SEASONALITY, SIZE PREMIUM AND THE RELATIONSHIP BETWEEN THE RISK AND THE RETURN OF FRENCH COMMON STOCKS

by

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Abstract

Recent work on the price behavior of French common stocks concluded that the evidence is consistent with equity pricing according to the Capital Asset Pricing Model (CAPM). In this paper we re-examine the evidence on the risk-return characteristics of French equity and show that the estimated parameters of the risk-return relationship exhibit strong seasonality. The risk-return relationship is not linear and portfolio size affect equity pricing during January. These results cast some doubt on the validity of the CAPM as a descriptor of French equity returns.

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Introduction

Since the early eighties, a growing number of studies have reported several anomalous empirical regularities in common stock returns, known as 'stock market anomalies'. Among these are the size effect (Banz (1981)) and the seasonal behavior of monthly common stock returns (Gultekin and Gultekin (1983)). The size effect refers to the observed inverse relationship between risk-adjusted returns and firm size (market value of shares outstanding): small-capitalization firms seem to earn, on average, excess returns after controlling for the difference in risk that may exist between small and large firms. The other phenomenon is the seasonal behavior of monthly return: most stock market indices exhibit, on average, higher returns in January than during the other months of the year[1]. There are no definitive explanations of these two phenomena which have been shown to be related. For example, Keim (1983) reports that nearly 50 percent of the excess return earned by small firms in the U.S. over the period 1963- 1979 occured during the month of January.

Seasonality and size have also been shown to affect the relationship between the risk and return of common stocks (Tiniç and West (1986)) casting some doubt on earlier work that supports the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Black (1972) but ignores seasonality and the effect of size. For this reason we wish to re-examine the results of a study reported in this Journal (Hawawini, Michel and Viallet (1983)) which concluded that the behavior of French common stocks conforms to the CAPM. Would this conclusion still hold if the risk-return relationship is re-examined in light of the size effect and stock return seasonality? The answer is mixed. We show that the CAPM is valid, on average, from February to December but not during January.

When all of the year's months are considered the CAPM is no longer valid. These results weaken the earlier findings in favor of the CAPM as a general descriptor of French equity returns.

The remainder of the paper is organized as follows. In the next section we review the work of Tiniç and West (1986) on seasonality, size premium and the pricing of U.S. common stocks. In the third section we describe our data and methodology. In the following sections we present our empirical results. The last section contains concluding remarks.

Seasonality, size premium and equity pricing

Seasonality and size have also been shown to affect the coefficients of the security market line estimated according to the the Fama and MacBeth (1973) methodology. Specifically, consider the following four-parameter return-generating process:

$$\tilde{R}_{p,t} = \tilde{\gamma}_{0,t} + \tilde{\gamma}_{1,t} \cdot \beta_{p,t-k} + \tilde{\gamma}_{2,t} \cdot \beta^2_{p,t-k} + \tilde{\gamma}_{3,t} \cdot U_{p,t-k} + \tilde{e}_{p,t} \qquad (1)$$

where $\tilde{R}_{p,t}$ is the realized return of portfolio p during month t, $\tilde{\beta}_{p,t-k}$ is the beta coefficient[2] (systematic risk) of portfolio p estimated over a period of time preceding month t[3]; $\tilde{U}_{p,t-k}$ is the unsystematic risk[4] of portfolio p estimated over a period of time preceding month t; and $\tilde{e}_{p,t}$ is the residual return of portfolio p during month t. The CAPM is a valid descriptor of equity returns if equity returns during month t ($R_{p,t}$) are positively and linearly related to systematic risk and unrelated to unsystematic risk[5]. In other words, we cannot reject the CAPM as a descriptor of equity returns if the mean value of the estimated monthly coefficients $\hat{\gamma}_{1,t}$ is significantly positive and the mean values of the estimated monthly coefficients $\hat{\gamma}_{2,t}$ and $\hat{\gamma}_{3,t}$ are statistically equal to zero.

Before turning to the empirical results for French common stocks we briefly summarize the results reported by Tiniç and West (1986) on a sample of U.S. common stock returns:

1) the average value of the estimated systematic risk premium (the mean of the monthly $\hat{\gamma}_{1,t}$) is generally negative in January and positive the rest of the year;

2) the average value of the estimated coefficient of β-squared is generally significantly different from zero during the rest of the year implying a non-linear relationship between average returns and systematic risk when January is excluded from the data;

3) the average value of the estimated unsystematic risk premium (the mean of the monthly $\hat{\gamma}_{3,t}$) is generally positive in January implying that investors receive a compensation for bearing unsystematic (diversifiable) risk during that month of the year.

The above results are not affected by the choice of the market index (equally-weighted versus value-weighted index). They are also unaffected by portfolio size. That is, adding a size variable to regression (1) reveals a significant size effect in January but doesn't alter the conclusions reached in the absence of a size variable. Tiniç and West (1986) conclude their paper with the following sentence "... our results clearly indicate that the existing empirical evidence for the model [the CAPM] is highly suspect.".

The evidence we report below indicates that the Tiniç and West's results are not unique to the U.S. equity markets[6]. Similar phenomena manifest themselves on the Paris Bourse where we uncovered the presence of a significant seasonality in the coefficients of the risk-return relationship as well as a size effect. But the seasonal behavior of the risk-return relationship on the Paris Bourse is, interestingly enough, the opposite of that observed in the U.S. equity market. We show that the negative risk-return relationship reported by Hawawini et al. (1983) is essentially a "rest-of-the-year" phenomenon[7]. The average value of the estimated systematic risk premium of French common stocks is negative from February to December. It is positive in the U.S. equity market. During January, high-risk, small-capitalization portfolios earn, on average, positive returns on the Paris Bourse but negative returns on the U.S. equity market. We also found that the January relationship between return and systematic risk is concave rather than linear. These results cast some doubt on the validity of the CAPM as a general descriptor of French equity returns during our sample period (January 1969 - December 1983).

Data and methodology

The sample consists of 112 common stocks which traded continuously on the Paris Bourse from January 1969 to December 1983. Hence, each common stock has 180 monthly returns that have been adjusted for dividend payments.

The 112 common stocks were grouped into 20 non-overlapping portfolios. With the first year of monthly returns (1969) we estimated the beta coefficient of each one of 112 common stocks using an equally-weighed portfolio of the 112 common stocks as a "market index". We also calculated the market value of each firm in the sample (number of shares multiplied by the price per share) as of the last trading day of December 1969. We then formed 5 portfolios on the basis of size. The first contains the 23 firms with the largest market value (the average market value equals FF 2,410 million) and the fifth contains the 23 firms with the smallest market value (the average market value equals FF 100 million). The remaining three intermediate size-portfolios contain 22 firms each. Each one of these 5 size portfolios was then subdivided into 4 subportfolios on the basis of the magnitude of the beta coefficient of the securities in the portfolio. For example, the first subportfolio within the largest size-portfolio had 7 securities with an average beta coefficient of 1.54 and the fourth subportfolio within the largest size-portfolio had 6 securities with an average beta coefficient of

0.35. Using this grouping procedure we obtained 20 equally-weighted portfolios ranked according to size and magnitude of beta.

The second year of monthly data (1970) was employed to estimate the beta coefficient and the unsystematic risk of the twenty portfolio using a Market Model specification[8]. Finally, 12 monthly cross sectional regressions were run over the third year data (1971), one for each month of the year. In these regressions, the realized monthly returns of the 20 portfolios is the dependent variable and beta, beta-squared, unsystematic risk and size were the alternative independent variables, all estimated over the previous calendar year (1970). This is the standard Fama and MacBeth (1973) methodology applied to portfolios ranked by size and the magnitude of beta.

The entire procedure was repeated until we reached the last year of data (1983). The estimated regression coefficients were then averaged out to test the statistical significance of the relationship between average portfolio returns and average portfolio risk and size. These results are presented and discussed in the following sections.

Seasonality, linearity and the pricing of unsystematic risk

If the CAPM holds, then the relationship between return and systematic risk should be positive and linear and unsystematic risk, being diversifiable, should not be priced in the market. In other words, if we assume that return are generated according to the four-parameter model given in regression (1) then linearity implies that the average value of the estimated slope coefficients $\hat{\gamma}_2$ must be statistically equal to zero. And diversification of unsystematic risk implies that the average value of the estimated slope coefficients $\hat{\gamma}_3$ must also be statistically equal to zero. Average values of $\hat{\gamma}_2$ and $\hat{\gamma}_3$ that are significantly different from zero would be inconsistent with asset pricing according to the CAPM.

The results are summarized in Table 1. When all months are considered there is no significant relationship between average returns and risk over our sample period. But when January is excluded from the data, there is a significant negative and linear relationship between average returns and systematic risk. Portfolios with relatively high systematic risk in a given year subsequently earn an average return that is significantly lower than the average return of low-risk portfolios. Unsystematic risk is not priced. Turning to the month-by-month evidence, we can see that only in January is the relationship between average returns and systematic risk significantly positive. But it is not linear. Hence the evidence is mixed at this point. There is a positive relationship between return and systematic risk but it is concave rather than linear and it occurs only during the month of January. During the rest of the year the risk-return relationship is linear but negative. Clearly, the all-year negative risk-return relationship reported by Hawawini et al. (1983) is essentially a "rest-of-the-year" phenomenon. Equity pricing in January is significantly different from that observed during the rest of the year.

Is there a size effect and is it seasonal?

If a size effect is present in the data then average returns and size must be inversely related. Consider the following regression:

$$\tilde{R}_{p,t} = \tilde{\gamma}^{s}_{0,t} + \tilde{\gamma}_{4,t} \cdot SIZE_{p,t-k} + \tilde{e}^{s}_{p,t} , \qquad (2)$$

where $SIZE = (MV_p - MV_m)/MV_m$ is the relative size of portfolio p, that is, market value of portfolio p minus average market value of all firms divided by the average market value of all firms. A significantly negative average value of the estimated slope coefficients $\hat{\gamma}_4$ implies the presence of a size effect.

TABLE 1

Average values of the Fama and MacBeth estimates of the intercept and slope coefficients for each month of the year from January 1971 to December 1983 for the regression:

$$\tilde{R}_{p,t} = \tilde{\gamma}_{0,t} + \tilde{\gamma}_{1,t} \cdot \beta_{p,t-k} + \tilde{\gamma}_{2,t} \cdot \beta^2_{p,t-k} + \tilde{\gamma}_{3,t} \cdot U_{p,t-k} + \tilde{e}_{p,t}$$

Average over	$\bar{\bar{\gamma}}_0$ (Intercept)	$\bar{\bar{\gamma}}_1$ (beta)	$\bar{\bar{\gamma}}_2$ (beta)^2	$\bar{\bar{\gamma}}_3$ (Unsyst. risk)	Sample size
All months	0.0166* (2.37)	-0.0103 (-1.00)	0.0011 (0.28)	-0.0316 (-0.42)	156
All months except January	0.0207* (2.80)	-0.0193* (-1.87)	0.0044 (1.05)	-0.0613 (-0.77)	143
JANUARY	-0.0282 (-1.57)	0.0888* (2.24)	-0.0347* (-2.52)	0.2959 (1.15)	13
FEBRUARY	0.0045 (0.24)	-0.0007 (0.03)	-0.0130 (-1.12)	0.3039 (1.25)	13
MARCH	0.0586* (1.95)	-0.0435 (-1.07)	0.0177 (1.43)	-0.3976* (-1.89)	13
APRIL	0.00709 (0.27)	0.0191 (0.44)	-0.0089 (-0.49)	0.0703 (0.25)	13
MAY	0.0440 (1.42)	-0.0714 (-1.61)	0.0221 (1.34)	-0.1534 (-0.68)	13
JUNE	0.0131 (0.45)	-0.0094 (-0.28)	-0.0059 (-0.39)	-0.2480 (-0.87)	13
JULY	0.0398 (1.68)	-0.0056 (-0.18)	0.0070 (0.55)	-0.0552 (-0.19)	13
AUGUST	-0.0035 (-0.19)	0.0240 (0.67)	-0.0100 (-0.68)	0.1446 (0.56)	13
SEPTEMBER	-0.0093 (-0.55)	0.0052 (0.14)	-0.0012 (-0.08)	-0.0890 (-0.59)	13
OCTOBER	0.0202 (0.75)	-0.0557* (-2.19)	0.0201* (2.06)	-0.1374 (-0.49)	13
NOVEMBER	-0.0435* (2.51)	-0.0325* (-1.95)	0.0195 (1.65)	-0.3147 (-1.15)	13
DECEMBER	0.0098 (0.36)	-0.0222 (-0.93)	0.0020 (1.17)	0.2018 (0.55)	13

*t statistics are in parentheses below average values. An asterisk indicates statistical significance at the 0.05 level.

A look at Table 2 indicates that there is a significant size effect on the Paris Bourse only during the month of January. Portfolios with relatively smaller market capitalization over a given year earn the following January an average return that is significantly higher than the average return of larger-size portfolios. It is worth pointing out that our sample of firms is biased toward a rejection of the size effect. Indeed, the 112 firms that make up our sample contain a disproportionate number of large firms. It is likely that we would have observed a stronger size effect if our sample of firms contained a larger number of smaller firms.

Note that the average value of the estimated intercept coefficient $\hat{\gamma}_0^s$ in regression (2) is equal to the average monthly return on the market index. This is so because the size variable takes the value of zero when portfolio p is equal to the market index (m). That is, when p=m we have $\bar{R}_m=\hat{\gamma}_0^s$. It follows that the second column in Table 2 provides the average monthly return on the market index. When all months are considered, the average monthly return on the market index is not significantly different from zero. But there are two months of the year during which the market return is, on average, significantly different from zero. These are January and July. During January, the average market return is 3.70 percent (44.40 percent on an annual basis), the year's largest. During July it is equal to 3.53 percent (42.36 percent on an annual basis).

Can the January and July effects be explained? Table 2 indicates that the January effect is related to the size effect. The larger market return observed during January is the manifestation of the presence of a size effect during that month. This January-size effect may be tax-driven. According to the the tax-loss selling hypothesis, smaller firms whose prices have fallen during the fiscal year are sold before December 31st. In order to generate capital losses that are deductible from taxable income[9]. This tax-driven selling puts a downward pressure on year-end prices. In January, prices rebound to their equilibrium level, causing the observed January-size effect also known as the turn-of-the-year effect. What about the July effect? It

TABLE 2

Average values of the Fama and MacBeth estimates of the intercept and slope coefficients for each month of the year from January 1971 to December 1983 for the regression:

$$\tilde{R}_{p,t} = \tilde{\gamma}^{s}_{0,t} + \tilde{\gamma}_{4,t} \cdot SIZE_{p,t-k} + \tilde{e}^{s}_{p,t}$$

Average over	$\bar{\hat{\gamma}}^{s}_{0}$ (Intercept)	$\bar{\hat{\gamma}}_{4}$ (Relative size)	Sample size
All months	0.0054 (1.17)	-0.0005 (-0.43)	156
All months except January	0.0026 (0.54)	-0.0002 (-0.13)	143
JANUARY	0.0370* (2.02)	-0.0039* (-1.98)	13
FEBRUARY	0.0040 (0.34)	-0.0012 (-0.41)	13
MARCH	0.0136 (0.60)	0.0002 (0.04)	13
APRIL	0.0181 (1.26)	0.0009 (0.26)	13
MAY	-0.0079 (-0.48)	-0.0011 (-0.29)	13
JUNE	-0.0175 (-1.13)	0.0010 (0.20)	13
JULY	0.0353* (2.35)	-0.0012 (-0.34)	13
AUGUST	0.0174 (1.29)	-0.0039 (-0.78)	13
SEPTEMBER	-0.0063 (-0.30)	-0.0021 (-0.46)	13
OCTOBER	-0.0237 (-1.58)	0.0030 (0.89)	13
NOVEMBER	-0.0041 (-0.31)	0.0002 (0.08)	13
DECEMBER	-0.0006 (-0.06)	0.0024 (0.68)	13

*t statistics are in parentheses below average values. An asterisk indicates statistical significance at the 0.05 level.

cannot be attributed to a size effect since the latter is not significant during July (see Table 2). Taxes, again, may provide an explanation for the July effect. Close to 60 percent of French firms pay their dividend during the month of July[10]. Since dividends are taxed at a higher rate than capital gains, investors may require and obtain higher returns in July to offset the reduced after-tax income due to the higher tax on dividends[11].

The next question is whether small French firms outform their larger counterparts on a risk-adjusted basis. The answer is found in Table 3 in which are reported the results for regression:

$$\tilde{R}_{p,t} = \tilde{\gamma}'_{0,t} + \tilde{\gamma}'_{1,t} \cdot \beta_{p,t-k} + \tilde{\gamma}'_{4,t} \cdot SIZE_{p,t-k} + \tilde{e}'_{p,t} \quad (3)$$

The size effect is statistically significant only in January even after we control for differences in systematic risk among portfolios. Indeed, a look at Table 3 indicates that the size premium (average value of the estimated coefficients $\hat{\gamma}'_4$) is statistically significant only in January and its sign is negative. Note that the systematic risk premium is positive in January but it is not significant. In other words, firm size seems to be a stronger indicator of expected return during January than is firm systematic risk. The rest of the year, however, systematic risk is a stronger indicator of expected return than size.

Finally, we wish to know if the conclusions reached with the four-parameter model (regression 1) still hold if we introduce size as a fifth parameter. That is, if we have:

$$\tilde{R}_{p,t} = \tilde{\gamma}''_{0,t} + \tilde{\gamma}''_{1,t} \cdot \beta_{p,t-k} + \tilde{\gamma}''_{2,t} \cdot \beta^2_{p,t-k} + \tilde{\gamma}''_{3,t} \cdot U_{p,t-k} + \tilde{\gamma}''_{4,t} \cdot SIZE_{p,t-k} + \tilde{e}''_{p,t} \quad (4)$$

TABLE 3

Average values of the Fama and MacBeth estimates of the intercept and slope coefficients for each month of the year from January 1971 to December 1983 for the regression:

$$\tilde{R}_{p,t} = \tilde{\gamma}'_{0,t} + \tilde{\gamma}'_{1,t} \cdot \beta_{p,t-k} + \tilde{\gamma}'_{4,t} \cdot SIZE_{p,t-k} + \tilde{e}'_{p,t}$$

Average over	$\bar{\hat{\gamma}}'_0$ (Intercept)	$\bar{\hat{\gamma}}'_1$ (beta)	$\bar{\hat{\gamma}}'_4$ (relative size)	Sample size
All months	0.0147* (3.73)	-0.0093* (-2.65)	-0.0000 (-0.01)	156
All months except January	0.0148* (3.59)	-0.0121* (-3.45)	0.0004 (0.38)	143
JANUARY	0.0140 (0.97)	0.0218 (1.48)	-0.0050* (-1.89)	13
FEBRUARY	0.0214* (1.82)	-0.0165* (-1.93)	-0.0001 (-0.02)	13
MARCH	0.0269 (1.26)	-0.0146 (-1.11)	0.0007 (0.19)	13
APRIL	0.0259 (1.77)	-0.0081 (-0.69)	0.0025 (0.65)	13
MAY	0.0164 (1.14)	-0.0263* (-1.94)	0.0009 (0.24)	13
JUNE	0.0087 (0.61)	-0.0261* (-3.84)	0.0022 (0.44)	13
JULY	0.0383* (3.72)	-0.0013 (-0.11)	-0.0010 (-0.26)	13
AUGUST	0.0061 (0.54)	0.0103 (0.85)	-0.0061 (-1.17)	13
SEPTEMBER	-0.0109 (-1.29)	0.0026 (0.17)	-0.0018 (-0.43)	13
OCTOBER	-0.0023 (-0.14)	-0.0200 (-1.73)	0.0029 (0.89)	13
NOVEMBER	0.0127 (1.37)	-0.0165* (-2.26)	0.0005 (0.19)	13
DECEMBER	0.0190 (1.46)	-0.0168 (-1.23)	0.0041 (1.08)	13

*t statistics are in parentheses below average values. An asterisk indicates statistical significance at the 0.05 level.

The results are summarized in Table 4. They are basically the same as those reported in Table 1. Introducing size in the pricing equation does not modify our earlier results. When all months are considered there is not significant relationship between risk and return on the Paris Bourse. During January there is a positive relationship between systematic risk and return but the relationship is concave. During the rest of the year the relationship between systematic risk and return is negative and linear.

Concluding remarks

We have re-examined the empirical relationship between the average return and the risk of a sample of French common stocks that traded continuously on the Paris Bourse from January 1969 to December 1983. We applied the Fama and MacBeth methodology to the monthly returns of 20 portfolios ranked according to size (market capitalization) and the magnitude of beta (systematic risk).

Our results indicate that there is no significant relationship between risk and return when all months of the year are considered. But a month-by-month analysis reveals an entirely different picture. In January the risk-return relationship is positive and concave, unsystematic risk is not priced but there is a significant size effect. The rest of the year the risk-return relationship is negative and linear, unsystematic risk is still not priced and there is no size effect. The January results are not consistent with equity pricing according to the CAPM but the results for the "rest-of-the-year" conform to that model.

What conclusions can we draw from these results? Can we reject the CAPM because that model provides a different pricing relationship during January than during the remaining eleven months of the year? Does the seasonal behavior of the estimated risk premium provide sufficient grounds to reject this model? We believe that seasonality, in and by itself, should not be sufficient to reject the CAPM provided that the CAPM is valid over each segment of the seasonal cycle. Unfortunately, our data has failed this test.

TABLE 4

Average values of the Fama and MacBeth estimates of the intercept and slope coefficients for each month of the year from January 1971 to December 1983 for the regression:

$$\tilde{R}_{p,t} = \tilde{\gamma}''_{0,t} + \tilde{\gamma}''_{1,t}\cdot\beta_{p,t-k} + \tilde{\gamma}''_{2,t}\cdot\beta^2_{p,t-k} + \tilde{\gamma}''_{3,t}\cdot U_{p,t-k} + \tilde{\gamma}''_{4,t}\cdot SIZE_{p,t-k} + \tilde{e}''_{p,t}$$

Average over	$\bar{\bar{\gamma}}''_0$ (Intercept)	$\bar{\bar{\gamma}}''_1$ (beta)	$\bar{\bar{\gamma}}''_2$ (beta)^2	$\bar{\bar{\gamma}}''_3$ (Unsyst. risk)	$\bar{\bar{\gamma}}''_4$ (size)	Sample size
All months	0.0175* (2.52)	-0.0125 (-1.23)	0.0024 (0.58)	-0.0362 (-0.47)	0.0002 (0.14)	156
All months except January	0.0219* (3.00)	-0.0226* (-2.26)	0.0060 (1.47)	-0.0612 (-0.75)	0.0007 (0.54)	143
JANUARY	-0.0307 (-1.64)	0.0982* (2.22)	-0.0376* (-2.38)	0.2381 (0.94)	-0.0052* (-1.84)	13
FEBRUARY	0.0044 (0.21)	0.0072 (0.24)	-0.0169 (-1.40)	0.2546 (0.95)	0.0000 (0.01)	13
MARCH	0.0570* (2.02)	-0.0443 (-1.13)	0.0182 (1.61)	-0.3718* (-2.01)	0.0016 (0.45)	13
APRIL	0.0093 (0.37)	0.0103 (0.24)	-0.0059 (-0.29)	0.0870 (0.33)	0.0035 (0.80)	13
MAY	0.0499 (1.64)	-0.0781 (-1.74)	0.0244 (1.50)	-0.2202 (-0.91)	0.0008 (0.21)	13
JUNE	0.0124 (0.47)	-0.0226 (-0.85)	0.0008 (0.07)	-0.1601 (-0.60)	-0.0005 (-0.11)	13
JULY	0.0399 (1.70)	-0.0050 (-0.17)	0.0062 (0.53)	-0.0498 (-0.16)	-0.0004 (-0.12)	13
AUGUST	-0.0023 (-0.11)	0.0306 (0.93)	-0.0097 (-0.72)	0.0175 (0.07)	-0.0066 (-1.30)	13
SEPTEMBER	-0.0073 (-0.45)	-0.0013 (-0.04)	0.0023 (0.16)	-0.0924 (-0.47)	-0.0034 (-0.78)	13
OCTOBER	0.0186 (0.65)	-0.0580* (-2.11)	0.0199 (1.76)	-0.0724 (-0.23)	0.0039 (1.06)	13
NOVEMBER	0.0454* (2.53)	-0.0595* (-2.21)	0.0217* (1.84)	-0.2771 (-0.94)	0.0030 (1.04)	13
DECEMBER	0.0132 (0.51)	-0.0298 (-1.45)	0.0048 (0.50)	0.2116 (0.56)	0.0053 (1.35)	13

*t statistics are in parentheses below average values. An asterisk indicates statistical significance at the 0.05 level.

Indeed, during January the empirical evidence reported in this paper is not consistent with equity pricing according to the CAPM (because of the concavity of the relationship and the presence of a significant size effect). All we can say at this point is that earlier results in favor of the CAPM are somewhat suspect. This paper's findings cast some doubt on the validity of this model as a general descriptor of common stock returns on the Paris Bourse.

Footnotes

1. In some countries higher than average returns may be present in months other than January. See Gultekin and Gultekin (1983) for the evidence and possible interpretations of this phenomenon.

2. The beta coefficient of portfolio p is the arithmetic average of the beta coefficients of the securities that make up that portfolio. It is estimated according to the Market Model (Fama (1976)) as the slope of the regression of the market index return on the return of the security.

3. By measuring risk over a period of time preceding the month over which the portfolio's return is measured we test the model as a normative pricing theory, that is, a theory that provides investors with guidelines to manage their portfolio. By holding portfolio with relatively high risk they should earn a higher return over a subsequent period.

4. Unsystematic risk is the standard deviation of the residual returns of the Market Model regression as specified in footnote 2.

5. In a CAPM world, unsystematic risk is diversified away at no cost to investors and hence investors are not rewarded for holding portfolios in which unsystematic risk has been eliminated from their portfolio via diversification.

6. For the evidence pertaining to the U.K. equity market see Corhay et al. (1987).

7. Hawawini, Michel and Viallet (1983) concluded that the relationship "between the average returns and the risk of French common stocks was generally negative: portfolios with relatively lower risk levels in a given period subsequently earned an average return which was significantly higher than the average return of higher-risk portfolios". (p. 333).

8. See Fama (1976) and footnote 2.

9. Any firm whose price has fallen during the year is a candidate for sale. But smaller firms, being more volatile than their larger counterparts, are more likely to be chosen for tax-related sale because they experience, on average, steeper price declines than larger firms. For a discussion on the logic of the tax-loss selling hypothesis see, for example, Roll (1983).

10. See Hamon (1986) who examined 2246 dividend payments made between January 1967 and December 1980. He reports that 59 percent of all dividends were paid in July, 19 percent in June and 14 percent in September.

11. For a discussion on the effect that a differential taxation of capital gains and dividends may have on equity pricing see, for example, Litzenberger and Ramaswamy (1979).

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