Market volatility and performance of Australian equity funds

Volatility is a constant factor when making investment decisions. **VT ALAGANAR** and **JONATHAN WHITEOAK** take a look at cross-sectional volatility and offer some solutions.

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Cross-sectional volatility of Australian stocks has increased since the Asian crisis in 1997 until about the mid-2002. Uncertainty associated with future earnings is one variable that has the ability to explain some of the cross-sectional volatility among stocks.

The term 'volatility' stands for risk and uncertainty and is usually measured by the standard deviation of returns. Greater variation in returns, as indicated by a higher standard deviation or a similar measure of dispersion, is linked to higher risk.

There are two different methods of representing volatility of returns at the aggregate market level. One is the variation of returns over a period of time such as a month or a year, and is called inter-temporal or time-series volatility.

In general, when we use the term volatility, we refer to this inter-temporal measure, since this is the most relevant gauge for an individual asset or market as a single entity. The second volatility measure captures the cross-sectional dispersion of returns within a pool of assets at a given time.

These two measures are related even though they involve quite different calculations. For example, cross-sectional volatility can change due to (a) a change in the time-series volatility of sectors in the market; (b) a change in the time-series volatility of the overall market; and (c) a change in the dispersion of average sector returns (Ankrim and Ding, 2002).

In theory, a stock's risk depends on the uncertainty associated with the company's underlying fundamentals such as earnings or cash flows. However, it is the changes in expectations about those fundamentals that predominantly influence the day-to-day price changes of a stock and therefore its time-series volatility. Another factor that contributes to both inter-temporal and cross sectional volatility measures that has been gaining increasing attention among researchers is behavioural biases (e.g. investor overreaction to news).

Here we study the volatility of Australian equities from 1994 to 2003, and how it relates to performance of equity funds over the same period. We do this from four main different points of view: (i) cross-sectional volatility of the ASX100 constituents; (ii) inter-temporal volatility of the aggregate market (ASX100 Index); (iii) cross-sectional volatility of earnings and earnings forecasts; and (iv) the level and dispersion of active equity fund returns. Our objective is to find out what lessons investors can learn from the past history of stock volatility and fund performance.

Volatility of individual stocks

We begin our analysis by examining the level and dispersion of volatility of ASX100 stock returns as given in Figure 1. We calculate the standard deviation of daily returns of each individual stock

FIGURE 1 **DISPERSION AND MEDIAN OF VOLATILITY OF INDIVIDUAL STOCKS IN ASX100**

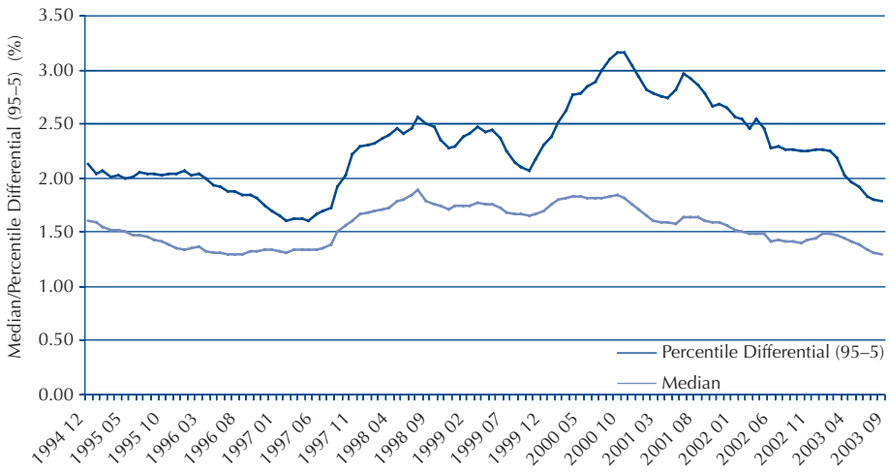


FIGURE 2 **NUMBER OF ASX100 STOCKS WITH A MONTHLY RETURN OVER/UNDER 15%**

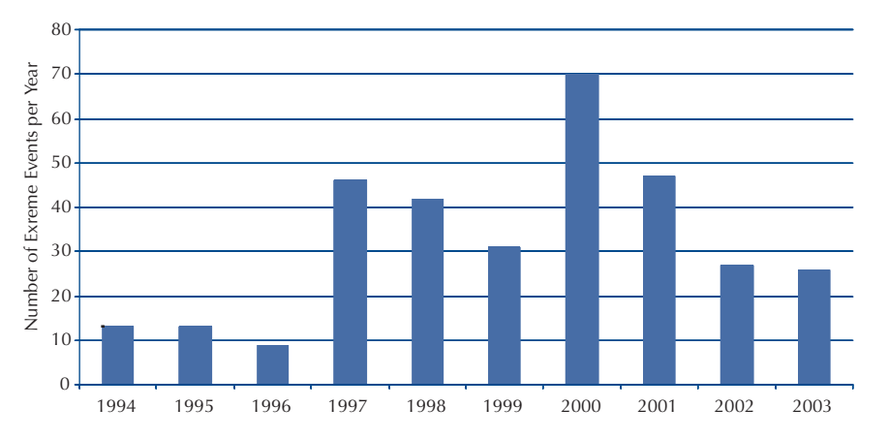
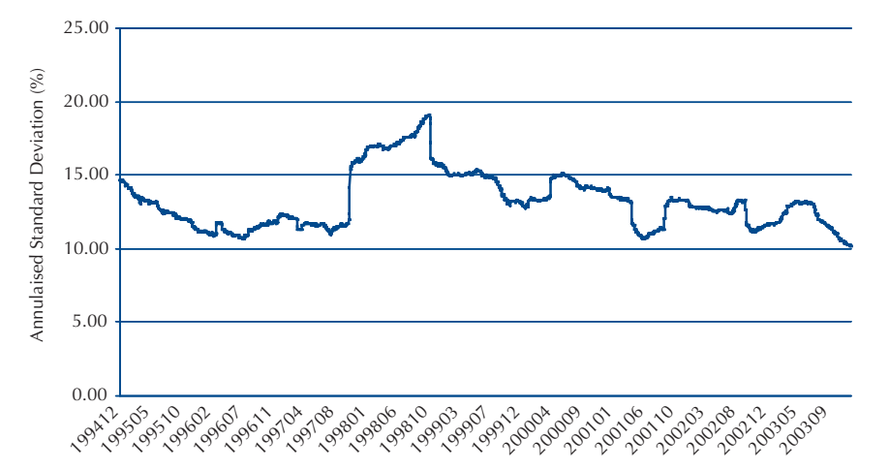


FIGURE 3 **MOVING ANNUAL VOLATILITY OF ASX100 DAILY RETURNS**



within a calendar month for all stocks in the ASX100, representing the time-series volatility of each stock. Then we measure the median and dispersion of these monthly standard deviation values. The dispersion criterion we use, the "percentile differential", is the difference between the 95th and 5th percentile ranking of standard deviations of individual stocks. Figure 1 shows the rolling 12-month average of medians and dispersions of standard deviations.

Higher dispersion of individual volatility is indicative of higher cross-sectional volatility. We observe two clear episodes where cross-sectional volatility had increased in the last decade. The first rise happened in the fourth quarter of 1997 coinciding with the Asian Crisis and the second occurred in early 2000 during the time of the TMT crash. With a gradual decline in volatility since 2002, we are currently (as of December 2003) experiencing a period of relatively low volatility.

A change in cross-sectional dispersion does not necessarily relate to a change in the average or median time-series volatility as seen in Figure 1. Until about mid-1998, the change in dispersion is in step with the change in median. From 1999 to 2001, the degree of change in dispersion is more pronounced than that of the median. This is attributed to the presence of extreme events that increased the dispersion while impacting little on the overall median. If we focused solely on the median of volatility in Figure 1, we could be misled into believing that the volatility of ASX100 stocks has remained relatively unchanged.

Next we look at the frequency of extreme events over the past ten years, shown in Figure 2. For this analysis, an extreme event is defined as one where a stock's return exceeded or fell below 15% in a calendar month. The frequent occurrence of extreme events since 1997 is consistent with the higher cross-sectional volatility documented in Figure 1. In terms of extreme events, the Australian equity market has become a riskier place to invest since the 1997 Asian crisis.

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Aggregate market volatility

Next we turn to the time-series volatility of the aggregate market. We calculate the standard deviation of daily returns of the ASX100 index over a rolling annual (252-day) window, shown in Figure 3. We see elevated aggregate market volatility in the later part of 1997 (Asian Crisis) and from there it has taken almost four years for the aggregate market volatility to come down to its pre-1995 levels.

The increased volatility due to the TMT crash in 2001 that we noted in Figure 1 does not seem to have propagated to any significant extent to the aggregate market. This result is consistent with that of Campbell, Lettau, Malkiel, and Xu (2001) who observe a rise in the cross-sectional volatility in the US market with no systematic increase in overall market volatility. One explanation for this is the declining correlation among stocks when cross-sectional volatility is higher, which is examined in detail later.

Volatility of actual earnings and earnings forecasts

It is interesting to find out whether there is any correspondence between the cross-sectional volatility of stock returns observed above with earnings expectations or actual earnings. Figure 4 shows the variation in earnings forecasts for ASX100 constituents as measured by the coefficient of variation of analysts' earnings forecasts (EPS_CV) and the variation in actual earnings as measured by the return on equity (ROE). The dispersion measure shown in Figure 4 corresponds to the difference between the 95th and 5th percentiles of the EPS_CV and ROE values among the ASX100 stocks.

EPS_CV is computed by dividing the average of the estimates of analysts' earnings forecasts for the next fiscal year by the standard deviation of these forecasts. Higher EPS_CV represents a lower dispersion and less uncertainty about future earnings among the security analysts. ASX100 stocks show an increase in the variability of EPS_CV since 1999. However, dispersion of actual earnings (as represented by ROE) shows a cyclical variation with approximately a three-year frequency.

FIGURE 4 **DISPERSION OF ROE AND EARNINGS FORECASTS – ASX100**

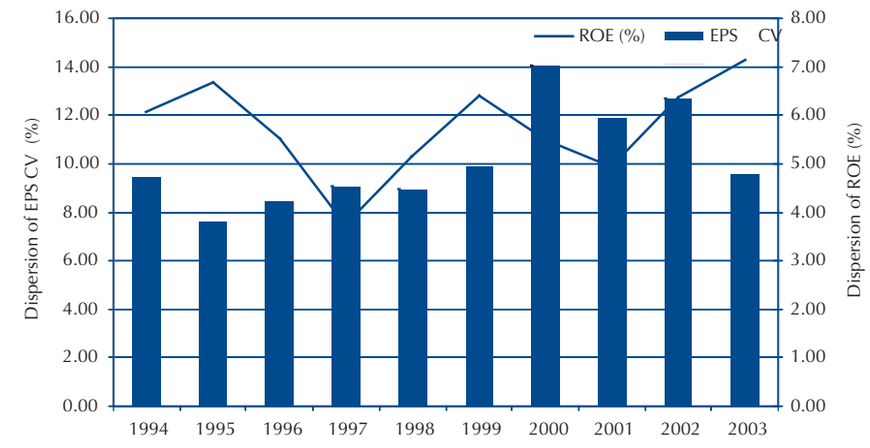


FIGURE 5 **ANNUAL EXCESS RETURNS OF EQUITY FUNDS AND CROSS-SECTIONAL VOLATILITY**

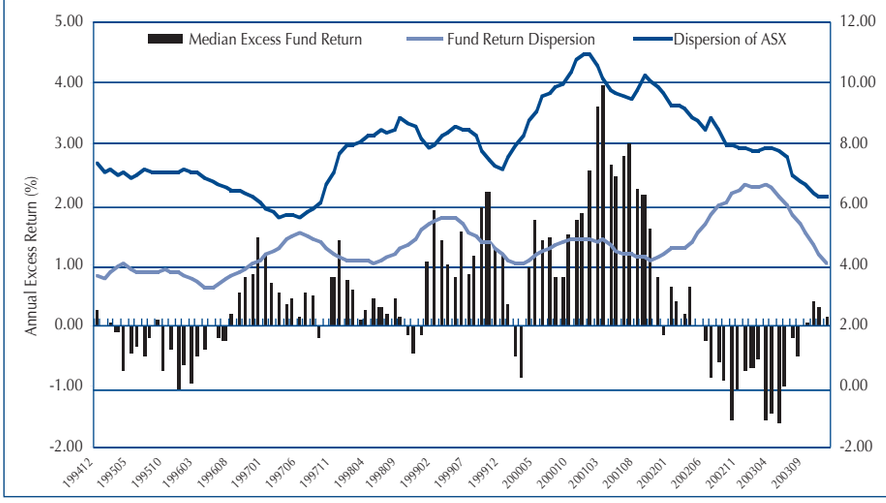
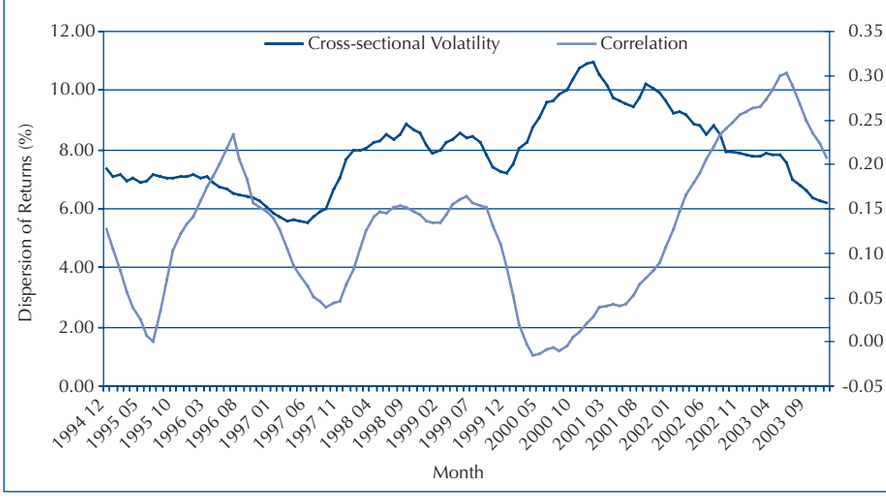


FIGURE 6 **CORRELATION AND CROSS-SECTIONAL VOLATILITY OF ASX100 STOCKS**



This could also be interpreted as a rapid mean reversion of ROE.

The cross-sectional volatility of returns we noted in figures 1 and 2 shows a negative association with the dispersion of EPS_CV, with no significant association with the dispersion of ROE.

Performance of Australian equity funds

Now we turn to the performance of Australian equity funds, obtained from the Mercer Investment Consulting Manager Performance Analytics software, for the ten-year period ending December 2003. There are 96 active Australian equity funds covered in this database. Our results are based on the number of funds with returns for at least 12 continuous months from January 1994 to December 2003. In figure 5, we present the (a) median annual excess return over the ASX100 index; (b) dispersion of performance as measured by the 75th and 25th percentile difference (inter-quartile range) in the annual excess returns of funds; and (c) cross-sectional volatility of ASX100 stock returns presented previously. All three variables are computed on a rolling 12-month basis.

We observe a higher (lower) median excess return for equity funds when the cross-section volatility or dispersion of the ASX100 is higher (lower). This relationship has become more prominent since 2000. Whenever cross-sectional dispersion increases across the market, as in the 1998 Asian Crisis, for the same stock bet size, the riskiness of the bet is magnified.

These higher levels of risk have rewarded investors with higher median active fund returns. This result is consistent with the general rule that for a constant (positive) ability to forecast stock returns, the higher the cross-sectional volatility the higher the return.

Another interesting observation is the divergence between best and worst fund as represented by the dispersion (inter-quartile range) of annual excess returns, which has remained in the 4%-6% range for most of the last decade. One of the main reasons why this range is relatively narrow is that we have pooled together funds of all investment styles, which results in a diversified set of returns. However, the correlation of 0.17 between the cross-sectional volatility of stocks and the dispersion of excess returns of equity funds represents a positive association between the two variables. This result is similar to the findings reported by Ankrim and Ding (2002) on US equity mutual funds.

Correlation and cross-sectional volatility

Results in the preceding section suggest that higher cross-sectional volatility of stocks is associated with higher dispersion and median returns for actively managed equity funds. These results are consistent with the modern portfolio theory. However, it also suggests that the correlation of returns of stocks is another important factor that is beyond the control of the fund manager, and that affects the portfolio returns.

We calculated the correlation coefficient of monthly returns for every pair of stocks in the ASX100 index using 24-lagged monthly returns. The average of these correlations are presented in Figure 6 together with the cross-sectional volatility (dispersion) shown earlier in Figures 1 and 5.

The overall relationship between the average correlation coefficient and the cross-sectional volatility of ASX100 stocks is inverse as given by their correlation coefficient of –0.29. This result is consistent with the research findings of Solnik and Roulet (2000) in which they recommend using dispersion of returns as a measure of instantaneous correlation. One implication of this result is that investors should pay more attention to portfolio diversification since it delivers more benefits during times of declining correlations and/or increasing cross-sectional volatility. Median excess returns of funds also have a negative association with the correlation of stocks as reflected in the correlation of –0.51 between the two variables.

However, the trend in the most recent period suggests a decline in both the cross-sectional volatility and correlations among Australian stocks, which does not match the generally expected inverse. Portfolio managers could find a silver lining here in that the lower cross-sectional dispersion (associated with lower returns) is being offset by lower correlations (associated with higher returns).

Even though the correlation has declined, however, the level is still high compared to its historical estimates. In this environment portfolio managers may have to increase their active positions in order to achieve the same level of excess returns. Taking such higher bets may not necessarily bring about a higher ex-post active risk given lower cross-sectional volatility.

Conclusion

The difference between the extreme (best and worst) managers as measured by the inter-quartile range has remained stable between 4% and 6%. Despite this narrow range, Australian equity funds have delivered higher excess returns during times of higher cross-sectional volatility among stocks.

Uncertainty associated with future earnings is one variable that has the ability to explain some of the cross-sectional volatility among stocks. We also seem to have entered a period of low cross-sectional volatility since mid-2002, with relatively high correlation among stocks. Assuming stable predictive power in their stock selection method, portfolio managers will find it more challenging to add value via stock selection unless they take larger active positions.

References:

Ankrim, E.M., and Ding, Z. 2002, Cross-Sectional Volatility and Return Dispersion, Financial Analysts Journal, (58-5), 67-72.

Campbell, J.Y., Lettau, M, Malkiel, BG and Xu Y. 2001, Have individual stocks become more volatile? An empirical investigation of idiosyncratic risk, Journal of Finance, (56-1), 1-43.

Solnik, B., and Roulet, J. 2000, Dispersion as Cross-Sectional Correlation, Financial Analysts Journal, (56-1), 54-61.

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New Member trends for 2004 reach new heights

We welcome our many new members for the year! The year-to-date new members numbers have now reached 2,069, which is the highest level of new members for some time, and certainly higher than both 2002 (1,871) and 2003 (1,639). We hope you will receive good value from your SIA membership and remain with us for many years to come.

topics from members are welcome.

Continuing alliances with ASIC, APRA and the API (Australian Property Institute) have resulted in a long-running series of seminars and workshops that always draw good attendances, and are a major Institute strategy for providing key compliance and knowledge updates for members and the industry in general.

Regional PD roundup

Vic/Tas region: Financial Planning Special Interest Group members now meet once a month in the Melbourne office of the Securities Institute to discuss topics relevant to the financial planning industry. SIA members, representing a wide variety of financial service providers ranging from large corporate firms to self managed small businesses, discuss and explore issues common to financial planning industry practitioners, and from these discussions, generate potential topics for seminars that would appeal to the wider financial services community.

Since July 2004 the Special Interest Group has been able to initiate several seminar topics including Retirement Income Changes, Growth Pensions, Risk Profiling and Asset Allocation, all of which were extremely successful with attendance numbers well exceeding initial targets. The Group will shortly be winding up for the year with a fun networking/social event and will commence meetings again early in 2005. New participants are welcome.

NSW/ACT region: Following the success of the face-to-face SIG meetings in Melbourne, similar meetings are planned for Sydney during 2005. Interested participants and ideas for meeting topics are welcome. Please contact John Watson at j.watson@securities.edu.au or on 02 8248 7538 to register your interest or with your ideas.

A Fellows event was held in early December to celebrate the continuing support and loyalty of a distinguished group of our members.

QLD region: Queensland region held an Inaugural Fellows' Dinner in September which was well attended and a very successful occasion. A fully sponsored Golf Day in August was similarly successful.

The region is currently in the process of initiating a face-to-face financial planning SIG and more information will be published to QLD members in the coming year. In the meantime, if you would like to assist or show your support, please contact the QLD office on 07 3234 7888 or sia.qld@securities.edu.au. At this stage it is proposed to hold one networking function per quarter.

SA/NT Region: The region has moved to inaugurate SIGs for Women in Finance and Young Professionals, with two very successful women's group workshops and three young professional events held over the year. Business leaders lunches have also proved to be a good means of attracting high-level local business people to Institute events.

WA region: A most successful Fellows Dinner was held in July 2004, and a very well attended Wesfarmers Luncheon with Michael Chaney in August was a huge success.

Regular showcases on Biotechnology, Gold and Petroleum are very popular and successful. J

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Notes

1 We chose the ASX100 index and its constituents in this study for two main reasons. They are: (i) most Australian equity funds are concentrated portfolios in that they have between 40 and 60 stocks in them, and most of these stocks belong to the ASX100, and (ii) it is well known that volatility of the stocks with low-market capitalisation is affected more by factors such as liquidity.

2 Another method of calculating the cross-sectional volatility is to measure the dispersion of monthly returns of the ASX100 stocks. This method gave similar results.

3 The correlations of cross-sectional volatility of ASX100 stocks with the dispersion of EPS_CV and ROE are –0.40 and -0.05 respectively.

4 The number of funds available in the Mercer database ranges from 28 (in 1994) to 70 (in 2003). As a result, we chose the inter-quartile range as the dispersion measure rather than the (95% -5%) percentile differential used in other illustrations.

5 The correlation between the annual excess median return of funds and the cross-sectional volatility is 0.47.

6 The method that is used to estimate the correlation coefficient involves a rolling estimation window of 24 months, and thus any permanent change in the correlation will not be transparent immediately. J

Best wishes for Christmas and the Festive season to all our members and readers. We hope you enjoy a restful break and return invigorated for a happy and healthy 2005.