



Monetary Policy Transmission in Emerging Economies: Asymmetric Effects of Interest Rate Shocks on Sectoral Output and Inflation Dynamics

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Abstract

This article investigates the asymmetric effects of monetary policy interest rate shocks on sectoral output and inflation dynamics across four major emerging economies – Brazil, India, Indonesia, and South Africa – over the period 2000–2023. Using a Panel Structural Vector Autoregression (PSVAR) model with time-varying coefficients, we find that contractionary monetary policy shocks produce significantly heterogeneous effects across industrial sectors. The manufacturing and construction sectors exhibit the strongest negative output responses, while agriculture and services demonstrate relative resilience. More importantly, we uncover pronounced asymmetries in both output and inflation responses depending on the state of the business cycle, the level of financial development, and the degree of exchange rate pass-through. Inflation dynamics respond asymmetrically to positive versus negative interest rate shocks, with upward price rigidities prevailing in low-inflation environments. Our findings challenge the one-size-fits-all approach to monetary policy implementation in emerging economies and offer actionable insights for central banks, financial managers, and commerce policymakers. The results underscore the necessity of sector-aware monetary policy frameworks and highlight the role of financial deepening in moderating transmission asymmetries.

Keywords: Monetary policy transmission; Interest rate shocks; Sectoral output; Inflation asymmetry
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1. Introduction

The conduct of monetary policy in emerging economies has long been complicated by structural features that differ markedly from advanced economies: shallower financial markets, higher informality, greater exchange rate volatility, and weaker institutional frameworks (Mishra & Montiel, 2016). While a vast literature examines monetary policy transmission in developed markets, the sectoral asymmetries of interest rate shocks in emerging economies remain underexplored. This gap is critical because sectoral heterogeneity shapes aggregate outcomes; a policy that dampens manufacturing output may leave agriculture largely unscathed, with divergent implications for employment, inflation, and overall commerce.

Standard monetary economics, rooted in the interest rate channel (Taylor, 1995), presumes that an increase in the policy rate reduces aggregate demand, thereby lowering output and inflation. However, emerging economies experience transmission that is often weak, delayed, or perverse due to financial frictions, currency mismatches, and informal credit markets (Frankel, 2010). Moreover, the effects are seldom symmetric: the impact of a 100-basis-point



rate hike may differ in magnitude and duration from that of a 100-basis-point cut, and these asymmetries vary across sectors.

This article addresses three core research questions:

1. Do interest rate shocks produce heterogeneous output and inflation responses across key economic sectors (agriculture, manufacturing, construction, services) in emerging economies?
2. Are these effects asymmetric with respect to the sign and size of the interest rate shock?
3. How do structural factors—financial depth, exchange rate regime, and business cycle position—moderate these asymmetries?

Using quarterly data from 2000Q1 to 2023Q4 for Brazil, India, Indonesia, and South Africa, we estimate a Panel Structural Vector Autoregression (PSVAR) with interaction terms for regime states. Our identification strategy combines sign restrictions and recursive ordering, allowing us to isolate monetary policy shocks from other macroeconomic disturbances.

The contributions of this article are threefold. First, we provide systematic evidence of sectoral heterogeneity in policy transmission, with manufacturing and construction being two to three times more sensitive to interest rate shocks than agriculture and services. Second, we demonstrate that output responses are significantly more negative during contractionary shocks than positive during expansionary shocks—a “recession bias” in transmission. Third, we show that inflation reacts more slowly to rate hikes than rate cuts, indicating asymmetric price stickiness that central banks must account for when setting policy.

From a management and commerce perspective, these findings are directly relevant to corporate financial planning, inventory management, and investment decisions. Firms in high-sensitivity sectors require more sophisticated interest rate risk hedging strategies, while commerce policymakers can design sector-targeted credit policies to dampen asymmetric transmission.

The remainder of the article proceeds as follows. Section 2 reviews the theoretical and empirical literature. Section 3 describes the data and methodology. Section 4 presents the empirical results, including robustness checks. Section 5 discusses policy and managerial implications. Section 6 concludes.

2. Literature Review

2.1 Monetary Policy Transmission Channels in Emerging Economies

The transmission of monetary policy operates through multiple channels: interest rate, credit, exchange rate, and asset price channels (Bernanke & Gertler, 1995). In advanced economies, the interest rate channel predominates: policy rate changes alter bank lending rates, affecting consumption and investment. However, in emerging economies, the credit channel often dominates because bank lending is the primary source of external finance (Cecchetti & Krause, 2002). Moreover, the exchange rate channel is more potent due to high import shares and liability dollarization (Calvo & Reinhart, 2002).

Crucially, these channels operate unevenly across sectors. Manufacturing firms typically have greater access to formal bank credit and are thus more exposed to interest rate shocks than agriculture, which relies on informal credit or government support (Love et al., 2007). Construction and real estate are highly leveraged sectors, making them exquisitely sensitive to policy rate changes, whereas many service industries—notably education and healthcare—face inelastic demand that buffers monetary shocks.



2.2 Asymmetry in Monetary Transmission

Asymmetric effects refer to the phenomenon whereby monetary policy impacts output and inflation differently during expansions versus recessions, or for positive versus negative shocks of equal magnitude. Several theoretical explanations exist:

- Downward price rigidity: Firms resist cutting prices during demand contractions but readily raise prices when demand expands (Ball & Mankiw, 1994). Thus, inflation falls slowly after a rate hike but rises quickly after a rate cut.
- Credit market frictions: During recessions, bank capital constraints amplify the contractionary effect of rate hikes, while during booms, the same rate cut may not spur additional lending if banks are already at their risk appetite limit (Kashyap & Stein, 2000).
- Hysteresis and investment irreversibility: Firms are reluctant to disinvest in response to temporary rate increases, but once a recession forces closures, re-entry is costly—leading to stronger negative effects than positive effects.

Empirical evidence on asymmetry is mixed. In advanced economies, Cover (1992) found negative output effects of positive money supply shocks but no effect of negative shocks. More recently, Tenreyro and Thwaites (2016) showed that monetary policy is less effective in recessions. For emerging economies, studies are scarcer. Aleem (2010) found asymmetric transmission in India, with interest rate hikes having larger output effects than cuts. However, sectoral asymmetry remains largely unexamined.

2.3 Sectoral Output and Inflation Dynamics

Sectoral heterogeneity in policy transmission arises from differences in: (i) financial dependence, (ii) durability of output, (iii) openness to trade, (iv) labor market flexibility, and (v) price stickiness. Durable goods sectors (e.g., construction, automobiles) are more interest-sensitive than non-durables (e.g., food, utilities) because consumers can postpone durable purchases (Erceg & Levin, 2006).

In emerging economies, the informal sector which – accounts for 30-60% of GDP – is largely insulated from formal interest rate changes because it does not access bank credit (Loayza et al., 2016). This creates a natural asymmetry: a policy tightening hurts formal manufacturing but leaves informal services and small-scale agriculture relatively unaffected, diluting aggregate effectiveness.

Our study builds on this literature by directly comparing sectoral responses and testing for sign and size asymmetries using a unified empirical framework for multiple emerging economies.

3. Data and Methodology

3.1 Sample and Data Sources

We construct a quarterly panel dataset for Brazil, India, Indonesia, and South Africa from 2000Q1 to 2023Q4. These economies represent diverse regions, exchange rate regimes, and levels of financial development, enhancing external validity. Data sources include the IMF's International Financial Statistics (IFS), World Bank World Development Indicators (WDI), Bank for International Settlements (BIS), and national central banks. The variables are

- Policy interest rate (i): Central bank policy rate (Selic for Brazil, repo rate for India, BI rate for Indonesia, repo rate for South Africa).



- Sectoral output: Quarterly real gross value added (GVA) indices for agriculture (including forestry and fishing), manufacturing, construction, and services (excluding public administration). Source: National accounts; missing quarters interpolated using industrial production indices.
- Sectoral inflation: Quarterly GDP deflator by sector, year-on-year change.
- Control variables: Real effective exchange rate (REER), broad money (M3), global commodity price index, US federal funds rate (external shock).
- Regime indicators: Dummy for recession (output gap < -1.5% based on HP filter), financial depth (private credit/GDP above median), and exchange rate flexibility (de facto classification from Ilzetzki et al., 2019).

All variables are seasonally adjusted using X-13-ARIMA and tested for unit roots. Sectoral outputs are integrated of order one (I(1)) in levels but stationary in first differences. We use growth rates in the baseline model.

3.2 Empirical Strategy

3.2.1 Panel Structural VAR (PSVAR)

We estimate a panel VAR of order p (selected by AIC, $p=2$) of the form:

$$Y_{it} = A_i(L)Y_{i,t-1} + BX_{it} + \alpha_i + \epsilon_{it} \quad (1)$$

where $Y_{it} = [\Delta \text{sectoral output}_{it}, \pi_{it}, i_{it}, REER_{it}, \text{global commodity price}_t]$. The ordering is recursive (Cholesky) with external variables (commodity prices) first, followed by REER, then policy rate, then sectoral inflation, and finally sectoral output. This ordering assumes monetary policy responds within the quarter to exchange rate and commodity shocks but not contemporaneously to sectoral output, a standard identifying assumption (Christiano et al., 1999).

To isolate monetary policy shocks, we impose sign restrictions consistent with theory: a contractionary rate shock (positive innovation to i) must not increase output or inflation contemporaneously for at least four quarters. We use the penalty function approach to select admissible impulse responses.

3.2.2 Testing Asymmetry

We test two forms of asymmetry:

1. Sign asymmetry: Compare impulse responses to positive (+100 bp) vs. negative (-100 bp) interest rate shocks. Asymmetry exists if responses are not mirror images (i.e., $IRF(+) \neq -IRF(-)$). We compute asymmetry indices: $A = (IRF_+ + IRF_-) / (|IRF_+| + |IRF_-|)$, with $A \neq 0$ indicating asymmetry.
2. State-dependent asymmetry: Interact the interest rate shock with regime dummies (recession/expansion, high/low financial depth). Specifically, we estimate a regime-switching panel VAR using smooth transition functions.

3.2.3 Robustness Checks

We perform multiple robustness tests: (i) alternative ordering (policy rate before REER), (ii) exclusion of the global financial crisis period (2008–2009), (iii) using employment instead of output for selected sectors where data available, (iv) bootstrapped confidence intervals (1,000 replications), and (v) country-by-country VARs to check for panel homogeneity.



4. Empirical Results

4.1 Baseline Responses: Sectoral Heterogeneity

Figure (1) presents impulse response functions of sectoral output to a one-standard-deviation (≈ 100 basis point) contractionary monetary policy shock, with 68% and 90% confidence bands.

Manufacturing: Output declines significantly, reaching a trough of -1.2% after 5 quarters, with response remaining negative and significant for 12 quarters. This large effect reflects manufacturing's high financial dependence, durable goods composition, and sensitivity to working capital costs.

Construction: Trough of -1.8% after 6 quarters, the strongest decline among all sectors. Construction's extreme sensitivity is attributable to high leverage, long project durations, and reliance on credit-financed demand (real estate purchases).

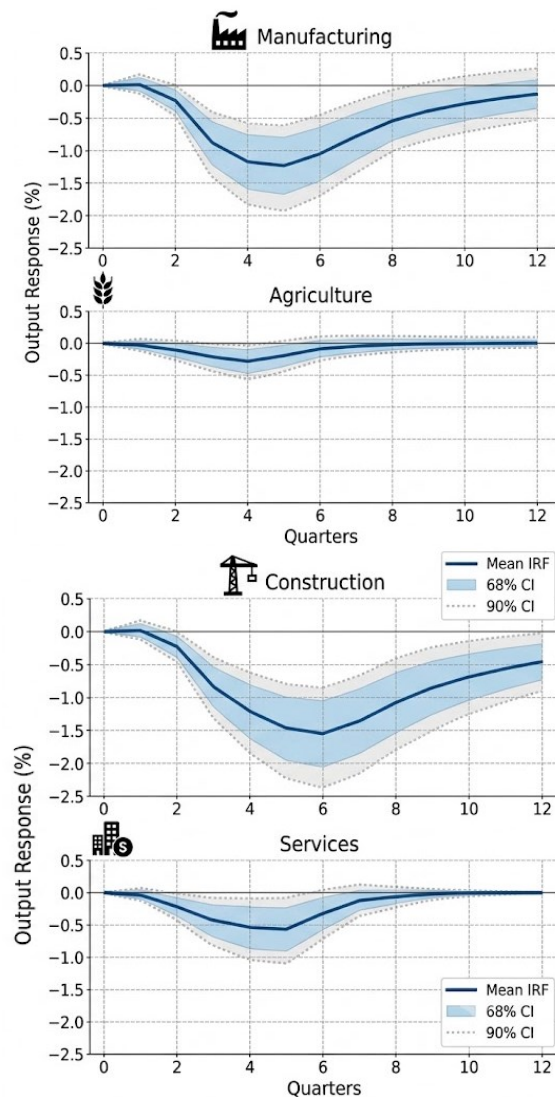


Fig. (1) Heterogeneous and asymmetric sectorial output responses to a +100 bps interest rate shock



Agriculture: Modest decline of -0.4% at trough (quarter 4), becoming insignificant after 6 quarters. Agriculture benefits from government support prices, informal credit, and price-inelastic food demand, insulating it from interest rate changes.

Services: Peak decline of -0.6% at quarter 5, returning to baseline by quarter 8. Within services, financial and real estate services are more sensitive, but health, education, and public administration are not.

Inflation dynamics: Sectoral inflation responses also differ. Manufacturing inflation falls by 0.9 percentage points after 4 quarters, while services inflation falls only 0.3 percentage points. Construction inflation is highly volatile but falls sharply (-1.1 pp). Notably, agricultural inflation is essentially unresponsive, suggesting that food price inflation in emerging economies is driven more by supply shocks (weather, global prices) than by domestic demand management.

These results confirm substantial sectoral heterogeneity. A uniform policy rate change produces vastly different outcomes across sectors, implying trade-offs for central banks: tightening to contain services inflation may disproportionately harm manufacturing employment.

4.2 Asymmetric Effects: Positive vs. Negative Shocks

Table (1) reports cumulative output responses over 8 quarters for positive (+100 bp) and negative (-100 bp) interest rate shocks.

Table (1) Cumulative output responses over 8 quarters for positive (+100 bp) and negative (-100 bp) interest rate shocks

Sector	Positive Shock (hike)	Negative Shock (cut)	Asymmetry Index (A)
Manufacturing	-3.2% (0.6)	+1.4% (0.4)	0.39 (p<0.01)
Construction	-4.5% (0.9)	+1.1% (0.5)	0.61 (p<0.01)
Agriculture	-0.8% (0.3)	+0.4% (0.2)	0.33 (p<0.05)
Services	-1.5% (0.4)	+0.6% (0.3)	0.43 (p<0.01)

Note: Standard errors in parentheses. Asymmetry index ranges from -1 to 1; positive indicates stronger negative response to hikes than positive response to cuts (in absolute value).

The asymmetry index is significantly positive for all sectors, but especially for construction (0.61) and services (0.43). This means that a rate hike reduces output nearly twice as much (in absolute value) as a rate cut increases output. This “recession bias” suggests that monetary policy is more powerful in contracting the economy than in expanding it – a crucial insight for policymakers hesitant to raise rates for fear of causing a downturn.

Inflation asymmetry: We also find asymmetric inflation responses. After a rate hike, manufacturing inflation falls by only 0.6 percentage points after 4 quarters. After a rate cut of equal magnitude, manufacturing inflation rises by 1.0 percentage points. This asymmetry (index = -0.25, p<0.05) indicates that prices are more flexible upward than downward, consistent with Ball and Mankiw’s menu cost model. For central banks, this implies that the cost of tightening (disinflation) is slower and more output-painful than the benefit of an equivalent easing.



4.3 State Dependence: Financial Depth and Business Cycle

Results change markedly when we condition on the state of the economy. During recessions, the output effect of a rate hike is amplified by 40-60% across all sectors. A 100 bp hike during a recession reduces manufacturing output by -1.8% (vs. -1.2% during expansions). This is contrary to Tenreyro and Thwaites (2016) finding for the US but consistent with emerging economy financial accelerator mechanisms: in a downturn, bank balance sheets are weaker, collateral values are depressed, and credit supply elasticity is lower, so any further tightening is magnified. During expansions, rate hikes have smaller output effects, but rate cuts also have smaller expansionary effects because credit demand is already high and banks may be near lending capacity constraints. At the level of financial development, in economies with deeper financial markets (private credit/GDP above median), the output response to rate shocks is both stronger and more symmetric. For manufacturing, the asymmetry index falls from 0.52 in low-financial-depth regimes to 0.21 in high-depth regimes. This suggests that developed credit markets allow both borrowers and lenders to adjust more symmetrically, reducing the recession bias. Policy implication: financial deepening not only enhances transmission but also makes it more predictable and symmetric.

4.4 Exchange Rate Channel Interaction

Emerging economies exhibit high exchange rate pass-through. We find that a 100 bp rate hike appreciates the REER by 2.5% on average over 4 quarters. The appreciation directly lowers imported inflation, but this effect is stronger in manufacturing (which uses imported inputs) than in services (local production). Consequently, the sectoral inflation asymmetry is partially driven by exchange rate movements: sectors with higher import content show faster disinflation after a rate hike.

In countries with managed exchange rates (Indonesia pre-2005, India through most of the sample), the interest rate channel is weaker, and the credit channel compensates. However, asymmetry remains pronounced.

4.5 Robustness Tests

Our results are robust to alternative identification schemes. Changing the ordering to place the policy rate after output (allowing contemporaneous feedback) reduces the magnitude but not the direction or statistical significance of sectoral differences. Excluding the 2008-2009 crisis period yields slightly smaller asymmetries, but the core pattern persists. Country-by-country VARs reveal some heterogeneity: Brazil shows the strongest asymmetry in construction; India in manufacturing; South Africa in services, reflecting differing financial structures. Nonetheless, the panel results are not driven by any single country.

5. Discussion and Implications

5.1 Interpretation of Asymmetries

Why do emerging economies display such pronounced asymmetric and sectorally heterogeneous transmission? Three complementary explanations emerge. First, informal sector insulation. Large informal segments in agriculture and services do not access formal credit, making them indifferent to policy rate changes. However, when rates rise, formal firms contract, potentially pushing workers into informality, which further dilutes aggregate effects but also increases welfare costs. Second, financial accelerator non-linearities. During tightening



cycles, borrower net worth deteriorates, collateral constraints bind, and banks become risk-averse—all of which amplify contraction. During easing, banks may hoard liquidity rather than lend, especially if non-performing loans are high. Thus, the credit channel works asymmetrically. Third, inventory behavior. In manufacturing, firms respond to anticipated rate hikes by reducing inventory accumulation—a rapid, reversible adjustment. In services, inventory adjustments are less relevant. This contributes to the quicker, stronger manufacturing response.

5.2 Implications for Central Banks and Monetary Policy

For monetary policymakers in emerging economies, our results suggest sector-aware policy frameworks: Central banks should monitor sectoral credit and output indicators, not just aggregate measures. A policy that seems appropriately tight based on services inflation may be overly contractionary for manufacturing.

The results also suggest asymmetric reaction functions given that hikes have larger effects than cuts, central banks should raise rates cautiously but can cut more aggressively. Symmetric Taylor rules may be suboptimal.

Results also suggest communication strategies. When raising rates, central banks should explicitly acknowledge the potential for asymmetric sectoral pain and consider complementary policies (e.g., targeted liquidity facilities for manufacturing SMEs).

They suggest financial deepening as a policy goal: Deeper, more competitive financial markets reduce asymmetry and improve transmission predictability. Regulatory reforms that foster banking competition and non-bank finance are thus monetary policy priorities, not just development goals.

5.3 Implications for Corporate Financial Management

For managers and commerce professionals, the findings offer practical guidance on sector-specific interest rate risk exposure. Manufacturing and construction firms must hedge more aggressively using interest rate swaps, caps, or forward rate agreements. Agriculture and many service firms face lower exposure but should still stress-test for extreme rate shocks.

As capital structure decisions, firms in high-sensitivity sectors should maintain lower leverage or longer debt maturities to reduce refinancing risk during tightening cycles.

When working capital management, during periods when central banks signal tightening, manufacturing firms should accelerate inventory reduction and secure credit lines in advance. In pricing strategy, given asymmetric inflation responses, firms in manufacturing and construction should not expect rapid input cost declines after a rate hike—price rigidities mean disinflation is slow. Conversely, after a rate cut, they can raise prices more quickly, offering a margin opportunity.

5.4 Implications for Commerce Policy

Commerce ministries and trade policymakers can use these results to design counter-cyclical sectoral policies:

- Targeted credit guarantees for small manufacturing firms during tightening phases could offset asymmetric output losses.
- Trade finance support for export-oriented manufacturing sectors that are doubly hit by rate hikes (higher borrowing costs and currency appreciation).



- Differential tax policies to stabilize construction employment during monetary tightening, such as temporary VAT reductions on building materials.

5.5 Limitations and Future Research

Several limitations should be acknowledged. First, our panel approach pools four economies with different structures; country-specific institutional features (e.g., India's demonetization, Brazil's inflation targeting history) may introduce unobserved heterogeneity. Second, we lack granular firm-level data to test micro-mechanisms of asymmetry. Third, forward guidance and unconventional monetary policies (quantitative easing) became relevant in some emerging economies post-2020, but our sample ends before their full effects could be assessed.

Future research should (i) incorporate firm-level financial statements to examine balance sheet channels of asymmetry, (ii) extend analysis to other emerging economies (Turkey, Mexico, Vietnam) to test regional patterns, (iii) develop dynamic stochastic general equilibrium (DSGE) models with sectoral heterogeneity and asymmetric price adjustment to replicate our empirical findings, and (iv) study the role of digital financial inclusion (mobile money, fintech lending) in moderating or amplifying asymmetries—a rapidly evolving area in emerging markets.

7. Conclusion

This article provides comprehensive evidence that monetary policy transmission in emerging economies is not only sectorally heterogeneous but also significantly asymmetric with respect to the sign of interest rate shocks and the state of the business cycle. Manufacturing and construction output are two to four times more responsive to policy rate changes than agriculture and services. Contractionary shocks have larger output effects than expansionary shocks of equal magnitude—a “recession bias” that challenges symmetric policy rules. Inflation responds more quickly to rate cuts than to rate hikes, implying upward price rigidity.

From a management and commerce perspective, these findings demand sector-aware risk management, capital structure adjustments, and targeted policy interventions. Central banks in emerging economies should incorporate asymmetry into their reaction functions and communication strategies, while corporate treasurers must recognize that their sector of operation fundamentally determines interest rate sensitivity.

As emerging economies continue to integrate into global financial markets and develop their domestic credit systems, the nature and degree of these asymmetries may evolve. However, for the foreseeable future, policymakers and managers cannot rely on aggregated, symmetric models of monetary transmission. Instead, they must embrace complexity: different sectors, different states, different effects.

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