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# New empirical results on anomalies and herd behavior: Vietnam stock market 2000-2004

ANDRÉ FARBER AND  
VUONG QUAN HOANG

This paper serves as a brief communication of new empirical results on Vietnam stock market, the Ho Chi Minh City-based Securities Trading Center (hereunder 'HSTC'). We will skip much of the information on the technicalities and description of the market, to mainly focus on the empirical results. It is organized as follows. It starts with a short section on the market background. The subsequent section deals with data set available for use and main mathematical statistical tools for analysis. The 'meat' presents key results, followed by some concluding remarks offered by insights drawn upon the work.

## 1. Institutional background

The trading on HSTC started on 28-Jul-2004, with only two stocks, REE and SAM. Until now, the market has experienced nearly four-year operations. The number of stocks listed on HSTC is now 24, with total market capitalization of approximately VND 4,200 billion (USD 270 million), only about 2.98% the total statutory capital of non-state enterprises in Vietnam. Its major authority is the State Securities Commission (SSC), now belonging to Vietnam Ministry of Finance. The most recent statistics by SSC shows that in Jun-2003, there were 15,068 trading accounts at broker firms, of which the majority, over 90%, are individual, a figure significantly higher than the initial 1,457 in Jul-2000.

The market follows order-driven concept, and is fully automated. Therefore, orders matching is done with computers. One critically important feature is the stock transaction price is subject to a daily price

limit, which can vary over time, following adjustments made by HSTC, with consent from the SSC. Price limits play a crucial role in this examination, so we briefly present here the applicable limits in corresponding period to facilitate readers' follow-on: (a) 28-Jul-2000 to 12-Jun-2001: 2%; 13-Jun-2001 to 9-Oct-2001: 7%; 10-Oct-2001 to 30-Jul-2002: 2%; 1-Aug-2002 to 1-Jan-2003: 3%; and the current period from 2-Jan-2003 to date: 5%. We will see shortly that these limits have a crucial impact on the market sentiment, including the herd behavior.

More details on HSTC technicalities and market work modalities, such as tick size, trading hours, processing system, other limits, and the likes, can be found in Vuong (2003). The rationale of this technical examination is offered in Farber (2004).

## 2. Data and Methods

### 2.1. The data set

We use the data set from HSTC daily announcement, organized and maintained by the Hanoi-based Mezon Finance Co. The data set in this study includes daily stock prices for the entire trading history of HSTC till the cutoff date, 29-Apr-2004. To incorporate the fundamental component into market moves, stock dividends are also used. Stock dividends are plugged in the time series on the ex-dividend date. Important information for this analysis is the price limits, provided above.

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Using these raw data, we compute individual stocks and market returns. In the simplest case, the market return is based on the widely cited local index, named VN-Index (VNI). With respect to limit-hits, we produce the simple counting of observed limit-hits, and group them into total hits, upside and downside.

**2.2. Methods**

We follow standard econometric checks on the validity of time series in use, details are offered in Vuong (2003). A discussion of only key points of the methodology follows. The returns are approximated, using both daily stock prices and dividends, by eq.(2.1).

$$(2.1) \quad r_{i,t} = \ln(P_t + D_t) - \ln(P_{t-1})$$

where  $r_{i,t}$  is the return of the stock  $i$ , on day  $t$ ;  $P_t, P_{t-1}$  are closing stock prices on days  $t, t-1$ , respectively;  $D_t$  is the dividend per share, with  $t$  is the ex-dividend date. Stock returns also require some adjustment, for instance, on the date of stock split, if applicable, in which case, the return is reset to zero.

In finding the empirical evidence of herd behavior, the method of cross-sectional standard deviation (CSSD) developed by Christine and Huang (1995) is used. Technical details are offered in Christine and Huang (1995) and Chang *et al.* (2000). The following presents the key point. CSSD is a measure of dispersion of individual stock

returns away from the market return on the day in question. It is computed using eq.(2.2)

$$(2.2) \quad CSSD_t = \sqrt{\frac{\sum_{i=1}^N (r_{i,t} - r_{M,t})^2}{N-1}}$$

where  $r_{M,t}$  is the (market) portfolio return, equally-weighted by all stocks present in the (market) portfolio;  $N$  is the number of stocks in the portfolio. The parameterized system to study the herd behavior is eq.(2.3)

$$(2.3) \quad CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \varepsilon_t$$

where  $D_t^L, D_t^U$  are two dummy variables devised to test the herd behavior.  $D_t^L = 1$  if the market return reach some extreme negative level, defined by the model, and  $D_t^L = 0$ , otherwise. In the same vein,  $D_t^U = 1$  if it attains some extreme upper return level, otherwise  $D_t^U = 0$ . The statistical task is to perform the regressions, and identify the validity of  $\beta^L, \beta^U$  in the model.

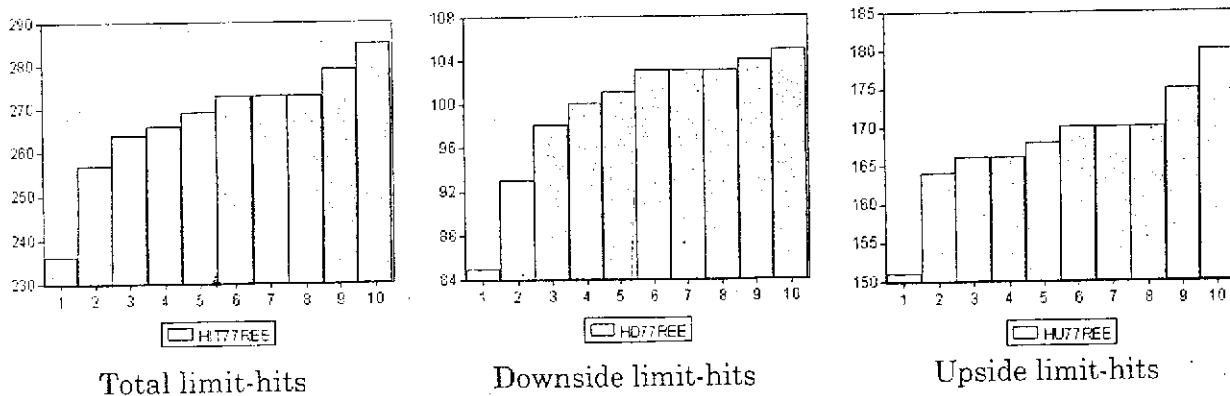
**3. Our New Results**

Below we discuss the new empirical results that we find striking on HSTC stocks returns. These results have not been reported previously.

**3.1. The phenomenon of price limit-hits**

Let us examine the veteran stock REE for its pattern of limit-hits over time, using fig.(3.1):

**FIG.(3.1): REE patterns of limit-hits over the study sample**



## New empirical results ...

The hit counts are collected for equally divided time periods, and cumulative, of the history, representing in fact the empirical distribution of limit-hits over the sample. What we learn is the cluster of hits is dense in the early stages of HSTC trading, and reduced over time. However, the situation has not been settled, as the phenomenon re-emerged in the

most recent periods of trading on HSTC. This has much to deal with investing sentiments, and is attributed to what investors call 'the foreign factor'. It appears that foreigners' investing into HSTC induces a surge in domestic individual investments and trades. Some statistics for continuous limit-hits sequences are provided in the table (3.1).

TABLE (3.1): An example of limit-hits sequences

HAP	TMS	REE	SAM	LAF	SGH
127	5	23	13	64	10
7	28	4	6	6	7
3	27	3	7	5	4
3	19	53	14	6	5
2	18	17	40	3	31
2	6	16	33	4	12
2	8	2	3	10	5
2	2	3	2	2	15
17	4	3	13	7	8
4	7	3	2	24	2
2	2	4	39	9	3
2	15	10	2	6	3
10	10	56	10	3	3
6	7	11	27	2	3
13	6	7	2	3	3
3	18	8	3	7	5
2	19	3	4	2	2
2	2	2	2	7	3
2	2	10	3	2	5
3	3	8	2	3	2
2	2	3	5	2	2
4	2	3	4	2	2
2	2	2	2	8	2

Note: Some sequences are doffed off so that all stocks end in the same row.

We eliminate single hit from the table (3.1), and find that in early stages of HSTC, hit sequences are much longer than more recently. Some extreme length can go up to 127 as HAP. Several long sequences also consist of quite many sequential hits, such as REE twice above 50; SAM twice above 30; and so. The situation presents an extremely critical situation of sustained disequilibrium, which, to our best knowledge, has not been

reported elsewhere in the research community. In brief, this show in many substantial periods of time, the market and stocks had stayed in disequilibria or moved from one disequilibrium to another, and very frequently.

For reference, the statistics of total hits by 12 stocks are given in the following table (3.2), where we can examine more in details about patterns of limit-hits.

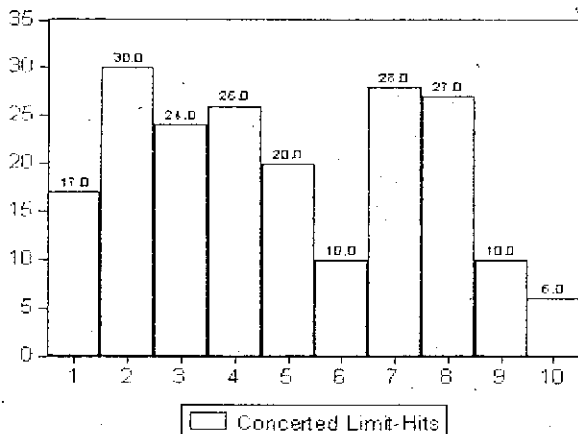
TABLE (3.2): 12 stocks' count of hits (either limit)

Subsample	S.277	S.377	S.477	S.577	S.677	S.777
HITBBC	42	71	76	77	84	92
HITBTC	32	61	86	107	107	122
HITCAN	66	93	100	103	110	119
HITDPC	47	78	93	93	100	107
HITGIL	28	55	58	61	71	86
HITHAP	212	233	234	237	243	259
HITLAF	175	211	225	226	233	243
HITREE	236	264	269	273	279	290
HITSAM	222	242	242	244	249	260
HITSGH	106	133	146	152	161	170
HITTMS	209	234	238	243	247	258
HITTRI	34	60	73	76	76	90

Note: The counting has been performed with expanding subsample size; e.g. the column S.577 of HITCAN row means the number of limit-hits for stock CAN, from S.1 until S.577.

Another important result we find is the concerted limit-hits. We define a group of first five stocks listed on HSTC, including the two 'giants', by the Vietnamese standard, REE and SAM. The concerted is the visual sign of animal spirit, where many stock prices go up to the limit or down to the lower, in the same direction, and at maximal magnitude possible. The situation for the group 5 is presented below.

FIG.(3.2): Group of 5's concerted hits



### 3.2. Evidence of the herd behavior

Herd behavior is the situation where extreme market moves, in terms of prices, and hence, returns, make the individual investors suppress their own expectations, and mimic the market actions. Naturally, there are two major directions of herding,

to the extreme positive return, and the negative. The empirical specification of eq.(2.3) will capture both directions. By using the dispersion statistic  $CSSD^t$  we aim at finding the presence of statistically negative  $\beta^L$ ,  $\beta^U$ , which is the sufficient condition to conclude that the herd behavior exists. For a better explanation of this, readers can refer to Chang et al. (2000).

There is a modification in our implementation of eq.(2.3) in relation to the definition of extreme returns. Both Christine and Huang (1995) and Chang et al. (2000) use the extreme returns as 5% of the lower and upper tails of the empirical return distributions. However, this practice will fail in Vietnam due to the previous results of limit-hits. In fact, a return of 1.6% during the period of 2% daily limit should be considered extreme towards positive. Thus, we define extreme returns as when they cluster around the limits, and attain absolute level of around 70% of the maximum gross daily return. For instance, it can be the lowest, given the limit, as  $|\pm 0.7 \times (1 + \text{lim})|$ .

In the table (3.3) below, we report statistical results from the regression analysis with dummy variables  $\beta^L$ ,  $\beta^U$ . We develop the specification for 4 portfolios: market with all stock present; first 5 stocks; first 10; and first 15.

TABLE (3.3): Results of *CSSD*, empirical estimations.

	$\alpha$	$\beta^L$	$\beta^U$
Market portfolio (All stocks available)		Sample: 2-778	
Coeff.	0.01428	0.001074	-0.011053
t-Stat.	43.1461(*)	0.52811	-22.48061(*)
Portfolio of 5, equally-weighted		Sample: 62-778	
Coeff.	0.011945	-0.002308	-0.009161
t-Stat.	30.81994(*)	-1.689899(***)	-16.45311(*)
Portfolio of 10, equally weighted		Sample: 218-778	
Coeff.	0.012371	-0.003427	-0.005224
t-Stat.	53.64082(*)	-3.072163(*)	-3.919996(*)
Portfolio of 15, equally weighted		Sample: 278-778	
Coeff.	0.012784	-0.001581	-0.003978
t-Stat.	55.17681(*)	-0.834214	-3.402168

Note: Data samples depend on the presence of full stocks defined for the portfolio; except the market portfolio where the return is computed for any stock available. (\*, \*\*\*) Statistically significant at 1% and 10%, respectively.

The reported statistics provide us with the following insights about the market situation:

- All specifications show statistically significant  $\beta^U$ , with correct sign (minus);
- For 2 portfolios of 5 and 10 stocks,  $\beta^L$  is also statistically significant at conventional level, with correct sign;
- The magnitude  $|\beta^U|$  is quite large for the market return, 0.01105. In general,  $|\beta^U| > |\beta^L|$ .

By this, we conclude that the herd behavior exist on HSTC, and fairly severe with respect to the extreme positive returns. Also, we could not rule out the herd towards extreme negative returns in selected groups of portfolios. However, in general the impact of herd towards extreme positive is much larger than the opposite direction.

#### 4. Final Remarks

Now the paper offers some interesting final remarks in a short paragraph, based on the results communicated above.

- HSTC is a market with interesting anomalies of constant limit-hits, evolving over time, and very strong consensus in terms of limit-hits among veteran stocks;
- The market has for long been in disequilibria;
  - These two have a close relationship to the existence of limits;
  - Existence of the herd behavior towards extreme positive returns is found, and weaker towards the opposite; and
  - The degree of herd is quite severe given the magnitude of  $|\beta^U|$ , compared to the

mean level of *CSSD*, standing at 0.12343.

These results are nontrivial and have not been reported before us for the Vietnam stock market. They are nontrivial because the continuous limit-hits and long sequences imply the serious degree of disequilibrium, which would likely reduce the market informational efficiency. The strong herd existence, on the other hand, helps reduce the market's liquidity. All in all, the disequilibrium of HSTC could make it more volatile and less attractive to both prospective investors and listed companies.

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