International order flows: Explaining equity and exchange rate returns

Peter Dunne [a,b,1], Harald Hau [c,*], Michael Moore [d,2]

[a] *Queens University, Belfast BT7 1NN, Northern Ireland, United Kingdom*
[b] *Central Bank of Ireland, Dublin 1, Ireland*
[c] *INSEAD Department of Finance, Boulevard de Constance, 77305 Fontainebleau Cedex, France*
[d] *School of Management and Economics, Queens University, Belfast BT7 1NN, Northern Ireland, United Kingdom*

ABSTRACT

Keywords:
Order flow
Exchange rates
Equity returns
Market interdependence

Macroeconomic models of equity and exchange rate returns perform poorly at high frequencies. The proportion of daily returns that these models explain is essentially zero. Instead of relying on macroeconomic determinants, we model equity price and exchange rate behavior based on a concept from microstructure–order flow. The international order flows are derived from belief changes of different investor groups in a two-country setting. We obtain a structural relationship between equity returns, exchange rate returns and their relationship to home and foreign equity market order flow. To test the model we construct daily aggregate order flow data from 800 million equity trades in the U.S. and France from 1999 to 2003. Almost 60% of the daily returns in the S&P100 index are explained jointly by exchange rate returns and aggregate order flows in both markets. As predicted by the model, daily exchange rate returns and order flow into the French market have significant incremental explanatory power for the daily S&P returns. The model implications are also validated for intraday returns.

© 2009 Elsevier Ltd. All rights reserved.

* Corresponding author. Tel.: +33 1 6072 4484; fax: +33 1 6074 5500.
 E-mail address: harald.hau@insead.edu (H. Hau).
 URL: http://faculty.insead.edu/hau
[1] Tel.: +44 28 9097 3310. p.g.dunne@qub.ac.uk, www.qub-efrg.com/staff/pdunne/
[2] Tel.: +44 28 9097 3208. m.moore@qub.ac.uk, www.qub-efrg.com/staff/mmoore/

1. Introduction

The aggregate stock market index and the exchange rate are known to have a very low correlation with any other measurable macroeconomic variable except at very low frequencies (Frankel and Rose, 1995; Rogoff, 2001). Financial economists interpret this very lack of predictability as evidence for efficiency, whereby only unpredictable news should move prices. But even gathering proxy variables for news ex-post does not seem to substantially increase the explanatory power of asset pricing models (Roll, 1988). This motivates us to examine a new financial market variable called order flow in its relationship to stock and exchange rate returns. Order flow is the net of buy minus sell *initiated* orders.[3] In the foreign exchange market, daily exchange rate returns and daily order flow show a remarkably high correlation (Evans and Lyons, 2002a,b,c; Killeen et al., 2006) and even permanent changes in the exchange rate appear to be explained by order flow. Unfortunately, most of the microstructure literature features order flow as an exogenous variable in a single market setting. Its very origin remains unexplained and this lack of economic structure constrains the analysis.

In this paper we derive order flow as the result of belief changes by heterogenous investor groups and explore if such a paradigm can structurally explain international equity and exchange rate returns. First, we provide a micro-founded market model in which order flow is the result of belief changes of three different investor groups. This allows for a structural interpretation of order flow regressions. The model features a two-country multi-market setting in which we can explore the relationship between equity, foreign exchange and bond markets. In particular, we obtain testable restrictions which link equity returns to the various order flows. We explicitly model exchange rate determination unlike much of the international investment literature (see Albuquerque et al., 2006). Second, we show that our empirical framework explains up to 60% of the daily return variations in the S&P 100 index. In accordance with the theory, both exchange rate returns and order flow into the overseas market have explanatory power for the domestic stock market returns. Third, our model can account for observable asymmetries in the correlation structure between equity returns and exchange rates. For example, most U.S. equity market appreciations typically come with U.S. dollar appreciations, while European equity market returns correlate negatively with Euro appreciations.

The starting point of our analysis is a coherent interpretation of order flow itself. What motivates trades through market orders as opposed to limit orders? In most microstructure models of limit order markets those market participants with private asset valuations removed from the current midprice tend to pursue market order strategies.[4] The intuition is straightforward. Execution uncertainty related to limit order submission is a multiplicative factor of the expected benefit of a trade. In the absence of risk aversion, the probability of non-execution reduces the expected trade benefit linearly as the difference between current midprice and the private value increases. The cost of market order submission by contrast is an additive cost related to the effective spread. It is unchanged by more extreme private asset valuations. A large change in the asset valuation by a segment of market participants will therefore tend to trigger predominantly market orders. This feature of modern limit order markets makes order flow a suitable proxy for (substantial) investor belief changes. Our simple market model captures this aspect, namely order flow is simply a linear function of belief changes. Hence, order flows can be used to identify heterogeneous belief changes within a segmented investor population. We do not deny that other trade motivations like (urgent) hedging or liquidation needs might also come with a preference for market over limit order implementation of the transaction. These trades are outside the model framework and feature as noise in the empirical analysis. We also highlight that we are agnostic about the source of the belief changes. These could be based on private information or have a behavioral explanation.

---

[3] Occasionally, order flow is also referred to as order imbalance.

[4] See for example Harris (1998), Parlour (1998), Foucault (1999), Biais et al. (2000). Empirical evidence on the trade-off between execution risk and spread costs is provided by Biais et al. (1995), Grifffiths et al. (2000), Harris and Hasbrouck (1996). See also Hollifield et al. (2004) for a non-parametric test of the hypothesis that order submission strategies depend on the distance of private asset values from the current midprice.