Value-Growth Investment Strategy: Evidence Based on the Residual Income Valuation Model

Walid Saleh

Associate Professor of Corporate Finance, Department of Business

Arab Open University-Jordan Branch, P.O.Box 1339. Amman Jordan

Tel: 962-6-563-0630, Fax: 962-6-563-0610 E-mail: w_saleh@aou.edu.jo or wsaleh99@yahoo.com

Received: October 3, 2010 Accepted: January 4, 2011 doi:10.5539/ijef.v3n4p233

Abstract

This paper explores whether a “value” investing strategy based upon different specifications of the residual income valuation model is riskier than a "growth" investing strategy. The paper motivates such an investigation by noting that, consistent with previous empirical work, the Ohlson (1995) model undervalues (overvalues) low (high) book-to-market stocks, whilst the Feltham-Ohlson model undervalues equities relative to stock market and that the valuation error is so high for low book-to-market stocks. However, the empirical research shows that the Choi et al. (2003) approach yields to overvaluation (undervaluation) problem for low (high) book-to-market stocks. The paper finds and concludes that the "rational school" proposed to explain the value effect is not satisfactory empirically.

Keywords: Residual Income model, Contrarian Investment Strategies, CAPM, Fama and French three-factor Model, and Value Premium.

JEL classification: G12

1. Introduction

It is generally accepted that "value stocks" have a tendency to outperform "growth stocks" (for example, see Fama and French 1992, 1993, 1995, 1996, 1998; Lakonishok et al. 1994; Gregory et al. 2001; Chan et al. 1991, amongst others). The value effect refers to the positive relationship between stock returns and some accounting-based measures such as book-to-market, earnings-to-price, dividends-to-price, and so on. The value effect suggests that a contrarian zero net investment strategy (buying "value stocks" and selling "growth stocks") will yield positive returns.

Several theories have been offered to explain the value effect. Some authors argue that this value effect may result from the fact that a high book-to-market implies a higher discount rate (the rational school). That is, such a stock is riskier and should have a higher risk and lower earnings-growth prospects than a "growth stock" For example, Fama and French (1992, 1993, 1995, 1996, and 1998) show that the value effect is associated with the degree of relative distress in the economy. They show that some common variation in stock returns (distressed stocks) are not explained by the market return. Therefore, they argue that such value effect is priced in addition to the traditional CAPM-type market risk. The authors suggest a three-factor model with one factor proxied by risk related to fundamental relative distress (high-minus-low book-to-market; HML) and another factor proxied by risk related to the size effect (small-minus-big, SMB). Fama and French find that HML and SMB factors have the greatest explanatory power in explaining the cross section of returns and suggest that such factors omitted from the CAPM. Overall, Fama and French argue that the observed higher returns produced by such value effect are justified by the risk associated with "value stocks". Some authors appear to support this theory by linking time variation in the value effect to variables such as GDP that captures aggregate macroeconomic risk (e.g. Vassalou, 2000; and Cooper et al., 2001). For example, Suh (2009) provides evidence suggesting that “most of market beta estimates are statistically significant and appear to be economically consistent with the systematic risk exposure of individual stocks”. Min et al (2009) also support the risk-based theory by confirming that value stocks are riskier than growth stocks in bad times.

Another explanation for the value effect is the "irrational school". Such a theory holds that individual stocks are not priced correctly. Thus, contrarian strategies yield higher returns because they exploit the tendency of some investors to overreact to good or bad news. For instance, Lakonishok et al. (1994) argue that value strategies are not fundamentally riskier than growth strategies. They suggest that such value effect arises because future growth rates of "growth stocks" are consistently overestimated relative to "value stocks". Such "irrational school" holds that individual stocks are not priced correctly, that is, individual investors put excessive weight on recent past history and therefore, do not make rational predictions of future prices. Haugen and Baker (1996), Daniel and Titman (1997), Griffin and Lemon (2001) and Daniel et al. (2001) support the previous view. However, Shleifer and Vishny (1990) and De Long et al. (1990) argue that institutional investors tend to favor a growth strategy that is more likely to yield higher returns in the short run whilst value strategies tend to pay high abnormal returns over 3 to 5 years. Further, Asgharian and Hansson (2009) confirm the existence of non-risk-based component which cannot be captured by the market factor. They show that a large part of observed book-to-market effect has a non-risk-based explanation.

This paper seeks to add to the current debate on the source of the value effect by using three unique valuations measures; Ohlson (1995), Feltham and Ohlson (1995), and Choi et al. (2003) models.

The remainder of this paper is as follows. Section 2 motivates research hypothesis. Section 3 presents research methodology, whilst Section 4 provides the empirical results. Finally, Section 5 concludes.

2. Research Hypothesis

Saleh (2010) shows that different stocks have different mean reversion of abnormal earnings. He uses three specifications of the residual income valuation model; namely: Ohlson (1995) model, Feltham and Ohlson (1995) model, and Choi et al. (2003) approach. He provides evidence suggesting that the Ohlson (1995) model undervalues (overvalues) low (high) book-to-market stocks, whilst the Feltham-Ohlson approach undervalues equities relative to stock market and that the valuation error is so high for low book-to-market stocks. However, he finds that the Choi et al. (2003) approach yields to overvaluation (undervaluation) problem for low (high) book-to-market stocks.

One implication of the above results is to examine the rational versus irrational explanations of value premium. Recall that the rational explanations of value premium focus on conventional neoclassical finance theory in which “value stocks” outperform “growth stocks” because the former are fundamentally riskier than the latter in certain aspects (e.g. Fama and French, 1993, 1995, and 1996). By contrast, the irrational explanations of value premium focus on the over-extrapolation of earnings (e.g. Lakonishok et al., 1994; Gregory et al. 2001; amongst others).

This paper hypothesizes that if the irrational explanations are correct, then we could expect that an investment strategy (buying high *V/P* ratio stocks and selling low *V/P* ratio stocks, where *V* is the fundamental value of stock and *P* is the market price of stock) based on the Ohlson (1995) model will lead to abnormal returns; whilst an investment strategy based on the Choi et al (2003) approach will lead to negative returns. Furthermore and consistent with Saleh’s (2010) argument, the paper expects that an investment strategy using the Feltham and Ohlson (1995) approach will not lead to abnormal returns.

3. Data & Research Methodology

3.1 Data

The paper uses data which covers the period from 1976-2001. The paper uses annual accounting data from the DataStream, whilst it uses London Share Price Database to collect monthly return data. The number of firms over the sample period is around 3500. The average portfolio size over the sample period is 74 for each portfolio. Table 1-1 shows the summary descriptive statistics of V/P ratio. Following previous research (e.g.Gregory, Saleh, and Tucker (2005)), the paper excludes firms with negative book value of equity.

3.2 Model Specifications

Saleh (2010) investigates the empirical performance of the residual income valuation model by estimating different specifications based on the Ohlson (1995) and Feltham and Ohlson (1995) models. The first specification which represents the Ohlson (1995) model includes value-relevant information from non-accounting source; implying that book value of equity, current abnormal earnings and the "other information" embedded in the forecast of next periods abnormal earnings all contain incremental information about price. Thus,

$$FV_t = BV_t + \alpha_1 X_t^a + \alpha_2 \nu_t \tag{1}$$

Where,

$$X_{t+1}^a = \omega_{10} + \omega_{11} X_t^a + e_{t+1} \tag{2}$$

$$\nu_{t+1} = \gamma_0 + \gamma_1 \nu_t + e_{t+1} \tag{3}$$

$$\alpha_1 = \frac{\omega_{11}}{(1+r-\omega_{11})} \qquad \alpha_2 = \frac{(1+r)}{(1+r-\omega_{11})(1+r-\gamma_1)}$$

Note that *FVt* is the fundamental value of equity at date *t*, *BVt* represents book value of equity at date *t*, X^a_t is the residual income (abnormal earnings) in period *t*, which equals X_t-$r.BV_{t-1}$, *Xt* represents earnings for period *t*, BV_{t-1} is the lagged book value of equity, *r* is the risk-free interest rate or cost of equity capital, ω and γ are the persistence parameters, ω reflects the extent to which the current level of abnormal earnings is likely to persist into the future. v_t is value-relevant information other than abnormal earnings.

The second specification represents the Feltham and Ohlson (1995) model; it ignores the "other information" variable. As in Myers (1999), this specification can be modeled as:

$$FV_t = \alpha_0 + \alpha_1 X_t^a + (1+\alpha_2)BV_t \tag{4}$$

where,

$$X_{t+1}^a = \omega_{10} + \omega_{11}X_t^a + \omega_{12}BV_t + e_{1,t+1} \tag{5}$$

$$BV_{t+1} = \omega_{22}BV_t + e_{2,t+1} \tag{6}$$

$$\alpha_0 = \frac{\omega_{10}}{(1+r-\omega_{11})r} \qquad \alpha_1 = \frac{\omega_{11}}{(1+r-\omega_{11})}$$

$$\alpha_2 = \frac{\omega_{12}(1+r)}{(1+r-\omega_{11})(1+r-\omega_{22})}$$

The third specification proposed by Choi et al. (2003) which is similar to the Ohlson model, but includes intercept terms from the generating processes for scaled residual income and the "other information" variable. Choi et al. use book value of equity instead of market value as a deflator. Their LIM approach is as follows:

$$\frac{X_{t+1}^a}{BV_t} = \omega_{10} + \omega_{11}\frac{X_t^a}{BV_t} + \frac{v_t}{BV_t} + e_{1,t+1} \tag{7}$$

$$\frac{v_{t+1}}{BV_t} = \gamma_0 + \gamma_1\frac{v_t}{BV_t} + e_{2,t+1} \tag{8}$$

$$\frac{BV_{t+1}}{BV_t} = G + e_{3,t+1} \tag{9}$$

They, then derive the following valuation function:

$$FV_t = \alpha_1 X_t^a + \alpha_2 v_t + (1+\alpha_3+\alpha_4)BV_t \tag{10}$$

where, $\alpha_1, and\, \alpha_2$ as previously defined in the Ohlson model, whilst

$$\alpha_3 = \frac{(1+r)\omega_{10}}{(1+r-\omega_{11})(1+r-G)} \qquad \alpha_4 = \frac{(1+r)\gamma_0}{(1+r-\omega_{11})(1+r-\gamma_1)(1+r-G)}$$

3.3 The Portfolio Formation Procedures

This paper conducts a portfolio analysis approach to examine whether the value measures implied by the above three specifications of the residual income valuation model are able to predict long-run future stock returns of up to five years. Thus, this paper uses the ratio of the fundamental model values to observed equity values; *FV/P* ratio, where *FV* is the fundamental values measured based on the above specifications and P is the market value of equity six month after the fiscal year end. For each year, stocks are sorted into deciles based on *FV/P ratio* values for each specification of the residual income valuation model. Lower deciles consist of stocks that are overpriced (growth stocks) relative to fundamental value and are likely to experience lower future stock returns. Higher deciles consist of stocks that are under-priced (value stocks) relative to fundamental value and are expected to generate higher future stock returns. To be included in the sample, firms must have data on the *FV/P ratio* recorded between the end of April of year *t-1* and the first of May of year *t*. The proceeds from a stock that de-lists during the holding period are distributed among other stocks in the portfolio according to their value-weight. The paper allows for at least a four-month lag between the measurement of accounting and returns data to ensure that accounting data are available at the date of formation. For each portfolio, the paper computes returns for: (1) each of the following five years, R1 to R5; (2) the average annual return over the five-year period (AR); and, (3) the average cumulative five-year return with annual compounding (ACR5).

3.4 Risk adjusted returns- The One-Factor Model

This paper tests whether the CAPM can explain differences in the returns between value and growth portfolios (or VMG portfolios).

$$R_{it} - R_{ft} = a_i + \beta_i\left(R_{mt} - R_{ft}\right) + e_{\mathrm{it}} \tag{11}$$

Where:

Ri = the monthly portfolio value-weighted returns.

R_m = the monthly return of the FTSE All Share Total Return Index

R_f = the monthly 3-month Treasury bill rate at the beginning of the month

This paper examines whether the intercept in each of the regressions is equal to zero using a conventional *t*-statistic. Portfolio returns are calculated by equally weighting each of the 5 years' value-weighted portfolio returns in calendar time. This implies some modest re-balancing each year, as the previous year 5 portfolio holding drops out and has to be replaced by the new first year portfolio. In addition, weightings between years change. The advantage of this approach is that information from all 5 years of a portfolio's life is used, as opposed to previous approaches to risk assessment where only first year returns are examined. An important characteristic is that this strategy is replicable by investors.

3.5 Risk adjusted returns- The Three-Factor Model

In addition to the one-factor analysis, the paper also employs the Fama and French (1993) three-factor model to explain the difference in returns between value and growth stocks. The model is:

$$R_{it} - R_{ft} = a_i + \beta_i\left(R_{mt} - R_{ft}\right) + s_i SMB_t + h_i HML_t + e_{\mathrm{it}} \tag{12}$$

SMB (small minus big) is the difference, each month, between the average of the returns on the three small-stock portfolios (S/L, S/M, and S/H) and the average of the returns on the three big-stock portfolios (B/L, B/M, and B/H). HML is the difference, each month, between the average of the returns of the two high-book-to-market portfolios (S/H and B/H) and the average of the returns on the two low-book-to-market portfolios (S/L and B/L). Following Fama and French and Gregory et al. (2001), the mimicking portfolios for the size (SMB) and book-to-market (HML) factors are constructed as follows. At the end of June of each year *t* stocks are allocated to two groups (big or small, b or s) based on whether their market value is above or below the median of the largest 350 companies. Further, stocks are allocated in an independent sort to three book-to-market groups (high, medium, and low; H, M or L) based on the breakpoints for the top 30 percent, middle 40 percent, and bottom 30 percent of the book-to-market values recorded for the largest 350 companies at the end of year *t-1*. From the intersection of the two size groups (S and B) and the three book-to-market groups (L, M, H), six size-book-to-market portfolios are constructed (S/L, S/M, S/H, B/L, B/M, B/H).

In addition, the paper examines returns in different market conditions; "up market" and "down market", and additionally extend the Fama and French three-factor model for each of the VMG portfolios in both up market and down market.

4. Empirical Findings

4.1 Returns to the Different Specifications of the Residual Income Valuation Model Investment Strategy

Table 1-2 reports value-weighted returns for portfolios formed based on the three specifications of the residual income model estimations of the V/P ratio. Panel A shows the results for the first specification (the Ohlson model). A general result is that as V/P increases, average returns tend to increase monotonically. The average return for VMG1 (VMG2) portfolio over the five-year period is 0.133 (0.105) and the average cumulative five-year return is 0.776 (0.604). Panel B gives the returns for the second specification; Feltham and Ohlson model. Consistence with the expectation of this paper, the difference in returns between high V/P stocks and low V/P stocks is minimal. Panel C gives the returns for the third specification (Choi et al. approach). The average return for the VMG1 (VMG2) is -0.093 (-0.078) and the average cumulative five-year return is -0.429 (-0.352). These results are consistence with the paper's expectation.

4.2 Explaining the Difference in Returns Between Value and Growth Stocks

4.2.1 The One-Factor Model

This subsection aims to test whether the CAPM can explain individual portfolio returns and return differences between value and growth stocks (VMG). Table 2 presents CAPM model parameters with decile returns or VMG returns as the dependent variable. This paper uses monthly returns for portfolios based on the V/P ratio over a five-year period, for each of the three specifications of the residual income valuation model.

Panel A reports the results for the first specification (the Ohlson model). The intercept is typically close to zero with a few exceptions for extreme value portfolios. The estimated loading of the market factor is highly significant. Thus, the one-factor model explains a high portion of the time series variation in returns for all ten portfolios. However, the intercept for the hedge portfolios (VMG1 and VMG2) is significantly greater than zero. The estimated loading market factor for these portfolios is negative and insignificant. Therefore, there is no evidence here to suggest that value-based investing strategies are conventionally more risky than growth strategies. Panel B presents the results of the second specification (Feltham and Ohlson model). The intercept coefficient for the hedge portfolios is close to zero, but the estimated loading of the market factor is significant (not significant) for VMG1 (VMG2). Panel C (the third specification; Choi et al.) shows that the intercept coefficient is negative and significant for VMG1 and VMG2 portfolios. Further, the estimated market factor is negative and significant for both portfolios (VMG1 and VMG2).

The results from Panels B and C may suggest a risk explanation for differences in returns between value and growth portfolios. However, more investigation is needed since the adjusted R^2 for VMG1 and VMG2 is very low, which suggests that the CAPM is not plausible to explain return differences between value and growth stocks.

4.2.2 The Three-Factor Model

In Table 3 the paper tests whether the three-factor model can explain differences in returns between value and growth stocks. Overall, the table reveals that the three-factor model significantly improves the paper ability to explain the time series variation in stock returns.

The results for the hedge portfolios (VMG1 and VMG2) reveal that the three-factor model has far greater explanatory power in terms of adjusted R^2 than the one-factor model. The intercept coefficients are statistically significant and positive (negative) for the first (third) specification. For the second one, the intercept coefficient is not significant. The estimated loading of the market factor is not significant (significant) at 5% level for the first and second specifications (for the third specification). The loading of book-to-market and size factors is significant and positive for the first and second specifications; except for the size factor of VMG1 in the second specification. For the third specification, the loading of book-to-market and size factors is significant and negative; except for the size factor of VMG1. Note that the loading on the book-to-market factor is lower for value than for growth portfolios and such result is not consistence with that in the first and second specifications. Therefore, the value premium does not work in the third specification.

In sum, the three-factor model captures more of the variation in stock returns than the one-factor model, but there is some unexplained variation in stock returns not captured by the Fama and French three-factor model. Furthermore, the overall results provide no evidence to suggest that value-based investing strategies are conventionally riskier than growth strategies.

4.2.3 Analysis of Market Conditions

In this section the paper examines returns in good market conditions ("up market") and bad market conditions ("down market"). Lakonishok et al. (1994) argue that if the risk-model (rational school) is plausible in explaining the difference in returns between value and growth stocks, then, we would expect that value stocks do worse in poor market conditions.

Table 4 (5) presents the three-factor model estimated in an up market (down market) using portfolios formed based on the three specifications of the residual income model.

In up market conditions, for hedge portfolios, the intercept coefficients for all three specifications are close to zero and not significant at 5% level. The market risk premium tends to be negative though not significant in its effect, except for VMG1 in the second specification. The book-to-market and size factors tend to be significant and positive in the first and second specifications, whilst they tend to be significant and negative in the third specification.

In down market conditions, the intercept coefficients are not significant for all three specifications for the hedge portfolios. An important note is that the loading of the market factor is not significant in all three specifications for the hedge portfolios. The loading of the size factor is significant and positive in the first specification, whilst it is not significant in the second and third specifications. The loading of book-to-market factor is significant and positive in the first and second specifications, whilst it is significant and negative only for VMG2 in the third specification.

In sum, the above results provide no evidence to suggest that value stocks are riskier than growth stocks.

5. Summary and Conclusion

The aim of this paper was to add to the current debate on the source of the value effect by using three unique valuation measures; Ohlson (1995), Feltham and Ohlson (1995), and Choi et al. (2003) models. Therefore, the paper applied a portfolio analysis approach to investigate whether the value measures implied by the above three specifications are able to predict long-run future stock returns. The paper shows that the three-factor model captures more of the variation in stock returns than the one-factor model. However, there are some unexplained variation in stock returns not captured by the Fama-French three-factor model. Moreover, the paper shows that the value effect does not work in some specifications. For instance, an investment strategy of buying high V/P ratio stocks and selling low V/P ratio stocks based on the Ohlson model leads to abnormal retuns, whilst an investment strategy based on the Choi et al approach leads to negative returns. Further and consistent with Saleh's (2010) argument, the paper shows that an investment strategy using the Feltham-Ohlson model leads to no abnormal returns. Such results open a new sight for future research on the sources of value effect and to discuss the reason of the inconsistent findings in the above three different specifications. One might argue that the information content of each model is slightly different and/or that the reason of the inconsistent findings is due to scale effect; market value versus book value of equity. Overall, this paper shows and concludes that the "rational school" proposed to explain the value effect is not satisfactory empirically.

References

Amihud, Y and H. Mendelson. (1986). Asset Pricing and the Bid-Ask Spread. *Journal of Financial Economics* 17, PP. 223-249.

Asgharian, H and B. Hansson. (2009). Book-to-Market and Size effects: compensations for risks or outcomes of market inefficiencies. *The European Journal of Finance,* Vol. 16, Issue 2, PP. 119-136.

Basu, S. (1977). Investment Performance of Common Stocks in Relation to their Price-Earnings Ratio: A Test of the Efficient Market Hypothesis. *Journal of Finance*, 32: 663-682. doi:10.2307/2326304, http://dx.doi.org/10.2307/2326304

Chan, L., Hamao, Y. and Lakonishok, J. (1991). Fundamentals and stock returns in Japan. *Journal of Finance*, 46: 1739-1764. doi:10.2307/2328571, http://dx.doi.org/10.2307/2328571

Choi, Y-S, J. O'Hanlon and P. Pope. (2003). Linear Information Models In Residual Income-Based Valuation: Intercept Parameters and Valuation bias. Working Paper, Lancaster University.

Conrad, J. and Kaul, G. (1993). Long-term market overreaction or biases in computed returns? *Journal of Finance*, 48: 39-63. doi:10.2307/2328881, http://dx.doi.org/10.2307/2328881

Cooper, M., H. Gulen and M. Vassalou. (2001). Investing in size and book-to-market portfolios using information about the macroeconomy: some new trading rules, *mimeo*, Columbia University, New York.

Daniel, K. and Titman, D. (1997). Evidence on the characteristics of cross-sectional variation in stock returns. *Journal of Finance*, 52: 1-33. doi:10.2307/2329554, http://dx.doi.org/10.2307/2329554

Daniel, K., Hirshleifer, D., and S. H. Teoh. (2001). Investor Psychology in Capital Markets:Evidence and Policy Implications, *Journal of Monetary Economics*, 49: 139-209.

Dechow, P. M., Hutton, A.P. and Sloan, R.G. (1999). An empirical assessment of the residual income valuation model. *Journal of Accounting and Economics*, 26: 1-34.

De Long, J.B., A. Shleifer, L. Summers and R. Waldmann. (1990). Noise trader risk in financial markets, *Journal of Political Economy*, Vol. 98, pp. 703-738.

Fama, E. and French, K. (1992). The cross-section of expected stock returns. *Journal of Finance*, 46: 427-466. doi:10.2307/2329112, http://dx.doi.org/10.2307/2329112

Fama, E. and French, K. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33: 3-56. doi:10.1016/0304-405X(93)90023-5, http://dx.doi.org/10.1016/0304-405X(93)90023-5

Fama, E. and French, K. (1995). Size and book-to-market factors in earnings and returns. *Journal of Finance*, 50: 131-155. doi:10.2307/2329241, http://dx.doi.org/10.2307/2329241

Fama, E. and French, K. (1996). Multifactor explanations of assets pricing anomalies. *Journal of Finance*, 51: 55-84. doi:10.2307/2329302, http://dx.doi.org/10.2307/2329302

Fama, E. and French, K. (1998). Value versus growth: the international evidence. *Journal of Finance*, 53: 1975-1998.

Feltham, G.A. and Ohlson, J.A. (1995). Valuation and clean surplus accounting for operating and financial activities. *Contemporary Accounting Research*, 11(2): 689–732. doi:10.1111/j.1911-3846.1995.tb00462.x, http://dx.doi.org/10.1111/j.1911-3846.1995.tb00462.x

Ferson, W. and Harvey, C. R. (1993). The risk and predictability of international equity returns. *Review of Financial Studies*, 9(3): 527-566.

Gregory, A., Harris, R. D. F. and Michou, M. (2001). An analysis of contrarian investment strategies in the UK. *Journal of Business Finance and Accounting*, 28: 1-36. doi:10.1111/1468-5957.00412, http://dx.doi.org/10.1111/1468-5957.00412

Gregory, A., Harris, R. D. F. and Michou, M. (2003). Contrarian investment and macroeconomic risk. *Journal of Business Finance and Accounting*, 30(1&2): 213-255. doi:10.1111/1468-5957.00004, http://dx.doi.org/10.1111/1468-5957.00004

Gregory, A., Saleh, W. and Tucker, J. (2005). A UK test of an inflation-adjusted Ohlson Model. *Journal of Business Finance and Accounting*, 32(3&4): 487-534.

Griffin, D. M. and M. L. Lemon. (2001). Does Book-to-Market Equity Proxy for Distress or Overreaction? Working Paper, University of Arizona .

Haugen, R.A. and N.L. Baker. (1996). Commonality in the determinants of expected stock returns, *Journal of Financial Economics*, Vol. 41, pp. 401-439. doi:10.1016/0304-405X(95)00868-F, http://dx.doi.org/10.1016/0304-405X(95)00868-F

Kothari, S. P., Shanken, J. and Sloan, R. G. (1995). Another look at the cross-section of expected returns. *Journal of Finance*, 50: 185-224. doi:10.2307/2329243, http://dx.doi.org/10.2307/2329243

Lakonishok, J., Shleifer, A. and Vishny, R.W. (1994). Contrarian investment, expectation, and risk. *Journal of Finance*, 49: 1541-1578.

Lo, A. W. and Mackinlay, A. C. (1990). Data-snooping biases in test of financial asset pricing models. *Review of Financial Studies*, 3: 431-467. doi:10.1093/rfs/3.3.431, http://dx.doi.org/10.1093/rfs/3.3.431

Min, B, J, Kang, and Ch. Lee. (2009). Macroeconomic Risk and the Cross-Section of Stock Returns. Working paper, Ohio State University and Kais Business School.

Myers, J. N. (1999). Implementing Residual Income Valuation with Linear Information Dynamics. *The Accounting Review*, Vol.74, No.1, PP.1-28. doi:10.2308/accr.1999.74.1.1, http://dx.doi.org/10.2308/accr.1999.74.1.1

Ohlson, J. A. (1995). Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research*, 11(2): 661-678. doi:10.1111/j.1911-3846.1995.tb00461.x, http://dx.doi.org/10.1111/j.1911-3846.1995.tb00461.x

Ohlson, J. A. (2001). Earnings, Book Values, and Dividend In Equity Valuation: An Empirical Perspective. *Contemporary Accounting Research* Vol 18, PP. 107-120. doi:10.1506/7TPJ-RXQN-TQC7-FFAE, http://dx.doi.org/10.1506/7TPJ-RXQN-TQC7-FFAE

Saleh, Walid. (2010). Linear Information Dynamic Parameters: Market-Wide vs. Group-Wide Estimation. *Journal of International Accounting and Finance,* Vol. 2, No. 3/4, PP. 275-297. doi:10.1504/IJAF.2010.034400, http://dx.doi.org/10.1504/IJAF.2010.034400

Shleifer, A. and R. Vishny. (1990). Equilibrium short horizons of investors and firms, *American Economic Review Papers and Proceedings*, Vol. 80, pp. 148-153.

Suh, D. (2009). The Correlations and Volatilities of Stock Returns: The CAPM Beta and the Fama-French Factors. Working paper, West Virginia University.

Vassalou, M. (2000). News related to future GDP growth as a risk factor in equity returns, Working Paper, Columbia University, New York.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48: 817-838. doi:10.2307/1912934, http://dx.doi.org/10.2307/1912934

Notes

Note 1. Note that "value stocks" refer to stocks with low price-earnings ratios and high projected earnings-growth ratios; whilst "growth stocks" refer to stocks with high price-earnings ratios and low projected earnings-growth ratios.

Note 2. Note that Basu (1997) finds a significant positive relation between earnings-to-price ratios and average returns that could not be explained by the CAPM.

Note 3. Note that some authors have argued for sample selection biases or data snooping (e.g. Lo and MacKinlay, 1990; and Kothari et al., 1995). Others have argued for liquidity effect (Amihud and Mendelson, 1986). Conrad and Kaul (1993) assert that stock prices take temporary swings away from their fundamental values due to waves of optimism and pessimism. However, the debate in the literature has focused on two central arguments (rational vs. irrational explanations).

Note 4. Previous research used to assume that all stocks have the same mean reversion of abnormal earnings (e.g. Dechow, Hutton, and Sloan, 1999; Myers, 1999; and Gregory, Saleh, and Tucker, 2005). However, unlike previous research Saleh (2010) relaxes the above assumption by investigating whether different stocks have different mean reversion of abnormal earnings.

Note 5. Note that this specification represents the residual income valuation model proposed by the Ohlson (1995) model.

Note 6. Following a suggestion by Ohlson (2001), this paper estimates the other information variable, ν_t as the difference between the market expectation of residual income for period *t+1* based on all available information and the expectation of abnormal earnings based only on current period residual income, that is, $\nu_t = E[X^a_{t+1}] - \omega_{11} X^a_t$. For more details, see Gregory, Saleh, and Tucker (2005).

Note 7. Myers (1999) argues that accounting conservatism may influence the long-run residual income series. Thus, this specification includes a conservatism parameter which is captured by ω_{12}, the book value effect of residual income. Furthermore, ω_{22} represents growth in book value of equity which must be equal to or greater than one for a going concern, but less than one plus the discount rate.

Note 8. Following Myers (1999), this paper includes all net assets and all earnings instead of using financial assets and operating income. Note that residual income and operating residual income are equal since financial assets only earn normal earnings (Myers, 1999).

Note 9. The authors argue that this approach will avoid the implicit assumption that scaled residual income and the other information variable have means of zero.

Note 10. Note that G here is equivalent to ω_{22} in the second specification, therefore, it defines as the median ratio of year t+1 book value of equity to year t book value of equity.

Note 11. This paper begins portfolio formation on the first of September every year because more than two thirds of the firms listed on the London Stock Exchange have their fiscal year end in December and March.

Note 12. The author would like to thank Alan Gregory for such thought.

Note 13. Mimicking portfolios refer to portfolios that may be substituted for the factors in a factor model regression to measure the betas, and whose expected returns are the risk premium (Ferson and Harvey, 1993).

Note 14. This uses the largest 350 companies instead of the whole sample in order to reduce the imbalance in the market value of the small and large groups. The approach here is consistent with Fama and French (1993 and 1996).

Note 15. Note that following Gregory et al. (2003), this paper runs regressions for months when the market excess returns are positive (up markets) and for months when the market excess returns are negative (down markets).

Table 1-1. Summary Descriptive Statistics of V/P Ratio

Panel A: Ohlson Model										
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Mean	0.45	0.60	0.65	0.72	0.79	0.87	0.97	1.08	1.21	1.40
Std	0.04	0.05	0.04	0.03	0.03	0.03	0.05	0.05	0.10	0.71
Panel B: Feltham-Ohlson Model										
Mean	0.60	0.63	0.67	0.72	0.69	0.75	0.81	0.89	1.01	1.20
Std	0.06	0.02	0.02	0.02	0.03	0.02	0.03	0.05	0.11	1.40
Panel C: Choi et al Model										
Mean	0.18	0.35	0.53	0.66	0.82	0.97	1.25	1.85	2.63	7.73
Std	0.06	0.05	0.04	0.05	0.05	0.07	0.10	0.26	0.45	6.76

Table 1-1 values represent the average values over the period 1976-2001. V/P is the fundamental value to price ratio.

Table 1-2. Value Weighted Returns for Portfolios Formed Based on V/P Ratios

Panel A: Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
R1	0.174	0.166	0.163	0.178	0.191	0.238	0.239	0.212	0.235	0.301	0.128	0.098
R2	0.128	0.167	0.174	0.174	0.241	0.196	0.264	0.270	0.272	0.290	0.162	0.133
R3	0.175	0.166	0.161	0.196	0.210	0.191	0.234	0.237	0.251	0.280	0.104	0.095
R4	0.143	0.171	0.172	0.179	0.179	0.249	0.239	0.295	0.275	0.329	0.186	0.145
R5	0.150	0.171	0.194	0.173	0.260	0.208	0.224	0.240	0.193	0.236	0.086	0.054
AVG	0.154	0.168	0.173	0.180	0.216	0.216	0.240	0.251	0.245	0.287	0.133	0.105
ACR5	0.545	0.598	0.611	0.676	0.820	0.842	1.003	0.994	1.031	1.321	0.776	0.604

Panel B: Feltham-Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
R1	0.196	0.197	0.181	0.191	0.189	0.184	0.211	0.210	0.188	0.224	0.028	0.010
R2	0.184	0.197	0.160	0.203	0.168	0.198	0.203	0.213	0.179	0.147	-0.059	-0.046
R3	0.227	0.180	0.167	0.159	0.209	0.175	0.215	0.265	0.238	0.214	0.028	0.032
R4	0.176	0.239	0.219	0.185	0.200	0.260	0.231	0.168	0.222	0.225	0.036	0.013
R5	0.145	0.174	0.186	0.167	0.200	0.206	0.191	0.250	0.179	0.177	0.017	0.001
AVG	0.186	0.198	0.183	0.181	0.193	0.204	0.210	0.221	0.201	0.197	0.010	0.002
ACR5	0.726	0.768	0.619	0.659	0.715	0.732	0.760	0.771	0.749	0.754	0.029	0.005

Panel C: Choi et al approach

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
R1	0.195	0.227	0.217	0.237	0.225	0.250	0.211	0.199	0.185	0.147	-0.061	-0.049
R2	0.236	0.233	0.239	0.259	0.226	0.199	0.183	0.190	0.205	0.131	-0.110	-0.084
R3	0.305	0.267	0.277	0.261	0.223	0.203	0.198	0.218	0.211	0.124	-0.153	-0.095
R4	0.235	0.244	0.296	0.221	0.232	0.222	0.171	0.205	0.162	0.163	-0.096	-0.099
R5	0.206	0.226	0.242	0.177	0.218	0.232	0.202	0.199	0.140	0.155	-0.044	-0.065
AVG	0.235	0.239	0.254	0.231	0.225	0.221	0.193	0.202	0.180	0.144	-0.093	-0.078
ACR5	0.889	0.976	0.975	0.959	0.867	0.854	0.723	0.757	0.675	0.484	-0.429	-0.352

Note: Table 1-2 values represent mean one- to five-year buy and hold return for portfolios formed on September each year, based on the fundamental value to price ratio (V/P). The sample period is 1976-2001. V represents value measures computed by the Ohlson model (using r= 0.05 constant), estimated on industry basis. P is the market value of equity six months after the fiscal year end. AR is the average return for R1-R5. CR5 is the five-year cumulative return. VMG1 represents the difference between portfolio 10 and portfolio 1. VMG2 represents the difference between the average of portfolio 10 and 9 and the average of portfolio 1 and 2.

Table 2. One Factor Model for Portfolios Formed Based on V/P Ratios

Panel A: Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	-0.0011	0.0003	-0.0004	0.0006	0.0020	0.0023	0.0034	0.0041	0.0040	0.0062	0.0073	0.0055
t(a)	-0.70	0.28	-0.37	0.38	1.59	1.68	1.77	1.83	1.68	2.34	2.55	2.12
β	0.96	0.94	0.96	0.97	0.96	0.98	1.00	1.01	0.95	0.91	-0.05	-0.020
t(β)	33.32	24.78	23.76	25.27	30.88	40.40	24.60	14.19	20.68	18.16	-1.16	-0.63
R^2	0.80	0.87	0.89	0.86	0.87	0.88	0.81	0.76	0.72	0.64	0.004	0.002

Panel B: Feltham-Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	0.0002	0.0024	0.0008	0.0002	0.0015	0.0004	0.0009	0.0019	0.0011	0.0015	0.0013	0.0000
t(a)	0.12	2.31	0.55	0.17	1.51	0.30	0.57	1.51	0.71	0.59	0.76	0.14
β	0.96	0.95	0.99	0.97	0.97	0.98	0.97	0.93	0.95	0.89	-0.07	-0.04
t(β)	32.59	41.89	27.95	23.04	34.48	24.14	27.94	36.55	23.37	21.25	-2.21	-1.09
R^2	0.83	0.89	0.87	0.88	0.89	0.88	0.85	0.88	0.81	0.63	0.011	0.0045

Panel C: Choi et al approach

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	0.0045	0.0038	0.0031	0.0017	0.0023	0.0019	0.0007	0.0006	-0.0002	-0.0020	-0.0065	-0.0053
t(a)	2.89	2.29	1.74	1.06	1.82	1.36	0.50	0.47	-0.13	-1.39	-3.34	-3.05
β	1.04	0.98	0.98	0.96	1.02	0.97	0.95	0.97	0.95	0.94	-0.10	-0.07
t(β)	31.54	31.57	21.44	22.47	38.59	34.12	25.23	40.59	26.43	26.74	-2.90	-2.12
R^2	0.85	0.83	0.82	0.85	0.88	0.88	0.87	0.88	0.84	0.80	0.030	0.018

Notes: $R_{it} - R_{ft} = a_i + \beta_i(R_{mt} - R_{ft}) + e_{it}$,

Where R_{it} is the monthly portfolio return. R_{ft} is the monthly Treasury bill rate at the beginning of the month. R_{mt} is the monthly return on the FTSE All Share Total Return Index. t( ) is the t-statistic with standard errors calculated using White (1980) corrections. R^2 is adjusted for degrees of freedom. Hedge return (VMG1) represents the difference between portfolio 10 and portfolio 1. VMG2 represents the difference between the average of portfolio 10 plus 9 and the average of portfolio 1 plus 2.

Table 3. Three Factor Model for Portfolios Formed Based on V/P Ratios

Panel A: Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	0.0014	0.0009	-0.0007	0.0002	0.0011	0.0014	0.0026	0.0029	0.0028	0.0054	0.0040	0.0030
t(a)	0.94	0.79	-0.61	0.13	0.87	1.10	1.73	1.98	1.64	3.42	2.16	1.80
β	0.97	0.95	0.96	0.98	0.96	0.98	1.02	1.04	0.97	0.95	-0.02	0.00
t(β)	27.32	23.40	24.57	27.02	37.24	47.90	30.14	32.84	28.77	25.14	-0.51	0.05
SMB	0.19	0.14	0.11	0.22	0.09	0.14	0.41	0.55	0.53	0.80	0.61	0.50
t(SMB)	3.28	2.95	2.27	4.03	1.68	3.24	6.28	8.09	7.49	12.54	7.99	7.98
HML	-0.53	-0.10	0.10	0.17	0.26	0.26	0.34	0.46	0.46	0.46	0.99	0.76
t(HML)	-6.39	-1.39	1.35	2.10	3.63	3.82	4.27	6.24	6.09	6.03	11.14	11.16
R^2	0.86	0.88	0.90	0.88	0.89	0.89	0.88	0.87	0.84	0.84	0.53	0.52

Panel B: Feltham-Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	0.0013	0.0035	0.0016	0.0005	0.0013	-0.0002	-0.0002	0.0010	0.0007	0.0012	0.0001	-0.0015
t(a)	1.04	3.48	1.23	0.45	1.30	-0.16	-0.15	0.85	0.49	0.56	0.14	-0.82
β	0.98	0.95	1.00	0.97	0.98	0.99	0.98	0.93	0.97	0.92	-0.06	-0.02
t(β)	37.98	38.48	25.53	22.64	35.85	27.47	34.40	41.71	25.93	26.33	-1.88	-0.78
SMB	0.42	0.19	0.27	0.20	0.13	0.20	0.18	0.06	0.38	0.59	0.17	0.18
t(SMB)	7.54	4.22	5.06	3.89	2.31	4.59	3.38	1.38	6.62	5.70	1.59	2.61
HML	-0.13	-0.20	-0.11	-0.01	0.10	0.21	0.32	0.24	0.23	0.27	0.40	0.42
t(HML)	-1.84	-3.34	-1.84	-0.14	1.56	2.47	3.67	3.54	2.88	2.02	3.12	4.58
R^2	0.88	0.91	0.89	0.89	0.90	0.90	0.88	0.90	0.86	0.73	0.11	0.22

Panel C: Choi et al approach

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	0.0044	0.0031	0.0027	0.0011	0.0017	0.0013	0.0001	0.0006	0.0008	-0.0007	-0.0051	-0.0037
t(a)	3.28	2.36	1.73	0.86	1.54	0.93	0.09	0.51	0.61	-0.50	-2.39	-2.04
β	1.06	1.00	0.99	0.98	1.03	0.98	0.96	0.98	0.96	0.96	-0.10	-0.07
t(β)	39.58	35.86	22.92	24.96	47.15	39.93	27.48	42.27	24.04	25.38	-2.99	-2.56
SMB	0.38	0.34	0.27	0.31	0.19	0.16	0.14	0.17	0.16	0.33	-0.05	-0.12
t(SMB)	7.47	5.78	3.79	4.91	3.15	3.92	2.37	3.17	2.75	4.62	-0.70	-2.08
HML	0.16	0.27	0.17	0.25	0.22	0.20	0.18	0.06	-0.17	-0.19	-0.35	-0.40
t(HML)	2.21	4.45	2.47	4.56	3.99	2.47	2.79	0.92	-1.96	-2.01	-2.98	-4.23
R^2	0.89	0.88	0.84	0.89	0.90	0.89	0.88	0.89	0.85	0.83	0.11	0.19

Notes: $R_{it} - R_{ft} = a_i + \beta_i(R_m - R_{ft}) + s_i SMB + h_i HML + e_{it}$,

Here, R_{it} is the monthly portfolio return, R_{ft} is the monthly Treasury bill rates at the beginning of the month, and R_{mt} is the monthly returns of the FTSE All Share Total Return Index. t( ) are the t-statistics with standard errors calculated using White (1980) corrections. R^2 is adjusted for degrees of freedom. SMB (small minus big) is the difference, each month, between the average of the returns on the three small-stock portfolios (S/L, S/M, and S/H) and the average of the returns on the three big- stock portfolios (B/L, B/M, and B/H). HML is the difference, each month, between the average of the returns on the two high-book-to-market portfolios (S/H and B/H) and the average of the returns on the two low-book-to-market portfolios (S/L and B/L). Hedge return (VMG1) represents the difference between portfolio 10 and portfolio 1. VMG2 represents the difference between the average of portfolio 10 plus 9 and the average of portfolio 1 plus 2.

Table 4. Three Factor Model for Portfolios Formed Based on V/P Ratios-Up Market Analysis

Panel A: Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	-0.0003	-0.0042	-0.0038	-0.0045	-0.0058	-0.0043	-0.0024	0.0011	0.0009	0.0023	0.0026	0.0039
t(a)	-0.10	-1.70	-2.13	-1.89	-2.17	-2.00	-0.97	0.48	0.34	0.69	0.63	1.24
β	1.04	1.13	1.07	1.13	1.14	1.12	1.16	1.09	1.05	1.05	0.01	-0.04
t(β)	13.69	16.74	21.65	20.67	16.79	22.50	17.56	19.24	16.30	14.11	0.13	-0.39
SMB	0.14	0.17	0.12	0.22	0.11	0.17	0.39	0.54	0.55	0.86	0.72	0.55
t(SMB)	2.00	2.90	2.01	3.41	2.17	3.58	5.69	7.65	6.97	11.23	8.28	6.86
HML	-0.65	-0.11	0.06	0.14	0.26	0.33	0.35	0.44	0.45	0.46	1.11	0.84
t(HML)	-6.73	-1.23	0.67	1.40	2.97	4.18	3.61	5.33	4.12	4.65	12.95	9.85
R^2	0.65	0.70	0.71	0.68	0.72	0.76	0.71	0.70	0.67	0.70	0.63	0.58

Panel B: Feltham-Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	-0.0025	0.0017	0.0012	-0.0061	-0.0047	-0.0064	-0.0052	-0.0053	-0.0037	0.0044	0.0069	0.0009
t(a)	-1.02	0.79	0.47	-2.64	-2.12	-3.08	-2.15	-2.54	-1.42	1.07	1.55	0.31
β	1.09	1.04	1.05	1.17	1.17	1.16	1.12	1.08	1.11	0.82	-0.27	-0.10
t(β)	19.86	21.28	17.81	18.08	20.77	20.45	18.69	19.36	13.39	7.81	-2.12	-1.06
SMB	0.36	0.19	0.26	0.22	0.23	0.19	0.15	0.10	0.41	0.62	0.26	0.24
t(SMB)	5.40	3.53	3.91	3.59	3.32	3.45	2.53	2.17	7.51	4.66	2.07	3.11
HML	-0.20	-0.25	-0.18	-0.08	0.08	0.21	0.38	0.30	0.21	0.26	0.46	0.46
t(HML)	-2.33	-3.74	-2.67	-1.15	1.04	1.82	3.64	4.11	2.41	1.45	3.09	4.68
R^2	0.69	0.74	0.66	0.73	0.74	0.74	0.70	0.78	0.69	0.40	0.18	0.27

Panel C: Choi et al approach

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	0.0024	0.0013	-0.0024	-0.0038	-0.0029	-0.0027	-0.0054	-0.0055	-0.0041	-0.0034	-0.0058	-0.0056
t(a)	0.90	0.52	-0.92	-2.10	-1.42	-1.21	-2.55	-2.24	-1.55	-1.14	-1.43	-1.80
β	1.12	1.07	1.14	1.12	1.14	1.09	1.12	1.15	1.12	1.05	-0.07	-0.01
t(β)	16.17	18.27	21.83	25.42	19.61	22.46	20.74	18.87	17.54	15.16	-0.72	-0.08
SMB	0.39	0.37	0.29	0.28	0.17	0.16	0.15	0.21	0.14	0.30	-0.09	-0.16
t(SMB)	7.45	5.46	4.46	4.24	2.33	3.53	2.09	3.11	2.04	3.88	-0.92	-2.22
HML	0.20	0.25	0.17	0.28	0.27	0.23	0.22	0.04	-0.22	-0.29	-0.49	-0.48
t(HML)	2.19	3.27	2.35	4.75	3.82	2.69	3.02	0.54	-1.98	-2.61	-3.71	-4.09
R^2	0.70	0.69	0.68	0.76	0.72	0.73	0.72	0.69	0.65	0.60	0.17	0.25

Notes: $R_{it} - R_{ft} = a_i + \beta_i(R_m - R_{ft}) + s_i SMB + h_i HML + e_{it}$,

R_{it} is the monthly portfolio return, R_{ft} is the monthly Treasury bill rate at the beginning of the month, and R_{mt} is the monthly return on the FTSE All Share Total Return Index. All t-statistics are in parentheses with standard errors calculated using White (1980) corrections. R^2 is adjusted for degrees of freedom. The hedge return (VMG1) represents the difference between portfolio 10 and portfolio 1. VMG2 represents the difference between the average of portfolio 10 plus 9 and the average of portfolio 1 plus 2. SMB (small minus big) is the difference, each month, between the average of the returns on the three small-stock portfolios (S/L, S/M, and S/H) and the average of the returns on the three big- stock portfolios (B/L, B/M, and B/H). HML is the difference, each month, between the average of the returns on the two high-book-to-market portfolios (S/H and B/H) and the average of the returns on the two low-book-to-market portfolios (S/L and B/L).

Table 5. Three Factor Model for Portfolios Formed Based on V/P Ratios-Down Market Analysis

Panel A: Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	-0.0012	-0.0046	-0.0033	-0.0032	0.0022	0.0019	0.0016	0.0020	-0.0004	0.0023	0.0035	0.0077
t(a)	-0.51	-1.93	-1.26	-1.56	1.10	0.97	0.61	0.68	-0.13	0.72	1.13	1.46
β	0.93	0.83	0.90	0.90	0.95	0.95	0.97	1.01	0.91	0.87	-0.06	0.02
t(β)	20.58	16.82	13.63	20.48	26.78	38.12	19.45	20.75	18.27	15.33	-1.04	0.26
SMB	0.32	0.14	0.14	0.27	0.08	0.13	0.48	0.59	0.51	0.75	0.43	0.40
t(SMB)	4.45	2.17	2.63	4.08	1.19	1.83	4.32	4.78	4.68	6.55	3.19	4.51
HML	-0.31	-0.15	0.13	0.17	0.23	0.09	0.29	0.48	0.45	0.39	0.70	0.65
t(HML)	-3.20	-2.09	1.53	2.34	3.07	1.14	2.91	4.50	4.32	3.48	4.48	6.86
R^2	0.88	0.86	0.90	0.90	0.90	0.88	0.87	0.84	0.77	0.80	0.32	0.38

Panel B: Feltham-Ohlson Model

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	0.0009	0.0002	-0.0020	-0.0010	-0.0008	-0.0011	-0.0023	0.0022	-0.0002	0.0050	0.0041	0.0019
t(a)	0.35	0.11	-0.79	-0.33	-0.42	-0.45	-1.04	1.23	-0.07	1.24	0.97	0.61
β	0.96	0.89	0.94	0.92	0.01	0.94	0.90	0.91	0.93	0.99	0.03	0.04
t(β)	26.79	40.63	15.58	13.06	30.30	15.82	23.15	28.29	14.69	12.84	0.49	0.62
SMB	0.57	0.24	0.33	0.24	0.04	0.27	0.29	0.03	0.37	0.52	-0.05	0.04
t(SMB)	7.26	4.41	5.05	3.64	0.69	4.30	3.44	0.43	3.80	4.39	-0.37	0.40
HML	0.002	-0.15	0.003	0.10	0.07	0.18	0.15	0.08	0.23	0.30	0.30	0.34
t(HML)	0.19	-1.62	0.04	1.38	1.11	2.28	1.61	0.88	1.86	2.28	1.75	2.56
R^2	0.90	0.89	0.90	0.89	0.90	0.91	0.89	0.89	0.86	0.78	0.05	0.13

Panel C: Choi et al approach

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	VMG1	VMG2
a	0.0021	0.0018	0.0019	-0.0024	0.0014	-0.0003	-0.0022	-0.0000	-0.0026	-0.0014	-0.0035	-0.0040
t(a)	0.86	0.71	0.55	-0.92	0.79	-0.16	-1.01	-0.02	-0.95	-0.46	-0.97	-1.46
β	1.01	0.96	0.94	0.88	1.00	0.91	0.88	0.93	0.87	0.94	-0.07	-0.08
t(β)	26.31	20.27	13.42	15.27	38.01	30.85	17.82	36.03	15.67	15.83	-1.17	-1.36
SMB	0.40	0.38	0.30	0.42	0.23	0.22	0.18	0.16	0.29	0.42	0.02	-0.035
t(SMB)	3.61	3.72	2.22	3.31	2.78	3.89	2.45	2.72	3.08	4.14	0.17	-0.36
HML	0.04	0.27	0.13	0.15	0.12	0.07	0.06	0.05	-0.14	-0.01	-0.05	-0.23
t(HML)	0.47	2.75	1.10	1.62	1.42	0.75	0.70	0.78	-1.64	-0.08	-0.34	-2.31
R^2	0.88	0.86	0.79	0.87	0.90	0.89	0.88	0.91	0.86	0.83	0.02	0.09

Notes: $R_{it} - R_{ft} = a_i + \beta_i(R_m - R_{ft}) + s_i SMB + h_i HML + e_{it}$,

R_{it} is the monthly portfolio return, R_{ft} is the monthly Treasury bill rates at the beginning of the month, and R_{mt} is the monthly return on the FTSE All Share Total Return Index. All t-statistics are in parentheses with standard errors calculated using White (1980) corrections. The R^2 is adjusted for degrees of freedom. The hedge return (VMG1) represents the difference between portfolio 10 and portfolio 1. VMG2 represents the difference between the average of portfolio 10 plus 9 and the average of portfolio 1 plus 2. SMB (small minus big) is the difference, each month, between the average of the returns on the three small-stock portfolios (S/L, S/M, and S/H) and the average of the returns on the three big-stock portfolios (B/L, B/M, and B/H). HML is the difference, each month, between the average of the returns on the two high-book-to-market portfolios (S/H and B/H) and the average of the returns on the two low-book-to-market portfolios (S/L and B/L).