THE VALUE OF MOMENTUM TO ACTIVE MANAGERS AND PLANNED SPONSORS IN AUSTRALIA

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In this paper we present some details of momentum investment hopefully of interest to fund managers and planned sponsors. The focus will be on momentum investment in Australia, but much of the discussion, and results, are applicable virtually everywhere. The academic literature considers many different types of momentum strategies, and we distinguish between academic and institutional momentum investment in section 2. In section 3, we discuss linkages between investor behaviour and momentum. We present information about the pattern of returns one might expect and market conditions that might help or hinder performance in section 4. Apart from being a style of investment, quantitative financial analysts (quants) also think of momentum as a factor; we shall discuss this briefly in section 5. We present some results in section 6 together with conclusions.

Introduction

Momentum in Australian equities has been studied by several authors; good reviews of the literature can be found in Vanstone et al. (2012), Zhong et al. (2014), and Gaunt (2016), while a recent examination of the broad literature can be found in Subrahmanyam (2018). There is disagreement among authors as to whether momentum is a factor driving Australian stock returns; results appear to be sensitive to the samples of stocks used and time periods involved. A broad conclusion is that value-weighted portfolios, or a universe consisting of large stocks lead to the existence of momentum profits, but equally weighted portfolios, or a universe consisting of both small (outside the top 500) and large stocks does not yield momentum profits. This is likely due to the size premium dominating the momentum effect for small stocks in Australia.

Durand et al. (2006) do not observe a momentum effect in Australian equities but note the existence of a 'July effect'[2], where a momentum strategy performs particularly poorly around the turn of the financial year (see also Zhong et al. 20 14, 2016). In particular, loser stocks tend to perform poorly in June and rebound in July, consistent with a tax-loss selling explanation (e.g. Ritter, 1988).

Bird et al. (2017) explore both cross-sectional and time-series momentum in a multiple-country setting. They note the existence of both effects in Australia, with time-series momentum appearing to be more pronounced among the most profitable momentum strategy (a value-weighted portfolio with nine months formation period and three months holding period). However, there is still clearly some guidance needed on the optimal construction of momentum portfolios based on both time-series and cross-sectional characteristics.

2.Definitions

We put forward several standard versions of momentum strategies, noting in passing that these can be elaborated in myriad different ways.

2.1 Cross-sectional momentum

Jegadeesh and Titman's (1993) $J \times K$ trading model is the widely-used model to construct cross-sectional momentum (CSM) portfolios. Assuming a CSM strategy based on monthly returns is to be constructed, then the construction process is as follows.

- **Sorting/formation period:** First, at construction time t, all valid sample stocks are ranked in a descending order based on their past J-month formation period cumulative returns (CR) and then sorted into one of the groups typically with an equal number of stocks.

- **Holding period:** In the next period of length K, (usually one period is omitted to avoid short-term reversal), the position is held, and returns are accumulated. Then one can take long-only, or long-short positions based on the investment context.

2.2 Time-series momentum

Moskowitz et al. (2012) propose the time-series momentum trading strategy (TSM) which varies from the CSM in the stock selection process. They argue that 'rather than focus on the relative returns of securities in the cross-section, time series momentum focuses purely on a security's own past return'. Thus, whether an asset is classified as a 'winner' or 'loser' in the TSM portfolio construction methodology depends on its own past performance, rather than the CSM procedure which compares an asset's performance with other assets. This is clearly explained by Bird et al. (2017) who suggest thresholds of plus or minus 5 per cent when constructing portfolios, although 'winners' are defined as stocks that have exhibited past returns above 0 per cent, and 'losers' are defined as stocks with negative past performance.

2.3 Relative strength portfolios

From a practical perspective, 'relative strength' portfolios, which typically rank stocks on the difference between the last recorded price and the average of the preceding k prices, are indistinguishable from CSM strategies. For instance, taking $k = 2$, it is straightforward to see that this becomes a momentum rule, albeit with a quadratic term in past returns.

Since we believe there is an important difference in portfolio construction involved, we reserve relative strength to mean portfolio construction techniques where the quantity invested is proportional to past absolute or benchmark relative returns. Readers will excuse a certain amount of algebra in clarifying what we mean by the above definition. Our version of relative strength follows the analysis of Lo and MacKinlay (1990), Jegadeesh and Titman (1993), and Lewellen (2002).

Let r_{mt} be the return to some long-only benchmark portfolio at time t with weight ω_{mit} being the weight to asset i in this portfolio. A relative strength weight ω_{rit-1} for portfolio r with vector of weights ω_{rt-1} at time $t - 1$ can be defined for asset i as:

(1)

$$\omega_{rit-1} = \omega_{mit-1}\left(r_{it-1} - r_{mt-1}\right)$$

It is straightforward to see that the relative strength portfolio has weights that add to zero and that stocks that have outperformed the portfolio will be held long assuming the benchmark portfolio is long-only. In the case that the benchmark is equal-weighted with N assets:

(2)

$$\omega_{rit-1} = \frac{\omega_{mit-1}\left(r_{it-1} - r_{mt-1}\right)}{N}$$

In particular, if we set

$$\omega_{rt-1} = r_{rt-1} \text{ then } E\left(\omega_{rt-1}' r_t\right)$$

can be shown to depend upon trend and positive autocorrelation.

It is interesting that versions of relative strength portfolios have been so popular with fund managers; cynically, one might say that one can charge active fees with relatively low research costs. The fact is that their success will depend upon trend and autocorrelation as the above structures indicate.

2.4 Institutional momentum investment

While the strategies discussed above are those debated in the academic literature, they do not reflect a momentum portfolio as held by institutional investors. First, very few pension funds or insurance companies would invest assets in a 100 per cent long $-$ 100 per cent short portfolio although it is the case that some hedge funds and high net worth investors might. Without presenting data on this point, we expect the vast majority of money invested in momentum to be long only. Furthermore, the first stage ranking would not then lead to a value- or equally-weighted portfolio, but be subject to industry and stock constraints. It may possibly even be fed through an

optimiser — on its own or as a sub-component of some larger portfolio construction — we call such portfolios institutional momentum portfolios. As such we can think of them as long-only portfolios, based on past ranking of returns, which could be underweight or overweight relative to appropriate benchmarks. In referring to 'momentum' without qualification or with the adjective academic, we mean the long–short definition and, if we refer to 'institutional momentum' portfolios, we shall say so explicitly.

Other reasons why there are few long–short momentum products invested in by institutional investors are: unbounded losses, limits to short-selling (e.g. Ali and Trombley, 2006; Gao and Leung, 2017) and lack of liquidity (e.g., see Sadka, 2006; Avramaov et al., 2016; Garcia-Feijoo et al., 2018). The 'paper profits' espoused in prior academic research likely overstate the profitability of momentum strategies for institutional investors as the economic costs of short selling, and restricted investable universes due to benchmark and liquidity considerations present limitations to the textbook implementation of the strategy[3].

3. Behavioural issues and momentum

Momentum has also been considered as a behavioural phenomenon. For instance, Grinblatt and Han (2005) build a model in which investors are prone to mental accounting and treat the purchase price of stocks as their reference price in a prospect theory framework. As they are reluctant to sell losing stocks, there is a delayed reaction to negative news and continuation in the performance of losing stocks. In contrast, stocks that have risen in value from a purchase price are sold too quickly, under disposition-effect style behaviour, and prices

are slow to reach their fundamental upside value. Using past prices and turnover rates, they construct 'average reference prices' for stocks, and find that stocks that exhibit extreme 'capital gains overhang' — those for which the average investor is in the domain of gains (losses) — exhibit subsequent drift upwards (downward), which explains a large component of momentum trading profits. This effect is strongly related to the 52-week high effect (George and Hwang, 2004) in which, due to anchoring, investors sell stocks close to the 52-week high price. As this price does not reflect fundamental information about the value of the firm, this selling slows price drift towards fundamental value. Thus, stocks near the 52-week high might generate positive returns on average, consistent with momentum trading. Bettman et al. (2010) note that this trading strategy does not appear to generate economically significant returns in Australia.

Market-wide sentiment, or market states generally (Cooper et al., 2004; Asem and Tian, 2010; Garcia-Feijoo et al., 2018) also appears to be strongly related to momentum profitability. Antoniou et al. (2013) show that the short-leg of momentum strategies, and the strategy, only generates reliably positive returns in periods of high-sentiment (similarly to other anomalies; Stambaugh et al., 2012). They attribute this effect to a cognitive dissonance among investors; poorly performing stocks tend to be overlooked when market participants are on average optimistic. This effect is particularly pronounced among small investors. Investor overconfidence provides another possible behavioural explanation for momentum profits. Daniel et al. (1998) present a model in which investors receive a private signal regarding the uncertain value

of an asset (for example, because of their own personal security analysis). If their private security analysis is later confirmed by the market reaction, they subsequently trade even more of the stock (e.g. in the case of a public signal that confirms their initial optimism, purchasing more of the stock would be the outcome), because their overconfidence (or self-attribution bias) implies that they received a good private signal. This type of behaviour pushes upward moving stocks further up, and downward moving stocks further down, and is only subsequently reversed as people are slow to realise their initial optimism was ill-founded. Adebambo and Yan (2016) present empirical evidence that stocks traded by overconfident fund managers exhibit a greater level of momentum than those traded by less overconfident fund managers, and these trading profits subsequently reverse. Managers who describe themselves as behavioural typically justify this by being active momentum investors, although value strategies are sometimes included as well (following similar logic).

4. Reasons for apparent high returns and circumstances when momentum does well/badly

Here we discuss factors that might enhance or degrade momentum returns. As discussed earlier the outperformance of these portfolios depends upon trend and positive auto-correlation.
However, portfolios also depend upon cross-sectional volatility (CSV) which we define as:

(3)

$$CSV_t = \frac{\sum_{i=1}^{N_t}(r_{it} - r_t)^2}{N_t - 1}$$

is the number of stocks available to invest at time t.

When CSV is low the active return will not look much different from the benchmark, and long-short investing will return something close to zero. One attractive feature of CSV is that it is may be forecasted so that one can anticipate, to some extent, momentum performance. In ex-ante terms, poor momentum returns will occur when the true distribution for asset returns have virtually the same means and variances and common covariances and are stationary (e.g. Grant and Satchell, 2016). Both CSM and TSM returns are strongly influenced by volatility. **Intuitively, one can see that if the volatility of returns disrupts the overall trends in individual stocks, then one can lose money, either long or short.** This has led to a whole series of volatility-adjusted momentum strategies in the academic literature, but some form of volatility adjustment is frequently used by practitioners as well.

Here we discuss the properties of CSM returns. Once the formation period returns are ranked we can create n-tiles, which are typically quintiles or deciles. What we hope to see ex-post is that quintile 1 will have the highest returns while quintile 5 (or 10 in the decile case) will have the lowest returns. An even more encouraging sign will be that the holding returns fall monotonically. What one frequently sees in practice is that holding returns do fall on average while the skewness of the returns rises. This means that long-short momentum returns often are often positive but exhibit negative skewness; intuitively if you short something that is positively skewed the result is a negatively skewed return. The pattern we might expect to see with such a strategy is many months of small positive returns, with the occasional month of large negative returns. Such a strategy is not for the risk-averse. This connection with negative skewness leads to what

are termed 'momentum crashes'; there is a lucid discussion of this phenomenon in Australia by Gaunt (2016) and he lists in Table 2 the worst 15 months for a long-short Australian momentum portfolio taken over the last 40 years of monthly data. In 11 of the 15 cases, it is the losers doing well rather than the winners doing badly. The potential unlimited liability of the loser portfolios evidenced here is a further reminder of the unsuitably of academic momentum for institutional investment. We shall return to this point when we look at some data.

5. Momentum as a factor

Momentum is widely used as a factor in the construction of portfolios and assessment of risk. A long-short CSM portfolio based on a wide universe is constructed following the methodology described in section 2.1, above. This becomes a factor in a linear factor model and a tilt towards momentum can be carried out by selecting or overweighting those stocks with a high exposure to the factor. The stocks considered for selection in the investment portfolio usually make up a subset of the universe used to build the factor.

Turning to such well-known models as the Fama-French model or the Carhart model, momentum is a key risk factor. These models are time-series based models and are typically used to compute exposure to momentum and other factors for portfolios of assets in the academic sphere. In commercial risk models, which are often cross-sectional in nature a firm-characteristic which proxies exposure to momentum is incorporated prior to the cross-sectional estimation of momentum returns. An obvious candidate at time t might be the ranking across the group of the formation return.

In certain situations, a universe of stock returns can be well-explained by a small number of factors in the sense that the total

volatility of portfolio returns can be attributed to a small number of factors and idiosyncratic risk should be small. In these circumstances, investors can eliminate these factor risks if they wish to, by offsetting the risks by taking positions in specially-constructed factor portfolios.

However, it is not generally true that this can be achieved in every market in an efficient manner; we shall return to this point in the conclusion.

It should also be noted that institutional investors who use standard factor mimicking portfolios in their risk models will use 'academic' long-short portfolios to mimic the momentum factor; however, this is not to be confused with an institutional investment long-only portfolio.

6. Some results with Australian and US data

We now present some results. Table 1 shows monthly momentum quintile returns for a broad US market universe over the period from May 1995 to March 2018. Data are obtained from Ken French's website[4] using data on stocks sorted on past returns (12 months to two months prior) and size and held for one month. This is an example of a (12 x 1) CSM trading model, see section 2.1.

The return moments exhibit characteristics seen in many other studies; average returns are monotonically increasing, skewness is generally decreasing in past returns, and kurtosis is monotonically decreasing. Thus, a long-only US momentum portfolio (i.e., holding stocks in the top quintile of past returns) would have generated about 1.1 per cent per month, or 13.5 per cent annually. It has an approximate annualised Sharpe ratio slightly under 0.50 but is negatively skewed and has fat tails relative to a normal distribution (although not excessively so).

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TABLE 1

TABLE 1: QUINTILE MOMENT OF PAST RETURNS FOR LARGEST QUINTILE OF STOCKS, KEN FRENCH'S DATA LIBRARY (5 Portfolios of Prior_12_2 x Size)

	Low past return	Q2	Q3	Q4	High past return
Average	0.0047	0.0091	0.0095	0.0095	0.0113
Std. Dev	0.0768	0.0528	0.0425	0.0401	0.0524
Skewness	0.4182	-0.1270	-0.4237	-0.6805	-0.4202
Kurtosis	3.4325	4.0317	2.3901	1.8557	1.7162

6.2 Momentum investment opportunities in Australia

The one reliable source on investment returns to momentum is the MSCI Momentum Australia Index, which extends from May 1995 to the present. As always with such exercises, care should be taken in examining the index construction method. This is carefully described in the momentum index methodology document (MSCI, 2014). Essentially, it is a weighted combination of two relative strength strategies which are then transformed into a long-only portfolio. In comparison with Table 1, for example, it should be borne in mind that the portfolio construction is quite different.

TABLE 2

TABLE 2: MSCI MOMENTUM INDEX RETURNS, MAY 1995 – MARCH 2018 FOR FIVE REPRESENTATIVE COUNTRIES

	Australia	Canada	Japan	UK	US
Mean	0.0066	0.0093	0.0015	0.0058	0.0091
Std. Dev	0.0397	0.0452	0.0542	0.0402	0.0462
Skewness	-1.0205	-0.6721	-0.4181	-0.8917	-0.8135
Kurtosis	2.6863	3.1749	1.2628	2.1189	1.5945

We report its moments in Table 1 as well as for four other countries (Canada, Japan, the US and UK) constructed by an identical methodology. For the Australian momentum index, average returns rank third, while volatility is relatively low, negative skewness is highest among Australian index returns. **The broad conclusion of this is that momentum in Australia offers slightly above-average returns (within the group of countries considered), with occasional large losses.** Overall, there is nothing in these numbers to suggest that momentum investing in Australia is outstanding relative to other international momentum opportunities.

We now turn to Table 3, which lists the MSCI Australian Momentum, MSCI Australia, and ASX 200 Accumulation indexes over the same May 1995 – March 2018 periods. We see immediately that MSCI Australia and the ASX 200 Accumulation index appear similar, except in the mean. We surmise that MSCI Australia is a capital gains index,

TABLE 3

TABLE 3: MSCI AUSTRALIA MOMENTUM INDEX MONTHLY RETURN MOMENTS COMPARED WITH OTHER BENCHMARKS.

	Low past return	Q2	Q3	Q4	High past return
Average	0.0047	0.0091	0.0095	0.0095	0.0113
Std. Dev	0.0768	0.0528	0.0425	0.0401	0.0524
Skewness	0.4182	-0.1270	-0.4237	-0.6805	-0.4202
Kurtosis	3.4325	4.0317	2.3901	1.8557	1.7162

while the ASX 200 Accumulation index includes dividends. Overall, it seems hard to make even a hypothetical case that investing in the momentum index would be beneficial relative to holding the ASX 200 Accumulation index. Table 3: MSCI Australia Momentum Index monthly return moments compared with other benchmarks.

It is worth asking what the MSCI Australian Momentum Index did on the six months listed in Table 2 of Gaunt (2016). We list below the six returns for the long side of Gaunt (which coincide with the MSCI index's operation) together with the corresponding six values of the MSCI index.

TABLE 4

TABLE 4: COMPARISON OF PERFORMANCE IN MSCI AUSTRALIA MOMENTUM AND (-12,-2) AUSTRALIAN WINNER FROM INVESTABLE UNIVERSE IN WORST PERFORMING MOMENTUM MONTHS REPORTED IN GAUNT (2016) FOR MONTHS WITH OVERLAPPING OBSERVATIONS.

Month	MSCI Australia Momentum	Gaunt (2016) winner return
April 2000	0.46%	-42.20%
April 2009	4.83%	4.30%
August 2003	-0.67%	8.60%
May 2009	-4.22%	0%
November 2001	3.26%	2.90%
October 2001	3.16%	3.40%

Gaunt (2016, Table 3) explains that the poor performance of winning stocks in the month of April 2000 coincides with the peak of the dotcom crash. These stocks had experienced extreme positive returns — small stocks becoming midcaps — in the leadup to the crash and as such were likely not considered as constituents of the MSCI Index. The composition of the portfolio of recent winners clearly affects the performance of the strategy; restricting it to overweighting recent large winners as does the MSCI Index erodes the large paper profits but also appears to reduce the level of volatility. This may also go some way to reconciling the different reported results between momentum in large stocks only and momentum across the universe of listed stocks.

7. Conclusions

The motivation behind this paper was the scarcity of momentum products in Australia. We make a distinction between what we call institutional (long-only) momentum portfolios and academic momentum (long-short) portfolios. There are no momentum ETFs, operational in Australia at present. Such ETFs that are available involve multi-factor constructions. Individual managers do offer momentum products but many of these are consciously designed to give exposure to other factors, such as value or size. One explanation as to why such style investing is

less prevalent in Australia relative to other markets is the presence of 'resource' stocks. This presence means that style-decompositions of portfolio risk and return is less likely to work well (compared with other developed countries). We do not find compelling evidence that Australian momentum strategies work particularly well, which is consistent with the findings of prior literature.

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