The central bank in market efficiency: The case of Taiwan

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ABSTRACT

This paper investigates the empirical relation between order imbalance and intraday NTD/USD exchange rate dynamics. Using one-year high frequency data, we demonstrate that interbank order imbalances have substantial explanatory power for concurrent exchange rate returns both on the daily and intraday bases. More importantly, we find that lagged-one order imbalances have a predictive negative effect on current returns. Further, we trace the predictability of returns using order imbalances over various intervals to investigate the intraday market efficiency. We show that the weak-form efficiency appears to prevail over intervals of 15 to 60 min in the NTD/USD exchange rate market.

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1. Introduction

This paper provides an empirical study of relation between order imbalance and intraday exchange rate dynamics in the case of a small open economy, Taiwan, with a managed floating exchange rate regime for local currency, the New Taiwan Dollar (NTD). Based mainly on the microstructure model of Evans and Lyons (2002a), we propose the time-series regression model and a time-varying GARCH(1,1) model to capture NTD/USD dynamics employing one-year inter-dealer high frequency data. We investigate the predictability of order imbalance on NTD/USD return by running time-series regressions of price movement on lagged imbalances as well as the out-of sample performance compared with random walk model. Furthermore, we trace the predictability of returns using order imbalances over various intervals to investigate the intraday efficiency.

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The choice of the exchange rate studied is essential for policy makers of small open economies for several reasons. First, the exchange rate is perhaps the most important asset price in the globalizing economy (Rose, 2011). A floating currency is a key component of monetary policy framework, helping the economy to adjust to shocks and playing an important part in the transmission of monetary policy. The stability of the exchange rate directly influences the overall macro-economy. Osorio et al. (2011) shows that economies with a relatively greater contribution from exchange rate and equity movements in the overall financial conditions, such as Hong Kong, Taiwan, and Singapore, tend to experience greater volatility in GDP growth. It may be thus not surprising that countries often follow practices of an active exchange rate management.[1]

Second, it is also important to note that exchange rate management and interventions occur mostly in emerging economies (Kriljenko and Iván, 2003). This phenomenon could be explained by a size effect: the intervention amounts have a relatively larger size to the level of market turnover in emerging economies compared to advanced economies (Levine, 1997). Furthermore, central banks in emerging economies have a greater information advantage over market participates. Owing to reporting requirements, central banks may infer aggregate order flow; they can actively use monetary regulation and operating practices (Scalia, 2008).

Taiwan is an export-dependent economy with adopting a managed floating exchange rate system. Under this exchange rate regime, the NTD exchange rate is determined, in principle, by market supply and demand. However, when the market is disrupted by seasonal or irregular factors, Taiwan central bank will step in.[2] Yan and Shea (2005) confirm that the policy consideration, such as exchange rate stabilization, plays an important role in influencing the NTD/USD exchange rate trend, and has driven the Taiwan central bank to undertake significant intervention into the market. By assessing the size of the order imbalance effect on NTD/USD exchange rate return, the paper is aimed to provide central bank with guidance for the magnitude intervention in the future.

Regarding the exchange rate dynamics issue, prior to the 1990s, analysis of the causes of exchange rate movements basically stems from macroeconomics arguments. However, plenty of empirical evidence shows that asset market models of exchange rate determination, using low frequency data on exchange rates and macroeconomic fundamentals, fail to explain exchange rate movements in the short run and can only indicate long-run trends.[3] The failure of asset market approach in explaining exchange rate dynamics at shorter horizons and data availability on intraday foreign exchange transactions have led, in the last decade, to increasing attention to models of exchange rate determination based on market microstructure arguments.

The principal empirical result of the new market microstructure approach to exchange rate determination is that order imbalance has the substantial explanatory power for exchange rate dynamics in the short term, from 5 min to daily interval, and even in the medium term, from weekly to monthly intervals.[4] Order imbalance defined as the net of buyer-initiated and seller-initiated currency transactions (Lyons, 2001)[5] is a measure of net buying pressure. The theoretical link between return dynamics and order imbalances mainly comes from two well-known channels of market microstructure theory.[6] First, an information channel emerges when dealers adjust price in response to order flows that may reflect private information (e.g., Kyle, 1985; Glosten and Milgrom, 1985; Admati and Pfleiderer, 1988; Frömmel et al., 2008; Danielsson et al.,2012; among others). Second, an inventory-control or liquidity channel emerges when dealers adjust price to control inventory risk due to order flows (e.g., Amihud and Mendelson, 1980; Ho and Stoll, 1983; Brennan et al., 2012; among others). Both channels imply that buyer-initiated trades push price up, while seller-initiated trades push it down.

Regarding the information-based channel in the field of foreign exchange rate, Breedon and Vitale (2010) distinguish two classes of traders: rational investors and unsophisticated customers. Rational investors represent all foreign exchange traders, such as dealers, hedge funds and of other actively traded funds, which have direct and full access to the two trading platforms: Reuters D2 and EBS (Electronic Broking System) systems. Unsophisticated customers correspond to traders, such as industrial corporations or institutional

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[1] See Menkhoff (2012) and Melvin et al. (2009) for detailed.

[2] See the introduction of foreign exchange management in the Taiwan central bank website (http://www.cbc.gov.tw/mp2.html).

[3] For example, Meese and Rogoff (1983) find that the random walk model outperforms other macro-fundamentals-based models of exchange rate determination at horizons of up to a year.

[4] See Breedon and Vitale (2004) for details.

[5] The definition of order imbalance for foreign exchange markets is similar to that for other financial markets, for example, Lee and Ready (1991) define the order imbalance as the net of buyer-initiated and seller-initiated equity transactions.

[6] See Lyons (1995) for details.