AN ASSESSMENT OF THE RISK AND RETURN OF FRENCH COMMON STOCKS

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Abstract

In this paper we examine the relationship between the average return and the risk of a sample of 160 French common stock which traded continuously over the decade 1969-1979. Although we found that a negative relationship existed between average return and systematic risk we could not gather sufficient evidence to reject the hypothesis that the pricing of French common stocks conforms to the Capital Asset Pricing Model. The nature and implications of the observed negative risk-return trade-off are discussed.

AN ASSESSMENT OF THE RISK AND RETURN OF FRENCH COMMON STOCKS

I. INTRODUCTION

In this paper we examine the relationship between the average return and various risk-measures of a sample of 160 common stocks which traded continuously on the Paris Stock Exchange (La Bourse de Paris) over the 10-year period beginning June 1969 and ending May 1979. The standard Capital Asset Pricing Model (CAPM) of Sharpe (23) and Lintner (15) as well as Black's (2) zero-beta version of the model and Levy's (13) Generalized CAPM provide the theoretical fromework against which the empirical tests are designed.

The methodology we employ to perform our tests is similar to that developed by Fama and McBeth (7) which has been shown to be free of the major limitations that characterize the early approach suggested by Black, Jensen and Scholes (3) in their test of the CAPM based on a sample of American common stocks. It is worth emphasizing from the onset that the Fama-McBeth methodology is designed to investigate the relationship between future returns and estimates of risk which are based on current information. Hence, the tests are performed not to examine the contemporaneous relationship between the return and the risk of French common stocks but, rather, the lagged relationship.

As such, the approach provides a test of the CAPM, not only as a positive theory, that is, as a theory that describes investors' and securities' behavior, but also as a normative theory, that is, as a theory that tells investors how to manage their investments.

Our empirical findings indicate that the lagged 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. These results as well as their implications for capital-markets theory and practical investment management are later discussed in this article. Despite these seemingly startling empirical results we cannot reject the hypothesis that the pricing of our sample of French common stocks conforms to the Capital Asset Pricing Model over the 1969-1979 decade.

This paper is organized as follows: in the next section we briefly survey the theoretical background against which the empirical tests are designed. The sample is described in section III. Methodological issues are discussed in section IV and the design of the statistical tests is explained in section V. In section VI the empirical findings are presented and their implications are examined in section VII. To our knowledge this paper is the first comprehensive test of the CAPM as applied to French data. Few studies have explicitly dealt with the investigation of the risk-return trade-off of European common stocks [1] and none has used the recent methodology developed by Fama and McBeth (7). The last section contains a short conclusion.

II THEORETICAL BACKGROUND

According to the Sharpe-Lintner version of the CAPM there exists, in equilibrium, a linear relationship between the expected return of any asset $E(\tilde{R}_j)$ and the risk of that asset which is measured by the ratio of the covariance between that asset's returns and those of the market portfolio σ_{jm} to the variance of the market portfolio's returns σ_m^2. The market portfolio consists of all assets held in proportion to their market value. In the linear relationship between $E(\tilde{R}_j)$ and σ_{jm}/σ_m^2, the constant term is the return of the risk free asset R_F and the slope is the expected return on the market portfolio $E(\tilde{R}_m)$ in excess of the risk free rate. We can write:

$$E(\tilde{R}_j) = R_F + [E(\tilde{R}_m) - R_F] \cdot \left(\frac{\sigma_{jm}}{\sigma_m^2} \right) \qquad (1)$$

where the risk measure σ_{jm}/σ_m^2 is often referred to as the systematic risk of asset j or its beta-coefficient ($\beta_j = \sigma_{jm}/\sigma_m^2$). The importance of the CAPM is not only in its explicit specification of the relationship between the expected return of an asset and its risk but also in its novel definition of risk. Risk, in a CAPM world, is not measured by the total variability of an asset's returns, that is, the standard deviation of that asset's returns σ_j, but, rather, by the covariability of that asset's return with those of the market portfolio. To clarify the distinction that is made between total risk σ_j and systematic risk σ_{jm}/σ_m^2, rewrite equation (1) as:

$$E(\tilde{R}_j) - R_F = \left[\frac{E(\tilde{R}_m) - R_F}{\sigma_m} \right] \rho_{jm} \sigma_j \qquad (1)'$$

where $\rho_{jm} = \sigma_{jm}/\sigma_j \sigma_m$ is the correlation coefficient between asset j's returns and those of the market portfolio. Since assets' returns are generally not perfectly correlated with those of the market portfolio, the correlation coefficient ρ_{jm} is typically less than one. The implication is that the relevant measure of risk in a CAPM context is less than total risk σ_j . The difference between total risk and CAPM-risk is usually referred to as "unsystematic" risk. It does not appear in the CAPM equation because risk-averse investors can costlessly diversify it away by holding portfolios of assets instead of investing their wealth in just a single asset. This discussion leads to some of the crucial assumptions underlying the CAPM. In a CAPM world, financial markets must be perfect in the sense that investors are price-takers, assets are infinitely divisible and there are no transaction and information costs and no taxes. The one-period percentage returns of assets are assumed to be normally distributed with known expected value and variance or to conform to some other two parameter symmetric stable distribution. Investors are risk-averse and behave as if they are maximizing their one-period expected utility of portfolio returns. Of course some of these assumptions do not hold strictly in actual financial markets, let alone the Paris Stock Exchange which is a relatively thin equity market with peculiar institutional characteristics [2]. We will return to this important point in section VII.

Another assumption underlying the equilibrium equation (1) is that there exists a risk free asset which can be issued by any market participants at the same riskless rate. Black (2) has shown that if this risk free asset does not exist then the equilibrium equation (1) can be rewritten as:

$$E(\tilde{R}_j) = E(\tilde{R}_0) + [E(\tilde{R}_m) - E(\tilde{R}_0)].\beta_j \qquad (2)$$

where $E(\tilde{R}_0)$ is the the expected return on a zero-beta asset, that is an asset whose returns are uncorrelated with those of the market portfolio[3].

Finally, Levy (13) has recently developed a Generalized CAPM which relaxes the assumption of perfect financial markets in which investors are extreme diversifiers. Instead any investor can hold portfolio containing just a few securities. In this world, beta (systematic risk) is no longer the relevant measure of risk; the variance (total risk) emerges as the dominant risk-measure.

The preceding discussion can be summarized in a set of six testable propositions:

(1) The relationship between an asset's expected return and its systematic risk is linear.

(2) Investors are compensated only for the systematic portion of the risk of an asset since the unsystematic portion can be costlessly diversified away.

(3) The expected return-systematic risk relationship is positive, that is, the slopes of equations (1) and (2) are positive.

(4) Market participants make investment decisions assuming that the distribution of asset returns are symmetrical.

(5) According to the Sharpe-Lintner version of the CAPM there exists unrestricted riskless borrowing and lending at a unique risk free rate.

(6) According to Levy's Generalized CAPM investors may not be extreme diversified but rather holders of small portfolios containing a few securities.

III. SAMPLE CHARACTERISTICS

The sample consists of 160 common stocks out of the 210 most actively traded issues on the Paris Stock Exchange. Weekly returns adjusted for capital changes and dividends payments were taken from the tape of the "Centre de Recherches sur les Processus de Management, Paris Dauphine"[4] The data begin June 1969 and end May 1979. The criterion for selecting the 160 stocks which make up our sample was that a stock must have complete weekly return data for the 10-year calendar period over which the tests are performed. The requirement may introduce a slight but inconsequential "survivalship" bias since firms with incomplete data are, in general, either newly quoted companies or companies which have been delisted.

The proxy for the market portfolio was constructed by simply taking the arithmetic average of the 160 securities in our sample. The resulting market index may suffer from two limitations: it is equally weighted and it does not include all traded securities. The former characteristic was shown to have little effect on tests of the CAPM, equally-weighted indexes usually yield results that are statistically similar to those obtained with value-weighted indexes.[5] The latter characteristic of our proxy market portfolio should not be a cause of concern: the 160 securities in our sample constitute a significant percentage of all securities traded and represent 75 percent of the total market capitalization.

The proxy for the return on the risk free asset was taken as the "day-to-day" lending rate posted by the major French banks and published in the "Bulletin de la Banque de France."

IV. METHODOLOGY

The CAPM expressed in equations (1) and (2) is formulated in terms of expectations. In order to test the model with historical data we must first specify the stochastic process which generates securities' return. We suggest the following process [6]:

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{1t}\beta_j + \tilde{\gamma}_{2t}\beta_j^2 + \tilde{\gamma}_{3t}s_j + \tilde{\gamma}_{4t}\sigma_j^2 + \tilde{\gamma}_{5t}S_j + \tilde{\mu}_{jt} \qquad (3)$$

where β_j is asset j's systematic risk, s_j is asset j's unsystematic risk, σ_j^2 is asset j's total risk and S_j the relative skewness of the return distribution of asset j. Note that the $\tilde{\gamma}$ - coefficients in equation (3) are stochastic variables.

Asset j's systematic and unsystematic risks are estimated using the well-known Market Model [7]:

$$\tilde{R}_{jt} = \alpha_j + \beta_j \tilde{R}_{mt} + \tilde{\varepsilon}_{jt} \qquad (4)$$

from which we get:

$$\hat{\beta}_j = \frac{\sum_{t=1}^{n} (\tilde{R}_{jt} - \bar{R}_j)(\tilde{R}_{mt} - \bar{R}_m)}{\sum_{t=1}^{n} (\tilde{R}_{mt} - \bar{R}_m)^2} \qquad (4.1)$$

$$\hat{\alpha}_j = \bar{R}_j - \hat{\beta}_j \bar{R}_m \qquad (4.2)$$

$$\hat{S}_j = \frac{\sum_{t=1}^{n} (\tilde{R}_{jt} - \hat{\alpha}_j - \hat{\beta}_j \tilde{R}_{mt})^2}{n - 1} \qquad (4.3)$$

where hats indicate estimated variables, bars indicate arithmetic means and n is the number of weekly observations.

Systematic risk is defined as the estimated slope coefficient of the regression equation (4) and unsystematic risk as the standard error of the regression equation (4). Total risk is measured by the variance σ_j^2 of the return-distribution of asset j. Finally, relative skewness is calculated by the ratio of the third moment around the mean of asset j's return-distribution to that distribution's standard deviation cubed.

The stochastic generating process expressed in equation (3) is then employed to formulate a set of six testable hypotheses which correspond to the six propositions enunciated in Section II.

<u>Hypothesis 1</u>: The relationship between a security's expected return and its systematic risk is linear. This hypothesis can be tested by examining the random coefficients of the following pair of equations:

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{1t}\beta_j + \tilde{\gamma}_{2t}\beta_j^2 + \tilde{\mu}_{jt} \quad (5.1)$$

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{2t}\beta_j^2 + \tilde{\mu}_{jt} \quad (5.2)$$

If the expected value of random coefficient $\tilde{\gamma}_{1t}$ is non-zero, that is, $E(\tilde{\gamma}_{1t}) \neq 0$ and the expected value of the random coefficient $\tilde{\gamma}_{2t}$ is zero, that is, $E(\tilde{\gamma}_{2t}) = 0$, then hypothesis 1 cannot be rejected.

Hypothesis 2: Investors are compensated only for bearing systematic risk. This hypothesis can be tested by examining the expected value of the random coefficients of the following pair of equations:

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{1t}\beta_j + \tilde{\gamma}_{3t}s_j + \tilde{\mu}_{jt} \quad (6.1)$$

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{3t}s_j + \tilde{\mu}_{jt} \quad (6.2)$$

In this case we must have $E(\tilde{\gamma}_{3t}) = 0$.

Hypothesis 3: The risk-return trade-off is positive. This implies that the expected value of the random coefficient $\tilde{\gamma}_{1t}$ in equation (7)

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{1t}\beta_j + \tilde{\mu}_{jt} \quad (7)$$

satisfies the condition $E(\tilde{\gamma}_{1t}) > 0$.

Hypothesis 4: Investors view securities' return distributions as symmetrical, that is, they ignore skewness when they make investment decision. Consequently, the expected value of the random coefficient $\tilde{\gamma}_{5t}$ in the following pair of equations must be zero:

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{1t}\beta_j + \tilde{\gamma}_{5t}S_j + \tilde{\mu}_{jt} \quad (8.1)$$

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{5t}S_j + \tilde{\mu}_{jt} \quad (8.2)$$

and

$$E(\tilde{\gamma}_{5t}) = 0.$$

Hypothesis 5: There exists unrestricted riskless borrowing and lending at a unique risk free rate R_F. This hypothesis implies that the expected value of the random coefficient $\tilde{\gamma}_{0t}$ in equation (7) is equal to R_F that is, $E(\tilde{\gamma}_{0t}) = R_F$.

Hypothesis 6: Investors are not extreme diversifiers. Levy (13) has shown that in this case the variance of a security's returns emerges as the dominant risk-measure as opposed to systematic risk. In this case the expected value of the random coefficient $\tilde{\gamma}_{4t}$ in the pair of equations:

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{1t}\beta_j + \tilde{\gamma}_{4t}\sigma_j^2 + \tilde{\mu}_{jt} \tag{9.1}$$

$$\tilde{R}_{jt} = \tilde{\gamma}_{0t} + \tilde{\gamma}_{4t}\sigma_j^2 + \tilde{\mu}_{jt} \tag{9.2}$$

must be positive, that is, $E(\tilde{\gamma}_{4t}) > 0$, otherwise hypothesis 6 can be rejected.

V. TESTS DESIGN

We tested the six hypotheses stated in the preceding section in the following manner. Our ten-year data set yielded 520 weekly return-observations for each of the 160 common stocks in the sample. The 10-year period was divided into three consecutive non-overlapping subperiods. A first subperiod of 52 weeks length (one year) was used to construct 20 portfolios of eight securities each. A second 52-week subperiod was employed to estimate the four independent variables which appear on the RHS of equation (3). Finally, a subperiod of 416 weeks (eight years) was used to test our six hypothesis.

The construction of portfolios begins with the calculation of the beta coefficient of each of the 160 stocks according to equation (4.1) where n = 52 and j = 1, ---, 160. The 160 securities are then ranked in descending order of the value of their beta-coefficient and the first eight securities with the highest beta coefficient are assigned to the first portfolio; securities 9 to 16 are assigned to the second portfolio and so on until all 160 securities are assigned to a portfolio. This procedure yields portfolios with the widest range of beta coefficients. The reason we perform the tests with portfolios of securities rather than individual securities is the existence of measurement errors in the calculated beta-coefficient of individual securities. These errors can be reduced by grouping securities in portfolios. Portfolios'betas suffer from significantly less measurement errors than individual securities'betas [8]. The grouping procedure, however, raises two problems. It reduces the number of observations (from 160 to 20 in our case) and introduces a measurement bias. The first problem means that we can only construct portfolios of 8 securities. Larger portfolios would have been preferable but the number of portfolios would have been reduced to less than 20, a size below which statistical techniques become less reliable. A measurement bias occurs because high-risk portfolios have been shown to have overestimated betas (in comparison to their true betas) whereas low-risk portfolios have underestimated betas [9]. This problem can be minimized by using the first subperiod solely to construct the portfolios via the ranking procedure. Estimation of the independent variables (particularly β_j) and tests of the hypotheses are performed in subsequent subperiods. By recalculating portfolios'betas in another subperiod one can minimize the measurement bias because over-and underestimations of individual securities'betas within a portfolio become random instead of predetermined as in the first subperiod.

The second subperiod is employed to estimate the four risk-measures which appear in the RHS of equation (3). Systematic risk is estimated with equation (4.1), unsystematic risk with equation (4.3), total risk is estimated as the variance of R_{jt} and relative skewness by the ratio of the third moment of $\tilde{R}_{jt}$ to σ_j^3.

The third subperiod is used to test the six hypotheses. To illustrate consider hypothesis 1. We want to estimate $E(\tilde{\gamma}_{1t})$ and $E(\tilde{\gamma}_{2t})$ over the first year of the third subperiod. This can be done by running 52 separate cross sectional regressions, one for each week of the year. The first regression consists in regressing the beta coefficient of 20 portfolios estimates over subperiod two (β_p and β^2_p) against the 20 weekly returns of these portfolios for the <u>first</u> week (t=105) of the third subperiod:

$$\tilde{R}_{p,t=105} = \hat{\gamma}_{0,t=105} + \hat{\gamma}_{1,t=105}\,\tilde{\tilde{\beta}}_p + \hat{\gamma}_{2,t=105}\,\tilde{\beta}^2_p + \tilde{\varepsilon}_{p,t=105}$$

This will yield the estimated coefficient $\hat{\gamma}_{0,t=105}$, $\hat{\gamma}_{1,t=105}$ and $\hat{\gamma}_{2,t=105}$. The procedure is repeated for the second week (t=106) of the third subperiod and so on until we obtain $\hat{\gamma}_{0,t=156}$, $\hat{\gamma}_{1,t=156}$ and $\hat{\gamma}_{2,t=156}$ for the 52nd week of the third subperiod (t=156). Then by taking the arithmetic average of the 52 $\hat{\gamma}_0$, $\hat{\gamma}_1$ and $\hat{\gamma}_2$ we have estimates of $E(\tilde{\gamma}_{0,t})$, $E(\tilde{\gamma}_{1,t})$ and $E(\tilde{\gamma}_{2,t})$. That is:

$$\hat{E}\,(\tilde{\gamma}_{i,t}) = \sum_{t=105}^{156} \hat{\gamma}_{i,t}/52 = \bar{\hat{\gamma}}_i \qquad (10)$$

where i = 0, 1, 2.

We repeat the entire procedure over the second year of the third subperiod (t= 157 to t=208) but we update our estimates of portfolio betas by recalculating β_p over the first year of weekly data of the third subperiod (t=105 to t=156) rather than keeping on using the portfolio betas estimated over subperiod two (t=53 to t=104). Thus, subperiod two (the estimation subperiod) extends into subperiod three (the testing subperiod). A similar general approach is employed in testing hypotheses 2 to 6.

VI EMPIRICAL RESULTS

The empirical findings are summarized in Table 1 to Table 4. In Table 1 we present various statistics relative to equation (7). The first column gives the year over which the statistics have been estimated. Actually, the year begins in June and ends the following May, that is, 1969 means the 12 months period from June 1969 to May 1970. Note that we provide statistics for the two first years although the first 104 weeks of data were used for portfolio construction and risk estimation. In order to obtain statistics for 1969 and 1970 we simply run our tests backward, that is, we used 1978 and 1977 as portfolio construction subperiod and risk estimation subperiod, respectively and run our tests yearly from 1976 to 1969 [10].

The second column of Table 1 gives the average value of the intercept $\hat{\gamma}_0$ followed by its t-statistics and its serial correlation coefficient. Statistical significance is indicated by asterisks. The fifth column gives the average value of the slope $\hat{\gamma}_1$ followed by its t-statistics and serial correlation coefficient. The last two columns give the average value and the standard deviation of the R-squares of the 52 cross sectional regressions, respectively.

Results for regressions with single risk-measures (other than systematic risk) are summarized in Table 2. Except for the case of equation (5.1) we only present the averages of the estimated slope coefficients and their t-statistics. Table 3 gives the results for regressions with multiple risk-measures (systematic risk plus another risk-measure). Again, for the sake of compactness, we do not report the results for the intercept coefficients. Finally, in Table 4 we summarize the behavior of the market portfolio and that of the risk free asset.

The t-statistics given in the four tables are for testing the hypothesis that the average value of $\hat{\gamma}_i$ is zero. These statistics are calculated as:

$$t(\bar{\hat{\gamma}}_i) = \frac{\bar{\hat{\gamma}}_i}{s(\hat{\gamma}_i)/\sqrt{n}}$$

$i = 0,1,2,3,4$ and 5

where $s(\hat{\gamma}_i)$ is the standard deviation of the weekly estimates of the regression coefficient $\hat{\gamma}_i$ and $n = 52$ is the number of weekly observations.

An examination of the findings presented in Table 1 through Table 4 leads to the following observations and comments. A general discussion of the implications of the results is deferred to the next section.

First, it appears that the relationship between average returns and systematic risk is generally linear. However, the trade-off between risk and return is not positive and hence hypothesis 1 cannot be rejected but hypothesis 3 must be rejected. In practical terms the findings indicate that investors, who made portfolio decision on the basis of the most current value of securities' systematic risk, ended up earning lower average returns than the market over the following year if they had constructed high-beta portfolios, and higher average returns than the market if they had constructed low-beta portfolios. This phenomenon occurs because the tests are performed with historical data whereas the CAPM is a statement about expectations and one expects, over an investment horizon of sufficient length, that the market portfolio will outperform the riskless asset if hypothesis 5 is met or the zero beta portfolio if it is not. Now looking at table 4, we can note that the average value of $\hat{\gamma}_{0,t}$ is generally significantly higher than the average return on the risk free asset. This may be evidence in support of Black's version of the CAPM and rejection of hypothesis 5. Thus, the excess return of the market portfolio should be related to the zero beta portfolio and not to the riskless asset. With historical data, when the excess return of the market portfolio drops in value over the test period, high-beta portfolios will exhibit a deeper decline than the market and low-beta portfolios will show a smaller fall. This will produce the reported downward sloping relationship between average returns and systematic risk.

When unsystematic risk is introduced, either alone (Table 2, part 2) or with systematic risk (Table 3 part 2) we found no statistically significant relationship between this measure of risk and portfolio's returns and hence hypothesis 2 cannot be rejected. Similar conclusions are drawn when we examine total risk as an explanatory variable. See Table 2, part 3 and Table 3. Hence, we found no evidence to support hypothesis 6. Finally, hypothesis 4 cannot be rejected: relative skewness does not affect the price of securities (Table 2 part 4) meaning that investors can be assumed to make decisions as if the distribution of securities' return were symmetrical.

Turning again to Table 1, note that in the years for which the average of $\tilde{\gamma}_{1,t}$ is significantly negative, the average of $\hat{\gamma}_{0,t}$ is significantly positive. Also, the serial correlation coefficient of the $\hat{\gamma}_{1t}$ is not significantly different from zero whereas the serial correlation coefficient of the $\hat{\gamma}_{0,t}$ is generally significantly positive. The critical value ρ_c of the serial correlation coefficient at the 5 percent level of significance was calculated as $\rho_c = 2\sqrt{n-1}$ where $n = 52$ is the number of weekly return observations. Thus, the behavior through time of $\hat{\gamma}_{1,t}$ is consistent with the notion of an efficient capital market. This is not the case for $\hat{\gamma}_{0,t}$ impliying that the French money market may not be efficient.

Finally from Table 4, notice that the average return of the market index has not been significantly different from zero except for 1976 and 1977, where it was significantly negative and positive, respectively. The index exhibits positive autocorrelation, a phenomenon that have been reported in studies of other equity markets [11].

VII DISCUSSION AND INTERPRETATION

Taken globally, the findings reported in the previous section cannot be used to reject the general hypothesis that the pricing of common stocks on the Paris Stock Exchange conforms to the CAPM. The findings, however, raise a disturbing question. How could a negative trade-off between risk and return occurs so often over a decade? In a reasonably efficient market such a phenomenon should not be observed.

First, recall that a negative trade-off is not inconsistent with the CAPM when we use historial returns in periods over which the observed excess return on the proxy market-portfolio is negative. The problem is that in an efficient market, populated by risk averse investors, higher risk should earn higher return in the long run. The price of relatively riskier assets should be bid down to bring their return in line with commensurate risk. A decade should be a period of sufficient length for market forces to reestablish a positive trade-off.

Although we do not have the definitive answer to our question we can make the following pertinent comments. Looking at our data we can note that our tests were performed with weekly returns whereas most, if not all, studies which examined the relationship between average returns and risk used monthly or longer return intervals. There is evidence, however, that the length of the return interval affects significantly the nature of the risk-return trade-off (11). Nevertheless it is doubtful that we could have observed a complete reversal of the sign of the risk return trade-off if we had used monthly or quaterly data. We intend to investigate this issue in another paper.

Another relevant observation is that the reported negative trade-off on the Paris Stock Exchange over the period 1969-1979 is not proper to French securities only. It has also been observed on the American equity markets. Schallheim and Demagistris (21) report that the average of the coefficient $\hat{\gamma}_{1,t}$ (using monthly returns) over the period 1968-1974 was equal to -.0052 with a t-statistics of -.81.

The foregoing discussion is only part of the answer. The persistence of the negative trade-off can also be traced back to factors that are peculiar to the French equity market [12]. In particular is the fact that the market is heavily institutionalized. Institutional investors do not have the flexibility, and the market does not have the liquidity, which will permit drastic rebalancing of portfolios, a mechanism that may restore a positive trade-off in the long run. The crucial point, however, is that common stocks represent only a small portion of institutional portfolios which contain other investment media such as real estate and commodities. Although some institutional investors may underperform on the common-stock portion of their portfolios, the overall excess return may still be positive. Viewed from the equity market, portfolio performance may have been inconsistent with a long run positive trade-off over the decade 1969-1979. This may have not been the case if we have taken into consideration the universe of investment media. In other words, our proxy market portfolio may simply be misspecified. Unfortunately, data is not available to conduct a more general test of the CAPM.

VIII CONCLUSION

In this paper we examined the relationship between the average returns and the risk of a sample of 160 French Common Stocks which traded continuously on the Paris Stock Exchange over the decade 1969-1979. Although we did find that a negative relationship existed between systematic risk and return we could not gather sufficient evidence to reject the hypothesis that the pricing of French Common Stocks conforms to the CAPM [13].

We have shown that investors were generally compensated only for the systematic portion of the risk of their portfolio and that the average return they earned was proprotional to the (systematic) risk of their portfolios. Investors also seemed to make portfolio decisions as if the distribution of securities prices were sysmmetrical. Finally, the reported negative trade-off between risk and return, was explained by the poor performance of the French equity market, a phenomenon that has also been observed in other equity markets, and by institutional factors which are proper to the French market. Further research is called for regarding the effect of the length of the return interval on the magnitude and sign of the risk-return trade-off of French common stocks as well as the effects that a better specified proxy market portfolio (containing a wider and more varied sample of risky assets) may have on the nature of the relationship between average return and risk. Unfortunately, the major obstacle to continued research in this area is the lack of readily available data.

NOTES

1. The exceptions are the studies of Modigliani, Pogue and Solnik (17); Guy (9) for the German equity market; Hawawini and Michel (10) for the Belgian equity market; and Levy (14) for the Israeli Stock Market. All these studies utilize the methodology of Black, Jensen and Scholes (3).

2. For an up to date discussion of the peculiarities of the Paris Stock Exchange, the reader is referred to the recent article of Stonham (24).

3 For a further discussion of the CAPM the reader is referred to Fama (5).

4 We are grateful to Ms Francine Roure and Mr Alain Butery for making this tape available.

5 See the recent work of Schallheim and De Magistris (21).

6 This process is a generalization of the one suggested by Fama and McBeth (7).

7 For further detail on the Market Model see Sharpe (22), Beja (1) and Fama (6). For empirical evidence on European data see Pogue and Solnik (18).

8 Practically all tests of the CAPM are performed with portfolios. For an exception see Jacob (12) and Levy (13) who use individual securities.

9 In this respect, see Blume (4).

10 The method is suggested by Guy (9).

11 See the pioneering work of Fisher (8).

12 See footnote 2.

13 Tests of the CAPM have recently been critized by Roll (19) and (20). Mayers and Rice (16), however, argue that this criticism is vastly over stated.

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TABLE 1

REGRESSIONS: $R_{pt} = \hat{\gamma}_{01,t} + \hat{\gamma}_{1t} \cdot \hat{\beta}_p$

Year	$\bar{\hat{\gamma}}_{01}$	$t(\bar{\hat{\gamma}}_{01})$	$\rho(\hat{\gamma}_{01})$	$\bar{\hat{\gamma}}_1$	$t(\bar{\hat{\gamma}}_1)$	$\rho(\hat{\gamma}_1)$	$\overline{r^2}$	$s(r^2)$
1969[a]	-.0014	-0.56	-.020	.0036	1.07	-.032	.1243	.1348
1970[a]	.0040	1.74*	-.299**	-.0036	-1.71*	.023	.0844	.1035
1971	.0078	3.69**	.295**	-.0045	-1.70*	-.160	.1559	.1660
1972	.0107	3.37**	.226*	-.0065	-2.18**	-.156	.1386	.1221
1973	-.0041	-1.41	-.001	.0005	0.11	-.009	.1361	.1415
1974	.0002	0.09	-.239*	.0019	0.36	.106	.1558	.1600
1975	.0024	1.49	-.156	-.0018	-0.67	-.132	.1373	.1722
1976	-.0068	-2.81**	.272*	.0006	0.23	-.126	.1277	.1412
1977	.0046	1.67*	.256*	.0048	1.08	-.127	.1756	.1713
1978	.0089	3.32**	.131	-.0041	-1.89*	-.095	.1137	.1178

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

[a] Results for the year are based on the "backward" method.

TABLE 2

REGRESSIONS WITH RISK MEASURES OTHER THAN BETA

Regressions	$R_{pt} = \hat{\gamma}_{02,t} + \hat{\gamma}_{2t}\hat{\beta}_p^2$				$R_{pt} = \hat{\gamma}_{03,t} + \hat{\gamma}_{3t} \cdot \hat{s}_p$		$R_{pt} = \hat{\gamma}_{04,t} + \hat{\gamma}_{4t} \cdot \hat{\sigma}_p^2$		$R_{pt} = \hat{\gamma}_{05,t} + \hat{\gamma}_{5t} \cdot \hat{S}_p$	
Estimated Coefficients and t-statistics	$\bar{\gamma}_{02}$	$t(\bar{\gamma}_{02})$	$\bar{\gamma}_2$	$t(\bar{\gamma}_2)$	$\bar{\gamma}_3$	$t(\bar{\gamma}_3)$	$\bar{\gamma}_4$	$t(\bar{\gamma}_4)$	$\bar{\gamma}_5$	$t(\bar{\gamma}_5)$
Year 1969[a]	.0005	0.24	.0014	0.95	-.1259	-1.28	-1.5152	-1.15	-.0053	-.48
1970[a]	.0029	1.52	-.0021	-1.62	-.1239	-0.98	-1.8861	-1.41	.0076	0.77
1971	.0057	2.74**	-.0020	-1.72*	.2214	1.25	0.6615	0.33	-.0199	-1.12
1972	.0082	3.03**	-.0034	-2.13**	.0865	0.42	-2.6210	-1.21	-.0061	-0.47
1973	-.0042	-1.76*	.0005	0.20	.1252	0.96	1.2184	0.77	.0083	0.64
1974	.0010	0.38	.0009	0.37	-.0891	-0.28	0.3936	0.14	.0102	0.58
1975	.0014	0.83	-.0006	-0.54	.0914	0.71	-0.0711	-0.08	.0194	1.13
1976	-.0067	-3.00**	.0004	0.29	.1197	1.26	1.6810	1.41	.0295	1.64
1977	.0068	2.23**	.0022	1.09	.1304	0.65	1.8093	0.90	-.0178	-0.97
1978	.0071	2.66**	-.0019	-1.45	-.2257	-1.56	-1.2239	-1.91*	.0188	1.55

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

[a] Results for the year are based on the "backward" method.

TABLE 3

REGRESSIONS WITH MULTIPLE RISK MEASURES

Regression	$R_{pt} = \hat{\gamma}_{0t} + \hat{\gamma}_{1t} \cdot \hat{\beta}_p + \hat{\gamma}_{2t} \cdot \hat{\beta}_p^2$				$R_{pt} = \hat{\gamma}_{0t} + \hat{\gamma}_{1t} \cdot \hat{\beta}_p + \hat{\gamma}_{3t} \cdot \hat{s}_p$				$R_{pt} = \hat{\gamma}_{0t} + \hat{\gamma}_{1t} \cdot \hat{\beta}_p + \hat{\gamma}_{4t} \cdot \hat{\sigma}_p^2$			
Estimated Coefficients and t-statistics	$\bar{\hat{\gamma}}_1$	$t(\bar{\hat{\gamma}}_1)$	$\bar{\hat{\gamma}}_2$	$t(\bar{\hat{\gamma}}_2)$	$\bar{\hat{\gamma}}_1$	$t(\bar{\hat{\gamma}}_1)$	$\bar{\hat{\gamma}}_3$	$t(\bar{\hat{\gamma}}_3)$	$\hat{\gamma}_1$	$t(\bar{\hat{\gamma}}_1)$	$\bar{\hat{\gamma}}_4$	$t(\bar{\hat{\gamma}}_4)$
Year 1969[a]	.0049	0.82	-.0007	-0.28	.0029	0.84	-.0936	-0.97	.0031	0.92	-0.3882	-0.89
1970[a]	-.0014	-0.21	-.0013	-0.35	-.0035	-1.68*	-.0065	-0.05	-.0032	-1.39	-0.3120	-0.22
1971	-.0085	-0.82	.0019	0.45	-.0040	-1.66*	.1168	0.78	-.0045	-1.69*	1.1726	0.55
1972	-.0127	-1.55	.0035	0.91	-.0065	-2.18**	.1015	0.49	-.0070	-2.09**	1.0158	0.43
1973	-.0038	-0.37	.0025	0.51	-.0003	-0.07	.1287	1.07	-.0008	-0.19	1.4133	0.98
1974	-.0007	-0.05	.0013	0.20	.0030	0.55	-.1826	-0.56	.0042	0.58	-1.6096	-0.40
1975	-.0128	-1.52	.0052	1.49	-.0034	-1.27	.2032	1.89*	.0087	-2.31**	2.6330	2.29*
1976	-.0022	-0.34	.0015	0.45	.0006	0.21	.1184	1.23	-.0005	-0.18	1.8452	1.63
1977	.0089	0.57	-.0019	-0.31	.0053	1.16	-.0638	-0.41	.0060	1.16	-0.808	-0.50
1978	-.0102	-0.88	.0031	0.56	-.0034	-0.99	-.0679	-0.38	-.0012	-0.26	-0.9231	-0.89

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

[a] Results for the year are based on the "backward" method.

TABLE 4

BEHAVIOR OF THE MARKET PORTFOLIO AND THE RISK-FREE ASSET

Year	$\bar{R}_m$	$t(\bar{R}_m)$	$\rho(R_m)$	$\bar{R}_F$	$\bar{\hat{\gamma}}_0$	$t(\hat{\gamma}_0)$	t($_0-\bar{R}_F$)
1969	.0022	0.90	.013	.0018	-.0014	-0.56	-1.22
1970	.0005	0.25	.083	.0014	.0040	1.74*	1.15
1971	.0036	1.35	.310	.0013	.0078	3.69**	3.13
1972	.0042	1.57	.004	.0017	.0107	3.37**	3.01**
1973	-.0035	-1.06	.196	.0020	-.0041	-1.41	-2.09**
1974	.0020	0.47	.283	.0021	.0002	0.09	-0.62
1975	.0007	0.27	-.015	.0015	.0024	1.49	0.27
1976	-.0061	-2.31**	.219**	.0018	-.0068	-2.81**	-3.65**
1977	.0094	2.04**	.007	.0017	.0046	1.67**	1.19
1978	.0048	1.44	.154**	.0021	.0089	3.32**	2.58**

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

LIST OF INSEAD RESEARCH WORKING PAPERS

80/01 "Identifying cognitive style determinants of retail patronage, by Christian PINSON, Arun K. JAIN and Naresh K. MALHOTRA, January 1980.

80/02 "Dimensions culturelles des conceptions de management - une analyse comparative internationale", par André LAURENT Février 1980.

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