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Bigger Fish in Small Pond:
The Interaction between Foreigners' Trading and Emerging Stock Market Returns under the Microscope

Numan Ülkü[*], Enzo Weber[**]

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[*] Central European University Business School, Frankel Léo út 30-34, 1023 Budapest, Hungary.
Phone: +36-1-887-5012, E-mail: UlkuN@ceubusiness.org
[**] Department of Economics and Econometrics, University of Regensburg, 93040 Regensburg, Germany.
Phone: +49-941-943-1952, E-mail: enzo.weber@wiwi.uni-regensburg.de
and Institute for Employment Research (IAB), Osteuropa-Institut Regensburg

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Abstract

This paper provides the first study of foreign investors' trading in a sizeable European emerging stock market, using a combination of daily and monthly complete data collected at the destination. It also introduces the structural conditional correlation (SCC) methodology to identify the contemporaneous interaction between foreign flows and returns. We show that global emerging market returns are an additional driver of foreign flows after controlling for global developed market returns. Foreigners do negative (positive)-feedback-trade with respect to local returns at the monthly (daily) frequency. SCC methodology shows that the standard assumption in the literature, that flows cause returns contemporaneously but not vice versa, is not justified, even at the daily frequency, making price impact estimates reported in previous literature questionable.

I. Introduction

Foreign investors' trading has been associated with a dominant influence in emerging stock markets. Moreover, it is perceived to have acted during the recent global crisis as a channel of transmitting the turbulence from developed economies into emerging economies, which were relatively more stable. These observations are particularly relevant for European emerging economies with large external deficits, which depend on foreign capital inflows to sustain their finances. However, most of the available research on foreign investors' trading in stock markets is confined to Asian markets, mainly due to availability of exact data on foreigners' trading. As data collected from one source country or from one custodian might be biased or at least unsafe to generalize,[1] conclusive research should be based on complete data compiled at the destination market. We are not aware of any published research in the literature on foreigners' trading in

[1] Studies that use such data include Froot et al. (2001) who employ data from only one particular custodian (State Street), and Bekaert et al. (2002) who employ data from only one source country (TIC data from US). However, such data may contain measurement errors and even biases, as they do not include all foreign flows. Foreign flows data should be collected from destination (see Pavabutr and Yan, 2007, who show that the correlation between actual foreign flows data in Thailand and that derived from US Treasury's bulletin is merely +0.43).

European emerging markets, which employs complete data from the destination.[2] Istanbul Stock Exchange (ISE), the largest and deepest stock market in the CEEMENA (Central and Eastern Europe, Middle East, North Africa) region, ranked 7th among all world emerging markets in terms of total value of shares traded, presents an ideal case study as precise data on foreigners' trading are compiled in a centralized manner. Moreover, as Turkey removed all restrictions on foreign portfolio investments in August 1989, an analysis on ISE is not blurred by the initial impact of liberalization (i.e.; one-time portfolio rebalancing by international investors) as documented in Bekaert et al. (2002).[3] Further, Turkey, unlike many Asian markets, has never implemented any (partial) restrictions on foreigners' trading in the stock market, so a clean picture of the foreign trader behavior and market return interaction can be obtained. Finally, and perhaps most importantly, results on Turkey with a very large external deficit enables to assess the generalizability of previous results obtained on external surplus economies of Asia, where stock markets are dominated by domestic individual investors. To highlight the point, the fraction of market capitalization held by foreigners has been fluctuating around 70% in recent years in ISE, which is representative of external deficit economies in emerging Europe (for example, roughly 72% in Hungary), while the same ratio is much smaller in Asian stock markets: 31.60% in Taiwan in October 2010; 32.65% in Korea and 36% in Indonesia as of end of 2009, 28% in Japan as of end of 2008).[4] That is, in Richards' (2005) words, the "big fish" is actually in emerging Europe. Given the fact that most stock exchange administrations in emerging Europe do not keep track of foreigners' trading,[5] this study on ISE provides the sole opportunity to investigate if previous results obtained on mostly Asian markets (Choe et al., 1999; Griffin et al., 2004; Richards, 2005 among many others) hold for European emerging markets characterized by external deficits.

[2] One exception is Slovenia in Griffin et al. (2004). However, this market is of negligible size, and even the authors questioned the legitimacy of reporting results on this market.

[3] In particular, as liberalization itself leads to stock market appreciation, an appearance of positive feedback trading may emerge in addition to a possible overstatement of the persistence in flows.

[4] These ratios were even much smaller during the periods covered by major papers in this literature. For example, Choe et al. (1999) report the average foreign ownership in their sample as merely 12%).

[5] We contacted all European emerging stock exchange administrations individually within a research project supported by OTKA (The Hungarian Scientific Research Fund), and found out that major stock exchanges (e.g. Budapest, Warsaw, Prague) do not even collect any data on foreigners' trading except for asking member brokers once a year about an estimate of the percentage of trading volume executed on behalf of nonresidents during the year. Daily data are reported to be available only in Ljubljana (Griffin et al., 2004), a market of negligible size, though we were unable to verify availability of such data.

By using new data, combining and contrasting the analysis at the daily and monthly frequencies, and most importantly, introducing a promising new methodology to address some previously unanswered questions, this paper takes the literature on the interaction between foreigners' trading and emerging stock market returns several steps further. A first contribution stems from the data used. The monthly data on foreigners' trading in ISE, which have been employed before, are compiled by ISE by requiring member brokers to report transactions executed on behalf of nonresident clients on a monthly basis. A daily counterpart does not exist. However, the Central Registry Agency of Turkey (CRAT) has been reporting the percentage of listed shares held by nonresident investors on a daily basis. To our knowledge, this paper is the first to utilize this data set, and more generally the first and only daily data on foreigners' trading in a sizeable European emerging market.

A main contribution of the paper is to explore feedback trading behavior of foreign investors. Academic literature predominantly characterizes foreign investors in equity markets as uninformed, positive feedback traders (Brennan and Cao, 1997), or portfolio rebalancers (Griffin et al, 2004; Hau and Rey, 2004). However, İkizlerli and Ülkü (2010) have shown that foreigners in ISE tend to negative feedback trade with respect to local returns at the monthly frequency. This finding contrasts earlier empirical literature that predominantly reports positive feedback trading by foreigners in (mostly Asian) emerging markets (Stulz, 1999; Bekaert et al., 2002; Kim and Wei, 2002; Griffin et al., 2004; Richards, 2005) and in developed markets (Dahlquist and Robertsson, 2004). In this paper, we explore foreigners' feedback trading behavior by combining monthly and daily data and further by putting the daily interaction under the microscope introducing a new methodology, based on GARCH modeling, for contemporaneous identification of returns and flows. A key finding is that the lagged response of net foreign flows to local returns, which is significantly negative at the monthly frequency particularly following positive returns, is positive at the daily frequency particularly following negative returns. This discards an automatic portfolio rebalancing mechanism, and suggests that different mechanisms may be operating at different time horizons. For example, foreigners might be responding to new information over a horizon of a few days and rebalancing their portfolios via contrarian trades in the following month. At the same time, the lagged response of net foreign flows to global returns is positive and strong at both the monthly and the daily frequency; yet negative feedback trading with respect to local returns, in particular following rising markets, at the monthly frequency

rules out a naïve positive feedback trading strategy or especially sentiment trading. Our results rather lead to a conclusion that foreign investors' trading reflects a sophisticated response to information. Finally, our new approach suggests that intraday positive feedback trading, which has been imposed not to exist in vector autoregressions (VAR) in the extant literature, may be a pervasive feature, as further discussed below.

The results of Griffin et al. (2004) and Richards (2005) strongly called for inclusion of global market returns as an exogenous variable in the VAR model describing the interaction between foreign flows and local stock market returns. Such results are predicted by theories of portfolio rebalancing (Griffin et al, 2004), that is, international investors in source markets should buy in foreign markets following increases in their home markets to bring portfolio weights back to previous levels. Hence, host market local return – net foreign flow interaction has been conditioned on returns in developed (source) markets.[6] In this paper, we show that global emerging market returns are a significant and strong driver of both foreign flows and local emerging stock market returns after controlling for global developed market returns, in particular at the monthly frequency[7] where we document a prolonged response. Persistence in foreign flows in Turkey is accounted for, to a large extent, by lagged positive responses to global emerging market index returns. The lower significance of global emerging market returns at the daily frequency may be a reflection of the fact that emerging market information is less salient and more scattered.

In trading – return interaction, the interpretation of positive contemporaneous correlation at low frequencies has been a notorious problem: it may reflect three possibilities, namely, contemporaneous and lagged intraperiod price impact, intraperiod positive feedback trading, or latent common factor influence driving both flows and returns simultaneously. The standard treatment in this line of literature has evolved based on a questionable assumption suggesting flows be ordered before returns to enable contemporaneous identification in a recursive VAR system, and major papers followed this assumption, that would be safe only under tick data; see

[6] The fact that in today's globalized economy, world market returns may provide significant information on future global economic climate, hence the possibility that foreign investors might be responding to information rather than merely rebalancing their portfolios is another possibility which could not be examined in extant literature as developed (source) market returns are a driver of both rebalancing and global economic information channels.

[7] It is interesting to note that Richards (2005) and Griffin et al. (2004) included MSCI Emerging Markets index in their preliminary analysis, however, continued the main analysis employing only US returns, possibly to avoid the problem of time-zone differences inherent in using MSCI Emerging Markets index at the daily frequency that may confuse the analysis.

Danielsson and Love (2006) and Sias et al. (2006) for a detailed discussion of this issue. The third possibility, latent common factor influence, has been totally ignored. A clarification is handicapped by the lack of trading data at sufficiently high frequency. In this paper, we propose a frontier methodology that exploits time variation in the volatility of shocks to achieve identification (see e.g. Sentana and Fiorentini, 2001 or Rigobon, 2003). In particular, we employ the structural conditional correlation (SCC) model of Weber (2010) to identify the contemporaneous return-flow interaction at the daily frequency. Importantly, the contributions of all three possible sources of the correlation can be estimated without zero-restrictions. Our results show that the standard assumption in this line of literature, that flows cause returns but not vice versa, is not justified. This implies that caution is needed in interpreting price impact estimates reported in earlier studies.

The paper is organized as follows. Section II first provides a review of the literature on foreign investors' interaction with emerging stock market returns, and then discusses the contemporaneous identification problem. Section III explains the data and methodology employed in the paper, with a subsection on adopting the SCC concept into the return-flow literature. Section IV first reviews the monthly results, then presents the daily results. Section V presents SCC results and discusses their implications. For the purpose of comparing to results in previous literature, the analysis is also replicated on Korea and Taiwan. Section VI concludes by summarizing the main lessons from the study.

II. Related Literature

A. Literature on Foreigner's Trading and Emerging Stock Market Returns

Research on foreigners' trading has dealt with three questions: i) Do foreign investors pursue positive feedback trading strategies? ii) What is the impact of foreign flows on domestic stock returns? Is the contemporaneous price impact to be explained by price pressure, by base-broadening or by information? iii) Does foreigners' trading contain superior information (i.e., forecast value)?

On the first question, Brennan and Cao (1997) using quarterly data; Stulz (1999), Bekaert et al. (2002), Kim and Wei (2002), and Dahlquist and Robertsson (2004) using monthly data;

Karolyi (2002) using weekly data; Choe et al. (1999),[8] Froot et al. (2001), Griffin et al. (2004), and Richards (2005) using daily data find evidence of positive correlation between current foreign flows and lagged local equity returns which suggests that international investors are positive feedback traders. Grinblatt and Keloharju (2000) report strong evidence of momentum trading by foreigners in individual stocks (i.e. buying past winners and selling past losers). The finding of positive feedback trading by foreigners seems to be a uniform result, with few exceptions, irrespective of the frequency of data used. The main exception has been documented on ISE, where foreigners pursue negative feedback trading with respect to local returns at the monthly frequency (İkizlerli and Ülkü, 2010).[9]

The above results raise the question of why international investors are positive feedback traders. In this respect, Brennan and Cao (1997) and Griffin et al. (2004) assert that the expectations of foreign investors regarding the local market returns are more extrapolative than local investors, because they are less informed. In support of this argument, Kim and Wei (2002) find that foreign investors outside Korea are more likely to engage in positive feedback trading than foreign investors residing in Korea. The model of Brennan and Cao (1997) predicts foreign investors to use recent returns as information signals, as they have an informational disadvantage in emerging markets. An alternative explanation examined by Bohn and Tesar (1996) and Bekaert et al. (2002) is that international investors are "expected return chasers" entering the markets that have high expected returns and fleeing from markets that have low expected returns. While Bohn and Tesar (1996) do, Bekaert et al. (2002) do not find evidence of expected return chasing. Richards (2005) concludes that positive feedback trading observed in his sample is likely to be due to behavioral factors or foreigners extracting information from recent returns rather than portfolio rebalancing.

The second question addressed in this line of literature focuses on the impact of flows on returns. All studies [for example, Clark and Berko (1997), Froot et al. (2001), Dahlquist and Robertsson (2004), and Richards (2005)] uniformly report that foreigners' net buying raises stock prices, which ironically means that net selling of an equal amount by domestic investors raises stock prices. Reported estimates of the price impact of net foreign flows equivalent to one

[8] Choe et al. (1999) also report, however, that foreigners did negative feedback trade at the daily frequency during the Asian crisis, selling to local individual investors who were buying following positive returns.
[9] The case of negative feedback trading in ISE has also been noted in some earlier papers (either unpublished or published in local journals): Karataş et al. (2004), Adabağ and Ornelas (2004) and Akar (2008).

per cent of market capitalization are: +13% in Mexico (Clark and Berko, 1997; monthly data 1989-96), +10% in Sweden (Dahlquist and Robertsson, 2004; monthly data, subsequent to liberalization), +14.9% in Turkey (İkizlerli and Ülkü, 2010; monthly data, 1997-2008) and +38% median for six Asia-Pacific emerging markets (Richards, 2005; daily data, 1999-2002).[10] Then, an issue of particular interest is whether the effect is temporary or permanent. If the price increase is temporary, it may reflect pure price pressure. If it is permanent, it may be a reflection of risk sharing benefits of a stock market liberalization, i.e. base-broadening [Bekaert and Harvey (2000), Henry (2000), Kim and Singal (1997) and Dahlquist and Robertsson (2004)] or information revelation (Froot and Ramodorai, 2001). The latter encompasses a proposition that foreign net purchases incorporate fundamental prospects, making the effect of flows on returns permanent. Focusing on 28 emerging markets and employing daily data, Froot et al. (2001) find some evidence of price pressure. As to studies employing monthly data, Clark and Berko (1997) and Dahlquist and Robertsson (2004) find no evidence of price pressure in their study, while Bekaert et al. (2002) report that only a very small portion of returns due to flow shocks are reversed subsequently.

In analyzing these two questions, it is necessary to consider to what extent the capital flows are determined by global factors in order to adequately describe the relationship between foreign flows and local returns. Models that fail to control for global returns are likely to overstate the price impact. Chuhan et al. (1998) document that US equity portfolio flows into emerging markets are more sensitive to *push* (US or global) than *pull* (host country-specific) factors. Foreign investors might affect emerging markets responding to a shock in broad markets by rebalancing their equity portfolios across markets (Kodres and Pritsker, 2002). The model of Griffin et al. (2004) also incorporates portfolio rebalancing effects which suggest that global investors might increase their allocations to emerging markets following price increases in their home markets. Thus, net inflows may be partly explained by global market returns. Richards (2005), focusing on six Pacific emerging markets using daily data, finds that lagged returns in mature markets, in particular S&P500, are useful in explaining equity flows into emerging markets. He further suggests that those *push* factors have a larger role than implied by previous

[10] In reporting price impact, several studies make a useful distinction between the expected and surprise components of foreign flows. Most of the price impact comes from the surprise component (Richards, 2005). On daily data from Thailand, Pavabutr and Yan (2007) show that the expected component, which is associated with positive feedback trading, has insignificant price impact.

work. Griffin et al. (2004) also document similar evidence for nine emerging markets, that is, lagged North American returns are useful in explaining the net inflows towards emerging markets.

The third question analyzed is whether foreigners' net trading contains private or superior information, i.e. ability to forecast future returns. Foreign flows generally come from professionally managed, institutional investors, who are likely to be informed traders. On the other hand, based on previous evidence that relates location to informedness, models such as Brennan and Cao (1997) and Griffin et al. (2004) assume that foreigners have informational disadvantages compared to domestic investors. Yet, it is also plausible to think that global institutional investors invest in information sources, thanks to their size, global experience, talent and resources [e.g. Barron and Ni (2008) find that "portfolio managers with larger portfolio size acquire information about the foreign asset"]. They may have advantages in analyzing push factors, which may be especially important at times when domestic markets are highly influenced by global factors. Seasholes (2002) suggests that some foreigners have an information advantage. Bailey et al. (2007) provide evidence from Thailand and Singapore that foreign investors have superior information processing ability. Grinblatt and Keloharju (2000) find that foreign investors in Finland achieve superior performance, even after adjusting for momentum. Griffin et al. (2004) find that the one-day-ahead predictive ability of foreigners' net purchases is mainly due to past flows signaling further future flows, and remain committed to their view that foreign investors do not posses an information advantage. Using monthly data from Sweden, Dahlquist and Robertsson (2004) similarly conclude that "foreigners are uninformed feedback traders" even though net foreign flows are positively associated with future returns. Richards (2005) finds that a substantial part of the price impact of inflows is completed the day after the inflow, and suggests that it would be difficult to economically exploit the apparent predictability using the information contained in foreigners' trading. The only paper to suggest significant forecast power of foreign flows is Froot et al. (2001). However, their findings are disputed by Richards (2005) due to problems in the inferred dates of trades. Perhaps, Dvorak's (2005) conclusion that global investors posses expertise but lack local information can be considered as a synthesis of extant literature on this question.

A prominent feature of foreign flows is persistence. As implied above, most of the forecast ability of foreign flows is accounted for by flow persistence. Most of the studies

mentioned above report that current net flows are a strong predictor of future net flows (see also Froot and Donohue, 2002, who show that the persistence of foreign equity flows into emerging markets is much more pronounced compared to those into developed markets, and document cross-country effects). However, these results are based on earlier sample periods dominated by post-liberalization effects, and it needs to be seen whether the persistence remains robust over time or after controlling for global emerging market returns.

B. The Problem of Endogeneity between Contemporaneous Flows and Returns

The typical solution to deal with the endogeneity between net foreign flows and local returns in VAR models (i.e. contemporaneous period identification of impulse response functions) has been to impose a Cholesky ordering assumption whereby flows are ordered before returns, that is flows are assumed to contemporaneously affect returns but not vice versa. Most papers, especially those using daily data, followed this assumption without questioning its validity (Froot et al., 2001; Bekaert et al., 2002; Richards, 2005) while some papers included a robustness check by the reverse ordering assumption (e.g. Dahlquist and Robertsson, 2004). The assumption that flows affect returns contemporaneously but returns can only affect future flows is questionable with daily data, and clearly unrealistic with monthly data.

It is important to see that the contemporaneous identification assumption is in close relation to the assumptions in microstructure theory (see Hasbrouck, 1991, for a detailed discussion). Specifically, classical models of price formation assume that public information arrivals are fully and instantaneously incorporated by only return innovations, excluding the possibility of accompanying flow (or trade) innovations. Thus, focusing on tick data, the contemporaneous relation between flows and returns is named *price impact*, and returns' lagged response to flows is associated with private (asymmetric) information, notwithstanding market frictions. An important issue, a frequent and systematic violation of the assumptions behind classical models in especially electronic order book systems without dealers, is the possibility that flows (trades) may actually be correlated with public information arrivals.[11] That is, both flows and returns may contemporaneously be driven by common factors such as public

[11] While perfect information models exclude trading in response to public information, there might be many types of market frictions that prevent full instantaneous adjustment (see the discussion in Hasbrouck, 1991 referring to a dealer system). In ISE, which operates under a continuous auction electronic order book system with irreversible limit orders, it is clear that such imperfections will be rule rather than exception.

information arrivals in general, and by global returns in our particular case of foreign flows. Thus, standard microstructure models that name the contemporaneous association between returns and flows as price impact (e.g. include current flows in the return equation in a VAR system of returns and flows) may be inaccurate, even under tick data. At least, the standard treatment incurs the risk of incorrectly attributing part of the contemporaneous relation between flows and returns as price impact whereas in reality it reflects common factor influence. Thus, an apparent time-variation in price impact may actually be caused by the time-varying intensity of public information.

Danielsson and Love (2006) present a detailed discussion of the problems associated with the ordering assumption that places flows before returns and offer a solution based on instrumental variables to enable contemporaneous identification. Obviously, the problem connected to this approach is to find strong and valid instruments, i.e. observed variables sufficiently correlated with the endogenous variables but uncorrelated with the residuals. In their foreign exchange example, Danielsson and Love (2006) find that the lagged instruments are insignificant at frequencies lower than five minutes while in our case foreign investor flows data at frequencies higher than days are a rarity. Dependency of stock returns over days is known to be weak at best, and besides, any instrument would have to yield a correlation *over and above* what can be explained by autoregressive lags. Concerning validity, an instrument say for the first variable must be excluded from the equation for the second variable. Taken at face value, the exclusion restrictions from the Cholesky approach are replaced by exclusion restrictions on the instruments. However, this makes it necessary to argue that for instance a variable influencing returns in the Turkish stock market does not directly affect flows in the very same market. This seems questionable at best.

The allocation of the contemporaneous positive relationship at low frequency between positive feedback trading, contemporaneous and delayed price impact and latent common factors has important implications for our understanding of the flow-return interaction, as the bulk of the relationship is observed at the contemporaneous period. This issue has become a particular challenge as flows data are typically unavailable at higher frequency. Besides Warther's (1995) classical simple suggestion, Sias et al. (2006) within the US institutional investor literature deal with this issue by introducing a term structure of correlations between quarterly flow data and monthly return data. However, this approach still cannot resolve the decisive contemporaneous

correlation at the higher of the two frequencies (i.e. in their paper the largest correlation appears for contemporaneous months, but this is exactly the correlation which is to be explained!). The approach cannot distinguish price impact from latent common factors, and by the same token, does not consider any observed external factors; it just measures covariances. Furthermore, it requires the choice of a number of differences (see Sias et al., 2006, section IV.D) to approximate an infinite recursion (normally, the high-frequency period length should be chosen such that no lagged interaction takes place within the span of one period.). This would inevitably introduce considerable noise into the estimates, especially when the higher frequency covers intraday data. Besides, concerning such data it is obvious that, say, hours of different trading days cannot be handled just as adjacent months of different quarters.

Here, we propose a frontier methodology that is suitable for daily data and does not rely on exclusion restrictions. Thereby, we follow Weber (2010), who developed the class of so-called *structural conditional correlation* (SCC) models. To recapitulate, the fundamental problem in estimating flow-return interaction concerns simultaneity. While we can observe a certain correlation of flow and return data, this can be due to three sources: flow-return spillover (price impact), return-flow spillover (intraperiod feedback trading) or latent common factors; the latter would be reflected in correlation of the structural innovations. Evidently, by conventional methods these three sources cannot be uniquely recovered from the single correlation without assumptions. The usual solution applied in extant literature is to exclude the second spillover and any correlation produced by latent factor exposure. The latter also holds for the methodologies of Sias et al. (2006) and Danielsson and Love (2006).

However, it can be shown that structural VARs (SVAR) become uniquely identifiable in the presence of time-varying second moments, i.e. heteroscedasticity; see Sentana and Fiorentini (2001) in this context. Further discussion is provided by Rigobon (2003) and Weber (2010). The idea is that variation in the structural variances provides additional identifying information through rotation of the whole reduced-form covariance matrix. Concretely, assume a change in the variance of a shock in a SVAR like (2) below. Through the contemporaneous impacts (matrix A_0 below), the considered shock enters all model equations. Therefore, the variance change is passed to the second moments (variances and covariances) of all residuals in the reduced form. Thus, it leads to a shift of the whole reduced-form covariance matrix. Since such a shift in reduced form is measurable, it provides additional information for the identification of

the contemporaneous structure (A_0). Importantly, no instruments and no identifying parameter restrictions are required.

The fundamental shocks in classical SVARs are uncorrelated. Furthermore, this assumption is made for example by Sentana and Fiorentini (2001) in order to achieve identification. As a matter of fact, unrestricted covariances of the structural innovations would exhaust the additional information obtained from time-varying volatility. However, uncorrelatedness of these innovations would *a priori* exclude the third potential source of flows-returns correlation, common driving forces of the variables. Accordingly, one could never be sure that potential exogenous variables in the model equations completely cover the factor influence. Weber (2010) allows for latent common driving forces by introducing a constant conditional correlation (CCC) specification for the structural disturbances. Here, time-varying covariances become assessable by restricting them to be governed by the conditional variance dynamics. The idea is that once the constant correlation coefficient is taken into account, shifts in volatility introduce no additional unknown covariance parameters. The method enables us to estimate a fully simultaneous model for flow and return data. Particularly, we can identify all relevant impacts, letting the data decide about the respective contributions to the flow-return interaction. We discuss the methodological details below.

III. Data and Methodology

To provide a comprehensive account of the interaction between foreigners' trading and stock market returns, we combine analyses using monthly and daily data. The key data set consists of monthly and daily foreign flows. The monthly purchases and sales of foreign investors are reported by ISE who requires member brokers to file monthly reports of trades executed on behalf of nonresident clients. These data start from January 1997 and our sample period ends in September 2010. We normalize monthly net foreign flows by dividing by contemporaneous market capitalization, which ensures stationarity and comparability across time periods and to the results of other studies. Such normalization is also useful to figure out how important the net foreign demand is compared to the total supply of shares. The daily data are

derived from the ownership data supplied by the CRAT on a daily basis.[12] These data start from May 4, 2004 and our sample period ends on October 7, 2010, providing a total of 1620 observations. Both monthly and daily samples used in this study are the longest employed in this line of literature.

The local market is represented by the ISE-100 index. The monthly local returns are inflation-adjusted, as annual inflation during our sample period ranged between 101.62% in January 1998 and 5.27% in September 2009. We represent global developed markets by the MSCI Europe index, and global emerging markets by the MSCI Emerging Market index; both in local currency terms, avoiding currency fluctuations clouding stock market returns. The reason for choosing MSCI Europe index instead of MSCI-World index or US indices is that using daily data, trading hour differences might blur the analysis, especially the contemporaneous and first lag interaction. As the monthly return correlation between MSCI World and MSCI Europe indices is 0.944, this choice does not distract us from picking worldwide market information. Moreover, ISE-100's correlation is stronger with MSCI-Europe index than with other global developed market proxies.[13] All stock index returns are the first differences of natural logs of index values. All variables entering the VAR system, including normalized net flows, are I(0), and unit root test results are available from authors.

Use of MSCI Emerging Markets index requires special care at the daily frequency given that it covers a range of time zones across the world. In particular, Latin American components, which have high correlations with ISE, contain global (developed) market information that is not available at Istanbul closing time. Using the same-dated index values would thus cause US market information from later Latin American trading hours to appear like current emerging market information, thus lead to overstating the impact of emerging markets on ISE at the expense of next day MSCI Europe index's impact, and may even distort contemporaneous flow-return estimations. Indeed, results turned out to be sensitive to the inclusion or exclusion of Latin American components of MSCI Emerging Markets index. To avoid this problem, we created a time-zone-adjusted Emerging Markets index by using values from *t*-1 of Latin American components and same-dated values of all other (Asia, Europe, Middle East, Africa) components

[12] These data have been published between May 4, 2004 and .November 25, 2005 by the Clearing and Custody Bank (www.takasbank.com.tr).

[13] Over the 1997-2010 sample period, the monthly return correlation of ISE-100 with the MSCI Europe index was 0.572, while it was 0.569 with the MSCI World index, 0.530 with the S&P500 index and 0.550 with the FTSE-100 index.

of the MSCI Emerging Markets index, such that its value only reflects globally available information as of Istanbul closing time. This critical issue has not been mentioned in earlier papers that experimented with the MSCI Emerging Markets index.

Finally, for the sake of comparing our results to earlier literature that predominantly focuses on Asian markets, and for reaching generalized conclusions, we replicate our key analyses on Korea (KSE) and Taiwan using precise data supplied by the respective stock exchanges. The daily and monthly data for Korea extend from January 1999 to September 2010, and those for Taiwan from January 2001 to July 2008. Note that in the daily analysis, due to time zone differences, we use S&P500 index (t-1) values to represent the world index as in Richards (2005) and omit the emerging markets index to ensure comparability to his results. Table 1 displays summary statistics for data employed in this study, including those on Korea and Taiwan.

TABLE 1

Summary Statistics

Panel A: Monthly Data

		Net Foreign Flow		Local Return	
	n	Mean	St.Dev.	Mean	St.Dev.
Turkey	165	0.000526	0.002794	-0.01325	0.14542
Korea	141	0.000751	0.004299	0.00853	0.08154
Taiwan	91	0.001957	0.004319	0.00655	0.07194

Panel B: Daily Data

		Net Foreign Flow		Local Return	
	n	Mean	St.Dev.	Mean	St.Dev.
Turkey	1620	0.000065	0.001366	0.00081	0.01895
Korea	2925	3.71E-05	0.000414	0.00040	0.01883
Taiwan	1872	9.46E-05	0.000465	0.00028	0.01464

A. Daily Foreign Ownership Data

While quarterly and annual institutional ownership data have been extensively used in studies on US institutional investors, use of this kind of data in foreign investors' trading literature, especially at the daily frequency, is not common. Research on foreigners' trading in European emerging markets is blocked due to the absence of high-frequency data on foreign flows. Our derivation of a daily net foreign flow proxy from the ownership data enables the first study of foreigners' trading in a sizeable European emerging market, where foreign investors have a much more significant role. As the current paper is, to our knowledge, the first to employ this data set from Turkey, we discuss here some points that deserve attention in using these data.

The variable we use as *normalized marketwide net foreign flows* is the first difference of the percentage held by foreigners. We do not use a log transformation here, as the change in the percentage held by foreigners multiplied by the total market cap is directly a proxy for net foreign trading in dollars normalized by market cap. Or reversely, as shown by Bekaert et al. (2002, p.300-301), the percentage held by foreigners is the cumulative normalized net foreign flow.

CRAT reports both the total number of shares held by domestic and foreign residents and the total market value of these shares, along with percentages calculated thereof. We analyzed both versions: the correlation between the two net foreign flow proxies based on number of shares and market value is +0.93. The former avoids potential biases to which the latter is vulnerable as the ownership ratio based on market value of holdings may change not only by trading but also by the relative price changes of stocks. This bias may potentially be systematic as foreigners are known to typically hold large-cap stocks, and our data indicate that they hold higher-priced stocks on average. On the other hand, in this marketwide aggregated study, it is obviously the dollar value of trading that matters in terms of the impact on the market index. To guide our choice, and also to perform an external check of the accuracy of the proxy we are using, we computed the correlations between the monthly counterpart of the proxy we derive from daily ownership data and the actual monthly net foreign trading data supplied by ISE. The correlation is +0.845 when number of shares is used versus +0.830 when market value is used. Hence, throughout the paper we report results based on number of shares, though results are almost identical in both versions. It is worth mentioning that the correlation between our proxy and the actual trading data is satisfactorily high, compared to poorer proxies used in US institutional investors literature that had much lower correlations with the actual trades.

One of the sources of deviations from actual trading data is the fact that ownership may change for reasons other than trading. To inquire about this, we had detailed conversations with the officials of the CRAT and were told that non-trading transfers do not typically take place between foreigners' and domestic residents' accounts. The high correlation between our proxy and the actual monthly net flows data is thus owing to the fact that most non-trading transfers take place among same-residence-status clients. Yet, the quality of the data could be further improved if all changes due to anything other than trading could be identified and adjusted for, which, however, is not possible. In this direction, however, we took the following steps: first,

there are two dates when these data were revised by CRAT (with statistical justifications explicitly explained) resulting in jumps in the percentage held by foreigners. We removed the related observations. Then, we identified outliers,[14] and analyzed them individually. For three observations the change in percentage ownership was accompanied by an offsetting change on a near date, giving a clear impression of a large-size swap or security borrowing, so we removed them. There is also one day when the Clearing and Custody Bank did not report the data and started the next day with a jump: we removed this observation although we could not find an explanation.[15] Finally, for the remaining outliers we checked the effect of removing them on the correlation with the monthly actual trading data, and decided to remove the outlier observations whenever an improvement in the correlation is observed. This procedure led us to remove six more outliers. As our data consists of 1620 observations, this concerns only a negligible portion of it.

B. Methodology

Our analysis is based on VAR methodology, which portrays the dynamic relationship between flows and returns.[16] We augment the bivariate-VAR model with the developed and emerging global market returns that are affected only by their own lags. The advantage of utilizing this specification instead of a conventional VAR is that none of the lags of foreign flows in ISE and local returns affect the world returns, but contemporaneous values of them are affected by the instantaneous and lag values of world returns.

Specifically, the following SVAR specification is estimated:

$$A(L)y_t = \varepsilon_t \qquad (1)$$

where *A(L)* is an *n* x *n* matrix polynomial in the lag operator, $\boldsymbol{y}' =$ [*E, EM, F, R*], ε_t is the 4x1 vector of structural disturbances. *E, EM, R* are the log returns of the MSCI Europe index, MSCI Emerging Markets index (adjusted for time-zone differences at the daily frequency) and ISE-100 index, respectively, and *F* is normalized net foreign purchases. The analysis is performed first at the monthly and then at the daily frequency. The matrices in (1) are specified as follows:

[14] An outlier is defined to be a change in "market cap held by foreigners" which is greater than 0.7% in absolute value.

[15] The correlations with the actual monthly data reported above are calculated after these adjustments that are justifiable externally.

[16] Hasbrouck (1991) was the first to suggest the interaction between returns and flows be modeled as a VAR system.

$$y_t = \begin{bmatrix} E_t \\ EM_t \\ F_t \\ R_t \end{bmatrix} \quad A(L) = \begin{bmatrix} \mathrm{A}_{11}(\mathrm{L}) & 0 & 0 & 0 \\ \mathrm{A}_{21}(\mathrm{L}) & \mathrm{A}_{22}(\mathrm{L}) & 0 & 0 \\ \mathrm{A}_{31}(\mathrm{L}) & \mathrm{A}_{32}(\mathrm{L}) & \mathrm{A}_{33}(\mathrm{L}) & \mathrm{A}_{34}(\mathrm{L}) \\ \mathrm{A}_{41}(\mathrm{L}) & \mathrm{A}_{42}(\mathrm{L}) & \mathrm{A}_{43}(\mathrm{L}) & \mathrm{A}_{44}(\mathrm{L}) \end{bmatrix} \quad \varepsilon_t = \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix} \qquad (2)$$

where the assumptions are that ε_t is uncorrelated with past y_{t-p} for $p > 0$, and the coefficient matrix of L^0, A_0, is non-singular. The block exogeneity is represented by zero entries in *A(L)*, and implies that *E* and *EM* are exogenous to local variables *F* and *R* both contemporaneously and at lags.[17] This set of restrictions reflect a plausible hypothesis that conditions in developed markets as well as the general appetite towards emerging markets as a whole affect the domestic emerging stock markets, however domestic market variables are unlikely to affect world indices.[18] Omission of this plausible restriction might result in inaccurate impulse response coefficients and variance decompositions. Major papers employing VAR methodology in this line of literature (Griffin et al., 2004; Richards, 2005) employ similar restrictions only contemporaneously to enable identification of contemporaneous impulse response coefficients. We performed a sensitivity analysis by comparing the results with and without restrictions on lagged VAR coefficients. Main conclusions of our analysis are robust under both specifications. However, we have noted some small differences whereby the impact of flows on local returns at some lags operates via their relation to global market indices. While the discovery of lagged responses of global indices to local variables in ISE is interesting itself, we leave it elsewhere. The key insight is that, without the restrictions on lag coefficients described above, impulse responses may incorporate a spurious transmission effect whereby a lead by local variables over global indices may appear like a direct causal relationship between two local variables, which might entail misleading inferences, in particular an overstatement of lagged price impact and the extent of positive feedback trading with respect to local returns.

We chose the lag order based on eliminating residual autocorrelation, thus we preferred a rich lag structure.[19] This led us to a lag order of 5 in daily analysis, which is also the suggestion of AIC, and 4 in monthly analysis. Impulse response functions (IRF) are derived based on the

[17] Note that the above specification allows *E* to affect *EM*, but not vice versa.

[18] This hypothesis would hold true except for contagious emerging market crises like Mexico-94, Thailand-97 or Russia-98; and no such crises have taken place in Turkey during our sample period.

[19] By doing so, we avoid imposing doubtful restrictions at the expense of losing some degrees of freedom. Especially at the daily frequency where our sample size is very large, this is not an issue at all. This helps us uncover borderline significant individual responses at some lags.

structural factorization as defined in Equation (2), which implies *E* to be ordered first, followed by *EM*, and then the block of local variables. Note that by ordering *EM* after *E*, we are measuring the incremental contribution of global emerging markets index over and above the global developed market index. The system is estimated via Maximum Likelihood. For inference, we compute bootstrapped error bands for impulse responses using the percentile method (Hall, 1992).

A central issue in the literature has been the ordering between flows and returns in Cholesky factorization to enable contemporaneous identification. While the common treatment in the literature has been to place flows first, as discussed in Section 2.B above, the assumption underlying this choice may not necessarily be justified for data at frequencies lower than tick data. Here, we first follow the classical treatment in the literature by restricting the contemporaneous response of *F* to *R* to zero. Then, we introduce the SCC methodology as a new solution for this problem, and contrast the implications of both approaches.

C. Structural Conditional Correlation

Herein we discuss methodological details of the structural CCC (SCCC) model. As explained in section 2.B, time-variation in volatility is exploited for identification. Since *E* and *EM* are factors exogenous to the domestic variables, it is sufficient to consider the *F* and *R* equations in this respect, i.e., we deal with a two-equations system ($n = 2$) that includes contemporaneous and lagged *E* and *EM* as regressors. The task is to disentangle the sources of the (sizeable) part of the contemporaneous correlation between *F* and *R*, which is left unexplained by the observed factors.

Introducing the heteroscedastic specification, denote the conditional variances of the elements in an innovation vector ε_t by

$$\mathrm{Var}(\varepsilon_{jt} \mid I_{t-1}) = h_{jt}^2 \qquad j = 1,\ldots,n\,, \tag{3}$$

where I_{t-1} stands for the whole set of available information at time $t-1$. The vector $H_t = \left(h_{1t}^2 \quad \ldots \quad h_{nt}^2\right)$ stacks the variances. The volatility dynamics are modelled by a set of univariate GARCH(1,1) processes. For $j = 1,\ldots,n$ we write

$$h_{jt}^2 = (1 - g_j - d_j)c_j + g_j h_{jt-1}^2 + d_j \varepsilon_{jt-1}^2\,, \tag{4}$$

where c_j denotes the unconditional variance and g_j and d_j are the GARCH and ARCH coefficients, respectively. The structural covariances can be recovered by the constant conditional correlation assumption as

$$\mathrm{Cov}(\varepsilon_{it}, \varepsilon_{jt} \mid I_{t-1}) = h_{ijt} = \rho_{ij} h_{it} h_{jt} \qquad i \neq j\,, \tag{5}$$

where ρ_{ij} denotes the correlation between the ith and jth innovation. This correlation can be thought of as arising from exposure of variables i and j to unobserved common factors.

Let P designate the correlation matrix of ε_t, holding ones on the main diagonal and the ρ_{ij} as its off-diagonal elements. Then, the conditional covariance matrix Ω_t of the structural innovations results as

$$\Omega_t = diag\{H_t\}^{1/2} P diag\{H_t\}^{1/2}\,. \tag{6}$$

Accounting for the discussion in Bollerslev (1990) and given positive variances from the GARCH processes, Ω_t is assured to be positive definite. This property carries over to the conditional covariance matrix of the reduced-form residuals $A_0^{-1}\varepsilon_t$

$$\Sigma_t = A_0^{-1} \Omega_t (A_0^{-1})' \tag{7}$$

due to its quadratic form. Cross-correlations, as represented by non-zero off-diagonal elements, can arise both from spillovers according to the coefficients in A_0^{-1} or from structural covariances h_{ijt} (the off-diagonal entries in Ω_t). In this context, note as well that the constant correlation restriction only applies to the *structural* innovations; the realised variables y_{it} may well feature time-varying correlation depending on the variance developments and the spillovers in A_0. Furthermore, Weber (2010) created a model version featuring dynamic structural correlation. We tested for time variation in P using the procedure proposed in Engle and Sheppard (2001). However, we found no evidence against constancy of structural conditional correlations, what supports the SCCC framework employed in the following.

The SCCC model is estimated by Quasi Maximum Likelihood (QML) applying conditional normal densities for the ε_{jt}. Numerical likelihood optimisation is performed using the BHHH algorithm (Berndt et al., 1974). In order to avoid relying on numerical standard errors we conduct relevant parameter tests by likelihood ratio (LR). All model equations (2), (4), (5) are estimated simultaneously in one step, i.e. including the VAR. Weber (2010) discusses

identifiability of the SCCC model. In particular, linear independence of the conditional variances is required. Logically, identification through SCCC relies on sufficient time variation in the variance of at least one of the innovations. In particular, ARCH effects must be present. While this is trivially fulfilled in daily financial data, it is well known that ARCH weakens when the data frequency is lowered. Indeed, in our monthly time series no ARCH can be detected. Therefore, using SCCC we focus on the daily data.

IV. VAR Results

We present results by studying IRFs. IRFs track the dynamic response of a variable to a shock in another variable until the effect of the shock dies down. Hence, they provide a tool to distinguish temporary and permanent effects, to simultaneously analyze contemporaneous[20] and lagged responses, and to quantify the cumulative effect. By portraying the trajectory of the lagged responses, they also enable measurement of economic significance of forecast ability.

In IRF graphs to follow, we track the response to a one-standard deviation shock (the solid line in the middle). Thus, we focus on the effect of the surprise (unexpected) component of the variables in the system. Bootstrapped 90% confidence bands are also provided to help a visual inspection of the significance of the results (dashed red lines around the solid line). Throughout the text below, we will use the variable names in abbreviated form as defined above. We first present monthly and then daily results. When we are comparing two IRFs in the same graph or focusing on measuring price impact, we depict cumulative IRFs.

A. Results at the Monthly Frequency

The first (upper-left) IRF in Figure 1 suggests a strongly positive contemporaneous response of *F* (net foreign flows in ISE) to *E* (global developed market returns). The lagged responses are positive and borderline significant in some of the subsequent months. The response to *EM* (global emerging market returns) is similarly significantly positive, though with a smaller magnitude contemporaneously, but stronger at lags, even significant up to 4th month. Thus,

[20] Concerning contemporaneous effects, they reflect the factorization imposed. However, SCC, which we will resort to in the next section, can avoid the ordering assumptions as discussed above.

global emerging market returns are an important determinant of foreign flows into ISE, significant even after controlling for global developed market returns. This is a new finding, suggesting that portfolio rebalancing following price changes in source markets may not be the only global driver of foreign flows into emerging markets. An additional factor, either portfolio rebalancing among emerging markets or an information factor correlated with emerging market returns, must exist.

In unreported results without controlling for *EM*, we find that the lagged responses of *F* to itself are significantly positive, implying strong persistence, which might be considered as an indication of herding as the alternative explanation, marketwide order splitting across months, is to be ruled out here. However, once sufficient lags of global emerging market returns are controlled for, its magnitude and significance visibly diminish, as seen in Figure 1 below (third graph in the upper row). Thus, lagged global emerging market returns account for a large portion of persistence in net foreign flows.

A key finding, already documented by İkizlerli and Ülkü (2010) is the negative feedback trading with respect to local market returns at the monthly frequency. Here, we show that this finding is robust to controlling for global emerging market returns (the fourth graph in the upper row). The negative lagged response of net foreign flows to local returns at the monthly frequency would be consistent with portfolio rebalancing whereby international investors reduce their holdings gradually over time after a particular emerging market has overperformed to bring their portfolio weights back to previous levels. Note that although the lagged response of net foreign flows to global returns is significantly positive, the negative response to local returns rules out two alternatives: a naïve, mechanic positive feedback trading strategy and sentiment trading.

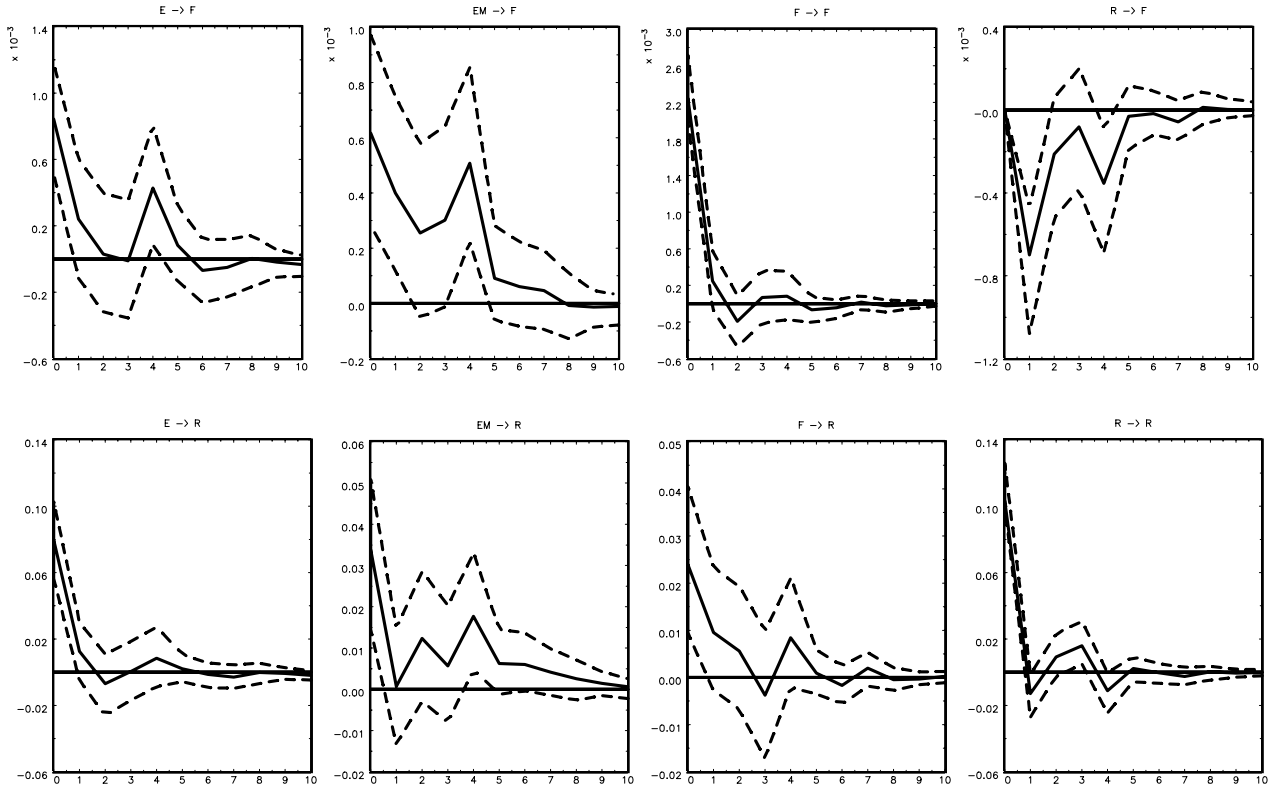
IRFs in the lower row suggest that ISE returns show some borderline-significant lagged response to global emerging market returns and net foreign flows, implying some forecastability. In particular, the cumulative lagged response of *R* to *EM* is noteworthy.

FIGURE 1

Monthly Impulse Reponses of *F* and *R*

The upper row shows impulse responses (IR) of net foreign flows (*F*) to a 1-standard deviation shock in MSCI-Europe index returns (*E*), MSCI Emerging Markets index returns (*EM*), itself, and ISE-100 index returns (*R*), respectively. The lower row shows impulse responses of ISE-100 returns (*R*) to a 1-standard deviation shock in MSCI-Europe index returns (*E*), MSCI Emerging Markets index returns (*EM*), net foreign flows (*F*) and itself, respectively. Each graph is

described by a notation on its top where the letter before the arrow stands for the impulse (shock) variable and the letter after the arrow represents the response variable. The solid line in the middle represents IR coefficients and the dashed lines around it represent bootstrapped 90% confidence band. X-axis shows the months. 0 is the contemporaneous month.



Forecast error variance decompositions based on the same specification are presented in Table 2 below to assess the relative role played by variables in our VAR system in explaining foreign flows and local returns. Global emerging market returns have a significant explanatory power in determining net foreign flows that operates with lags of several months. It is also noteworthy that a significant portion of the variance in *F* (unlike that in *R*) is accounted for by lagged variables in the system.

TABLE 2

Variance Decompositions for the Monthly Frequency

Proportions of forecast error in **F** accounted for by:					Proportions of forecast error in **R** accounted for by:				
forecast horizon	**E**	**EM**	**F**	**R**	forecast horizon	**E**	**EM**	**F**	**R**
1	0.12	0.06	0.82	0.00	1	0.35	0.07	0.03	0.55
2	0.11	0.08	0.74	0.07	2	0.34	0.07	0.04	0.55
3	0.11	0.08	0.74	0.07	3	0.34	0.07	0.04	0.55
4	0.11	0.09	0.73	0.07	4	0.34	0.08	0.04	0.55
5	0.13	0.12	0.68	0.08	5	0.33	0.09	0.04	0.54
6	0.13	0.12	0.68	0.08	6	0.33	0.09	0.04	0.53
7	0.13	0.12	0.68	0.08	7	0.33	0.10	0.04	0.53
8	0.13	0.12	0.68	0.08	8	0.33	0.10	0.04	0.53
9	0.13	0.12	0.68	0.08	9	0.33	0.10	0.04	0.53
10	0.13	0.12	0.68	0.08	10	0.33	0.10	0.04	0.53

Next, we provide additional break-downs using dummy variables to partition the data. Specifically, by employing dummy variables, we estimate different coefficients for a particular right-hand-side variable (including all lags) depending on its current sign. In Figure 2, we compare the cumulative impulse responses of net foreign flows to local return shocks when returns are negative or positive.[21] There is a pronounced asymmetry: negative feedback trading appears only following positive local returns. This rules out a mechanic portfolio rebalancing strategy and especially sentiment trading. In Figure 3, we compare the cumulative impulse responses to positive and negative net foreign flows. Panel A shows that net flows are more persistent at long lags following net inflows, whereas they are more volatile (persistent at lag 1, but reverse later) following net outflows. In unreported results, we also find that both net inflows, but in particular net outflows, exhibit contrarian market timing with respect to local returns. Panel B shows that ISE returns exhibit more lagged response to *F* when foreign capital flows out whereas the price impact in case of net inflows is mainly contemporaneous and partly reversed later. These results together may be indicative of an ingenious timing strategy whereby foreigners build up long positions smoothly over time, and take advantage of bullish sentiment among domestic investors, after initially riding it, to exit the market well ahead of bad times, successfully avoiding a contemporaneous price impact.[22] As we shall see below, daily results also support this interpretation.

FIGURE 2

[21] As the standard deviation in cases of positive and negative values of the variables might differ, in asymmetry checks we track impulse responses to a 1-unit rather than 1-standard deviation shock for better comparability.

[22] An alternative interpretation based on the relative easiness of implementing portfolio rebalancing following a rise in the local market (in the form of profit taking) would not be consistent with the lagged price impact of net outflows.

Asymmetry in Feedback Trading

The solid-blue (dashed-red) line shows cumulative impulse responses of net flows to a 1% return shock when returns are positive (negative). 0 is the contemporaneous period.

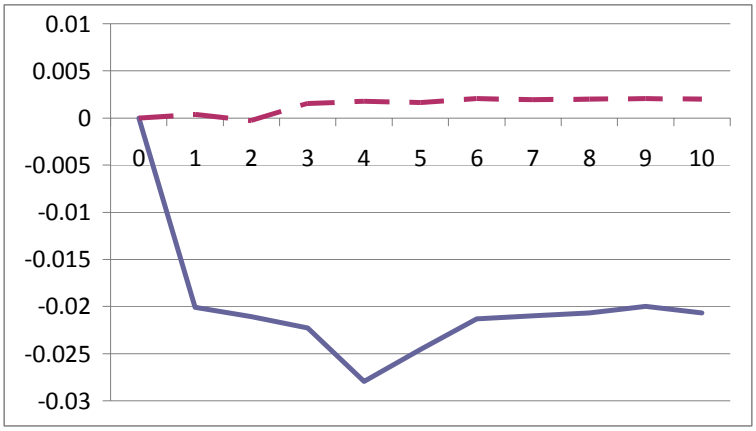
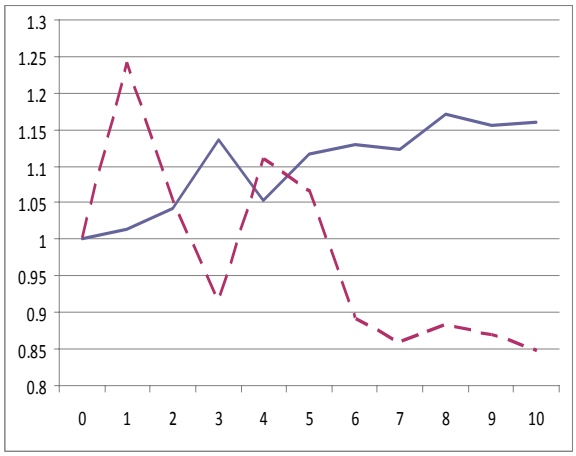


FIGURE 3

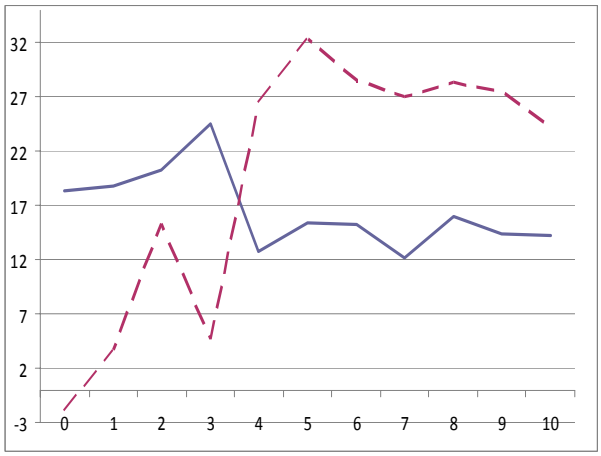
Asymmetry with respect to Net Inflows versus Net Outflows

In Panel A, the solid-blue (dashed-red) line shows cumulative impulse responses of net flows to a unit net flow shock when it is inflow (outflow). In Panel B, the solid-blue (dashed-red) line shows cumulative impulse responses of local returns (in per cent) to a unit net flow shock when it is inflow (outflow). 1-unit net flow is 1 % of market capitalization. 0 is the contemporaneous period.

Panel A: Response of *F* to positive vs. negative *F*



Panel B: Response of *R* to positive vs. negative *F*



To assess whether the above results are specific to a European emerging market with a large external deficit or can be generalized, we compare our results by replicating the same specification on Korea and Taiwan. Results available from the authors suggest that in both Korea

and Taiwan *E* is a significant determinant of *F* both contemporaneously and at the first lag, while *EM* is significant only contemporaneously.[23] The persistence in net foreign flows is much stronger in Korea, while it is similar to Turkey in Taiwan. Net flows respond to local returns significantly negatively at the first and second month lags in both Korea and Taiwan, as in Turkey. This suggests quite uniform behavior of foreign investors across geographies and qualifies results of some previous studies that report positive feedback trading at the monthly frequency.[24] However, the asymmetry (i.e., negative feedback trading following bullish but not bearish months) is most visible in Turkey, quite moderate in Taiwan and absent in Korea. This may be consistent with an argument that large external deficits might make foreign investors more alert at good times and hesitant to finance at bad times.

B. Results at the Daily Frequency

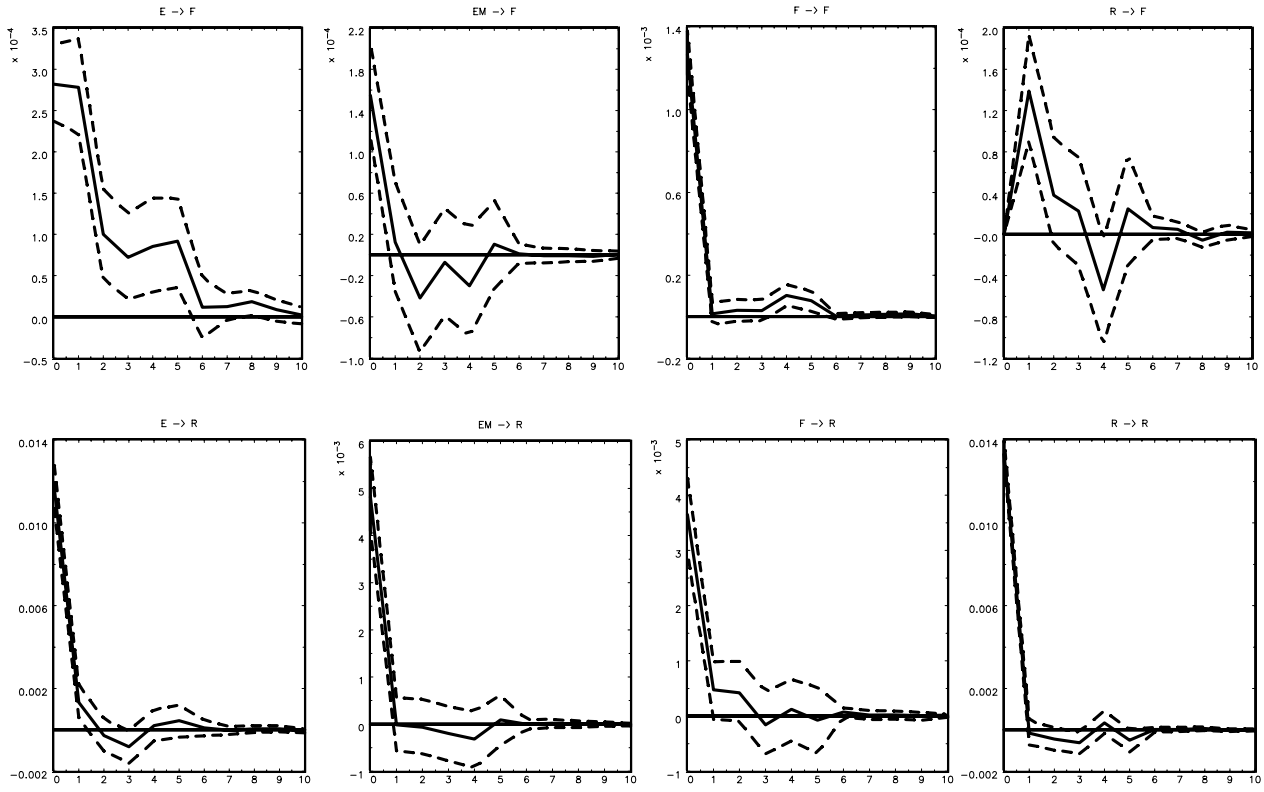
In this section, we present the first daily results on foreigners' trading in a sizeable European emerging market in the literature. The first (upper-left) graph in Figure 4 shows that net foreign flows in ISE exhibit significantly positive contemporaneous and lagged responses to *E* (global developed market returns). Net foreign flows have a significantly positive contemporaneous association with *EM* (global emerging market returns), however the lagged responses to *EM* are insignificant (the second graph).[25] Thus, we obtain a different picture at the daily frequency where the effect of *E* is much stronger as opposed to the monthly frequency where *EM* took a stronger and prolonged role. A viable interpretation is that developed market returns induce immediate rebalancing whereas the prolonged lagged responses to global emerging markets index operates via a different channel such as longer term trends. Foreign flows may be instantaneously responding to globally relevant information such as US data or US-European market events, which are more visible, and reacting to emerging markets related information, which is less visible and more scattered, only when they lead to medium-term trends.

[23] Results are robust when we replace *E* with S&P500 index or MSCI World index.
[24] Those earlier results may be due to failure to properly control for global developed and emerging market returns, and short samples covering post-liberalization periods with partial restrictions on foreigners' trading.
[25] When interpreting the daily results, one should recall that we are employing here a time-zone-adjusted version of the MSCI Emerging Markets index. The results with the original MSCI Emerging Markets index were misleading in that the responses of both *F* and *R* to *EM* were significant at the first lag, which justifies the efficacy of our time-zone-adjusted version.

FIGURE 4

Daily Impulse Responses of Net Foreign Flows and Local Returns

The upper row shows impulse responses (IR) of net foreign flows (*F*) to a 1-standard deviation shock in MSCI-Europe index returns (*E*), MSCI Emerging Markets index returns (*EM*), itself, and ISE-100 index returns (*R*), respectively. The lower row shows impulse responses of ISE-100 returns (*R*) to a 1-standard deviation shock in MSCI-Europe index returns (*E*), MSCI Emerging Markets index returns (*EM*), net foreign flows (*F*) and itself, respectively. Each graph is described by a notation on its top where the letter before the arrow stands for the impulse (shock) variable and the letter after the arrow represents the response variable. The solid line in the middle represents IR coefficients and the dashed lines around it represent bootstrapped 90% confidence band. X-axis shows the days. 0 is the contemporaneous day.



One of the key contributions of this paper is to combine monthly and daily analysis to illuminate the issue of feedback trading by foreigners. The finding of negative feedback trading at the monthly frequency is neither consistent with previous results reported in the literature nor easy to explain in the light of available theories other than the rebalancing theory of Hau and Rey (2004). The last graph in the upper row of Figure 4 shows that net foreign flows exhibit a significantly positive lagged response to local returns at the daily frequency, in sharp contrast to monthly frequency. Hence, foreigners' feedback trading does not follow a mechanic trading rule.

Our daily results are not consistent with an automatic rebalancing mechanism whereby international investors respond by immediately reducing their holdings when a particular emerging market overperforms, either. Rather, they may be responding to local information instantaneously within days when it arrives, then shifting to contrarian strategy after the pricing-in of new information is completed or local traders overreact to it.

A comparison of lagged responses of *F* and *R* to each other raises strong doubt on the validity of the standard ordering assumption in the literature at the monthly frequency, as net foreign flows' lagged response to local returns is much more pronounced compared to local returns' lagged response to net foreign flows. The variance decompositions presented later show that *R*'s lagged effect in the forecast error variance of *F* is about seven times bigger than *F*'s lagged effect in the forecast error variance of *R*. In the next section, we will further question the validity of the same assumption in identifying the contemporaneous day association between flows and returns, employing novel methodology.

The first two graphs in the second row of Figure 4 show that ISE-100 index returns (*R*) exhibit a significant contemporaneous response to both *E* and *EM*. The response to *E* at the first lag is also significantly positive, though of a much smaller magnitude compared to the contemporaneous response, and is reversed at the third lag. All other lagged responses are insignificant. This indicates that global market information is quite quickly incorporated in stock prices in ISE. The contemporaneous price impact of net foreign flows (as interpreted under the standard assumption that flows cause returns) is significantly positive, and first and second lags are also positive at borderline levels of significance, which implies a modest degree of forecast ability contained in surprise foreign flows. As there are no negative lagged responses, our results reject the price pressure hypothesis, but are consistent with information and/or base-broadening. This insight is enhanced in the light of monthly results where we had reported no reversal, either. The response of *R* to a shock in itself shows that domestic information is priced-in instantaneously and precisely within one day.

We can compare these results to those on Korea and Taiwan (available from authors). A first note is about common factor influence: Richards' (2005) results are based on overnight US returns being the sole control variable. However, it is well known that global information is incorporated via US index futures that are traded on an almost-24-hour basis, hence a simultaneous global return variable is missing in Richards' specification. For this reason, we

include same-day returns of Nikkei-225 index of Japan into the specification which are highly correlated with US index futures during Asian trading hours. Japanese returns enter the system significantly, alter other coefficients and, in particular, reduce the price impact estimates of foreign flows, making a typical example of omitted common factor influence. In both Korea and Taiwan, we observe a higher degree of persistence in net foreign flows, as compared to Turkey. In Korea, there is significantly positive feedback trading at the first lag, which suggests that Richards's (2005) finding of insignificant negative feedback might be due to the short sample. However, positive feedback trading is relatively short-lived. In Taiwan, positive feedback trading is significant and persists through the third day. Thus, notwithstanding small differences, positive feedback trading at the daily frequency appears to be a uniform result. One can also note that the borderline significant forecast power contained in *F* at the first and third lags in Turkey is absent in Korea and confined to the first lag in Taiwan. All other results are qualitatively similar to those on Turkey.

Next, we enquire potential asymmetries at the daily frequency by comparing cumulative impulse responses to a 1-unit shock. Figure 5 shows that positive feedback trading is particularly significant following negative local returns, which is consistent with a quick defensive reaction to bad news, and a lax slow reaction to good news.[26] It is also consistent with the well-known contrast between institutional and individual investor behavior: institutionals are more likely to cut losses following bad news while individuals suffer from disposition effect (O'Connel and Teo, 2009). Panel A of Figure 6 shows that flows exhibit strong persistence following only net buys. Thus, the asymmetry of net flows to positive and negative local returns cannot be explained by an asymmetry between buying and selling persistence (i.e., different strategies employed in executing large buy and sell orders, or different intensity of herding when buying versus selling). Rather in presence of persistence asymmetry, the feedback trading asymmetry becomes more pronounced.

FIGURE 5
Asymmetry in Feedback Trading

[26] This finding is in line with İkizlerli and Ülkü (2011) who document, using monthly data, that foreign investors in Turkey exhibit an immediate response to political risk downgrades but a slow modest response to political risk upgrades.

The solid-blue (dashed-red) line shows cumulative impulse responses of net flows to a 1% return shock when returns are positive (negative). 0 is the contemporaneous day.

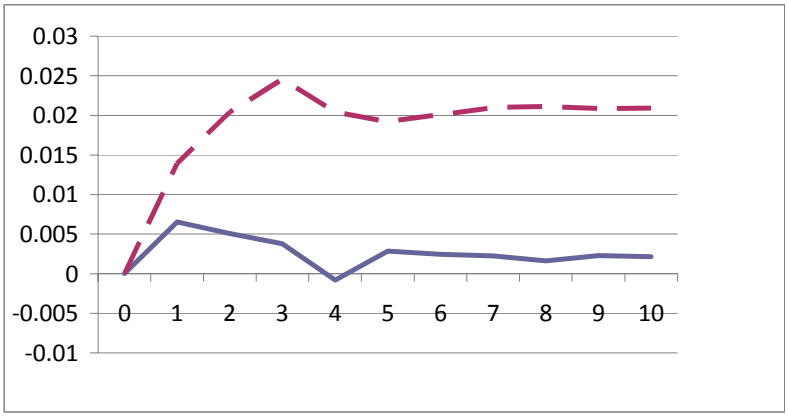
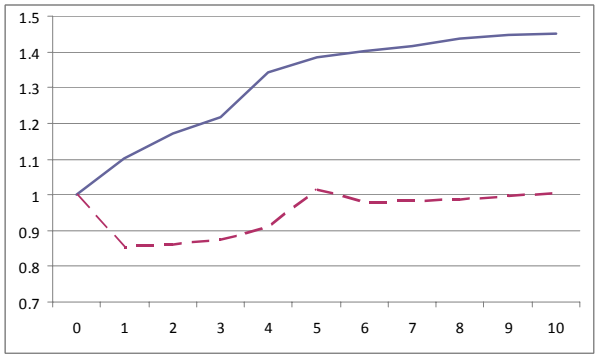


FIGURE 6

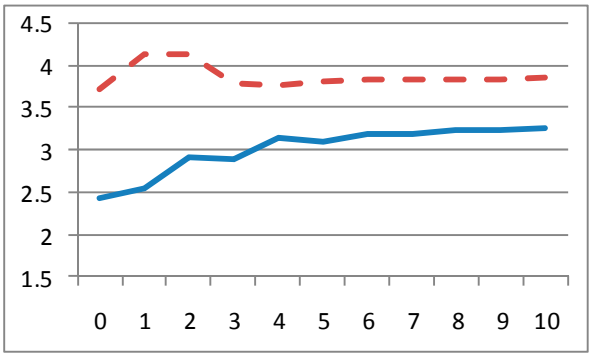
Asymmetry in Responses to Net Inflows versus Net Outflows

In Panel A, the solid-blue (dashed-red) line shows cumulative impulse responses of net flows to a unit flow in case of net inflows (net outflows). In Panel B, the solid-blue (dashed-red) line shows cumulative impulse responses of local returns (in per cent) to a unit flow shock in case of net inflows (net outflows). 1-unit net flow is 1 % of market capitalization. 0 is the contemporaneous period.

Panel A: Response of *F* to Positive vs. Negative *F*



Panel B: Response of *R* to Positive vs. Negative *F*



Panel B of Figure 6 shows that the contemporaneous price impact (again as interpreted under the standard assumption) is stronger in case of net foreign selling, although it should be easier to supply liquidity to a seller than to a buyer in a non-dealer market where short selling is practically absent. This is also true at the first lag. From the second lag, lagged price impact of buys continues and that of sells partly (in particular, the follow-through at the first lag) reverses. These observations, in relation to net flow persistence following only net buys, are consistent

with immediate reaction to bad news but slow build-up of confidence upon good news. Recall that at the monthly frequency, we found negligible contemporaneous price impact of net foreign selling whereas at the daily frequency we see net selling has even stronger contemporaneous price impact. These break-downs are quite illuminating in that they lead us to a comprehensive description of foreign investors' trading behavior: Foreigners are probably a heterogeneous group, who employ sophisticated medium-term timing strategies to minimize price impact by picking extreme bullish sentiment among domestic investors to exit, while also reacting to bad news immediately. Thus, it would be fair to argue that their trading reflects (a sophisticated use of available) information.

Variance decomposition results at the daily frequency show some contrast to those at the monthly frequency in that *EM* has a very small incremental role in explaining net foreign flows at the daily frequency. As all of this role come at the contemporaneous period, we interpret this as absence of rebalancing with respect to global emerging markets, consistent with our aforementioned interpretation that foreign flows' response to *EM* operates via a different channel. Half of the response to *E* comes at lags. Note that the forecast error variance of *F* and *R* accounted for by each other reported here rely on the standard ordering assumption that only flows can cause returns contemporaneously, and will be compared to those results when this assumption is relaxed in the next section.

TABLE 3

Variance Decompositions for the Daily Frequency

Proportions of forecast error in **F** accounted for by:					Proportions of forecast error in **R** accounted for by:				
forecast horizon	**E**	**EM**	**F**	**R**	forecast horizon	**E**	**EM**	**F**	**R**
1	0.05	0.01	0.94	0.00	1	0.40	0.07	0.04	0.50
2	0.09	0.01	0.89	0.01	2	0.40	0.06	0.04	0.50
3	0.09	0.01	0.88	0.01	3	0.40	0.06	0.04	0.50
4	0.09	0.01	0.88	0.01	4	0.40	0.06	0.04	0.50
5	0.10	0.01	0.88	0.01	5	0.40	0.06	0.04	0.50
6	0.10	0.01	0.87	0.01	6	0.40	0.06	0.04	0.50
7	0.10	0.01	0.87	0.01	7	0.40	0.06	0.04	0.50
8	0.10	0.01	0.87	0.01	8	0.40	0.06	0.04	0.50
9	0.10	0.01	0.87	0.01	9	0.40	0.06	0.04	0.50
10	0.10	0.01	0.87	0.01	10	0.40	0.06	0.04	0.50

V. Daily Results Identified by SCC

A. Estimation Results

As noted above, we estimate the structural VAR under the SCCC specification by QML. The focus is on the simultaneous part, i.e. the spillovers between flow and return in A_0 and the correlation ρ of the according shocks, ε_{3t} and ε_{4t}. We explore by LR tests which coefficients matter for the simultaneous structure. The null hypothesis $H_0 : \rho = 0$ leads to a LR statistic of .03. This is clearly insignificant, the 10% critical value being 2.71. Evidently, the considered exogenous variables are sufficient to cover the common factor influence. The contemporaneous spillover from flows to returns $A_{0,43} = 0.7162$ is only borderline-significant with a LR value of 2.735.[27] Notably, this value is far smaller than that in the standard Cholesky model.[28] The second spillover from returns to flows $A_{0,34} = 0.0188$ is highly significant (LR=9.202). This suggests that a larger portion of the contemporaneous association between foreign flows and local returns is due to returns affecting flows rather than vice versa.

As the application of the SCC methodology to this line of literature is new, it may be useful to provide a mapping between the concepts of standard models and our results using the SCC approach. As noted previously, under the infeasibility of contemporaneous identification and negligence of common factors, the standard models decompose flow-return interaction into three effects: (i) price impact (the in-tick-data-sense contemporaneous association between flows and returns which is assumed to be caused by flows thus attributed to either private information if it is permanent, or to price pressure if it is reversed subsequently), (ii) intraday lagged price impact (which would be attributed to asymmetric information), and (iii) intraday positive feedback trading. The output of our approach does not map one-to-one. For example, (i) may in reality be due to (i.a) latent common factor influence (i.e. public information arrivals) to the extent that price reaction to public information arrivals is accompanied by trading,[29] and (i.b) price impact. It should also be noted that SCC methodology does not impose a time order within the contemporaneous period, rather it operates based on identifying contemporaneous regression

[27] Recall that A_0 stand left hand side, so that positive spillovers have a negative sign in the estimated equation, however we report them the way they should be interpreted for reader's convenience.

[28] Danielsson and Love (2006) argue that in their case price impact *increases* when *positive* feedback trading is allowed for. However, note that both spillovers $A_{0,43}$ and $A_{0,34}$ simultaneously explain the given flow-return correlation. When the feedback trading rises from zero (i.e., no feedback trading) to some positive value, there remains a lower share of the correlation to be explained by the price impact. Therefore, the price impact should *decrease*, as it does in our estimations.

[29] In ISE, electronic order book system with irreversible limit orders and absence of specialists makes public information arrivals for sure accompanied by trading.

coefficients. Our approach decomposes the contemporaneous interaction between flows and returns into four components: 1) common observed factor influence (the impact of global indices), 2) common latent factor influence (domestic public information), 3) flow's impact on return (as all common drivers are controlled for in (1) and (2), this can be regarded either private information if it is permanent or price pressure if it is reversed on subsequent days), 4) return's impact on flow (after controlling for all common drivers and logically excluding the possibility of returns affecting same-moment flows, this can be regarded feedback trading, although SCC results are not based on a time order within the day). The SCCC specification captures (1) by explicitly controlling for known common drivers *E* and *EM*, (2) via the correlation ρ of the according shocks, ε_{3t} and ε_{4t}, (3) and (4) via the identified contemporaneous coefficients of *F* and *R* in *R* and *F* equations, respectively.

Thus, our SCCC results lead to the following interpretation: The correlation between ε_{3t} and ε_{4t} in a standard bivariate VAR, which does not contain the global indices *E* and *EM*, is 0.35, and falls to 0.26 once global public information (*E* and *EM*) are controlled for. Hence, a significant portion of the contemporaneous association between domestic returns and net foreign flows is due to global indices. While one may expect it to be even higher as ISE returns are very strongly related to global indices and a main determinant of foreign flows is known to be global markets, it should be recalled from Figure 4 that more of the response of net flows to *E* comes at lags, while *R*'s response to *E* is almost completed at the contemporaneous period. This is consistent with a heterogeneous speed of adjustment by foreign investors to global market information or gradual rebalancing over a time span of several days. The remaining 26% are to be further decomposed by SCC. As ρ turned out to be insignificant, we conclude that domestic public information has little role in leading to simultaneous flows and local returns. This can be interpreted as either domestic (country-specific) public information being not so important as a common driver of ISE returns and foreign flows, or foreign investors responding to it either ahead or with some lag.[30] In particular, if foreigners are heterogeneous in terms of access to

[30] Our direct observations in the market are partly consistent with both arguments. For example, intraday behavior of ISE indices and market participants show much more modest response to domestic macroeconomic data compared to US macroeconomic data. Moreover, variance decompositions at the daily frequency show that the lagged role of *E* in explaining *F* is about four times larger than the lagged role of *R*, so a smaller contemporaneous role of domestic information is no surprise taking into consideration potential delays in foreigners' response to domestic information. Our observations also suggest that lagged reactions to domestic public information are common.

private information, among short-term traders contemporaneous positive response to public news may be offset by contrarian trading (profit taking) by privately informed foreigners, while long-term foreign investors' response comes with lags. Sophisticated institutional traders might be hesitant to trade right upon public information arrivals either to avoid unfavorable price impact or because they need time to assess the implications of news within institutional decision making bodies.

Results on coefficients $A_{0,43}$ and $A_{0,34}$ suggest that the interaction between domestic returns and foreign flows is bilateral, even the effect of local returns on foreign flows is stronger rather than vice versa. Three factors may contribute towards a significant effect of local returns on foreign flows:[31] (i) intraday positive feedback trading whereby foreigners infer information from intraday price changes or technical-trading funds condition their trades on intraday price signals; (ii) local returns adjusting to new information quickly and precisely whereby foreigners as a group display a partial and gradual adjustment to new information; (iii) a front running story whereby local returns adjust faster and more precisely to the information contained in foreign order flows forcing foreigners to split orders.[32] For a better understanding of (ii) and (iii) it is important to note that these mechanisms would create noise in *F*. Specifically, trades adjusting with a lag, or limit orders filled on a later delay upon a reverse price move would create noise in *F* amid the contemporaneously reacting flows. Thereby, "noise" is used in the sense of effects orthogonal to the actual *F*-*R* connection. Other sources of such effects include liquidity-motivated trading or deviations of the measured from the true *F* series (see Section III.A). It is well known that such noise is rather neutral when it concerns a dependent variable, since it can simply enter the residual. However, when an explaining variable contains noise, its explanatory power is adversely affected by the presence of components unconnected to the dependent variable. In our simultaneous equation system this implies that the causality might tend to be allocated away from the effect of *F* on *R* towards the reverse effect. This would be the case when

[31] Danielsson and Love (2006) mention a fourth possibility, which is more relevant for the foreign exchange markets they study: stop-loss orders. With stop-loss orders, it is clear that causality runs from returns to flows. However, stop-loss orders are not very common in ISE, and foreign investors are generally long-term investors who make less use of stop-loss orders.

[32] Several mechanisms may lead to this: leakage of information on large foreign orders, leakage of information during foreign investors institutional decision process, the high level of transparency in ISE enabling intraday traders infer information from trades of brokers associated with large foreign clientele so that when foreign traders start executing a large order they could buy or sell the largest portion of the order only after driving the price by a significant magnitude and quite frequently have to postpone execution of part of the order.

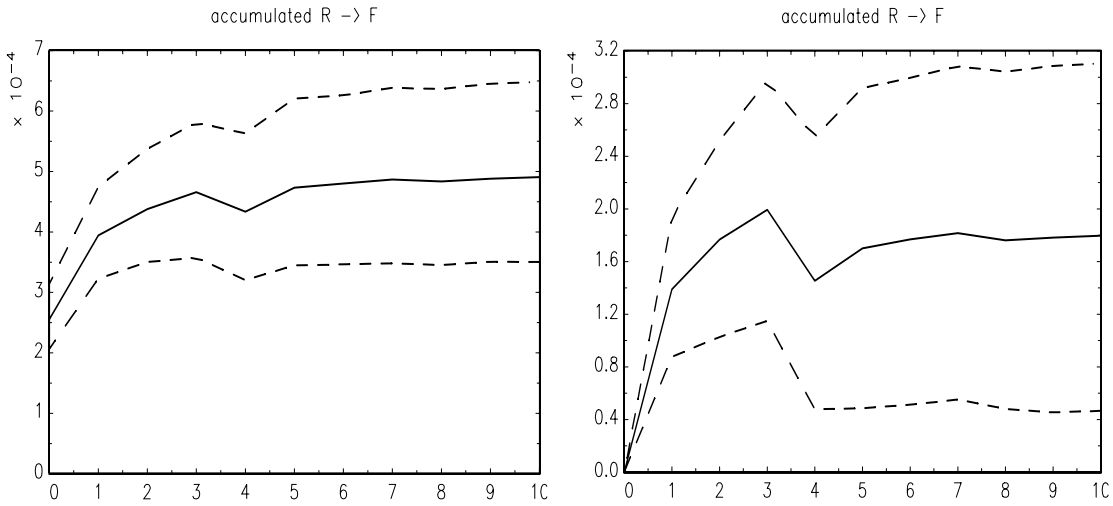
R responds precisely the information contained in a noisier *F* distracted by other influences unrelated to the *F*-*R* connection.

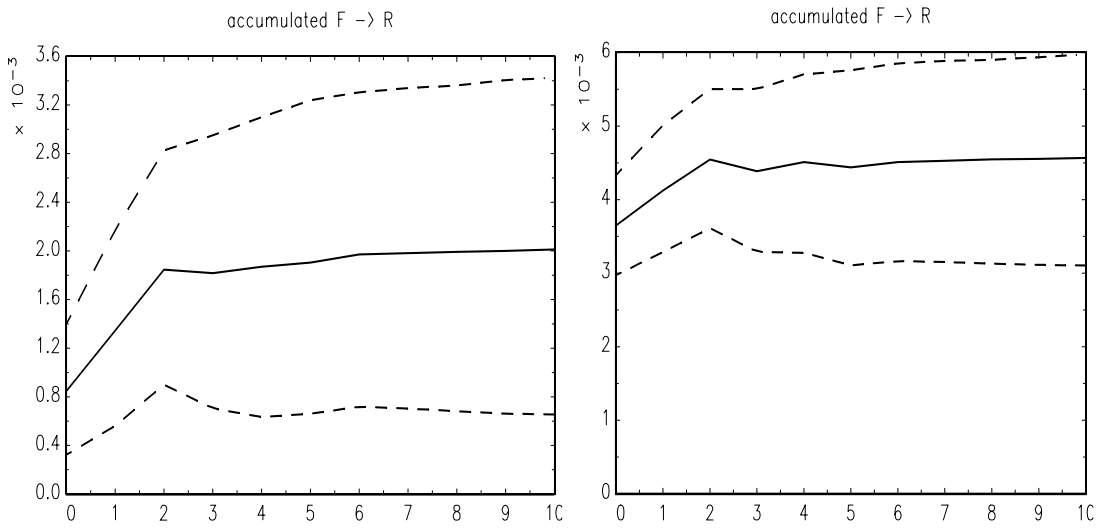
As SCC results alter impulse response functions, which were previously based on an inaccurate Cholesky ordering assumption, we repeat the impulse response analysis in the correctly identified model (ρ is restricted to zero to improve estimation efficiency). Figure 7 compares *F* and *R*'s cumulative impulse responses to each other under the SCCC model (on the left) and under the standard Cholesky assumption (on the right). Most obvious is the shift from *imposed* price impact to feedback trading.

FIGURE 7

Comparison of Flow-Return Interaction under the Standard Assumption vs. under SCCC

IR's on the left are based on SCCC results and those on the right are based on the standard assumption that only flows can cause returns contemporaneously. The upper row shows ISE-100 index returns' cumulative IR to a 1-standard deviation shock in net foreign flows. The lower row shows net foreign flows' cumulative IR to a 1-standard deviation shock in ISE-100 index returns.





Finally, the variance decompositions based on the SCCC model are reported in Table 4 below. It is striking that the proportion of local returns accounted for by net foreign flows is negligible once the Cholesky assumption is relaxed.

TABLE 4

Daily Variance Decompositions under the SCCC Assumption

Proportions of forecast error in **F** accounted for by:					Proportions of forecast error in **R** accounted for by:				
forecast horizon	**E**	**EM**	**F**	**R**	forecast horizon	**E**	**EM**	**F**	**R**
1	0.05	0.01	0.90	0.04	1	0.40	0.07	0.00	0.53
2	0.09	0.01	0.85	0.05	2	0.40	0.06	0.00	0.53
3	0.09	0.01	0.85	0.05	3	0.40	0.06	0.00	0.53
4	0.09	0.01	0.84	0.05	4	0.40	0.06	0.00	0.53
5	0.10	0.01	0.84	0.05	5	0.40	0.06	0.00	0.53
6	0.10	0.01	0.84	0.05	6	0.40	0.06	0.00	0.53
7	0.10	0.01	0.84	0.05	7	0.40	0.06	0.00	0.53
8	0.10	0.01	0.84	0.05	8	0.40	0.06	0.00	0.53
9	0.10	0.01	0.84	0.05	9	0.40	0.06	0.00	0.53
10	0.10	0.01	0.84	0.05	10	0.40	0.06	0.00	0.53

For a re-assessment of previous studies' results, in particular the reported price impacts, in the light of SCCC methodology, we find it useful to replicate the same analysis on daily Korea and Taiwan data to see whether our finding is a general phenomenon. We follow the same specification introduced above which includes Japanese returns as an additional control variable to proxy for same-day global market information. In Korea, the contemporaneous spillover from

flows to returns is 2.856, significant with a LR value of 4.27, and the spillover from returns to flows is 0.0033, significant with a LR value of 22.70. In Taiwan, the spillover from flows to returns is 5.977, significant with a LR value of 22.69 and the spillover from returns to flows is 0.0022, also significant with a LR value of 9.10. These results confirm that intraday spillover from returns to flows is a common phenomenon, omission of which seems to have biased upwards the price impact estimates reported in previous studies. Yet, contemporaneous spillovers from returns to foreign flows are relatively stronger in Turkey compared to in Korea and Taiwan.

B. Implications of SCC Results

Our results based on the SCCC approach presented above have shown that the contemporaneous effect is running to a considerable extent in the opposite direction to what the standard assumption in the literature imposes. This new finding has important implications. At the first glance, it may suggest that intraday positive feedback trading might be a more pervasive behavior of foreigners than previously thought. However, this is not the only possible explanation of this finding: as mentioned above, returns may be adjusting more precisely to new information, even to the information contained in foreign order flows, while foreign flows display a noisier adjustment with lags and order execution delays. In that case, and particularly in combination with our results pointing to the absence of latent common drivers, our finding may imply that foreign investors are disadvantaged in executing orders and in exploiting the information they have. This may be consistent with Choe et al.'s (2005) result that foreign traders are disadvantaged in daily prices at which they trade and that prices move more against foreign investors than domestic investors before they trade. This may lead them to adopt order splitting strategies, especially in buy orders which typically require less urgency so that their trading appears to be affected by recent returns. Further research is needed to distinguish between these possibilities.

To the extent that returns independently respond to information and foreign flows just adjust to the information that would anyway be incorporated, an important implication of our SCCC results comes on the price impact estimates reported in this line of the literature. Specifically, the implication of the price impact estimates under the standard interpretation that flows cause returns gets blurred, and can even be misleading. Consider an extreme case where

foreigners only respond to information contained in returns in the manner predicted by Brennan and Cao (1997) and markets are efficient such that all information is incorporated instantaneously and fully (that is, the contemporaneous association between flows and returns is due only to spillover from returns to flows). Suppose, in country X foreign investors have a large participation, and in country Y they have a rather minor participation. Then, the price impact estimate, interpreted in the standard sense and measured as the return associated with a net foreign purchase equivalent to 1% of market capitalization, will be the higher, the smaller the net foreign flow is. Thus, *ceteris paribus,* one will obtain a higher price impact estimate in country Y than in X. In this respect, it is interesting to note that Richards' (2005) price impact estimates (38% median value to a net flow equivalent to 1% of market cap) are highest for Indonesia and Philippines (lowest for KSE) where the standard deviation of daily net foreign flows is lowest (highest). As the standard deviation of daily net foreign flows is much higher, we naturally obtain a much lower price impact estimate in Turkey under the standard Cholesky assumption (merely around 3.3%). Thus, to the extent that returns independently respond to information and flows just adjust to the information that would anyway be incorporated, conventional price impact estimates lose their meaning. In a similar manner, the contemporaneous price impact estimate of net foreign flows (or in general net flows of any investor group whose trades are correlated with information) will be higher, the higher the volatility of returns, that is the intensity of new information, which may shed light on time variation in price impact.

Overall, our findings are consistent with the well-supported view that foreign investors do not transmit instability or misinformation, rather they only respond to information. In markets where local individual investor participation is larger, they may have a role in accelerating the process of incorporating information into prices. The relatively higher local individual investor participation rates in Asian markets may be leaving an informative role to foreign investors, consistent with our results suggesting stronger spillover from foreign flows to local returns in Korea and Taiwan compared to in Turkey.

VI. Conclusion

In the first comprehensive study of foreign investors' trading in a sizeable European emerging market combining complete data at the daily and monthly frequencies, and comparing

our results to those on Taiwan and Korea, we reach several conclusions that can be fairly generalized. First, we show that global emerging market returns bear strong incremental explanatory power on foreign investor flows especially at the monthly frequency. For Turkey, inter-month persistence in flows is accounted for, to a large extent, by global emerging market returns.

We document an interesting term structure of feedback trading by foreigners, which is fairly robust across regions of the world: while the lagged response of net foreign flows to global returns is always positive, the lagged response to local returns is negative at the monthly frequency, but positive at the daily frequency. The positive feedback trading at the daily frequency is more significant following negative returns although the persistence of daily flows is stronger in case of net inflows. For Turkey, the negative feedback trading at the monthly frequency is significant only following positive returns. These results at least point to the fact that there is no automatic type of rebalancing by foreigners, while monthly feedback trading asymmetry seen in Turkey may be a symptom of foreigners' attitude to large external deficits. Taken together, these results are not fully accounted for by existing theories of uninformed positive feedback trading or portfolio rebalancing, rather they are consistent with the view that foreigners' net trading is correlated with information and reflects their sophistication in utilizing information. Yet, foreigners do not seem to possess significant asymmetric information as a group. It is more likely that net foreign trading follows returns or responds to the same information to which returns already adjust faster and more precisely, rather than returns are caused by net foreign trading, in a European emerging stock market where foreign ownership fluctuates around 70% of market capitalization.

Our results cast doubt on the standard ordering assumption in the microstructure literature that "flows cause contemporaneous returns but not vice versa", and the consequent interpretation of price impact. While it is easy to show the invalidity of this assumption at the monthly frequency by measuring and comparing the lagged responses of net flows and local returns to each other as long as daily trading data are available, putting a microscope into the day is made possible only by the approach proposed here utilizing the SCCC concept. An additional advantage of this contemporaneous identification technique is enabling to check for latent common drivers of flows and returns. Our results using this approach imply that the aforementioned standard assumption is fairly questionable even at the daily frequency: it is even

more likely that local returns lead foreign flows than vice versa. This should be no surprise given that under the standard specification the daily lagged response of net foreign flows to local returns is several times larger than local returns' lagged response to net foreign flows, not only in Turkey but also in Korea and Taiwan. Foreign investors may simply be more likely to trade on information that would anyway be incorporated into prices rather than causing prices to move. This finding points to a need to revise the conventional interpretation of the price impact. We caution that our finding of contemporaneous spillover from local returns to net foreign flows may not necessarily imply that foreigners infer information from intraday returns and trade accordingly. Rather, it may also imply that, in line with market efficiency, stock prices do adjust to information more precisely and timely than net foreign flows responding to the same information. Under both cases, however, the interpretation of the price impact in the conventional sense can be misleading. Though, in Asian markets where local individual investor participation is high, foreign investors may have a role in speeding up the process of incorporating new information into prices.

Net foreign flows appear to respond to information in a sophisticated manner. This conclusion is enhanced under the finding that net foreign flows respond negatively to previous month's positive but not negative local returns, possibly exploiting sentiment among local investors in a large-external-deficit economy. Remember that our data partition market participants on the duality of resident versus nonresident. Hence, our results imply that local market participants on average trade in the opposite direction of information. In other words, they supply liquidity to foreign investors who trade on information. As in the absence of significant price impact foreigners responding to information have to trade after the major part of the information is priced, the price of supplied liquidity appears to be higher in Turkey than in Korea and Taiwan, possibly due to higher local individual trader participation in the latter.

The adoption of the SCC approach from the GARCH literature opens up a new set of possibilities for expanding research in the microstructure literature. Research has so far been confined to limited, in most cases privately acquired, short samples of trading data obtained from stock exchanges that risk being not representative of all population characteristics. It is from now possible to expand research using long samples of publicly available data sets at the daily frequency by putting a microscope into the day employing the approach introduced here.

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