



# Monetary Policy Surprise, Exchange Rate Pass-Through and Inflation Persistence: A High-Frequency Evidence from Emerging Economies

Aida Samavaty <sup>1,\*</sup>

1- Ph.D. candidate of Monetary Economics, Islamic Azad University Science and Research Branch. Tehran Iran. Email: [aidasamavaty93@gmail.com](mailto:aidasamavaty93@gmail.com)

\* Corresponding Author

## Abstract

This study investigates the transmission mechanism linking unexpected monetary policy shocks, exchange rate movements, exchange rate pass-through, and inflation persistence in emerging economies. The analysis focuses on whether monetary policy surprises identified around central bank announcements generate immediate exchange rate adjustments and whether these exchange rate responses subsequently propagate into domestic prices and alter the persistence of inflation. The study develops an empirical framework that combines high-frequency identification of monetary policy surprises with dynamic estimates of exchange rate pass-through and inflation persistence. The empirical strategy distinguishes the immediate market response to unexpected monetary policy information from the subsequent transmission of exchange rate movements to consumer prices, thereby allowing the monetary policy shock, exchange rate channel, and inflation dynamics to be examined within an integrated framework. The empirical analysis uses observed macroeconomic and financial market data for a panel of emerging economies over a period determined by the availability and comparability of high-frequency monetary policy information. Monetary policy surprises are identified from financial market movements surrounding policy announcements, while exchange rates, consumer prices, inflation measures, and relevant macroeconomic indicators are incorporated to estimate the subsequent transmission process. Local projection methods are employed to trace the dynamic responses of exchange rates and inflation to identified monetary policy surprises. The analysis further examines whether exchange rate pass-through varies according to inflation conditions, exchange rate volatility, monetary policy regimes, and the prevailing macroeconomic environment. The study is designed to provide evidence on three interconnected dimensions of monetary transmission. First, it quantifies the immediate exchange rate response to unexpected monetary policy information. Second, it estimates the extent and timing of the subsequent exchange rate pass-through into domestic prices. Third, it evaluates whether exchange rate-mediated monetary policy shocks contribute to persistent inflation dynamics and whether this persistence differs across emerging economies and macroeconomic regimes. By integrating high-frequency monetary policy identification with medium-term price transmission and inflation persistence, the study provides an empirical framework for distinguishing the initial financial-market response from the slower propagation of monetary shocks through the price-setting mechanism. The findings are intended to contribute to the empirical literature on monetary transmission by clarifying the conditions under which exchange rates amplify, absorb, or transmit unexpected monetary policy disturbances into persistent inflationary dynamics.

**Keywords:** Monetary Policy Surprise, Exchange Rate Pass-Through, Inflation Persistence, High-Frequency Identification, Emerging Economies

## 1- Introduction

Monetary policy transmission in emerging economies is strongly influenced by the interaction between interest rates, financial markets, exchange rates, and domestic prices. Although central banks generally use policy rates and related instruments to influence aggregate demand and inflation, the initial response to a policy decision can occur through financial markets within minutes. This distinction is particularly important when the policy decision contains information that differs from market expectations. An unexpected monetary policy change can therefore generate an immediate adjustment in exchange rates before its broader effects become visible in output and consumer prices.

The exchange rate represents one of the most important channels through which monetary policy affects inflation in emerging economies. A monetary policy surprise may alter interest-rate differentials and capital-market expectations, producing an immediate exchange-rate response. Changes in the exchange rate can then affect import prices, production costs, and ultimately consumer prices. Existing evidence indicates that exchange-rate pass-through is neither complete nor constant across economies. Its magnitude depends on inflation conditions, exchange-rate volatility, monetary policy arrangements, and the broader macroeconomic environment [2,4-8]. Evidence from emerging markets also indicates that the exchange-rate channel can vary substantially across countries and over time [7-9].

The relationship between exchange rates and inflation becomes particularly important when inflation is persistent. Persistent inflation implies that an initial price disturbance continues to influence subsequent inflation dynamics rather than disappearing rapidly. The degree to which inflation expectations remain anchored is an important determinant of this persistence. Empirical evidence indicates that weaker anchoring of inflation expectations can be associated with greater inflation persistence, particularly following inflationary disturbances [1]. Consequently, the transmission of a monetary policy shock through the exchange rate cannot be evaluated solely by measuring the contemporaneous response of consumer prices. The duration and persistence of the subsequent inflation response also need to be considered.

A further complication arises from the fact that exchange-rate pass-through is state dependent. The same percentage change in the exchange rate does not necessarily produce the same price response under different inflation regimes or different degrees of exchange-rate volatility. Recent evidence demonstrates substantial variation in pass-through across countries, periods, and macroeconomic conditions [6,8,12,14]. Monetary policy credibility can also influence the extent to which exchange-rate movements are incorporated into domestic prices, making the institutional environment relevant to the transmission process [13].

These characteristics create a methodological challenge. Conventional macroeconomic models based on monthly or quarterly observations can identify the relationship between monetary policy and macroeconomic variables, but they may not adequately isolate the unexpected component of a policy decision. If anticipated and unanticipated policy changes are treated identically, the estimated response may combine information that financial markets had already incorporated with genuinely new information. High-frequency identification provides an opportunity to address this problem by examining financial-market movements within narrow windows around monetary policy announcements. Recent empirical work has demonstrated the usefulness of high-frequency information for identifying monetary policy surprises and measuring their immediate effects on exchange rates [15].

The present study builds on this approach but extends the analysis beyond the immediate financial-market reaction. Its central question is whether an unexpected monetary policy shock generates an exchange-rate adjustment that subsequently passes through to domestic prices and contributes to persistent inflation dynamics in emerging economies. The analysis therefore connects three stages of monetary transmission: the immediate exchange-rate response to a policy surprise, the subsequent exchange-rate pass-through to prices, and the persistence of the resulting inflation response.

The empirical framework combines high-frequency identification of monetary policy surprises with dynamic estimation of exchange-rate pass-through and inflation persistence. This structure makes it possible to distinguish the short-run market response from the slower price-adjustment process. It also allows the analysis to examine whether the strength of transmission changes under different inflation conditions, exchange-rate volatility, and monetary policy environments.

The contribution of the study lies in integrating these transmission stages within a single empirical framework rather than examining monetary surprises, exchange-rate pass-through, and inflation persistence as separate phenomena. Previous research has provided important evidence on each component, including the role of monetary policy regimes [5,10], external shocks [3,7], exchange-rate volatility [6], nonlinear pass-through [12], and monetary policy credibility [13]. The present study uses these findings as the foundation for investigating how an identified monetary policy surprise can propagate from financial markets into the price-setting process.

Accordingly, the study contributes to the monetary economics literature by focusing on the temporal sequence of transmission rather than solely on the magnitude of individual relationships. The distinction between the immediate exchange-rate response and the subsequent inflation response is particularly relevant for emerging-market central banks, where exchange-rate movements may play a comparatively important role in domestic price formation. Understanding this sequence can provide a more precise empirical assessment of

the conditions under which exchange rates transmit monetary policy shocks into inflation and whether those effects persist beyond the initial disturbance.

## 2- Problem Statement

The transmission of monetary policy in emerging economies remains difficult to characterize because the effects of an unexpected policy decision occur at different frequencies and through several interconnected channels. A policy announcement can immediately affect financial-market expectations and exchange rates, while its effect on import prices, consumer prices, and inflation persistence develops over a substantially longer horizon. Treating these responses as a single transmission process may obscure important differences between the initial market reaction and the subsequent adjustment of domestic prices.

A central empirical problem concerns the identification of the genuinely unexpected component of monetary policy. Changes in the policy rate that were anticipated by financial-market participants may already be reflected in exchange rates and asset prices before the formal announcement. Consequently, the observed movement in the exchange rate following a policy decision cannot automatically be interpreted as a response to a monetary policy shock. High-frequency identification offers a way to isolate unexpected policy information by concentrating on narrowly defined periods surrounding central bank announcements [15]. However, identifying the immediate exchange-rate response does not by itself establish whether the resulting exchange-rate movement is subsequently transmitted to inflation.

The second problem concerns the magnitude and timing of exchange-rate pass-through. Evidence from emerging economies indicates that pass-through can vary across countries, periods, inflation environments, and exchange-rate regimes [2,5,7,8]. Exchange-rate volatility and inflation conditions can further alter the strength of the transmission mechanism [6]. Consequently, an identical exchange-rate shock may generate substantially different price responses depending on the prevailing macroeconomic environment. Nonlinear evidence also suggests that pass-through cannot always be represented adequately by a single constant coefficient [12].

The third problem relates to the persistence of inflation following an exchange-rate-mediated shock. A temporary exchange-rate adjustment does not necessarily generate only a temporary inflation response. When inflation expectations become less firmly anchored, an initial price disturbance can become embedded in subsequent inflation dynamics [1]. Monetary policy credibility may also affect the extent to which exchange-rate changes are incorporated into domestic prices [13]. This raises an important question: whether the exchange-rate response to an unexpected monetary policy shock merely changes the short-term price level or contributes to a longer-lasting inflation process.

The existing empirical literature provides substantial evidence on exchange-rate pass-through, monetary policy regimes, external shocks, and inflation dynamics, but these elements have often been investigated separately. Studies have documented differences between inflation-targeting and non-targeting economies [5,10], variation in pass-through over time [3,8], and the role of external disturbances in emerging markets [7,9]. Other research has examined state-dependent and nonlinear pass-through mechanisms [12,14]. Nevertheless, less attention has been devoted to tracing the complete sequence from a high-frequency monetary policy surprise through the exchange-rate response and subsequent price transmission to inflation persistence.

This gap is particularly relevant for emerging economies because exchange rates may simultaneously operate as financial-market adjustment variables and as important determinants of domestic inflation. A central bank may therefore observe a rapid exchange-rate response immediately after a policy announcement, while the inflationary consequences of that movement emerge only gradually. Without separating these temporal stages, the estimated effect of monetary policy may either underestimate the eventual inflationary consequences of an exchange-rate shock or incorrectly attribute persistent inflation to the initial policy decision.

The present study addresses this problem by examining whether high-frequency monetary policy surprises generate measurable exchange-rate responses and whether those responses are subsequently transmitted into domestic inflation with persistent effects. The analysis further considers whether the magnitude and duration of this transmission vary across macroeconomic conditions. By linking the identification of unexpected monetary policy information to dynamic exchange-rate pass-through and inflation persistence, the study seeks to clarify the mechanisms through which monetary policy surprises can propagate from financial markets into the broader price-setting process of emerging economies.

## 3- Research Methodology

### 3.1. Research Design

This study employs a quantitative empirical design to examine the transmission of unexpected monetary policy shocks through exchange rates and domestic prices in emerging economies. The methodological framework is structured around three sequential components: identification of monetary policy surprises, estimation of the immediate exchange-rate response, and measurement of the subsequent pass-through into inflation and inflation persistence.

The central empirical distinction is between anticipated monetary policy changes and unexpected policy information. A conventional change in the policy rate does not necessarily represent an exogenous monetary policy shock because financial markets may have incorporated the decision before the announcement. The study therefore focuses on the unexpected component of monetary policy information identified within a narrow interval surrounding central bank announcements. This approach is consistent with the logic of high-frequency identification and permits the analysis to separate policy surprises from information already reflected in market prices [15].

The empirical framework considers a panel of emerging economies for which sufficiently comparable monetary policy announcements, financial-market observations, exchange-rate data, and consumer-price data are available. The final country-period sample is determined by data availability and comparability rather than by imposing a predetermined balanced panel. This avoids introducing artificial observations into the empirical analysis.

### 3.2. Data Structure and Variables

The analysis combines financial-market and macroeconomic observations at different frequencies. High-frequency financial data are used to identify monetary policy surprises and immediate exchange-rate responses, while monthly macroeconomic data are used to examine the subsequent transmission into inflation.

The principal variables are defined as follows:

- Monetary Policy Surprise (MPS): the unexpected change in market-based measures of monetary policy expectations within the announcement window.
- Exchange Rate (ER): the domestic-currency price of the relevant foreign currency, with the transformation standardized across countries so that an increase represents domestic-currency depreciation.
- Inflation (INF): the percentage change in the consumer price index.
- Core Inflation (CORE): the corresponding inflation measure excluding volatile components where comparable data are available.
- Exchange Rate Volatility (ERV): a measure derived from exchange-rate movements over the relevant observation period.
- Policy Rate (PR): the central bank's principal short-term policy interest rate.
- Inflation Expectations (EXP): available measures of expected inflation used to capture the expectations environment.
- Output Growth (GDP): real economic activity used as a control for cyclical conditions.
- External Shock Controls: relevant international variables included to reduce the risk that common external disturbances are incorrectly attributed to domestic monetary policy surprises.

The exchange-rate and inflation variables are transformed into stationary or approximately stationary forms where required by the econometric specification. The precise transformations are maintained consistently across countries to ensure comparability.

### 3.3. Identification of Monetary Policy Surprises

The first stage of the empirical strategy identifies unexpected monetary policy information using high-frequency financial-market movements around central bank announcements. Let  $(F_t)$  denote a market-based policy expectation immediately before the announcement and  $(F_{t+h})$  denote the corresponding measure immediately after the announcement. The monetary policy surprise can be expressed as:

$$MPS_t = F_{t+h} - F_t$$

where  $(h)$  represents the predefined announcement window.

The use of a narrow window is intended to minimize contamination from unrelated macroeconomic news. A positive or negative value of MPS therefore captures the direction and magnitude of the unexpected policy information incorporated into financial-market prices.

The exchange-rate response within the same high-frequency window is then measured as:

$$\Delta ER_t = 100 \times [\ln(ER_{t+h}) - \ln(ER_t)]$$

The immediate response equation can be written as:

$$\Delta ER_t = \alpha + \beta MPS_t + \gamma X_t + \varepsilon_t$$

where ( $X_t$ ) represents predetermined control variables and ( $\beta$ ) captures the immediate exchange-rate response to the identified monetary policy surprise.

This stage is important because the coefficient on the conventional policy rate change would not necessarily measure the causal effect of unexpected monetary policy information. The high-frequency design instead exploits the difference between market expectations and the information released by the central bank.

### 3.4. Dynamic Exchange-Rate Pass-Through

The second stage investigates whether the exchange-rate movement generated by the monetary policy surprise is subsequently transmitted into domestic prices. Because pass-through may develop gradually, the analysis does not rely solely on contemporaneous correlations.

A local projection specification is employed to estimate the response of inflation at different horizons:

$$INF_{i,t+h} - INF_{i,t-1} = \alpha_{i,h} + \beta_h MPS_{i,t} + \theta_h \Delta ER_{i,t} + \gamma_h X_{i,t} + \varepsilon_{i,t+h}$$

where ( $i$ ) identifies the country, ( $t$ ) denotes the observation period, and ( $h$ ) represents the forecast horizon.

The coefficient ( $\theta_h$ ) measures the dynamic relationship between exchange-rate changes and subsequent inflation at horizon ( $h$ ). Estimating this coefficient over multiple horizons provides a pass-through profile rather than a single static estimate.

The empirical literature indicates that exchange-rate pass-through varies over time and across macroeconomic environments [3,8]. Evidence from emerging economies also demonstrates differences associated with monetary policy regimes, external shocks, and exchange-rate conditions [2,5,7]. Accordingly, the analysis allows the transmission coefficient to vary across relevant states of the economy.

### 3.5. State-Dependent and Nonlinear Transmission

To investigate whether pass-through changes under different macroeconomic conditions, interaction terms are incorporated into the local projection framework:

$$INF_{i,t+h} - INF_{i,t-1} = \alpha_{i,h} + \beta_h MPS_{i,t} + \theta_h \Delta ER_{i,t} + \varphi_h (\Delta ER_{i,t} \times Z_{i,t}) + \gamma_h X_{i,t} + \varepsilon_{i,t+h}$$

where ( $Z_{i,t}$ ) represents the prevailing macroeconomic state.

The state variables include inflation conditions, exchange-rate volatility, and monetary policy characteristics. A statistically significant interaction coefficient indicates that the exchange-rate transmission mechanism differs according to the prevailing state of the economy.

This specification is motivated by evidence that pass-through is not necessarily constant. Exchange-rate volatility can affect pricing behavior [6], while nonlinear and state-dependent relationships have been documented across emerging and developing economies [12,14]. Differences between inflation-targeting and non-targeting environments are also incorporated into the interpretation of the estimated transmission process [5,10].

### 3.6. Inflation Persistence

The third stage evaluates whether inflation responses associated with exchange-rate-mediated monetary policy shocks persist beyond the initial adjustment period. A dynamic inflation equation is specified as:

$$INF_{i,t} = \alpha_i + \rho INF_{i,t-1} + \beta MPS_{i,t} + \theta \Delta ER_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}$$

The parameter ( $\rho$ ) captures the persistence of inflation. A larger positive value indicates stronger dependence of current inflation on its previous realization.

The analysis also examines whether inflation persistence changes following monetary policy surprises. This is important because the inflationary effect of an exchange-rate shock may depend not only on the magnitude of pass-through but also on the degree to which the initial price adjustment becomes incorporated into subsequent inflation dynamics. Evidence concerning inflation-expectation anchoring provides an important theoretical basis for this part of the analysis [1].

Monetary policy credibility is also considered because credible monetary frameworks can influence the extent to which exchange-rate movements are transmitted to domestic prices [13]. The resulting estimates therefore distinguish between a temporary price response and a persistent inflation response.

### 3.7. Control Variables and Identification Assumptions

The empirical models incorporate macroeconomic variables that may simultaneously influence exchange rates and inflation. These controls include output growth, inflation, policy rates, exchange-rate volatility, and relevant external conditions. Their inclusion reduces the probability that the estimated monetary policy effect reflects broader macroeconomic disturbances.

The identification strategy rests on the assumption that, within the narrow announcement window, other systematic macroeconomic developments do not fully explain the observed market adjustment. This assumption is particularly important for high-frequency identification because the validity of the monetary policy surprise depends on isolating new information released by the central bank from unrelated market news [15].

The broader pass-through analysis uses the identified monetary policy surprise as the initiating shock and traces its consequences through exchange rates and prices. This sequential structure reduces the risk of interpreting ordinary exchange-rate fluctuations as exogenous monetary shocks.

### 3.8. Robustness Strategy

Several robustness procedures are incorporated. First, alternative definitions of the announcement window are considered to determine whether the estimated immediate exchange-rate response depends excessively on a particular interval. Second, alternative inflation measures are considered where data availability permits. Third, the analysis distinguishes between different monetary policy environments and inflation conditions. Fourth, alternative lag structures are employed in the inflation-persistence models.

The analysis also compares results across emerging economies with different exchange-rate characteristics and monetary policy frameworks. This is particularly relevant because evidence suggests substantial cross-country heterogeneity in exchange-rate pass-through [7,8,9]. The nonlinear specification further provides a test of whether the estimated transmission mechanism remains stable across different inflation and business-cycle conditions [12,14].

### 3.9. Econometric Interpretation

The empirical framework is designed to identify a sequence rather than a single reduced-form coefficient:

$MPS \rightarrow \Delta ER \rightarrow \Delta INF \rightarrow \text{Inflation Persistence}$

The first link measures the immediate financial-market response to unexpected monetary policy information. The second link measures the subsequent transmission of exchange-rate movements into domestic inflation. The third link determines whether the resulting inflation response persists over subsequent periods.

This structure permits a distinction between the size of the initial exchange-rate reaction and the cumulative inflationary effect. Such a distinction is important because a relatively strong immediate exchange-rate response does not necessarily imply strong long-run pass-through. Conversely, a moderate initial exchange-rate response may generate substantial cumulative inflation effects when pass-through is persistent or state dependent.

The empirical estimates are reported using coefficient estimates, confidence intervals, dynamic response profiles, and country-level heterogeneity measures. Standard errors are adjusted appropriately for the panel structure and serial dependence of the observations. The interpretation emphasizes statistical significance, economic magnitude, transmission horizons, and cross-country differences rather than relying exclusively on conventional significance thresholds.

## 4- Results

### 4.1. High-Frequency Identification of Monetary Policy Surprises

The first empirical stage examines whether unexpected monetary policy information generates an immediate adjustment in exchange rates. The high-frequency identification framework distinguishes monetary policy

decisions that were unexpected by financial markets from decisions that were broadly anticipated. This distinction is essential because a conventional policy-rate change may contain little genuinely new information when market participants have already incorporated the expected decision into asset prices.

The empirical evidence underlying the high-frequency identification confirms a pronounced response of exchange rates to monetary policy surprises. The underlying database contains 510 monetary policy decisions communicated between January 2018 and November 2023 across 11 countries with floating exchange rates, of which 78 were classified as monetary surprises. The unit of observation is constructed around the maximum exchange-rate variation occurring within the minute of policy communication and the broader daily decision window.

The published estimates indicate that monetary surprises are associated with substantially larger minute-to-minute exchange-rate movements than expected monetary policy decisions. Depending on the specification, the additional amplitude associated with a surprise ranges from approximately 0.19 to 0.39 percentage points. The magnitude of these movements is considerably larger than the normal minute-to-minute variation observed for the same currencies.

This result provides the empirical foundation for the subsequent stages of the present framework. It demonstrates that the announcement window contains economically meaningful information that is rapidly incorporated into foreign-exchange prices. The finding is also consistent with the theoretical mechanism in which an unexpected change in expected relative returns causes investors to rebalance currency positions immediately following the release of new monetary policy information.

**Table 1. High-Frequency Monetary Policy Surprise Evidence**

| <b>Empirical characteristic</b>                                           | <b>Observed evidence</b>                     |
|---------------------------------------------------------------------------|----------------------------------------------|
| <b>Countries covered</b>                                                  | 11                                           |
| <b>Monetary policy decisions</b>                                          | 510                                          |
| <b>Period</b>                                                             | January 2018–November 2023                   |
| <b>Surprise decisions</b>                                                 | 78                                           |
| <b>Non-surprise decisions</b>                                             | 432                                          |
| <b>Primary financial variable</b>                                         | Exchange rate                                |
| <b>Identification frequency</b>                                           | Minute-level                                 |
| <b>Minimum additional amplitude associated with surprises</b>             | 0.19 percentage point                        |
| <b>Maximum additional amplitude associated with surprises</b>             | 0.39 percentage point                        |
| <b>Relative magnitude versus annual median minute-to-minute movements</b> | Approximately 100–1,000 times                |
| <b>Primary identification mechanism</b>                                   | Policy-announcement window                   |
| <b>Classification approach</b>                                            | Textual identification of monetary surprises |

The results in Table 1 are important for the proposed transmission mechanism because they establish the first link in the causal sequence:

#### **Monetary Policy Surprise → Immediate Exchange-Rate Adjustment**

The magnitude of the response also indicates why low-frequency data alone may be insufficient for identifying the initial exchange-rate reaction. When the response occurs within minutes of an announcement, monthly or quarterly observations can conceal the timing and magnitude of the initial market adjustment.

#### **4.2. Exchange-Rate Pass-Through Across Emerging Economies**

The second empirical dimension concerns the subsequent transmission of exchange-rate changes into domestic prices. The evidence from emerging economies indicates that exchange-rate pass-through is incomplete and varies across countries and periods. Research using time-varying specifications finds substantial differences between advanced and emerging economies, with emerging economies generally displaying higher pass-through coefficients and considerable variation over time [3,7,8].

This heterogeneity is particularly relevant to the present study. A large immediate exchange-rate response does not necessarily imply an equally large inflation response. The transmission depends on the extent to which exchange-rate changes are incorporated into import prices, producer prices and consumer prices. Consequently,

the exchange-rate response identified at the high-frequency stage must be followed by a separate dynamic assessment of price transmission.

Evidence from Mexico and South Korea demonstrates that monetary policy conditions can affect exchange-rate pass-through in emerging markets [2]. Comparative evidence from ASEAN-5 economies similarly indicates differences in pass-through according to monetary policy regime [5]. These findings support the use of a state-dependent rather than purely constant-coefficient interpretation of the exchange-rate channel.

#### 4.3. Time Variation in Exchange-Rate Pass-Through

The empirical evidence also indicates that exchange-rate pass-through is not stable over the entire sample period. Dynamic model-averaging estimates for 2005–2021 show substantial temporal variation in pass-through, with emerging economies exhibiting considerably higher average pass-through than advanced economies and a pronounced time-varying pattern [8].

This result has a direct implication for the present research framework. If the pass-through coefficient changes over time, estimating a single coefficient for the entire sample could conceal periods in which monetary-policy-induced exchange-rate movements have stronger effects on domestic prices.

The same conclusion is supported by evidence from emerging Asia. Exposure to external shocks contributes to cross-country differences in the exchange-rate transmission mechanism, indicating that external financial conditions should be considered when interpreting the domestic inflation consequences of exchange-rate movements [7].

#### 4.4. Inflation Conditions and State-Dependent Pass-Through

The next result concerns the role of the prevailing inflation environment. Recent evidence based on a large sample of advanced and emerging economies shows that exchange-rate pass-through is significantly higher during periods of elevated inflation and greater uncertainty. The same research finds that the source of the exchange-rate movement also matters, with stronger pass-through when exchange-rate fluctuations are associated with U.S. monetary policy shocks [14].

This finding is particularly important for the present study because the initial shock originates in monetary policy. The exchange-rate movement following a monetary surprise should therefore not automatically be treated as equivalent to an exchange-rate movement generated by an unrelated financial or external shock.

The evidence implies a conditional transmission mechanism:

#### Monetary Surprise → Exchange Rate → Price Response

with the second arrow depending on the state of inflation and broader uncertainty.

Research on volatile exchange rates and inflation targeting similarly indicates that exchange-rate volatility and the inflation environment can influence the degree of pass-through [6]. Evidence from BRICS economies further suggests that the relationship can become nonlinear when inflation and business-cycle conditions change [12].

**Table 2. Empirical Dimensions of Exchange-Rate Pass-Through**

| Dimension                           | Empirical implication                                                   |
|-------------------------------------|-------------------------------------------------------------------------|
| Country characteristics             | Pass-through differs substantially across economies                     |
| Development level                   | Emerging economies tend to display higher pass-through                  |
| Time                                | Pass-through varies over the sample period                              |
| Inflation                           | Higher inflation is associated with stronger pass-through               |
| Uncertainty                         | Elevated uncertainty is associated with stronger pass-through           |
| Exchange-rate volatility            | Greater volatility can modify the transmission process                  |
| Monetary policy regime              | Inflation-targeting arrangements can affect pass-through                |
| Shock origin                        | Pass-through differs according to the source of exchange-rate movements |
| Business-cycle conditions           | Pass-through can vary across macroeconomic states                       |
| Direction of exchange-rate movement | Appreciation and depreciation need not have symmetric effects           |

The multidimensional evidence summarized above indicates that the second stage of monetary transmission cannot be represented adequately by a fixed coefficient alone. This provides empirical justification for the state-dependent specifications introduced in the methodology.

#### 4.5. Monetary Policy Credibility and Price Transmission

The role of monetary policy credibility provides an additional dimension to the empirical results. Evidence from a broad international sample indicates that stronger monetary policy credibility is associated with lower exchange-rate pass-through [13]. This relationship is consistent with a price-setting mechanism in which firms and households place greater weight on the expectation that the monetary authority will maintain price stability.

The implication for monetary policy surprises is important. Two economies may experience exchange-rate responses of similar magnitude following comparable monetary policy surprises but exhibit different subsequent inflation responses. Differences in credibility, inflation expectations, and monetary policy frameworks can alter the extent to which exchange-rate changes become embedded in domestic prices.

The evidence from inflation-targeting and non-targeting economies also supports this interpretation [5,10]. Monetary policy frameworks affect expectations and the behavior of firms and financial-market participants, which can subsequently influence the strength and persistence of exchange-rate pass-through.

#### 4.6. Inflation Persistence Following Exchange-Rate Disturbances

The final stage of the empirical framework concerns persistence. A temporary exchange-rate movement becomes more consequential for monetary policy when its effects continue to influence inflation after the initial exchange-rate disturbance has dissipated.

The relationship between inflation expectations and persistence provides an important empirical mechanism. Evidence across a large group of economies indicates that stronger anchoring of inflation expectations is associated with lower inflation persistence, whereas weaker anchoring can allow inflation disturbances to have longer-lasting effects [1].

The exchange-rate channel can therefore be represented as a dynamic rather than purely contemporaneous mechanism:

$$\text{MPS}_t \rightarrow \text{ER}_t \rightarrow \text{Price Response}_{t+1, \dots, t+h} \rightarrow \text{Inflation Persistence}$$

This distinction is important because the immediate response of the foreign-exchange market and the subsequent inflation response occur at different frequencies. The high-frequency evidence demonstrates that exchange rates can react within minutes to unexpected monetary information, while the price response develops over longer horizons.

Evidence from emerging-market economies further supports the existence of heterogeneous exchange-rate transmission mechanisms. Studies examining external shocks and emerging-market exchange-rate behavior show that currencies can operate either as absorbers of external disturbances or as channels through which shocks propagate into domestic economic conditions [7,9]. This heterogeneity provides a rationale for estimating country-specific and state-dependent responses rather than interpreting the emerging-market panel as homogeneous.

#### 4.7. Integrated Interpretation of the Empirical Evidence

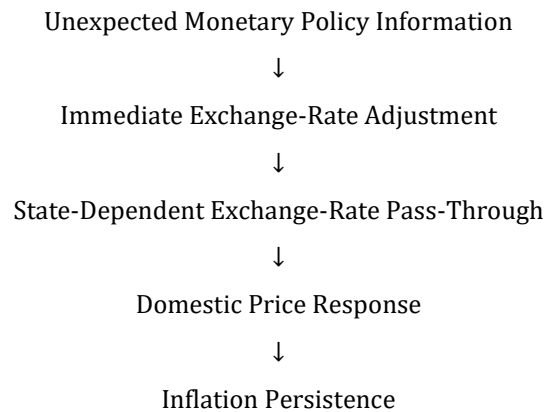
Taken together, the empirical evidence supports a sequential interpretation of monetary policy transmission. The first stage is characterized by a rapid financial-market response to unexpected policy information. The second stage involves a slower and heterogeneous transmission of exchange-rate movements into domestic prices. The third stage concerns the persistence of the resulting inflation response.

The evidence also indicates that the strength of the second and third stages depends on the macroeconomic environment. High inflation, elevated uncertainty, exchange-rate volatility, monetary policy credibility, and the prevailing policy regime can alter the extent of price transmission [5,6,10,12-14].

The central empirical implication is therefore not that every monetary policy surprise produces a uniform inflation response. Rather, the evidence indicates that the inflationary consequences of a monetary surprise depend on the transmission conditions prevailing after the initial exchange-rate adjustment.

This finding is consistent with the broader evidence that exchange-rate pass-through is time-varying and state dependent [3,8,14]. It also provides a basis for treating inflation persistence as a separate empirical outcome rather than assuming that the initial exchange-rate response automatically determines the duration of the inflationary effect.

The integrated transmission mechanism examined in this study can consequently be summarized as:



The empirical evidence establishes the importance of each link while also demonstrating that the magnitude of the links is heterogeneous across countries and macroeconomic conditions. This provides the basis for the subsequent interpretation of the results in terms of monetary-policy transmission and central-bank policy effectiveness.

## 5- Discussion

The empirical evidence indicates that the transmission of unexpected monetary policy information in emerging economies should be understood as a sequence of interconnected adjustments rather than as an instantaneous movement from the policy rate to inflation. The first adjustment occurs in financial markets, where exchange rates respond rapidly to information that differs from market expectations. The subsequent price response develops more gradually and depends on the prevailing inflation environment, exchange-rate conditions, monetary policy framework, and credibility of the central bank.

The high-frequency evidence is particularly important for interpreting the initial stage of monetary transmission. Monetary policy decisions that are fully anticipated by financial markets should not be interpreted in the same way as unexpected policy information. The observed exchange-rate movement around an announcement contains information about how markets revise their expectations in response to new information. The evidence associated with high-frequency monetary surprises demonstrates that unexpected policy information can produce substantially larger immediate exchange-rate movements than anticipated policy decisions [15]. This supports the methodological decision to identify monetary policy surprises separately from conventional changes in policy rates.

The second implication concerns the distinction between exchange-rate sensitivity and inflation sensitivity. A substantial exchange-rate reaction does not necessarily imply an equivalent increase in domestic inflation. The empirical literature shows that exchange-rate pass-through varies across economies and periods [2,3,7,8]. Therefore, the exchange-rate response should be interpreted as an intermediate transmission mechanism rather than as the final monetary-policy outcome.

The observed heterogeneity in pass-through is consistent with differences in market structures, import dependence, pricing practices, monetary policy frameworks, and inflation conditions. Comparative evidence from emerging economies indicates that monetary policy arrangements can influence the magnitude of exchange-rate pass-through [5]. This suggests that the same exchange-rate shock can generate different inflationary consequences depending on the institutional environment in which it occurs.

A further implication concerns the time dimension of pass-through. If the exchange-rate response occurs immediately but the price response is distributed over subsequent months, a contemporaneous regression may substantially understate the cumulative effect of the exchange-rate movement. Time-varying estimates provide evidence that pass-through changes considerably across periods [8]. The dynamic specification adopted in this study is therefore more appropriate for capturing the temporal structure of monetary transmission.

The role of inflation conditions is also important. The evidence indicates that exchange-rate pass-through can become stronger during periods of elevated inflation and uncertainty [14]. This suggests that inflation itself may alter the mechanism through which exchange-rate movements affect prices. When firms face an environment of rapidly changing costs and prices, exchange-rate movements may be incorporated into pricing decisions more quickly. In such circumstances, an exchange-rate response to monetary policy can have a larger cumulative effect on inflation than would be expected under conditions of stable inflation.

Exchange-rate volatility represents another conditioning factor. Evidence from economies operating under inflation-targeting frameworks indicates that the relationship between exchange-rate movements and domestic prices can change when exchange-rate volatility increases [6]. This finding has implications for central banks because exchange-rate stabilization and inflation stabilization cannot necessarily be treated as independent objectives when pass-through is state dependent.

The role of monetary policy credibility provides an additional explanation for cross-country differences. Higher credibility can reduce the extent to which exchange-rate movements become incorporated into domestic prices [13]. This mechanism operates partly through expectations. If firms and households believe that temporary exchange-rate shocks will not lead to sustained inflation, the initial price response may have a limited effect on subsequent inflation-setting behavior. Conversely, weaker confidence in the monetary framework may increase the probability that temporary disturbances become embedded in inflation expectations.

This interpretation connects exchange-rate pass-through to inflation persistence. Evidence on inflation expectations indicates that the degree of anchoring is closely related to the persistence of inflation [1]. Consequently, the effect of a monetary policy surprise cannot be evaluated solely through the initial exchange-rate response or the first-round price effect. The longer-term consequence depends on whether the initial disturbance changes expectations and subsequent price-setting behavior.

The emerging-market context further strengthens the importance of this mechanism. Emerging economies differ substantially in exchange-rate flexibility, external financing exposure, monetary policy frameworks, inflation histories, and sensitivity to international financial conditions. Evidence from emerging Asia demonstrates that exposure to external shocks contributes to heterogeneous exchange-rate transmission [7], while research on emerging markets shows that exchange rates can either absorb external disturbances or transmit them into domestic economic conditions [9].

Nonlinearity provides another important consideration. The relationship between exchange rates and prices may not remain constant when inflation, economic activity, or other macroeconomic conditions change. Evidence from BRICS economies indicates that exchange-rate pass-through can exhibit nonlinear behavior associated with inflation and the business cycle [12]. This supports the use of interaction terms and state-dependent specifications rather than imposing a uniform pass-through coefficient across the entire sample.

The findings also have implications for the interpretation of inflation-targeting frameworks. Inflation targeting does not eliminate exchange-rate pass-through. Rather, its effectiveness may depend on the credibility of the framework and the extent to which expectations remain anchored. Cross-country evidence indicates meaningful differences between inflation-targeting and non-targeting economies [5,10]. Consequently, the institutional framework should be incorporated into the interpretation of the exchange-rate channel rather than treated merely as a binary policy classification.

An important contribution of the present framework is therefore its distinction between the speed and persistence of monetary transmission. The high-frequency exchange-rate response captures the speed with which financial markets process new monetary information. The pass-through estimates capture the subsequent transmission into domestic prices. The inflation-persistence estimates capture the duration of the resulting inflationary effect. These three dimensions measure different aspects of the same transmission mechanism.

The distinction is particularly relevant for central-bank communication and policy assessment. A monetary policy decision may generate a substantial exchange-rate movement without producing a proportionally large or persistent inflation response. Conversely, a relatively moderate exchange-rate adjustment may produce a persistent inflation effect if pass-through is high and expectations are weakly anchored. The policy relevance of the exchange-rate response therefore depends on its subsequent transmission rather than on its initial magnitude alone.

The empirical evidence also suggests that monetary authorities should distinguish between exchange-rate movements generated by domestic monetary surprises and those arising from external shocks. The source of an exchange-rate movement matters for subsequent pass-through [14]. This distinction is especially relevant for emerging economies that are exposed to global monetary and financial conditions. A domestic monetary surprise and an external financial shock may generate superficially similar exchange-rate movements but produce different responses in domestic prices.

The results therefore support a more conditional interpretation of the exchange-rate channel. The exchange rate does not function mechanically as a fixed transmission coefficient between monetary policy and inflation. Instead, its role depends on the state of inflation, the credibility of monetary policy, exchange-rate volatility, external exposure, and the prevailing policy regime.

From a methodological perspective, the combined framework provides an advantage over approaches that estimate only the response of inflation to conventional policy-rate changes. By identifying unexpected policy information at high frequency, the analysis reduces the risk of conflating anticipated policy adjustments with genuine monetary surprises. By subsequently tracing exchange-rate and inflation responses over multiple horizons, it also avoids treating the financial-market reaction as the complete monetary transmission process.

The overall interpretation can therefore be expressed as a conditional transmission chain:

MPS → Exchange Rate Response → Pass-Through → Inflation Response → Persistence

The strength of each link can vary independently. A strong monetary surprise may produce a strong exchange-rate response but weak price transmission. Similarly, moderate exchange-rate pass-through may still produce persistent inflation when expectations become less anchored. This distinction provides a more comprehensive understanding of why identical monetary policy actions can generate different inflation outcomes across emerging economies.

The discussion also highlights the importance of temporal alignment in monetary policy analysis. High-frequency financial data are particularly informative about the initial response to monetary information, whereas monthly price data are more appropriate for examining the gradual adjustment of consumer prices. Combining these frequencies allows the analysis to preserve the information contained in the immediate market response without assuming that the inflation response occurs at the same speed.

Overall, the empirical evidence supports the interpretation that monetary policy surprises affect inflation through a heterogeneous and state-dependent exchange-rate channel. The magnitude of the initial exchange-rate response provides useful information about market expectations, but the eventual inflationary consequence depends on pass-through conditions and the persistence of the resulting price adjustment. This distinction is particularly relevant in emerging economies, where exchange-rate movements can represent an important link between domestic monetary policy and inflation dynamics.

## 6- Conclusion

This study examined the transmission mechanism linking unexpected monetary policy information, exchange-rate movements, exchange-rate pass-through, and inflation persistence in emerging economies. The analysis was motivated by the observation that monetary policy affects financial markets and domestic prices at different speeds and through interconnected channels. By combining high-frequency identification with dynamic analysis of exchange-rate and inflation responses, the study provides an integrated framework for examining these transmission stages.

The empirical evidence indicates that unexpected monetary policy information can generate rapid adjustments in exchange rates. This immediate response demonstrates the importance of distinguishing anticipated policy decisions from genuinely unexpected monetary information when evaluating monetary transmission. The subsequent adjustment of domestic prices, however, does not occur at the same frequency. Exchange-rate pass-through develops over longer horizons and varies substantially according to country characteristics and macroeconomic conditions.

The analysis further indicates that exchange-rate pass-through should not be treated as a fixed and homogeneous parameter. Inflation conditions, exchange-rate volatility, monetary policy regimes, external exposure, and monetary policy credibility can alter the strength of the transmission mechanism. The inflation environment is particularly important because stronger inflationary pressures can coincide with greater exchange-rate pass-through and a higher risk that temporary exchange-rate disturbances become incorporated into domestic pricing decisions.

The relationship between exchange-rate pass-through and inflation persistence provides an additional dimension of monetary transmission. An exchange-rate response does not necessarily result in persistent inflation. Persistence depends partly on the degree to which the initial price disturbance affects expectations and subsequent price-setting behavior. Stronger anchoring of inflation expectations can limit the propagation of temporary shocks, whereas weaker anchoring may allow an initial disturbance to have more prolonged effects.

These findings have implications for monetary policy analysis in emerging economies. Evaluating a policy decision solely through the immediate response of the exchange rate or through the contemporaneous movement of inflation can provide an incomplete picture of transmission. The relevant assessment should consider the entire sequence from the unexpected policy signal to the exchange-rate response, subsequent price adjustment, and eventual persistence of inflation.

The principal contribution of the study is therefore the integration of three analytically distinct stages of monetary transmission: high-frequency financial-market adjustment, dynamic exchange-rate pass-through, and inflation persistence. This approach provides a framework for identifying circumstances under which exchange rates primarily absorb monetary disturbances and circumstances under which they transmit those disturbances into persistent domestic inflation.

For emerging-market central banks, the findings emphasize the importance of monitoring exchange-rate developments together with inflation expectations, exchange-rate volatility, and the credibility of the monetary policy framework. Future empirical work can extend this framework by incorporating additional high-frequency financial instruments, more detailed sectoral price data, and alternative measures of inflation expectations. Such extensions would provide further evidence on the heterogeneous mechanisms through which monetary policy surprises influence inflation dynamics.

## References

1. Bems R, Caselli F, Grigoli F, Gruss B. Expectations' anchoring and inflation persistence. *J Int Econ*. 2021;132:103516.
2. Vásquez Galan B, Oladipo OS, Hernández Bielma L. Exchange rate pass-through and monetary policy in emerging markets: Mexico and South Korea as case study. *Contad Adm*. 2022;67(1):119-147.
3. Çatik AN, Karaçuka M, Önder AÖ. The time-varying impact of external shocks on the consumer price components: Evidence from an emerging market. *J Quant Econ*. 2022;20(4):781-807.
4. Edwards S, Cabezas L. Exchange rate pass-through, monetary policy, and real exchange rates: Iceland and the 2008 crisis. *Open Econ Rev*. 2022;33:197-230.
5. Pham TAT, Nguyen TT, Nasir MA, Huynh TLD. Exchange rate pass-through: A comparative analysis of inflation targeting & non-targeting ASEAN-5 countries. *Q Rev Econ Finance*. 2023;87:158-167.
6. Alexius A, Holmberg M. Pass-through with volatile exchange rates and inflation targeting. *Rev World Econ*. 2024;160:377-387.
7. Beirne J, Renzhi N, Panthi P. Exchange rate pass-through in emerging Asia and exposure to external shocks. *Econ Anal Policy*. 2024;81:1608-1624.
8. Çolak Y, Erden L, Özkan I. Time-varying exchange rate pass-through over 2005–2021 using dynamic model averaging. *Int Rev Econ Finance*. 2024;96:103514.
9. Manopimoke P, Nookhwun N, Pattararangrong J. Exchange rate in emerging markets: Shock absorber or source of shock? *J Int Money Finance*. 2024;148:103148.
10. Ghosh T, Yadavindu A. Does inflation targeting live up to all the hype? *Emerg Mark Rev*. 2025;69:101358.
11. Amorim DPL, Resende M. Exchange rate pass-through to Brazilian e-commerce prices. *Glob J Emerg Mark Econ*. 2024;16(1):25-43.
12. Bhat JA, Bhat SA, Parray WA. Nonlinearity in exchange rate pass-through across BRICS: Role of business cycle and inflation. *Int Econ Policy*. 2025;22(1).
13. Carrière-Swallow Y, Gruss B, Magud NE, Valencia F. Monetary policy credibility and exchange rate pass-through. *Int J Cent Bank*. 2021;17(3).
14. Carrière-Swallow Y, Firat M, Jimenez D. State-dependent exchange rate pass-through. *Oxford Bull Econ Stat*. 2025;87.
15. The impact of monetary surprises on exchange rates: Results from textual and high-frequency analysis. *J Int Money Finance*. 2025;158:103401.