Herding and the Thin Trading Bias in a Start-Up Market: Evidence from Vietnam

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Abstract

Research in behavioural finance has denoted the significant presence of herd behaviour in emerging capital markets. However, although the latter are typified by substantial levels of thin trading, its impact over the measurement of herding has been the subject of very little attention. We address this issue in the context of the Vietnamese market and our results indicate that correcting for thin trading leads to the depression of the herd's significance. Our findings are suggestive of thin trading introducing a bias over herding estimations which we interpret through existing literature evidence related to the illiquid structures of emerging markets.

JEL Classification: G10, G15

Keywords: Herding; Thin Trading; Vietnam

1. Introduction

Emerging capital markets constitute environments whose institutional structures innately facilitate the manifestation of herd behaviour (Gelos and Wei, 2002). Normally operating in jurisdictions under incomplete regulatory frameworks (Antoniou et al, 1997a) and inadequate or ill-enforced provisions, these markets are susceptible to adverse practices including rumour-mongering (Van Bommel, 2003) and manipulation (Allen and Gale, 1992). Consequently, this leads to the transparency of the informational environment being compromised, thus fostering the development of collective trading tendencies among investors.

The above has prompted a large amount of empirical research on the premises of both microdata (Choe et al, 1999; Kim and Wei, 2002a; 2002b; Bowe and Domuta, 2004; Voronkova and Bohl, 2005) as well as aggregate data (Demirer and Kutan, 2006; Farber et al, 2006; Ha, 2007) with results largely confirming the presence of significant herding in developing market settings. A characteristic feature of the latter is that they tend to accommodate substantial levels of thin trading, whose presence has been found (Antoniou et al, 1997a) to be associated with the introduction of biases in empirical estimations in Finance. Despite the large number of herding studies that have included emerging markets in their design, the possibility of thin trading conferring such a bias over herding estimates appears to have received relatively little attention.

Kallinterakis and Kratunova (2007) were the first to explore the issue of the thin trading bias over herding estimations by testing for it in Bulgaria at the level of the market's top capitalization index (SOFIX) with their evidence being in favor of thin trading producing an underestimated picture of herding. In this study we extend the scope for research on this issue by studying it at the market-wide level in the context of the newly emerging market of Vietnam. We consider the Vietnamese market to constitute an interesting background for this study, as research has already highlighted its thin trading levels (Loc, 2006; Ha, 2007), and indicated the potential for collective behaviour on the premises of specific stock-samples

(Farber et al, 2006; Ha, 2007). To that end, our research contributes to the Finance literature as it investigates for the first time the effect that thin trading bears upon herding estimations in an emerging market (Vietnam) at the market-wide level.

The rest of the paper is structured as follows: Section 2 introduces the concept of herding (2.1) and discusses (2.2) the possible effects of thin trading over its manifestation. Section 3 includes a brief overview of the Vietnamese market's evolution. Section 4 discusses the data (4.1) used in this research, delineates the methodology utilized (4.2) and provides some descriptive statistics (4.3). Section 5 presents and discusses the results and Section 6 concludes.

2. Theoretical Background

2.1 Herd Behaviour

Individuals form herds when they align their behaviour to a mode of collective conduct following the "interactive observation" of the *actions* and the *payoffs* (arising from those actions) of their peers (Hirshleifer and Teoh, 2003). Behavioural finance research has associated herding with the intentional sidelining of investors' private information in favor of the observable "consensus" (Bikhchandani and Sharma, 2001) irrespective of fundamentals (Hwang and Salmon, 2004). Deciphering the causes of imitation is not always possible, as it can be ascribed to a variety of motivations of both psychological as well as rational background.

In psychological terms, imitation has often been assumed to be driven by the behavioural biases of the human nature itself. Hirshleifer (2001) noted how *conformity* can lead people to copy the actions of those around them. Such an imitative tendency may be explained through individuals' interactive communication, which could be described as either *explicit* (when people are conversing- Shiller, 1995) or *tacit* (when people observe others' choices, for example in fashion-Bikhchandani et al, 1992). Drawing from earlier findings of cognitive psychology, Prast (2000) demonstrated how the interplay of *congruity* and *cognitive dissonance* is capable of facilitating herding among individuals.

On the "rational" side, Devenow and Welch (1996) showed that herding could be driven by more subtle considerations, if its practice is associated with the realization of *informational payoffs* by those imitating the decisions of others. Such considerations may well hold when one: a) possesses no private information, b) has private information yet is uncertain about it perhaps because it is of low quality, c) considers his information-processing abilities to be inadequate or d) perceives others as better-informed.

The above are particularly applicable in the case of investment professionals (fund managers; financial analysts) who are subject to certain *career/reputation-based* considerations. As their performance is evaluated (Scharfstein and Stein, 1990) on a relative basis (i.e. versus the performance of their peers) and since the levels of ability and reputation are not uniform among them, it is reasonable to conjecture that those possessing lower ability/reputation have an obvious incentive to copy the actions of those with higher ability/reputation, if this will help improve their professional image (Scharfstein and Stein, 1990; Trueman, 1994). However, well-able/reputed professionals may also choose to follow the investment decisions of the majority, even if these are sub-optimal, if the risk from a potential failure is perceived as higher compared to the benefits accruing from a potential success by "going-it-alone" (Graham, 1999). The presence of relative *homogeneity* (Lakonishok et al, 1992; De Bondt and Teh, 1997; Wermers, 1999) in the ranks of investment professionals (they bear similarities in their educational background, professional qualifications and their framework of professional conduct) is expected to further encourage conformity in their actions.

Whether herding is induced by psychological or rational motivations, its proliferation in the market is bound to lead to collective trading phenomena that can impact adversely upon a market's informational efficiency. Indeed, if many investors decide to ignore their private signals and free-ride on the informational content of others' actions, this is expected to facilitate the development of "*informational cascades*" (Banerjee, 1992; Bikhchandani *et al*, 1992) that can lead to a temporarily slower aggregation of information in securities' prices. Such cascading is expected to be more prevalent in cases where there exist limited alternative options (Devenow and Welch, 1996), since this will limit the array of possible responses towards those options and enhance the potential for converging to one of them.

2.2 Herding and Thin Trading in Emerging Markets

The term "thin trading" refers to the case where securities' prices do not trade at every consecutive session but rather exhibit pockets of inertia over time. Thin trading is a typical feature of emerging markets (Antoniou et al, 1997a) as they are normally characterized by substantial illiquidity which renders the frequency of the execution of trades lower compared to developed capital markets. Underlying this illiquidity are factors conducive to limits to participation (Holmes and Wong, 2001) in such markets, including entry restrictions (e.g. for foreign investors), trading restrictions (e.g. margin trading and short-sales' constraints), market frictions (e.g. high transaction costs) as well as overall macroeconomic conditions (e.g. when the country's average income is low).

The issue of thin trading introducing a bias over empirical estimations in Finance has been examined in a series of studies, including Lo and MacKinley(1990), Miller et al (1994) and Antoniou et al (1997a; 1997b) with results confirming the existence of such a bias. However, if this is the case, then one would expect thin trading to also bear an effect over herding estimations in emerging capital markets, given their illiquid structures. This issue, though, has not been thoroughly pursued in Finance research as the few herding studies (Hwang and Salmon, 2005; Henker et al, 2006) that have eventually touched upon it, have tried to control for its impact by excluding thinly traded stocks from their samples, thus biasing their results towards the most liquid stocks without directly addressing it.

The seminal study investigating the impact of thin trading over herding estimations from both a theoretical as well as an empirical viewpoint was conducted by Kallinterakis and Kratunova (2007) and produced evidence indicative of an adverse effect of thin trading over the estimated herding. Utilizing the historical constituents of the top-capitalization index (SOFIX) in Bulgaria, they showed that herding in that market was insignificant prior to correcting for thin trading, with its significance exhibiting signs of increase following the correction. Moving one step ahead, the authors interpreted their results by arguing that they could be justified on the premises of the relative illiquidity of the Bulgarian market, as they claimed that the ability to follow the herd in illiquid markets can be considered a function of the ability to trade. If there exists herding on the buy- (sell-) side, then that herd will be able to express itself in the market more significantly as soon as the size of the sell- (buy-) side allows the herd's participants to transact. Thus, the authors argue that their results are indicative of thin trading being capable of "masking" the actual herding in the market, thus casting a potentially negative effect over its estimation.

Although the above constitute a valid possibility in emerging markets, the very fact that thin trading introduces distortions in the trading process need not necessarily produce an adverse effect over herding. The issue here is indirectly related to the trading interference hypothesis (Kim and Rhee, 1997)[1] in the sense that thin trading, as a market friction, inhibits the conduct of trading during certain days and renders it feasible during others. This, in turn implies a delay in the execution of orders with the ensuing order-imbalance fostering the generation of excess demand/supply, which will begin to clear once sufficient numbers of traders arrive at both sides (buy/sell) of the market. However, as Ahn et al (2002) have shown, the unloading of such impending excess demand/supply will be clustered on "active" days, thus giving rise to herding emanating from one of the two sides (buy/sell) of the market on those days[2]. Such concentrated excess demand/supply could further be enhanced by the presence of traders with demand for immediacy/liquidity whose participation would be stimulated during "active" days and who would otherwise feel hesitant to trade under such thin conditions (Bossaerts et al, 2001). The above therefore illustrate the fact that it is possible for thin trading to foster herding in emerging market environments.

Our discussion here indicates that the impact of thin trading over herding estimations constitutes a relatively unexplored issue that remains far from being resolved, more so since the seminal evidence in this area (Kallinterakis and Kratunova, 2007) emanate from a sample of an emerging market's most liquid stocks. To that end, we extend the scope for the research of this issue by investigating it at the market-wide level in Vietnam. The choice of Vietnam here is motivated by the fact that it is a thin market (Loc, 2006; Ha, 2007) where research (Farber et al, 2006; Ha, 2007) has indicated the presence of collective trading mentality on the premises of specific stock-samples. Consequently, we consider our research to constitute an original contribution to the Finance literature as it empirically addresses for the first time the impact of thin trading over herd behaviour at the market-wide level in a thin market setting (Vietnam), which is both relatively new and for which there exists very little Finance research.

3. The Vietnamese Stock Market

The establishment of securities' exchanges in Vietnam constitutes a step in the process of the economic reforms (*doi moi*) underway since the mid-1980s with the purpose of ensuring the smooth transition of the country from central planning to the market economy (Loc, 2006). The country's main stock market[3] was launched in Ho Chi Minh City in July 2000, with trading initially being conducted on Mondays, Wednesdays and Fridays; since March 1st, 2002, the market began to trade daily. Trading can be (Farber et al, 2006; Loc, 2006; Long, 2006) either electronic (via the Automated Order Matching system that handles the orders relayed from the brokerages) as well as "put through" (where the dealing price is negotiated between the brokerages and may be different from the session's closing price). The market's operations are regulated and supervised by the State Securities Commission (SSC) and are characterized by several restrictions including price-limits (currently[4] at ± 5 percent), prohibition of day-trading (Farber et al, 2006) and short-selling (Truong et al, 2007) and ceilings (Loc, 2006, Truong et al, 2007) in foreign investors' participation (aggregate foreign shareholding in a firm is not allowed to exceed 49 percent). About 90 percent of the volume of trade is undertaken by individual investors (Truong et al, 2007), while the overall informational structures are considered weak (Farber et al, 2006).

The above conditions are capable of giving rise to significant herding tendencies, a fact confirmed by Farber et al (2006) and Ha (2007) whose studies investigated the issue within specific stock-portfolios. Even though investors' participation is growing, the market still maintains substantial levels of thin trading (Loc, 2006), while transaction costs are also high (brokerage fees range between 0.2-0.4 percent for individual investors[5]). In view of the discussion here, we believe that Vietnam constitutes an appealing market for the study of the impact of thin trading over herding.

4. Data and Methodology

4.1 Data

Our empirical design is based upon the premises of the Vietnam Index (VNI, hereafter) of the Ho Chi Minh Stock Exchange which accommodates all the stocks listed in that market. Our sample period covers the five-year window between March, 1st 2002 and February 28th, 2007 inclusive. The choice of March 1st, 2002 as our start-date emanates from our previous discussion regarding the switch of the market from non-continuous to continuous trading on that very date, the purpose being to mitigate any potential biases in our results stemming from the pre-continuous trading system's price-process. Our sample includes data regarding the closing prices and market capitalizations of 112 listed stocks as well as the Vietnam Index retrieved from the EcoWin-Reuters database. We also consider it important to accentuate at this point that our sample does not include stocks listed on the Hanoi Stock Exchange, as these are not taken into account in the calculation of the Vietnam Index (Truong et al, 2007).

4.2 Methodology

4.2.1 Herding

As our purpose is to test for herding in Vietnam at the market-wide level, we utilize the empirical framework developed by Hwang and Salmon (2004) which aims at extracting herding from the factor-sensitivity of assets at the cross-sectional level of the market. Their model traces its rationale back to the herding measure proposed by Christie and Huang (1995), who argued that herding could be reflected in the cross-section of asset returns, in the sense that a lower (cross-sectional) dispersion of returns would indicate that assets moved *in* *tandem* with their cross-sectional mean, i.e. herded towards some sort of market consensus. However, the examination of herding in Christie and Huang (1995) is restricted to periods characterized as "extreme" (defined as being two or three standard deviations far from the return-distribution mean), thus overlooking the possibility that herding might also manifest itself during "non-extreme" (according to their definition) periods[6]. What is more, the Christie and Huang (1995) model allows herding to be examined only during specific periods, thus deterring us from gauging its evolutionary course over time[7]. It is these very considerations that prompted us to select the Hwang and Salmon (2004) measure to work with.

Their model presupposes that when investors are driven by behavioural biases, their perceptions of the risk-return relationship of assets may be distorted. If they do indeed herd towards the market consensus, then it is possible that as individual asset returns follow the direction of the market, their CAPM-betas will deviate from their equilibrium values. Consequently, the beta of a stock is not expected to remain constant but rather change with the fluctuations of investors' sentiment. In the event of market-wide herding prevailing, the cross-sectional dispersion of the stocks' betas would be expected to be smaller, i.e. asset betas would tend towards the value of the market beta, namely unity.

Hwang and Salmon (2004) assume the equilibrium beta (let β_{imt}) and its behaviourally biased equivalent (β^b_{imt}), whose relationship is assumed to be the following:

$$(E^b_t(r_{it}) \;/\; E_t(r_{mt})) = \beta^b_{imt} = \beta_{imt} - h_{mt}\ (\beta_{imt} - 1) \tag{1}$$

where $E^b_t(r_{it})$ is the behaviourally biased conditional expectation of excess returns of asset *i* at time *t*, $E_t(r_{mt})$ is the conditional expectation of excess returns of the market at time *t* and $h_{mt} \leq 1$ is a time-variant herding parameter. To measure h_{mt} (and for this reason, herding on a market-wide basis), the authors calculate the cross-sectional dispersion of β^b_{imt}, as:

$$Std_c(\beta^b_{imt}) = Std_c(\beta_{imt})\ (1 - h_{mt}) \tag{2}$$

Equation (2) is rewritten as follows:

$$log\,[\,Std_c(\beta^b_{imt})\,] = log\,[\,Std_c(\beta_{imt})\,] + log\,(1\text{-}\,h_{mt}\,) \tag{3}$$

in order to extract h_{mt}.

Finally, (3) is written as follows:

$$log\,[\,Std_c(\beta^b_{imt})\,] = \mu_m + H_{mt} + \upsilon_{mt} \tag{4}$$

where

$$log\,[\,Std_c(\beta_{imt})\,] = \mu_m + \upsilon_{mt} \tag{5}$$

with μ_m = $E\,[log\,[\,Std_c(\beta_{imt})\,]]$ and υ_{mt} ~ $iid\,(0,\ \sigma^2_{m,\upsilon}\,)$

and H_{mt} = $log\,(1\text{-}\,h_{mt}\,)$ (6)

Hwang and Salmon (2004) assume that the herding parameter follows an AR(1) process and their model becomes:

$$log\,[\,Std_c(\beta^b_{imt})\,] = \mu_m + H_{mt} + \upsilon_{mt} \tag{7}$$

$$H_{mt} = \phi_m\, H_{m,t-1} + \eta_{mt} \tag{8}$$

where η_{mt} ~ $iid\,(0,\ \sigma^2_{m,\eta}\,)$.

The above system of equations (7) and (8) accommodates herding as an unobserved component. To extract the latter, Hwang and Salmon (2004) employ the Kalman filter. Thus, in the above setting, the $log\,[\,Std_c(\beta^b_{imt})\,]$ is expected to vary with herding levels, the change of which is reflected through H_{mt}. Special attention is drawn here to the pattern of H_{mt}. If $\sigma^2_{m,\eta}$ = 0, then H_{mt} = 0 and there is no herding. Conversely, a significant value of $\sigma^2_{m,\eta}$ would support the existence of herding and (as the authors state) this would further be reinforced by a significant ϕ_m. The absolute value of the latter is taken to be smaller than or equal to one, as herding is not expected to be an explosive process.

To test for the robustness of their results Hwang and Salmon (2004) re-estimated their original model by adding several variables of both fundamental (dividend-price ratio, relative treasury bill rate, term spread, default spread) as well as non-fundamental (market volatility, market direction, "size", "book-to-market" ratio) nature in equation (7). The idea here was to gauge whether the significance of H_{mt} would remain robust in the presence of variables corresponding to different states of the market. If changes in the *log* $[\,Std_c(\beta^b_{imt})\,]$ were to be attributed to such variables and not market-wide herding, then their inclusion in the model would render H_{mt} insignificant.

Due to the limited availability of data regarding the Vietnamese market, we test for the robustness of the results from the original Hwang and Salmon (2004) model (equations 7-8) using market direction (reflected through index returns) and market volatility as control variables. More specifically, we re-estimate the Hwang and Salmon (2004) model using each of the following two versions of equation (7) in turn:

$$log[\,Std_c(\beta^b_{imt})\,] = \mu_m + H_{mt} + c_1\, r_{VNI,t} + \upsilon_{mt} \tag{9}$$

$$log[\,Std_c(\beta^b_{imt})\,] = \mu_m + H_{mt} + c_2\, log\,\sigma_{VNI,t} + \upsilon_{mt} \tag{10}$$

where $r_{VNI,t}$ is the return of the Vietnam Index (VNI) at time *t* and $log\,\sigma_{VNI,t}$ is the market's logarithmic volatility calculated on the premises of the Vietnam Index (hence the "VNI" in both their subscripts). The index returns ($r_{VNI,t}$) in equation (9) are calculated using the percentage log-differenced returns of the Vietnam Index for each period t, while the market volatility ($\sigma_{VNI,t}$) of equation (10) is calculated with squared daily returns using the Schwert (1989) methodology (in line with Hwang and Salmon, 2004).

Since all the above estimations take place on the premises of equal-weighted cross-sectional expectations, we test for their robustness using value-weighted cross-sectional expectations as well; the purpose here is to gauge whether the presence of small stocks influences our results in any way[8]. To that end, the value-weighted $Std_c(\beta^b_{imt})$ is calculated as follows (in line with Hwang and Salmon, 2004):

$$Std_c(\beta^b_{imt}) = \sqrt{\sum_{i=1}^{N_t} w_{it}\,(\beta^b_{imt} - \overline{\beta}^b_{imt})^2} \tag{11}$$

where $\overline{\beta}^{b}_{imt} = \sum_{i=1}^{N_t} w_{it} \; \beta^{b}_{imt}$, N_t is the number of equities in month t and w_{it} is the value of the stock i relative to the total market value at time t.

To estimate the Hwang and Salmon (2004) measure, we first obtain the OLS-estimates of the betas using daily return data within monthly windows in the standard market model:

$$r_{itd} = \alpha^{b}_{it} + \beta^{b}_{imt} \, r_{mtd} + \varepsilon_{itd} \tag{12}$$

where the subscript "*td*" indicates daily data for month *t*.

In line with Hwang and Salmon (2004), the r_{itd} in (12) refers here to excess returns. To calculate the latter, we first derive the percentage log-differenced returns from the closing prices of the Vietnam Index and all the sample-stocks and then adjust them by using the 3-month Vietnam Interbank Rate (VNIBOR)[9]. Having estimated these monthly betas for the stocks in month *t*, we then estimate their cross-sectional standard deviation for that month, thus constructing a monthly time-series. As Hwang and Salmon (2004) argue, the choice of monthly windows is driven by both estimation considerations (to reduce the estimation error of the betas) as well as practical ones (to maintain a number of observations sufficient enough to detect herding). The cross-sectional standard deviation derived is then used (in its logarithmic form-see equation (7)) as the input for the estimation of the herding measure.

4.2.2 Thin Trading

In conceptual terms, thin trading refers to the case where a stock is not traded frequently and as a result its prices exhibit relative inertia, i.e. they remain constant for a series of days. To correct for thin trading we employ the methodology proposed by Miller et al (1994), according to which one has to estimate a moving average model reflective of the number of non-trading days. As the identification of the non-trading days is often hard, Miller et al (1994) have shown that the adjustment of returns for thin trading can be accomplished through an AR(1) process, as follows:

$$r_t = \alpha_1 + \alpha_2 \, r_{t-1} + e_t \tag{13}$$

The original returns are then adjusted for thin trading as:

$$r_t^{adj} = e_t/(1- \alpha_2) \tag{14}$$

As Antoniou et al (1997a; 1997b) argue, equation (13) implies that the adjustment for thin trading remains constant over time, which is something that may not be the case for emerging markets, as they often accommodate substantial windows of trading inertia. To that end, they propose a recursive estimation of (13), which, given the thin trading levels of the Vietnamese market (Loc, 2006), we choose to replicate here. The r_t in (13) represents the percentage log-differenced returns (both of the Vietnam Index as well as the 112 stocks of our sample); having adjusted these returns for thin trading, we then use them as input in the Hwang and Salmon (2004) framework in order to gauge the impact of thin trading onto our herding estimations.

4.3 Descriptive Statistics

Table 1 presents some statistics related to the estimated cross-sectional standard deviation as well as the logarithmic cross-sectional standard deviation of the betas of the equal- and value-weighted Vietnam Index portfolios, both for adjusted (for thin trading) as well as unadjusted returns. As indicated by the table, the cross-sectional standard deviation of the betas of both adjusted and unadjusted returns is significantly different from zero and exhibits significant positive skewness and kurtosis[10], while the Jarque-Bera statistic indicates significant departures from normality. When looking at the statistics of the logarithmic cross-sectional standard deviation of the betas, the above phenomena disappear; therefore, the Kalman filter can be legitimately employed to test for the state-space model of Hwang and Salmon (2004) described previously.

5. Results – Discussion

5.1 Results

We will begin with the presentation of our results from the Hwang and Salmon (2004) measure, for returns unadjusted for thin trading. As Table 2 illustrates, both the persistence parameter (ϕ_m) as well as the standard deviation ($\sigma_{m,\eta}$) of the state-equation error (η_{mt}) are statistically significant (5 percent level) when using returns unadjusted for thin trading. These results are robust to equal-/value-weighted cross-sectional expectations in the measurement equation as well as the inclusion of control variables (volatility, market direction), thus confirming the presence of significant market-wide herding during our sample period in the Vietnamese market. The value of μ_m (reflective of the mean level of the logarithmic cross-sectional standard deviation of the market-portfolio betas, $log[Std_c(\beta^b_{imt})$, as adjusted through herding-expressed here as H_{mt}) is found to be statistically significant in most cases, while there is mixed evidence regarding the significance of the $log[Std_c(\beta^b_{imt})$ itself, as the estimates of the $\sigma_{m,\upsilon}$ indicate.

The c_1-coefficient is found to be insignificantly negative in our tests while the c_2-coefficient appears significantly negative. These results indicate that the $log[Std_c(\beta^b_{imt})]$, increases (decreases) when the market and its volatility fall (rise), yet it is only the relationship between the $log[Std_c(\beta^b_{imt})]$ and volatility that seems to be statistically significant (1 percent level).

The bottom row of Table 2 provides us with the signal-proportion value (calculated by dividing the $\sigma_{m,\eta}$ by the time series standard deviation of the $log[Std_c(\beta^b_{imt})]$), which according to Hwang and Salmon (2004) indicates what proportion of the variability of the $log[Std_c(\beta^b_{imt})]$ is explained by herding. As Hwang and Salmon (2004) showed empirically in their paper, the bigger the value of the signal-to-noise ratio, the less smoothly over time herding evolves. Our results show us that the signal-proportion values of our tests range between approximately 37 and 80 percent, thus being reflective of a rather noisy picture of herding-evolution over our sample period.

We now turn to our herding results following the adjustment of returns for thin trading, as illustrated in Table 3. We observe here that the estimations following the adjustment for thin trading appear to be indicating the presence of insignificant market-wide herding as ϕ_m appears near-overtly insignificant[11] while the $\sigma_{m,\eta}$ also lacks significance in some tests. Therefore, adjusting for thin trading appears to have exerted a certain impact over the results of our herding measure, as it has led to the depression of the significance of herding. The values of μ_m appear significant (5 percent level) while those of $\sigma_{m,\upsilon}$ exhibit mixed statistical significance. The signs and corresponding significance of the c_1- and c_2-coefficients appear to be similar to those observed prior to adjusting for thin trading, thus reaffirming the existence of a significantly (insignificantly) inverse relationship between the $log[\, Std_c(\beta^b_{imt})\,]$ and the market's volatility (direction). The signal-proportion assumes values ranging between approximately 22 and 89 percent, thus again pointing towards a noisy evolution of herding between March 2002 and February 2007.

Figures 1-4 present the evolution of herding diagrammatically (according to equation (6), $h_{mt} = 1 - exp\,(H_{mt})$ both before as well as after adjusting for thin trading for the equal- and value-weighted cross-sectional expectations. As the Figures illustrate, herding assumes values well below unity (between -0.56865 and 0.37685), which indicates that extreme degrees of herding were not observed during our sample period. In line with what we mentioned previously about the signal-to-noise ratio, we observe that herding in the Vietnamese market appears to adhere to no distinctive directional patterns over time (its course is reflective of multiple, short-lived fluctuations) irrespective of whether we employ equal-/value-weighted cross-sectional expectations or use (un)adjusted returns for thin trading.

5.2 Discussion

Our results provide us with interesting insight into the manifestation of herd behaviour in a thinly traded environment, since according to them, herding appears significant prior to correcting for thin trading and insignificant afterwards. These findings constitute evidence indicative of thin trading introducing a positive bias over herding estimations and are documented for the first time at the market-wide level in the herding literature. Given our discussion in section 2.2, we consider our evidence to lend support to the view that thinly traded structures can encourage herding tendencies. This is because the delayed execution of orders in thin markets can lead to accumulated excess demand/supply channelled into "active" trading days, thus raising the possibility for the evolution of buy-/sell-herding during those days (Ahn et al, 2002). As the Vietnamese market is characterized by notable illiquidity (Loc, 2006) and accommodates substantial levels of order-imbalances (Farber et al, 2006; Ha, 2007; Truong et al, 2007), we consider our findings to be particularly relevant to the context here.

Our results run counter to Kallinterakis and Kratunova (2007), as their evidence pointed towards a negative impact of the presence of thin trading over the estimated herding[12]. However, it is our understanding that any comparison is probably inappropriate here, given the fact that their study involved a sample of stocks (the historical constituents of Bulgaria's top-capitalization index) while our work is based upon the universe of stocks traded on the Vietnamese market. It is interesting, however, to notice that the intertemporal evolution of herding appears rather noisy both in our study as well as theirs; given that both Bulgaria and Vietnam constitute emerging market settings in their primary stages of development[13], we consider this to be an indication of a possible herding pattern in similar market environments.

Further to the above, we believe that our study expands the scope of existing herding research in the Vietnamese market. Relevant studies (Farber et al, 2006; Ha, 2007) test for herding within specific groups of stocks of the Ho Chi Minh stock exchange through the employment of the Christie and Huang (1995) framework, which as we saw in section 4.2.1, restricts the examination of herding during certain periods[14]. Our work here provides a more integrated picture of herding in the Vietnamese market, as it examines it at the market-wide level without conditioning its estimation upon any specific period, while also presenting its diagrammatical evolution over time.

As Tables 2 and 3 illustrate, correcting for thin trading appears also to have conferred a certain impact on the structure of the measured herding. More specifically, as the estimates presented indicate, adjusting for thin trading does not only lead to the persistence parameter growing insignificant (as noted in section 5.1) but also becoming smaller in value; in other words, correcting for thin trading renders herding not only insignificant but also less persistent.

Another issue that arises from the findings documented in Tables 2 and 3 is the one related to the effect of volatility over our herding estimates. As both these tables show, the highest values for the persistence parameter and the smallest signal-to-noise ones are obtained when including volatility as a control variable which indicates that the presence of volatility in our estimations leads to the generation of a more persistent and smoother picture of herding. However as Figures 1-4 also illustrate, controlling for volatility forces herding to hover closer to zero and, in any case, within much narrower bands compared to the cases of the original Hwang and Salmon (2004) model or its extension utilizing market direction as a control variable. One might argue that the above are due to the fact that much of the noise in the herd's course could be the result of the high volatility levels observed in the Vietnamese market (Hoang, 2002; Farber et al, 2006), and that controlling for it renders the herd's appearance less volatile. Thus, although the presence of volatility in our estimations does not confer an effect over the significance-patterns of herding[15], it does appear to bear an impact over its structure and evolution over time.

Looking at the bigger picture, our findings denote that the presence of thin trading leads to the generation of an overestimated picture of the significance of herding at the market level. Based upon the context of the thinly traded market setting of Vietnam, we document robust evidence indicating that the statistical significance of market-wide herding dissipates once adjusting returns for thin trading. We consider our findings to be of substantial research interest as they raise a series of important issues.

First of all, our results denote that thin trading introduces a bias in herding measures, thus confirming previous research (Antoniou et al, 1997a) associating its presence with biasing empirical estimations in Finance. In view of the large aforementioned amount of research on herding in emerging capital markets, these findings are suggestive of a revised approach towards the measurement of herding in such environments, aiming at taking this bias into account. What is more, given that this issue has attracted very little attention in Finance, we believe our study to constitute a useful stimulus for further research, in order to assess whether our results are robust across emerging markets with differences in their institutional frameworks and stages of development. It is our understanding that furthering the research over a large sample of emerging markets may generate a set of results capable of leading towards the formulation of a theory regarding the impact of thin trading over herding and we deem our theoretical discussion in section 2.2 to motivate research in that direction.

6. Conclusion

A considerable amount of literature in behavioural finance has focused upon the study of herd behaviour in emerging capital markets, with results being largely in favor of its significant presence there. Emerging markets are frequently typified by thin trading, which has been found (Antoniou et al, 1997a) to exert certain biases over empirical research in Finance; however, no study has up to date taken into account the effect of thin trading over herding estimations in such markets. Using data from the newly emerging Vietnamese market we test for the first time for this effect at the market-wide level and find robust evidence suggesting that thin trading introduces a positive bias over herding, as the latter's significance disappears after correcting for thin trading. We consider our results to be indicative of a favorable impact of thin trading over herding and we interpret this through existing research linking thin trading with the accumulation of excess demand/supply during "active" trading days as a result of the delayed execution of orders in illiquid environments.

We believe our study to constitute an original contribution to the Finance literature, since, to the best of our knowledge, the impact of thin trading over herding has never been addressed before at the market-wide level. However, it is our understanding that generalizing on the basis of our findings is inappropriate here given that our investigation is conducted on the premises of a single market. Consequently, we consider it necessary for further research to test for this issue at the comparative level (i.e. using multi-market samples) in order to improve our understanding of the issue.

Notes:

1 The trading interference hypothesis refers to the impact of market frictions (most notably, price-limits, circuit-breakers and trading halts) over trading activity. The idea here is that these frictions tend to prevent trading on certain days (e.g. when prices hit their limits), thus leading to more intense trading during the following days due to the impending orders. For more on this, see Kim and Limpaphayom (2000) and Bildik (2006).

2 The fact that thin trading limits the number of days during which one can trade can *per se* be considered conducive to herding, in view of what we mentioned previously with regards to informational cascades being facilitated by the presence of a limited number of possible options (Devenow and Welch, 1996).

3 Vietnam's second stock exchange was established in Hanoi in March 8th, 2005 and accommodates mostly small- and medium-sized (for Vietnamese standards) enterprises (Loc, 2006). Due to the very short-window of data available, we chose not to include the Hanoi market in our research design.

4 The history of the band-fluctuations of price-limits is as follows (Farber et al, 2006): ± 5 percent (20/7/2000-31/7/2000), ± 2 percent (1/8/2000-13/6/2001), ± 7 percent (14/6/2001-9/10/2001), ± 2 percent (10/10/2001-31/7/2002), ± 3 percent (1/8/2002-1/1/2003), ± 5 percent (2/1/2003-present).

5 0.05 percent for brokers and institutional investors (Truong et al, 2007).

6 An example here constitute the findings of Choe et al (1999) who reported lower levels of overseas investors' herding in the South Korean market during the Asian Crisis compared to the period prior to its outbreak. Hwang and Salmon (2004) found that herding tended to decrease during crisis-periods (Asian/Russian Crises) while Demirer and Kutan (2006) documented the absence of herding in the Chinese markets during the Asian crisis.

7 The idea behind the Christie and Huang (1995) model is to regress the cross-sectional standard deviation of returns over a constant and two dummy variables; each of the latter is identified with one of the two "extreme" tails of the returns' distribution ("extreme" defined here as lying over two/three standard deviations from the sample average). Given their model's construction, it does not allow for the observation of the herd's course over time; the latter issue is addressed by Hwang and Salmon (2004).

8 Evidence of the small stocks' association with more significant herding on the premises of microdata (i.e. investors' accounts) has been documented in Lakonishok et al (1992), Oehler (1998) and Wermers (1999).

[9] Obtained from Ecowin-Reuters.

[10] With the exception of the equal-weighted, cross-sectional standard deviation adjusted as well as unadjusted for thin trading.

[11] With the exception of the value-weighted test using volatility as a control variable.

[12] It is important to note here that Kallinterakis and Kratunova (2007) also investigated the impact of thin trading over herding in the Hwang and Salmon (2004) context.

[13] The Bulgarian stock exchange assumed its contemporary form in October 1997.

[14] Farber et al (2006) and Ha (2007) use the Christie and Huang (1995) measure to investigate herding in Vietnam during periods when stocks returns hover around the (up- and down-) price limits existing there.

[15] Recall from our results in Tables 2 and 3 that herding remains significant (insignificant) prior to (after) adjusting for thin trading irrespective of whether volatility is rising or falling. The above results indicate that herding is significant irrespective of the state of the market (a fact also confirmed by our results when using market direction as a control variable) and is in line with relevant findings of Hwang and Salmon (2004).

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Appendix

Table 1: Hwang and Salmon (2004) measure sample statistics (March 2002 – February 2007)

	Cross-Sectional standard deviation of OLS betas				**Logarithmic cross-sectional standard deviation of OLS betas**			
	Unadjusted for thin trading		***Adjusted for thin trading***		***Unadjusted for thin trading***		***Adjusted for thin trading***	
	Equal-Weighted	*Value-Weighted*	*Equal-Weighted*	*Value-Weighted*	*Equal-Weighted*	*Value-Weighted*	*Equal-Weighted*	*Value-Weighted*
Mean	0.58482***	0.54990***	0.50313***	0.44490***	-0.28215***	-0.31602***	-0.35285***	-0.41236***
Standard Deviation	0.28955	0.29222	0.27230	0.25626	0.20840	0.22528	0.21563	0.22973
Skewness	1.10297***	1.41733***	1.27750***	1.66377***	0.08511	-0.07737	0.27556	0.07442
Kurtosis	1.11259	3.18979***	0.88632	3.34390***	-0.64076	-0.33730	-0.06436	0.35631
Jarque-Bera	15.26000***	45.52516***	18.28390***	55.63547***	1.09888	0.34430	0.76969	0.37277

*(**=significance at the 5 % level; ***=significance at the 1 % level).*

Table 2: Herding Estimates Prior to Adjusting for Thin Trading

Variable	Equal-Weighted Cross Sectional Expectation			Value-Weighted Cross Sectional Expectation		
	Original Herding Measure	Herding Measure (Control Variable: Volatility)	Herding Measure (Control Variable: Market Direction)	Original Herding Measure	Herding Measure (Control Variable: Volatility)	Herding Measure (Control Variable: Market Direction)
μ_m	-0.294883404 (0.048153961)***	-0.015853288 (0.032283941)	-0.289375507 (0.047570491)***	-0.323444000 (0.050638638)***	-0.067709518 (0.040265679)	-0.315670181 (0.050317863)***
ϕ_m	0.563148647 (0.112127528)***	0.676143246 (0.130310685)***	0.567666261 (0.113786339)***	0.639870720 (0.124061432)***	0.655340419 (0.131635615)***	0.635042689 (0.124034306)***
c_1			-0.038304921 (0.052904180)			-0.051413381 (0.061034293)
c_2		-0.465660667 (0.043256341)***			-0.425125131 (0.053977573)***	
$\sigma_{m,\upsilon}$	0.045627404 (0.003799279)	0.107899778 (0.003076263)***	0.054674912 (0.003814543)	0.132496626 (0.005898223)***	0.128783621 (0.004630372)***	0.130130715 (0.005793694)***
$\sigma_{m,\eta}$	0.167167622 (0.005575940)***	0.076434966 (0.002477314)**	0.162898499 (0.005510905)***	0.13858821 (0.006267133)***	0.102059497 (0.004056699)**	0.139636564 (0.006248801)***
$\sigma_{m,\eta}$ / S.D. (log-CXB)	0.802138159	0.366766015	0.78165317	0.615165819	0.453022044	0.619819255

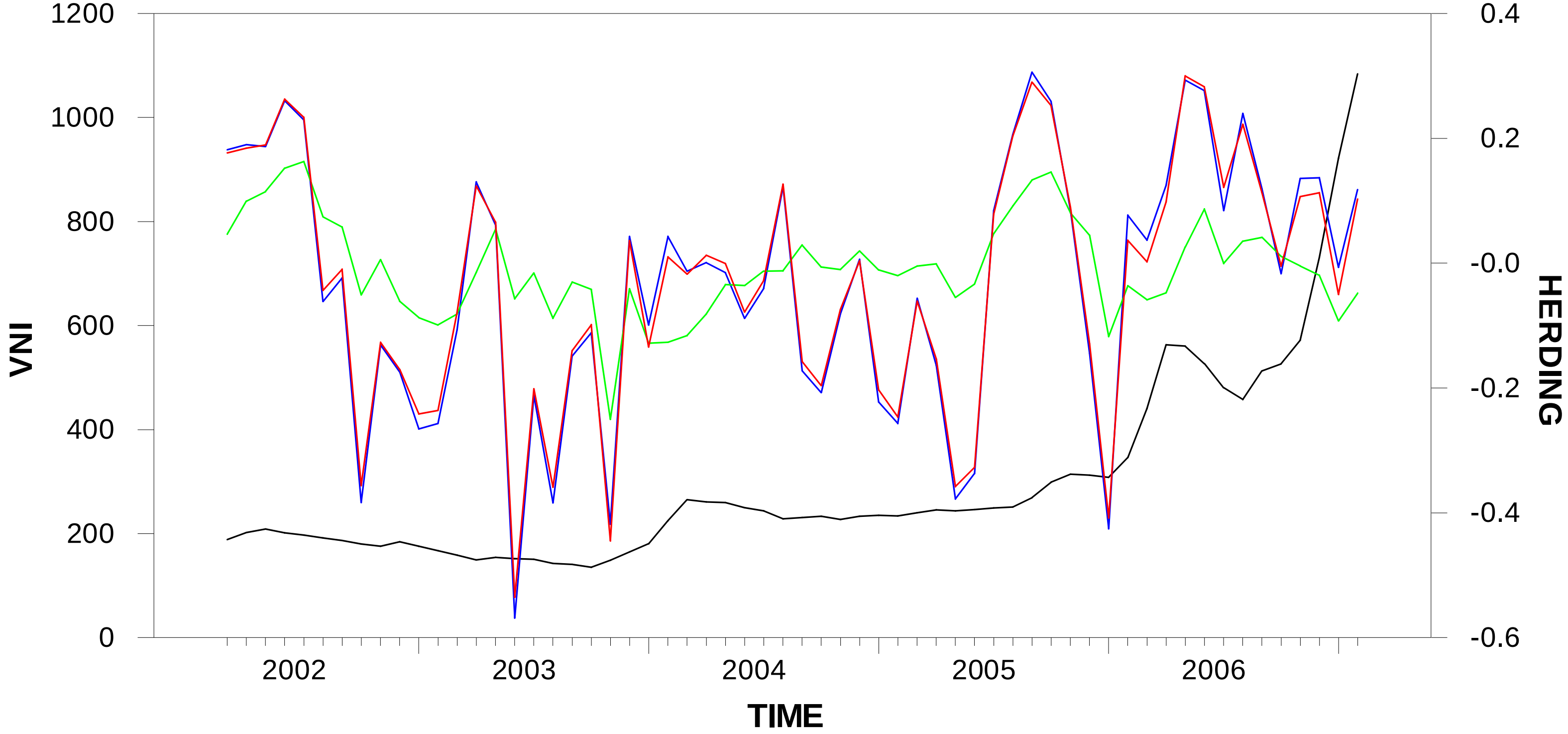
*(**=significance at the 5 % level; ***=significance at the 1 % level). Parentheses include the standard errors of the estimates; sample period: March 2002 – February 2007.*

Table 3: Herding Estimates Following the Adjustment for Thin Trading

Variable	Equal-Weighted Cross Sectional Expectation			Value-Weighted Cross Sectional Expectation		
	Original Herding Measure	Herding Measure (Control Variable: Volatility)	Herding Measure (Control Variable: Market Direction)	Original Herding Measure	Herding Measure (Control Variable: Volatility)	Herding Measure (Control Variable: Market Direction)
μ_m	-0.354052615 (0.034410042)***	-0.050976973 (0.024118343)**	-0.349137964 (0.034294681)***	-0.412463190 (0.033534049)***	-0.123543751 (0.034170404)***	-0.406742555 (0.034172247)***
ϕ_m	0.251260423 (0.145652239)	0.521106123 (0.450974360)	0.278134522 (0.159964478)	0.214659923 (0.212250824)	0.610912813 (0.215092513)***	0.264536524 (0.220829320)
c_1			-0.050218376 (0.064638768)			-0.058122150 (0.068842387)
c_2		-0.445894126 (0.032174522)***			-0.426150445 (0.044304861)***	
$\sigma_{m,\upsilon}$	0.082566876 (0.007314653)	0.160407649 (0.005185677)***	0.105910472 (0.007278274)	0.150565262 (0.009073594)**	0.173922075 (0.006838783)***	0.15828626 (0.008910644)***
$\sigma_{m,\eta}$	0.190943248 (0.007940961)***	0.046628714 (0.003278634)	0.17712147 (0.007806170)***	0.167011485 (0.009163615)***	0.07978629 (0.004433780)	0.157008583 (0.008910935)***
$\sigma_{m,\eta}$ / S.D. (log-CXB)	0.88547995	0.216235934	0.821382854	0.726988196	0.347303605	0.683446329

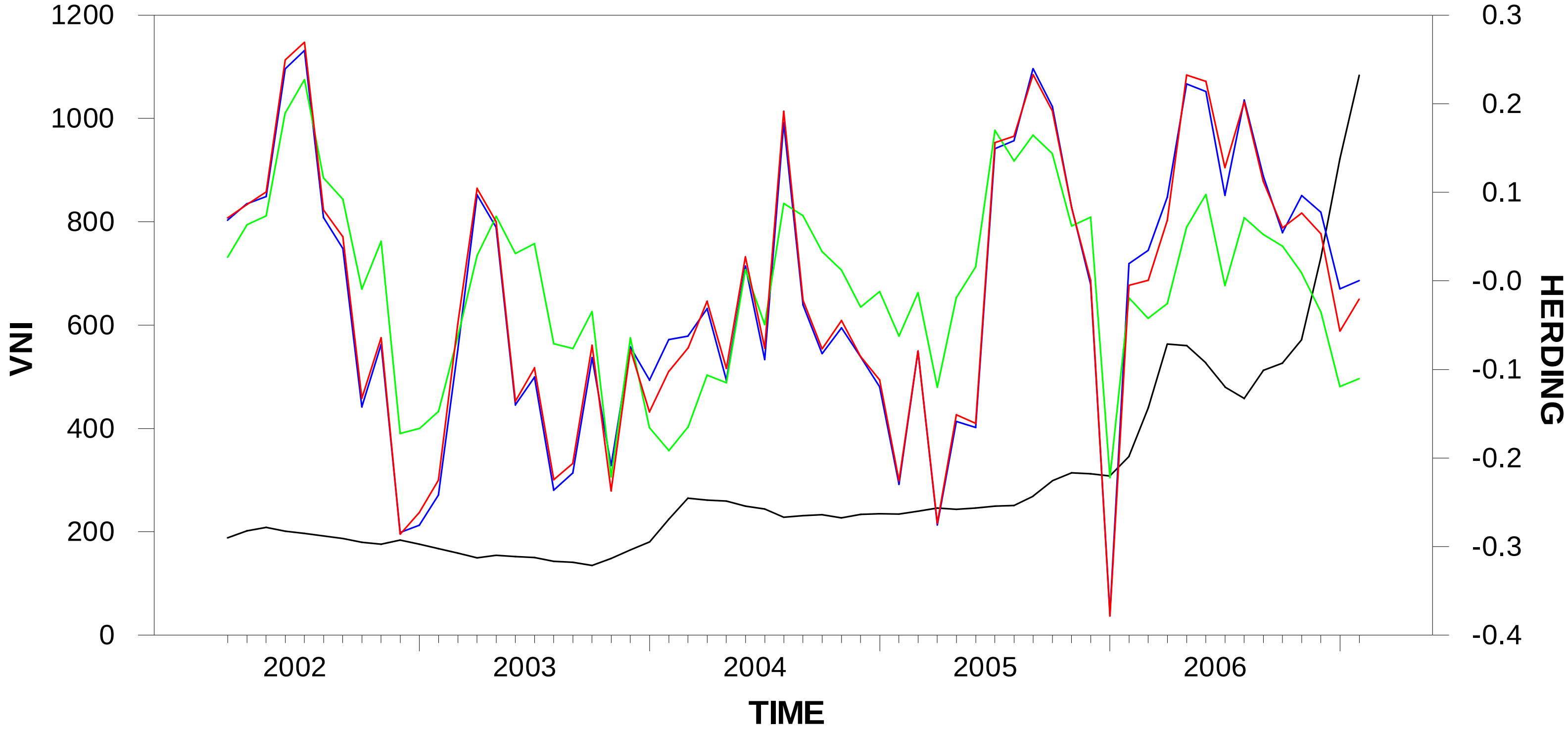
*(**=significance at the 5 % level; ***=significance at the 1 % level). Parentheses include the standard errors of the estimates; sample period: March 2002 – February 2007*

Figure 1: Herding Towards the VNI (Equal-Weighted Cross-Sectional Expectations; Unadjusted for Thin Trading)



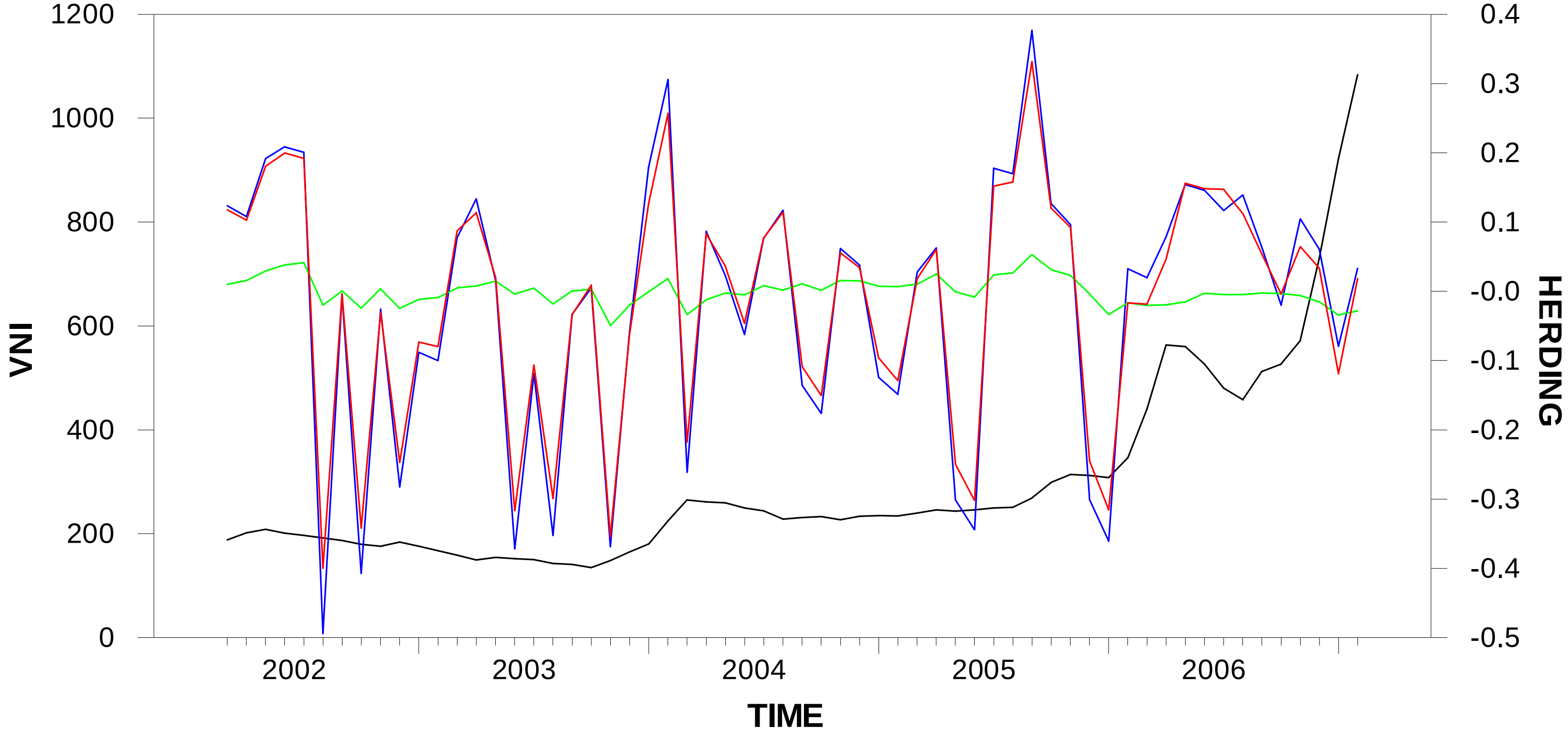
N.B.: Black line = Vietnam Index (VNI); Blue line = Herding estimated with the original Hwang and Salmon (2004) model (no control variables); Red line = Herding estimated with market direction as a control variable; Green line = Herding estimated with volatility as a control variable.

Figure 2: Herding Towards the VNI (Value-Weighted Cross-Sectional Expectations; Unadjusted for Thin Trading)



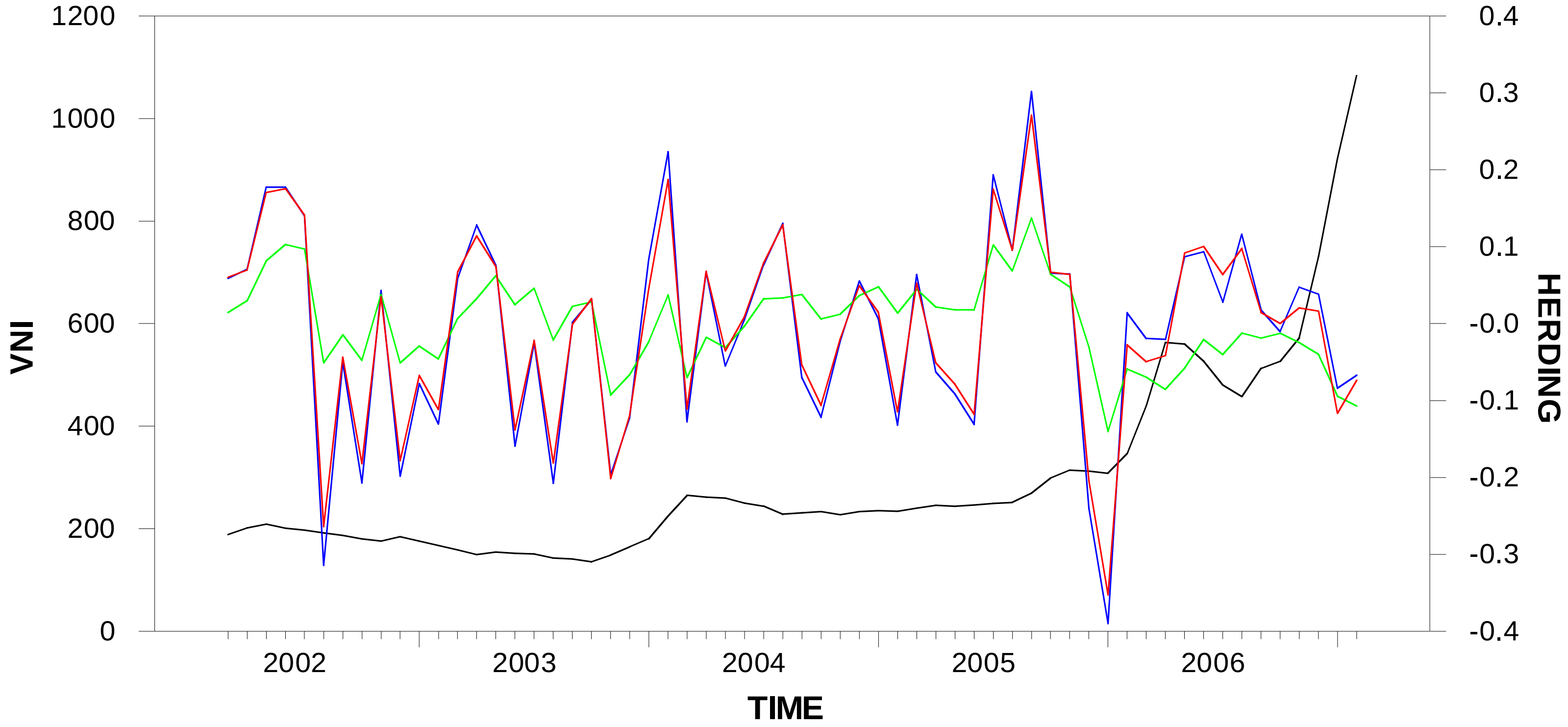
N.B.: Black line = Vietnam Index (VNI); Blue line = Herding estimated with the original Hwang and Salmon (2004) model (no control variables); Red line = Herding estimated with market direction as a control variable; Green line = Herding estimated with volatility as a control variable.

Figure 3: Herding Towards the VNI (Equal-Weighted Cross-Sectional Expectations; Adjusted for Thin Trading)



N.B.: Black line = Vietnam Index (VNI); Blue line = Herding estimated with the original Hwang and Salmon (2004) model (no control variables); Red line = Herding estimated with market direction as a control variable; Green line = Herding estimated with volatility as a control variable.

Figure 4: Herding Towards the VNI (Value-Weighted Cross-Sectional Expectations; Adjusted for Thin Trading)



N.B.: Black line = Vietnam Index (VNI); Blue line = Herding estimated with the original Hwang and Salmon (2004) model (no control variables); Red line = Herding estimated with market direction as a control variable; Green line = Herding estimated with volatility as a control variable.