



## The dynamics of market volatility, market return, and equity fund flow: International evidence



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### ARTICLE INFO

#### Article history:

Received 1 January 2013

Received in revised form 3 October 2014

Accepted 7 October 2014

Available online 15 October 2014

#### JEL classification:

G10

G11

#### Keywords:

Market volatility

Market return

Equity fund flow

Structural VAR

Identification

### ABSTRACT

We identify and test the structural VAR model for the relations among market volatility, market return, and aggregate equity fund flows in an international context. The major empirical findings are as follows. First, reduced-form and structural VAR analyses demonstrate that the relations among the three variables are most evident in the U.S. Second, the structural VAR model shows that contemporaneous effects are the most relevant factor in these relations. Third, the results of a variance decomposition analysis imply that Western investors are more concerned with market volatility and return than Asian investors when they buy and redeem equity funds. Fourth, the hypothesis tests reveal that the overall effects observed in this study are largely attributable to contemporaneous effects. In conclusion, the empirical evidence from the U.S. might not be directly applicable to other countries, particularly Asian countries.

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### 1. Introduction

With the rapid growth of mutual fund markets and industries around the world, many academicians have been interested in the relations between equity fund flows and stock returns. A variety of studies have assessed these relations using daily and monthly frequency data at both the individual fund level and the aggregate market level. Individual fund level studies analyze these relations with a focus on various micro-level characteristics such as indirect costs, investors' timing ability, and redemption policy.<sup>2</sup>

Aggregate market-level studies tend to focus on the relations among macro-level variables. Warther (1995) is the first to investigate the relations between mutual fund flows and market returns using monthly data at the aggregate market level. He finds a positive contemporaneous relation between stock market returns and unexpected fund flows, but not positive feedback trading from stock market returns to fund flows. These findings are consistent with the belief that new fund investors are not smarter than existing

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<sup>2</sup> Edelen (1999) is the first to study the relation between mutual fund flows and performance at the individual fund level. His analysis focuses on a statistically significant indirect cost in the form of a negative relation between a fund's abnormal return and investor flow. Recently, Friesen and Sapp (2007) analyze the timing ability of mutual fund investors using cash flow data. Greene, Hodges, and Rakowski (2007) find that the redemption fee is an effective tool in controlling the volatility of fund flows. Following Warther's (1995) approach, Rakowski and Wang (2009) study the relation between short-term mutual fund flows and returns using vector auto-regression, and determine that past fund flows have a positive effect on future fund returns. Rakowski (2010) investigates the time-series and cross-sectional effect of fund flow volatility on fund performance.

fund investors. Warther (1998) subsequently confirms his earlier results. However, Fortune (1998) finds strong evidence that realized security returns affect subsequent security purchases in his vector auto-regression (henceforth VAR). Fant (1999) shows that Warther's (1995) finding namely, the negative correlation between returns and the subsequent fund flows, is attributable to exchange-out.<sup>3</sup> Cha and Lee (2001) find that equity fund flows are influenced by the performance of the stock market. Edelen and Warner (2001) carefully analyze this relation in the context of daily frequency and find that the daily contemporaneous relation reflects fund flows and institutional trading affecting returns. Cao, Chang, and Wang (2008) study the dynamic relations among market return, market volatility, and aggregate mutual fund flows using daily data from the U.S. Jank (2012) finds that variables that predict the real economy as well as the equity premium are related to mutual fund flows.

All of the mentioned studies thus far have focused on the U.S. mutual fund markets. Recently, Alexakis, Dasilas, and Grose (2013) examine the causality between fund flows and stock index prices in Japan whereas Alexakis, Niarchos, Patra, and Poshakwale (2005) examine the interaction between fund flows and stock returns in Greece. Ferreira, Keswani, Miguel, and Ramos (2012) investigate the convexity of the flow–performance relationship across 28 countries and explain their results using economic and financial factors in an international context. However, they do not consider the concurrent relations between fund flow and performance.

As noted by Brennan (1998) and Shiller (1998), Warther's (1995) research methodology might have some problems in terms of dealing with endogeneity or simultaneity issues. Brennan (1998) and Shiller (1998) propose a vector auto-regression methodology to evaluate the relation between aggregate fund flows and market returns. Fortune (1998), Fant (1999), and Cha and Lee (2001) employ the VAR methodology, which uses the reduced-form of equations. Reduced-form VAR analysis, however, cannot appropriately address the contemporaneous relations among endogenous variables. Cao et al. (2008) employ a structural VAR (henceforth SVAR) and identify the model by Cholesky decomposition that has been criticized by many economists because of the lack of economic basis or theory. Yet they fail to address their identification explicitly based on economic theory or empirical evidence. Consequently, their empirical findings might be dubious.

In this paper, we investigate the dynamic relations among monthly market volatility, market return, and aggregate equity fund flows in an international context.<sup>4</sup> A possible spurious relation between market volatility and fund flow can also be empirically examined, which is a question Cao et al. (2008) address. This study extends Warther (1995), Cha and Lee (2001), and Cao et al. (2008) by using a tri-variate SVAR model in an international context. Our SVAR model is identified based on the results of previous studies (e.g., Ben-Rephael, Kandel, and Wohl, 2011, 2012; Merton, 1980), thereby differentiating our analysis from that of Cao et al. (2008) in terms of research methodology. Our international findings are interpreted by the features of each country's capital markets and investment behavior. This study extends Cao et al. (2008) to some extent. The sample period encompasses the recent eleven and a half years for the ten international markets. We address the following two questions: First, does unexpected market volatility have an effect on equity fund flows? Second, does unexpected market return have an effect on equity fund flows? These two questions will be addressed by testing the hypothesis of over-identifying restrictions under the SVAR framework.<sup>5</sup>

This paper is organized as follows: Section 2 discusses the data used in this study. Methodological issues and the hypotheses to be tested are presented in Section 3. Section 4 presents the empirical results. Section 5 concludes the paper.

## 2. Data

We study each country's stock market return, market volatility, and aggregate equity fund flow. In this study, equity mutual funds are open-end pooled investment vehicles that are generally bought and redeemed at the fund's net asset value (henceforth NAV), although each country has different legal structures and practices for publicly available funds.

Table 1 describes the data used in this study. Sample countries are selected based on data availability from each country's mutual fund association. Five Western countries (the U.S., Canada, the U.K., Sweden, and France) and five Asian countries (Japan, Korea, Hong Kong, Taiwan, and India) are selected for our analysis. We obtain the total net assets (henceforth TNAs) or net sales data from the website of each country's mutual fund association.<sup>6</sup> The sample period covers about eleven and a half years (or 138 months) from January 2000 through June 2011.<sup>7,8</sup> In the case of Japan, international equity funds are included in the sample.

For each country, stock market indices and market capitalizations are collected from Thompson Reuters's DataStream. On principle, we choose the representative market index and the corresponding market capitalization for each country except for the cases in which the corresponding market capitalizations are not available. In the absence of corresponding market capitalizations, we utilize alternative stock market capitalizations provided by DataStream. The sources of short-term risk-free rates are described in the fourth column. Generally, one-month risk-free rates are available from the website of each country's central bank.

<sup>3</sup> The findings of Fant (1999) are also consistent with the disposition effect that investors sell winners too early and keep losers too long.

<sup>4</sup> We do not model the effects of a shock to a large country (i.e., the U.S.) on any other countries (i.e., Asian countries). Although such an analysis seems interesting, it goes beyond the scope of this study.

<sup>5</sup> For the relationship between market volatility and returns, see Li, Yang, Hsiao, and Chang (2005) and Bekaert and Wu (2000).

<sup>6</sup> In Appendix A, we list the exact sources of the TNA data (or flow data) for each country. Unfortunately, the website of the U.S. Investment Company Institute (ICI) had not posted monthly TNAs or net sales data. Recently, it posted historical monthly net sales data of long-term mutual funds since 2007. When we requested the historical data from the ICI, it generously provided us with net sales data.

<sup>7</sup> For Taiwan and Korea, the sample period covers 122 (May 2001 through June 2011) and 132 months (July 2000 through June 2011), respectively.

<sup>8</sup> Our sample period includes the 2007 global financial crisis. A subsample analysis could be an interesting extension of this paper. However, our sample period (January 2000–June 2011) is not long enough to analyze any sub-period because VAR estimation requires a sufficiently long period to guarantee a stable covariance structure when we use monthly observations. Instead of a sub-period analysis, we employ two alternative estimations to understand the effect of the 2007 financial crisis. First, we use a dummy variable for 2007 when we estimate the reduced-form VAR. Second, we omit the 2007 data. The estimation results are not reported in this paper due to space limitations, but are available upon request. Our conclusion is that the 2007 global financial crisis has minimal effects on the results.

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