Estudios de Administración, vol. 18, Nº 1, 2011, pp. 23-44

Herding in Chile: the case of equity trading in the Chilean pension fund market

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Abstract

The phenomena of 'herding' or herd behavior can have important effects when it manifests in equity markets as co-movement in trades of institutional money managers. On one hand, the assets under management are so large in comparison with the size of the market that the trades of these managers affect asset prices, even more so if many managers trade in the same direction. On the other hand, commissions and fees paid by investors are supposedly levied in exchange for an expert management of the investors' capital. Thus, a manager that simply imitates the behavior of others does not add value with her work. The present study is the first to report the results of two measures of herding used to study this phenomenon in

the equity portions of Chilean AFP (pension) funds. One measure is the widely used Lakonishok, Vishny y Shleifer (1992) metric, the other is a relatively newer measure presented in Sias (2004). Using a dataset of monthly fund trades during the period 2003-2011, both measures find herding in the Chilean market which, while moderate in intensity, is still higher than that reported in the stock markets of developed countries. More interesting is the asymmetry of results: herding is stronger during times of market crisis, and almost disappears during periods when the economy expands. These results have important implications for performance evaluation and value added of the pension funds managed by the AFPs, as well as the impact of their trades in the stability of the stock market.

Keywords: Herding, pension funds, portfolio management, institutional investors.

Resumen

El fenómeno de *herding* o comportamiento de manada puede tener serias implicancias cuando se manifiesta en el mercado de la mano de los administradores de fondos institucionales. Por un lado, los capitales bajo administración son tan elevados en comparación al mercado que las transacciones de estos administradores afectan los precios de los activos, más aún cuando estos movimientos se realizan en conjunto. Por otro, la comisión que paga el inversionista es a cambio de una administración profesional de su fondo de pensión. Entonces, un administrador que sólo imita el comportamiento del resto no agrega valor con su gestión. El presente trabajo reporta por primera vez los resultados de dos medidas de *herding* para medir este efecto en las posiciones de renta variable chilena que mantienen las AFP. Una es la conocida medida de Lakonishok, Vishny y Shleifer (1992), la otra, una más nueva de Sias (2004). Considerando el período 2003-2011, ambas medidas confirman la existencia de *herding* en el mercado nacional, con una intensidad si bien moderada, de todas formas, mayor que la reportada en los mercados accionarios de países desarrollados. De mayor interés es la asimetría de los resultados: el *herding* aparece con mayor fuerza en los momentos de crisis de los mercados, para casi desaparecer en períodos expansivos de la economía. Los resultados tienen importantes implicancias para la evaluación del desempeño y valor agregado de la administración de fondos de

pensión gestionados por las AFP, así como el impacto en la estabilidad del mercado accionario.

Palabras clave: Comportamiento de manada (*herding*), AFP, administración de portfolio, inversionistas institucionales.

1. Introducción

Chilean pension fund managers, AFP (Administradoras de Fondos de Pensión) are charged with managing the pension savings of all workers in Chile, and do so by investing in both, local and foreign markets. They are the largest institutional investors in the Chilean equity market, and thus their trades can cause important movements in the prices of these assets, causing, for example, strong and persistent violations of the efficient market hypothesis.

It is therefore no surprise that these money managers are the focus of much attention and research. One factor that can have important consequences for various stakeholders (pension savers, minority investors, traded firms, etc.) is the potential for herding behavior. That is, the propensity for an investor to imitate the behavior of other market agents.

Herding can potentially cause serious deviations of asset prices from their fundamentals, as large investors pile into and out of securities, thus destabilizing the market. Another important consequence of herding is faced by investors, in that these are charged fees for the money management service, and it is fair to ask if this fee should be charged if the all the manager does is imitate other fund managers instead of delivering any added value.

The present study applies two measures of herding to measure this effect in the Chilean pension fund market. The measures are that of Lakonishok, Shleifer and Vishny (1992), henceforth LSV, and Sias (2004). The sample comprises all local

equity trades, inferred from monthly portfolio holdings, spanning the period between September 2003 and December 2011.

In economics and finance, the expression "to herd" is defined as a tendency of agents to move together. That is, agents are said to be "herding" if the natural correlation of individual agent's decisions increases for a period of time. In financial markets herding behavior, particularly of institutional investors, has been widely studied due to the impact these money managers can have on security prices.

Various theory models attempt to relate herding behavior to processes such as information cascades, where an agent observes a number of his peers taking a certain, equal decisions and assumes them to have superior information, and therefore makes the same decision ignoring his own private information. Other potential determinants of rational herding previously studied include compensation incentives and reputational issues (see Bikhchandani and Sharma (2001) and Hirshleifer and Teoh (2003)).

Herding studies have also been carried out in other areas of financial decision making. For example, Graham (1999) finds evidence of herding in the recommendations issued by analysis in investment newsletters, while Frot & Santiso (2009) find herding in the allocation of international aid funds.

Bikhchandani and Sharma (2001), as well as Kremer and Nautz (2007) define two types of herding: 'spurious herding', where agents make similar investment decisions because they face similar information and react rationally to that information, and 'intentional herding' which denotes herding as a result of some investors imitating the behavior they observe in others.

LSV (1992) attribute financial institutional investor herding to the following situations:

- Institutions might try to infer the quality of an investment by observing other market participants trades, and thus end up imitating their strategies.

- It is difficult to evaluate fund manager performance, and in particular separate skill from luck. Typically managers are evaluated with respect to each other, so in order to avoid lagging the group by employing an individual strategy, managers have incentives to "stay with the pack" and have the same assets in their portfolios as the rest of their peer group.

- Institutions might be reacting to shocks in the same exogenous variables, such as dividend changes and analyst recommendations, which would provoke herding behavior. In this respect, signals that emanate from institutional investors are more correlated than those that are perceived from individual investors.

- Herding can also ensue when investors are attracted by similar assets.

In the Chilean pension fund market an added factor is the strong regulation of pension fund portfolios, which both negatively impacts the possible range for implementing individual strategies, and also forces managers to trade in the same directions whenever there is a change in regulation that imposes changes in investment limits.

Most herding studies focus on institutional investors, due to the disproportionate effect that their trades have on asset prices and market equilibrium. LSV (1992) base this premise on two ideas: the first is that changes in demand of institutional investors have a stronger effect on stock prices than those of smaller investors; the second, that institutional investors might not base their strategies on fundamental analysis, possibly due to agency problems of the fund managers. These strategies should bear fruit in the long term, while money managers might be more concerned with benchmarks that are used to measure their performance in shorter periods of time. These conditions are particularly extreme in the Chilean market, where the

participation of retail investors is extremely limited, and a few pension funds dominate the market.

LSV (1992) propose the first measure of herding, and so far the most popular and widely used. While this measure is easy to estimate and flexible enough to disaggregate effects into subsamples (for example, by groups of investors, assets and periods of time), various shortcomings have been reported which cast doubt on any inference gleaned from this measure, mainly the fact that this measure does not allow identification of the causes of the observed herding, 'spurious' or intentional. However, there are also other important issues that must be taken into account when employing the LSV measure. Bikhchandani & Sharma (2001) point out that the measure does not take into account trade intensity. That is, a trade is logged as a buy or sell, but the number of shares trading hands is not accounted for. Also, there is no way to identify intertemporal trading patterns in a fund, such as rebalancing or the realization of small gains. Walter and Weber (2006) mention that, by not considering changes in the fund's relevant benchmark portfolio or index, the results of the LSV measure are only partial as it does not take into account changes in the managed portfolio as a consequence of changes in the relevant index. Blasco, Corredor y Ferreruela (2009) show that the measure is very sensitive to changes in the data frequency and suggest using daily data to correctly identify herding behavior, as 'follower' evidence becomes weaker with longer frequencies. Finally, various authors report the measure to be biased. This issue is discussed in more detail in Section 3.

The other measure applied in this study is proposed in Sias (2004), and estimates herding as the intertemporal correlation between a fund manager's trades in one period of time and the market's past trades. Although both measures are similar in many aspects, while the LSV measure tests trading behavior dependency in each period of time independently, the Sias measure tests the correlation between the investor's contemporary behavior and her behavior in an adjacent past period of time. While this measure falls

victim to many of the same criticism aimed at the LSV measure, it does capture some intertemporal behavior, thus improving on that factor on the LSV measure.

Other measures of herding have been proposed over the last few years. Some of them include Christie and Huang's (1995) "Cross section standard deviation" which estimates herding in terms of a measure of disperision in asset returns, Patterson and Sharma (2006) who propose a herding intensity statistic based on Bikhchandani, Hirshleifer & Welch's (1992) model of information cascades, and Hwang and Salmon (2004) who propose a herding measure based on observed deviations from in asset prices from equilibrium as determined by the CAPM. Nevertheless, the LSV and Sias measures are the ones used in most research articles, due to their ease with which they can be applied and their results interpreted.

Herding literature using Chilean market data is scarce. Olivares and Sepulveda (2007) use a sample from 2002 to 2005, and apply the Sias measure. Maturana and Walker (2002) use a correlation and regression based framework, and study imitation between Chilean fund managers via de application of Granger causality tests. They find evidence of trade imitation, but the methodology does not allow a quantification of the phenomena, only hypothesis testing. Villatoro (2009) proposes a model that integrates fund manager reputation as a determinant of herding behavior and makes predictions based on the model. One of his empirical predictions is that the money management institutions with poorer reputation are the ones most likely to herd. Since the Chilean market is dominated by institutional investors, these considerations are particularly important.

The present article is organized as follows. The following section explains the empirical methodology employed and describes the data analyzed. Section 3 contains the results obtained from the application of the herding measures, and Section 4 concludes.

2. Data and methodology

Data for this analysis was obtained from the Superintendencia de AFP, and consists of monthly portfolio holdings of all pension fund managers and all funds, but restricted to the equity portions of these portfolios. The dataset thus obtained spans a period from October 2003 to December 2011.

Individual trades are inferred by the monthly variations in the number of shares of each firm held by each fund. Finally, each trade is classified as a buy or sell by whether the portfolio's position in the stock has increased or decreased.

Two measures of herding are estimated using the pension fund market trades data.

The LSV (1992) measure is based on the intuition that herding can be viewed as an excess in the propensity to buy or sell a stock, when compared to the expected proportion of buys and sells in the overall market. Thus, the LSV is expressed as

$$H(i) = \left| \frac{B(i)}{B(i) + S(i)} - p(t) \right| - AF(i)$$

where $B(i)$ is the number managers that increase their position in stock i at time t, $S(i)$ is the number of managers who decrease their position, $p(t)$ is the expected proportion of buys for period t (estimated as total buys divided by total trades), and AF is an adjustment factor. This last component is included because the expectation of the first component of the LSV measure is not zero. Thus, in an attempt to calibrate the measure, LSV subtract the expected value of the first term. This expectation term, AF, is obtained based on the binomial distribution that the term should follow under the null hypothesis of no herding. Since AF depends on the propensity to buy, $p(t)$, and the number of funds in the market

at each point in time, for each asset this factor decreases as the number of portfolios with long positions in the asset increase.

Sias (2004) approaches herding on the basis of the co-movement of money manager trades. Investors' demand for an asset is positively correlated with past demand for that asset. That is, investors follow the behavior of other investors in the same and other stocks.

Sias's measure tries to capture the time series patterns observed in cross-sectional investor trades, in order to ascertain whether fund managers tend to react to previous trends by trading in the same direction. That is, the Sias measure looks for serial correlation between an investor's trades and trades that occur in the previous period, both her own and others.

First, Sias obtains the percentage of traders that buy asset *k* at time *t*, for each asset and period of time, and calls it the "*raw*" change in the holdings of asset *k* at time *t*,

$$Raw\Delta_{k,t} = \frac{No.\ of\ institutions\ buying_{k,t}}{No.\ of\ institutions\ buying_{k,t} + No.\ of\ institutions\ selling_{k,t}}.$$

Then, this measure is standardized as

$$\Delta_{k,t} = \frac{Raw\Delta_{k,t} - \overline{Raw\Delta_t}}{\sigma(Raw\Delta_{k,t})},$$

where $\overline{Raw\Delta_t}$ is the average change in holdings for all assets at time *t*, and $\sigma(Raw\Delta_{k,t})$ is the standard deviation of the changes in holdings.

In order to test whether institutional demand predicts institutional demand, Sias sequentially estimates a cross-sectional

regression of the standardized raw fraction of buys of an asset on its own one period lag,

$$\Delta_{k,t} = \beta_l \Delta_{k,t-1} + \varepsilon_{k,t}.$$

The resulting coefficients represent the direction and intensity of overall market herding for each time period.

The correlation observed between institutional investor's trades at a time period and the same measure for the previous period can be decomposed into the portion of that correlation due to an investor following her own previous trades, and the investor who follows other investors' previous trades. In effect, the previously estimated measure can be decomposed to separate the overall 'herding' effect into the effect of institutional investors following each other into and out of stocks over time, and that of investors following their own trades. As the second part of this decomposition is closer to our definition of herding, we apply Sias' decomposition as well.

The coefficients resulting from the linear model previously estimated can be expressed as

$$\beta_t = \rho(\Delta_{k,t}, \Delta_{k,t-1}) =$$
$$= \left[\frac{1}{(K-1)\sigma(Raw\Delta_{k,t})\sigma(Raw\Delta_{k,t-1})}\right] x \sum_{k=1}^{K}\left[\sum_{n=1}^{N_{k,t}} \frac{(D_{n,k,t-1} - \overline{Raw\Delta_{t-1}})(D_{n,k,t-1} - \overline{Raw\Delta_{t-1}})}{N_{k,t}N_{k,t-1}}\right]$$
$$+ \left[\frac{1}{(K-1)\sigma(Raw\Delta_{k,t})\sigma(Raw\Delta_{k,t-1})}\right] x \sum_{k=1}^{K}\left[\sum_{n=1}^{N_{k,t}}\sum_{m=1,m\neq n}^{N_{k,t-1}} \frac{(D_{n,k,t-1} - \overline{Raw\Delta_{t-1}})(D_{m,k,t-1} - \overline{Raw\Delta_{t-1}})}{N_{k,t}N_{k,t-1}}\right]$$

where $N_{k,t}$ is the number of investors trading asset *k* at time *t*, and $D_{n,k,t}$ is a dummy variable which equals one if trader *n* is a buyer of stock *k* at time *t*, and zero if the trades is a sell. Similarly, $N_{k,t-1}$ is the number of investors trading stock *k* at time *t*-1, $D_{n,k,t-1}$ is a dummy variable that equals one if trader *n* is a buyer of asset *k* at

time *t*-1, and $D_{m,k,t-1}$ is a dummy variable that equals one if trade *m* (*m*≠*n*) buys security *k* at time *t*-1.

The first term of the expression is the portion of the overall correlation due to investors following themselves into and out of positions. If this is the case, this term will be positive. If investors' contemporary trades tend to be independent of their previous trades, then this term will be zero.

The second part of the expression accounts for the correlation due to investors following each other. If investors tend to buy the assets that other investors have bought in the past, then this term will be positive. On the other hand, if investors who observe the past behavior of their colleagues tend to sell the assets that other have bought, then the term will be negative. If cotemporary trader behavior is independent of past behavior of other traders, then the term will be zero.

The measures are estimated for each time period in the sample, as well as for subsamples selected on two criteria. The first criteria is to separate stocks listed in the local IPSA index, which gathers the 40 most traded stocks, from the rest of the stocks traded in the market. The second is an aggregation of data for the period before the current economic crisis. The Superintendencia de Pensiones de Chile defines August 2007 as the beginning of a period of heightened market volatility. Thus, for this analysis the sample is split into the period before and after August 2007, and the resulting herding measures compared.

3. Empirical Results

A. Full sample analysis

LSV and Sias measures of herding are first applied to a sample of Chilean pension funds for the complete period under study. The results obtained are shown in Table I.

Table I
LSV and Sias measures of herding for full sample

PANEL A: LSV MEASURE	
	LSV
H	0.046
T	21.321
p	< 0.001
PANEL B: SIAS MEASURE	
	SIAS
Beta	0.340
T	15.643
Own	0.111
Others	0.230

Panel A contains the LSV measure of herding, the t statistic and resulting p-value of the measure. Panel B shows the Sias Beta coefficient for the full herding effect, with its related t-statistic below, and followed by the decomposed Betas representing herding in terms of a manager that follows his own prior trades ("Own") and those of other managers ("Others").

The resulting statistic can be interpreted as a propensity to buy (i.e.: enter positions) that is 4.6% above that which would be

expected in the absence of herding. While the number is not large in an absolute sense, it nearly doubles LSV's measure for the U.S. market at that time, which was 2.7%, consistent with literature that reports higher levels of herding in emerging markets than in developed ones. This is usually attributed to emerging markets having incomplete regulation, particularly in the area of market transparency. Also, the low quality of the information available in these markets generates uncertainty and casts doubts on publicly available information, which runs contrary to reliable fundamental stock analysis.

The Sias measure shows a correlation coefficient of 0.34 and, as is the case with the LSV measure, the statistic is significant at the 1% level. Of this correlation, 0.11 is due to investors following their own trades, while the remaining 0.23 is due to them following other investor's trades. Thus, approximately 68% of the overall detected correlation is due to herding by pension fund managers.

These results are consistent with those of Olivares and Sepulveda (2007) who use a sample spanning from October 2002 to December 2005, and report an average Sias measure of 0.23, of which 0.19 is explained by institutional investors following each other's trades, equivalent to 86% of the full measure.

B. Subsample analysis

Table II contains the results obtained from applying the LSV and Sias measures to the subsamples described in the previous section.

While herding theory predicts that the phenomena should be stronger in samples of smaller assets for which there is less information available to investors, both measures find a disproportionate level of herding in the sample of stocks that conform the IPSA index. The LSV measure reports a level of herding of 6% for the IPSA stocks, and only 2.8% for the non-IPSA

stocks, while the Sias measure marks a correlation of 0.424 for IPSA and 0.328 for non-IPSA stocks.

Table II
LSV and Sias measures of herding for full subsamples

PANEL A: LSV MEASURE				
	IPSA	Non-Ipsa	Pre-crisis	Crisis
H	0.060	0.028	0.006	0.077
t	19.869	9.541	2.075	21.560
p	< 0.001	< 0.001	< 0.001	< 0.001
PANEL B: SIAS MEASURE				
	IPSA	Non-Ipsa	Pre-crisis	Crisis
Beta	0.424	0.328	0.280	0.381
t	18.214	11.297	9.253	17.655
Own	0.087	0.129	0.161	0.101
Others	0.337	0.199	0.119	0.280

Both Panels A and B show the results of applying herding measures to subsamples. Panel A contains the LSV measure of herding, the t statistic and resulting p-value of the measure for subsamples of stocks belonging to the Chilean IPSA index ("IPSA"), and those that are not in the index ("Non-IPSA"), as well as for the sample predating the financial crisis ("Precrisis"), and the periods that follow ("Crisis"). Panel B shows the Sias Beta coefficient for the full herding effect, with its related t-statistic below, and followed by the decomposed Betas representing herding in terms of a manager that follows his own prior trades ("Own") and those of other managers ("Others"), for the same subsamples described above.

The IPSA stocks are issued by the largest firms in Chile, and are thus the ones under the closest scrutiny by the authorities, analysts and the financial press. It is precisely this quality which

may be the key to understand while standard herding patterns are not seen in this market. Pension funds in Chile are extremely regulated in terms of the kind of assets they may or may not include in their portfolios. This regulation includes caps on the level of ownership the funds can take in any one firm, as well as the characteristics of the firms, including variables related to risk as is size. Since this is a study of herding in a sample of pension funds, we are in fact analyzing a subsample of the Chilean investment fund industry. This particular subsample is mostly invested in the larger stocks, and focuses its research on those firms only. Thus, the effect seen here could be caused by research herding: all researchers follow the same firms, obtain roughly the same vision of the market and expectations of performance, and so herding is caused by rational trades of each fund manager using very similar information sets (as opposed to mimicking each other's trades). However, this hypothesis is not tested in this article, and is left as a task for future research.

With respect to the composition of the Sias measure, it is interesting to note that the portion of the herding correlation due to investors following each other's trades is 63% of the total measure for the non-IPSA stocks, while this percentage increases to 79% for the sample of IPSA stocks. Again, this can be seen as a consequence that Chilean pension funds trade mostly large stocks, and are not so concerned with their positions in smaller firms to closely follow their peers in this part of the market.

Splitting the sample into pre-crisis and crisis years also yields interesting results. Consistent with theory on the asymmetries in market reactions to volatility in up markets versus that of down markets (see, for example, Haugen et. al. (1991), Womack (1996), Chan (2003) and others), the LSV measure for the pre-crisis period is 0.6%, compared to the herding detected since the onset of the crisis, which rises to 7.7%. The Sias measure echoes these results, with a correlation during the period ending in 2007 of 0.28, of which only 0.119 is due to follower behavior (equivalent to 43%), contrasted by a correlation for the period that follows of 0.381, and a

follower component of 0.28, or a 74% contribution to the total measure.

All subsample measure differences (IPSA vs. non-IPSA, pre vs. post crisis) are significant at the 1% level[1].

These results are consistent, for example, with those of Kremer and Nautz (2011) who find an increase in herding in the German stock market since the start of the current economic crisis in late 2007. Likewise, Caporale, Fotini and Nikolaos (2008) in a study of herding in the Athens stock market in extreme conditions, find evidence of a significant imitator behavior during and after the crisis of 1999.

In addition to documented rational basis for exacerbated manager co-movement in down markets (i.e.: "flight to quality"), in the Chilean pension fund market this asymmetry in herding behavior can also be explained by local regulation. Pension funds must by law guarantee a minimum return to their clients, which is calculated on the basis of the average return of all funds from all pension fund management firm active in the system. Thus, firms that lag the performance of the market end up paying their clients with returns they did not really achieve, which entail cash flows from their own earnings. Therefore, in down markets it is more probable that managers will try to "move with the pack", as opposed to trying individual strategies, and risk falling below the average return obtained by her peers.

[1]Since the distributions of resulting Sias betas reject normality in standard Jarque Bera and Lilliefors tests, both standard t-test and non-parametric Mann-Whitney-Wilcoxon tests are used to establish the significance of the subsample differences. The results of both tests are consistent with rejection of the null of zero difference at levels far below 1%.

C. Some limitations of the study

The main criticism of both the LSV and Sias measures is that they are not able to distinguish between intentional "copycat" herding and the natural herding occurring when money managers react in unison to the same market signals or regulatory pressures.

This is particularly the case in the strongly regulated Chilean pension fund market, where, for example, changes in regulated caps in company ownership by pension funds lead to all portfolios being rebalanced in the exact same direction. Likewise, since pension funds are amongst the biggest investors in the Chilean market, any firm's SEO will likely be offered first to these investors, and subscription will heavily favor them, in trades that will appear to be synchronized increases in positions, but which do not correspond to imitation.

Another potential problem is that the significance of the measures is obtained from standard t-tests. These tests assume normality of the data, an assumption that is rejected by normality tests[2].

Finally, there is much discussion on the potential biases of the herding measures, both upward and downward. Kremer and Nautz (2011) estimate each measure with daily, monthly and quarterly data, finding a higher reported level of herding when using monthly and quarterly data than when the measures are estimated with daily data. This, according to Blasco, Corredor and Ferreruela (2009) could imply an overstatement of the herding measures for this data. Wylie (2000) uses bootstrapped re-sampling to construct various datasets which present no herding, in order to test the LSV measure. Since LSV detects herding in these datasets, the measure is assumed to be upward biased. On the other hand, Bellando (2010) provides a formal explanation of the bias, and shows that the

[2]Jarque-Bera and Lilliefors tests are employed. Results available upon request.

measure is downward biased. Frey, Herbst & Walter (2007) arrive at the same conclusion as Bellando, empirically showing that the LSV measure is only exact in the absence of herding, and that the measure is otherwise downward biased.

In the case of the present study, and adding to the effects described above, all funds in the Chilean pension system are considered to be trading independently. However, each pension fund firm offers five funds, one for each risk category, and it can be safely assumed that the research that prompts changes in the equity portions of each of these funds is the same for each of these funds, even if their exposures to equity varies. By considering each fund to be trading independently this sharing of information, and resulting equal direction of trades, could be positively biasing the measure.

What the resulting size and direction of these combined effects may be is beyond the scope of this analysis.

4. Conclusions

Herding is detected in the equity portions of the Chilean pension fund market. The measure of herding is stronger than in larger, more developed economies, but is asymmetric in that the phenomena appears to be very strong in times of market crisis, and almost inexistent in a rising market, and also is far stronger in stocks listed in the local IPSA index than in those that are not included in the index.

From the point of view of the pension fund investor, a fund manager that 'herds' or bases her strategy on following other managers' trades does not add value and therefore would have trouble justifying the expenses charged to the investor. While this implication of the findings of this study is important, the conclusions are limited by the shortcomings of both measures employed, LSV (1992) and Sias (2004). These measures are not able to divine intentionality in the herding measure. That is, they are not able to

inform the researcher whether the herding detected is due to fund managers following each other, or if all managers are reacting in similar ways to exogenous market signals, which might be consistent with rational and utility-maximizing behavior.

What cannot be discounted by the intentionality argument is the potentially destabilizing effect that a high correlation in institutional fund manager trades could have in a relatively small market as is the Chilean stock market. In particular, since this effect is far stronger during times of crisis, the co-movement of pension fund managers can cause strong fluctuations in asset prices, with the resulting consequences to the firms and minority shareholders affected.

Due to its important effect in the Chilean market, this area of market inefficiency warrants further research. Some potential improvements include the extension of the dataset and an increase in the frequency of the data, as well as the implementation of other measures of herding. One important goal would be to ascertain the level of intentional herding, as opposed to spurious herding. Another, to establish the potential effect of different types of market shock in the prices of various assets and the index, incorporating the herding effect, which might guide policy makers as they devise market stability regulation.

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