ABSTRACT

This study undertakes an empirical examination of how exchange rate variations, import price behaviour and domestic inflation are interlinked causally for the Indian economy at the aggregate level during the period succeeding the economic reforms using data from official sources. The first key objective of this study is to systematically analyse the extant wisdom on exchange rate pass-through estimation in the Indian context. The second objective is to empirically estimate the quantitative relationship between exchange rate variations and domestic prices including the import prices with suitable econometric exercises in the Indian setting. Consequently, attention is also directed to the stability of the exchange rate pass-through relationship. The third key objective of this study is to investigate the macroeconomic factors affecting the observed pass-through within the open economy macroeconomics literature. The fourth motivation is to assess the determinants of aggregate import price variations and domestic inflation. The fifth impetus is to estimate whether there exists directional, size and composite asymmetries in the behaviour of the pass-through relationship in India. The final objective is to study the dynamic interactions of exchange rate, domestic prices and the real sector in India.

Chapter one provides the analytical foundations on the subject-matter by surveying the theory of exchange rate pass-through within both global and Indian perspectives. The fundamental motivations of the study are laid down in this chapter. The primary objectives and the key hypotheses to be tested are explored. The macroeconomic data environment of the study is pitched and the critical perspectives on macroeconomic measurements, their importance and pitfalls are elaborated. The chapter also explains the time period to be adopted for the empirical analysis and scrutinizes the rationale for adopting the same. The importance of the post-reforms period for macroeconomic analysis in general, and for the examination of exchange rate pass-through in particular, is established therein.

Chapter two substantiates the theoretical and empirical foundations of the present attempt by systematically exploring a large volume of evidence on the subject under consideration. First, the evidences at the international level that cut across cross-sections of nations, regions and other spaces are explored beginning from 1976 and till date. Second, the evidences in the Indian context are surveyed from 1996 onwards. A large body of literature is thereby summarized. Third, thematic

debates and perspectives that emerge from the review of evidences are explored while contextualizing the extant literature in the global context. Similarly, the key issues in the Indian context are addressed thereafter.

Chapter three provides the macroeconomic background and the broader analytical foundation for the empirics explored in later chapters. The issue of exchange rate pass-through is subsumed under the larger macroeconomic debates and dilemmas pertaining to diverse matters such as trade balance adjustment, fiscal management, monetary policy behaviour, and other allied matters. Hence, understanding the larger macroeconomic environment prevailing in India during the sample period is necessitated to contextualize the major economic developments with the empirical analysis which is to be conducted thereafter. By decomposing the entire period into five-yearly sub-periods, key macroeconomic developments in India, especially pertaining to inflation, monetary policy and the external sector are explored while also focusing on other important components in the macroeconomic story of India. Theoretical expectations on the nature of the exchange rate pass-through process are partly laid down through this chapter.

Chapters four and five address the first fundamental issue – namely the determination of the short-run pass-through effects of exchange rate variations with reference to aggregate import prices in India and domestic prices respectively. With regards to chapter four, a baseline model and an extended baseline perspective are employed to estimate the short-run and long-run price impacts of exchange rate. Thereafter, the sensitivity of the estimated pass-through coefficient to alternative specifications is also tested for. Irrespective of the horizon, exchange rate pass-through is found to be complete in case of the aggregate import prices. However, the quantum of pass-through contracted considerably and portrayed incompleteness when approached from the perspective of the bilateral exchange rate instead of the nominal effective exchange rate index. Short-run pass-through is evident to be larger than the long-run pass-through. The chapter also studied the determinants of the variations in the aggregate import prices in India since economic reforms. A host of demand and supply side variables from the domestic and external sectors were employed within the markup pricing framework on lines of Campa and Goldberg (2005) to examine the nature of aggregate import price variations in India. Demand pressures on aggregate imports emanating from real output growth showed a strong and sizeable impact on import prices. Thereafter, the external sector, as measured through the movements in the exchange rate, was found to be a prevalent source of import price inflation in India. The exchange rate channel was located to be active and robust in case of inflation being experienced in India's aggregate imports. The third major factor was found to be the global financial crisis which showed a negative impact on import prices, perhaps suggesting that the crisis led to a contraction of import demand along with a generalized slowdown in global trade which could have enabled the disinflationary tendencies of exchange rate during the crisis. Other important determinants included the world consumer price inflation indicating the phenomenon of 'cost pass-through' to India's importers emanating from the foreign firms.

Chapter four also examined the stability of the pass-through coefficient using the rolling regression and the Time-Varying Coefficients model on lines of Schlicht (2021). In case of the rolling regression approach, the pass-through remained complete and largely stable over time. However, from the perspective of the Varying-Coefficients model, the extent of pass-through showed considerable rise during the sample period, while slightly reversing its trend from 2009-10 onwards. The chapter also examined the factors shaping the behaviour of exchange rate's interrelations with aggregate import prices. Two approaches were utilized on this account. The first approach delved into an 'interaction variables' approach wherein the possible determinants of exchange rate pass-through were interacted with the exchange rate variable itself within the import price function. The second approach looked into this subject by studying the key macroeconomic forces shaping the stability of the pass-through coefficient over time. The first approach suggested that the lagged value of inflation, volatility in inflation, exchange rate volatility and trade openness were responsible for increasing the effects of exchange rate on import price inflation in India. The second approach suggested that movements in real output and the level of inflation were the primary drivers of the aggregate pass-through to imports.

Chapter five addresses the issues pertaining to the nexus between exchange rate alterations on domestic prices in India. The theoretical model in this chapter broadly emerges from the open economy backward-looking Phillips curve specification. Short-run pass-through was is found to be incomplete and the extent of incompleteness is observed to be sensitive to the exchange rate variable employed in the analysis. The nominal effective index showed a larger pass-through effect than the bilateral Rupee-US Dollar exchange rate. Pass-through is found to be larger in the long-run, whether looked from the perspective of the nominal effective index or the bilateral rate.

Thereafter, attention is directed to study the determinants of inflation in India within a parsimonious framework. Two baseline variants of the underlying theoretical model are employed for this task. The role of monetary policy remained dominant in shaping the temporal movements in aggregate local prices during the sample period. Across all specifications – whether emerging from the first or the second baseline model, monetary policy movements as measured by the growth in the nominal stock of broad money, remained the dominant driver of aggregate domestic inflation in India. The second significant factor in driving the inflationary momentum in India was located to be the persistence in inflation as captured by the lagged term of inflation itself. The third important factor was located to be the inflationary impact of currency variations, i.e. the pass-through coefficient. Thereafter, the stability of the pass-through coefficient was scrutinised and it was inferred that the extent of price impact from exchange rate on domestic prices remained stable throughout the sample period – whether looked from the angle of rolling regression model or from the viewpoint of the time-varying coefficients model.

A crucial debate in the pass-through literature is the dynamic interactions between exchange rate and domestic prices. This matter is approached through the Structural Vector Auto Regression approach. Improving upon the extant approaches, the present study incorporated the real sector into the pass-through process. Short and long run pass-through, and the dynamic elasticity of domestic prices to exchange rate variations are empirically assessed. The behaviour of pass-through to the wholesale and consumer prices at the aggregate level are also explored. Furthermore, the dynamic interconnections between wholesale price inflation and consumer price inflation are evaluated. Pass-through to wholesale price inflation was found to be consistently lower than the pass-through to aggregate consumer prices. Moreover the dynamic elasticity of pass-through after four quarters also revealed the same finding wherein the dynamic impact of exchange rate shock on consumer prices was more than double its impact on wholesale prices. Similarly, the long-run pass-through to wholesale and consume prices was also explored through the estimated impulse response functions. Results indicated that the impact from exchange rate shock dissipated after twelve quarters in case of the wholesale prices, while it took considerably longer time for the shock to wear-off its impact from consumer prices. Retail markets were found to be responding with much more persistence that the wholesale markets and the finding that there was a large and rapid transmission of the exchange rate impulses from wholesale to retail markets further attested these observations.

The subject-matter of asymmetric exchange rate pass-through is investigated in chapter six. Three major issues are addressed – namely that of directional, size, and composite asymmetries. The analysis is conducted separately for pass-through to the aggregate import price, as well as to aggregate domestic price. With regards to the pass-through to aggregate import price variations, it was found that the pass-through from depreciation was complete while the pass-through from appreciations was more-than-complete. Evidence seemed to be pointing towards some form of 'hysteresis effect' at play. Appreciations were found to be inducing larger pass-through than depreciation in the case of import prices. Furthermore, smaller changes were found to be associated with larger pass-through as compared to larger changes, and the finding was robust to alternative definitions of the threshold size. The findings on the size asymmetry in import price pass-through was found to be consistent across all the three approaches. With regards to the issue of composite asymmetry, the findings were not strongly evident, though indications were obtained that small depreciations have had a larger pass-through than other forms of asymmetries.

On account of the asymmetries in pass-through to domestic inflation, evidence suggested that depreciations in exchange rate had a higher pass-through as compared to appreciations. This finding was consistent with the findings in the recent literature within the Indian scenario. Inferences were robust to alternative empirical methodologies. With regards to size asymmetries, small changes were found to have higher pass-through than large changes in the exchange rate, though the 'incompleteness hypothesis' was maintained in both the scenarios. This inference was not consistent, however, between the two empirical approaches employed. While the dummy variable approach indicated smaller exchange rate changes as inducing a slightly higher pass-through than larger changes, the polynomials approach suggested otherwise. Lastly, composite asymmetry in pass-through to domestic prices was scrutinized and evidence depicted that large depreciations had the highest impact on domestic prices while large appreciations had the lowest impact.

Lastly, chapter seven provides a concluding perspective on the key findings, the interconnections across the major inferences, the caveats associated with the study, summary on important debates and some policy implications. The last chapter is organized in a manner that links the empirics with the underlying motivations and objectives highlighted in earlier chapters. The expectations and the actual findings are contrasted to drive home the essence of how exchange rate pass-through has behaved in the Indian context at the aggregate level since the reforms were unleashed in the early 1990s.