Order flow and exchange rate dynamics in electronic brokerage system data ☆

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Abstract

We analyze the association between order flow and exchange rates using a new dataset representing a majority of global interdealer transactions in the two most-traded currency pairs at the one minute frequency over a six-year time period. This long span of high-frequency data allows us to gain new insights about the joint behavior of these series. We first confirm the presence of a substantial association between interdealer order flow and exchange rate returns at horizons ranging from 1 min to two weeks, but find that the association is substantially weaker at longer horizons. We study the time-variation of the association between exchange rate returns and order flow both intradaily and over the long term, and show that the relationship appears to be stronger when market liquidity is lower. Overall, our study supports the view that liquidity effects play an important role in the relationship between order flow and exchange rate changes. This by no means rules out a role for order flow as a channel by which fundamental information is transmitted to the market, as we show that our findings are quite consistent with a recent model by Bacchetta and Van Wincoop (2006: Can information heterogeneity explain the exchange rate determination puzzle? *American Economic Review*, 96, pp. 552–576.) that combines both liquidity and information effects.
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1. Introduction

A strong positive contemporaneous association between exchange rate returns and order flow has been documented in many recent empirical studies. Evans and Lyons (2002), for instance, in a seminal paper, reported that a regression of Deutsche mark/dollar daily returns on daily order flow yielded an R^2 in excess of 60%. Other authors have since confirmed the association between order flow and returns at daily or intradaily frequencies using several other foreign exchange datasets. However the various papers have come to very different conclusions as to the role of order flow in price discovery in foreign exchange markets and the permanence of its impact.

Froot and Ramadorai (2005) draw a distinction between two possible views of the relationship between exchange rates and order flow. The first – which they term the "strong flow-centric" view – holds that order flow is correlated with changes in the fundamental value of a currency as it transmits fundamental macroeconomic information to the market. The second – which they term the "weak flow-centric" view – holds instead that order flow is correlated with the *deviation* of the exchange rate from its fundamental value, but not with the fundamental value itself. A deviation of the exchange rate from its fundamental value might, for example, come from hedging demand shocks, liquidity effects, or the overreaction of investors, but is in any case temporary. It is also possible, however, to have elements of both the strong and weak flow-centric views, in which order flow is informative about fundamentals but is associated with transitory exchange rate movements as well. This is the case in the model of Bacchetta and Van Wincoop (2006), which provides an analytical framework with both portfolio-balance and informational effects of order flow on exchange rates. Their model is a dynamic rational expectations model in which each investor receives a noisy signal about future fundamentals. The average signal across all investors is the true future fundamental value. Rational investors would infer the average signal of others from observed exchange rate changes, except that the exchange rate is also affected by hedging demand that is unrelated to fundamentals. Investors must therefore attempt to infer whether observed exchange rate movements represent information about future fundamentals or about hedge trades. In the rational expectations equilibrium, order flow will be correlated with both the future fundamentals (the information channel), but also with hedging demand (the liquidity channel). The two channels are intertwined in this model: Order flow from hedging demand shocks can have a substantial short-run effect on the exchange rate, but this is largely because of the fact that information about future fundamentals can also be revealed through order flow.

These contrasting views about the relationship between order flow and exchange rates have different implications about the association between these series at different horizons. Under the strong flow-centric view, the effect of order flow on exchange rates is permanent, as fundamental macroeconomic information is revealed to the market and becomes embedded in prices via order flow. Under the weak flow-centric view, where order flow does not convey information about macroeconomic fundamentals, order flow is associated only with transitory exchange rate movements. In the model of Bacchetta and Van Wincoop (2006) the relationship between order flow and exchange rates can be stronger or weaker at long horizons than at short horizons depending on the parameter values. The strong flow-centric model of Killeen et al. (2006) implies that cumulative order flow and exchange rates are nonstationary but cointegrated, so that there exists a stable long-run equilibrium relationship between these time series. Weak flow-centric models, such as Froot and Ramadorai (2005) and Breedon and Vitale (2004), do not, however, imply cointegration. And, in the model of Bacchetta and Van Wincoop (2006), although order flow reflects, in part, fundamental information, cumulative order flow and exchange rates are not cointegrated.[1]

Turning to the data, to reach these differing conclusions researchers have used datasets that vary in frequency, span, period of coverage, and segment of the market in which the order flow is recorded. Papers arguing for the strong-flow centric view include Evans and Lyons (2002, 2005, 2006), Love and Payne (in press) and Killeen et al. (2006), among others. Authors generally favoring the weak flow-centric interpretation include Froot and Ramadorai (2005) and Breedon and Vitale (2004) who conclude that "the strong contemporaneous correlation between order flow and exchange rates is mostly due to liquidity effects." The data used in the seminal work of Evans and Lyons (2002), for instance, was 4 months of high-frequency data from the Reuters direct-dealing interdealer electronic platform in 1996, and the same data were used in Evans and Lyons (2006) to study the role of order flow at times of news releases. Breedon and Vitale (2004) studied high-frequency brokered electronic interdealer data, spanning 6 months in 2000 and 2001, to reach conclusions different

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[1] See Appendix D of Bacchetta and Van Wincoop (2006). The intuition is that hedge trade shocks permanently affect cumulative order flow but do not permanently affect the level of the exchange rate. Note that cumulative order flow, exchange rates, and cumulative hedging demand shocks are, however, cointegrated.