



An investigation of customer order flow in the foreign exchange market

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ABSTRACT

This paper examines the effect that heterogeneous customer orders flows have on exchange rates by using a new, and the largest, proprietary dataset of weekly net order flow segmented by customer type across nine of the most liquid currency pairs. We make several contributions. Firstly, we investigate the extent to which customer order flow can help to explain exchange rate movements over and above the influence of macro-economic variables. Secondly, we address the issue of whether order flows contain (private) information which explain exchange rates changes. Thirdly, we look at the usefulness of order flow in forecasting exchange rate movements at longer horizons than those generally considered in the micro-structure literature. Finally we address the question of whether the out-of-sample exchange rate forecasts generated by order flows can be employed profitably in the foreign exchange markets.

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1. Introduction

Currency markets are amongst the most liquid and economically important in the world but also, in terms of transaction information, amongst the most opaque. Over \$3.2tn is traded on the foreign exchange (FX) market everyday according to the BIS,¹ FX transactions facilitate international trade which, through the principle of comparative advantage, should be economically beneficial to all parties. The exchange rate is therefore very important for an international economy. It impacts on international competitiveness, growth and inflation through its effect on both import and export prices.

Given their importance, currency markets have received a lot of attention in the academic literature. However, exchange rate determination and forecasting has remained something of an enigma ever since Meese and Rogoff's seminal 1983 paper. In fact the so called "macro approach" (see Lyons, 2002) based on traditional exchange rate determination models has failed empirically.

The failure of traditional empirical models has generated a body of research, led by Martin Evans and Richard Lyons, to identify micro-determinants of the exchange rates (i.e. order flows). This work

aims to examine the micro-structure of the FX market to see if it has a better record in explaining and forecasting exchange rate movements. Evans and Lyons (2002) assert that order flow, that is, the detail on the size, direction and initiator of transactions, does have significant explanatory power on exchange rates, at least at a high-frequency, intra-day or daily level. The main conclusion of this research is that the FX market can act as an aggregator of information regarding the expectations and circumstances of participants, and order flow is the signal (i.e. it can be viewed as a variable mapping disperse information in the economy towards FX price discovery). Moreover, due to the nature of how this private signal is revealed, inferred from trades in the inter-dealer market, the effect on the spot price should not be transient and should improve the forecastability of exchange rates. Of course one would expect a lag² between the time when the information contained in the order flow is formed and when it is fully revealed to the market.³

The objective of this paper is to explore and test some of these micro-structural relationships and examine their significance using weekly exchange rates and order flows. Specifically, it looks

² Sometimes it may take few days until the order flow information are revealed to the markets. See discussion in Rime et al. (2010).

³ This may also be a reason why some studies using daily order flows find little evidence of (days) out of sample forecasts for exchange rates returns. In fact it is not a coincidence that, for example, studies like Evans and Lyons (2007) report strong out-of-sample forecastability power at one to three weeks horizons.

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¹ Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity in April 2007 Bank of International Settlements – December 2007.

at customer order flow (a great majority of the present micro-structure literature has focused on inter-dealer or brokered markets). The reason for this focus is that customer order flow is the active side of the trade; the FX market is decentralized with market-makers who quote prices to a wide variety of customers. They then use the brokered market to adjust their inventory to the required level⁴ amongst themselves (thus adding “hot-potato effects” which greatly increase the total volume traded). Customer order flow can therefore be viewed as the ‘source’ of the transactions conducted in the inter-broker market. By definition all order flow must sum to zero, if we accept that dealers do not carry large inventory positions (see Bjønnes and Rime (2005) for evidence supporting this), therefore if there is a long term impact on FX rates, this must be due to a differential information content of individual orders, dependent on the (perceived) information of the person trading, the reason and size of the trade.

The paper therefore examines the effect that heterogeneous customer orders (and the information contained in them) may have on exchange rates by using a unique dataset of weekly net order flow segmented by customer type across nine of the most liquid currency pairs over a six-year period. This is the largest order flow dataset ever used in the literature.

It is important to make the distinction between ‘customer order flow’ and ‘inter-dealer order flow’. As described above, a large proportion of the empirical literature on micro-structure has focused on inter-dealer order flow (see Lyons (2001) and extensive references therein for examples). This data has been made available to researchers by some of the platforms used by market-makers to conduct their business. More recently (see Bjønnes et al. (2005b), Evans and Lyons (2007) and Sager and Taylor (2008) for examples), data on customer order flow, that is the initiated underlying trade that is given to one or several market-makers, has become available in various forms from some of the top FX trading investment banks in the world. As we shall discuss later in the paper, given market-makers’ risk-aversion to holding large inventory positions over-night (Bjønnes and Rime (2005)), customer order flow can be assumed to be the underlying information revealed through inter-dealer activity. For the rest of the paper the use of the term order flow is associated to this “source,” customer order flow unless we explicitly reference inter-dealer market.

If order flow does indeed assist in the information transmission of heterogeneous agents’ expectations, there should be differential information signals from each customer segment. Presumably the motivation for trading of a large corporation will be very different from that of a leveraged hedge fund and therefore the information transmitted by the order should have a different impact on spot rates. Therefore we are interested in three separate issues. The first major issue follows from the previous literature and attempts to address the usefulness of order flow as a conduit through which private information becomes embedded within market prices. This involves an investigation of the extent to which order flow can help to explain exchange rate movements over and above the influence of macro-economic variables. The second issue is to assess the usefulness of order flow in forecasting exchange rates. Given our span of data we are able to shed some light on whether order flows are useful in forecasting exchange rate movements at longer horizons (one and two weeks ahead) than those generally considered in the micro-structure literature.⁵ Finally we address the question of whether order flow could be used to generate forecasts that can

be employed profitably in the FX market (this approach is similar to that taken recently by Rime et al. (2010)).

The paper is organised as follows. Section 2 provides a review of the main literature on the micro-structure approach to exchange rates. Section 3 describes our dataset of customer order flows and other macro-variables. Sections 4–6 present the empirical results on the estimates and forecasting performance of the model with aggregate and disaggregate order flows. Section 7 examines the profitability of exchange rate forecasts from the order flow model via a simulating trading strategy. The final section summarises the main empirical findings.

2. Micro-structure models

Given the failure of traditional economic fundamentals-based models in explaining and forecasting exchange rate movements, it is unsurprising that researchers began to look in other directions. One direction was to look at the underlying micro-structure of the FX market in search of answers – the FX market is structured differently from the centralised exchanges of, for example, stock and financial derivative markets. This may have important effects for price discovery and movement. Part of the literature, following Shleifer (2000), has focused on the presence of noise and chartist traders as the principal agents causing distortions in the FOREX market. Menkhoff and Taylor (2007) being the most recent example. However, the most fruitful avenue of investigation in this area has probably come from the work of Lyons (1997, 2001) on order flow.

The underlying model postulates that what is important to market-makers and FX brokers who, after all, set the price at which we all transact are the order flows that they receive. By examining price-by-price movements Lyons (1997, 2001) found some support for the explanatory power and persistence of these order flows. For example in a regression of changes in the spot exchange rate against interest rate differentials, used as a proxy for all macro information, and inter-dealer order flow⁶ he finds highly significant parameters for order flow and a high explanatory *R*-squared (*t*-statistics of 10.5 and 6.3 and *R*-squared 0.64 and 0.45 for both DM/\$ and Yen/\$) compared with insignificant coefficients for interest rate differentials. The rationale for focusing on order flows being that by using the order flow, market participants are actually getting an accurate distillation of market expectations in aggregated form. This is actual, instant, money-backed expectations not those gained from collecting survey evidence.

To better understand this premise we need to have some knowledge of the institutional setting of the FX market. This is described in the following section.

2.1. The FOREX market

There is no centralised exchange or regulatory authority for trading foreign exchange, trading is conducted via different chan-

⁴ All the evidence suggests that the typical dealer holds positions for a very short half-life (10 min) and does not carry significant over-night inventory (see Lyons, 1998, 2001).

⁵ Obviously this may be too long a horizon for some hedge funds. However, asset management companies will be interested in the 1–2 week forecasts used here. Pension funds and central banks generally have even longer investment horizons.

⁶ Again, we stress that, in the present study, we are focusing on customer rather than inter-dealer order flow. On a theoretical ground causality should be in one direction. Since customer order flows come from underlying customers, they are linked directly to the underlying sources of demand in the economy and represent the external ‘shocks’ to the interdealer market that trigger trading. As Lyons (2001, p. 244) puts it, “the ultimate driver of inter-dealer flow is customer flow”. For future research it might be useful to test this causality direction by looking at the relationship between customer flow and inter-dealer flow. Our dataset is not of a sufficiently high enough frequency to conduct this investigation however. We have tried to address this issue in this paper using data from Treasury Bulletin. We recognize that this dataset is rather limited. However, an important result we obtain is that when we observe higher than average activity in the customer market, we observe higher than average activity in the dealer market (given the limitation of our dataset, we cannot say anything on the direction).

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