Resurrecting the Size Effect:

Firm Size, Profitability Shocks, and Expected Stock Returns

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Abstract

Recent studies report that the size effect in U.S. stock returns has disappeared after the early 1980s. We show that the conclusion that the size effect has gone away is premature. The reduction in the observed size premium can be attributed to profitability shocks to small and large firms. Small firms experience large negative profitability shocks after the early 1980s, while large firms experience positive shocks. As a result, realized stock returns of small and large firms differ substantially from expected returns over this period. After accounting for the impact of profitability shocks, we find that there still is an economically and statistically significant size effect in U.S. stock returns.

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The size effect in the cross-section of stock returns is one of the most extensively studied topics in financial economics. Since Banz (1981) reported that small firms earn higher returns than big firms, a large body of research has evolved on the size effect which has produced a wealth of empirical evidence and several potential explanations.[1] However, in recent years a consensus seems to have developed among academic researchers that the size effect has disappeared. Several studies report that small firms have not outperformed large firms after the early 1980s.[2]

Realized stock returns can deviate significantly from expected returns over prolonged periods of time (Elton (1999)). From a standard Campbell and Shiller (1988) decomposition, we know that stock returns, by definition, must equal the sum of expected returns, cash flow shocks, and discount rate shocks. Furthermore, Vuolteenaho (2002) shows that firm-level stock returns are primarily driven by cash flow shocks. This raises the possibility that differences in cash flow shocks across small and large firms could be responsible for the observed decline in size premium since the early 1980s. In other words, the size effect may have disappeared because the returns on small firms were lower than expected due to negative in-sample cash flow shocks whereas the returns on large firms were higher than expected due to positive cash flow shocks. In this paper, we examine this hypothesis.

Consistent with our conjecture, Fama and French (2004) suggest that the poor performance of small newly listed firms after 1980 can be explained by the occurrence of a "bad draw." Chan (2003) uses a database of news headlines over the 1980-2000 period and documents that firms that experience good news are much larger than firms that experience bad news over

[1] See Van Dijk (2006) for a survey of the literature to date.

[2] Dichev (1998), Chan, Karceski, and Lakonishok (2000), Horowitz, Loughran, and Savin (2000), and Amihud (2002) find no evidence of a size effect in the 1981-1995, 1984-1998, 1979-1995, and 1980-1997 periods, respectively. Fama and French (1992, table AIV) report that the relation between stock returns and firm size is much weaker in the 1980s than in the 1960s and 1970s. Hirshleifer (2001, footnote 8) suggests 1984 as the year in which the disappearance of the size effect first materialized. Schwert (2003, p. 943) asserts that "(…) it seems that the small-firm anomaly has disappeared since the initial publication of the papers that discovered it."

this period. The 1980s and 1990s are also characterized by an unprecedented increase in competition due to industry deregulation and trade liberalization (e.g., Revenga (1992), MacDonald (1994), and Winston (1998)). There is some evidence suggesting that large firms are better equipped than small firms to cope with the challenges and opportunities of increased competition (e.g., Borenstein (1992), Sachs and Schatz (1994), and Zingales (1998)).

We analyze all NYSE, Amex, and Nasdaq stocks over the period 1963-2005. We divide the sample period in half and examine the size effect in both subperiods. For the 1963-1983 subperiod, the average value-weighted excess return is 0.93% per month for the smallest size-sorted decile portfolio and 0.11% per month for the largest decile, implying a size premium of close to 10% per annum. By way of contrast, for the 1984-2005 subperiod, small stocks on average earn a value-weighted excess return of 0.77% per month, while large stocks earn 0.71% per month, a difference of 0.07% that is both statistically and economically insignificant.

To estimate cash flow shocks at the firm level, we use the cross-sectional profitability model developed by Fama and French (2000) and extended by Fama and French (2006) and Hou and Robinson (2006). This model captures a large part of the variation in profitability across firms. Profitability shocks (realized profitability minus expected profitability) are close to zero for all size deciles for the pre-1984 subperiod. But after 1984, small firms have significantly worse than expected profitability, while large firms experience better than expected profitability.

There is a strong and positive relation between profitability shocks and realized stock returns, consistent with Vuolteenaho's (2002) finding that cash flow shocks are an important driver of individual stock returns. For our 1963-2005 sample period (and both subperiods), a zero-investment portfolio (denoted *UP* for unexpected profitability) that is long in the quintile of stocks with the highest level of profitability shocks and short in the quintile of stocks with the lowest level of profitability shocks earns an average return of close to 2% per month.

We use two methods to examine the impact of profitability shocks on the size effect. First, we compute the return premium per unit of profitability shock each month by scaling the return on the *UP* portfolio with the difference in profitability shocks between the highest and lowest profitability shock-sorted quintile portfolios. We then adjust the monthly returns on individual stocks for the price impact of profitability shocks by subtracting the product of the scaled return premiums and a firm's profitability shocks from its raw excess returns. After the adjustment, we uncover a significant size premium of 0.72% per month for the 1984-2005 subperiod. The size effect for the 1963-1983 subperiod remains highly significant after the adjustment.

In addition, we follow the approach of Brennan, Chordia, and Subrahmanyam (1998) and Chordia and Shivakumar (2006) and study the systematic price impact of profitability shocks by regressing individual stock returns on the returns of the zero-investment *UP* portfolio. After controlling for the exposure to the *UP* portfolio, we obtain a significant size premium of 0.85% per month for the post-1984 subperiod. Again, the return adjustment has little effect on the size premium for the pre-1984 subperiod.

Firm-level Fama-MacBeth (1973) cross-sectional regressions confirm the resurrection of the size effect for the post-1984 subperiod. After we adjust stock returns for the impact of profitability shocks, the average regression coefficient on size is negative and significant in all specifications and of similar magnitude for both halves of the sample period.

The size effect can largely be traced to the superior performance of small firms in January. Small firms on average outperform large firms in January by 8.47% for the 1963-1984 subperiod and by 5.09% for 1984-2005. In February-December, small firms outperform large firms by 0.36% per month pre-1984 and underperform by 0.16% per month post-1984. Our return adjustments for profitability shocks affect the size premium in January and February-December in a similar way.

This paper provides evidence in favor of a straightforward explanation for the apparent disappearance of the size effect after the early 1980s. We show that shocks to the profitability of small and large firms have caused the size premium to appear negligible in the post-1984 period. After adjusting for the price impact of these profitability shocks, the returns of small firms exceed those of large firms by close to 10% per annum for both halves of the 1963-2005 sample period. Our findings suggest that the size effect in expected stock returns is alive and well.

While it is well-known that cash flow shocks (as well as discount rate shocks) render realized stock returns an imperfect measure of expected returns, to the best of our knowledge our paper is the first study that explicitly adjusts realized returns for these shocks in order to arrive at a more accurate measure of expected returns.

The rest of the paper is structured as follows. Section 1 describes the data and summarizes the size effect for the entire sample period as well as for the pre-1984 and post 1984 subperiods. Section 2 presents our firm-level cross-sectional profitability model and demonstrates the relation between size and profitability shocks. Section 3 examines how profitability shocks affect the cross-section of stock returns. Section 4 re-estimates the size effect after adjusting realized returns for the impact of profitability shocks. Section 5 studies the interaction between the size effect and January effect before and after the profitability shock-based return adjustments. Section 6 concludes.

1. Sample Selection and Data Description

Our sample includes all NYSE, AMEX, and Nasdaq listed securities with sharecodes 10 or 11 (i.e., excluding ADRs, closed-end funds, and REITs) that are contained in the intersection of the CRSP monthly returns file and the Compustat industrial annual file between July 1963 and December 2005. Excluding financial firms and utilities does not affect our findings. Following

Fama and French (1992), we match CRSP stock return data from July of year *t* to June of year *t*+1 with Compustat accounting information for the fiscal year ending in year *t*–1. We use the following variable definitions. Size (CRSP market equity) is measured by multiplying the number of shares outstanding by the stock price at the end of June of year *t*. Earnings is operating income after depreciation from Compustat. Book equity is Compustat stockholder's equity (or common equity plus preferred stock par value, or assets minus liabilities) plus balance sheet deferred taxes and investment tax credit minus the book value of preferred stock and post retirement assets. We also obtain total assets and dividends from Compustat. In addition, the market value of a firm's assets is defined as its total assets plus Compustat market equity (stock price times the number of shares outstanding at fiscal year end) minus book equity. Finally, for some of our tests, we also calculate operating accruals using the indirect balance sheet method as the change in non-cash current assets less the change in current liabilities excluding the change in short-term debt and the change in taxes payable minus depreciation and amortization expense.

Table 1 presents the results of univariate sorts on size. At the end of June of each year between 1963 and 2005, firms are sorted into size decile portfolios based on NYSE breakpoints, and the value-weighted and equal-weighted monthly returns on the decile portfolios are calculated from July to June of next year. Table 1 reports the summary statistics (Panel A) and the average value-weighted (Panel B) and equal-weighted (Panel C) returns (in excess of the 1-month T-Bill rate) for each size portfolio as well as the differences in returns between Decile 1 (smallest) and Decile 10 (largest), for the entire sample period (1963:07-2005:12) and for the two subperiods (1963:07-1984:06 and 1984:07-2005:12). Previous studies suggest that the size effect disappears in the early 1980s (see footnote 2). As we do not want to engage in a debate on exactly when the size effect goes away, we split the sample period down the middle and contrast the two subperiods against each other throughout the paper.[3] Our main findings do not change when we use 1980 as the cut-off point instead of 1984.

Over the entire sample period, the average return spread (value-weighted) between Deciles 1 and 10 amounts to 0.44% per month (barely two standard errors from zero). Consistent with previous literature, there is a strong size effect for the first half our sample period. The average 1-10 spread is 0.82% (*t*-stat = 2.48) per month for 1963:07-1984:06, implying a size premium of close to 10% per annum over this period. By contrast, the average return spread is only 0.07% (*t*-stat = 0.21) for 1984:07-2005:12. Interestingly, the reduction in the size premium derives to a large extent from the remarkable performance of large firms, as the average excess return of Decile 10 increases from 0.11% per month for the first half of the sample period to 0.71% per month for the second half. Similar patterns can be observed in the equal-weighted average returns reported in Panel C of Table 1.

Figure 1 gives a graphical representation of the development of the size effect over time. Although there are several years before 1984 in which small firms earn lower returns than large firms, the poor performance of small firms during the second half of the sample period – and especially in the 1980s and the 1990s – is striking.

2. Measuring Profitability Shocks

Building on the work of Campbell and Shiller (1988) and Campbell (1991), a substantial body of research focuses on measuring the relative importance of cash flow shocks and discount rate shocks for stock returns. Vuolteenaho (2002) concludes that individual stock returns are predominantly driven by cash flow shocks. Campbell and Vuolteenaho (2004) present evidence

[3] Using the Andrews (1993) test for a structural change with unknown change point, we find evidence of a structural break in the size premium after 1983. The choice of our cut-off point is consistent with this breakpoint.

that a firm's beta with respect to the component of market returns reflecting cash flow news ("bad beta") carries a much higher price of risk than a firm's beta with respect to discount rate news ("good beta"). The importance of cash flow shocks as a key driver of stock returns suggests that, even if there is a significant size effect in expected returns, differences in cash flow shocks across small and large firms can obscure the size effect for certain periods. Alternatively, the substantial size effect observed in the period 1963-1983 could be driven by differences in cash flow shocks rather than differences in expected returns.

To explore this issue, we use the profitability models in Fama and French (2000, 2006) and Hou and Robinson (2006). Specifically, we estimate, for each year during our sample period, a cross-sectional regression of profitability on variables that have been shown to capture differences in expected profitability across firms:

$$\frac{E_{t+1}}{A_t} = \alpha_0 + \alpha_1 \frac{V_t}{A_t} + \alpha_2 DD_t + \alpha_3 \frac{D_t}{B_t} + \alpha_4 \frac{E_t}{A_{t-1}} + \eta_{t+1}, \qquad (1)$$

where E_{t+1}/A_t is earnings in year t+1 scaled by lagged total assets, V_t/A_t is the ratio of the market value to the book value of assets, DD_t is a dummy variable that equals 0 for dividend payers and 1 for non-payers, and D_t/B_t is the ratio of dividend payments to book equity. All explanatory variables are measured at the end of year t.

Firms with total assets or book equity close to zero could produce extreme observations in the variables in (1). To prevent these extreme observations from dominating the profitability regressions, we exclude firms with total assets less than \$5 million and book equity less than \$3 million. In addition, we winsorize E_{t+1}/A_t, V_t/A_t, and D_t/B_t annually at the 0.5% and 99.5% percentiles. Our results are robust to changing the asset and book equity cut-offs or removing the winsorization.

We estimate the profitability model annually from 1963 to 2005. Then, for each firm in the sample, we compute the expected profitability for year t+1 ($E[E_{t+1}/A_t]$) using the independent variables observed at the end of year t and the regression coefficients from the profitability regression the year before (that is, the regression in which E_t/A_{t-1} is regressed on independent variables measured at the end of year t–1, to ensure that all the information necessary to forecast year t+1 profitability is available at the end of year t). The unexpected profitability (or profitability shock) for year t+1 is then calculated as the difference between realized and expected profitability.

Table 2 presents the average coefficients from the annual profitability regressions as well as their time series t-statistics for the 1963-2005 period and for the two subperiods 1963-1983 and 1984-2005. Our numbers are similar to those reported in Fama and French (2000, 2006) and Hou and Robinson (2006). Over the entire sample period, profitability is positively related to the market-to-book ratio and the dividend-to-book ratio, suggesting that firms with higher market-to-book ratios (commonly used as a proxy for Tobin's Q) and those that pay out more dividends tend to be more profitable. The coefficient on DD_t is negative, confirming the findings in Fama and French (2001) that non-dividend payers tend to be much less profitable than dividend payers. The coefficient on lagged profitability is large and positive, suggesting that profitability is highly persistent. All coefficients are statistically significant and the model explains around 60% of the cross-sectional variation in profitability. Table 2 also presents the estimation results of extended profitability models that include a negative earnings dummy, asset growth, and positive and negative accruals (following Fama and French (2006)). Although several of these variables have coefficients that differ significantly from zero, they do not improve the explanatory power of the model by much. Therefore, we focus on the basic profitability model for the rest of the paper. (The results are slightly stronger when we use the extended models.)

Table 3 reports the average expected and unexpected profitability for size deciles. There is no discernable pattern in the unexpected profitability (or profitability shock) across size deciles for the 1963-1983 subperiod. Profitability shocks are close to zero for all size deciles, in both economic and statistical terms. The difference in unexpected profitability between Deciles 1 and 10 is also not statistically distinguishable from zero. By way of contrast, unexpected profitability and size are strongly positively correlated for the 1984-2005 subperiod. Firms in the smallest size decile experience a value-weighted average profitability shock of −1.23% per year (*t*-stat = −4.41), which represents a negative shock that amounts to 50% of the magnitude of their expected profitability (2.45%). Firms in the largest size decile show a positive profitability shock of 1.92% per year on average (*t*-stat = −4.96).

The equal-weighted results (Panel B) exhibit a similar pattern. None of the size deciles exhibits significant profitability shocks for the first half of the sample, but small firms experience large negative shocks and large firms experience large positive shocks after 1983. Table 3 also shows that, especially for small firms, expected profitability declines over the sample period, in line with the findings of Fama and French (2004).

These results suggest that the spread in the expected returns between small and large firms for the second half of the sample period could be more positive than the realized size premium implies. Our estimates of the profitability shocks for size deciles show that the performance of small firms is unexpectedly poor and the performance of large firms is unexpectedly strong for the 1984-2005 period. In the next section, we investigate how profitability shocks are related to stock returns.

3. Profitability Shocks and the Cross-Section of Stock Returns

To study the impact of profitability shocks on stock returns, at the beginning of each year *t* between 1963 and 2005, we sort firms into quintile portfolios based on their profitability shocks for that year using NYSE breakpoints. Table 4 reports the average value-weighted (Panel A) and equal-weighted (Panel B) profitability shocks for the quintile portfolios. Our profitability model produces substantial cross-sectional variation in unexpected profitability. For the entire 1963-2005 sample period, Quintile 1 shows an average profitability shock of −6.15% per annum, while Quintile 5 shows a positive shock of 7.61% per annum. We also observe a similar dispersion in profitability shocks in both subperiods.

The table also presents average value-weighted and equal-weighted monthly excess returns for year *t* on the quintile portfolios, as well as the return difference between Quintile 5 (highest profitability shocks) and Quintile 1 (lowest profitability shocks). The relation between contemporaneous returns and profitability shocks is positive and highly significant. For the whole 1963:07-2005:12 sample period, the average value-weighted excess return increases monotonically from −0.60% per month for Quintile 1 to 1.38% per month for Quintile 5. The spread between the two is 1.98% per month with a *t*-statistic of 14.54.

To examine whether the stock price reaction is symmetric for positive and negative shocks, we regress the excess returns on the quintile portfolios on the market excess returns. The CAPM alpha is −1.11% per month for Quintile 1 versus 0.86% for Quintile 5, suggesting that stock prices react more strongly to negative profitability shocks than to positive shocks. (We note that the average shock is bigger in magnitude for Quintile 5 than for Quintile 1.)

The results for the two subperiods are very similar to those for the whole sample period, in terms of the magnitude of the profitability shocks, the excess returns, and the CAPM alphas. The equal-weighted results in Panel B of Table 4 show even greater spreads in profitability shocks and returns. The average 5-1 return spread is over 3% per month for the entire sample period as well as for the two subperiods.

Our analysis so far shows that small firms experience negative profitability shocks for the second half of our sample period whereas large firms experience positive shocks. We also find a strong positive relation between profitability shocks and contemporaneous stock returns. In the next section, we examine whether the size effect for 1984-2005 can be restored by adjusting realized stock returns of individual firms for the impact of unexpected shocks to their profitability.

4. Profitability Shocks and the Size Effect

We use two different methods to adjust realized stock returns for the price impact of profitability shocks. The first approach corrects individual stock returns for the observed contemporaneous relation between returns and profitability shocks across firms. More specifically, we measure the price impact per unit of profitability shock by dividing the return difference between the highest and lowest profitability shock-sorted quintile portfolios each month by the difference in profitability shocks between the two extreme quintiles. We then subtract this scaled return multiplied by a firm's profitability shock from its raw excess return to obtain an estimate of the return adjusted for the effect of profitability shocks.

In the second method, we use the approach in Brennan, Chordia, and Subrahmanyam (1998) and Chordia and Shivakumar (2006) to measure the systematic price impact of profitability shocks by regressing individual stock returns on a zero investment portfolio (*UP* portfolio henceforth) that longs the quintile of firms with the highest (positive) profitability shocks and shorts the quintile of firms with the lowest (negative) shocks. We use value-weighted returns on the *UP* portfolio to obtain a conservative estimate of adjusted returns. (Using equal-weighted returns produces considerably stronger results.) We also include the market excess returns in the regressions to correct for the market exposure of the *UP* portfolio. The regressions are estimated with 60 months (36 months minimum) of monthly returns ending in June of each year, and each stock's adjusted returns are calculated from July to June next year by subtracting the product of the estimated *UP* loading and the returns on the *UP* portfolio from its raw excess returns.[4] We note that this adjustment method uses a slightly smaller sample of firms due to the minimum of three years of past returns requirement. It also means that the first subperiod starts in 1966:07 instead of 1963:07 under this return adjustment.

Table 5 presents average unadjusted and adjusted returns (both value-weighted and equal-weighted) of the size decile portfolios, as well as the 1-10 spread for the entire sample period and for the two subperiods. To be included in the analysis, a firm has to have sufficient information to calculate its profitability shocks. This data requirement increases the value-weighted size premium based on raw excess returns from 0.44% per month (*t*-stat = 1.94) to 0.65% (t-stat = 2.87). A similar increase in premium applies to the equal-weighted results.

For the whole sample period, adjusting individual stock returns for the impact of profitability shocks raises the value-weighted size premium by about 0.20% per month. This increase stems primarily from the return adjustments for the second half of the sample period. For 1963:07-1984:06, we see only minor changes in the size premium after the return adjustments (for example, the size premium decreases slightly from 1.05% per month unadjusted to 0.98% per month under the first adjustment procedure), consistent with the findings in Table 3 that profitability shocks are close to zero for both small and large firms during this period.

[4] As a robustness check, we also use the Dimson (1979) procedure with one lag to account for thin trading when estimating the *UP* loadings, and find the return adjustment results to be slightly stronger.

In contrast to the pre-1984 period, for 1984:07-2005:12 the size premium increases from 0.27% per month (*t*-stat = 0.91) unadjusted to 0.72 % per month (*t*-stat = 2.32) adjusted using the first method (Adjustment 1), and to 0.85% (*t*-stat = 2.66) using the second method (Adjustment 2). The increase in the size premium derives from both the long side (small firms) and the short side (large firms). For example, under Adjustment 1, the average return on small firms (Decile 1) increases from 0.97% per month to 1.26% per month, whereas the average return on large firms (Decile 10) decreases from 0.70% per month to 0.54% per month. These results are in line with our findings in Table 3 that during the second half of our sample period small firms experience negative profitability shocks while large firms experience positive shocks. The equal-weighted results in Panel B of Table 5 display comparable patterns.

Table 6 examines the interaction between profitability shocks and the size effect using monthly Fama and MacBeth (1973) cross-sectional regressions of individual stocks' unadjusted and adjusted returns on size.[5] These regressions complement and provide further robustness checks to our portfolio-based results in Table 5 by using all firms without imposing decile breakpoints, and therefore steering clear of the potential data-snooping biases in the portfolio-based approaches (see, e.g., Lo and MacKinlay (1990) and Ferson, Sarkissian, and Simin (1999)). They also provide an alternative weighting scheme to the value-weighted and equal-weighted portfolios employed in Table 5. Each coefficient from a cross-sectional regression is the return to a zero-cost minimum variance portfolio with a weighted average value of size equal to one. The weights are tilted towards small and volatile stocks. In addition, using adjusted returns as the dependent variable of the cross-sectional regressions allows us to avoid the error-in-variable problems created by errors in estimated profitability shocks and loadings on the *UP* portfolio (the

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[5] The tenor of the results is unchanged when we include the book-to-market ratio and past twelve months' return (skipping the most recent month) to control for the value and momentum effects.

long-short profitability shock-based portfolio) for individual firms, because these errors are impounded in the dependent variable directly.

Table 6 reports the averages of the monthly regression coefficients as well as their time series *t*-statistics. The first column of Table 3 shows that size is strongly negatively related to average unadjusted excess returns for the entire sample period and for the pre-1984 subperiod, but not for the post-1984 subperiod. The average coefficient on size is equal to −0.17 (*t*-stat = 3.95) for 1963:07-2005:12, −0.22 (*t*-stat = −3.30) for 1963:07-1984:06, and −0.11 (*t*-stat = −1.83) for 1984:07-2005:12. The significance of the size effect appears to be stronger than the results in Table 5 from value-weighed decile portfolios, but in line with the equal-weighted portfolio results. This is not surprising since Fama-MacBeth regressions minimize least squares, which tends to put more weight on small and volatile stocks among which the size effect is more pronounced.

The next three columns of Table 6 report regression results for adjusted returns. Adjusting individual stock returns for the impact of profitability shocks clearly strengthens the significance of the size effect, especially for the second half of the sample period. For the entire sample period, the average coefficient on size increases from −0.17 to −0.22 (*t*-stat = −4.98) under Adjustment 1, and only slightly to −0.19 (*t*-stat = −3.89) under Adjustment 2. More impressively, for the second half of the sample period, the two return adjustment methods raise the coefficient on size from −0.11 to −0.23 (*t*-stat = −3.90) and −0.17 (*t*-stat = −2.86), respectively. The average coefficient on size for the first subperiod is virtually unaffected by the return adjustments.

The last column of Table 6 presents “purged” estimates of the coefficient on size when returns are adjusted according to the second method. Brennan, Chordia, and Subrahmanyam (1998) and Chordia and Shivakumar (2006) demonstrate that when individual stock returns adjusted for their exposure to known risk factors are used in Fama-MacBeth regressions, the monthly regression coefficient estimates will be correlated with the factor realizations if the errors in the estimated factor loadings are correlated with the independent variables. In our context, this argument implies that the average coefficient on size could be biased by an amount that depends on the average return of the *UP* portfolio. To account for this potential bias, we follow Black, Jensen, and Scholes (1972) and regress the monthly coefficient estimates on size on the returns of the *UP* portfolio, and obtain the purged estimator as the intercept from the time series regression. These purged estimates are very similar to the average coefficients reported in the column before, suggesting that our Fama-MacBeth regressions are not affected by the aforementioned bias. They also confirm the resurrection of the size effect in adjusted returns for the second half of our sample period.

In sum, the results in Tables 5 and 6 suggest that unexpected returns driven by in-sample profitability shocks are responsible for the disappearance of the size effect after the early 1980s. After adjusting for the impact of profitability shocks on stock returns, we are able to uncover a significant size premium for the post-1984 period.

5. The January Effect

Brown, Kleidon, and Marsh (1983), Keim (1983), and Reinganum (1983) link the size effect to the January seasonal in stock returns (Rozeff and Kinney (1976)). Both the size effect and the January effect can to a large extent be attributed to the extraordinary return performance of small firms in January. Extant explanations for the January effect include tax-loss selling by retail investors (e.g., Keim (1983) and Reinganum (1983)) and institutional window dressing (e.g., Ritter and Chopra (1989)). The goal of our paper is not to evaluate alternative explanations for the January effect. Nevertheless, it is interesting to examine whether there remains a strong January seasonal in the returns of small firms after the early 1980s. We also want to investigate how the return adjustments for profitability shocks affect small and large firms in January versus other months.

Table 7 presents the average unadjusted and adjusted returns of size deciles for January and for February-December. The results based on unadjusted returns show a strong January effect for both halves of our sample period. For 1963:07-1884:06, small firms outperform large firms by 8.47% per month (*t*-stat = 6.01) in January when value-weighted, and by only 0.36% per month (*t*-stat = 1.15) in February-December. For the later 1984:07-200512 period, small firms outperform large firms by 5.09% per month (*t*-stat = 3.70), and actually underperform large firms by 0.16% per month (*t*-stat = −0.55) in February-December.

Adjusting returns for the impact of profitability shocks affects the size premium in January and February-December in a similar way. For instance, over the 1984:07-2005:12 period, Adjustment 1 raises the size premium in January by 0.55% (from 5.09% to 5.64%) and in February-December by 0.44% (from −0.16% to 0.28% per month). Adjustment 2 increases the size premium in January by 0.53% and in February-December by 0.59%.

Cross-sectional Fama-MacBeth regressions (not tabulated) confirm the results from Table 7. We find a significantly negative coefficient on size in January for both subperiods when unadjusted returns are used in the regressions. In February-December, however, size is not significantly correlated with average returns. When we use adjusted returns in the regressions, the coefficient on size becomes considerably more negative for the 1984:07-2005:12 period. The magnitude of the change in the coefficient is similar for January and for February-December. There is little difference between the results based on the two adjustment methods.

The results in this section show that there still is a strong January effect for the second half of our sample period. Despite the fact that the size premium over the entire year is insignificant for the post-1984 period, small firms continue to produce significantly higher returns than large firms in January. Furthermore, the return adjustments for profitability shocks have a comparable impact on the size premium in January and in February-December, suggesting that profitability shocks are impounded into stock prices equally throughout the year.

6. Conclusion

The size effect in the cross-section of stock returns is one of the oldest and most-studied asset pricing anomalies. It was widely accepted by researchers that small firms earn higher returns than large firms – until the mysterious disappearance of the size effect in the early 1980s. Our paper examines the possibility that differences across firms in unexpected returns that arise from in-sample profitability shocks are responsible for the disappearance of the size effect.

To investigate this hypothesis, we estimate expected and unexpected profitability of individual firms using a cross-sectional profitability model. We show that profitability shocks are close to zero for small and large firms over the 1963-1983 period, but there is a clear positive relation between profitability shocks and size after 1983. Small firms experience substantial negative shocks to their profitability, while large firms experience positive shocks for the 1984-2005 period. Furthermore, we find a strong and monotonically positive relation between profitability shocks and stock returns. A zero-investment portfolio constructed on the basis of profitability shocks produces an average return of almost 2% per month. After adjusting for the price impact of profitability shocks, we uncover a significant size premium for the post-1984 period. The resurrection of the size effect for the second half of our sample period is robust to alternative profitability models, different return adjustments, and different test methods.

The results in this paper are not only relevant for academic researchers, but also for investment practitioners who are interested in the role of size in portfolio optimization, active-risk budgeting, performance evaluation, and style/attribution analysis. Our analysis indicates that tilting equity portfolios toward small cap stocks produces systematically higher expected returns over a prolonged period of time. While small firms may again suffer from negative profitability shocks in the future, we show that the size effect in expected returns has not gone away.

There are a number of interesting areas for future research. First, we hope that the finding that the size effect in expected returns has not disappeared will lead to a revival of academic research on the underlying causes of the size effect, which has dried up in recent years.

Second, we show that the differences between realized and expected returns have a substantial impact on the size effect. In a concurrent paper, we examine the implications of these differences for a broad range of anomalies studied in the asset pricing literature.

Third, there may be room for improvement in the way we adjust realized stock returns to obtain a better measure of expected returns. For example, we do not control for discount rate shocks in our analysis, yet they may have a non-trivial effect on realized returns. We leave a thorough investigation of this and other issues for future research.

Our results also beg the question: What economic forces are behind the negative profitability shocks to small firms and positive shocks to large firms after the early 1980s? A possible explanation for the poor performance small firms is the "new lists" effect documented by Fama and French (2004). They report that the number of newly listed firms on major U.S. exchanges increases dramatically in the 1980s and 1990s. However, both the profitability and the survival rate of these newly listed firms decline sharply over this period, especially for small new lists. They postulate that a decline in the cost of equity allows weaker firms and firms with more distant expected payoffs to raise equity, and raise the possibility that "(…) ex post, a bad draw occurs; the failure rates of the new weaker class of new lists turn out to be higher than was rationally anticipated ex ante, and the overall new list returns are low." For the second half of our sample period, newly listed firms make up a substantial fraction of the firms in the smallest size decile. The negative profitability shocks we observe for small firms during this period might thus to a considerable extent stem from the poor performance of these new lists.

Another potential explanation for the opposite profitability shocks to small and large firms is greater competition. The U.S. economy has become increasingly open in the 1980s and 1990s, with the ratification of the 1979 Tokyo round of the GATT, the 1988 Canada-U.S. Free Trade Agreement, and NAFTA in 1993 as legislative landmarks of trade liberalization. One of the consequences is a strong and steady rise in import penetration ratios (see, e.g., Revenga (1992) and MacDonald (1994)). Also, starting in the late 1970s, we see a wave of deregulation in many U.S. industries. Adjustments of deregulated industries to their new competitive environment can take decades and the consequences for the performance of different companies are hard to anticipate (Winston (1998)). It is possible that large firms turn out be relatively more effective in dealing with increased competition than small firms. Consistent with this argument, Sachs and Schatz (1994) document that large multinationals play an important role in the dramatic increase in international trade. Borenstein (1992) and Mitchell and Mulherin (1996) show that deregulation forces firms to consolidate in the 1980s and 1990s. The results of Zingales (1998) suggest that large firms are more likely to survive after deregulation, consistent with the models of Telser (1966) and Bolton and Scharfstein (1990). A full investigation of these potential explanations may prove to be yet another fruitful area of academic research.

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Table 1: Summary Statistics for Size Deciles

This table reports the average number of firms, the value-weighted (VW) and equal-weighted (EW) average size in billions of dollars (Panel A), the value-weighted (Panel B) and equal-weighted (Panel C) average returns (in excess of the risk-free rate) in percent per month and their *t*-statistics for decile portfolios of NYSE, Amex, and Nasdaq stocks formed on the basis of their market equity at the end of June of each year using NYSE breakpoints, as well as the return spread between Deciles 1 and 10. Results are reported for the full 1963:07-2005:12 sample period and for the 1963:07-1984:06 and 1984:07-2005:12 subperiods.

Panel A: Summary Statistics

	Small	2	3	4	5	6	7	8	9	Big
1963:07-2005:12										
# of firms	2,299	550	365	288	242	206	183	171	157	151
VW size	0.04	0.10	0.16	0.25	0.38	0.58	0.90	1.54	3.07	35.34
EW size	0.02	0.09	0.16	0.25	0.38	0.57	0.88	1.49	2.93	14.49
1963:07-1984:06										
# of firms	1,644	353	257	218	196	168	155	147	139	137
VW size	0.02	0.04	0.06	0.08	0.12	0.18	0.28	0.45	0.77	10.73
EW size	0.01	0.04	0.06	0.08	0.12	0.18	0.27	0.44	0.75	3.22
1984:07-2005:12										
# of firms	2,939	743	471	356	288	242	211	195	175	164
VW size	0.06	0.15	0.27	0.42	0.64	0.96	1.50	2.57	5.27	58.83
EW size	0.04	0.15	0.26	0.41	0.63	0.95	1.47	2.50	5.00	25.26

Panel B: Value-Weighted Average Returns

	Small	2	3	4	5	6	7	8	9	Big	Small-Big
1963:07-2005:12											
VW excess return	0.85	0.65	0.70	0.69	0.72	0.60	0.68	0.62	0.54	0.41	0.44
t-statistic	*2.92*	*2.29*	*2.57*	*2.59*	*2.80*	*2.48*	*2.89*	*2.71*	*2.57*	*2.15*	*1.94*
1963:07-1984:06											
VW excess return	0.93	0.66	0.67	0.69	0.61	0.45	0.43	0.40	0.23	0.11	0.82
t-statistic	*2.08*	*1.60*	*1.68*	*1.80*	*1.69*	*1.29*	*1.25*	*1.26*	*0.78*	*0.42*	*2.48*
1984:07-2005:12											
VW excess return	0.77	0.64	0.73	0.69	0.82	0.75	0.93	0.83	0.84	0.71	0.07
t-statistic	*2.05*	*1.64*	*1.96*	*1.86*	*2.25*	*2.22*	*2.86*	*2.54*	*2.80*	*2.50*	*0.21*

Table 1, continued

Panel C: Equal-Weighted Average Returns											
	Small	2	3	4	5	6	7	8	9	Big	Small-Big
1963:07-2005:12											
EW excess return	1.11	0.67	0.71	0.69	0.72	0.60	0.67	0.61	0.55	0.42	0.69
t-statistic	*3.72*	*2.36*	*2.58*	*2.59*	*2.79*	*2.48*	*2.86*	*2.67*	*2.60*	*2.10*	*2.88*
1963:07-1984:06											
EW excess return	1.15	0.67	0.68	0.69	0.61	0.45	0.42	0.39	0.24	0.12	1.04
t-statistic	*2.53*	*1.63*	*1.70*	*1.79*	*1.69*	*1.30*	*1.23*	*1.22*	*0.81*	*0.43*	*3.03*
1984:07-2005:12											
EW excess return	1.07	0.66	0.73	0.69	0.82	0.74	0.92	0.83	0.85	0.72	0.35
t-statistic	*2.76*	*1.70*	*1.96*	*1.86*	*2.24*	*2.21*	*2.83*	*2.53*	*2.81*	*2.48*	*1.05*

Table 2: Fama and MacBeth (1973) Cross-Sectional Profitability Regressions

This table reports the average slopes and their time series *t*-statistics from annual cross-sectional regressions of profitability (earnings scaled by lagged total assets, E_{t+1}/A_t) on variables that are hypothesized to capture differences in expected profitability across firms. V_t/A_t is the market-to-book ratio of a firm's assets. DD_t is a dummy variable that equals 0 for dividend payers and 1 for non-dividend payers. D_t/B_t is the ratio of dividends to book equity. *Neg* E_t is a dummy variable that equals 1 for firms with negative earnings (0 otherwise). dA_t/A_t is the growth rate of total assets. $-AC_t/B_{t-1}$ and $+AC_t/B_{t-1}$ are operating accruals for firms with negative and positive accruals, respectively. The regressions are run annually between 1963 and 2005. Results are presented for the full 1963-2005 sample period as well as for the 1963-1983 and 1984-2005 subperiods.

	Intercept	V_t/A_t	DD_t	D_t/B_t	E_t/A_{t-1}	*Neg* E_t	dA_t/A_{t-1}	$-AC_t/A_{t-1}$	$+AC_t/A_{t-1}$	Adj. R^2
1963-2005										
Coefficient	0.0153	0.0059	-0.0075	0.2067	0.6926					0.60
t-statistic	*11.21*	*4.09*	*-5.84*	*10.58*	*53.43*					
Coefficient	0.0176	0.0070	-0.0053	0.1464	0.7208	-0.0075	-0.0357			0.61
t-statistic	*12.28*	*4.27*	*-4.67*	*6.56*	*45.87*	*-1.82*	*-5.58*			
Coefficient	0.0185	0.0070	-0.0071	0.1453	0.7242	-0.0105	-0.0238	-0.0570	-0.1094	0.61
t-statistic	*10.00*	*4.11*	*-5.76*	*6.40*	*48.50*	*-2.36*	*-3.91*	*-4.29*	*-9.94*	
1963-1983										
Coefficient	0.0125	0.0124	-0.0025	0.2043	0.6934					0.63
t-statistic	*6.60*	*7.92*	*-1.79*	*6.14*	*40.58*					
Coefficient	0.0146	0.0140	-0.0031	0.0785	0.7752	0.0111	-0.0717			0.64
t-statistic	*7.54*	*7.58*	*-2.23*	*2.29*	*46.43*	*5.81*	*-15.77*			
Coefficient	0.0155	0.0143	-0.0031	0.0786	0.7740	0.0102	-0.0585	-0.0107	-0.0786	0.63
t-statistic	*7.21*	*7.14*	*-2.18*	*2.33*	*48.62*	*4.85*	*-13.63*	*-0.82*	*-6.49*	
1984-2005										
Coefficient	0.0182	-0.0005	-0.0126	0.2091	0.6917					0.58
t-statistic	*10.02*	*-0.38*	*-8.24*	*9.79*	*34.72*					
Coefficient	0.0204	0.0003	-0.0075	0.2110	0.6691	-0.0252	-0.0015			0.58
t-statistic	*10.49*	*0.16*	*-4.40*	*9.87*	*32.00*	*-4.60*	*-0.32*			
Coefficient	0.0213	0.0000	-0.0108	0.2090	0.6768	-0.0302	0.0092	-0.1010	-0.1388	0.59
t-statistic	*7.39*	*0.01*	*-6.73*	*8.76*	*33.38*	*-5.21*	*2.25*	*-5.51*	*-8.73*	

Table 3: Expected and Unexpected Profitability for Size Deciles

This table reports the value-weighted (Panel A) and equal-weighted (Panel B) average expected and unexpected profitability (in percent) of the size decile portfolios. Expected profitability is the one-period ahead forecast of profitability. Unexpected profitability is the difference between realized profitability and expected profitability. The final column reports the *t*-statistics for the null that the expected and unexpected profitability for Decile 1 are equal to those for Decile 10. Results are presented for the full 1963-2005 sample period as well as for the 1963-1983 and 1984-2005 subperiods.

Panel A: Value-Weighted Average Expected and Unexpected Profitability

	Small	2	3	4	5	6	7	8	9	Big	*t*(Small=Big)
1963-2005											
VW expected profitability	6.33	8.83	9.91	10.81	11.65	11.91	12.51	12.51	12.42	15.42	10.00
t-statistic	*8.32*	*11.96*	*15.76*	*19.12*	*20.76*	*22.89*	*26.70*	*29.87*	*29.47*	*31.05*	
VW unexpected profitability	-0.66	-0.04	0.45	0.64	0.94	0.98	0.89	0.88	0.66	0.99	4.33
t-statistic	*-2.75*	*-0.18*	*2.25*	*2.87*	*3.88*	*4.31*	*3.90*	*3.60*	*2.70*	*3.34*	
1963-1983											
VW expected profitability	10.60	12.78	13.16	13.55	14.30	14.25	14.80	14.52	14.43	18.01	9.03
t-statistic	*17.36*	*20.62*	*24.58*	*24.98*	*26.29*	*27.40*	*29.88*	*32.62*	*32.76*	*32.85*	
VW unexpected profitability	-0.07	0.13	0.28	0.17	0.36	0.39	0.20	0.04	-0.19	0.02	0.18
t-statistic	*-0.19*	*0.29*	*0.81*	*0.47*	*0.98*	*1.16*	*0.62*	*0.11*	*-0.67*	*0.06*	
1984-2005											
VW expected profitability	2.45	5.23	6.95	8.32	9.23	9.78	10.43	10.68	10.59	13.07	15.51
t-statistic	*4.15*	*8.05*	*11.51*	*14.49*	*15.69*	*16.92*	*24.32*	*27.05*	*25.89*	*37.81*	
VW unexpected profitability	-1.23	-0.21	0.61	1.09	1.49	1.54	1.54	1.68	1.46	1.92	6.61
t-statistic	*-4.41*	*-0.89*	*2.84*	*4.86*	*5.46*	*5.92*	*6.07*	*5.96*	*4.82*	*4.96*	

Table 3, continued

Panel B: Equal-Weighted Average Expected and Unexpected Profitability											
	Small	2	3	4	5	6	7	8	9	Big	*t*(Small=Big)
1963-2005											
EW expected profitability	5.17	8.77	9.87	10.76	11.64	11.89	12.51	12.52	12.41	14.10	10.01
t-statistic	*6.89*	*11.85*	*15.65*	*18.93*	*20.85*	*22.95*	*26.41*	*30.02*	*29.15*	*29.14*	
EW unexpected profitability	-0.90	-0.07	0.45	0.64	0.94	0.96	0.89	0.88	0.63	0.79	5.11
t-statistic	*-3.89*	*-0.30*	*2.25*	*2.89*	*3.92*	*4.24*	*3.96*	*3.65*	*2.62*	*3.34*	
1963-1983											
EW expected profitability	9.51	12.75	13.14	13.53	14.28	14.23	14.83	14.51	14.46	16.48	8.79
t-statistic	*16.17*	*20.56*	*24.74*	*25.11*	*26.09*	*27.70*	*29.89*	*32.85*	*32.08*	*30.99*	
EW unexpected profitability	-0.31	0.13	0.29	0.18	0.38	0.37	0.21	0.04	-0.18	-0.03	0.61
t-statistic	*-0.89*	*0.30*	*0.84*	*0.48*	*1.03*	*1.11*	*0.66*	*0.14*	*-0.64*	*-0.12*	
1984-2005											
EW expected profitability	1.22	5.14	6.89	8.25	9.24	9.76	10.41	10.70	10.54	11.94	16.32
t-statistic	*2.41*	*8.03*	*11.43*	*14.28*	*15.88*	*16.95*	*23.81*	*26.89*	*26.25*	*28.66*	
EW unexpected profitability	-1.46	-0.27	0.59	1.08	1.47	1.53	1.54	1.69	1.40	1.58	8.05
t-statistic	*-5.77*	*-1.11*	*2.87*	*4.89*	*5.56*	*5.82*	*6.19*	*6.10*	*4.64*	*5.64*	

Table 4: Average Returns of Portfolios Sorted on Unexpected Profitability

This table reports both value-weighted (Panel A) and equal-weighted (Panel B) average unexpected profitability, returns (in excess of the risk-free rate) in percent per month, CAPM intercepts, and their corresponding *t*-statistics for quintile portfolios formed on the basis of unexpected profitability using NYSE breakpoints, as well as the differences between Quintile 5 and Quintile 1. Results are reported for the full 1963:07-2005:12 sample period as well as for the 1963:07-1984:06 and 1984:07-2005:12 subperiods.

Panel A: Value-Weighted Average Unexpected Profitability and Returns

	Low	2	3	4	High	High-Low
1963:07-2005:12						
VW unexpected profitability	-6.15	-1.52	0.22	2.16	7.61	13.76
t-statistic	*-15.31*	*-9.09*	*1.34*	*11.18*	*20.42*	*23.12*
VW excess return	-0.60	0.19	0.54	0.80	1.38	1.98
t-statistic	*-2.51*	*0.94*	*2.67*	*3.94*	*5.71*	*14.54*
CAPM α	-1.11	-0.24	0.10	0.36	0.86	1.97
t-statistic	*-11.79*	*-3.39*	*1.56*	*5.57*	*10.44*	*14.38*
1963:07-1984:06						
VW unexpected profitability	-5.84	-1.83	-0.13	1.68	6.50	12.35
t-statistic	*-11.68*	*-6.32*	*-0.46*	*5.36*	*14.88*	*27.31*
VW excess return	-0.76	-0.18	0.34	0.64	1.21	1.97
t-statistic	*-2.37*	*-0.63*	*1.20*	*2.22*	*3.63*	*11.31*
CAPM α	-0.99	-0.38	0.14	0.44	0.98	1.97
t-statistic	*-10.76*	*-4.46*	*1.95*	*5.19*	*8.32*	*11.26*
1984:07-2005:12						
VW unexpected profitability	-6.44	-1.23	0.56	2.63	8.66	15.11
t-statistic	*-10.26*	*-7.73*	*3.64*	*13.92*	*17.13*	*15.02*
VW excess return	-0.45	0.55	0.73	0.96	1.54	1.99
t-statistic	*-1.25*	*1.95*	*2.58*	*3.35*	*4.43*	*9.49*
CAPM α	-1.24	-0.09	0.08	0.29	0.72	1.96
t-statistic	*-7.50*	*-0.83*	*0.71*	*2.92*	*6.32*	*9.24*

Table 4, continued

Panel B: Equal-Weighted Average Unexpected Profitability and Returns						
	Low	2	3	4	High	High-Low
1963:07-2005:12						
EW unexpected profitability	-9.07	-1.57	0.24	2.22	8.86	17.93
t-statistic	*-21.15*	*-9.41*	*1.46*	*11.79*	*21.27*	*24.59*
EW excess return	-0.60	0.39	0.80	1.33	2.64	3.24
t-statistic	*-2.04*	*1.74*	*3.43*	*5.33*	*8.79*	*35.13*
CAPM α	-1.15	-0.05	0.33	0.83	2.05	3.20
t-statistic	*-6.78*	*-0.44*	*2.91*	*6.85*	*13.27*	*35.07*
1963:07-1984:06						
EW unexpected profitability	-7.28	-1.83	-0.08	1.77	7.14	14.43
t-statistic	*-15.88*	*-6.31*	*-0.27*	*5.86*	*17.71*	*30.13*
EW excess return	-0.78	0.17	0.73	1.28	2.44	3.22
t-statistic	*-1.88*	*0.48*	*1.98*	*3.33*	*5.55*	*24.82*
CAPM α	-1.04	-0.06	0.49	1.03	2.16	3.20
t-statistic	*-4.82*	*-0.38*	*3.04*	*6.14*	*10.34*	*25.37*
1984:07-2005:12						
EW unexpected profitability	-10.77	-1.32	0.55	2.65	10.49	21.26
t-statistic	*-22.42*	*-8.16*	*3.40*	*13.73*	*20.72*	*24.92*
EW excess return	-0.42	0.60	0.87	1.37	2.83	3.25
t-statistic	*-1.00*	*2.30*	*3.04*	*4.35*	*6.93*	*24.82*
CAPM α	-1.24	0.05	0.26	0.70	1.98	3.22
t-statistic	*-4.69*	*0.37*	*1.72*	*4.22*	*8.75*	*24.33*

Table 5: Average Unadjusted and Adjusted Returns for Size Deciles

This table shows value-weighted (Panel A) and equal-weighted (Panel B) average unadjusted and adjusted returns (in percent per month) and their t-statistics for the size decile portfolios as well as the return differences between Deciles 1 and 10. Unadjusted returns are raw returns in excess of the risk-free rate. Adjusted returns 1 are computed by subtracting from the raw excess returns of a firm the product of its unexpected profitability and the return difference between the high and low unexpected profitability-sorted portfolios scaled by the difference in unexpected profitability between the two portfolios. Adjusted returns 2 are computed by running, for each firm, rolling 60-month regressions of excess returns on the market excess return and returns on the long-short quintile spread portfolio based on unexpected profitability (*UP* portfolio) and subtracting the estimated loadings on the *UP* portfolio multiplied by the returns on the *UP* portfolio from the raw excess returns. Results are reported for the full 1963:07-2005:12 sample period as well as for the 1963:07-1984:06 and 1984:07-2005:12 subperiods.

Panel A: Value-Weighted Average Returns

	Small	2	3	4	5	6	7	8	9	Big	Small-Big
1963:07-2005:12											
VW excess return	1.06	0.78	0.75	0.76	0.81	0.65	0.71	0.67	0.57	0.40	0.65
t-statistic	*3.60*	*2.76*	*2.77*	*2.85*	*3.15*	*2.69*	*2.98*	*2.90*	*2.74*	*2.08*	*2.87*
VW adjusted return 1	1.19	0.85	0.75	0.73	0.76	0.59	0.65	0.61	0.53	0.34	0.85
t-statistic	*4.00*	*2.93*	*2.72*	*2.71*	*2.92*	*2.40*	*2.64*	*2.61*	*2.47*	*1.72*	*3.68*
VW adjusted return 2	1.11	0.90	0.83	0.78	0.87	0.69	0.73	0.72	0.56	0.25	0.86
t-statistic	*3.46*	*2.92*	*2.82*	*2.72*	*3.14*	*2.65*	*2.86*	*2.93*	*2.52*	*1.17*	*3.39*
1963:07-1984:06											
VW excess return	1.15	0.85	0.73	0.76	0.77	0.54	0.50	0.47	0.27	0.09	1.05
t-statistic	*2.47*	*1.97*	*1.74*	*1.87*	*2.02*	*1.48*	*1.39*	*1.40*	*0.90*	*0.35*	*3.07*
VW adjusted return 1	1.12	0.85	0.72	0.75	0.77	0.54	0.50	0.50	0.33	0.14	0.98
t-statistic	*2.41*	*1.98*	*1.74*	*1.86*	*2.01*	*1.46*	*1.39*	*1.48*	*1.11*	*0.52*	*2.86*
VW adjusted return 2	0.87	0.73	0.53	0.52	0.60	0.33	0.31	0.33	0.12	0.00	0.87
t-statistic	*1.62*	*1.47*	*1.13*	*1.14*	*1.37*	*0.79*	*0.77*	*0.88*	*0.35*	*0.00*	*2.16*
1984:07-2005:12											
VW excess return	0.97	0.72	0.78	0.75	0.84	0.75	0.91	0.85	0.86	0.70	0.27
t-statistic	*2.66*	*1.92*	*2.21*	*2.18*	*2.46*	*2.37*	*2.90*	*2.73*	*2.98*	*2.50*	*0.91*
VW adjusted return 1	1.26	0.84	0.78	0.71	0.74	0.65	0.79	0.73	0.73	0.54	0.72
t-statistic	*3.38*	*2.18*	*2.15*	*1.98*	*2.12*	*1.96*	*2.39*	*2.22*	*2.39*	*1.85*	*2.32*
VW adjusted return 2	1.32	1.05	1.08	1.00	1.11	1.01	1.10	1.05	0.96	0.46	0.85
t-statistic	*3.50*	*2.74*	*3.00*	*2.83*	*3.16*	*3.10*	*3.42*	*3.32*	*3.24*	*1.56*	*2.66*

Table 5, continued

Panel B: Equal-Weighted Average Returns											
	Small	2	3	4	5	6	7	8	9	Big	Small-Big
1963:07-2005:12											
EW excess return	1.26	0.81	0.76	0.76	0.80	0.65	0.71	0.66	0.59	0.44	0.82
t-statistic	*4.21*	*2.83*	*2.79*	*2.86*	*3.14*	*2.69*	*2.97*	*2.88*	*2.78*	*2.19*	*3.50*
EW adjusted return 1	1.44	0.87	0.76	0.74	0.76	0.59	0.65	0.61	0.55	0.39	1.05
t-statistic	*4.74*	*3.00*	*2.74*	*2.73*	*2.92*	*2.40*	*2.64*	*2.61*	*2.54*	*1.89*	*4.41*
EW adjusted return 2	1.34	0.93	0.83	0.79	0.86	0.69	0.73	0.71	0.59	0.34	1.01
t-statistic	*4.10*	*3.01*	*2.83*	*2.75*	*3.12*	*2.66*	*2.86*	*2.90*	*2.60*	*1.56*	*3.86*
1963:07-1984:06											
EW excess return	1.30	0.87	0.74	0.76	0.78	0.55	0.50	0.47	0.29	0.15	1.15
t-statistic	*2.73*	*2.00*	*1.77*	*1.87*	*2.02*	*1.50*	*1.38*	*1.37*	*0.94*	*0.51*	*3.31*
EW adjusted return 1	1.29	0.86	0.73	0.75	0.78	0.54	0.50	0.50	0.35	0.20	1.09
t-statistic	*2.72*	*2.00*	*1.76*	*1.87*	*2.03*	*1.47*	*1.39*	*1.47*	*1.14*	*0.69*	*3.14*
EW adjusted return 2	1.07	0.75	0.54	0.53	0.60	0.35	0.31	0.32	0.13	0.00	1.06
t-statistic	*1.94*	*1.51*	*1.15*	*1.15*	*1.37*	*0.83*	*0.77*	*0.85*	*0.37*	*0.01*	*2.58*
1984:07-2005:12											
EW excess return	1.22	0.75	0.78	0.76	0.83	0.75	0.91	0.85	0.87	0.72	0.50
t-statistic	*3.30*	*2.00*	*2.21*	*2.20*	*2.43*	*2.35*	*2.89*	*2.73*	*2.99*	*2.55*	*1.60*
EW adjusted return 1	1.58	0.87	0.78	0.72	0.74	0.65	0.79	0.73	0.75	0.58	1.00
t-statistic	*4.20*	*2.27*	*2.15*	*2.00*	*2.11*	*1.95*	*2.39*	*2.24*	*2.45*	*1.96*	*3.09*
EW adjusted return 2	1.59	1.09	1.08	1.02	1.09	0.99	1.09	1.05	0.99	0.63	0.96
t-statistic	*4.15*	*2.84*	*2.99*	*2.87*	*3.13*	*3.07*	*3.40*	*3.32*	*3.34*	*2.16*	*2.89*

Table 6: Fama and MacBeth (1973) Cross-Sectional Return Regressions

This table reports the average slopes and their time series *t*-statistics from cross-sectional regressions of individual stocks' unadjusted and adjusted returns on size estimated monthly from 1963:07 to 2005:12. Unadjusted returns are raw returns in excess of the risk-free rate. Adjusted returns 1 are computed by subtracting from the raw excess returns of a firm the product of its unexpected profitability and the return difference between the high and low unexpected profitability-sorted portfolios scaled by the difference in unexpected profitability between the two portfolios. Adjusted returns 2 are computed by running, for each firm, rolling 60-month regressions of excess returns on the market excess return and returns on the long-short quintile spread portolio based on unexpected profitability (*UP* portfolio) and subtracting the estimated loadings on the *UP* portfolio multiplied by the returns on the *UP* portfolio from the raw excess returns. Ln(Size) is the natural logarithm of size. The purged estimates are the intercepts from time-series regressions of the monthly Fama-MacBeth coefficients on the returns of the *UP* portfolio. Results are reported for the full 1963:07-2005:12 sample period as well as for the 1963:07-1984:06 and 1984:07-2005:12 subperiods.

	Excess return	Adjusted return 1	Adjusted return 2	Adjusted return 2 (purged)
1963:07-2005:12				
Intercept	2.89	3.53	3.16	3.02
t-statistic	*4.40*	*5.32*	*4.35*	*3.44*
Ln(size)	-0.17	-0.22	-0.19	-0.18
t-statistic	*-3.95*	*-4.98*	*-3.89*	*-3.00*
Adj. R^2	0.02	0.02	0.02	
1963:07-1984:06				
Intercept	3.25	3.19	2.96	3.14
t-statistic	*3.20*	*3.13*	*2.47*	*2.08*
Ln(size)	-0.22	-0.22	-0.21	-0.22
t-statistic	*-3.30*	*-3.21*	*-2.67*	*-2.17*
Adj. R^2	0.02	0.02	0.03	
1984:07-2005:12				
Intercept	-2.54	3.87	3.35	3.01
t-statistic	*3.03*	*4.54*	*3.81*	*2.93*
Ln(size)	-0.11	-0.23	-0.17	-0.15
t-statistic	*-1.83*	*-3.90*	*-2.86*	*-2.10*
Adj. R^2	0.01	0.01	0.01	

Table 7: Average Unadjusted and Adjusted Returns for Size Deciles – January versus Other Months

This table shows value-weighted (Panel A) and equal-weighted (Panel B) average unadjusted and adjusted returns in January and in February-December (in percent per month) and their *t*-statistics for the size decile portfolios as well as the return differences between Deciles 1 and 10. Unadjusted returns are raw returns in excess of the risk-free rate. Adjusted returns 1 are computed by subtracting from the raw excess returns of a firm the product of its unexpected profitability and the return difference between the high and low unexpected profitability-sorted portfolios scaled by the difference in unexpected profitability between the two portfolios. Adjusted returns 2 are computed by running, for each firm, rolling 60-month regressions of excess returns on the market excess return and returns on the long-short quintile spread portolio based on unexpected profitability (*UP* portfolio) and subtracting the estimated loadings on the *UP* portfolio multiplied by the returns on the *UP* portfolio from the raw excess returns. Results are reported for the full 1963:07-2005:12 sample period as well as for the 1963:07-1984:06 and 1984:07-2005:12 subperiods.

Panel A: Value-Weighted Average Returns

	Small	2	3	4	5	6	7	8	9	Big	Small-Big
1963:07-2005:12											
VW excess return – Jan	7.95	5.40	4.28	3.30	2.75	2.39	2.11	1.73	1.62	1.17	6.78
t-statistic	*6.00*	*4.10*	*3.50*	*2.88*	*2.42*	*2.24*	*2.03*	*1.80*	*1.89*	*1.47*	*6.73*
VW excess return – Feb to Dec	0.43	0.36	0.43	0.52	0.63	0.49	0.58	0.57	0.48	0.33	0.10
t-statistic	*1.53*	*1.31*	*1.60*	*1.96*	*2.44*	*2.01*	*2.41*	*2.42*	*2.23*	*1.68*	*0.45*
VW adjusted return 1 – Jan	8.18	5.65	4.55	3.42	2.92	2.39	2.22	1.82	1.65	1.20	6.99
t-statistic	*6.34*	*4.39*	*3.72*	*3.02*	*2.60*	*2.25*	*2.14*	*1.91*	*1.92*	*1.53*	*6.99*
VW adjusted return 1 – Feb to Dec	0.55	0.41	0.41	0.49	0.56	0.43	0.50	0.50	0.43	0.26	0.29
t-statistic	*1.94*	*1.44*	*1.48*	*1.78*	*2.14*	*1.71*	*2.03*	*2.09*	*1.95*	*1.29*	*1.34*
VW adjusted return 2 – Jan	8.42	5.82	4.69	3.37	2.94	2.48	2.20	1.68	1.50	1.11	7.30
t-statistic	*5.65*	*3.96*	*3.43*	*2.63*	*2.32*	*2.10*	*1.96*	*1.64*	*1.59*	*1.25*	*6.58*
VW adjusted return 2 – Feb to Dec	0.45	0.46	0.48	0.55	0.68	0.53	0.60	0.63	0.48	0.17	0.28
t-statistic	*1.49*	*1.53*	*1.66*	*1.90*	*2.46*	*2.02*	*2.31*	*2.52*	*2.10*	*0.79*	*1.18*

Table 7, continued

Panel A: Value-Weighted Average Returns, continued											
	Small	2	3	4	5	6	7	8	9	Big	Small-Big
1963:07-1984:06											
VW excess return – Jan	8.95	6.82	5.72	4.59	3.90	3.02	2.41	1.97	1.42	0.48	8.47
t-statistic	*4.12*	*3.16*	*2.77*	*2.39*	*2.06*	*1.72*	*1.34*	*1.19*	*1.01*	*0.40*	*6.01*
VW excess return – Feb to Dec	0.42	0.30	0.26	0.40	0.48	0.31	0.33	0.33	0.17	0.06	0.36
t-statistic	*0.96*	*0.72*	*0.65*	*1.00*	*1.28*	*0.85*	*0.91*	*0.99*	*0.55*	*0.21*	*1.15*
VW adjusted return 1 – Jan	8.87	6.82	5.89	4.61	4.07	2.88	2.47	2.02	1.44	0.60	8.27
t-statistic	*4.14*	*3.25*	*2.89*	*2.48*	*2.19*	*1.69*	*1.41*	*1.25*	*1.04*	*0.52*	*5.85*
VW adjusted return 1 – Feb to Dec	0.39	0.30	0.24	0.39	0.46	0.32	0.32	0.36	0.23	0.09	0.30
t-statistic	*0.90*	*0.72*	*0.60*	*0.98*	*1.23*	*0.87*	*0.89*	*1.06*	*0.76*	*0.35*	*0.95*
VW adjusted return 2 – Jan	9.33	7.16	6.09	4.40	4.05	2.82	2.23	1.63	1.02	0.16	9.17
t-statistic	*3.40*	*2.67*	*2.41*	*1.85*	*1.73*	*1.31*	*1.07*	*0.85*	*0.61*	*0.12*	*5.09*
VW adjusted return 2 – Feb to Dec	0.10	0.15	0.02	0.17	0.28	0.10	0.13	0.21	0.04	-0.01	0.11
t-statistic	*0.19*	*0.31*	*0.05*	*0.38*	*0.67*	*0.25*	*0.34*	*0.57*	*0.10*	*-0.05*	*0.31*
1984:07-2005:12											
VW excess return – Jan	6.95	3.99	2.85	2.01	1.59	1.75	1.82	1.49	1.82	1.86	5.09
t-statistic	*4.52*	*2.64*	*2.20*	*1.63*	*1.27*	*1.42*	*1.66*	*1.47*	*1.81*	*1.77*	*3.70*
VW excess return – Feb to Dec	0.44	0.43	0.59	0.64	0.77	0.67	0.83	0.80	0.77	0.59	-0.16
t-statistic	*1.24*	*1.13*	*1.63*	*1.78*	*2.18*	*2.03*	*2.53*	*2.42*	*2.57*	*2.06*	*-0.55*
VW adjusted return 1 – Jan	7.45	4.42	3.14	2.18	1.70	1.86	1.95	1.62	1.87	1.82	5.64
t-statistic	*5.21*	*3.02*	*2.44*	*1.73*	*1.40*	*1.47*	*1.74*	*1.57*	*1.81*	*1.73*	*4.08*
VW adjusted return 1 – Feb to Dec	0.71	0.52	0.57	0.58	0.66	0.54	0.69	0.65	0.62	0.43	0.28
t-statistic	*1.95*	*1.33*	*1.52*	*1.55*	*1.80*	*1.58*	*1.99*	*1.88*	*1.96*	*1.41*	*0.95*
VW adjusted return 2 – Jan	7.60	4.62	3.43	2.45	1.95	2.17	2.17	1.73	1.94	1.97	5.62
t-statistic	*5.28*	*3.21*	*2.71*	*2.05*	*1.64*	*1.84*	*2.01*	*1.77*	*1.92*	*1.76*	*4.41*
VW adjusted return 2 – Feb to Dec	0.76	0.74	0.88	0.88	1.03	0.90	1.00	0.99	0.87	0.33	0.43
t-statistic	*2.07*	*1.88*	*2.34*	*2.36*	*2.82*	*2.68*	*2.99*	*2.97*	*2.82*	*1.08*	*1.36*

Table 7, continued

Panel B: Equal-Weighted Average Returns											
	Small	2	3	4	5	6	7	8	9	Big	Small-Big
1963:07-2005:12											
EW excess return – Jan	9.14	5.48	4.31	3.31	2.76	2.40	2.13	1.74	1.63	0.99	8.15
t-statistic	*6.75*	*4.16*	*3.51*	*2.89*	*2.42*	*2.25*	*2.05*	*1.81*	*1.89*	*1.20*	*7.87*
EW excess return – Feb to Dec	0.54	0.38	0.43	0.53	0.62	0.49	0.58	0.57	0.49	0.39	0.15
t-statistic	*1.94*	*1.37*	*1.61*	*1.97*	*2.42*	*2.01*	*2.39*	*2.41*	*2.27*	*1.89*	*0.72*
EW adjusted return 1 – Jan	9.31	5.72	4.57	3.43	2.93	2.39	2.23	1.84	1.67	1.05	8.26
t-statistic	*7.01*	*4.46*	*3.73*	*3.02*	*2.60*	*2.25*	*2.15*	*1.92*	*1.93*	*1.31*	*7.99*
EW adjusted return 1 – Feb to Dec	0.72	0.43	0.41	0.49	0.56	0.43	0.50	0.50	0.45	0.33	0.39
t-statistic	*2.53*	*1.50*	*1.49*	*1.80*	*2.14*	*1.72*	*2.01*	*2.09*	*2.01*	*1.55*	*1.81*
EW adjusted return 2 – Jan	9.75	5.96	4.74	3.42	2.97	2.49	2.22	1.69	1.55	0.96	8.79
t-statistic	*6.36*	*4.05*	*3.45*	*2.66*	*2.34*	*2.12*	*1.99*	*1.63*	*1.62*	*1.07*	*7.59*
EW adjusted return 2 – Feb to Dec	0.59	0.48	0.48	0.55	0.67	0.53	0.59	0.62	0.50	0.28	0.31
t-statistic	*1.93*	*1.60*	*1.66*	*1.92*	*2.43*	*2.02*	*2.30*	*2.49*	*2.17*	*1.27*	*1.30*

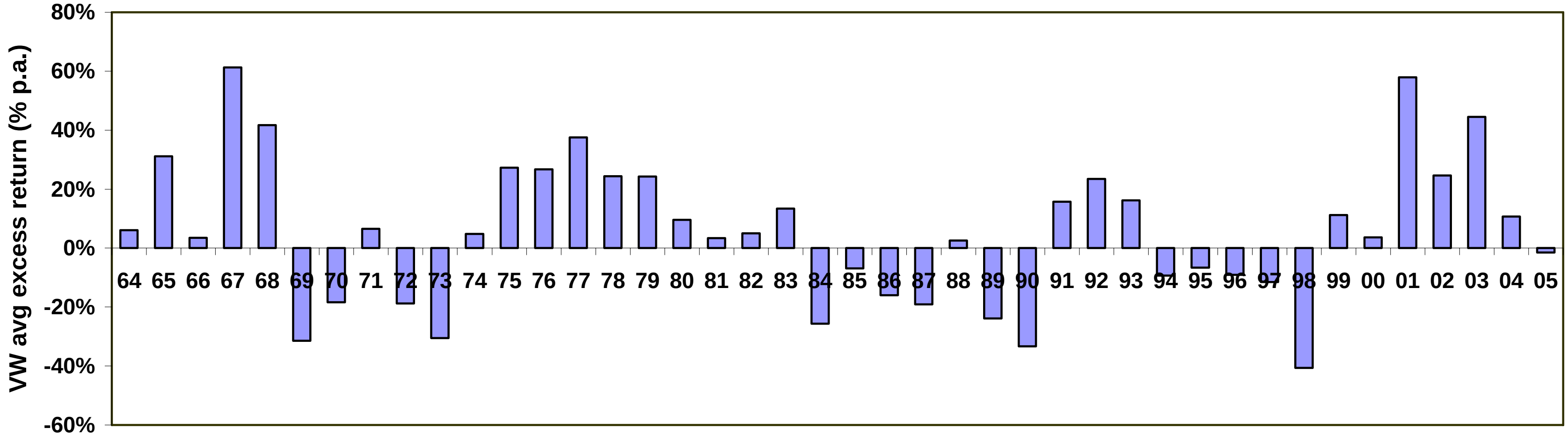
Table 7, continued

Panel B: Equal-Weighted Average Returns, continued											
	Small	2	3	4	5	6	7	8	9	Big	Small-Big
1963:07-1984:06											
EW excess return – Jan	10.00	6.84	5.72	4.63	3.91	3.07	2.42	2.00	1.47	0.30	9.70
t-statistic	*4.43*	*3.18*	*2.77*	*2.42*	*2.05*	*1.75*	*1.35*	*1.20*	*1.03*	*0.23*	*6.73*
EW excess return – Feb to Dec	0.49	0.31	0.27	0.40	0.49	0.32	0.32	0.32	0.18	0.13	0.35
t-statistic	*1.11*	*0.76*	*0.68*	*1.00*	*1.29*	*0.87*	*0.89*	*0.96*	*0.58*	*0.46*	*1.15*
EW adjusted return 1 – Jan	9.89	6.83	5.89	4.65	4.07	2.93	2.48	2.05	1.48	0.43	9.46
t-statistic	*4.44*	*3.26*	*2.88*	*2.51*	*2.19*	*1.71*	*1.42*	*1.27*	*1.06*	*0.34*	*6.51*
EW adjusted return 1 – Feb to Dec	0.49	0.31	0.25	0.39	0.47	0.32	0.32	0.35	0.24	0.18	0.31
t-statistic	*1.11*	*0.74*	*0.63*	*0.98*	*1.24*	*0.87*	*0.88*	*1.04*	*0.78*	*0.61*	*1.01*
EW adjusted return 2 – Jan	10.62	7.25	6.10	4.46	4.06	2.88	2.26	1.67	1.09	-0.13	10.75
t-statistic	*3.73*	*2.71*	*2.40*	*1.88*	*1.73*	*1.34*	*1.10*	*0.86*	*0.64*	*-0.09*	*5.92*
EW adjusted return 2 – Feb to Dec	0.20	0.16	0.04	0.17	0.28	0.12	0.13	0.20	0.04	0.02	0.18
t-statistic	*0.39*	*0.34*	*0.08*	*0.38*	*0.67*	*0.28*	*0.33*	*0.53*	*0.11*	*0.05*	*0.50*
1984:07-2005:12											
EW excess return – Jan	8.28	4.12	2.90	1.99	1.61	1.72	1.85	1.49	1.79	1.67	6.60
t-statistic	*5.40*	*2.72*	*2.23*	*1.61*	*1.28*	*1.39*	*1.68*	*1.46*	*1.77*	*1.65*	*4.58*
EW excess return – Feb to Dec	0.60	0.45	0.59	0.65	0.76	0.66	0.83	0.80	0.79	0.64	-0.04
t-statistic	*1.69*	*1.19*	*1.62*	*1.81*	*2.14*	*2.01*	*2.52*	*2.43*	*2.60*	*2.16*	*-0.14*
EW adjusted return 1 – Jan	8.71	4.56	3.19	2.14	1.73	1.82	1.97	1.61	1.87	1.71	7.00
t-statistic	*6.02*	*3.13*	*2.46*	*1.70*	*1.42*	*1.45*	*1.76*	*1.56*	*1.79*	*1.69*	*4.81*
EW adjusted return 1 – Feb to Dec	0.95	0.55	0.57	0.59	0.65	0.54	0.69	0.65	0.65	0.48	0.47
t-statistic	*2.63*	*1.40*	*1.51*	*1.59*	*1.78*	*1.58*	*1.98*	*1.90*	*2.03*	*1.55*	*1.54*
EW adjusted return 2 – Jan	8.96	4.79	3.52	2.47	1.99	2.15	2.19	1.71	1.96	1.93	7.03
t-statistic	*6.19*	*3.33*	*2.76*	*2.06*	*1.67*	*1.82*	*2.02*	*1.74*	*1.94*	*1.91*	*5.02*
EW adjusted return 2 – Feb to Dec	0.93	0.76	0.87	0.89	1.02	0.89	1.00	0.99	0.90	0.52	0.42
t-statistic	*2.55*	*1.95*	*2.31*	*2.39*	*2.77*	*2.65*	*2.97*	*2.97*	*2.92*	*1.70*	*1.33*

Figure 1: Time Series Plot of Size Premium

This graph depicts the value-weighted (Panel A) and equal-weighted (Panel B) average return differences (on a per annum basis) between the smallest and the largest size decile portfolios from 1964 to 2005.

Panel A: Value-Weighted Size Premium



Panel B: Equal-Weighted Size Premium