Exchange Rate Volatility and Agricultural Commodity Trade

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SUMMARY

This paper is concerned with the relationship between exchange rate volatility and agricultural commodity trade. Since the Bretton Woods system had been established in 1973, many countries have moved from a fixed exchange rate system to a floating system. Because market forces determine the exchange rate in a floating system, such a system is characterized by higher volatility (McKenzie, 1999). The increase in volatility has provoked considerable interest both in the theoretical and empirical trade literature. The theoretical literature has come up with several explanations for a causal relationship between exchange rate uncertainty and commodity trade. The conventional wisdom is that an increase in exchange rate uncertainty causes an increase in revenue uncertainty which will hamper trade. This uncertainty is the result of risk aversion and/or irreversible investment in productive capital (Ethier, 1973; Demers, 1991). On the other hand, Franke (1991) argues that an increase in exchange rate volatility can have a positive effect on trade. He shows that a multinational monopolist with a trading strategy that factors in exchange rate uncertainty may increase trade as a reaction to growing volatility in the exchange rate. As pointed out by De Grauwe (1988), exchange rate volatility can have a negative or positive effect on trade flows, depending on the shape of the expected marginal utility of income function.

The empirical literature on the relationship between exchange rate volatility and commodity trade is fairly substantial and highly inconsistent with respect to the effect estimates (see for an extensive review Auboin and Ruta, 2012). Most of the earlier studies provide evidence for a negative effect of exchange rate volatility on commodity trade (Thursby and Thursby, 1987; Koray and Lastrapes, 1989; Rose, 2000). The literature on agricultural commodities is largely in line with this assertion (Pick, 1990; Cho, Sheldon, and McCorriston, 2002; Kandilov, 2008). However, this view is challenged by Tenreyro (2007) who argues that the negative and significant effect estimates are the result of endogeneity and heteroskedasticity issues that had been neglected. Tenreyro (2007) outlines an identification strategy that addresses both issues simultaneously and also accounts for reverse causality (Mundell, 1961). She finds that an increase in short-run exchange rate volatility has no effect on commodity trade. In a recent paper, Broda and Romalis (2011) introduced a structural estimation approach to account for reverse causality. They argue that the insignificant estimates in Tenreyro (2007) are the result of aggregation bias and exchange rate volatility should only depress trade in differentiated products. Moreover, it is reasonable to assume that an agent's reaction to short-run uncertainty is differers from the reaction to long-run uncertainty, which is a possible explantation for the insignificant estimates presented in Tenreyro (2007).

The contribution of this paper is threefold. First, I contribute to the ongoing debate on the relationship between exchange rate volatility and commodity trade by testing for a causal effect at the commodity level. I categorize 223 agricultural commodities according to the liberal classification by Rauch (1999) in homogenous (64), referenced priced (86), and differentiated commodities (73). This classification is widely used in the empirical trade literature and according to Broda and Romalis (2011), exchange rate volatility should only affect differentiated commodities because they are not sold on organized markets which implies that search costs are in general considerably higher. Second, I study the effect of both short-run and long-run exchange rate volatility (Rose, 2000; Tenreyro, 2007). Agents may react differently to these sources of uncertainty. To calculate the measure of volatility, I extracted daily exchange rate data for 15,750 currency pairs and 16 years from the Thomson Reuters exchange rate database. The exchange rate measures are assigned to bilateral trade data for 143 countries covering 2001/2012. To compare my results with the literature, I follow the standard approach and use end-month exchange rate data to calculate the short-run and long-run exchange rate volatility following the approaches outlined in Rose (2000) and Tenreyro (2007). These measures are likely biased as they do not represent the distribution of exchange rates within a month accurately. Hence, I also calculate both measures with daily, median month and average month exchange rate data. These measure should mimic the uncertainty faced by agents more accurately. Third, my identification strategy addresses the following identification issues simultaneously: Endogeneity, heteroskedasticity, zero trade flows, sampling, and reverse causality. By using a Poisson regression model (Santos Silva and Tenreyro, 2006), I account for heteroskedasticity and zero trade flows. The multilateral trade resistance terms that may cause an endogeneity issue are accounted for with time-varying fixed effects for importers and exporters (Anderson and van Wincoop, 2003). I also include standard gravity control variables such as distance, economic integration agreements, contiguity and others. The sampling issue is addressed by analyzing trade flows for all available country pairs. Lastly, reverse causality is accounted for with the instrumental variable approach outlined in Tenreyro (2007).

The empirical model is estimated commodity by commodity and the parameter estimates are analyzed according to category (homogenous, referenced priced, and differentiated commodities) and volatility measure. My empirical results provide evidence for a significant effect of exchange rate volatility on agricultural commodity trade. I find that the higher the exchange rate volatility between two countries is, the less these countries trade with each other. The magnitude of this effect varies widely, but is strongest for differentiated commodities. Lastly, I find that the use of the end-month volatility measure masks the true effect of exchange rate volatility as the measure provides significantly lower effect estimates.

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