Exchange Rate Pass-through to Prices

The recent international financial turbulence, intensified since September, has been causing significant exchange rate movements. The American dollar increased, between the end of August and the end of November, 16% as compared to the Euro, 18% against the Sterling Pound, 31% against the Australian dollar and 41% as compared to the Real. The increase in the risk aversion and the capital repatriation has also been strengthening the Japanese Yen, which grew 12% as compared to the American dollar and 24% when compared to the Euro, in the same period. In this context, it is natural that monetary authorities worry about the possibility of pass-through of the exchange rate change to prices. Given the relevance of the present subject, this box aims at showing a summary of the recent literature on this topic.

Monacelli (2008) identifies three different layers of pass-through, according to the degree of sensitivity of domestic prices to international prices. The pass-through to the prices of imported products at the dock or in the border would be high, but not complete (not unity). In the case of economies of the Organization for Economic Co-operation and Development (OECD), Campa and Goldberg (2005) estimate an average pass-through, in this layer, of 0.46 p.p. in the short term (a quarter) and of 0.64 p.p. in the long term. The pass-through to imported products prices in retail would be low, as the pass-through to consumer price index, which would depend on the participation of imported goods in the consumption basket and on the elasticity of substitution.

Mishkin (2008) emphasizes the role played by better monetary systems in the latest decades as a factor of reduction of the exchange rate pass-through. In contexts of more stable and predictable monetary policies, with anchored inflation expectations, the pass-through would tend to be smaller. He presents some reasons for an incomplete pass-through even at the dock: the pricing-to-market practice (importers would adjust the coefficient of pass-through in markets regarded as strategic); local currency pricing (firms define the price in the currency of the countries to which they are exporting); price rigidity (incomplete pass-through in the short term, but complete in the long term); and international production (when different phases of production occur in different countries, the cost of the product will comprise variations of diverse currencies).

Besides, one should underscore that part of the distribution costs is domestic, which contributes to a smaller pass-through. However, referring to imported goods which are used in the production process, the pass-through depends on the degree of substitutability among imported inputs and domestically produced inputs (Engel, 2002).

Generally, literature points to the reduction of the exchange rate pass-through in the latest decades. Gagnon and Ihrig (2004), for example, estimated pass-through coefficients for a broad set of mature economies from 1971 to 2002, and found an average pass-through of about 0.2 p.p. However, when re-estimate the coefficient based on samples that include only periods of more stable monetary policy, initiated in the 1980s in most of the countries, they found an average value of 0.05 p.p.

Several explanations have been offered for the reduction of the pass-through coefficients. Campa and Goldberg (2005) found evidence that the main factor in the reduction of the pass-through import prices in developed countries was the change in the composition of imports, with an increase of the share of manufactured goods, whose prices tend to have a lower pass-through, and corresponding reduction of the share of raw materials. Other explanations emphasize the role played by the price rigidity of differentiated goods. Mishkin (2008), as mentioned above, highlights the improvement of the monetary

policy quality, which would be responsible for the strengthening of inflation expectations anchoring, as a fundamental factor:

> "*...a stable monetary policy – supported by an institutional framework that allows the central bank to pursue a policy independent of fiscal considerations and political pressures – effectively removes an important potential source of high pass-through of exchange rate changes to consumer prices... an important corollary is that low exchange rate pass-through will persist only so long as the monetary authorities continue to ratify the public's expectations that they will continue to respond aggressively to shocks that have potentially persistent adverse effects on inflation*"

Empirical works have been seeking to identify factors which impacted the foreign exchange pass-through. Goldfajn and Werland (2000) used a sample of 71 countries, in the period between 1980 and 1998, to assess to which extent different macroeconomic factors would explain the pass-through magnitude. The statistically more robust results point to the degree of initial valuation of the real exchange rate and the initial level of inflation as the main determinants. In this sense, the greater the initial valuation, against average or equilibrium rates, the smaller the pass-through. The justification is that, if the growth of the nominal exchange rate is only correcting a great disarray of the real exchange rate, the pressure for pass-through to prices will be lower. On the other hand, the greater the initial inflation the greater the pass-through will be, because a higher inflation is accompanied by a higher degree of inflation persistence. Taylor's (2000) explanation is based on the expectation of greater persistence of changes in costs and prices. Besides, in case of emerging market economies, a hypothesis would be the still high indexation level. Among the factors statistically less robust, the text in question highlights the output gap and the economy's degree of openness: the greater the gap (when the economy is heated), the greater the pass-through; the greater the openness, the greater the pass-through.

Correa and Minella (2006) investigated the presence of non-linear mechanisms of the exchange rate pass-through in Brazil, using a Phillips curve with threshold, for the period from the first quarter of 1995 to the fourth quarter of 2005. The estimates point to a greater pass-through to the market prices when the economy is more heated and when the exchange rate depreciation is higher than a certain value, than in episodes of modest depreciation or of exchange rate appreciation. Estimates updated with a sample that goes up to the end of the second quarter of 2008 do not show significant changes in the previous results.

One should note that, in this estimation, the exchange pass-through occurs with a lag of one quarter, and the output gap affects inflation with a lag of two quarters. The result is in line with the view that there are lags in the transmission mechanisms to inflation and that the exchange rate operates with a lower lag than the output gap. In this sense, see, for example, the box "Monetary Policy and Transmission Mechanism Lags" contained in the "Inflation Report" of September 2007. In this respect, one should note that estimates of vector autoregressive (VAR) and semi-structural models, on a monthly basis, to the Brazilian Economy, indicate that the impact on market prices is concentrated in the first three months, with slight predominance of the second one; from the fourth to the sixth month the impact would be slightly lower; and, in the two classes of models, after twelve months, the effect is practically over. We should consider, however, that the pass-through lag to the Broad National Consumer Price Index (IPCA) can be longer, taking into account that the monitored items respond with delay to the effect of exchange rate changes on the reference price index.

Burstein, Eichenbaum and Rebelo (2005) studied five episodes of significant exchange rate depreciation (including Brazil in 1999), which are accompanied by great decreases of the real exchange rate. The text traces a parallel between the role played by the price of non-tradable items and that of pure tradable items, which would have a greater change. According to these authors, generally, the literature makes a mistake when divides the price indices simply into prices of non-tradables and of tradables. The

reason is that the prices of tradable goods have two non-tradable important components: distribution costs (retail and wholesale services, marketing and publicity, and local distribution services) and local goods (defined as goods which are produced only to the domestic market).

In summary, in the prospective evaluation of the pass-through magnitude, we should take into account several factors, such as the inflation initial level, the current and expected degree of utilization of the production factors, the behavior of international inflation and the initial degree of real exchange rate appreciation. Furthermore, the literature strongly suggests that the degree of final pass-through depends, importantly, on the agents' perception of the monetary policy stance.

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