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| |  |  | | --- | --- | | Adjustment patterns to commodity terms-of-trade shocks: The role of exchange rate and international reserves policies[Joshua Aizenman](http://www.voxeu.org/index.php?q=node/1097) [Sebastian Edwards](http://www.voxeu.org/index.php?q=node/7524) [Daniel Riera-Crichton](http://www.voxeu.org/index.php?q=node/7523) 14 January 2012 *Last year’s surge in commodity prices was a reminder, if we needed one, of the problems caused by terms-of-trade volatility in emerging economies. This column looks at the real exchange rate adjustments to commodity terms-of-trade shocks in the region exposed to the highest volatility – Latin America. It finds that active reserve management not only lowers the short-run impact of shocks, but also substantially reduces real exchange rate volatility.*  In many countries – Brazil being a prime example – terms-of-trade improvements have been accompanied by a surge in capital inflows. A number of prominent policymakers have argued that the combination of significant increases in export prices and higher capital flows has generated ‘Dutch disease’–type situations, where acute real exchange rate appreciation has resulted in the crowding out of non-commodities tradable industries. Within this picture, emerging countries’ policymakers have discussed a number of palliatives, including the imposition of controls on capital inflows, tax incentives to ailing tradable industries, and active central bank intervention in foreign-exchange markets with the concomitant accumulation of international reserves.  Most of these offsetting policies may have important implications for domestic as well as international prices, as Michael Melvin, Managing Director at Black Rock, recently commented: "I always wondered why it’s hard to make money trading commodity terms-of-trade, one can forecast and trade those. May be [*sic*] this is the answer: central banks lean against this stuff, and there is not an opportunity"(discussion at the JIMF-SCIIE conference International Policy Implications and Lessons from the Global Financial Crisis, September 2011, UCS).  In a recent paper ([Aizenman *et al* 2011](http://www.nber.org/papers/w17692)), we use a ‘commodity terms-of-trade’ data set to analyse the way in which shocks to commodity prices affect the real exchange rate and the way international reserve policy and the choice of exchange-rate regime impact the transmission of commodity terms-of-trade to the real exchange rate. Commodity terms-of-trade in Latin American economies Our analysis focuses on the Latin American countries and covers the period 1970–2009. As shown in Figure 1, during the last 40 years, commodity terms-of-trade shocks have been 50% more volatile in Latin America than in emerging Asia, and almost twice as volatile as in other emerging markets. This concept of ‘commodity terms-of-trade’ differs from the traditional measure in that it only includes the relative prices of a country’s commodity exports and imports, weighted by their country-specific GDP shares. By excluding industrial goods, and concentrating on commodity prices, we focus on the most volatile component of import and exports prices.[1](http://www.voxeu.org/index.php?q=node/7525#fn1)  **Figure 1.**Commodity terms-of-trade shock volatility across emerging regions  http://www.voxeu.org/sites/default/files/image/FromAug2011/AizEdwardsFig1.gif  *Note:* CTOT Shock Volatility is measured as the standard deviation of ΔLogCTOT  As shown in Figure 2, real exchange rate volatility in Latin America has significantly decreased over the last two decades. This Figure also shows opposite directions in the evolution of commodity terms-of-trade and real exchange rate volatilities, leading us to conjecture that active policies were used successfully to insulate international relative prices (REERs) from the volatility of international commodity prices. Recent studies have shown that reserve accumulation may indeed be used for such purposes. Comparing the evolution of reserve accumulation and real exchange rate volatility (Figure 3), we observe that the decrease in the latter was accompanied by a steady increase of the former. While governments may accumulate international liquidity for other reasons, this accumulation may be also helpful in buffering the real exchange rate from commodity terms-of-trade shocks. Moreover, the different speeds at which these economies accumulated reserves during periods where commodity terms-of-trade shocks were positively skewed versus periods were shocks were negatively skewed, may indicate an active use of reserve accumulation as a policy against commodity terms-of-trade volatility.  **Figure 2.** Real exchange rate volatility, commodity terms-of-trade shock volatility and reserve accumulation (% growth of stock of reserve over GDP) in Latin America by periods  http://www.voxeu.org/sites/default/files/image/FromAug2011/AizEdwardsFig2.gif  *Notes:* CTOT Shock and REER Volatility are measured as the standard deviation of ΔLogCTOT and ΔLogREER respectively. RES corresponds to the average annual change in international reserves over GDP for each sample period.  **Figure 3.** Evolution of reserve stocks vs real exchange rate volatility in Latin America (1990-2009)  http://www.voxeu.org/sites/default/files/image/FromAug2011/AizEdwardsFig3.gif  *Note:* REER volatility is measured as a 5 year rolling standard deviation of real exchange rate. Buffering the effects of commodity terms-of-trade volatility in the real exchange rate Breaking with the traditional assumption of purchasing power parity (PPP) for tradable goods, the literature has identified relative price movements within the tradeables sector, specifically, movements in the relative price of exports to imports (terms of trade), as major determinant of real exchange-rate movements (See for example Edwards 1989). These studies suggest direct links between terms-of-trade shocks and the real exchange rate. Our study tests these links for the most volatile segments of traded goods – commodities – focusing on the continent most exposed to commodity terms-of-trade shocks, Latin America.  In earlier work, Aizenman and Riera-Crichton (2008) report evidence that international reserves cushion the impact of terms-of-trade shocks on the real exchange rate, and that this effect is important for developing countries, but not for industrial ones. This finding is consistent with a broader buffer stock view of international reserves, where proper reserve policy reduces the volatility of the real exchange rate, possibly supporting superior economic performance. An important question then is what happened to real exchange rate volatility during periods of increased commodity terms-of-trade shock volatility? As shown in Figure 2, real exchange rate volatility in Latin America has significantly decreased over the last two decades. This Figure also shows opposite directions in the evolution of commodity terms of trade and real exchange rate volatilities, leading us to conjecture that active policies were used successfully to insulate international relative prices (real exchange rates) from the volatility of international commodity prices.  A second policy that may affect the pattern of adjustment in real exchange rates is the choice of the *nominal* exchange rate regime. More specifically, it is highly likely that countries that peg their nominal exchange rate to a foreign currency or to a basket of currencies will exhibit different real exchange rate dynamics than countries allowing for full nominal exchange rate flexibility. Real exchange rate adjustment dynamics and the role of international reserves We analyse the role played by international reserves on the short- and intermediate-run real exchange rate dynamics generated by a commodity terms-of-trade shock (defined as the log deviations of current commodity terms of trade from its long-run value). Our analysis focuses on both ‘reserve availability’ – measured as stock of international reserves – and ‘active reserve management’, measured as changes in international reserves.  In our analysis, we use, as a base-case model, a linear dynamic error correction formulation. We are interested in understanding:   * How real exchange rates adjust to commodity terms-of-trade shocks in several Latin American economies; and * The way in which this adjustment is affected by international reserves policies.   We believe that reserves affect the dynamic adjustment of real exchange rate in two different ways: first, by buffering the direct transmission of the commodity terms-of-trade shock; and second, by softening the adjustment dynamics increasing the persistence of the shock and decreasing the speed at which real exchange rates return to equilibrium. All this makes international reserves an important tool to reduce real exchange rate volatility. In order to capture the size and shape of these buffering effects we use dynamic fixed-effects panel regressions introducing either the stock of reserves or the change of reserves as interaction terms on the autoregressive, on the error correction (defined as the distance between actual real exchange rates and a measure of long-run real exchange rates), and directly on the commodity terms-of-trade shock coefficients. Empirical results Following the estimated coefficients for our dynamic equation and using the stock of reserves as a proxy for the country’s ability to apply reserve policy, Figure 4 shows the impulse response function (IRF) of the real exchange rate to a commodity terms-of-trade shock under different levels of international reserves. The response function shows that an average Latin American economy with reserves of 3% of GDP (approximately one standard deviation below the region average holding of international reserves) will suffer a short-run real appreciation of approximately a 16% as a result of a 20% commodity terms-of-trade transitory shock. In turn, the same economy holding 13% reserves over GDP (approximately one standard deviation above the region average) would experience a real appreciation of only 8.6% in the next period, reaching a maximum appreciation of 9.3% in the second quarter.  **Figure 4.** IRF to a 20% commodity terms-of-trade shock (full sample)  http://www.voxeu.org/sites/default/files/image/FromAug2011/AizEdwardsFig4.gif  *Notes:* Each line displays estimated real exchange rate impulse responses to a 20% shock on the country’s commodity terms-of-trade under a different level of international reserves.  This direct buffer effect is combined with an increase of shock persistence and reduction of adjustment speed to create a ‘smoothing’ effect lowering the volatility of log real exchange rate (measured as the relative standard deviation) in the first five quarters after the shock from 5.6% to 3.4%. We find that, contrary to what many analysts believe, the real exchange rate in Latin American economies are more exposed to positive commodity terms-of-trade shocks than negative ones. It is also shown that the stocks of international reserves play a larger role insulating real exchange rate from commodity terms-of-trade when the economy faces positive shocks. In both cases, real exchange rate volatility is greatly diminished from 11% to 5% in the case of the positive shock and from 8% to 1% in the case of the negative commodity terms-of-trade shock.[2](http://www.voxeu.org/index.php?q=node/7525#fn1)  Figure 5 displays the differences in real exchange rate adjustment patterns across *nominal* exchange rate regimes. We find that the effects of commodity terms-of-trade shocks are much larger in flexible regimes. This is expected, since the real exchange rate is protected from commodity terms-of-trade shocks under fixed nominal rates and sticky domestic prices. These results leave us with two interesting conjectures:   * First, countries choosing to peg their currencies are able to effectively insulate their external relative prices against transitory commodity terms-of-trade shocks. * Second, countries in Latin America have an alternative way of buffering against commodity terms-of-trade shocks through active international reserve management under exchange-rate flexibility.   **Figure 5.** IRF to a 20% commodity terms-of-trade shock: Fixed vs flexible exchange rate regimes  http://www.voxeu.org/sites/default/files/image/FromAug2011/AizEdwardsFig5.gif  *Notes:* Each line corresponds to real exchange rate impulse responses after a 20% shock on the country’s commodity terms-of-trade under flexible or fixed exchange rate regimes. Solid lines correspond to the estimated impulse responses for countries holding a relative small amount of reserves (3% of GDP) while broken lines correspond to estimated real exchange rate responses when the country holds relatively large amounts of reserves (13% of GDP).  These policies seem to be similarly effective for a level of reserves over GDP (13%), a level that is far below the mean level of reserves in other emerging regions, such as Asia (20%) or East Europe (17%). Finally, most of the effectiveness of active reserve policy comes from absorbing the pressure off the nominal exchange rate  *A priori*, the ‘reserves buffer’ would seem to matter more when intervening to support a weak currency (as in the past) rather than intervening to slow down the pace of appreciation (as recently). In order to test this assumption we look at the effectiveness of ‘active reserve management’ from absorbing the pressure off the nominal exchange rate during positive as well as negative shocks to commodity terms of trade. Thus, Figure 6 focuses on the *change* in reserves, as opposed to the *level* of reserves making a distinction between positive and negative commodity terms-of-trade shocks. As may be seen, apart from buffering the initial shock, the active reserve management significantly reduces real exchange rate volatility. This effect is not symmetric, being the buffer effect of active reserve management slightly larger under negative commodity terms-of-trade shocks. Accumulating reserves by 1.5% of GDP during a positive commodity terms-of-trade shock will lower real exchange rate volatility from 5.7% to 3.1%. Meanwhile, for a negative commodity terms-of-trade shock, selling reserves by 1.5% of GDP will drop volatility from 6% to 1%.  **Figure 6.** IRF of a 20% commodity terms-of-trade shock with active reserve policy (all LATAM countries)  http://www.voxeu.org/sites/default/files/image/FromAug2011/AizEdwardsFig6.gif  *Notes:* Each line corresponds to real exchange rate impulse responses after a 20% positive or negative shock on the country’s commodity terms-of-trade. Solid lines correspond to the estimated real exchange rate responses where countries choose to execute a relatively small adjustment in their level or reserves (+/- 0.5% of GDP). Broken lines correspond to the estimated response for countries executing relatively large reserve adjustments (+/- 1.5 % of GDP).  We also find that reserve management could be an effective alternative to fiscal or currency policies for relatively trade-closed countries and economies with relatively poor institutions or high government debt. Finally, we analyse the effects of active use of reserve accumulation aimed at smoothing real exchange rates. The results support the view that ‘leaning against the wind’ is potent, but more effective when intervening to support weak currencies rather than intervening to slow down the pace of real appreciation. Conclusion Our paper identifies an important role for international reserves and managed exchange-rate flexibility in buffering and stabilising the real exchange rate in the presence of large commodity terms-of-trade shocks. This result is consistent with the trends observed in the last two decades, where emerging market economies have converged to the middle ground of the ‘economics trilemma’, opting for greater financial integration *and* larger exchange rate flexibility buffered by sizable accumulation of international reserves. 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Spatafora, N and I Tytell (2009), “Commodity Terms of Trade: The History of Booms and Busts”, IMF Working Papers, 09-205.  1 See Ricci *et al* (2008) and Spatafora and Tytell (2009) for detailed review of the definition and the data used in constructing the commodity terms of trade.   |  | | --- | | 2 This result is consistent with the ‘fear of appreciation’, where emerging markets may be more concerned with transitory appreciations due to the adverse competitiveness effects of commodity driven terms-of-trade improvement on non-commodities exports | | |

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