6 The retirement risk zone: a baseline study
BRETT DORAN, MICHAEL E. DREW SF Fin and
ADAM N. WALK F Fin, Griffith University

12 Reducing the risk of VWAP orders execution — a new approach to modelling intra-day volume
JĘDRZEJ BIAŁKOWSKI, University of Canterbury, New Zealand
SERGE DAROLLES and GAËLLE LE FOL, Université Paris Dauphine, France

19 Do large Australian companies emphasise non-GAAP financial measures over statutory net profit (GAAP) in annual reports?
ROBYN CAMERON and MAJELLA PERCY, Griffith University
PETA STEVENSON-CLARKE, RMIT University

26 Buying’s one thing, holding’s another: how much does Australian housing really cost?
ROB BROWN SF FIN, IAN O’CONNOR SA FIN, GREG SCHWANN and CALLUM SCOTT, University of Melbourne

34 Global investing — innovating for sustainable growth
JOHN FRASER, UBS Global Asset Management and VFMC
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JASSA is the journal of FINSIA — Financial Services Institute of Australasia (ACN 066 027 389, ABN 96 066 027 389), Australia Square, Sydney NSW 2000. It was formerly published as the Journal of the Australian Society of Security Analysts, and then of the Securities Institute of Australia, now incorporated into Finsia. JASSA is published four times each year, providing an avenue for views and information on matters affecting the financial services industry. No part of the material published in JASSA may be reproduced without the permission of the author or authors and of the Institute.

Acknowledgement of the author or authors, Finsia and JASSA is required.

ISSN 0313-5934

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From the Chair of the Editorial Board

The retirement risk zone: a baseline study
BRETT DORAN, MICHAEL E. DREW SF Fin and ADAM N. WALK FFin
This paper undertakes a baseline study to explore the heady mix of the portfolio size effect and sequencing risk facing superannuants within the retirement risk zone. It explores the impact on retirement outcomes when portfolios are subjected to a single sequencing risk event at different points through a member’s investing life. We report sensitivities between the timing (or sequence) of a negative return event on terminal wealth outcomes and the associated impact on longevity risk. Our findings suggest that greater priority needs to be given to sequencing risk earlier in a member’s accumulation phase than convention suggests.

Do large Australian companies emphasise non-GAAP financial measures over statutory net profit (GAAP) in annual reports?
ROBYN CAMERON, MAJELLA PERCY and PETA STEVENSON-CLARKE
Large companies’ frequent focus on non-GAAP financial measures (‘pro forma’ earnings), rather than statutory net profit or GAAP measures, raises concerns about the potential for misinformed financial decision-making. Despite recommendations by ASIC and Finsia, in Australia there is no consistency in the calculation of non-GAAP financial measures or in their reconciliation to statutory net profit. Our study of the disclosures and the reconciliation to GAAP earnings by the largest 50 Australian listed non-mining companies finds considerable variations in reporting practices from highly transparent reconciliations to what appears to be considerable secrecy.

Buying’s one thing, holding’s another: how much does Australian housing really cost?
ROB BROWN SF Fin, GREG SCHWANN, IAN O’CONNOR SA Fin and CALLUM SCOTT
Despite widespread media reports on the problem of housing affordability, our research finds that user housing costs appear relatively modest except for the late 1980s and early 1990s, and the early 2000s. This paper presents estimates of the user cost of housing, a measure of housing affordability that takes into account the full range of housing costs and benefits for owner-occupiers and investors and the typical multi-year holding period for residential property. Our research also examines the differences in housing costs between owner-occupiers and investors.

Reducing the risk of VWAP orders execution — a new approach to modelling intra-day volume
JĘDRZEJ BIAŁKOWSKI, SERGE DAROLLES and GAÉLLE LE FOL
This paper proposes a new dynamic approach to modelling intra-day trading volume based on factor models. It assumes that intra-day volume can be decomposed into two parts each predicted using separate time-series models. By enabling more accurate prediction of intra-day volume, this methodology allows for a significant reduction in the cost of executing Volume Weighted Average Price orders.

Global investing — innovating for sustainable growth
JOHN FRASER, UBS Global Asset Management and VFMC
After several decades of rapid growth, financial services and the investment management industry, in particular, are facing significant challenges arising from changes in the macroeconomic environment, the sources of investment pools and the types of investment that clients are seeking. The industry needs to address the strategic issues raised by these trends if it wants to continue prospering in the post-crisis economic and financial environment.

John Fraser presented this paper at the recent Melbourne Financial Services Symposium.
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2012 promises to be another excellent year for JASSA. The first issue of the journal for this year addresses a number of highly topical and significant questions for financial services practitioners, focusing on various factors related to financial decision making.

First, the baseline findings of the paper by Brett Doran, Michael E. Drew SF Fin and Adam N. Walk F Fin raise a number of critical questions about the scope of the retirement risk zone. The findings suggest that contemporary beliefs of where the typical investor’s retirement risk zone lies (10 years pre- and post-retirement), may need to be adjusted to incorporate a greater time span within the accumulation phase (that is, perhaps 15–20 years pre-retirement and around five years post-retirement). The results also suggest that the order in which returns occur plays a crucial role in achieving adequacy in retirement funding.

Next, Jędrzej Białkowski, Serge Darolles and Gaëlle Le Fol propose a new dynamic approach to modelling intra-day trading volume based on factor models. This approach assumes that intra-day volume can be decomposed into two parts each predicted using separate time-series models. By enabling more accurate prediction of intra-day volume, this methodology allows for a significant reduction in the cost of executing Volume Weighted Average Price orders. This, in turn, suggests that VWAP trade orders can be offered at a lower commission fee to clients.

Robyn Cameron, Majella Percy and Peta Stevenson-Clarke examine the issue of whether large companies’ frequent focus on non-GAAP financial measures (‘pro forma’ earnings), rather than statutory net profit or GAAP measures, raises the potential for misinformed financial decision-making. Their study of the disclosures and the reconciliation to GAAP earnings by the largest 50 Australian listed non-mining companies finds considerable variations in reporting practices. The findings of this paper also reinforce the authors’ belief that management may be seeking to engage in a form of ‘impression management’ by emphasising the earnings measure that presents the company’s financial performance in the best light.

Despite ongoing public debate and widespread media reports about the problem of housing affordability in Australia, research by Rob Brown SF Fin, Greg Schwann, Ian O’Connor SA Fin and Callum Scott indicates that user housing costs appear relatively modest except for the late 1980s and early 1990s, and the early 2000s. Their paper presents estimates of the user cost of housing, a measure of housing affordability that takes into account the full range of housing costs and benefits for owner-occupiers and investors and the typical multi-year holding period for residential property. This research also indicates that the tax system does not unambiguously favour either investors or owner-occupiers.
The paper by John Fraser examines the fundamental changes that have occurred recently in the economic backdrop for the financial services industry, the sources of assets and the types of investments clients are seeking. He expects the current era of low real returns to endure with investors struggling to earn decent returns on traditional markets, Defined Benefit (DB) pension funds struggling to match their liabilities and the new players such as the sovereign wealth funds and private equity funds further expanding their influence in global markets. He also suggests that the industry needs to address the strategic issues raised by these trends if it wants to continue prospering in the post-crisis economic and financial environment.

I would like to take this opportunity to thank our outgoing Managing Editor, Rosemary McLauchlan F Fin, for her excellent work on the journal over many years, and also to welcome our new Managing Editor, Kevin Davis SF Fin, Professor of Finance at the University of Melbourne and Research Director, Australian Centre for Financial Studies. Kevin is well known and highly respected within the financial services industry and academia.

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Keywords: retirement risk zone, sequencing risk, longevity risk.

THE RETIREMENT RISK ZONE: A BASELINE STUDY

This paper undertakes a baseline study to explore the heady mix of the portfolio size effect and sequencing risk facing superannuants within the retirement risk zone. It explores the impact on retirement outcomes when portfolios are subjected to a single sequencing risk event at different points through a member’s investing life. We report sensitivities between the timing (or sequence) of a negative return event on terminal wealth outcomes and the associated impact on longevity risk. Our findings suggest that greater priority needs to be given to sequencing risk earlier in a member’s accumulation phase than convention suggests.

As investors, we walk a tightrope in seeking to take a prudent amount of risk at every stage of our working and retirement lives. Too little risk and we will fall short of the promise of endless summers; too much risk can deplete our retirement nest egg to the point at which it may never recover. The retirement risk zone (also known as the ‘conversion’ phase) is commonly defined as the final 10 years of working life (the ‘accumulation’ phase) and the first 10 years of retirement (the ‘decumulation’ phase). Importantly, it is this 20-year period when the greatest amount of retirement savings is in play and, subsequently, risk is at its zenith.

Given the volatility experienced over the past decade, how can we manage the risks that we face in the critical conversion phase (or retirement risk zone) of our investing life? The impact of these risks was never more evident than during the global financial crisis (GFC), when people near or at retirement felt the full extent of two related forces: the portfolio size effect (what you do when the largest amount of your money is at risk matters); and the problem of sequencing risk (how much you lose during a bear market may not be anywhere near as important as the timing of the loss, again, especially during the conversion phase).

Let’s explore these two concepts a little further. Recent research by Basu and Drew (2009) has drawn attention to one particular feature of the dynamics of retirement investing: the portfolio size effect. Basu and Drew (2009) found that, due to the positive compounding effect of salary growth, contributions and returns, portfolio size grows rapidly in the latter half of the accumulation phase. A large and rapidly growing portfolio size is exactly what superannuation fund members seek to achieve in order to fund an adequate retirement income. However, when the portfolio size effect is combined with an unfavourable sequence of returns (‘sequencing risk’, see Macqueen and Milevsky 2009), this goal is jeopardised. Today, investors aged in their late 50s/early 60s, with a growth-oriented asset allocation, have borne the brunt of a decade of various financial crises — these are clear examples of sequencing risk events that have affected their retirement nest egg and thus the sustainability of their retirement income.

The portfolio size effect and sequencing risk have a direct relationship with longevity risk. Longevity risk is the likelihood that superannuation savings will be depleted prior to satisfying the lifetime financial needs of the dependents of those savings (Macqueen and Milevsky 2009). One way that longevity risk manifests itself is when an investor’s superannuation savings are subject to a major negative market event within the retirement risk zone. A smaller pool of retirement savings will, all other things being equal, deplete at a faster rate than a larger pool, hence retirement outcomes are largely path dependent.

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This paper undertakes a baseline study to explore the heady mix of the portfolio size effect and sequencing risk facing superannuants within the retirement risk zone. It explores the impact on retirement outcomes when portfolios are subjected to a single sequencing risk event at different points through a member’s investing life. We report sensitivities between the timing (or sequence) of a negative return event on terminal wealth outcomes and the associated impact on longevity risk. Our findings suggest that greater priority needs to be given to sequencing risk earlier in a member’s accumulation phase than convention suggests.

Keywords: retirement risk zone, sequencing risk, longevity risk.

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The combination of the portfolio size effect, sequencing risk and longevity risk combine to form a trinity of investment issues that need to be managed by superannuants, particularly when inside the retirement risk zone. This paper undertakes a baseline study to explore just how dangerous these three related issues can be. The baseline approach adopted explores the variable effects on retirement outcomes that occur when portfolios are subjected to a single sequencing risk event at different points through their life course.

Using a bootstrap simulation approach, the paper finds that the sequence of returns materially affects the terminal wealth of superannuants and heightens the probability of portfolio ruin. This paper finds that sequencing risk can deplete terminal wealth by almost a quarter, at the same time increasing the probability of portfolio ruin at age 85 from a probability of one-in-three, to one-in-two. We argue that, for someone in their 20s, the impact of sequencing risk is minimal: younger investors have small account balances, and plenty of time to recover (Bodie et al. 1992). However, for someone in their late 50s/early 60s, the interplay between portfolio size and sequencing risk can cause a potentially catastrophic financial loss that has serious consequences for individuals, families and broader society.

Using a bootstrap simulation approach, the paper finds that the sequence of returns materially affects the terminal wealth of superannuants and heightens the probability of portfolio ruin.

Data and method

This paper examines the impact of sequencing risk on a hypothetical investment portfolio with a constant asset allocation (rebalanced annually) as follows: 70 per cent Australian equities, 20 per cent Australian bonds and 10 per cent Australian cash. Over a century of annual returns for these respective asset classes (1900 through 2009) was used. Since the dataset spans several decades, we are able to capture the wide-ranging effects of favourable and unfavourable events of history on returns of individual asset classes. A bootstrap simulation method was used to create a total of 10,000, 75-year investment horizons, a lifetime of potential investment paths. Each simulated return path was then separately applied to generate 10,000 hypothetical accumulation balances using the following assumptions identified in Table 1.

Scenario analysis was then undertaken to test the impact on the final account balance of a one-off negative return. This ‘forced’ return was imposed at a single point in time (at five-year intervals from year 5 onward) for all 10,000 wealth paths in the accumulation (Tables 2 and 3) and decumulation (Table 4) phases. This approach allows us to observe the impact of the timing of a single shock when it occurs in successively later intervals in the investing life cycle. The annual withdrawals from the account upon retirement were held constant with an adjustment for inflation of 3 per cent. The decision to impose constant real withdrawals is a conservative approach as most data shows that spending tends to decrease with age during retirement. It is important to note that the lowest annual return for any of the portfolios in the sample period (1900 through 2009) was -21.6 per cent. This minimum annual return value (-21.6 per cent) is used as the single

### Table 1: Key assumptions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting balance</td>
<td>$0</td>
</tr>
<tr>
<td>Starting salary</td>
<td>$30,000</td>
</tr>
<tr>
<td>Salary growth rate</td>
<td>4% p.a.</td>
</tr>
<tr>
<td>Contribution rate</td>
<td>9% p.a.</td>
</tr>
<tr>
<td>Starting age</td>
<td>25 years</td>
</tr>
<tr>
<td>Retirement age</td>
<td>65 years</td>
</tr>
<tr>
<td>Investment horizon</td>
<td>75 years</td>
</tr>
<tr>
<td>ASFA Comfortable Living Standard*</td>
<td>$40,121</td>
</tr>
<tr>
<td>Inflation</td>
<td>3% p.a.</td>
</tr>
</tbody>
</table>

*As at June 2011, Association of Superannuation Funds of Australia (2011).
sequencing risk event, and was forced upon all 10,000 75-year investment horizons at five-year intervals. Longevity risk was assessed by finding the percentage of portfolios with a nil balance — throughout this paper, referred to as the probability of portfolio ruin at age 70, 75, 80, 85, 90, 95 and 100, respectively. Again, this approach was taken for every scenario.\footnote{Note: Table 2 provides outcomes for all 10,000 wealth paths when the single sequencing risk event (-21.6 per cent return) has been forced to occur in one year of the accumulation phase (year 5 is the base year for comparison).}

**Results**

The key finding of this baseline study is that sequencing risk has an association with longevity risk, and this confirms the findings of current literature in the field (Basu and Drew 2009, De Waegenaere et al. 2010 and Basu et al. 2011). Table 2 provides the descriptive statistics of the 10,000 wealth paths and the differences between the terminal wealth of each scenario and the base year in percentage terms. Year 5 represents the base year and result from the sequencing risk event (-21.6 per cent return) being forced upon every wealth path in the fifth year of accumulation (investor at age 30). The sequencing risk event was then imposed in year 10, then year 15, and so on, with the base year being used to calculate a percentage impact.

Table 2 highlights the impact of a single negative event on the retirement outcomes for superannuants. Following a shock in the final 10 years of accumulation, an investor can experience a 20–25 per cent decrease in average final account balance relative to experiencing this event in the fifth year of his or her accumulation journey. As expected, this impact can be higher for the minimum terminal wealth path as compared with the shock being experienced in year 5.

There are two approaches to consider when analysing the decumulation phase. The first is to assume that the withdrawal period is constant, implying variable annual withdrawals so that the portfolio lasts for a given withdrawal period. The second is to withdraw from the portfolio at a constant rate, leaving the withdrawal period to vary. When the withdrawal period is held constant, withdrawals are affected to approximately the same degree as the final account balances shown in Table 2.\footnote{Note: Table 3 provides a longevity risk analysis, reporting the proportion of the 10,000 portfolios in ruin when subjected to a single sequencing risk event applied at five-year intervals in the accumulation phase.}

For instance, with the sequencing risk event occurring in the 40th year of accumulation (age 65), annual withdrawals are around 23 per cent less than in the base year. We surmise that the second approach, in which withdrawals are held constant, is more realistic because, for the average retiree, longevity is unknown and a decision has to be made about the rate of withdrawal.

In this section of the baseline study, we assume that the retiree will withdraw at the rate estimated by the Association of Superannuation Funds of Australia (2011) to provide a comfortable living standard for a single person, indexed for inflation for 40 years. We analysed every year from retirement (age 65) until age 100. The only variable

| Table 2: Impact on terminal wealth of a negative sequencing event during the accumulation phase |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Wealth path     | Mean            | Median          | Minimum         | Maximum         | Standard deviation |
| (year of risk event) | $2,186,750      | $1,861,017      | $164,497        | $13,923,948     | $1,455,909       |
| Year 5 (Base Year) |                |                  |                  |                  |                  |
| Year 10 -7.0%   | -7.0%           | -13.6%          | 0%              | 2.2%            |
| Year 15 -12.0%  | -12.0%          | -19.3%          | 0%              | 3.6%            |
| Year 20 -15.6%  | -15.6%          | -26.0%          | 0%              | 4.3%            |
| Year 25 -17.3%  | -17.3%          | -32.3%          | 0%              | 4.9%            |
| Year 30 -20.4%  | -20.4%          | -34.0%          | 0%              | 5.2%            |
| Year 35 -22.1%  | -22.1%          | -34.6%          | 0%              | 5.5%            |
| Year 40 -23.5%  | -23.4%          | -35.2%          | 0%              | 5.6%            |

Note: Table 2 provides outcomes for all 10,000 wealth paths when the single sequencing risk event (-21.6 per cent return) has been forced to occur in one year of the accumulation phase (year 5 is the base year for comparison).

| Table 3: Probability of ruin — negative sequencing event during the accumulation phase | (No sequencing risk is the base year for comparison) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Age             | 70              | 75              | 80              | 85              | 90              | 95              |
| No sequencing risk | 1.2%           | 10.6%           | 21.4%           | 29.6%           | 35.5%           | 39.7%           | 42.7%           |
| Year 5           | 1.5%           | 12.3%           | 24.2%           | 33.1%           | 39.4%           | 43.9%           | 46.5%           |
| Year 10          | 1.8%           | 14.8%           | 27.7%           | 37.0%           | 43.7%           | 48.0%           | 51%             |
| Year 15          | 2.2%           | 16.6%           | 30.5%           | 40.7%           | 47.2%           | 51.6%           | 54.8%           |
| Year 20          | 2.6%           | 18.3%           | 33.3%           | 43.2%           | 50.0%           | 54.4%           | 57.9%           |
| Year 25          | 3.0%           | 20.0%           | 35.1%           | 45.6%           | 53.0%           | 57.2%           | 60.2%           |
| Year 30          | 3.5%           | 21.6%           | 36.9%           | 47.7%           | 54.2%           | 58.5%           | 61.4%           |
| Year 35          | 3.9%           | 22.8%           | 38.4%           | 48.9%           | 55.6%           | 60.0%           | 63.2%           |
| Year 40          | 4.5%           | 23.9%           | 39.8%           | 50.6%           | 56.9%           | 60.9%           | 63.9%           |

Note: Table 3 provides a longevity risk analysis, reporting the proportion of the 10,000 portfolios in ruin when subjected to a single sequencing risk event applied at five-year intervals in the accumulation phase.
The analysis to date has provided some preliminary evidence on the impact of a negative shock during the accumulation phase for Australian superannuants, with its effects on longevity risk being consistent with international evidence (Odenath 2006, Vickerstaff 2006, Cheng 2007, Basu and Drew 2009). We now consider the impact of a negative sequencing risk event that occurs in the decumulation phase. As previously noted, we keep allocation weightings constant in this baseline study to ensure that the timing of the single negative shock is the only variable. Table 4 shows the proportion of portfolios in ruin when the -21.6 per cent return is applied to every fifth year in the decumulation or post-retirement phase.

Table 4 highlights the risks faced by investors during their journey through the decumulation phase. If a substantial negative return occurs five years after retirement (year 45 of the investment horizon, or age 70) the risk of ruin at age 85 grows to 44.2 per cent (shaded, Table 4). The risk of ruin has fallen to below that of the 25th year scenario by around 1.5 per cent (see Table 3). The risk of ruin at age 85 of a year 50 shock has fallen to 38.0 per cent (shaded, Table 4), illustrating that after just 10 years of retirement, longevity risk has reduced to the same level as if the shock occurred in around the 10th year of accumulation (see Table 3). These baseline findings suggest that further research is required as a matter of priority to more formally define the retirement risk zone window. In short, the baseline findings suggest that contemporary beliefs of where the typical investor’s retirement risk zone lies (10 years pre- and post-retirement), may need to be adjusted to incorporate a greater span of time within the accumulation phase (that is, perhaps 15–20 years pre-retirement and around five years post-retirement).

In short, the baseline findings suggest that contemporary beliefs of where the typical investor’s retirement risk zone lies (10 years pre- and post-retirement), may need to be adjusted to incorporate a greater span of time within the accumulation phase (that is, perhaps 15–20 years pre-retirement and around five years post-retirement).

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**Table 4: Probability of ruin — negative sequencing event during the decumulation phase**

<table>
<thead>
<tr>
<th>Age (year of risk event)</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
<th>90</th>
<th>95</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 45</td>
<td>1.6%</td>
<td>17.5%</td>
<td>33.1%</td>
<td>44.2%</td>
<td>51.0%</td>
<td>55.8%</td>
<td>59.1%</td>
</tr>
<tr>
<td>Year 50</td>
<td>1.2%</td>
<td>11.4%</td>
<td>26.7%</td>
<td>38.0%</td>
<td>45.3%</td>
<td>50.2%</td>
<td>54.0%</td>
</tr>
<tr>
<td>Year 55</td>
<td>1.2%</td>
<td>10.6%</td>
<td>22.1%</td>
<td>33.5%</td>
<td>42.1%</td>
<td>46.7%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Year 60</td>
<td>1.2%</td>
<td>10.6%</td>
<td>21.4%</td>
<td>29.9%</td>
<td>38.3%</td>
<td>43.7%</td>
<td>47.4%</td>
</tr>
<tr>
<td>Year 65</td>
<td>1.2%</td>
<td>10.6%</td>
<td>21.4%</td>
<td>29.6%</td>
<td>35.8%</td>
<td>41.6%</td>
<td>45.4%</td>
</tr>
</tbody>
</table>

Note: Table 4 provides a longevity risk analysis, reporting the proportion of the 10,000 portfolios in ruin when subjected to a single sequencing risk event at different times in the decumulation phase.
Figure 1 suggests an asymmetry in the impact of sequencing risk in the pre- and post-retirement phases. Consider the horizontal line which bisects the age 85 series pre- and post-retirement. This line identifies the shock timing, pre- and post-retirement, which results in equal probabilities of ruin at age 85. This asymmetry suggests that superannuants are exposed to the potentially negative consequences of sequencing risk earlier in the accumulation phase than conventional wisdom suggests (again, we reiterate the caveat that these are baseline estimates and will change given different member circumstances).

The baseline results also suggest that the risk of portfolio ruin declines comparatively rapidly the later a sequencing risk event occurs in the decumulation phase. As expected, a shock occurring one year either side of retirement, produces a fairly similar risk of portfolio ruin (that is, the highest probability of ruin is observed when the negative sequencing event occurs in the retirement year). Interestingly, just two years after retirement (year 42, age 85 series) the risk of ruin has fallen to 48.3 per cent; roughly equivalent to a sequencing risk event occurring in the 32nd year of accumulation (eight years pre-retirement). For some age series, such as 80, 95 and 100, the year immediately after retirement is the most risky. Again, it is important to note that these results assume that the withdrawals are made once at the end of each year. Thus the first withdrawal would not occur until the end of the 41st year and this year would have the largest account balance.

Concluding comments

The Australian retirement savings system that emerged in the early 1990s is maturing and undergoing a period of significant reform. As part of this reform, a number of critical issues need to be addressed. How can we design default options that efficiently and effectively manage the dynamic nature of risk as we progress through our investing lifetime? What is the super fund’s strategy for managing the portfolio size effect, the critical conversion journey from pre- to post-retirement? And, given the challenges of sequencing risk, what specific strategies should be employed to limit the impact of the next major bear market?

These issues are challenging for members, trustees and regulators alike and are the priority items on the agenda of boards of trustees of leading superannuation funds around the country. This paper seeks to provide a baseline analysis to help define the risks facing members in the retirement risk zone.

We find that members are exposed to a very real risk of an inopportune sequence of returns. The baseline results suggest that the order in which returns occur plays a crucial role in achieving adequacy in retirement funding. It is important to note that for average life expectancy, a single, poorly timed negative return event (of around -20 per cent) can raise the probability of ruin from 33 per cent to 50 per cent. The baseline findings also raise questions regarding the scope of the retirement risk zone. We would encourage future researchers to test the efficacy of the simple baseline findings presented in this study. As a matter of priority, the asymmetry of the impact of sequencing risk on retirement outcomes across the retirement risk zone is worthy of further investigation.
Notes

1. We thank the Managing Editor, Professor Kevin Davis, and an anonymous reviewer, for helpful comments and suggestions. All errors remain the sole responsibility of the authors.

2. For completeness, we conceptualize a ‘baseline study’ as an ‘analysis of current situation to identify the starting points for a program or project’, see http://www.businessdictionary.com/definition/baseline-study.html#x22ljyV8j2E

3. To resample returns, this paper uses an updated version of the dataset of nominal returns for Australian stocks, bonds, and bills originally compiled by Dimson et al. 2002. The returns include reinvested income and capital gains.

4. Bootstrap simulation is a process of randomly sampling with replacement from a dataset to create multiple synthetic return paths (Efron and Tibshirani 1993). This method is used widely in the literature, for instance, see Basu and Drew (2009) and Basu et al. (2011).

5. Specifically, a ‘forced’ negative return was input into the same year of all 10,000 paths and final account balance and longevity risk were evaluated. For simplicity, taxation, management fees and transaction costs are excluded from the calculations.

6. For further discussion see Australian Bureau of Statistics (2011).

7. It is important to note two issues regarding the methodology employed. First, that there are other paradigms within which this problem can be examined, for instance an expected utility framework. And, second, the assumptions underlying this model are highly simplified (e.g. constant salary growth and constant withdrawals). Our motivation is to provide baseline findings in the Australian setting that can be used by future researchers to advance the portfolio size debate.

8. The compounding effect within the undrawn balance added little to the portfolio’s longevity.

9. Data taken from the Mortality Database Life Tables provided by Australian Institute of Health and Welfare (2011). It should also be noted that the probability of ruin by a particular age is based on simulations involving all portfolios, and not allowing for the probability that individuals might die before that date. It provides a probability of ruin for individuals who have survived to that age but not, for example, the probability of ruin at age 85 of an individual currently aged 65.

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Keywords: intra-day trading volume, VWAP orders, execution risk, trading costs in securities markets.

REDUCING THE RISK OF VWAP ORDERS EXECUTION — A NEW APPROACH TO MODELLING INTRA-DAY VOLUME

This paper proposes a new dynamic approach to modelling intra-day trading volume based on factor models. It assumes that intra-day volume can be decomposed into two parts each predicted using separate time-series models. By enabling more accurate prediction of intra-day volume, this methodology allows for a significant reduction in the cost of executing Volume Weighted Average Price orders.

In an era of increasing competition in financial services, financial institutions are spending more resources on broadening the array and reducing the price of products offered to clients. This also applies to broking houses, which have a vital interest in reducing costs associated with the execution of their clients’ orders.

This paper presents a technique that aims to reduce the execution risk of VWAP (Volume Weighted Average Price) orders, which are orders to buy or sell a certain amount of a stock during the specified period at the VWAP. VWAP is calculated by dividing the value of trades by the volume over a specified period.

To illustrate the issue, very simply, suppose that trading takes place at only three times \( (t_1, t_2, \text{ and } t_3) \) during the day, with 20 per cent of the trading volume expected to occur at \( t_1 \), 50 per cent at \( t_2 \), and 30 per cent at \( t_3 \). An investor wishing to purchase 100,000 shares using a VWAP order would place orders for 20,000 to be bought at \( t_1 \), 50,000 at \( t_2 \), and 30,000 at \( t_3 \). If the market trading volume matched expectations, the average purchase price for the investor would match the VWAP of trades undertaken on the market during the day. However, the pattern of trading during the day may differ from that expected, because the volume profile is not stable, thus leading to deviations in the average purchase price from the VWAP benchmark (Gefen and Jones 2011). As McCulloch and Kazakov (2010) note, ‘a riskless VWAP trading strategy is not possible without knowledge of final market volume’. We propose a dynamic titled VWAP strategy that alleviates these problems by adding some short-term, stock-specific, trading dynamics to the historical, market-wide, daily trading pattern.

Algorithm trading is estimated to be responsible for 73 per cent of institutional equity trading in the United States, and VWAP execution orders are a significant part of it (see, for example, Mackenzie 2009, Chistalla 2011, and Nybo 2011). There are at least two reasons why this type of order has become so popular. First, by selecting this type of order, large investors hope to reduce the market impact of their trades (i.e. the change in a stock’s price due to the execution of the trade) which is one of the factors affecting the total cost of the trade. (Institutional investors can expect a negative price reaction to a large sell order and a positive price reaction to a large buy order, with such market impacts reducing the profit of the trade.) Second, VWAP orders allow foreign investors to reduce the risk of placing orders before the opening of the market that are to be executed at the opening price or via some limit order. The VWAP order generates an average trade price which is close (if the VWAP algorithm works well) to the average price at which all transactions in the market are completed that day, thereby avoiding possible execution of the order at an extreme price. While VWAP orders seem to be a
remedy for a number of investors’ problems, a word of caution is required. Recent studies by Gefen and Jones (2011) and Quantitative Service Group LLC (2009) have shown that the application of so-called naive algorithms for VWAP execution can lead to an increase in execution risk.

Modelling intra-day trading volume

One of the distinctive attributes of intra-day trading volume is its higher level at the beginning and the end of a trading day. This feature is known as the U-shape of intra-day volume. The U-shape for the US market was reported by Admati and Pfleiderer (1988), Jain and Joh (1988), Foster and Viswanathan, (1990), Chan et al. (1995) and others. For French and Japanese markets, U-shaped volume was confirmed by the studies of Gouriéroux et al. (1999) and Konishi (2002), respectively. For the Australian market, Aitken et al. (1994) reported that the U-shape is observed for the number of transactions during a trading day. Kalev et al. (2004) reported the U-shape for traded volume for the companies with the highest frequency of trading.

Several explanations of this phenomenon can be found. The most important are: the accumulation of information during non-trading hours; the concentration of trades; the opening of other key stock markets; and the low activity of traders during lunchtime.

The modelling of intra-day volume is of vital interest to a trader who is responsible for executing clients’ VWAP orders. If a trader’s aim is only to sell or buy a stock at VWAP, the only knowledge which he or she needs is the U-shape of the volume for a particular day. By analysing an area below the U-curve, a trader is able to determine what percentage of the order needs to be executed in each part of the day. It is worth highlighting, that what he or she really needs is the intra-day shape, not the level, of the volume.

The standard method of predicting the U-shape of the volume for a given stock has been to use an average of trading patterns over a certain number of preceding days (at either a market-wide or individual stock level). Each day is divided into a constant number of time intervals (buckets) and the average volume is calculated separately for each bucket. The details of this approach are described by Madhavan (2002) and Manchaladore et al. (2010).

This model is known as the classical or static approach. If volume U-shape remains unchanged over time, it would be unquestionably a very good model. Unfortunately, the daily dynamics of the volume are more complex. Consequently, more advanced models for the U-shape of intra-day volume need to be introduced. Moreover, the static approach means that the volume structure is only updated gradually as the historical average changes, rather than being updated dynamically in response to recent information.

In this paper, we propose a new dynamic approach based on factor models (see also Bialkowski et al. 2008). It assumes that intra-day volume can be decomposed into two parts each predicted using separate time-series models. The first describes intra-day trading volume patterns for the whole exchange, and changes in that pattern over time resulting in changes in the first component of the intra-day volume for individual stocks. For obvious reasons, we will call it the market component. The second component depicts the intra-day dynamics of the volume, which is distinctive for each examined stock.

The turnover ratio was selected as the measure of volume. It is defined as:

\[ x_t = \frac{\sum_i V_{it}}{N_t} \]

where \( x_t \) denotes the turnover series for stock \( i \) at the intra-day time \( t \), \( V_{it} \) is the number of shares traded at time \( i \), \( N_t \) is the number of shares on issue at time \( t \). The total number of stocks under scrutiny is \( K \). In case of decomposition of turnover into the market and its specific

The VWAP order generates an average trade price which is close (if the VWAP algorithm works well) to the average price at which all transactions in the market are completed that day, thereby avoiding possible execution of the order at an extreme price.
The parameter $K$ should be equal to the number of stocks in a main index.

In order to complete the factor decomposition, we apply Principal Component Analysis (PCA). For each stock included in the index (40 in the specific case studied here, see below) we prepare a time series dataset consisting of 20-minute intervals (bucket) for each trading day for the past three months. Since each day is thus divided into 25 buckets and with approximately 21 trading days per month, each time series has approximately 1575 observations. For each day, we apply PCA analysis to the 40 times series of intra-day trading volume over the past three months. It allows for the following decomposition of volume:

$$x_{i,t} = c_{i,t} + y_{i,t}$$

where the common or market component of turnover denoted as $c_{i}$ is the derived first principal component and the specific part of turnover $y_{i}$ is the remainder. One of the methods of evaluating the validity of the PCA decomposition is analysis of variance explained by each of the components. According to our results for the French stock market, the market component of such decomposition is able to explain, on average, 40 per cent of the observed variance in intra-day volume. Therefore, it is suitable to describe the volume changes caused by the movements of the whole market.

As was mentioned earlier, the decomposition is the first part of the analysis. The next step is to construct separate models for the market component and the specific component of the turnover. The market component is expected to capture overall (market-wide) intra-day turnover fluctuation, i.e. the daily U-shape, and we refer to this as the seasonal component. To predict this component we propose a model which is often used by traders to predict the total volume. It is based on the idea that the U-shape for the next day’s volume can be predicted by the historical arithmetical average over the past L-trading days. Undoubtedly, the advantage of this static approach is its simplicity. However, the serious drawback of this approach is that it ignores the intra-day, stock-specific, dynamics of turnover. Note that, if we apply this method to the market component obtained from the principal component decomposition, we do not face this problem.

Hence, $\overline{c}_{i,t}$ represents the market historical average of intra-day volume for time bucket $t$ over the past $L$-trading days until day $j$ in the examined sample. It is given by:

$$\overline{c}_{i,t,j} = \frac{1}{L} \sum_{l=1}^{L} c_{i,t}$$

where $c_{i,t}$ is the market component of turnover for stock $i$ at the intra-day time $t$ on the $j$-th day of the examined sample.

The specific component (i.e. the volume not explained by the first (market) principal component for each stock) is modelled by using either an ARMA model or a self-exciting threshold autoregressive (SETAR) model. The ARMA $(1,1)$ with white noise is defined as:

$$y_{i,t} = \psi_{1} y_{i,t-1} + \psi_{2} + \epsilon_{i,t}$$

The alternative model is SETAR defined as:

$$y_{i,t} = \begin{cases} \phi_{11} y_{i,t-1} + \phi_{12} + \epsilon_{i,t} & y_{i,t-1} \leq \tau, \\ \phi_{21} y_{i,t-1} + \phi_{22} + \epsilon_{i,t} & y_{i,t-1} > \tau. \end{cases}$$

The application of the SETAR model gives further insight into the dynamics of the specific components of turnover. The construction of the model is based on the idea that the dynamics of the specific component of turnover are different when the specific component of turnover has a value higher than the estimated threshold. Parameters of the SETAR model are estimated by using the sequential conditional least squares method. A detailed description of the estimation technique can be found in Frances and van Dijk (2000). This particular choice of model for the specific part of volume is based on analysis of autocorrelation and partial autocorrelation functions. In the selection process we seek a model that is as simple as possible with goodness of fit superior to the static approach.

**Implementation of the model to trading**

Each day, traders responsible for the execution of VWAP orders have to decide between two alternatives. The first one is to predetermine the trading strategy at the beginning of a session and then follow it until the end of the validity of the order. The second assumes updating the execution strategy during the day. Our results show that the second option, with the application of the SETAR or ARMA model, leads to a reduction in execution risk.
the validity of the order. The second assumes updating the execution strategy during the day. Our results show that the second option, with the application of the SETAR or ARMA model, leads to a reduction in execution risk. This section briefly describes the ‘updating the execution’ strategy by incorporating new information available from the market. Figure 1 presents the scheme of the algorithm.

First, we predict the turnover for the entire day by using the SETAR or ARMA model applied to its specific part and the static approach applied to the market component. We obtain 25 (number of 20-minute intervals during one trading day) predictions of trading volumes (\(\hat{x}_1, \ldots, \hat{x}_{25}\)). The proportion of the order to execute at the beginning of the day (the first time interval) is equal to:

\[
\sum_{t=1}^{25} \hat{x}_{t}
\]

At the end of the first period, we observe \(x_1\) and use it to predict new (\(\hat{x}_2, \ldots, \hat{x}_{25}\)). The proportion of the remaining volume to execute in the second period is then equal to:

\[
\sum_{t=1}^{25} \hat{x}_{t}
\]

The procedure is continued until the end of the day. As a consequence, at the very beginning of the day, the trader using the above strategy will trade without information about that day. Then, with time passing, he or she will improve predictions and be able to beat a trader who predicted the whole U-shaped volume at the beginning of the trading day. Further details of the approach are available in Bialkowski et al. (2008).

Data

To illustrate the approach, we use a dataset from the European stock market. Our examination focuses on all stocks included in the CAC40 index at the beginning of September 2004. The analysis is based on a sample ranging from September 2003 to the end of August 2004. The tick-by-tick volume and prices were obtained from the Euronext database. The data is aggregated to 20-minute intervals. The 20-minute volume is defined as the sum of the traded volumes while a 20-minute price is identified by taking an arithmetic average over 20-minute periods. We have restricted the examination to continuous trading between 9.20 am and 5.20 pm. Finally, as a proxy of volume, we chose the turnover defined as the traded volume divided by the outstanding number of shares for a particular stock. Our selection is consistent with a few previous studies on volume (see, for example, Lo and Wang 2000). For the sake of brevity, we have presented the results for six out of 40 companies. The other results are available on request.

Results

First, we examine how well our statistical models fit the data, and then consider how well VWAP trading strategies based upon them perform, using the size of deviations of achieved average prices from actual VWAP as a performance measure.

Figure 2 presents plots of autocorrelation and partial autocorrelation functions (ACF and PACF) of the turnover of France Telecom stock. It presents the results for three trading days, equivalent to 75 buckets (1 bucket is 20 min). The left graphs show typical characteristics of the intra-day turnover, namely cyclical fluctuations. From the middle graphs, one recognises the ability of the common component to capture cyclical variations. The final graphs illustrate ACF and PACF for the specific part of turnover. The fast decay of the autocorrelation suggests that the ARMA-type model is suitable for depicting this time series.

For next day’s prediction of the cyclical fluctuations of the daily U-shape, the historical average of the first component of PCA decomposition is used. The dynamic part of the daily U-shape, defined as a specific component after PCA decomposition, is modelled by a SETAR or ARMA model. The application of those models is feasible only because the specific component of intra-day volume is a stationary time series.

All companies from the CAC 40 index were analysed in order to determine whether the approach presented above can reduce the risk of execution of VWAP orders. Given the space constraints, we report the results for six companies characterised by high capitalisation.

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**FIGURE 1: Scheme of the dynamic VWAP order execution algorithm**

![Diagram](attachment:image.png)

Table 1 reports the basic statistics of turnovers. The highest average 20-minute turnover is observed for Alcatel. It is equal to 0.04 per cent and the lowest turnover is observed for LVMH. The turnover in the 20-minute time bucket with the highest turnover (indicated by the Q95 quantile) was 2.5 times the average turnover of all of the time buckets.

In Table 2, we report the average cost (for deviations of price achieved from the actual VWAP) of executing VWAP orders for the period between 3 September and 2 December 2003. The reported results are based on the pre-determined strategy. Three models for intra-day volume are examined. Two are the models developed above, one using the ARMA approach (Pc-ARMA) for the specific component and the other using the SETAR approach (Pc-SETAR). The third is based on a static approach to predicting the daily dynamics of volume which assumes that the volume during a particular time interval can be approximated by taking the historical average. Table 2 was prepared in the following way: for each day of the three-month period examined, actual VWAP is compared with that predicted by each of the models. The mean absolute percentage error (MAPE) is used as an error measure.

The reported results confirm the effectiveness of the proposed factor decomposition models. The application of a PC-ARMA model allows for the reduction of the average cost of VWAP orders by more than 4 basis points (bps) in comparison with the static approach. In turn, selection of PC-SETAR provides the opportunity for a further 1 bp decrease in comparison with PC-ARMA. The superiority of PC models is also confirmed by the results of the 95 per cent quantile comparison. The 95 per cent quantiles indicate the average MAPE for the 5 per cent of days in which the strategy performed worst. On average, the 95 per cent quantile is two times lower for PC models than for the static approach. The best results are obtained for LAZARGE with reductions of 44 bps and 49 bps for PC-ARMA and PC-SETAR, respectively. In order to give the reader a better understanding, we randomly selected two succeeding days from our sample to prepare Figure 3. This allows us to evaluate the goodness of fit for those two successive days in November 2003. The left graphs show the daily U-shape of intra-day turnover and its prediction for France Telecom stock. In turn, the middle graphs present a prediction of the seasonal part of the daily U-shape, as an historical average of the common component. It is the same shape across all examined stocks. The right graphs in Figure 3 illustrate the dynamic part of daily U-shapes for both stocks. It is clear that differences in the U-shape are due to specific components. It is worth highlighting also that there is no coincidence in the strong similarity between average components for the two successive days in November 2003. To sum up, through the application of the proposed models, a trader is able to reduce the cost of VWAP orders and, moreover, his or her chance of large costs measured by the 95 per cent quantile is lower. Therefore, VWAP trade orders can be offered at a lower commission fee to clients.

<table>
<thead>
<tr>
<th>Turnover</th>
<th>Common component</th>
<th>Specific component</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACF</td>
<td>ACF</td>
<td>ACF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PACF</td>
<td>PACF</td>
<td>PACF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The left graphs show typical characteristics of the intra-day turnover, namely seasonal variations. From the middle graphs, one recognises the ability of the common component to capture seasonal variations. The final graphs illustrate ACF and PACF for the specific part of turnover. The fast decay of the autocorrelation suggests that the ARMA type model is suitable to depict this time series. The graphs present 75 lags equivalent to three trading days.
TABLE 1: Summary statistics for the intra-day aggregated turnover over 20-minute intervals, for the period between 2 September 2003 and 31 August 2004

<table>
<thead>
<tr>
<th>Name of company</th>
<th>Mean</th>
<th>STD</th>
<th>Q5</th>
<th>Q95</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCATEL</td>
<td>0.0381</td>
<td>0.0383</td>
<td>0.0062</td>
<td>0.1064</td>
</tr>
<tr>
<td>FRANCE TELECOM</td>
<td>0.0123</td>
<td>0.0115</td>
<td>0.0025</td>
<td>0.0312</td>
</tr>
<tr>
<td>LAFARGE</td>
<td>0.0188</td>
<td>0.0307</td>
<td>0.0035</td>
<td>0.0477</td>
</tr>
<tr>
<td>LVMH</td>
<td>0.0105</td>
<td>0.0185</td>
<td>0.0018</td>
<td>0.0276</td>
</tr>
<tr>
<td>SUEZ</td>
<td>0.0162</td>
<td>0.0182</td>
<td>0.0032</td>
<td>0.0418</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.0150</td>
<td>0.0277</td>
<td>0.0031</td>
<td>0.0373</td>
</tr>
<tr>
<td>Overall</td>
<td>0.0185</td>
<td>0.0241</td>
<td>0.0034</td>
<td>0.0487</td>
</tr>
</tbody>
</table>

Note: The table reports basic statistics for the turnover ratio selected as measure of volume. The ratio is defined as: number of shares traded at each 20-minute bucket divided by the number of shares on issue on a given trading day. STD, Q5, and Q95 are standard deviation, 5% quantile and 95% quantile, respectively.

TABLE 2: Summary statistics for cost of execution VWAP orders for the period between 3 September and 2 December 2003

<table>
<thead>
<tr>
<th>Name of company</th>
<th>Static approach</th>
<th>PC-ARMA</th>
<th>PC-SETAR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>STD</td>
<td>Q95</td>
</tr>
<tr>
<td>LAFARGE</td>
<td>13.97</td>
<td>17.24</td>
<td>70.02</td>
</tr>
<tr>
<td>LVMH</td>
<td>9.60</td>
<td>10.63</td>
<td>32.38</td>
</tr>
<tr>
<td>SUEZ</td>
<td>12.34</td>
<td>11.02</td>
<td>32.50</td>
</tr>
</tbody>
</table>

FIGURE 3: Application of PC-SETAR model to prediction of daily U-shape for two successive days in November 2003

Through the application of the proposed models, a trader is able to reduce the cost of VWAP orders and, moreover, his or her chance of large costs measured by the 95 per cent quantile is lower. Therefore, VWAP trade orders can be offered at a lower commission fee to clients.
Conclusion

In this paper, we have presented a methodology for modelling intra-day volume. It is based on decomposing a single stock’s trading volume into a market and a specific component. The first part, describing market volume behaviour, is modelled by an historical average. The specific part, volume, is described using well-known econometrics models such as ARMA and SETAR. The application of the discussed methodology can enable more accurate prediction of intra-day volume. As a consequence, based on the empirical estimates, a trader making use of the proposed model would be able to reduce significantly the cost of executing VWAP orders.

Notes

1. Acknowledgements: The authors are most grateful to the Managing Editor Kevin Davis for very helpful comments and suggestions that significantly improved this paper. Serge Darolles and Gaëlle Le Fol gratefully acknowledge financial support of the chair QUANTVALLEY/Risk Foundation: Quantitative Management Initiative (QMI). Jędrzej Białkowski is grateful to BNZ bank for funding support, but none of the views expressed in this paper should be attributed to them.

2. The first step of the procedure is calculating $K \times K$ the dimension variance-covariance matrix. The spectral decomposition of this matrix leads to $K$ orthogonal vectors, $(C_i, C_j)$, with $T$-dimension each. $uk$ is the $k$th eigenvector. Each eigenvector is associated with a positive eigenvalue $\lambda$ such that: $\text{Cov}(C_i, C_j) = \lambda_i \delta_{ij}$, where $\delta_{ij}$ is Kronecker symbol. After simplification, we obtain the decomposition in the form given by the formula:

$$x_i - \bar{X} = \frac{1}{\lambda_i} \text{Cov}(x_i, C_i) C_i^T + \sum_{k \neq i} \frac{1}{\lambda_k} \text{Cov}(x_i, C_k) C_k^T$$

Thus, the turnover for stock $i$ at time $t$ is given by:

$$x_{i,t} = C_{i,t} + y_{i,t}$$

$C_{i,t}$ is the first principal component, $y_{i,t}$, other principal components.

3. Note that we use all the intra-day observations from 9.00 am to 9.20 am to get the 9.20 observation and so on for each time bucket until the 5.20 pm observation.

4. These models are called PC-ARMA and PC-SETAR hereafter.

References:


DO LARGE AUSTRALIAN COMPANIES EMPHASISE NON-GAAP FINANCIAL MEASURES OVER STATUTORY NET PROFIT (GAAP) IN ANNUAL REPORTS?

Large companies’ frequent focus on non-GAAP financial measures (‘pro forma’ earnings), rather than statutory net profit or GAAP measures, raises concerns about the potential for misinformed financial decision-making. Despite recommendations by ASIC and Finsia, in Australia there is no consistency in the calculation of non-GAAP financial measures or in their reconciliation to statutory net profit. Our study of the disclosures and the reconciliation to GAAP earnings by the largest 50 Australian listed non-mining companies finds considerable variations in reporting practices from highly transparent reconciliations to what appears to be considerable secrecy.1

Keywords: financial reporting, disclosure, pro forma earnings, non-GAAP earnings.

In March 2009, the Financial Services Institute of Australasia (Finsia) and the Australian Institute of Company Directors issued a policy guidance paper on disclosures about non-GAAP financial measures (Finsia and AICD 2009). The stated intention was to ‘encourage companies to provide, in a responsible and consistent manner, additional non-statutory information about underlying profit … in a table that shows and explains adjustments made to the statutory profit’.

In the United States, concern about the potential for pro forma or non-GAAP financial measures to mislead investors (Jennings and Marques 2001, p. 2), resulted in the Sarbanes-Oxley Act 2002 requiring that the Securities and Exchange Commission (SEC) issue regulation related to this issue. The SEC issued Regulation G (effective 28 March 2003), which prohibits disclosure of ‘a non-GAAP financial measure and related disclosure that is misleading’, and requires ‘quantitative reconciliation of the non-GAAP measure to the most directly comparable GAAP measure’ (Nichols et al. 2005, p. 30).

These examples indicate concern by regulators and the profession about the disclosure of non-GAAP financial measures. Although earlier research (Bradshaw and Sloan 2002; Bhattacharaya et al. 2003) provided evidence that non-GAAP financial measures are more value relevant than statutory net profit or GAAP earnings, recent research finds that investors can be misled by non-GAAP or pro forma financial measures. For example, Zhang and Zheng (2011) reported that prior to Regulation G, mispricing of pro forma earnings was limited to firms with low reconciliation quality, with no evidence of mispricing for firms with high reconciliation quality. After Regulation G, they found no evidence of mispricing at all, which would suggest that better reconciliations reduce the extent of mispricing.

Marques (2010) reported that managers strategically give more prominence to non-GAAP measures than to GAAP figures when the GAAP number falls short of a
benchmark but the non-GAAP earnings number does not. According to Marques (2010, p. 119): ‘This disclosure strategy may influence the perception of the firm’s financial results’. As well, Jennings and Marques (2011) provide evidence that prior to Regulation G, but not after it, investors were misled by disclosures on non-GAAP or pro forma financial earnings by firms with weaker corporate governance. Earlier, Lougee and Marquardt (2004) reported that the higher the pro forma earnings relative to GAAP earnings, the lower the future returns and Doyle, Lundholm and Soliman (2003) found that excluding certain transitory or non-recurring expenses (as deemed by the company) leads to predictably lower future cash flows and that investors do not fully assimilate the lower future cash flow implications.

Bowen, Davis and Matsumoto (2005, p. 1011) reported that a subset of firms reporting pro forma profits but GAAP losses placed more emphasis on pro forma earnings and less emphasis on GAAP earnings. Greater emphasis on pro forma earnings results in a stronger market reaction to the surprise in pro forma earnings reported in the press releases. The authors concluded that their results suggest that managers appear to be deliberate in the metrics they emphasise in their press releases.

Our results provide evidence that the provision of non-GAAP or pro forma financial earnings in the narrative sections of corporate annual reports is a common occurrence, with the emphasis being more frequently on pro forma earnings in preference to statutory net profit than vice versa.

Managers of firms provide non-GAAP or pro forma financial earnings for many reasons, for example, to report underlying earnings that are likely to recur, or to provide a more positive image of the company by removing expenses that they claim will be transitory. We address the following research questions in our study:

1. Which earnings metric(s) is emphasised by management in the annual report?
2. Where pro forma earnings are emphasised, is reconciliation to GAAP net profit provided within the annual report?
3. Where a pro forma earnings metric is emphasised, does it convey a different view of the firm’s performance?

Our research is motivated partly by Schrand and Walther (2000), who reported that managers disclose information in an attempt to influence stakeholders’ perceptions of earnings, which suggests that managers may act opportunistically in choosing which earnings measures to disclose.

Pro forma earnings disclosures by US companies most frequently relate to either quarterly earnings announcements or the mandated Management Discussion and Analysis (MD&A) section of company annual reports. However, in Australia, these disclosures typically appear in the largely unregulated narrative sections of the corporate annual report. Although unaudited, except to the extent that the auditor has to read for consistency with the financial statements, such voluntary disclosures may draw credibility from their proximity to the auditor’s report (Neu et al. 1998); enhancing their capacity to influence financial decision making.

A review conducted by the Australian Securities and Investments Commission (ASIC 2010) on the 30 June 2010 annual reports of 50 of the top 200 Australian listed entities observed that 61 per cent of sample entities made disclosures of alternative profit measures within the management commentary section of the annual report. Further, approximately two-thirds of these entities gave more prominence to the alternative profit figure than the statutory net profit, while approximately half failed to reconcile their alternative profit figure and statutory profit. This is consistent with our findings which cover the prior three-year period.

Our results provide evidence that the provision of non-GAAP or pro forma financial earnings in the narrative sections of corporate annual reports is a common occurrence, with the emphasis being more frequently on pro forma earnings in preference to statutory net profit than vice versa. We observe that considerable variation occurs in the ways that pro forma earnings are measured, and in the extent to which reconciliation to statutory net profit is available. More often than not, emphasised pro forma earnings exhibit a better year-on-year trend than statutory net profit, which could indicate management emphasises the earnings measure that presents the company’s financial performance in the best light. These findings have implications with regard to the comparability of financial performance both across accounting periods and between companies.

Evidence to date

The empirical evidence to date is mixed in terms of the effectiveness of Regulation G in the United States in reducing the bias towards reporting higher pro forma earnings (relative to GAAP) and in terms of the potential for investors to be misled by such disclosures. While Nichols et al. (2005) found that pro forma earnings (for a sample covering 1999 to 2004) were significantly and materially higher than the comparative GAAP earnings, Johnson and Schwartz (2005) cast doubt on the notion that investors are, on average, misled by pro forma earnings disclosures.
Using an experimental approach (see, for example, Frederickson and Miller 2004), behavioural research has demonstrated that presenting pro forma earnings before GAAP earnings influences non-professional investors’ judgments but not those of analysts. The earlier study by Moser (1989) found that when subjects were required to make an assessment about whether the earnings of a company would increase, their assessments were influenced by the order of the information provided to them.

More recently, Elliott (2006) showed that the emphasis placed by management on pro forma earnings, rather than the mere disclosure of pro forma earnings, influences non-professional investors’ judgments and decisions, although this is mitigated by the presence of a quantitative reconciliation. Analysts, however, tended to view pro forma earnings as more reliable in the presence of a quantitative reconciliation.

In a study of media releases using a sample of the top 20 Australian listed companies, Ernst & Young (2008, p. 5) report that there are variations in the number of earnings figures reported, and also variations in the terminology used to describe the adjustments made by companies to earnings. While there was ‘consistency in the types of adjustments made’ (p. 5), with the most common form of adjustments pertaining to significant or one-off adjustments and IFRS related-matters, these findings related primarily to media releases rather than annual reports. In that respect, there has been little academic research conducted in Australia on these strategic disclosures, either in relation to their emphasis and the placement of the quantitative reconciliation within the annual report, or any associated behavioural implications.

Australian evidence
We investigated the prominence of pro forma earnings disclosures and the availability of their reconciliation to statutory net profit (GAAP earnings) for the years 2007, 2008 and 2009. Our sample included the top 50 (by market capitalisation) Australian public non-mining companies as at 30 June 2009. From sample companies’ annual reports we hand-collected data pertaining to statutory (GAAP-based) net profit and various pro forma earnings measures for the years 2006 to 2009. Thus we established a dataset comprising 200 firm-years.

Analysis of this dataset was undertaken to classify firms on a year-by-year basis to address the three research questions identified earlier.

Illustrative of pro forma earnings disclosures adopted by Australian companies, on page 1 of Rio Tinto’s 2008 annual report the highlights state, ‘Record underlying EBITDA of US$22,317 million, 60 per cent above 2007 ... Record underlying earnings of US$10,303 million, 38 per cent above 2007 ... Net earnings were US$3,676 million, 50 per cent below 2007’. However, the Group GAAP income statement reported a profit of US$4,609 million, which was almost 60 per cent lower than the 2007 figure. It is not until page 23 of the annual report that ‘Underlying earnings’ is defined:

Underlying earnings is the key financial performance indicator used across the Group. It is a measure of earnings that provides insight into the underlying business performance of the Group’s operations. Items excluded from net earnings to arrive at underlying earnings are explained in note 2 of the 2008 full financial statements.

Perusal of note 2 of the financial statements reveals that the difference between Rio Tinto’s underlying earnings and statutory net profit was almost exclusively due to net impairment charges of US$7,579 million being excluded from so-called underlying earnings.

Research question 1
Our first research question is: Which earnings metric(s) is emphasised by management in the annual report? Table 1 shows the frequency of disclosure for various pro forma earnings measures.

While all of the 50 largest Australian non-mining companies in our sample disclosed pro forma earnings in the narrative sections of their 2008 and 2009 annual reports and 48 of the 50 in their 2007 annual reports, the degree of emphasis and actual computations varied widely. Table 1, column 1 shows that the most frequently disclosed metrics were variants of EBIT (Earnings Before Interest and Tax) or EBITDA (Earnings Before Interest, Tax, Depreciation and Amortisation) followed by variants of NPAT (Net Profit After Tax, column 2). But the adjustments to EBIT, EBITDA or NPAT vary from one company to another, and sometimes from one year to the next for the same company. The next most frequent performance measure was ‘underlying earnings’ followed by ‘normalised’ earnings. These measures were sometimes based on either EBIT/EBITDA or NPAT, although some were variants of pre-tax profits or (in one case) cash flows. Occasionally, ‘underlying’ or ‘normalised’ earnings were provided without any mention of how this measure had been calculated. The ‘other’ classifications referred to in Table 1 included firm-specific measures such as insurance profit and proportionate earnings where assets were not wholly owned.

While all of the 50 largest Australian non-mining companies in our sample disclosed pro forma earnings in the narrative sections of their 2008 and 2009 annual reports and 48 of the 50 in their 2007 annual reports, the degree of emphasis and actual computations varied widely.
The degree of emphasis on pro forma earnings, relative to GAAP net profit, was assessed by considering which measure was discussed first, together with the relative emphasis in the management discussion. As some degree of subjectivity was required in making this assessment, two researchers independently assessed each firm and in the few cases where there was initial disagreement, the cases were reconsidered and discussed until consensus was reached. Table 2 presents the results of this analysis, and suggests a slight shift in emphasis from GAAP net profit to pro forma earnings over the three-year period analysed. Table 2 shows that in 2007, 31 companies emphasised pro forma earnings as compared with 16 emphasising GAAP net profit. By 2009 the relative proportions had increased to 35 companies emphasising pro forma earnings and 14 emphasising GAAP net profit.

Research question 2
The second research question we address is: Where pro forma earnings are emphasised, is reconciliation to GAAP net profit provided within the annual report? Table 3 gives the number of sample companies: providing a reconciliation (Column 1); providing no reconciliation but providing a “trail” enabling a reconciliation (Column 2); and where no reconciliation or trail is provided (Column 3). This is of importance given prior (US) research findings (Elliott 2006) that the reporting of a quantitative reconciliation can mitigate the influence of pro forma earnings disclosures on non-professional investors’ judgments and decisions.

We found that most companies provided either a full reconciliation or a sufficient “trail” such that reconciliation could be determined by the reader. Nevertheless, there
were a small number of cases in which the emphasised pro forma figure could not be reconciled to GAAP profit due to insufficient information on how the pro forma figure had been calculated.

**Research question 3**

Our third research question is: Where a pro forma earnings metric is emphasised, does it convey a different (compared with GAAP net profit) view of the firm’s performance? We addressed this question in two ways. First, we calculated the difference between the emphasised pro forma earnings measure and GAAP net profit and compared this difference with the absolute value of GAAP net profit (see Table 4). This provides a ‘feel’ for the magnitude of the difference between the two performance measures. Second, we calculated the annual change in both pro forma earnings and GAAP earnings to determine whether the trend in pro forma earnings reflected better financial performance than the trend in GAAP net profit. This was done to provide some insight into whether management might be choosing to emphasise the earnings measure that presents firm performance in the best light. Table 5 presents the results of this analysis.

With reference to the data presented in Table 4, we constructed (somewhat arbitrarily) seven categories representing varying magnitudes of the scaled (by absolute value of GAAP net profit) difference between emphasised pro forma earnings and GAAP net profit, and then determined the number of companies falling into each category. For the years 2008 and 2009 (after the global financial crisis), the number of companies making net positive adjustments to net profit, to derive a pro forma earnings measure that is emphasised, is considerably greater than the number of companies making net negative adjustments, particularly with respect to the larger impact adjustments. The magnitudes (not tabulated) of the net negative adjustments ranged from 1 per cent to 92 per cent of the absolute value of reported net profit. The magnitudes (not tabulated) of the net positive adjustments ranged from zero to more than 1000 per cent of the absolute value of reported net profit. The most common types of adjustments related to gains/losses on disposal of assets, business restructuring costs, depreciation/amortisation and impairment losses.

While the data presented in Table 4 provide an indication of the significance of the adjustments that may be made in deriving pro forma earnings, investors may also be influenced by comparisons with figures from the previous year. We therefore calculated the year-on-year trends for both statutory and pro forma earnings. Panel A of Table 5 reports the number of sample companies for which emphasised pro forma earnings showed a better trend than GAAP net profit, while Panel B reports the number of sample companies for which emphasised pro forma earnings showed a worse trend than the reported GAAP net profit.

Panel A indicates that in both 2008 and 2009, in more than two-thirds of cases which emphasised pro forma earnings, growth was better than that of statutory net profit. (In 2007, there was an equal split.) While these figures provide limited evidence of selective reporting, we observed that in a number of cases where emphasised pro forma earnings exhibited a worse trend than net profit, the emphasised metric had shown a better trend (relative to net profit) in the previous year. For example, in 2008 there were eight companies that emphasised pro forma earnings that exhibited a worse trend than statutory net profit. However, in three of these cases the pro forma measure had shown a better trend than net profit in 2007 (suggesting that the emphasis on the pro forma measure was for the sake of consistency of reporting), leaving only five cases that could be construed as examples of genuinely informative reporting. In 2009, of the 11 companies emphasising pro forma earnings showing a worse trend than statutory net profit, seven had shown a better trend for pro forma earnings (relative to net profit) in either 2008 and/or 2007. We therefore conclude that it is probably only in a minority of cases that pro forma earnings are emphasised for genuinely informative reasons.

We also questioned whether companies were emphasising positive pro forma earnings in an attempt to focus attention away from negative statutory net profit figures. While we identified only one such case in 2007,
in 2008 there were five cases, with the number of cases increasing to eight by 2009 (see Table 6). By contrast, there were no cases of the opposite situation occurring (that is, of companies emphasising negative pro forma earnings where statutory net profit was positive). These findings reinforce our belief that management may be seeking to engage in a form of ‘impression management’ by emphasising the earnings measure that presents the company’s financial performance in the best light. 

Conclusion
This study has highlighted that the provision of pro forma earnings in the narrative sections of the annual report is a common occurrence. The most frequent performance measures disclosed were modified EBIT, EBITDA or NPAT, with the types of modifications varying from one company to another and sometimes from one year to the next for the same company. More companies emphasised these pro forma earnings in preference to the statutory net profit than vice versa. In approximately 60 per cent of all firm-years, the emphasised pro forma earnings exhibited a better year-on-year trend than the statutory net profit, while in 14 per cent of firm-years the emphasised pro forma earnings figure was positive while statutory net profit was negative.

Overall, the results suggest that management may be attempting to engage in a form of ‘impression management’ by emphasising the earnings measure that presents the company’s financial performance in the best light. We conclude that it is only in a minority of cases that pro forma earnings are emphasised for genuinely informative reasons. The findings of this study have implications for financial statement users as not only does this type of reporting make comparisons across reporting periods difficult, it also impedes comparisons with other companies, potentially leading to misinformed and inappropriate decisions on the part of investors. Using a larger sample, future research could further examine: whether pro forma earnings disclosures appear to be efficient (information-enhancing) versus opportunistic, perhaps adopting an experimental approach; and whether particular firm characteristics are associated with efficient versus opportunistic pro forma disclosures.
Notes
1. The authors appreciate the helpful comments of the referee and participants at the Accounting Standards Special Interest group at the 2010 AFANZ Conference, Christchurch, New Zealand, particularly Michael Bradbury, Bryan Howieson and Kevin Stephenson. Funding for data collection was provided by an AFANZ 2009 Research Grant.
2. If the auditor does identify a material inconsistency in information reported in the narrative sections compared with the audited financial report, then the auditor shall determine whether the audited report or the narrative section needs to be revised (ASA 720).
3. The 2006 data is used to calculate the change in annual earnings from the previous year for 2007.
4. ‘Trail’ means sufficient information to allow the reader to do their own reconciliation.
5. We chose to look at the change in earnings metrics rather than the actual values of these metrics on the basis that financial decision-making is more likely to be based on performance trends than individual yearly performance figures.

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Despite widespread media reports on the problem of housing affordability, our research finds that user housing costs appear relatively modest except for the late 1980s and early 1990s, and the early 2000s. This paper presents estimates of the user cost of housing, a measure of housing affordability that takes into account the full range of housing costs and benefits for owner-occupiers and investors and the typical multi-year holding period for residential property. Our research also examines the differences in housing costs between owner-occupiers and investors.

In recent years there has been considerable public discussion about house prices in Australia, much of it focused on the problem of ‘housing affordability’ confronting first home buyers. Addressing this issue, the Senate Select Committee on Housing Affordability in Australia reported in June 2008 that, ‘There is a significant problem with housing affordability’, but qualified this conclusion slightly by adding ‘albeit not as severe or widespread as some media reports suggest’. Public perceptions have changed little since the release of the report. For example, Senator Ludlam (2011) released a media statement with the heading ‘Housing affordability in Australia a “world-class outrage”’.

There is no doubt that in many parts of Australia house prices, relative to income, are currently at historically high levels. Figure 1, taken from Yates (2011), puts current house prices into historical perspective.

FIGURE 1: Real house prices, GDP per capita and earnings (1961/62=100)
There is also no doubt that, all other things being equal, a higher house price reduces affordability from the perspective of potential purchasers. But housing affordability relates also to the costs incurred by existing homeowners (who are a much larger group). The Australian Housing and Urban Research Institute (AHURI) defines housing affordability as, ‘the financial outcome for a household of renting or purchasing the dwelling they need or wish to occupy’ (AHURI 2006). AHURI adds that:

There are different measures for different purposes ... Some focus on whether households have sufficient incomes to save to enter home purchase; others focus on whether households have sufficient income to sustain their housing payments; still others focus on whether households have sufficient income after paying for their housing to buy the basic necessities of life.

The price paid for a house is, of course, a very important component of housing costs. For a potential buyer, a higher price reduces affordability but for a current owner, a higher price is like a negative cost and hence reduces a current owner's housing costs. Moreover, there are many costs other than the purchase price. Examples include interest payable on debt used to purchase a property, a wide range of ongoing costs such as maintenance and local government rates and (for investors) income tax. In this paper we present estimates of a measure known as the ‘user cost of housing’ (UCH), which takes into account the full range of housing costs.

Our focus here can be summarised as asking the question: what was the average weekly cost incurred by an individual who purchased a house at some specified date, and who then owned the property for a specified time period (five years is used) before selling? It is thus an ex post analysis and the results depend upon the date of purchase and a range of assumptions, including whether the purchase is for owner occupation or for investment. The main cost differences between owner occupation and investment are due to taxation arrangements.

Our estimates show a pattern in housing costs that is considerably different from the rapidly increasing trend of real housing costs depicted in Figure 1. Contrary to many analyses, we show that user costs in Brisbane, Melbourne and Sydney have been reasonably modest — below $500 per week in real terms (2010 dollars) for a median-price three-bedroom house — for much of the period from 1988 to 2010. User costs were, however, much higher in the high interest rate period of the late 1980s and early 1990s and the high housing price, low price appreciation period of the early 2000s.

Measuring the user cost of housing

The user cost of housing is an imputed value. It is the net present value of the costs of owning a housing unit over a given holding period. There are three components of this discounted value. The first is the cost of purchasing the property, which includes the down payment and the costs of conveyancing and stamp duty, net of any offsetting first homeowner grants.

The second cost component includes the running costs of holding the property such as mortgage interest, repairs and maintenance, the opportunity cost of the funds tied up in housing equity and economic depreciation. When the property is a rental property, we take into account that rental income is taxable and holding costs are deductible. It should be noted that ‘paying off the mortgage’ does not substantially reduce the economic running costs. It shifts the cost from mortgage interest to the opportunity cost of housing equity. For rental properties, this shift will eliminate the mortgage interest deduction and increase the tax payable, which may have the perverse effect of increasing the running cost.

The final cost component is the net costs of sale. These include all sales commissions, legal costs, capital gains tax (if applicable) and other costs of disposing of the property. These costs are offset by the selling price of the property net of the outstanding balance on the mortgage used to finance the property. In a strongly appreciating property market, the net costs of sale will be negative because the capital gain is greater than the sum of the other costs but, in a flat or declining property market, the net cost of sale will be positive because the reverse occurs.

The three cost components occur at different points during the holding period. Therefore, they must be discounted at the property owner’s opportunity cost of funds to account for the time value of money. We use Australia-wide quarterly data on the cash management trust rate to measure the opportunity cost of funds before tax. This choice was made because we require a return on a retail investment that is readily available to individual homeowners.
All other things being equal, a higher house price increases the user cost because the acquisition cost is higher, but price appreciation during the holding period reduces the user cost. Therefore, a city with higher house prices (like Sydney) does not necessarily have a higher user cost of housing.
and small investors. Discounting is done at the after-tax rate calculated using the marginal tax rate for our representative property owners. The calculations described above capitalise the costs of owning a housing unit. This value will depend greatly on the holding period. To allow easy comparison across holding periods, we follow the established practice of spreading the net present value out over the holding period by calculating the equivalent quarterly cost using the property owner’s opportunity cost of funds. To further promote comparisons across cities and time, we also calculate the quarterly user cost as a percentage of the house purchase price. For the details of the calculations, see Brown et al. (2011).

Overview: the user cost of housing in Australia 1988 – 2010

We investigate the real user cost of median-price three-bedroom housing in Sydney, Melbourne and Brisbane for overlapping five-year holding periods beginning in the March quarter of 1988 and ending with the March quarter of 2010. We consider two representative property owners — one an owner-occupier and the other an investor — and assume that these owners earn twice average weekly earnings and borrow 80 per cent of the purchase price. We take into account the different tax treatments applicable to owner-occupiers and investors and build in the various changes in income tax rates and stamp duty rates as well as the significant changes to capital gains tax legislation that took effect in September 1999.

The findings for owner-occupiers are summarised in Figure 2, which plots weekly user costs for overlapping five-year holding periods. For example, in the figure, ‘1988’ means the five-year holding period from March 1988 to March 1993. A striking feature of Figure 2 is that all three cities generally display a similar trend over time: high user costs early in the period (when interest rates were high), falling over time until the five-year period beginning around 1998–99. Initially, this decrease in the user cost was driven by falling interest rates but, subsequently, the decrease was fuelled by the capital gains from accelerating house prices. Property price appreciation was high enough between 1996 and 1999 to cause the user cost to be negative (that is, in hindsight, this period was a good time to enter the market). Towards the end of the period the user cost again increased as property price appreciation slowed. Figure 2 also gives the impression — confirmed by statistical tests — that Brisbane behaves somewhat differently from the other two cities. There is, however, no consistency in the rank of each city: for example, at times, Sydney had the highest user cost and at other times the lowest user cost. In contrast, throughout the period studied, house prices in Sydney were higher than in the other two cities. All other things being equal, a higher house price increases the user cost because the acquisition cost is higher, but price appreciation during the holding period reduces the user cost. Therefore, a city with higher house prices (like Sydney) does not necessarily have a higher user cost of housing.

Figure 3, which provides a summary of user costs as a percentage of the house price, shows similar patterns to those observed in Figure 2. The percentage user cost is highly variable over time, from a low of about - 6 per cent per annum to a high of nearly 20 per cent per annum. Similarly, it is high early in the period, then falls and then rises towards the end of the period. Again, Brisbane appears to behave differently from Sydney and Melbourne, and different cities occupy the highest and lowest cost rank at different times.

Australian property investors face both cost advantages and cost disadvantages relative to owner-occupiers. Investors pay tax on their net taxable income from renting the property. When the outgoings exceed rental income, this loss may be deducted from other income for tax purposes. These are the gains from negative gearing so often commented on. Since owner-occupiers cannot negatively gear their property for tax purposes, investors have a cost advantage relative to owner-occupiers when rental income lags expenses. The magnitude of this cost advantage is illustrated in Figure 4. This figure shows the extent to which the user cost of housing of owner-occupiers exceeded that of investors. It is clear from the figure that, in many years, owner-occupiers paid more than investors for the same housing. However, during years of rapid house price appreciation, owner-occupiers paid less than investors. This is because property investors must pay capital gains tax, while owner-occupiers do not. This considerable cost disadvantage for investors outweighed the advantage of negative gearing during the late 1990s.

The comparison between investors and owner-occupiers in Figure 4 should be viewed with some caution. It is too easy to focus on the highs or lows in the comparison. The figure shows that some investors were lucky or unlucky in the timing of their investment. It is better to make this comparison over the long run. Over our sample period, investors had a long-run cost advantage, but it was not huge. It was $7 per week in Brisbane, $125 per week in Melbourne and $129 per week in Sydney. A second reason for being cautious is that the interpretations of the results portrayed in Figure 4 depend on one’s viewpoint. For example, to an owner-occupier they appear to advantage investors, while to a renter, competition among landlords for tenants should mean that the cost advantage is passed on as lower rents.

Causes

It is natural at this point to ask what caused the U-shaped time pattern in the user cost of housing. Three plausible explanations of this pattern are: house prices; changes in interest rates; and changes in taxation. Each of these factors changed significantly between 1988 and 2010 and each played a role in determining the user cost. However, our investigations show that it was house price changes that primarily determined the time pattern in the user cost of housing. Figure 5 highlights this point.
by plotting the user cost of housing for our reference group of owner-occupiers as a percentage of the house price for Melbourne against the average rate of house price appreciation in Melbourne for each of the five-year holding periods. The result is striking — the two time series are almost mirror images. When the average rate of house price appreciation rises, the user cost falls and vice versa. This result holds for investors as well.

To get some idea of the effect of the marked decline in interest rates prior to the mid-1990s, we calculated the percentage owner-occupier user cost of housing that would have prevailed had interest rates been fixed at their average rates for the 1988–2010 period and then compared these costs with the actual costs in Figure 3. Figure 6 depicts the result of our experiment by showing the actual user cost minus the fixed interest rate user cost. The drop in interest rates reduced the user cost of housing by 8 per cent between 1988 and 1991 and a further 4 per cent between 1991 and 1996. Since 1996, a gradual rise in interest rates has been reflected in an approximately 2 per cent increase in the user cost. Thus the downward leg of the U-shaped time pattern in the user cost of housing was driven in part by an interest rate decrease, but its role was small in the upward leg.
Tax changes are the third plausible explanation of changes in the user cost of housing across time. Our tax rate experiments suggest that changes in income tax rates had only a minor effect at most.

The changes to capital gains taxation (CGT) were the most profound change in the tax provisions during the period. Prior to 1999, long-term capital gains were subject to tax only to the extent that they exceeded inflation. In 1999 the system was changed to 50 per cent of a nominal capital gain being taxable — frequently described as a ‘50 per cent discount’. However, investors who owned properties at the time of the change were permitted to choose to remain under the old system but with the important variation that the inflation adjustment would be frozen at the level it had when the change occurred.

At the time of the tax changes, there was considerable discussion of whether, compared with the previous system, the new system would generate more, or less, tax on properties purchased after 1999. In simple terms, the tax collected would increase (decrease) under the new system if property prices grew at less (more) than twice the inflation rate. Hence, the question arises: Did the 1999 changes to CGT increase or decrease the user cost for property investors? Brown et al. (2011) conducted a partial test of the impact of the 1999 changes by calculating the user cost after 1999 but assuming that the 1985 system continued. Their results suggest that the CGT changes reduced the user cost (expressed as an annual percentage) but rarely by more than a few percentage points a year, and usually by much less than that. Moreover, even this modest reduction tended to decline over time.

It can be argued that, if a capital gain is in fact income, then it should be subject to income tax in the ordinary way — that is, with no discount. Indeed, capital gains realised within 12 months of asset acquisition have long been treated in precisely this fashion. In this sense, the 50 per cent discount is a distortion in the tax system. How great is the effect of this distortion? Brown et al. (2011) constructed a similar test by estimating what the user cost for investors would have been if no discount were allowed. At first, the effect is significant, with the user cost (expressed as a rate per year) increasing by 3 to 4 percentage points per year. Later in the period, as house price growth slowed, the value of the discount to the investor declined to around 1 percentage point per year.

Conclusion

An objective of this paper was to present estimates of housing affordability that take into account the full range of housing costs and benefits for owner-occupiers and investors, and the typical multi-year holding period for residential property. This measure is termed the user cost of housing.

User costs appear relatively modest except for the late 1980s and early 1990s, and the early 2000s, largely because the capital gains from holding property have often offset the direct costs of property ownership. The other major factor that has helped to keep user costs low has been the decline in mortgage and other interest rates since the early 1990s. We show that this rate reduction reduced the user cost of housing in 2010 by about 10 per cent compared with 1988.

The paper had one further objective, which was to draw out the differences in housing costs between owner-occupiers and investors. Our research shows that investors have lower housing costs than owner-occupiers during periods of low house price appreciation, but higher costs during periods of high house price appreciation. This dichotomy arises mainly because investors must pay capital gains tax while owner-occupiers do not. The disadvantages faced by investors relative to owner-
occupiers during periods of high house price appreciation are enough to more than offset the tax shield generated by negative gearing. Brown et al. (2011) summarised this by stating:

If [negative gearing] is a distortion, it is of a similar order of magnitude to the distortion of the large CGT discounts available to property owners: 50 per cent in the case of investors and 100 per cent in the case of owner-occupiers.

The upshot of this is that the tax system does not unambiguously favour either investors or owner-occupiers.

Notes

1. Interestingly, the terms of reference for the Senate Committee seem to be based on the assumption that housing affordability is indeed limited to the barriers to becoming a home owner. The report includes a four-page glossary but ‘housing affordability’ is not included in the glossary.

2. In the absence of reliable information we exclude search costs.

3. The specification of the rate of return on forgone investments is always debatable. A higher (lower) required rate will increase (decrease) the user cost of housing, all other things being equal.

4. Brown et al. (2011) also consider property owners who earn average weekly earnings and property owners with no debt. They find that the user cost is correlated highly across the various ownership categories. Typically, owner-occupiers who have a mortgage and who earn average weekly earnings have the highest user cost, while owner-occupiers without a mortgage and who earn twice the average weekly earnings have the lowest user cost. The various categories of investors fall between these two.

5. The plots for the corresponding investors are very similar. Differences between user costs of owner-occupiers and investors are discussed later.

6. Averaged over 20 quarters to match the user cost calculation.

7. The horizontal axis in Figure 5 indicates the start date of each five-year user cost and rate of appreciation and, for other uses, because both are meant to reflect forward-looking values. Of course, the mid-point of these calculations is 2½ years later and, for other uses, it may be appropriate to change the horizontal axis by shifting it 2½ years to the right.

8. They describe it as a partial test because they take the property prices as given. That is, no attempt was made to model the effect of the tax changes on the prices themselves.

9. Of course, an even greater distortion is the exemption of owner-occupied housing from CGT; the exemption is effectively a discount of 100 per cent.

References


Senate Select Committee on Housing Affordability in Australia 2008, A good house is hard to find: housing affordability in Australia, Canberra, June.

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The changing macroeconomic environment

The economic backdrop for the financial services industry has fundamentally changed in the space of a few short years. The boom conditions of 2003 to 2007 have given way to recession in many countries, followed by only modest growth as private sector deleveraging takes hold. Inflation in most countries remains relatively subdued, held in check in the advanced economies by large output gaps and high unemployment.

The macro policy environment has also undergone radical change. The initial policy response to the global financial crisis was very Keynesian, relying on large budget deficits to support activity. Not surprisingly, but far too belatedly, this has given way to concerns about government debt levels and a reassessment of the use of fiscal policy to support the economy.

Fiscal tightening and austerity are now the properly prescribed medicines. Pressure has been most acute in the eurozone and the policy debate in Europe is now shifting, also far too slowly, to how to support growth via structural reforms in the labour and product markets.

Credible medium-term fiscal policies are needed urgently to address major structural issues such as ageing populations and the pressures that they will place not only on retirement incomes but also on health spending. And, as a critical part of these policies, welfare must be made less attractive for the good of all, not least for many of the welfare recipients themselves.

The stark fact is that southern Europe must regain competitiveness either through an increase in productivity and/or through a fall in real wages. We are seeing some progress along these lines in Ireland, where appropriate policies are being implemented. However, in the majority of European countries, acknowledgement of the ‘sacrifices’ needed to regain competitiveness is still scarce and politicians — often hamstrung by coalition governments — are not keen to engage in such debates as they fear losing consensus.

Fiscal tightness and austerity are now the properly prescribed medicines. Pressure has been most acute in the eurozone and the policy debate in Europe is now shifting, also far too slowly, to how to support growth via structural reforms in the labour and product markets.

All of this is likely to make the adjustment process longer and this is not good for investors. With these constraints on fiscal policy, monetary policy has undertaken the bulk of the countercyclical response. But it is running into the issue of a zero ‘lower bound’ on interest rates. As a result, quantitative easing has now sadly become the orthodox approach — the central bank expands its balance sheet, buying government and private sector bonds to directly affect longer-term interest rates.

There is nothing conceptually new in this policy approach as it was initially proposed by Keynes. But this new orthodoxy is starkly different from the traditional one of...
productivity-enhancing infrastructure. This should change. Now there is clearly a conflict between these two objectives — funding infrastructure and further fiscal consolidation — although, with hindsight, this need not have been the case if government spending had been more restrained.

A focus on infrastructure with a re-ordering of spending priorities is a worthwhile objective and, over the medium term, this would enable the economy to strive for greater growth and provide a broader productive base. As others have said, few infrastructure products appear attractive ex ante but many look remarkably attractive ex post. The highway and rail spending in earlier decades in the United Kingdom is a good example of this.

Changes in the sources of investment pools

The global financial crisis has not changed the gradual shift in the centre of gravity of the global economy. Its move from mature economies to emerging markets, particularly in Asia, and to commodity exporting countries including Australia started in the last decade.

Thanks to solid macroeconomic fundamentals — low debt in the household and public sectors and no significant leverage in the financial sector — emerging market economies were able to cushion effectively the impact of the crisis and remain on a sustained path of economic growth throughout the global recession and in the following years. The low growth, deleveraging and low returns on capital in advanced economies are in stark contrast with the higher economic dynamism, rapid wealth accumulation and the rise of a new middle class in emerging markets. Together, these factors are leading to a shift in the source of global financial wealth and the emergence of new players in global capital markets.

In the 1980s and 1990s, Western countries’ pension funds dominated the investment landscape. However, in the past decade, sovereign wealth funds and private equity funds have emerged as the new financial ‘powerhouses’. Sovereign wealth funds, largely originating in emerging markets, already control nearly USD 5 trillion of funds and their assets are expected to grow to nearly USD 10 trillion by the middle of this decade. These state-controlled investment vehicles are something of a novelty for the global economy.

Following decades of public sector retrenchment from financial markets in Western economies, the state in these
emerging markets appears to be regaining a strategic role in the allocation of global capital and the management of financial wealth. Add up the assets controlled by sovereign wealth funds, the foreign exchange reserves managed by central banks and all of the other assets controlled by state-owned corporations, and the share of global wealth directly or indirectly falling under the control of the state rises dramatically. And, it is likely to continue rising as emerging markets look set to continue outperforming advanced economies for the foreseeable future.

Sovereign wealth funds differ from other institutional investors such as pension funds not only in the public nature of their sponsors but also in terms of their investment style. Without (or with lower) explicit liabilities, sovereign wealth funds face less pressure from their sponsors on short-term returns and can adopt a longer-term investment horizon. Because of this, they benefit from their ability to access structural risk premia and to take advantage of secular macro trends.

Given their long-term investment horizon and the increasingly strategic nature of their investments, sovereign wealth funds often partner with private equity firms or turn themselves into fully funded private equity firms searching for the best direct investment opportunities in listed or unlisted companies in both advanced and emerging markets. In this world of low returns on listed equity markets, private equity firms now aim to capture the illiquidity premium and deliver it to end-investors searching for additional returns.

The increasing number of institutional investors and high net worth individuals turning to direct investment in search of additional returns appears likely to continue. This trend poses some new challenges for the asset management industry, which is often too focused on ‘short-termism’ and ‘benchmarking’.

New investment trends

The global financial crisis put risk in the spotlight. It highlighted the asymmetric distribution of investment returns and the potential losses from tail risks, which are low-probability but high-impact events.

Risk is multi-dimensional and cannot be adequately summarised by a standard measure of volatility. Increasingly, asset managers and pension funds are looking to better understand the impact that these risks may have on their portfolios and the feasibility of hedging them. One response to this has been factor-based investing, where asset classes are analysed in terms of the factors driving their return not simply the asset class to which they belong.

Since the crisis, financial markets have experienced high volatility but have also been characterised by a marked increase in correlation across asset classes. This has brought clearly into focus the fact that true diversification comes from the minimisation of correlation between asset classes rather than the number of asset classes in which we invest. Many investors were lulled into a false sense of security by diversifying asset classes only to find that their true diversification was limited. A more dynamic approach to asset allocation is called for.

With the ‘new normal’ of shorter business cycles and heightened volatility and correlations, an overly passive approach anchored by a strategic asset allocation could leave investors vulnerable to evolving macro trends. Investors are realising that prospective returns are going to be lower than those experienced in the past few decades.

Ongoing private sector deleveraging, fiscal consolidation and deteriorating demographics all point to weak economic growth in the advanced economies. This, combined with a commitment to zero interest rate policies and quantitative easing, means the outlook for returns in fixed income markets is poor compared with recent decades. Equity markets also have the capacity to disappoint.

While priced on historically modest price-to-earnings ratios, the prospect of a significant market re-rating of stocks may be some time in coming, given the elevated risk premiums in the post-crisis world. Investors will have to focus on a true long-term investment approach.

Very few asset managers would resist the temptation to claim that they are ‘long-term investors’. Yet when trying to define what ‘long-term investing’ means precisely, asset managers tend to talk about selecting companies with long-term potential. A distinct advantage of true long-term investment is the possibility of investing in less liquid assets such as private equity, real estate or infrastructure. One could extend the concept further by adopting an investment strategy based on ‘long-term economic value’ rather than ‘short-term financial value’. This is a whole new area of research for the asset management industry and requires a much deeper look at those factors driving the long-term growth potential of countries and sectors.

The perceptions and the reality of what is a ‘risk-free’ asset are also driving post-crisis investment trends. There are now only eight countries with a triple-A rating that do not have either a credit watch negative or a negative outlook rating. The shrinking size of the pool of very high-rated sovereign assets is leading to the development of alternative global sovereign bond benchmarks such as GDP, fiscal strength or multi-factor weighted indices.

One way in which this trend is manifesting itself for Australia is the upward pressure on the Australian dollar as investors seek yield and relative safety. Net capital flows over the past two years have been dominated by foreign purchases of government securities. And, while the data is not granular enough to pinpoint the precise source of demand, strong demand has been coming from official sources overseas.

Australia’s current ‘safe haven’ status is a significant turnaround from the more peripheral status in financial
markets which the country tended to have until recent years. While it clearly brings benefits, it also brings a downside in the shape of currency strength that adds to the other adjustment issues I referred to earlier.

The challenges for the investment management industry

We can expect the current era of low real returns to endure with investors struggling to earn decent returns on traditional markets. Defined Benefit (DB) pension funds struggling to match their liabilities and the new players such as the sovereign wealth funds and private equity funds further expanding their influence in global markets.

These trends pose a challenge for the financial industry in general and the investment management industry in particular. After several decades of rapid growth, the investment management industry needs to address the strategic issues raised by these trends if it wants to continue prospering in the post-crisis economic and financial environment.

The increasing trend towards long-term investing among sovereign wealth funds and other institutional investors leads to increasing disintermediation — or internalisation — of some investment capabilities. This reflects the fact that asset managers have only recently started considering new approaches to asset management. It also reveals the weak alignment that sometimes occurs between the interests of investment institutions and their external managers with regard to factors such as time horizon, liquidity profile and short-term benchmarking.

One emerging trend is a desire by institutional investors for more targeted absolute returns and less reliance on targets relative to benchmarks. This requires a rethinking of asset managers’ relationships with these institutions through the introduction of innovative structures that, while taking advantage of the expertise and market access of professional investors, also offer more control and flexibility to their sponsors. Such structures could include co-investment with external fund managers, the establishment of funds with the explicit aim of making long-term investments and better alignment of client–manager incentives with regard to benchmarking and compensation.

The shift towards long-term investing also requires greater activism by shareholders, including asset managers acting on behalf of their clients. With institutional investors more concerned about long-term value creation, asset managers will increasingly be required to work alongside their clients in exercising ownership rights and with the investee companies’ managers to develop long-term goals and identify long-term risks.

So far, asset managers have generally been reluctant to engage more with the companies they invest in; fearful of the fiduciary responsibilities and the costs involved. This is likely to change as the incentives of the asset manager and the clients become more aligned. And, I can foresee that, in future, a requirement to exercise ownership rights will be more frequently included in investment mandates.

I would like to conclude by making a few observations on the asset management industry more generally.

Even one year ago, there was still considerable short-term optimism about the outlook for the industry. This was driven principally by growing evidence of the need for higher levels of retirement savings but other factors included the fact that: governments in many countries would be seeking to privatise their public age retirement systems; there was the continued but remarkably slow push to Defined Contribution pension schemes in Europe; and the heightened need for products for investment in retirement. All of these factors still pertain.

But, what was not identified, was the major downward shift in confidence about markets generally and mutual funds in particular. Increasingly, clients are questioning the fees for active management and they are suspicious of active management, more generally. Clients’ concerns about active management and the general lowering of market returns are key factors behind the weaker outlook for the industry.

We in the asset management industry can rightly be accused of considerable hubris. We have been too lavish in our claims about how we will perform. By and large, we failed — just as badly as investment banks and others — in forecasting the global financial crisis and we failed to recognise some of the dangers in some of the remedial measures that were put in place in terms of how they would affect markets. The theoretical underpinnings of many of our claims were also exposed.

I am a great believer in a value-based approach to investing but I also now believe that this may be more useful as a much longer term approach to investing. It is not always the best approach for those who are investing with a shorter time horizon in mind. We need to be far more careful and transparent in discussing our products and approaches to investment.

At the same time, the push towards passive or near passive funds and ETFs (exchange-traded funds) has quickened on both the institutional and retail levels. ETFs have understandably raised some regulatory concerns but I suspect that these vehicles will become even more important in the future as investors, in retirement, increasingly and aggressively question fee levels and move towards self-management of their portfolios. ETFs facilitate this.

Yet, remuneration levels remain sticky and, understandably, we are seeing many firms in Europe and in the United States undertaking long overdue cost-cutting programs. The net result of these and other factors is that the outlook for profitability has slipped significantly.

This decline in the outlook for profitability and the effects of a number of regulatory changes both in Europe and
in the United States have meant that many firms in the industry are looking to consolidate. This consolidation is taking many forms: smaller firms are seeking to combine; some banks are questioning whether asset management firms should be fully owned; and a number of boutiques are also finding the burden of operating in a more regulated world a less attractive environment than it was a few years ago. While significant consolidation has already occurred, that should quicken quite dramatically in Europe and in the United States in the next year or so.

I believe we are also entering a period in which investments will be selected more for income through dividends and interest payments. In some ways, this is a return to what was far more prevalent in the 1960s and 1970s. Capital appreciation will become a secondary — although still important — source of return. Products in the asset management industry will need to take this into account.

Related to the earlier points, I think the industry needs to re-educate itself — and its clients — as to what long term means. We have slipped — either consciously or unconsciously — into a thought process in which three years is viewed as being long term. Recent experience suggests this is not the case. The industry needs to understand, as most sophisticated institutional investors around the world already do, that the long term stretches beyond three years.

I do not know what is the appropriate length of time but it is more like seven to eight years at least. Commensurate with this, we need to produce fixed income and equity products that are suitable for longer-term investors.

Finally, performance fees continue to spread far more slowly than I would have expected and hoped. However, I do see things changing in this area. Performance fees are spreading into long-only products and, within hedge funds, we are seeing the first signs of downward pressure both on base fees and performance fees.

We are a rather strange industry in that we are remunerated regardless of whether we outperform. I wonder whether, as the years roll on, more people will question this remarkably generous approach to our industry.
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