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Exchange Rate Pass-through Under Inflation Targeting in Transition Economies

This paper assesses whether the exchange rate pass-through in transition economies changed due to inflation targeting and the ongoing crisis. The economies of Central and South Eastern Europe and the Commonwealth of Independent States, of which nine are inflation targeters, are examined over the period 1993-2011. Results suggest that the exchange rate pass-through in transition economies is generally quite high. However, inflation targeters achieved a pass-through that was nearly four times lower and maintained it during the crisis due to their acquired monetary credibility. On the other hand, for non-inflation targeters, the pass-through increased during the crisis, likely due to temporary exchange rate shocks being perceived by agents as permanent.

Inflation targeting as a monetary regime began in the developed world, but over the last 20 years, many developing and transition economies have also adopted this framework. Since then, inflation targeting has resulted in lower inflation levels and persistence, and it will likely survive the ongoing crisis.[1] However, critics have pointed out that inflation targeting is too focused on inflation, overlooking other worthy goals like employment, and that it will likely fail to ameliorate the ongoing crisis.[2] In addition, inflation targeting in developing economies faces some distinct challenges like institutional weaknesses, high currency substitution, fiscal and financial dominance, and the high exchange rate pass-through.[3] However, Mishkin argues that a country should not necessarily resolve these weaknesses prior to adopting inflation targeting, but rather should improve them afterwards.[4] Indeed, many developing countries adopted inflation targeting after turbulence in the foreign exchange market, forgoing the chance to improve the economic environment prior to inflation targeting.[5]

The exchange rate pass-through is defined as a change in domestic prices resulting from a unitary change in the nominal exchange rate. Many studies have documented the high exchange rate pass-through to prices in developing economies.[6] This would imply that monetary policy might be ineffective in combating "imported" inflation, i.e. the central bank would increase the interest rate, which would suffocate the real activity but would not bring inflation down.[7] So the high pass-through may jeopardise the attainment of the inflation target and, under larger supply shocks, may be accompanied by a protracted recession. This is the source of fear shown lately by Stiglitz[8] and Frankel[9] that inflation targeting will certainly fail, as it was not designed to manage "imported" inflation due to the high pass-through.

1 For a summary, see A. Angeriz, P. Arestis: Inflation Targeting: Assessing the Evidence, in: J.S.L. McCombie, R.C. Gonzalez (eds.): Issues in Finance and Monetary Policy, 2007, Palgrave Macmillan.

2 See e.g. B.M. Friedman: The Use and Meaning of Words in Central Banking: Inflation Targeting, Credibility, and Transparency, in: P. Mizen (ed.): Essays in Honour of Charles Goodhart, Vol. 1, Northampton, MA 2003, Elgar; J. Stiglitz: The Failure of Inflation Targeting, 2008, http://www.project-syndicate.org/commentary/the-failure-of-inflation-targeting; J. Frankel: The Death of Inflation Targeting, 2012, http://www.project-syndicate.org/commentary/the-death-of-inflation-targeting.

3 A. Fraga, I. Goldfajn, A. Minella: Inflation Targeting in Emerging Market Economies, NBER Eighteenth Annual Conference on Macroeconomics, Washington 2004, pp. 365-400; J. Aizenman, M. Hutchison, I. Noy: Inflation Targeting and Real Exchange Rates in Emerging Markets, in: World Development, Vol. 39, No. 5, 2011, pp. 712-724.

4 F.S. Mishkin: Why the Fed Should Adopt Inflation Targeting, in: International Finance, Vol. 7, No. 1, 2004, pp. 117-127.

5 M. Petreski: A Markov Switch to Inflation Targeting in Emerging Market Peggers with a Focus on the Czech Republic, Poland and Hungary, in: Focus on European Economic Integration, Vol. 3, No. 11, 2011, pp. 57-75.

6 K. Schmidt-Hebbel, M. Tapia: Inflation targeting in Chile, in: The North American Journal of Economics and Finance, Vol. 13, No. 2, 2002, pp. 125-146; K. Schmidt-Hebbel, A. Werner: Inflation Targeting in Brazil, Chile and Mexico: performance, credibility and the exchange rate, Central Bank of Chile, WP171, 2002.

7 A. Fraga et al., op. cit.

8 J. Stiglitz, op. cit.

9 J. Frankel, op. cit.

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While the literature on the exchange rate pass-through is quite exhaustive,[10] the literature on the pass-through under inflation targeting has evoked less attention.[11] No empirical research has been done for transition economies, and there had been no attempt to put the issue in the context of the crisis in order to test Stiglitz's claim that inflation targeting is destined to fail.[12]

The objective of this paper is to assess the exchange rate pass-through in a set of transition economies in Central and South Eastern Europe and the Commonwealth of Independent States (CIS) in the light of inflation targeting and the ongoing economic crisis.

Literature overview

The literature on the exchange rate pass-through is quite comprehensive: an early survey of both the theoretical and empirical literature is done by Menon,[13] while more recent contributions include, for example, Gust et al.[14] and An and Wang.[15] One strand of this literature, arguably led by Klaus Schmidt-Hebbel, showed that the exchange rate pass-through is higher in emerging economies, likely due to the lower credibility of their central banks, leading agents to perceive temporary exchange rate shocks as permanent.[16] The literature on the pass-through under inflation targeting has received less attention.[17] This, though, does not reflect the importance of the issue in emerging economies: having a higher pass-through than developed economies may jeopardise the achievement of their inflation target, as Stiglitz[18] and Frankel[19] have pointed out.

However, research suggests that the exchange rate pass-through considerably declined under inflation targeting, mainly because of the credibility gained by monetary authorities under inflation targeting[20] and the generally more favourable economic environment in both advanced and emerging economies. The former claim is largely supported by Taylor's argument that in a low-inflation environment – achieved by inflation targeting – firms expect inflation deviations to be less persistent and would therefore pass on less of an exchange rate-induced increase in the price of imported inputs to their selling prices.[21]

The empirical literature shows that inflation targeting helped to reduce inflation.[22] According to Taylor's hypothesis, this should have led to a reduction of the exchange rate pass-through.[23] Indeed, some argue that just before the current crisis and food price shocks, the low-inflation environment explained some of the pass-through reduction.[24] Others argue that the pass-through in emerging markets declined according to their development paths, which were associated with the changing composition of their imports.[25] Reyes ascribes the lower pass-through in inflation-targeting developing economies to substantial foreign exchange interventions, which likely reduced the correlation between inflation and the exchange rate.[26]

The empirical literature largely confirms these notions. Coulibaly and Kempf investigate the reaction of the exchange rate pass-through to prices in inflation-targeting and non-targeting countries in a panel VAR framework.[27] They find that the adoption of inflation targeting reduces the pass-through to consumer prices, import prices and producer prices, while no significant change in the pass-through could be identified for

10 For a survey, see J. Menon: Exchange Rate Pass-Through, in: Journal of Economic Surveys, Vol. 9, No. 2, 1995, pp. 197-231; more recent contributions include, e.g. C. Gust, S. Leduc, R. Vigfusson: Trade integration, competition, and the decline in exchange-rate pass-through, in: Journal of Monetary Economics, Vol. 57, No. 3, 2010, pp. 309-324; L. An, J. Wang: Exchange Rate Pass-Through: Evidence Based on Vector Autoregression with Sign Restrictions, in: Open Economies Review, Vol. 23, No. 2, 2012, pp. 359-380.

11 F.S. Mishkin, M. Savastano: Monetary policy strategies for Latin America, in: Journal of Development Economics, Vol. 66, No. 2, 2001, pp. 415-444; J.E. Gagnon, J. Ihrig: Monetary policy and exchange rate pass-through, in: International Journal of Finance & Economics, Vol. 9, No. 4, 2004, pp. 315-338; R.P. Nogueira: Inflation Targeting and the Role of Exchange Rate Pass-Through, University of Kent Discussion Paper, No. 0602, 2006.

12 J. Stiglitz, op. cit.

13 J. Menon, op. cit.

14 C. Gust, S. Leduc, R. Vigfusson, op. cit.

15 L. An, J. Wang, op. cit.

16 K. Schmidt-Hebbel, M. Tapia, op. cit.; K. Schmidt-Hebbel, A. Werner, op. cit.

17 F.S. Mishkin, M. Savastano, op. cit.; J.E. Gagnon, J. Ihrig, op. cit.; R.P. Nogueira, op. cit.

18 J. Stiglitz, op. cit.

19 J. Frankel, op. cit.

20 F.S. Mishkin, M. Savastano, op. cit.; K. Schmidt-Hebbel, A. Werner, op. cit.

21 J. Taylor: Low Inflation, Pass-Through, and the Pricing Power of Firms, in: European Economic Review, Vol. 44, No. 7, 2000, pp. 1389-1408.

22 See C.E.S. Gonçalves, J.M. Salles: Inflation targeting in emerging economies: What do the data say?, in: Journal of Development Economics, Vol. 85, No. 1-2, pp. 312-318, for some evidence on emerging markets.

23 J. Taylor, op. cit.

24 Ibid.; E.U. Choudhri, D.S. Hakura: Exchange rate pass-through to domestic prices: Does the inflationary environment matter?, in: Journal of International Money and Finance, Vol. 25, No. 4, 2006, pp. 614-639; A. Baqueiro, A.D. de León, A. Torres: Fear of Floating or Fear of Inflation? The role of the exchange rate pass-through, BIS Papers No. 19, 2003.

25 See e.g. J.M. Campa, L.S. Goldberg: Exchange Rate Pass-Through into Import Prices, in: Review of Economics and Statistics, Vol. 87, No. 4, 2005, pp. 679-690.

26 J. Reyes: Inflation Targeting in Emerging Countries: Modeling Exchange Rate Issues, in: Journal of Business and Economics Research, Vol. 1, No. 4, 2003, pp. 61-74; J. Reyes: Exchange Rate Pass-through Effects and Inflation Targeting in Emerging Economies: What is the Relationship?, in: Review of International Economics, Vol. 15, No. 3, 2007, pp. 538-559.

27 D. Coulibaly, H. Kempf: Does Inflation Targeting Decrease Exchange Rate Pass-through in Emerging Countries?, Banque de France Working Paper, 2011.

non-targeters. In addition, they find that the contribution of exchange rate shocks to price fluctuations in targeting countries has decreased since the adoption of inflation targeting, while the contribution of exchange rate shocks to price fluctuations in non-targeting countries has increased. Similarly, Nogueira,[28] using the ARDL approach finds that the pass-through is higher in emerging economies than in developed economies and that it has decreased since the adoption of inflation targeting. However, no research has investigated how the pass-through has evolved in inflation-targeting economies during the current crisis. This contribution aims to fill this gap.

Methodology and data

In order to assess the exchange rate pass-through in transition economies, we design the following regression:

$$\pi_{it} = \alpha + \beta_1 y_{it} + \beta_2 e_{it} + u_i + \varepsilon_{it} \quad (1)$$

where π_{it} stands for inflation, y_{it} denotes GDP growth, e_{it} is the exchange rate depreciation, u_i is a country-specific error term, and ε_{it} is the idiosyncratic error which is assumed to be independently and identically distributed. With certain variations, this estimation model is commonly used in the respective literature.[29] Our main interest is to estimate the β_2 coefficient, which measures the response of domestic inflation to a unitary change in the exchange rate. As the change in the exchange rate is here taken as a depreciation, we would expect a positive β_2 coefficient.

Since our objective is to assess the exchange rate pass-through under inflation targeting and during the crisis, we need to augment Equation 1 with three level-shift and three slope-shift (interaction) dummy variables, as shown in Table 1.

In addition to these dummies, we add the log of the imports value as a robustness check, as argued by Ganapolsky and Vilan,[30] to capture the impact of changes in foreign producer costs on the local currency price of imports.

The econometric challenge in estimating Equation 1 is that of reverse causality. For instance, if inflation and exchange rate depreciation are measured contemporaneously, a positive coefficient on the latter can be obtained because it affects inflation positively, but also because higher inflation leads to depreciation. Reverse causality can lead to wrong inference. We therefore consider an instrumental variables (IV) estimation approach where past values of the variables suspected of endogeneity are used as instruments to correct for it.

Table 1
Level-shift and interaction dummies

Level-shift dummy	Interaction dummy	Measuring
Inflation targeting	Inflation targeting · exchange rate depreciation	Inflation performance and exchange rate pass-through under inflation targeting as compared to non-inflation-targeting transition economies
Crisis	Crisis · exchange rate depreciation	Inflation performance and exchange rate pass-through during the global crisis as compared to the non-crisis period
Inflation targeting · crisis	Inflation targeting · crisis · exchange rate depreciation	Inflation performance and exchange rate pass-through under inflation targeting during the crisis as compared to non-inflation-targeting transition economies and to the non-crisis period

Source: Drafted by the author.

The model is estimated for 24 economies of Central and South Eastern Europe and the CIS: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Serbia, the Slovak Republic, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, the Kyrgyz Republic, Moldova, the Russian Federation and Ukraine. Annual data over the period 1993-2011 are used, covering the entire transition experience of these countries. The source is the IMF. Inflation targeters, according to the IMF, are Albania, Armenia, the Czech Republic, Georgia, Hungary, Poland, Romania, the Russian Federation and Serbia. The global crisis has been noted over the period 2009-2011, since these countries first felt it at the end of 2008.

Estimation results and discussion

The estimation results are given in Table 2. Note that the table reports the cumulative coefficients for the pass-through effect, along with their cumulative significance. The cumulative coefficients are obtained by adding up the respective coefficients,[31] while the cumulative significance is obtained from the Wald test. All statistics presented are robust to heteroscedasticity and autocorrelation. According to the Hansen test, instruments are valid in all specifications. Column 1 presents the basic specification, while columns 2 to 4 add the

28 R.P. Nogueira, op. cit.

29 I. Goldfajn, S. Werlang: The pass-through from depreciation to inflation: a panel study, Central Bank of Brazil WP05, 2000; J. Reyes: Inflation Targeting in Emerging Countries …, op. cit.

30 E. Ganapolsky, D.S. Vilan: Buy foreign while you can: the cheap dollar and exchange rate pass-through, in: Economic Review of Federal Reserve Bank of Atlanta, Vol. 90, No. 3, 2005, pp. 15-35.

31 For example, the coefficient on "depreciation under inflation targeting" is in fact a sum of the coefficients on "depreciation" and on "depreciation under inflation targeting" obtained in the specification.

groups of level-shift and interaction dummies as specified in Table 1. Column 5 adds the log of imports. The coefficients remain relatively stable across the different model specifications.

Results suggest that the exchange rate pass-through in transition economies is quite high, ranging from a 0.7 to 1.1 percentage point increase in inflation when the exchange rate depreciates by one percentage point. The finding is consistent with the argumentation and findings in Schmidt-Hebbel and Werner.[32] Inflation targeting contributed to reducing inflation by about eight percentage points on average compared to non-inflation-targeting transition economies, while the pass-through under inflation targeting declined to about 0.2 percentage points, suggesting about a fourfold reduction. This can certainly be ascribed to the acquired monetary credibility and better management of shocks under inflation targeting and is largely in line with the findings of earlier studies.[33]

As concerns over the resistance of inflation targeting to shocks are pertinent to the current crisis, columns 3 to 5 add the crisis effect, highlighting the contribution of the current paper to the sparsity of knowledge. Not surprisingly, although inflation dwindles during the global crisis, reflecting the largely depressed prices, the pass-through soars to almost double the levels seen before the crisis (see column 3). Eichengreen argues that the high pass-through is due to the lack of credibility of the monetary authorities, which leads to a general belief among economic agents that temporary exchange rate shocks during a crisis are of a permanent nature.[34] This argumentation is not unfamiliar to the non-inflation-targeting transition economies, as a majority of them maintain rigid exchange rates, precisely due to the lack of credibility of their central banks and the fear of floating.[35] That this result might be stemming from the non-inflation-targeting transition economies is evident from column 4, whereby the effect for inflation-targeting countries during the crisis is estimated separately (so that the crisis dummies represent the effect for non-inflation-targeting economies) and is of the same magnitude as in column 3. Interestingly, the pass-through for the inflation-targeting economies during the crisis is of similar magnitude to the whole period under inflation targeting: there is no statistical difference, according to the respective test statistics (not shown but available on request). On the other hand, the difference between the pass-through during crisis in inflation-targeting and non-inflation-targeting transition economies is statistically significant at the five per cent level.

Table 2
Estimation results

Dependent variable: Inflation	(1)	(2)	(3)	(4)	(5)
Growth	-0.415	0.147	-0.013	-0.089	-0.010
Depreciation	1.137***	0.974***	0.759***	0.678**	0.705***
Inflation targeting		-8.099***	-4.943*	-7.914**	-7.856**
Depreciation under inflation targeting		0.255**	0.242***	0.221*	0.073*
Crisis			-4.358*	-7.109**	-7.002***
Depreciation during crisis			1.328***	1.337**	1.348***
Inflation targeting during the crisis				-7.363**	-8.504*
Depreciation under inflation targeting during the crisis				0.183***	0.099***
Log of imports					1.934*
Observations	238	238	238	238	238
Hansen test	0.6078	0.3435	0.2572	0.2096	0.5823

Note: *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Source: Own calculation based on IMF data.

These results are further confirmed in column 5, which shows a positive effect of imports upon inflation, reflecting the positive impact of the changes in foreign producer costs on the local currency price of imports. The inclusion of this variable somewhat reduces the pass-through under inflation targeting and under inflation targeting during the crisis, but the coefficients are similar in magnitude to those shown in columns 3 and 5.

Conclusion

The findings of this study suggest that the exchange rate pass-through in transition economies is quite high. However, inflation targeters achieved a pass-through that was nearly four times lower, and they maintained it during the global crisis. It was likely due to their acquired monetary credibility, but also due to factors such as the changing composition of imports, exchange rate monitoring and intervention in the foreign exchange market when necessary. On the other hand, for non-inflation targeters, the pass-through increased during the crisis. This increase is likely due to temporary exchange rate shocks being perceived by agents as permanent.

32 K. Schmidt-Hebbel, A. Werner, op. cit.
33 D. Coulibaly, H. Kempf, op. cit.; R.P. Nogueira, op. cit.
34 B. Eichengreen: Can emerging markets float? Should they inflation target?, Central Bank of Brazil WP36, 2002.
35 G.A. Calvo, C.M. Reinhart: Fear of Floating, in: The Quarterly Journal of Economics, Vol. 117, No. 2, 2002, pp. 379-408.