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Chan, Howard W.; Faff, Robert W.

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AN INVESTIGATION INTO THE ROLE OF LIQUIDITY IN ASSET PRICING: AUSTRALIAN EVIDENCE

Howard W. Chan*

Robert W. Faff

Department of Accounting and Finance
Monash University
Clayton VIC 3800

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*Corresponding author. Tel: 0061 3 9905 2424; Fax: 0061 3 9905 5475; Email: howard.chan@buseco.monash.edu.au

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Abstract:

In the context of a cross-sectional regression framework, we explore whether liquidity is priced in an Australian setting, using monthly data over the period 1990 to 1999. Our major findings are as follows. First, we find that liquidity (as proxied by turnover) is negatively related to stock returns. Moreover, the importance of turnover persists even after controlling for book-to-market, size, stock beta and momentum. Second, we find that momentum is positively related to stock returns, with the momentum effect much stronger in our latter subperiod, 1995 to 1999. Third, the role of turnover (liquidity) in asset pricing though related to momentum is separate from it. That is, turnover is not simply capturing the momentum effect documented in the literature – rather, turnover seems to be an adequate proxy for liquidity. Finally, we find a non-linearity related to the size factor for the full sample period but for the liquidity factor the non-linearity is found only for the subperiod 1990 to 1994.

1. Introduction

Over the last decade in particular, many deficiencies have been identified with the Capital Asset Pricing Model (CAPM). One of the most influential studies to challenge the supremacy of the CAPM is the Fama and French (1992) paper which documented the cross-sectional explanatory power of book-to-market and size on returns. In the US, there have been many papers such as Fama and French (1993), Davis (1994), Kothari et al (1995), Jaganathan and Wang (1996) that have replicated, refined and modified the study by Fama and French (1992). In Australia, there has been only one published paper, namely, Halliwell, Heaney and Sawicki (1999), which replicated Fama and French (1993) using Australian data over the period 1981 to 1991.

Within the context of the Fama-French three factor model, the current paper has as its main objective the investigation of liquidity (proxied by share turnover) as an additional factor in asset pricing in the context of the Australian equity markets. The motivation for such a study is provided by Amihud and Mendelson (1986), Brennan and Subramanyam (1996), Brennan, Chordia and Subrahmanyam (1998), Datar, Naik and Radcliffe (1998), Chui and Wei (1999), Rouwenhurst (1999) and Chordia, Subrahmanyam and Anshuman (2001). All of these papers examine the role of liquidity in asset pricing for the US markets. Some papers such as Amihud and Mendelson (1986) and Brennan and Subramanyam (1996) examine liquidity using bid-ask spreads and other microstructure variables. However, Brennan, Chordia and Subrahmanyam (1998), Datar, Naik and Radcliffe (1998), Chui and Wei (1999), Rouwenhurst (1999) and Chordia, Subrahmanyam and Anshuman (2001) use a measure of trading activity such as dollar volume or turnover due to the difficulty of obtaining bid-ask prices over long periods of time.

Our paper will examine liquidity in the context of a Fama-French cross-sectional framework using share turnover as our proxy for liquidity. The paper will apply the basic framework of Datar, Naik and Radcliffe (1998) – thereby ensuring comparability with recent

US evidence. In the latter part of the paper, we conduct some robustness checking which addresses two main issues: (a) the role of momentum effects; and (b) the impact of potential non-linearities. In the case of the former, we examine the interaction between momentum and liquidity employing a lagged return variable as the proxy for the momentum effect, similar to that used by Chordia, Subrahmanyam and Anshuman (2001). In the case of the latter we allow for non-linearity in the turnover liquidity effect as well as the size effect.

Over the last few years, beginning with Datar, Naik and Radcliffe (1998) and Brennan, Chordia and Subrahmanyam (1998) the role of liquidity in asset pricing has been examined through a volume proxy. Most of these papers choose to work in the context of the Fama and French framework. For example, Datar, Naik and Radcliffe (1998) examined asset returns and liquidity by using a turnover ratio, defined by the number of shares traded divided by the number of shares on issue, as a proxy for liquidity. They employed a modified Fama-MacBeth (1973) methodology in their analysis of the cross-sectional returns of stocks. Size is measured as the (natural) log of the company's market value of equity in the prior month. Book-to-market is constructed along the lines of Fama-French (1992) and individual market betas are assigned based on portfolio betas, following the method developed by Amihud and Mendelson (1986). They found that liquidity plays a role in explaining the cross-sectional returns of stocks even after controlling for size, book-to-market and beta. In addition, they found that this liquidity effect is present throughout the year and is not restricted to January.

In more US recent work, Lee and Swaminathan (2000) discuss the relationship between turnover and momentum. In particular they argue that price momentum might induce a relation between turnover and expected returns that has little to do with liquidity. As such, this suggests the need to control for any momentum effects before any strong conclusions are drawn on share turnover as a (priced) liquidity factor. To this end, Chordia, Subrahmanyam and Anshuman (2001) control for momentum effects and found that there was still a significant cross-sectional relationship between returns and turnover.

While prior Australian papers have examined the role of liquidity in asset pricing (see Beedles, Dodd and Officer (1988) and Anderson, Clarkson and Moran (1997)), they have not done so in the context of the Fama and French three-factor model. Beedles, Dodd and Officer (1988) employing a dataset covering the period 1974 to 1984, found that illiquidity (among other variables) is a partial explanation of the small firm effect in Australia. Somewhat in contrast, Anderson, Clarkson and Moran (1997) found that liquidity does not play an important role in asset pricing, over the sample period 1982 to 1989. Accordingly, our study is an important extension of this literature because it (a) employs the Fama-French three-factor model framework; (b) investigates a much more recent dataset from 1990 onwards; and (c) applies key robustness checks for momentum effects and non-linearities.

In section two we present the empirical framework. Section three discusses the data, while the results are presented in section four. Finally, a summary and conclusion is provided in section five.

2. Empirical Framework

Following recent papers such as Datar, Naik and Radcliffe (1998) and Chordia, Subrahmanyam and Anshuman (2001), the current paper uses the cross-sectional regression approach of Fama and MacBeth (1973). Specifically, we examine whether cross-sectional variations in individual stock returns can be explained by differences in liquidity (proxied by share turnover), in the context of the Fama-French variables of size, book-to-market and stock beta.

The research method involves three basic stages. In stage one, the full range of variables (the dependent variable and all independent variables) required for the cross-sectional regressions are constructed. Stage two then involves estimating the different versions of the cross-sectional regressions for each month, culminating in a complete time series of (pricing) slope coefficients associated with each included variable. These regressions are estimated using generalised method of moments (GMM), which has the advantage (over OLS) of making much weaker assumptions about the error term distribution. That is, while OLS assumes normality of the errors, GMM does not and it applies White's heteroskedasticity consistent covariance matrix. The use of GMM in this stage is justified by the fact that tests of the distribution of the error term in the cross-sectional regressions systematically reject the normality assumption. In stage three, using the time series of the cross-sectional regression slopes generated in the previous stage, we compute the average (pricing) slopes. For this final stage we employ a weighted least squares (WLS) methodology to test the significance of the average slopes of the cross-sectional regressions, since WLS places more (less) importance on slope estimates that are more (less) precisely estimated in previous stage regressions.[1]

In stage one, the Fama-French variables are constructed along the lines of Fama and French (1992) with some slight modifications that suit the Australian context and data constraints. Firm size is the market capitalization of each stock in December of each year t. All firms are sorted by the log of firm size and allocated into quintiles. Pre-ranking βs are estimated on the previous 48 monthly returns before January of year $t+1$ with a minimum of 24 months of returns.[2] Then, each size quintile is partitioned into five portfolios on the basis of pre-ranking βs for individual stocks. After assigning stocks to one of twenty-five size-β portfolios in December, our procedure in calculating post-ranking βs follows Fama-French (1992) (and employed by others including Datar et al (1998)). Specifically, individual market betas are assigned based on the constructed portfolio beta, of the portfolio to which the individual stock belongs. This procedure aims to control for the measurement error inherent in using actual beta estimates for the stocks themselves, by using the portfolio beta as an instrumental variable. Book-to-market is calculated in December of year t as Australia has a June end of financial year, thereby effectively achieving a similar time 'buffer' to that of the

[1] As we shall see shortly in the case of our first-cut basic set of results presented in Table 2, we have used ordinary least squares (OLS), generalised method of moments (GMM) and WLS. However, for the reasons stated and to ensure comparability with Datar et al (1998), we have used WLS for all remaining tests.

[2] All betas are calculated via the Dimson (1979) method using one lead and one lag term.

counterpart US studies.[3] Our proxy for liquidity, the turnover variable for each stock is computed as the average of the monthly trading volume divided by the number of shares on issue for the previous three months (updated monthly) and is similar to that used by Datar et al (1998).

The main part of our analysis follows Datar et al (1998). Liquidity ('Turnover') is examined after controlling for (the natural logarithm of) stock size ('LnSize'), (the natural logarithm of) book-to-market ('Ln (B to M)') and stock beta ('Beta'). In other words, stage two involves the estimation of various multiple regressions that comprise different combinations of variables known to be determinants of stock returns but always augmented by our proxy for liquidity.

In the latter part of the paper, additional analyses are performed to independently investigate the argument of Lee and Swaminathan (2000) that turnover and stock returns are dependent on the stock's past performance (momentum). To this end and similar to Chordia et al (2001), we use a lagged return variable as a proxy for the momentum effect, namely, we use the cumulative return over the five months ending at the beginning of the previous month.[4]

3. Data

Our analysis is performed at the monthly level for the period from January 1989 to December 1999 and all returns are continuously compounded. The data comes from two main sources. From the IRESS financial database, we collected for all currently listed companies, the volume of shares traded per month, the balance date and the end of financial year balance

[3] We use Net Tangible Assets (NTA) as our book value. We check the accuracy of the data by comparing the reconstructed total assets less total liabilities with the reconstructed shareholders equity.

[4] This measure of momentum is equivalent to combining two of the momentum proxies used by Chordia et al (2001), namely, (a) the cumulative return over the two months ending at the beginning of the previous month ('RET2-3') and (b) the cumulative return over the three months ending at the beginning of three months previously ('RET4-6').

sheet numbers to calculate a book value for each company.[5] Companies without either a book value and trading activity data on IRESS were deleted from the sample. The remaining companies are then matched with the same companies recorded in the Australian Graduate School of Management (AGSM) Price Relative file. From the AGSM Price Relative file, we extracted the company price relative, the value-weighted market price relatives, the risk-free price relative, the market capitalisation and the number of shares on issue for each company in each month of our sample period.

We use as our market proxy the value weighted market index taken from the AGSM Price relative file. The monthly market risk premium is calculated as the index return less the risk-free interest rate from the AGSM price relative file.

Any company that could not be matched to the AGSM price relative file or that was an IPOs for that calendar year, was excluded from our final sample. The final sample used in our analysis averaged 534 companies – a figure that constitutes just under half the total number of available stocks. This average compares very favourably with Datar et al (1998) who report an average of 880 stocks across their US sample. Over the ten years of our analysis, the minimum sample number was 390 companies (33.25 % of available stocks) in 1991 and a maximum of 725 companies (60.12% of available stocks) in 1998.

Table 1 gives a further perspective on the representativeness of our sampling procedure in the form of a size (market capitalisation) comparison of our sample versus the total set of domestic stocks. From the table we can see that, as expected, the sampling procedure is skewed toward the largest Australian stocks and thus suggests our analysis will be biased against detecting a liquidity effect in asset pricing. Nevertheless, the table also clearly demonstrates that our sample does include a number of very small stocks. For example, consider the minimum size of companies included in our sample – we see that in all years companies of substantially less than A$1 million in market capitalisation are present.

[5] IRESS is real time database provided by Bridge News Service and Dunai Financial Service. From our discussion with IRESS, the financial statement data is originally sourced from the ASX FINDATA database.

Specifically, in 1990 a company of only AUD75,000 is included as compared to the counterpart minimum of AUD32,000 for the unfiltered sample. Further, a comparison of yearly median size figures is also quite instructive in that very minimal differences are evident between our sample and the full set of available companies. In short, based on these size comparisons, while it is undeniable that our sample is skewed toward the larger and, hence, more liquid stocks, we see sufficient inclusion of small (illiquid) stocks to warrant the investigation of a liquidity factor as outlined in section 2 above.

[TABLE 1 ABOUT HERE]

In Table 2, we report the average monthly cross-sectional correlations between the transformed firm characteristics used in the pricing regressions, covering the period 1990 to 1999. In Panel A the correlations are shown for the full sample including all months. The correlation having the greatest magnitude by a long margin (-0.69) is that between size and beta – they are strongly negatively correlated as expected, since large (small) companies are more likely to have lower (higher) systematic market risk. The correlation with the next highest magnitude (0.233) is between the turnover and momentum variables. This suggests that from a univariate point of view there is a mild tendency for companies with a high share turnover rate to also have performed quite well in the past 6 months.

[TABLE 2 ABOUT HERE]

The existence of monthly seasonal effects in stock returns is now well established in the empirical finance literature. While in the US it manifests as the well known January effect, in Australia the effect has been observed for December-January and July-August (Brown, Keim, Kleidon and Marsh (1983); and Gaunt, Gray and McIvor (2000)). Accordingly, we consider to what extent the pricing relationships are impacted by the months of January and July. To this end as a preliminary exercise, in Panels B and C of Table 2, we report further cross-sectional correlations for the months of January and July, respectively. Comparing these correlations to the all months counterpart (Panel A) we see a remarkable similarity. As such, on the basis of this preliminary analysis, there is nothing to suggest anything greatly peculiar about January and July.

4. Results

4.1 Basic Results

In each month, from January 1990 to December 1999, we run cross-sectional regressions of stock returns, both individually and jointly, on our liquidity variable, book-to-market, size and beta variables. Initially we report the result of these regressions using OLS, GMM and WLS to estimate the time series average of cross-sectional slope coefficients. The primary reason for reporting these three variations is to show the impact of making different assumptions regarding how the averages are constructed. To put such a comparison in perspective, we need to note the following about each of the techniques. Employing OLS provides the equally-weighted average of the relevant slope coefficient and the associated t-statistic assumes normality. However, the residuals of such estimations are typically found to be non-normal, which naturally leads to the consideration of an alternative technique that is robust to the normality assumption. GMM serves this purpose. However, both OLS and GMM estimate the equally-weighted average slope coefficient, thereby giving equal importance to the point estimates of the slope coefficients, irrespective of how precisely they are estimated. For example, consider a hypothetical estimated size slope coefficient of 0.1 with a standard error of 0.5 (that is, it has a t-statistic of 0.2 and is therefore insignificant in its own right) in one cross section. This 'weak' point estimate will have an equal contribution compared to another cross section producing a much 'stronger' (more precisely estimated) coefficient – say, with the same estimated slope and a standard error of 0.025 (that is, it has a t-statistic of 4 and is highly significant in its own right). As such, ignoring the precision of estimation seems potentially flawed. This paves the way for employing the WLS estimate of the mean slope, as it gives more importance to slope estimates that are more precisely estimated, directly proportional to the relative degree of precision with which they are estimated in the cross-sectional regression.

Table 3 summarises the result of estimating five alternative regression specifications (following Datar et al, 1998) using OLS, GMM and WLS to compute the sample average cross-sectional slope coefficients. The major finding of note from this table is that our liquidity variable is significant and negatively related (at the 5 % level) to stock returns and this result strongly confirms that found by Datar et al (1998) using US data. Interestingly in our univariate and multivariate regressions, the results are strongest when WLS is used, which as discussed above, are the most reliable findings due to the fact that WLS employs an unequal weighting being a function of the precision of the underlying cross-sectional estimates. In the case of WLS, for each regression the liquidity and book-to-market variables are always significant (at the 5 % level) while the size and beta variables are never significant.[6] When OLS and GMM are used, the liquidity variable is less significant but we know that this is being driven by the fact that some relatively large positive and imprecise slope estimates are being afforded undue influence in the computation of an equally-weighted average. This is a salutary lesson. Accordingly, since the WLS methodology gives more importance to slope estimates that are more precisely estimated, we use WLS to compute the sample average slopes in the remainder of our analysis.

[TABLE 3 ABOUT HERE]

4.2 Monthly Seasonality

The basic motivation for examining seasonality is provided by Eleswarapu and Reinganum (1993) and Datar et al (1998) amongst others. Both of these studies investigated the effect of a January seasonality on liquidity, whilst Chui and Wei (1998) examined seasonality in the

[6] Given the high negative correlation between size and beta identified earlier, it is possible that multicollinearity has made the *t-statistics* insignificant on these variables in the full model. However, we believe that this is not a major problem since size is still insignificant when it is used in models without beta. In any case, this does not alter the primary finding of this paper, namely, that returns are strongly negatively related to turnover.

context of size, book-to-market and beta for stock markets in the Pacific-Basin region. In an Australian setting, as argued in the data section, we feel that it is of some interest to examine the potential impact of a January and/or July seasonality effect.[7] Accordingly, we repeated our basic analysis using data for non-January months and non-January and non-July months. The outcome of this analysis is summarised in Table 4.

[TABLE 4 ABOUT HERE]

First, as revealed in Panels A and C of this table, the liquidity and book-to-market variables are the only significant variables (at the 5 % level) in non-January and non-July months for all regressions, whether univariate or multivariate. When both January and July are excluded (Panel C) size does become significant at the 10 % level. While this suggests that liquidity is generally related to returns throughout the year, it leaves open the question of whether a changed relationship occurs in January and/or July. To explore this issue, we report the outcome of the average slope estimates for January months only (Panel B) and January and July months only (Panel D). We can see from the table that when we examine January and July only, the liquidity variable is not significant for any of the regressions. In contrast, the average book-to-market slope remains significant for January months only (at the 10 % level) and for January and July months only (at the 5 % level). Furthermore, while size does show some signs of significance in these months, it is of the (perverse) negative variety. Finally, there is evidence that the average slope of beta is positive and significant (at the 5 % level) in the January and July months. Superficially, this suggests that these variables may subsume the liquidity variable only in January and July, which is puzzling and difficult to explain.

Given the small sample sizes involved in these cases, we should be cautious not to draw too much from the preceding analysis. Indeed, as a supplementary analysis to this

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[7] The incorporation of a July seasonality, relative to the June financial (and tax) year-end for Australia presents an appealing symmetry to the January seasonal in the US, relative to the December tax year-end for that market setting.

question of seasonality, in Table 5 we provide formal tests of the January and July seasonality reported in Table 4. Specifically, we regress the Fama-Macbeth monthly slope coefficients on a constant, a January dummy variable (D_{Jan}) and a July dummy variable (D_{Jul}). In this case the slope coefficient estimates come from monthly cross-sectional 'full' regressions of Regression 5, wherein the individual stock return is the dependent variable and the explanatory variable set comprises a turnover variable, augmented by all three Fama and French factors. The most notable finding reported in Table 5 is that liquidity (as proxied by the share turnover rate) does not provide any statistically significant differential explanatory power in January and/or July. This suggests that the preceding tentative conclusion drawn in favour of a monthly seasonality in liquidity is unsubstantiated. Rather, based on the evidence revealed in Table 5 we can more reasonably conclude that liquidity has a generally significant pricing impact across all months. However at the 10 % level of significance, the positive July coefficient for book-to-market suggests that the positive book-to-market effect is even stronger in July. Similarly, the average slope coefficient for beta increases and becomes significantly positive in July. Finally, it seems that over this sample period in the context of our liquidity-augmented Fama-French model, size has no significant pricing role – either adjusted for monthly seasonality or not.

[TABLE 5 ABOUT HERE]

4.3 Subperiod Anaysis

The ten-year sample available in this study affords us some opportunity for a limited subperiod analysis, to check for possible instability in the pricing relationships. Accordingly, we re-run the analysis over two (arbitrarily chosen) equal five-year subperiods. Table 6 provides the subperiod analysis from 1990 to 1994 and this represents a counterpart to the full period analysis of Tables 4 and 5.[8] First, we should note that in a broad comparison of the first

[8] Due to the small sample size, we omit the 'January only' analysis for this and the second subperiod.

subperiod to the full sample period findings, the results regarding liquidity (turnover) are very similar; suggesting that over the first subperiod liquidity also had an important pricing role. One slight variation to this conclusion is worthy of note however. Specifically, there does appear to be a January/July seasonality effect that weakens the role liquidity in this first subperiod (eg. at the 10 % level the July liquidity coefficient is significantly positive in Panel D). This is likely to be an important source of the ambiguity for liquidity in January/July that was observed and discussed above, for the full sample analysis. Perhaps the only other point of interest in Table 6 is the weakened book-to-market effect for the months of January and July only in this first subperiod – although the small sample size should temper our conclusion in this case.

[TABLE 6 ABOUT HERE]

In Table 7, we repeat the subperiod analysis for the second half of our sample period from 1995 to 1999. With regard to the main analysis in this table, where we consider non-January and non-July months (Panels A and B), the standout feature is that liquidity is the only statistically significant variable. Moreover, its negative sign strongly reinforces the accumulated evidence of a significant pricing role revealed thus far. Moreover, the results reported in Panels C and D suggest that while liquidity effect may seem a little weaker in the January and July months only, this is not a statistically significant phenomenon. The second major feature of the Table 7 results relates to book-to-market. Specifically, taking the evidence contained in all panels together, it seems that the extent to which the book-to-market effect was at play in the second subperiod (1995 to 1999), it was largely driven out of January and/or July seasonality. However, as was stated before the relatively small sample in this situation should caution us from pushing this conclusion to hard.

[TABLE 7 ABOUT HERE]

4.4 Some Robustness Checks: Momentum and Non-linearities

Prior to drawing some overall conclusions regarding the asset pricing role of liquidity as proxied by the share turnover rate, it is instructive to conduct a few robustness checks that emanate from some more recent work by other researchers in this field. In particular, we choose two important cases: (a) the potentially competing role of a 'momentum' factor (for example, Lee and Swaminathan (2000)) and (b) the possibility that there are important non-linearities in the asset pricing relationship (Chordia, Subrahmanyam and Anshuman (2001)). We now consider the impact of these issues on our analysis.

With regard to momentum, Lee and Swaminathan (2000) raise the question of whether a turnover premium can be interpreted as purely an illiquidity premium. Interestingly, in their study they find that high (low) turnover stocks tend to behave like 'glamour' (value) stocks. Moreover, they report that low (high) turnover stocks earn significant positive (negative) abnormal returns around subsequent quarterly earnings announcements dates. This raises the challenging question of what exactly turnover represents, a proxy for illiquidity or for value/glamour?[9] To address this issue we re-ran our analysis using a five-factor model – achieved by augmenting the previous liquidity-augmented Fama-French model with a momentum variable. The momentum variable is defined as the cumulative return over the five months ending at the beginning of the previous month. The outcome of this first robustness check is exhibited in Table 8.

[TABLE 8 ABOUT HERE]

Our results for the full sample period reported in Panel A of Table 8, need to be compared with the earlier results revealed in Table 5. From this comparison, the most important thing we observe is that the inclusion of the momentum variable does not change the level of significance of the other variables and especially turnover. This is a particularly

[9] We are extremely grateful to an anonymous referee for bringing this issue to our attention.

forceful result due to the fact that the momentum variable itself is highly significant and positively related to returns. So, despite finding a significant momentum effect, the significant role of the turnover variable is preserved. This robustness suggests that the importance of turnover (though possibly related to momentum) is not driven by its proxying effect for 'value/glamour' and thereby we can have greater confidence that it is proxying an important pricing role for liquidity. Of lesser importance, but still worthy of comment from Panel A of Table 8, is the finding that the momentum effect was greatly weakened or even non-existent in July (across the full sample).

The subperiod analysis reported in Panels B and C of Table 8 reveal the following additional information. It appears that the momentum effect in Australia is only positively significant in the latter subperiod, 1995 to 1999. However, the role of turnover remains robust across both subperiods. Once more, this reinforces the view that turnover is proxying liquidity and that liquidity is an important pricing factor.

With regard to our second and final robustness check, Chordia et al (2001) postulated that there may be non-linearities in the relationship between liquidity and returns, and/or size and returns. They address this issue through the use of quadratic terms on these variables and we examine the potential non-linearities in a similar manner. The results of this analysis are reported in Table 9. For liquidity, we find that there is no statistically significant non-linearity for the full sample, nor for the second subperiod from 1995 to 1999. However, for the earlier subperiod from 1990 to 1994, we find that there is a statistically significant non-linearity in turnover. However, the strong finding coming through this (regardless of whether the effect is non-linear or not) is that turnover is still statistically important. This adds further weight to our argument that the significant pricing role of the turnover variable is robust and, this combined with the preceding evidence, that it is proxying a(n) (il)liquidity effect. One final thing to note from this table is that for size, there is a statistically significant non-linearity effect in evidence for the full sample period and for both subperiods. This result is consistent with that found by Chordia et al (2001).

[TABLE 9 ABOUT HERE]

5. Summary and Conclusions

In this paper, we have examined the role of liquidity (proxied by share turnover) in explaining stock returns in the context of the Fama-French cross-sectional framework for the Australian equity market. We perform this analysis using monthly data covering the ten-year sample period 1990 to 1999. The first part of the paper is similar to Datar et al (1998), however it also provides additional analysis such as incorporating a momentum variable, examining non-linearities and by testing for both a January and a July seasonality.

Our main findings all relate to the asset pricing role of turnover/liquidity and can be summarised as follows. First and foremost, we find for the full sample period, for the two subperiods, for all months and for the liquidity augmented Fama-French model that stock returns are strongly negatively related to turnover, as proxied by liquidity. Second, we find that while the role of turnover may be weakened by January and/or July seasonality, it is not seriously so. Third, we find that the importance of turnover is robust to the inclusion of a momentum factor. The significance of this finding is that it rebuts the argument of Lee and Swaminathan (2000) who suggest that turnover is less a proxy for illiquidity and more a proxy for 'value/glamour'. By the inclusion of a momentum variable, we are controlling for the value/glamour effect, and the fact that turnover retained its strong negative relationship with returns in this setting, gives added credence to the view that turnover proxies liquidity in our study. Fourth, we find that the role of turnover is not greatly affected by modelling the potential for non-linear relationships.

In short, we conclude that in Australia over the time of our sample period there has been a significant asset pricing role for turnover. Moreover, our evidence suggests that it is much more likely that turnover is proxying liquidity than it is proxying ‘value/glamour’. As such, we believe that liquidity has been an important priced factor, forming a strong negative relationship with returns.

Table 1: Size (MCap) Comparison of Sample Stocks Versus All Stocks

	MCap ($AUDmil) - Our Sample					MCap ($AUDmil) - All Stocks				
	Max	Min	Med	Mean	Total ($Abil)	Max	Min	Med	Mean	Total ($Abil)
1990	15,148.12	0.075	5.120	228.001	95.988	15,148.12	0.032	3.000	125.580	168.906
1991	21,510.49	0.108	9.178	357.726	139.513	21,510.49	0.024	4.620	198.646	233.012
1992	21,527.50	0.226	9.785	346.788	148.425	21,527.50	0.020	6.403	234.592	248.668
1993	29,127.80	0.350	20.271	480.632	211.959	29,127.80	0.050	16.510	340.667	373.030
1994	33,607.20	0.255	18.447	421.491	199.787	33,607.20	0.097	17.011	292.265	343.703
1995	37,039.01	0.393	20.315	476.846	239.854	37,039.01	0.059	18.733	362.231	424.173
1996	35,606.97	0.316	25.432	491.605	290.538	35,606.97	0.028	23.985	423.526	500.607
1997	30,266.97	0.658	21.048	489.252	339.541	30,266.97	0.025	21.541	458.051	552.411
1998	35,628.01	0.512	19.521	504.848	366.015	35,628.01	0.059	18.988	499.843	602.810
1999	34,779.26	0.104	32.100	657.252	433.645	53,175.44	0.593	28.141	551.483	705.347

* Market Capitalization is measured at year-end for all companies in the sample

Table 2: Correlation Matrix of Transformed Firm Characteristics

This table reports time series averages of monthly cross-sectional correlations between transformed firm characteristics used in pricing regressions, covering the period 1990 to 1999. 'Turnover' is the share turnover rate; 'B to M' is the natural logarithm of the book-to-market ratio; 'Size' is the natural logarithm of the firm's market capitalization; Beta is the firm's assigned portfolio beta and Momentum is the cumulative return over the five months ending at the beginning of the previous month. Panel A provides results for all months. Panel B provides results for January months only. Panel C provides results for July months only.

	Turnover	B to M	Size	Beta	Momentum
Panel A: All Months					
Turnover	1.000				
B to M	-0.102	1.000			
Size	-0.064	-0.193	1.000		
Beta	0.193	0.085	-0.693	1.000	
Momentum	0.233	-0.057	0.052	-0.054	1.000
Panel B: January Months Only					
Turnover	1.000				
B to M	-0.156	1.000			
Size	0.008	-0.207	1.000		
Beta	0.137	0.091	-0.692	1.000	
Momentum	0.159	-0.190	0.088	-0.111	1.000
Panel C: July Months Only					
Turnover	1.000				
B to M	-0.088	1.000			
Size	-0.077	-0.187	1.000		
Beta	0.212	0.086	-0.695	1.000	
Momentum	0.215	0.016	-0.029	0.045	1.000

Table 3: Average Slopes of Cross-sectional Regressions – 1990 to 1999, All Months

This table reports average Fama-Macbeth regression estimates using individual security data over all months of our full sample period – 1990 to 1999. In each month a cross-sectional regression is estimated using the generalized method of moments, wherein the individual stock return is the dependent variable and the explanatory variable set comprises various combinations of the turnover measure augmented by none, some or all three of the Fama and French factors. 'Turnover' is the share turnover rate; 'B to M' is the natural logarithm of the book-to-market ratio; 'Size' is the natural logarithm of the firm's market capitalization; and Beta is the firm's assigned portfolio beta. Panel A provides the equally-weighted average of the relevant slope coefficient and the associated t-statistic, coming from an OLS procedure, assumes normality. Panel B also provides the equally-weighted average slope coefficient, but through the use of generalised method of moments estimation, provides a robust t-statistic. Panel C provides a weighted least squares estimate of the mean slope, thereby giving more importance to slope estimates that are more precisely estimated. The t-statistics are reported in parentheses directly below the relevant mean slope estimate.

	Constant	Turnover	B to M	Size	Beta
Panel A: OLS					
Regression 1	0.0045	-0.0714			
	(1.06)	(-1.67)			
Regression 2	0.0061	-0.0639	0.0033		
	(1.46)	(-1.49)	(2.25)		
Regression 3	0.0240	-0.0820		-0.0009	
	(0.92)	(-1.95)		(-0.86)	
Regression 4	0.0234	-0.0782	0.0026	-0.0008	
	(0.90)	(-1.91)	(1.92)	(-0.76)	
Regression 5	0.0030	-0.0834	0.0026	-0.0001	0.0043
	(0.17)	(-2.27)	(1.95)	(-0.19)	(1.14)
Panel B: GMM					
Regression 1	0.0045	-0.0714			
	(0.77)	(-1.62)			
Regression 2	0.0061	-0.0639	0.0033		
	(1.07)	(-1.48)	(2.75)		
Regression 3	0.0240	-0.0820		-0.0009	
	(0.74)	(-1.92)		(-0.72)	
Regression 4	0.0234	-0.0782	0.0026	-0.0008	
	(0.72)	(-1.91)	(2.20)	(-0.63)	
Regression 5	0.0030	-0.0834	0.0026	-0.0001	0.0043
	(0.15)	(-2.40)	(2.20)	(-0.16)	(1.14)
Panel C: WLS					
Regression 1	0.0020	-0.1596			
	(0.52)	(-4.55)			
Regression 2	0.0038	-0.1515	0.0038		
	(0.99)	(-4.33)	(3.21)		
Regression 3	-0.0108	-0.1608		0.0005	
	(-0.45)	(-4.94)		(0.49)	
Regression 4	-0.0118	-0.1516	0.0039	0.0006	
	(-0.50)	(-4.76)	(3.56)	(0.65)	
Regression 5	-0.0098	-0.1496	0.0038	0.0005	0.0011
	(-0.57)	(-5.09)	(3.46)	(0.69)	(0.33)

Table 4: Average Slopes of Cross-sectional Regressions – 1990 to 1999, Excluding January and July

This table reports average Fama-Macbeth regression estimates using individual security data over our full sample period – 1990 to 1999. In each month a cross-sectional regression is estimated, wherein the individual stock return is the dependent variable and the explanatory variable set comprises various combinations of the turnover measure augmented by none, some or all three of the Fama and French factors. 'Turnover' is the share turnover rate; 'B to M' is the natural logarithm of the book-to-market ratio; 'Size' is the natural logarithm of the firm's market capitalization; and Beta is the firm's assigned portfolio beta. Panel A provides results for all months excluding January. Panel B provides results for January months only. Panel C provides results for all months excluding January and July. Panel D provides results for January and July months only. All estimation in this table is based on weighted least squares and t-statistics are reported in parentheses directly below the relevant mean slope estimate.

	Constant	Turnover	B to M	Size	Beta
Panel A: Excluding January					
Regression 1	0.0010	-0.1702			
	(0.25)	(-4.63)			
Regression 2	0.0027	-0.1622	0.0035		
	(0.66)	(-4.40)	(2.87)		
Regression 3	-0.0202	-0.1701		0.0009	
	(-0.82)	(-4.98)		(0.87)	
Regression 4	-0.0211	-0.1605	0.0037	0.0010	
	(-0.87)	(-4.78)	(3.24)	(1.03)	
Regression 5	-0.0129	-0.1573	0.0035	0.0007	-0.0003
	(-0.72)	(-5.08)	(3.10)	(0.91)	(-0.10)
Panel B: January only					
Regression 1	0.0152	0.0684			
	(1.11)	(0.79)			
Regression 2	0.0179	0.0877	0.0071		
	(1.44)	(1.31)	(1.70)		
Regression 3	0.1137	0.0356		-0.0048	
	(1.47)	(0.43)		(-1.57)	
Regression 4	0.1134	0.0428	0.0069	-0.0047	
	(1.45)	(0.68)	(1.67)	(-1.50)	
Regression 5	0.0306	0.0158	0.0071	-0.0020	0.0184
	(0.55)	(0.26)	(1.76)	(-0.83)	(2.85)
Panel C: Excluding January and July					
Regression 1	-0.0017	-0.1841			
	(-0.44)	(-4.92)			
Regression 2	-0.0004	-0.1759	0.0026		
	(-0.09)	(-4.69)	(2.23)		
Regression 3	-0.0410	-0.1795		0.0017	
	(-1.71)	(-5.14)		(1.74)	
Regression 4	-0.0397	-0.1701	0.0032	0.0017	
	(-1.67)	(-4.96)	(2.82)	(1.79)	
Regression 5	-0.0180	-0.1618	0.0030	0.0010	-0.0031
	(-0.97)	(-5.04)	(2.66)	(1.23)	(-0.94)
Panel D: January and July only					
Regression 1	0.0244	0.0085			
	(2.38)	(0.09)			
Regression 2	0.0278	0.0193	0.0110		
	(2.89)	(0.21)	(2.88)		
Regression 3	0.1606	-0.0349		-0.0065	
	(2.35)	(-0.40)		(-2.37)	
Regression 4	0.1486	-0.0259	0.0086	-0.0058	
	(2.18)	(-0.31)	(2.44)	(-2.10)	
Regression 5	0.0356	-0.0676	0.0087	-0.0021	0.0239
	(0.81)	(-0.94)	(2.55)	(-1.08)	(3.07)

Table 5: Testing for a Monthly Seasonal Effect in the Average Slopes of Cross-sectional Regressions in a Dummy Variable Framework

This table reports the results of regressing the Fama-Macbeth monthly slope coefficients on a constant, a January dummy variable (D_{Jan}) and a July dummy variable (D_{Jul}). These regressions are based on individual security data over our full sample period – 1990 to 1999. In each month a cross-sectional regression is estimated wherein the individual stock return is the dependent variable and the explanatory variable set comprises a turnover variable, augmented by all three Fama and French factors (ie. the same specification as Regression 5 in Tables 2 and 3). 'Turnover' is the share turnover rate; 'B to M' is the natural logarithm of the book-to-market ratio; 'Size' is the natural logarithm of the firm's market capitalization; and Beta is the firm's assigned portfolio beta. All estimation in this table is based on weighted least squares and t-statistics are reported in parentheses directly below the relevant coefficient estimate.

Dep Variable	Constant	D_{Jan}	D_{Jul}	R^2
Turnover	-0.1618	0.1776	0.0507	0.1118
	(-5.13)	(1.24)	(0.48)	
B to M	0.0030	0.0041	0.0074	0.0639
	(2.55)	(0.97)	(1.73)	
Size	0.0010	-0.0029	-0.0031	0.0223
	(1.22)	(-1.03)	(-1.16)	
Beta	-0.0031	0.0216	0.0320	0.0788
	(-0.93)	(1.83)	(2.82)	

Table 6: Average Slopes of Cross-sectional Regressions – 1990 to 1994

This table reports average Fama-Macbeth regression estimates using individual security data over the first half of our full sample period – 1990 to 1994. In each month a cross-sectional regression is estimated, wherein the individual stock return is the dependent variable and the explanatory variable set comprises various combinations of the turnover measure augmented by none, some or all three of the Fama and French factors. 'Turnover' is the share turnover rate; 'B to M' is the natural logarithm of the book-to-market ratio; 'Size' is the natural logarithm of the firm's market capitalization; and Beta is the firm's assigned portfolio beta. Panel A provides results for all months excluding January. Panel B provides results for all months excluding January and July. Panel C provides results for January and July months only. Panel D reports the results of regressing the Fama-Macbeth monthly slope coefficients on a constant, a January dummy variable (D_{Jan}) and a July dummy variable (D_{Jul}), thereby enabling a formal test of a monthly seasonal effect. All estimation in this table is based on weighted least squares and t-statistics are reported in parentheses directly below the relevant mean slope estimate.

	Constant	Turnover	B to M	Size	Beta
Panel A: Excluding January					
Regression 1	-0.0010	-0.2413			
	(-0.18)	(-3.91)			
Regression 2	0.0024	-0.2231	0.0049		
	(0.43)	(-3.57)	(2.44)		
Regression 3	-0.0064	-0.2276		0.0002	
	(-0.18)	(-3.99)		(0.15)	
Regression 4	-0.0024	-0.2066	0.0052	0.0002	
	(-0.07)	(-3.65)	(2.93)	(0.13)	
Regression 5	-0.0021	-0.2022	0.0050	0.0001	0.0007
	(-0.10)	(-3.80)	(2.90)	(0.10)	(0.11)
Panel B: Excluding January and July					
Regression 1	-0.0056	-0.2738			
	(-1.00)	(-4.35)			
Regression 2	-0.0019	-0.2567	0.0044		
	(-0.35)	(-4.02)	(2.38)		
Regression 3	-0.0340	-0.2560		0.0013	
	(-0.96)	(-4.36)		(0.86)	
Regression 4	-0.0278	-0.2357	0.0050	0.0011	
	(-0.80)	(-4.04)	(2.99)	(0.80)	
Regression 5	-0.0073	-0.2248	0.0047	0.0004	-0.0043
	(-0.31)	(-4.04)	(2.90)	(0.40)	(-0.71)
Panel C: January and July only					
Regression 1	0.0473	0.3314			
	(3.31)	(4.18)			
Regression 2	0.0449	0.3350	0.0063		
	(3.34)	(4.49)	(0.80)		
Regression 3	0.2790	0.2403		-0.0109	
	(2.99)	(3.17)		(-2.90)	
Regression 4	0.2786	0.2217	0.0036	-0.0109	
	(3.19)	(2.87)	(0.55)	(-3.08)	
Regression 5	0.0814	0.1386	0.0044	-0.0044	0.0413
	(1.37)	(1.88)	(0.69)	(-1.74)	(3.60)

Panel D: Dummy Variable Regressions

Dep Variable	Constant	D_{Jan}	D_{Jul}	R^2
Turnover	-0.2248	0.2830	0.4056	0.1730
	(-4.30)	(0.94)	(1.83)	
Ln (B to M)	0.0047	-0.0055	0.0042	0.0793
	(2.68)	(-0.76)	(0.62)	
Ln(Size)	0.0004	-0.0066	-0.0033	0.0562
	(0.39)	(-1.72)	(-0.98)	
Beta	-0.0043	0.0322	0.0549	0.1324
	(-0.73)	(1.38)	(2.79)	

Table 7: Average Slopes of Cross-sectional Regressions – 1995 to 1999

This table reports average Fama-Macbeth regression estimates using individual security data over the second half of our full sample period – 1995 to 1999. In each month a cross-sectional regression is estimated, wherein the individual stock return is the dependent variable and the explanatory variable set comprises various combinations of the turnover measure augmented by none, some or all three of the Fama and French factors. 'Turnover' is the share turnover rate; 'B to M' is the natural logarithm of the book-to-market ratio; 'Size' is the natural logarithm of the firm's market capitalization; and Beta is the firm's assigned portfolio beta. Panel A provides results for all months excluding January. Panel B provides results for all months excluding January and July. Panel C provides results for January and July months only. Panel D reports the results of regressing the Fama-Macbeth monthly slope coefficients on a constant, a January dummy variable (D_{Jan}) and a July dummy variable (D_{Jul}), thereby enabling a formal test of a monthly seasonal effect. All estimation in this table is based on weighted least squares and t-statistics are reported in parentheses directly below the relevant mean slope estimate.

	Constant	Turnover	Ln (B to M)	Ln (Size)	Beta
Panel A: Excluding January					
Regression 1	0.0022	-0.1251			
	(0.39)	(-2.84)			
Regression 2	0.0028	-0.1241	0.0027		
	(0.49)	(-2.82)	(1.75)		
Regression 3	-0.0288	-0.1363		0.0013	
	(-0.84)	(-3.25)		(0.91)	
Regression 4	-0.0328	-0.1343	0.0028	0.0015	
	(-0.95)	(-3.24)	(1.86)	(1.11)	
Regression 5	-0.0195	-0.1329	0.0026	0.0011	-0.0008
	(-0.71)	(-3.52)	(1.73)	(0.93)	(-0.21)
Panel B: Excluding January and July					
Regression 1	0.0005	-0.1233			
	(0.09)	(-2.85)			
Regression 2	0.0007	-0.1222	0.0016		
	(0.11)	(-2.83)	(1.04)		
Regression 3	-0.0454	-0.1316		0.0019	
	(-1.37)	(-3.17)		(1.47)	
Regression 4	-0.0472	-0.1308	0.0021	0.0021	
	(-1.42)	(-3.20)	(1.36)	(1.57)	
Regression 5	-0.0245	-0.1256	0.0019	0.0013	-0.0025
	(-0.88)	(-3.31)	(1.25)	(1.13)	(-0.65)
Panel C: January and July only					
Regression 1	0.0138	-0.0895			
	(1.00)	(-0.68)			
Regression 2	0.0191	-0.0783	0.0132		
	(1.44)	(-0.60)	(3.42)		
Regression 3	0.1008	-0.1164		-0.0042	
	(1.05)	(-0.93)		(-1.10)	
Regression 4	0.0831	-0.1006	0.0108	-0.0031	
	(0.86)	(-0.83)	(2.72)	(-0.80)	
Regression 5	0.0077	-0.1258	0.0107	-0.0006	0.0162
	(0.12)	(-1.21)	(2.67)	(-0.23)	(1.59)

Panel D: Dummy Variable Regressions

Dep Variable	Constant	D_{Jan}	D_{Jul}	R^2
Turn	-0.1256	0.1294	-0.0677	0.1182
	(-3.22)	(0.81)	(-0.57)	
Ln (B to M)	0.0019	0.0084	0.0091	0.0929
	(1.22)	(1.54)	(1.62)	
Ln(Size)	0.0013	-0.0009	-0.0029	0.0158
	(1.12)	(-0.23)	(-0.72)	
Beta	-0.0025	0.0176	0.0199	0.0560
	(-0.63)	(1.30)	(1.44)	

Table 8: Average Slopes of Cross-sectional Regressions, Monthly Seasonality and the Momentum Effect

This table reports the results of regressing the Fama-Macbeth monthly slope coefficients on a constant, a January dummy variable (D_{Jan}) and a July dummy variable (D_{Jul}). These regressions are based on individual security data over the period 1990 to 1999. In each month a cross-sectional regression is estimated, wherein the individual stock return is the dependent variable and the explanatory variable set comprises a turnover variable, augmented by all three Fama and French factors plus a momentum factor. 'Turnover' is the share turnover rate; 'B to M' is the natural logarithm of the book-to-market ratio; 'Size' is the natural logarithm of the firm's market capitalization; Beta is the firm's assigned portfolio beta and Momentum is the cumulative return over the five months ending at the beginning of the previous month. All estimation in this table is based on weighted least squares and t-statistics are reported in parentheses directly below the relevant coefficient estimate.

Dependent Variable	Constant	D_{Jan}	D_{Jul}	R^2
Panel A: Full Sample Period – 1990 to 1999				
Turnover	-0.1595	0.0804	0.1017	0.0812
	(-4.94)	(0.55)	(1.00)	
B to M	0.0030	0.0047	0.0068	0.0615
	(2.50)	(0.98)	(1.58)	
Size	0.0012	-0.0023	-0.0039	0.0300
	(1.62)	(-0.82)	(-1.54)	
Beta	-0.0030	0.0245	0.0317	0.0785
	(-0.87)	(1.91)	(2.77)	
Momentum	0.0183	0.0009	-0.0467	0.1006
	(4.09)	(0.06)	(-3.13)	
Panel B: First Subperiod – 1990 to 1994				
Turnover	-0.1686	0.1793	0.2877	0.0873
	(-3.27)	(0.59)	(1.22)	
B to M	0.0045	0.0003	0.0017	0.0675
	(2.45)	(0.04)	(0.25)	
Size	0.0008	-0.0048	-0.0043	0.0466
	(0.73)	(-1.18)	(-1.29)	
Beta	-0.0052	0.0331	0.0558	0.1345
	(-0.85)	(1.38)	(2.80)	
Momentum	0.0067	0.0310	-0.0506	0.1414
	(1.06)	(1.43)	(-2.59)	
Panel C: Second Subperiod – 1995 to 1999				
Turnover	-0.1530	0.0459	0.0545	0.0877
	(-3.67)	(0.28)	(0.48)	
B to M	0.0022	0.0069	0.0097	0.0761
	(1.29)	(1.10)	(1.69)	
Size	0.0015	-0.0009	-0.0036	0.0229
	(1.38)	(-0.23)	(-0.93)	
Beta	-0.0019	0.0207	0.0191	0.0544
	(-0.46)	(1.37)	(1.37)	
Momentum	0.0250	-0.0161	-0.0414	0.1004
	(4.03)	(-0.77)	(-1.89)	

Table 9: Average Slopes of Cross-sectional Regressions, Monthly Seasonality and Potential Non-linearities

This table reports the results of regressing the Fama-Macbeth monthly slope coefficients on a constant, a January dummy variable (D_{Jan}) and a July dummy variable (D_{Jul}). These regressions are based on individual security data over the period 1990 to 1999. In each month a cross-sectional regression is estimated, wherein the individual stock return is the dependent variable and the explanatory variable set comprises a turnover variable, the squared turnover variable, augmented by all three Fama and French factors plus the squared size variable. 'Turnover' is the share turnover rate; 'B to M' is the natural logarithm of the book-to-market ratio; 'Size' is the natural logarithm of the firm's market capitalization; and Beta is the firm's assigned portfolio beta. The two squared variables are included to capture any potential non-linearities. All estimation in this table is based on weighted least squares and t-statistics are reported in parentheses directly below the relevant coefficient estimate.

Dependent Variable	Constant	D_{Jan}	D_{Jul}	R^2
Panel A: Full Sample Period – 1990 to 1999				
Turnover	-0.2659	0.5119	0.2219	0.0649
	(-3.83)	(1.93)	(0.89)	
Turnover^2	0.1339	-1.0175	-0.2203	0.0073
	(1.15)	(-1.43)	(-0.60)	
B to M	0.0019	0.0043	0.0068	0.0534
	(1.70)	(1.03)	(1.63)	
Size	-0.0576	-0.0533	-0.0528	0.0340
	(-6.48)	(-1.68)	(-1.69)	
Size^2	0.0013	0.0011	0.0011	0.0345
	(6.81)	(1.61)	(1.62)	
Beta	-0.0109	0.0134	0.0228	0.0545
	(-3.23)	(1.14)	(1.95)	
Panel B: First Subperiod – 1990 to 1994				
Turnover	-0.5246	0.8472	1.2342	0.2359
	(-4.67)	(1.81)	(2.88)	
Turnover^2	0.5408	-1.9465	-2.4270	0.0691
	(2.34)	(-1.19)	(-1.90)	
B to M	0.0031	-0.0056	0.0058	0.0649
	(1.84)	(-0.81)	(0.90)	
Size	-0.0498	-0.1431	-0.0384	0.1098
	(-3.94)	(-2.79)	(-0.80)	
Size^2	0.0011	0.0030	0.0007	0.1047
	(4.08)	(2.72)	(0.71)	
Beta	-0.0097	0.0047	0.0450	0.0936
	(-1.72)	(0.22)	(2.30)	
Panel C: Second Subperiod – 1995 to 1999				
Turnover	-0.1476	0.3664	-0.1859	0.0500
	(-1.72)	(1.16)	(-0.62)	
Turnover^2	0.0109	-0.7850	0.0427	0.0173
	(0.08)	(-0.99)	(0.11)	
B to M	0.0013	0.0088	0.0075	0.0807
	(0.79)	(1.60)	(1.32)	
Size	-0.0623	-0.0155	-0.0584	-0.0025
	(-5.01)	(-0.37)	(-1.40)	
Size^2	0.0014	0.0003	0.0012	-0.0034
	(5.30)	(0.34)	(1.36)	
Beta	-0.0114	0.0166	0.0125	0.0378
	(-2.65)	(1.14)	(0.83)	

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