zero to twelve months. CI L and CI U denote the lower and upper bounds of ninety-five percent confidence intervals constructed using country-clustered standard errors. Country-specific regressions follow the specification described in Chapter 4.

Table B.4: Country-Level Symmetric Exchange Rate Pass-Through Estimates (Full Horizons)

Country	Horizon (months)	Coefficient	Std. Error	CI (Lower)	CI (Upper)
Liberia	0	-0.4389	0.1241	-0.6823	-0.1956
Liberia	1	0.0036	0.0013	0.0011	0.0062
Liberia	2	0.0036	0.0013	0.0011	0.0062
Liberia	3	0.0036	0.0013	0.0011	0.0062
Liberia	4	0.0034	0.0012	0.0010	0.0057
Liberia	5	0.0031	0.0011	0.0009	0.0053
Liberia	6	0.0031	0.0011	0.0009	0.0053
Liberia	7	0.0031	0.0011	0.0009	0.0053
Liberia	8	0.0031	0.0011	0.0009	0.0053
Liberia	9	0.0014	0.0006	0.0002	0.0027
Liberia	10	-0.0000	0.0005	-0.0009	0.0009
Liberia	11	-0.0000	0.0005	-0.0009	0.0009
Liberia	12	-0.0000	0.0005	-0.0009	0.0009
Côte d'Ivoire	0	0.0347	0.0302	-0.0245	0.0938
Côte d'Ivoire	1	-0.0000	0.0011	-0.0021	0.0021
Côte d'Ivoire	2	-0.0000	0.0011	-0.0021	0.0021
Côte d'Ivoire	3	-0.0001	0.0009	-0.0019	0.0018
Côte d'Ivoire	4	0.0001	0.0009	-0.0016	0.0018
Côte d'Ivoire	5	0.0187	0.0302	-0.0406	0.0779
Côte d'Ivoire	6	0.0003	0.0010	-0.0016	0.0022
Côte d'Ivoire	7	0.0003	0.0010	-0.0016	0.0022
Côte d'Ivoire	8	0.0003	0.0010	-0.0016	0.0023
Côte d'Ivoire	9	0.0004	0.0010	-0.0015	0.0023
Côte d'Ivoire	10	0.0169	0.0329	-0.0477	0.0814
Côte d'Ivoire	11	0.0004	0.0009	-0.0014	0.0022
Côte d'Ivoire	12	0.0004	0.0009	-0.0014	0.0022
Ghana	0	-0.1894	0.0765	-0.3393	-0.0396
Ghana	1	0.0034	0.0017	0.0001	0.0066
Ghana	2	-0.0362	0.0179	-0.0713	-0.0012
Ghana	3	0.0052	0.0022	0.0010	0.0094
Ghana	4	-0.0103	0.0126	-0.0349	0.0143
Ghana	5	0.0043	0.0017	0.0009	0.0077
Ghana	6	0.0063	0.0031	0.0003	0.0123
Ghana	7	0.0046	0.0020	0.0007	0.0085
Ghana	8	-0.0099	0.0140	-0.0373	0.0175
Ghana	9	-0.0022	0.0020	-0.0061	0.0017
Ghana	10	-0.1314	0.0503	-0.2299	-0.0328
Ghana	11	0.0036	0.0016	0.0004	0.0068

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Country	Horizon (months)	Coefficient	Std. Error	CI (Lower)	CI (Upper)
Ghana	12	-0.0560	0.0236	-0.1022	-0.0098
Kenya	0	-0.0902	0.0566	-0.2012	0.0207
Kenya	1	0.0151	0.0064	0.0027	0.0276
Kenya	2	0.0151	0.0064	0.0027	0.0276
Kenya	3	0.0048	0.0021	0.0006	0.0089
Kenya	4	0.0048	0.0021	0.0006	0.0090
Kenya	5	-0.0920	0.0503	-0.1906	0.0066
Kenya	6	0.0151	0.0064	0.0026	0.0276
Kenya	7	0.0151	0.0064	0.0026	0.0276
Kenya	8	0.0088	0.0038	0.0014	0.0162
Kenya	9	0.0088	0.0038	0.0014	0.0163
Kenya	10	-0.0812	0.0359	-0.1515	-0.0109
Kenya	11	0.0150	0.0064	0.0025	0.0276
Kenya	12	0.0150	0.0064	0.0025	0.0276
Nigeria	0	-0.0963	0.0136	-0.1230	-0.0697
Nigeria	1	0.0033	0.0006	0.0022	0.0045
Nigeria	2	0.0033	0.0006	0.0022	0.0045
Nigeria	3	0.0017	0.0004	0.0010	0.0024
Nigeria	4	0.0017	0.0004	0.0009	0.0024
Nigeria	5	-0.0538	0.0201	-0.0932	-0.0144
Nigeria	6	0.0032	0.0006	0.0021	0.0043
Nigeria	7	0.0032	0.0006	0.0021	0.0043
Nigeria	8	0.0027	0.0005	0.0017	0.0036
Nigeria	9	0.0026	0.0005	0.0017	0.0036
Nigeria	10	-0.0044	0.0046	-0.0134	0.0045
Nigeria	11	0.0031	0.0005	0.0021	0.0042
Nigeria	12	0.0031	0.0005	0.0021	0.0042
Sierra Leone	0	-0.3762	0.0751	-0.5235	-0.2290
Sierra Leone	1	0.0454	0.0092	0.0275	0.0633
Sierra Leone	2	0.0454	0.0092	0.0275	0.0634
Sierra Leone	3	0.0130	0.0034	0.0063	0.0197
Sierra Leone	4	0.0132	0.0034	0.0065	0.0199
Sierra Leone	5	-0.3237	0.0760	-0.4728	-0.1747
Sierra Leone	6	0.0453	0.0092	0.0274	0.0633
Sierra Leone	7	0.0454	0.0092	0.0274	0.0634
Sierra Leone	8	0.0177	0.0044	0.0092	0.0262
Sierra Leone	9	0.0180	0.0044	0.0094	0.0266
Sierra Leone	10	-0.2845	0.0791	-0.4395	-0.1294
Sierra Leone	11	0.0461	0.0093	0.0278	0.0645
Sierra Leone	12	0.0462	0.0094	0.0278	0.0645
South Africa	0	-0.0065	0.0091	-0.0243	0.0113
South Africa	1	0.0002	0.0004	-0.0005	0.0009
South Africa	2	0.0002	0.0004	-0.0005	0.0009
South Africa	3	0.0001	0.0002	-0.0003	0.0005
South Africa	4	0.0001	0.0002	-0.0002	0.0005
South Africa	5	-0.0123	0.0084	-0.0287	0.0041
South Africa	6	0.0002	0.0003	-0.0005	0.0009
South Africa	7	0.0002	0.0003	-0.0005	0.0009
South Africa	8	0.0002	0.0003	-0.0004	0.0007
South Africa	9	0.0002	0.0003	-0.0004	0.0007
South Africa	10	-0.0047	0.0066	-0.0177	0.0083
South Africa	11	0.0002	0.0003	-0.0004	0.0009
South Africa	12	0.0002	0.0003	-0.0004	0.0009
Tanzania	0	-0.1176	0.0692	-0.2534	0.0181
Tanzania	1	0.0074	0.0021	0.0033	0.0114
Tanzania	2	0.0074	0.0021	0.0033	0.0114
Tanzania	3	0.0034	0.0011	0.0013	0.0055
Tanzania	4	0.0034	0.0011	0.0013	0.0055
Tanzania	5	-0.0358	0.0630	-0.1594	0.0877
Tanzania	6	0.0074	0.0021	0.0033	0.0116
Tanzania	7	0.0074	0.0021	0.0033	0.0116
Tanzania	8	0.0057	0.0017	0.0024	0.0090
Tanzania	9	0.0056	0.0017	0.0024	0.0089

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Country	Horizon (months)	Coefficient	Std. Error	CI (Lower)	CI (Upper)
Tanzania	10	-0.0493	0.0210	-0.0905	-0.0080
Tanzania	11	0.0074	0.0021	0.0033	0.0115
Tanzania	12	0.0074	0.0021	0.0033	0.0115
The Gambia	0	-0.0214	0.0123	-0.0455	0.0027
The Gambia	1	0.0013	0.0007	-0.0000	0.0026
The Gambia	2	0.0013	0.0007	-0.0000	0.0026
The Gambia	3	0.0007	0.0004	-0.0000	0.0015
The Gambia	4	0.0007	0.0004	-0.0000	0.0015
The Gambia	5	-0.0287	0.0120	-0.0521	-0.0052
The Gambia	6	0.0012	0.0007	-0.0000	0.0025
The Gambia	7	0.0012	0.0007	-0.0000	0.0025
The Gambia	8	0.0010	0.0005	-0.0000	0.0020
The Gambia	9	0.0010	0.0005	-0.0000	0.0020
The Gambia	10	-0.0204	0.0097	-0.0393	-0.0015
The Gambia	11	0.0012	0.0006	-0.0001	0.0025
The Gambia	12	0.0012	0.0006	-0.0001	0.0025
Uganda	0	-0.0946	0.0502	-0.1929	0.0037
Uganda	1	0.0028	0.0012	0.0005	0.0051
Uganda	2	0.0028	0.0012	0.0005	0.0051
Uganda	3	0.0013	0.0008	-0.0002	0.0027
Uganda	4	0.0014	0.0007	-0.0001	0.0028
Uganda	5	-0.1304	0.0596	-0.2472	-0.0135
Uganda	6	0.0030	0.0012	0.0007	0.0054
Uganda	7	0.0030	0.0012	0.0007	0.0054
Uganda	8	0.0027	0.0010	0.0006	0.0047
Uganda	9	0.0027	0.0010	0.0007	0.0047
Uganda	10	-0.0173	0.0213	-0.0590	0.0245
Uganda	11	0.0031	0.0012	0.0008	0.0054
Uganda	12	0.0031	0.0012	0.0008	0.0054

Notes: The table reports country-level local projection estimates of the inflation response to a one-percentage exchange rate depreciation under the symmetric specification. Country-specific regressions follow the specification described in Chapter 4.

Appendix C

Robustness Checks

This appendix reports robustness exercises designed to assess whether the main empirical findings are sensitive to alternative specifications. Each exercise maintains the baseline local projection framework used in Chapter 4 and modifies one element of the conditioning set.

C.1 Robustness Check: Lagged Inflation Control

Inflation typically exhibits persistence, raising the concern that omitting lagged inflation could affect the estimated response to exchange rate movements. To address this, the panel local projection model is re-estimated including lagged inflation as an additional control variable. Apart from this modification, the specification remains unchanged relative to the baseline model.

Table C.1: Robustness Check: Panel Local Projections with Lagged Inflation Control

Horizon (months)	Coefficient	Std. Error	t-stat	CI (Lower)	CI (Upper)
0	-0.1081	0.0410	-2.638	-0.1884	-0.0278
1	0.0018	0.0008	2.214	0.0002	0.0034
2	-0.0085	0.0089	-0.956	-0.0258	0.0089
3	0.0045	0.0022	2.069	0.0002	0.0087
4	-0.0031	0.0032	-0.953	-0.0094	0.0033
5	-0.0423	0.0229	-1.851	-0.0871	0.0025
6	0.0024	0.0010	2.424	0.0004	0.0043
7	0.0022	0.0009	2.453	0.0004	0.0040
8	-0.0025	0.0034	-0.749	-0.0091	0.0041
9	0.0003	0.0011	0.274	-0.0018	0.0024
10	-0.0572	0.0306	-1.867	-0.1173	0.0028
11	0.0018	0.0007	2.425	0.0003	0.0033
12	-0.0135	0.0130	-1.038	-0.0390	0.0120

The results remain qualitatively similar to the baseline estimates. Inflation responds significantly to exchange rate depreciation at short horizons, while medium-run effects

remain limited. This suggests that the main pass-through pattern is not driven by omitted inflation persistence.

The reported number of observations corresponds to the country-month sample used in each local projection regression. The slight decline in observations at longer horizons reflects endpoint effects as the dependent variable is projected further into the future.

C.2 Robustness Check: Interest Rate Control

Monetary policy conditions may influence both exchange rate dynamics and inflation, which raises the possibility that estimated pass-through captures omitted monetary policy factors. To account for this channel, the panel local projection model is re-estimated including lagged short-term interest rates as an additional control variable. The remainder of the specification follows the baseline model.

Table C.2: Robustness Check: Panel Local Projections with Interest Rate Control

Horizon (months)	Coefficient	Std. Error	t-stat	CI (Lower)	CI (Upper)
0	-0.1081	0.0410	-2.638	-0.1884	-0.0278
1	0.0018	0.0008	2.214	0.0002	0.0034
2	-0.0085	0.0089	-0.956	-0.0258	0.0089
3	0.0045	0.0022	2.069	0.0002	0.0087
4	-0.0031	0.0032	-0.953	-0.0094	0.0033
5	-0.0423	0.0229	-1.851	-0.0871	0.0025
6	0.0024	0.0010	2.424	0.0004	0.0043
7	0.0022	0.0009	2.453	0.0004	0.0040
8	-0.0025	0.0034	-0.749	-0.0091	0.0041
9	0.0003	0.0011	0.274	-0.0018	0.0024
10	-0.0572	0.0306	-1.867	-0.1173	0.0028
11	0.0018	0.0007	2.425	0.0003	0.0033
12	-0.0135	0.0130	-1.038	-0.0390	0.0120

The estimated impulse responses remain close to those obtained under the baseline specification. Exchange rate depreciation continues to have a statistically significant effect on inflation in the short run, while the medium-run response remains muted. The inclusion of interest rate dynamics does not materially change the main conclusions.

As above, the number of observations reflects the available country-month observations at each horizon and declines modestly with horizon length due to endpoint effects.

C.3 Robustness Check: Horizon Sensitivity and Sample Composition

A potential concern is whether the negative coefficients observed at intermediate horizons reflect country-specific volatility or sample imbalance rather than systematic exchange rate pass-through dynamics. To address this issue, two additional robustness exercises are conducted.

First, the panel local projection model is re-estimated after excluding Liberia from the sample. This test evaluates whether the medium-horizon estimates are driven by country-specific shocks, including periods of heightened macroeconomic volatility.

Second, the model is re-estimated using a balanced subsample of countries with sufficiently long time-series coverage, thereby reducing the possibility that uneven sample lengths distort medium-horizon estimates.

Table C.3: Robustness Check: Horizon Sensitivity and Sample Composition (Selected Horizons)

Horizon (months)	Full Sample (10 countries)	Exclude Liberia (9 countries)	Balanced Sample
5	-0.0423 (0.0229)	-0.0431 (0.0234)	-0.0423 (0.0229)
10	-0.0572 (0.0306)	-0.0582 (0.0313)	-0.0572 (0.0306)

Notes: This table reports panel local projection estimates at selected horizons under three specifications: the full sample, a sample excluding Liberia, and a balanced country panel. Each cell reports the estimated coefficient with the standard error in parentheses.

The estimates remain highly stable across specifications. At horizon five, the coefficient is approximately -0.042 in all cases, while at horizon ten it remains close to -0.057. Both the magnitude and statistical precision of the estimates are virtually unchanged across alternative samples.

The medium-horizon responses do not appear to be driven by any single country or by sample imbalance. The persistence of the estimates across specifications supports the interpretation that the observed pattern reflects genuine panel-level dynamics rather than econometric artifacts.

C.4 Robustness Check: Fixed Effects Specifications

A potential concern in pooled panel estimations is that unobserved time-invariant heterogeneity across countries, or common time shocks affecting all economies simultaneously, could bias the baseline estimates if not adequately controlled for. Although the baseline specification pools observations across countries and clusters standard errors at the country level, it does not explicitly remove fixed cross-country or time effects.

To assess the robustness of the results, the panel local projection model is re-estimated under alternative fixed effects structures.

Specifically, the baseline specification without fixed effects is compared to alternative models that incorporate additional controls for unobserved heterogeneity. First, a specification including *country fixed effects* is estimated in order to absorb time-invariant structural differences across economies. Second, a *two-way fixed effects* specification is considered, incorporating both country and time fixed effects to account for common shocks and regional macroeconomic conditions shared across countries.

Table C.4: Robustness Check: Fixed Effects Specifications (Selected Horizons)

Horizon (months)	Baseline (no FE)	Country FE	Country + Time FE
0	-0.1081 (0.0410)	-0.1068 (0.0406)	-0.0989 (0.0370)
3	0.0045 (0.0022)	0.0056 (0.0026)	0.0135 (0.0071)
6	0.0024 (0.0010)	0.0038 (0.0019)	0.0110 (0.0053)
12	-0.0135 (0.0130)	-0.0121 (0.0135)	-0.0043 (0.0090)

Notes: This table reports panel local projection estimates at selected horizons under three specifications: baseline (pooled, no fixed effects), country fixed effects, and country plus time fixed effects. Each cell reports the estimated coefficient with clustered standard errors in parentheses.

Across all selected horizons, the estimated coefficients remain close in magnitude and statistical significance across the three specifications. The inclusion of country fixed effects does not materially alter the estimated pass-through, indicating that time-invariant cross-country heterogeneity is not driving the results. Likewise, controlling for common time shocks via two-way fixed effects leaves the qualitative pattern of exchange rate pass-through unchanged.

Taken together, these findings support the interpretation of the baseline results as reflecting robust panel-level exchange rate pass-through dynamics rather than artefacts of omitted fixed effects.

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