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Explaining the Cross-Section Returns in France : Characteristics or Covariance

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EXPLAINING THE CROSS-SECTION RETURNS IN FRANCE: CHARACTERISTICS OR COVARIANCES?

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Second version

Abstract. In this study, we test the three factor model of Fama and French and the Characteristic Model of Daniel and Titman (1997) on The French Stock Market over July 1976 to June 2001 period. Stocks are ranked by size and book to market ratios and then by ex-ante HML, SMB or Mkt loadings. The characteristic-based model predicts that these portfolios should have an average return of zero. While, the factor model says that these returns should be positive. Our results reject the factor model with characteristic balanced portfolios that load on the HML, SMB and MKt factors. Moreover, the three factor model predicts that the intercepts of regressions of the returns of these characteristic-balanced portfolios on the Fama and French factor portfolios are indistinguishable from zero. In contrast, the alternative hypothesis of the characteristic model says that these intercepts should be negative. Our results are consistent with the factor pricing model and inconsistent with the characteristic-based pricing model. Because the size and the value premiums are relatively small, our conclusions must be interpreted carefully. In contrast, market premium allows more powerful tests of the two models.

Key words and phrases. Asset Pricing, Size effect, Book to market ratio, Risk factors, The Fama and French Unconditional Model, The Characteristic Model and Anomalies.

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Introduction

The Capital Asset Pricing Model CAPM (Sharpe (1964), Lintner (1965), Mossin (1966) and Black (1972)) is the first and the most widely used model of asset pricing because of its simplicity. It assumes that investors respect the Markowitz mean-variance criterion in choosing their portfolios. The beta revolution has had significant impact on the academic and non-academic financial community. Other factor pricing models attempted to explain the cross-section of average asset returns [The Inter-temporal Capital Asset Pricing Model (Merton (1973)), The Arbitrage Pricing Model (Ross (1976)) and the inter-temporal capital asset pricing model based on consumption (Rubinstein (1976), Lucas (1978), Breeden (1979), among others [1])].

The well-known prediction of the CAPM is that the expected excess return on an asset equals the β of the asset times the expected excess return on the market portfolio, where the β is the covariance of the asset's return with the return on the market portfolio divided by the variance of the market return. Roll (1977) argued that the model is not testable because the tests involve a joint hypothesis on the model and the choice of the market portfolio. On the other hand, many patterns emerge from empirical studies which are not explained by the CAPM; such as: expected returns and earnings to price ratio have a positive relation (Basu (1977)), small capitalisations have higher expected returns than big capitalisations (Banz (1981)), there is a positive relation between the level of debt and stock returns (Bhandari (1988)) and the book to market ratio is considered as an explanatory variable in stock returns (Chan et al. (1991) and Fama and French (1992) on Japanese and American markets respectively).

In our study, we compare the Three Factor Asset Pricing Model of Fama and French (1993) and the Characteristic Model of Daniel and Titman (1997) in explaining stock returns in the case of France. Fama and French argue that stock returns can be explained by three factors: market, book to market ratio and size. Their model summarizes earlier results (Banz (1981), Huberman and Kandel (1987), Chan and Chen (1991)). However, it is much debated: To be a compensation for risk in a multi-factor version of Merton's (1973) Inter-temporal Capital Asset Pricing Model (ICAPM) or Ross's (1976) Arbitrage Pricing Theory (APT), factors must be related to state variables which justify a risk premium.

A competing model of the three factor model of Fama and French is the model of the characteristics of the firm of Daniel and Titman (1997). Indeed, Daniel and Titman give a different interpretation for the relation between book to market ratio and stock returns. They reject the assumption of "factor of risk" in favor of the model of "the characteristics of the firm": A low book to market ratio, which is one of the characteristics of the large firms, causes a low stock returns which does not, necessarily, correspond to a risk. They show the superiority of their model in comparison to that of three factors of Fama and French. However, Davis et al.

[1] Cochrane (2001)documented that: ≪...all factor models are derived as specializations of the consumption-based model. Many authors of factor model papers disparage the consumption-based model, forgetting that their factor model is the consumption-based model plus extra assumptions that allow one to proxy for marginal utility growth from some other variables.≫ p151

(2000) show that this interpretation is specific to the period of study and confirm the results of the three factor model. In the same way, Lewellen (1999) confirms the superiority of the model of Fama and French (1993) compared to the model of Daniel and Titman (1997).

This paper tests the three factor model of Fama and French (1993) and the characteristic model of Daniel and Titman(1997) in the case of France for a one quarter century period. Our study extends the asset pricing tests in two ways: (a) We expand the test of the three factor model to the French market for a long period. So our results are useful because they are an out of sample test of the three factor model. The main result says that the three factor model explains the common variation and the cross-section of stock returns, (b) We compare the three factor model and the characteristic model. This is the first study that makes such a comparison for the French market. Our results, which are based on Daniel and Titman (1997) tests, fail to reject the Fama and French three factor model.

In the next section, we expose the theoretical framework of our study. Methodology used and database considered are discussed in the second part of the paper. In sections three and four, we summarize results and then we will conclude.

1. THEORETICAL FRAMEWORK: THE THREE FACTOR MODEL VS. THE CHARACTERISTIC MODEL

1.1. **The Three Factor Model.** The basic idea of Fama and French (1993) is: the size and book to market ratio are considered as factors of risk that we must remunerate. The unconditional version [2] of the model is expressed in the following equation:

$$E(R_i) - R_f = ß_i(E(R_M) - R_f) + s_i E(SMB) + h_i E(HML)$$

with:

$E(R_i)$: expected stock return.

R_f: risk free rate.

$E(R_M)$: expected return of market portfolio.

$E(SMB)$: *Small Minus Big*: is the difference between the equal-weight averages of the returns on the three small stock portfolios and the three big stock portfolios.

$E(HML)$: *High book to market Minus Low book to market*: is the difference between the return on a portfolio of high book to market stocks and the return on a portfolio of low book to market stocks, sorted be neutral with respect to size.

$ß_i, s_i, h_i$: are factor loadings.

Indeed, on the basis of two criteria, size and book to market (BE/ME), Fama and French construct twenty five portfolios, from a sample of the stocks of the NYSE, AMEX and NASD over 366 months (From June 1963 to December 1993). Monthly stock returns show a superiority of stocks of small capitalization and high book to market ratio, compared to the stocks of big capitalizations and low book to market ratio. This is why, they made the following regression:

[2] The conditional version of the model authorizes a temporal variation of the rate of stock returns and coefficients of the factors of risk.

$$R_i - R_f = \alpha_i + ß_i(R_M - R_f) + s_i SMB + h_i HML + \epsilon_i$$

The results show that the coefficient α_i is:(i)Negative for portfolios located in the extreme quantiles of the stocks of small capitalizations and low ratio book to market and (i)Positive for portfolios located in the extreme quantiles of the stocks of big capitalizations and high book to market ratio. In addition to these results on the extremes, the coefficient α_i is not significantly different from zero; which makes it possible to affirm that the three factor model explains cross-section stock returns.

There are many explications for size and book to market anomalies. They can be summarized in the following points: The premium of the financial distress is irrational (Lakonishok et al. (1994) and MacKinlay (1995)). Three arguments justify it: It can express an over-reaction of the investors. The second argument is relative to the empirical observation of low stock return of firms with distressed financial situation, but not necessarily during period of low rate of growth of GNP [3] or of low returns of all stocks. Lastly, diversified portfolios of stocks with, as well high as low, ratio book to market; have the same variance of returns.

Other researchers documented other arguments [4] which can replace the premium of the financial distress and validate the CAPM: *(a) Survivor bias*(Kothari et al. (1995)): But it should be noticed that even if the critic of the survivor biais is true, it is not necessarily in favor of the CAPM (Kim (1997), Barber and Lyon (1997)). *(b) Data-snooping*(Black (1993), Black, Lo and MacKinlay (1990)): An extrapolation of data can lead to false conclusions, so how we need the *out-of-sample* tests. Fama and French (1996b) and Fama and French (1996a) reject this biais [5]. Moreover, the relation between stock returns and the book to market ratio was confirmed by: Davis (1994) on data over a long period; Chan et al. (1991) on Japanese data and Barber and Lyon (1997) on data on the financial institutions [6], among others. *(c) Bad market proxies* : Indeed, according to this argument, the model of asset pricing to be retained is that of the CAPM and because we don't know the market portfolio we have anomalies. This is why, the "real" βs are not observed. This problem is called *errors-in-variables*(Kim (1997)).

Nevertheless, there are many attempts to give theoretical explanation for the three factor model. Berk et al. (1999) give a micro-economic model of the firm which integrate options of growth investments. The simulations of the model give

[3] Gross National Product: Chen (1991) indicate that the expected stock returns are negatively correlated with the present rate of growth of GNP and positively correlated with its future rate of growth.

[4] we limit the presentation to three biais related to the use of the data but there exists others; such as errors of corresponding market and accounting data or *look ahead bias*.

[5] Fama and French (1996b) and Fama and French (1996a) give four arguments: the premium of the financial distress is not special to a particular sample since it is checked for different periods. It was also the subject of many studies made on international data. The size, book to market equity, earning to price and cash flow ratios, indicators of expected incomes (Ball 1978), have a great utility to test models of asset pricing like the CAPM. And in fourth point, the limited number of the anomalies excludes the assumption of*data-mining*.

[6] Barber and Lyon (1997) confirmed the relation between the size, the book to market ratio and the stock returns, published by Fama and French (1992), for the financial institutions (Fama and French considered only the non-financial firms).

consistent results with the conclusions of the three factor model. More recently, Ferguson and Shockley (2003) explain that the factor portfolios of Fama and French are correlated with a missing beta risk related to leverage. The empirical application of their model show that relative leverage and relative distress are powerful in explaining cross-sectional returns.

1.2. **The Characteristic Model.** A competing model of the three factor model of Fama and French is the model of the characteristics of the firm of Daniel and Titman (1997). Indeed, Daniel and Titman give a different interpretation for the relation between book to market ratio and stock returns. They reject the assumption of "factor of risk" in favor of the model of "the characteristics of the firm": A low book to market ratio, which is one of the characteristics of the large firms, causes a low stock returns which does not, necessarily, correspond to a risk.

To understand the difference between the three factor model and the characteristic model, Daniel and Titman (1998) propose the following example: *"We know that people with college degrees earn more. The question is why. One hypothesis (the characteristic model) might be that getting a degree enhances your earning power. An alternative hypothesis (the factor model) is that the degree doesn't add anything; only IQ is valued. The reason that people with degrees earn more is that the degree proxies for their IQ."*

To show the superiority of their model in comparison to that of three factors of Fama and French, Daniel and Titman form two sorts of portfolios: (1)factor balanced portfolio (FB) which consists in the purchase of portfolio of stocks of high ratio B/M and low sensitivity to factor HML β_{hml} and the sale of portfolio of stocks of low ratio B/M and of the same sensitivity to factor HML β_{hml} and (2)characteristic balanced portfolio (CB)which has a high sensitivity to factor HML. It consists in the purchase and the sale of stocks of high ratio B/M (the purchase and the sale are made for the same amount). The behavior of these portfolios, with null investment, differs according to the model considered: the average returns of portfolio CB is null according to the characteristic model; while the factor model predicts that the average stock returns of portfolio FB is zero.

Daniel and Titman (1997) reject the factor model for the U.S. stocks. However, Davis et al. (2000) show that this interpretation is specific to the period of study and confirm the results of the three factor model. In the same way, Lewellen (1999) confirms the superiority of the model of Fama and French (1993) compared to the model of Daniel and Titman (1997)in explaining time-varying expected returns on the U.S. market. Daniel et al. (2000) replicate the Daniel and Titman tests on a Japanese sample and fail to reject the characteristic model. Because of these contradictory conclusions, we give in our study another out of sample test. We compare the Three Factor Asset Pricing Model of Fama and French (1993) and the Characteristic Model of Daniel and Titman (1997) in explaining stock returns in the case of France.

2. SIZE AND BOOK TO MARKET SORTED PORTFOLIOS

2.1. **Database and methodology.** We study monthly returns on stock portfolios for France. Portfolios use all French stocks with the relevant Datastream data. We start with 428 stocks: 157 stocks of the *Premier Marché*, 236 of the *Second Marché* and 35 of the *Nouveau Marché*. Only the stocks with available market and accounting data are used; so that our sample is reduced to 294 stocks[7]. After eliminating stocks with negative book to market and/or monthly returns for only one year, we obtain our sample of 274 firms: 142 from the *Premier Marché*, 116 from the *Second Marché* and 16 from the *Nouveau Marché*(Table 1). We consider the period from July 1976 to June 2001 (300 months)[8]. This is the first test of the two models that we made on a limited data. In a forthcoming work, we will counter the limit of the survivor biais and we will extend the sample.

TABLE 1.

Descriptive statistics for stocks of French stock market

The sample is composed of 274 French stocks. All variables are from the database of Datastream. Book to Market value divides the Net Book Value (Net Tangible Asset) by the Market Value. For companies which have more than one classe of equity capital, both market value and net tangible asset are expressed according to the individual issue. Market Value is defined as the share price multiplied by the number of ordinary shares issue. The amount in issue is updated whenever new tranches of stock are issued or after a capital change. The table shows: the average market value used to form size groups, the average book to market value used to form book to market groups, the number of stocks on the whole period and the periods covered.

	Premier Marché	*Second Marché*	*Nouveau Marché*
Market Value	2071.72	160.75	91.67
Book to Market Value	0.23	0.17	0.14
Number of Stocks	142	116	16
Period	July1974/June2001	July1989/June2001	July1998/June2001

In our study, we used the Fama and French(1993) methodology which consists into two classifications:

(1) *A classification of book to market ratio*: 30% of the stocks are grouped in the class of high ratio B/M, 40% of the stocks in the class of medium ratio B/M and 30% of the stocks in the class of low ratio B/M. We consider book to market ratio of December of the year $(t-1)$ for the formation of the portfolios for the period from July of year (t) to June of year $(t+1)$. Book to market ratio is calculated as being the reverse of the variable *Market Value To Book* which appears in the database of Datastream[9]. Unlike Fama and French who used the breakpoints of the ranked values of book to market for NYSE

[7] We have 148 stocks of the *Premier Marché*, 124 stocks of the *Second Marché* and 22 stocks of the *Nouveau Marché* with monthly return, market value and book to market ratio

[8] Returns are calculated from July 1974 however the sample of risk free rate starts in July 1976, so that our sample starting date is July 1976.

[9] Market value to Book divides the Market Value by the Net Book Value (Net Tangible Asset). For companies which have more than one classe of equity capital, both market value and net tangible asset are expressed according to the individual issue.

stocks to group NYSE, Amex and NASDAQ stocks, we use the breakpoints of the whole sample (*Premier Marché*, *Second Marché* and *Nouveau Marché*)to make our classification. Like Fama and French, we do not use negative book to market firms.

TABLE 2.

Book to market ratio classification

Stocks are classified into three groups of book to market ratio: high (H), medium (M) and low (L). In this table, we show the number (Nbr) of shifting from one group of book to market to another for all stocks of the sample.

The sample

Nbr.	0	1	2	3	4 and more	Total
Stocks	93	63	44	18	56	274
Pourcentage	33.94	22.99	16.06	6.57	20.44	100.00

We can ask about the significance of book to market classification? Indeed, a low book to market ratio characterize firms with high market value relative to book value. This is the case of firms with high growth investment opportunities. Another possible explanation is the existence of intangible assets, like investments in R&D. We mention also the case of firms with low risk with can be expressed in a high market value. Nevertheless, the understanding of the book to market ratio must be made in a context of three dimensions: the life-cycle of the firm, the sector and the stock market.

Table 2 shows the number of shifts in the book to market classification for all the stocks. One third of stocks doesn't change their book to market classification. These stocks are grouped in the same proportions between the three groups H, M and L. Indeed, 42% of 93 stocks are in the group L, 38% in H and 20% in M. Stocks with one shift in the book to market classification, which represent 23% of the total sample, are stocks around breakpoints. Only 5% of stocks change from low to high book to market ratio and vise versa.

The same observation can be made for stocks with two shifts in the book to market classification. Indeed, the majority of stocks change their book to market group around breakpoints. 30% (11%) of stocks move from low ratio (medium) to medium (low) then to low (medium). In the case of the breakpoint between high and medium book to market ratio, 20% and 18% of stocks are concerned.

(2) *A classification of size*: The stocks are grouped in two classes; the stocks of small capitalizations and the stocks of big capitalizations. We consider

the capitalization[10] of June of year (t) for the formation of portfolios for the period from July of year (t) to June of year ($t + 1$). Unlike Fama and French who used the median NYSE size to split NYSE, Amex and NASDAQ stocks (that's why the two size groups contain disproportionate numbers of stocks), we use the median size of the whole sample (*Premier Marché*, *Second Marché* and *Nouveau Marché*) to make our classification. The splits (three book to market groups and two size groups) are arbitrary. However Fama and French (1993) argued that there is no reason that tests are sensitive to this choice.

In financial literature, many authors ask about the variable to use in making the size classification. In empirical studies, it is usual to consider the market value. Nevertheless, this variable is subject of debate[11]. As we have mentioned earlier, in our study we consider the market value for the size classification. A firm is classified in small capitalisation for different raisons. We summarize all possible explanations in three categories. First, we have small firms because of their sector of activity. Second, firms in the beginning of their life-cycle can be classified, temporary, in small capitalisations. Finally, we have destressed firms.

Indeed, when we analyse our size classification, made yearly, we can make the following observations (Table 3). First, more than half of stocks (63%) doesn't change their classe of size. Within these stocks, 66% belong to small capitalisations and 34% to big capitalisations. This observation remove the hypothesis of distressed firms in our sample. Indeed, small firms are classified as small ones because they have relatively low market value in comparaison to other stocks in the sample. They aren't distressed ones.

22% of the hole sample are stocks with only one shift in size classification. This change is made from small capitalisations to big ones (92%). The simple explanation that we can give is the fact that firms begin with small size and then with growth investment opportunities they move to big capitalisations group. Only, 8% of stocks change from big to small group. Finally, 15% of stocks have more than one change in size classification. They are stocks around the breakpoints.

Six portfolios (HS, HB, MS, MB, LS, and LB) are formed with the intersection of the two preceding classifications, made independently. The monthly returns of each portfolio corresponds to the value-weight monthly returns of the stocks:

$$R_{p,t} = \sum_{i=1}^{n} \omega_{i,t} * R_{i,t}$$

Where:

$R_{p,t}$: is the value-weight monthly return of portfolio p in month t.

$R_{i,t}$: is the monthly return of stock i of portfolio p in month t.

[10] Market Value is defined as the share price multiplied by the number of ordinary shares issue. The amount in issue is updated whenever new tranches of stock are issued or after a capital change.

[11] See Berk (1995) and Berk (1997)

TABLE 3.

Size classification

Stocks are classified in to two groups: small capitalisations (S) and big ones (B). This classification is made yearly. In this table, we show the number of shifts (Nbr) in size groups for all stocks of our sample.

Total sample

Nbr.	0	1	2	3	4 and more	Total
Titres	173	61	19	15	6	274
Pourcentage	63.14	22.26	6.93	5.47	2.19	100.00

Any shift			One shift			
S	114	65.90%	From S to B		56	91.80%
B	59	34.10%	From B to S		5	8.20%
Total	173	100.00%	Total		61	100.00%

$\omega_{i,t}$: is the ratio of market value of stock i on total value market of portfolio p in month t.

n: is the number of stocks of portfolio p.

In our study, the risk free interest rate used is the monthly equivalent rate to: Short term interest rate for the period from July 1976 to January 1981, Money market, one month, rate from February 1981 to January 1987, PIBOR from February 1987 to December 1998 and EURIBOR from January 1999 to June 2001.

Table 4 shows that the portfolios in the smallest size quintile and the lowest book to market quintile and these in the biggest size quintile and the highest book to market quintile contain, on average, less stocks than other portfolios. Like table 1 in Fama and French (1993), in the smallest (biggest) size quintile, the number of stocks increases (decreases) from lower to higher book to market portfolios. Table 1 shows that stocks of *Second Marché* and *Nouveau Marché* have, on average, the smallest market value and the highest market to book value. This pattern has as a consequence that these stocks tend to be in the small and low B/M portfolio. Most stocks of big and high B/M portfolio are from *Premier Marché* because they have, on average, the biggest market value and the lowest market to book value.

2.2. **Empirical Results: The Three Factor Model Regressions.** From the equation of the three factor model of Fama and French, we have three explanatory variables: Market, HML and SMB:

$$R_i - R_f = \alpha_i + \beta_i(R_M - R_f) + s_i SMB + h_i HML + \epsilon_i$$

Table 4.

Descriptive statistics for six stock portfolios formed from independent sorts on size and book to market: From July 1976 to June 2001 (300 months)

The sample is composed of 274 French stocks. The six size-book to market portfolios are formed using the Fama and French methodology: (i)*A classification of ratio book to market*: 30% of the stocks are grouped in the class of high ratio B/M, 40% of the stocks in the class of medium ratio B/M and 30% of the stocks in the class of low ratio B/M. We consider book to market ratio of December of the year $(t-1)$ for the formation of the portfolios from July of year (t) to June of year $(t+1)$. Book to market ratio is calculated as being the reverse of the variable *Market Value To Book* which appears in the database of Datastream. Like Fama and French, we do not use negative book to market firms. (ii)*A classification of size*: The stocks are grouped in two classes: the stocks of small capitalizations and the stocks of big capitalizations. We consider the capitalization of June of year (t) for the formation of portfolios from July of year (t) to June of year $(t+1)$. Capitalisation is the Market Value, defined as the share price multiplied by the number of ordinary shares, of Dtastream.

	Book to Market equity quintiles		
Size	L	M	H
	Average of annual averages of firm size		
S	128.44	132.78	106.66
B	2366.71	1743.05	1346.68
	Average of annual Book to Market ratios		
S	0.083	0.571	1.353
B	0.138	0.545	1.268
	Average of annual number of firms in portfolio		
S	11.1	20.8	22.4
B	21.1	22.4	10.2

Two portfolios, HML and SMB, are formed from the six portfolios presented above. Indeed, the monthly stock returns of portfolio HML correspond to the difference between the average monthly stock returns of the two portfolios of high B/M ratio (HS and HB) and the average monthly stock returns of the two portfolios of low B/M ratio (LS and LB): $HML = \{(HS+HB)-(LS+LB)\}/2$.

As for the monthly stock returns of portfolio SMB, it corresponds to the difference between the average monthly stock returns of the three portfolios of small capitalization (HS, MS and LS) and the average monthly stock returns of the three portfolios of high capitalization (HB, MB and LB): $SMB = \{(HS+MS+LS)-(HB+MB+LB)\}/3$. The market portfolio is the value-weight returns of all the stocks (stocks are weighted by their market value).

For the dependent variable of our time-series regressions, we consider stock portfolio returns. Indeed, we regress monthly returns of the following portfolios: the six portfolios HS, HB, MS, MB, LS and LB, a portfolio with high B/M ratio (*high B/M equity portfolio*) which corresponds to the average of returns of two portfolios of high B/M ratio (HS and HB), or $HB/M = (HS + HB)/2$ and a portfolio with low B/M ratio (*low B/M equity portfolio*) which corresponds to the average of returns of two portfolios of low B/M ratio(LS and LB), or $LB/M = (LS + LB)/2$.

Table 5 summarizes returns of the dependent and explanatory variables in the time series regressions. The average excess returns of the eight stock portfolios considered range from 0.83% to 1.33% per month. The positive relation between average returns and book to market equity is confirmed in the smallest size quintile because average returns increase with book to market ratio[12]. Like Molay (1999), in every book to market quintile but the medium, average returns tend to decrease with the size which confirms evidence that there is a negative relation between size and average return. All excess returns of portfolios have high standard deviations (greater than 6% per month). The low (high) book to market portfolio has an average annual return of 11.31% (14.10%). Fama and French (1998)[13] documented an annual excess returns of 9.46% and 17.10% for, respectively, low and high book to market portfolios in the case of France. All portfolios, but SL and BH (which have the smallest number of stocks), produce average excess returns that are more than two standard errors from zero.

Table 5 shows also average values of explanatory variables. These values give the average risk premiums for the common factors in returns. The average value of excess returns of market portfolio is 1.045% per month with 2.932 t-statistic. This is large compared to Fama and French (1993) in the US-case (only 0.43% with 1.76 standard errors from zero) and Molay (2001) in the French case (0.61% with 1.36 standard errors from zero[14]. However, Fama and French (1998) documented an average annual value for the market portfolio in the French case about 11.26% (0.89% per month) and Heston et al. (1999) [15]about 1.21% per month. The average HML return is only 0.208% per month with a marginal 0.729 standard errors from zero. The size factor SMB produces an average premium of 0.103% per month, however the t-statistic is less than two (0.442).

Because the size and the value premiums are relatively small, we can not produce a conclusive contest between the risk model and the characteristic model. In contrast, market premium allows more powerful tests of the two models.

[12]In a first publication on the French market (204 stocks) for the period from July 1992 to June 1997, Molay (1999) confirms the negative relation between size and average return, however he does not found any relation between book to market ratio and average return. Standard deviation of excess stock portfolio returns in his study are less than these of our sample. In his thesis Molay (2001), he considered the period from July 1988 to June 1998 (120 months) for an average of 250 stocks and he confirmed the negative size/average returns relation for only high book to market classes and the positive book to market/average returns relation for only small capitalisations.

[13] Fama and French (1998) study the case of France for the period from July 1975 to June 1995. There sample has, on average, 108 stocks

[14] Molay (1999) documented an average excess return for the market portfolio of only 0.31%.

[15] Heston et al. (1999) study the case of France (among 12 European countries) for the period from 1978 to 1995. There sample has 418 stocks

TABLE 5.

Summary statistics for the monthly dependent and explanatory returns (in percent): From July 1976 to June 2001 (300 months)

The sample is composed of 274 French stocks. The six size-book to market portfolios are formed using the Fama and French methodology, as described in table 2. For the dependent variables, we consider excess monthly returns of the following portfolios: the six portfolios HS, HB, MS, MB, LS and LB, a portfolio with high B/M ratio which corresponds to the average of returns of two portfolios of high B/M ratio (HS and HB), or $HB/M = (HS + HB)/2$ and a portfolio with low B/M ratio which corresponds to the average of returns of two portfolios of low B/M ratio(LS and LB), or $LB/M = (LS + LB)/2$. The table gives average monthly excess returns, standard deviation and t-statistic for means (to test wether mean is different ro not from zero) of these eight portfolios. We have three explanatory variables: Market, HML and SMB. Indeed, the monthly stock returns of portfolio HML correspond to:$HML = \{(HS + HB) - (LS + LB)\}/2$. As for the monthly stock returns of portfolio SMB, it corresponds to: $SMB = \{(HS+MS+LS)-(HB+MB+LB)\}/3$. The market portfolio is the value-weight returns of all the stocks. The table gives correlations, average monthly returns, standard deviation and t-statistic for means of these three explanatory variables.

Dependent variables: excess returns per month (in percent)

	Mean	*Standard Deviation*	*t-Statistic*
SL	0.91	8.37	1.893
SM	1.03	6.95	2.585
SH	1.33	7.12	3.251
BL	0.87	6.65	2.288
BM	1.22	6.29	3.383
BH	0.87	7.69	1.966
LB/M	0.89	6.73	2.306
HB/M	1.10	6.73	2.845

Explanatory variables: correlation and excess returns per month (in percent)

Correlations

	Mktpond.	HML	SMB
Mktpond.	1.00		
HML	-0.015	1.00	
SMB	-0.131	-0.243	1.00

Explanatory returns

	Mktpond.	HML	SMB
Mean	1.045	0.208	0.103
Standard Deviation	6.17	4.95	4.06
t-statistic for means	2.932	0.729	0.442

Like Fama and French (1993), table 5 shows that HML portfolio returns have negative correlation with excess market and SMB portfolio returns (-0.015 and -0.243 respectively). Unlike Fama and French (1993), SMB and market portfolio have negative correlation. Molay (1999) documented that this negative correlation between SMB portfolio and market portfolio can be explained by the fact that market portfolio is value weighted. When we consider an equal weighted portfolio, this correlation become positive (and it is about 0.165 for our sample and 0.13 in Molay's study)[16].

On the basis of the adjusted R^2 criterion, we can affirm that the three factor model captures common variation in stock returns[17]. Indeed, for the eight portfolios, we obtained an average adjusted R^2 about 90.5%. Our results are better than these of Molay (2001) who obtained an average adjusted R^2 of 82.0% with the three factor model[18]. The market βs are all more than 31 standard errors from zero and adjusted R^2 ranges from 82.1% to 95.3%. Moreover, HML slopes are related to book to market ratio. For, as big as small, capitalisations; they increase from negative values for the lowest book to market quintile to positive values for the highest book to market quintile. Their t-statistics are greater than three. Similarly, SMB slopes are related to size. In every book to market quintile, they decrease from small to big capitalisation. They are more than three standard errors from zero.

Fama and French (1993) argue that the multi-factor asset pricing models of Merton (1973) and Ross (1976) imply a simple test of whether the set of explanatory variables suffice to describe the cross-section of average returns: intercepts of time-series regressions should be close to zero. In all cases, intercepts are below two standard errors from zero[19]. To sum up our results, we can say that the regressions of the three factor model absorb common time-series variation in returns (slopes and adjusted R^2 values). Moreover, because of intercepts which are close to zero, they explain the cross-section of average returns.

3. SIZE, BOOK TO MARKET AND HML FACTOR LOADINGS SORTED PORTFOLIOS

3.1. **Database and Methodology.** Like Daniel and Titman, we use ex-ante observable information to estimate expected future HML factor loading of stocks. We regress each stock's returns on the three factor portfolios (Market, HML and SMB) for the period -42 to -7 relative to the portfolio formation date. Both Daniel and Titman (1997) and Davis et al. (2000), use special factor portfolios to calculate the preformation factor loadings. They consider constant weights of June of year t to returns from date -42 to -7. However, Davis et al. (2000) report that using the variable-weight factors to estimate preformation risk loadings has little effect on the

[16] The appendix shows the monthly excess returns of the three explanatory variables for the period from July 1976 to June 2001.

[17] For further results on the comparaison between the three factor model and the CAPM, see Ajili (2002).

[18] Molay (1999) obtained an average adjusted R^2 of 79.7% with the three factor model

[19] Molay (1999)and Molay (2001), obtained two regressions of the three factor model out of nine where intercepts are more than two standard errors from zero.

Table 6.

Regressions of monthly excess returns of portfolios formed from independent sorts on size and book to market: From July 1976 to June 2001 (300 months)

The sample is composed of 274 French stocks. The six size-book to market portfolios are formed using the Fama and French methodology, as described in table 2. The monthly returns of each portfolio corresponds to the value-weight monthly returns of the stocks:$R_{p,t} = \sum_{i=1}^{n} \omega_{i,t} * R_{i,t}$. We have three explanatory variables: Market, HML and SMB, as described in table 3. The risk free interest rate used is the monthly equivalent rate to: Short term interest rate for the period from July 1976 to January 1981, Money market, one month, rate from February 1981 to January 1987, PIBOR from February 1987 to December 1998 and EURIBOR from January 1999 to June 2001. The following table presents, for each portfolio, the slopes and their t statistics (between brackets), and R^2 adjusted of time-series regressions. We regressed monthly returns of eight portfolios according to:

$$FF3FM : R_i - R_f = \alpha_i + \beta_i(R_M - R_f) + s_i SMB + h_i HML + \epsilon_i.$$

	FF3FM				
Ptf.	α	β	s	h	Adj. R^2
SL	-0.001	0.989	0.970	-0.538	0.844
	(-0.551)	*(31.589)*	*(19.764)*	*(-13.471)*	
SM	-0.001	1.012	0.773	0.256	0.893
	(-1.151)	*(47.038)*	*(22.932)*	*(9.353)*	
SH	0.000	0.971	0.950	0.633	0.948
	(0.967)	*(63.103)*	*(39.418)*	*(32.274)*	
BL	-0.000	0.991	-0.209	-0.277	0.928
	(-0.738)	*(58.590)*	*(-7.881)*	*(-12.866)*	
BM	0.001	0.973	0.091	0.076	0.901
	(1.598)	*(51.976)*	*(3.110)*	*(3.195)*	
BH	-0.002	1.009	-0.189	0.553	0.821
	(-1.448)	*(32.751)*	*(-3.919)*	*(14.075)*	
LB/M	-0.000	0.990	0.381	-0.407	0.953
	(-1.071)	*(71.317)*	*(17.497)*	*(-23.033)*	
HB/M	-0.000	0.990	0.381	0.593	0.952
	(-1.071)	*(71.317)*	*(17.497)*	*(33.506)*	

results. In our study, we use the Fama and French factor portfolios with variable weights to estimate preformation factor loadings.

The number of stocks having size, book to market and HML factor loading classification is 197 stocks. The hole period covered is from July 1980 to June 2001 (21 years). Based on independent size and book to market sorts, we place stocks into four groups[20]. Each of the four groups is subdivided into two portfolios based on preformation HML slopes. Because the number of stocks is not large, we form two rather than five (Daniel and Titman (1997)) or three (Davis et al. (2000))β_{hml}

[20]to make size and book to market classifications, we use breakpoints of the whole market.

TABLE 7.

Descriptive statistics for the 8 portfolios formed on the basis of size, book to market and HML factor loadings: From July 1980 to June 2001

The sample is composed of 197 French stocks. The four size-book to market portfolios are formed using the Fama and French methodology: we rank all stocks by their book to market ratio of December of the year $(t-1)$ and their capitalization of June of year (t). Our database is Datastream. Each of the stocks in these four portfolios is then sorted into one of two sub-portfolios based on their HML loadings in the regression: $R_i - R_f = \alpha_i + \beta_{Mkt}(R_{Mkt} - R_f) + \beta_{SMB}R_{SMB} + \beta_{HML}R_{HML}$. Like Daniel and Titman, we use ex-ante observable information to estimate expected future HML factor loading of stocks. We regress each stock's returns on the three factor portfolios for the period -42 to -7 relative to the portfolio formation date. We use the Fama and French factor portfolios with variable weights to estimate preformation factor loadings, as is described in section 2.2. This table presents the average number of stocks, the mean and standard deviation of the monthly excess returns of the 8 portfolios formed on the basis of size, book to market and the estimated factor loadings on the HML portfolio, for the period from July 1980 through June of 2001.

Char. Prot.		Factor Loading Portfolio	
BM	SZ	Low	High
Average number of stocks in each portfolio			
L	S	3.8	3.8
L	B	13.4	13.4
H	S	11	11
H	B	8.8	8.8
Average monthly excess returns			
L	S	0.016	0.009
L	B	0.010	0.008
H	S	0.013	0.015
H	B	0.008	0.015
Standard deviation of monthly excess returns			
L	S	0.118	0.074
L	B	0.063	0.062
H	S	0.075	0.076
H	B	0.067	0.077

portfolios for each size-B/M group. We obtain 8 portfolios. The lowest number of stocks in our 8 portfolios is one stock and the highest one is 28 stocks. Only low book to market and small capitalisation (LS) portfolios, with low and high HML slopes, have one stock for one year (July 1990 to June 1991).

Table 7 summarizes the descriptive statistics for the 8 portfolios. The results reveal a positive relation between average monthly excess return and ex-ante factor loading rankings for high book to market portfolios. The difference between the average returns of low and high factor loading portfolios is 0.2 percent per month for high book to market and small stocks (HS) and 0.7 percent per month for high book to market and large stocks (HB). However, this positive relationship is reversed for low book to market portfolios because in this book to market group, low factor loading portfolios have, on average, monthly excess returns higher than high factor loading ones .

TABLE 8.

Average book to market and size of test portfolios

The sample is composed of 197 French stocks. The four size-book to market portfolios are formed using the Fama and French methodology: we rank all stocks by their book to market ratio of December of the year (t−1) and their capitalization of June of year (t). Our database is Datastream. Each of the stocks in these four portfolios is then sorted into one of two sub-portfolios based on their HML loadings in the regression: $R_i - R_f = \alpha_i + \beta_{Mkt}(R_{Mkt} - R_f) + \beta_{SMB}R_{SMB} + \beta_{HML}R_{HML}$. Like Daniel and Titman, we use ex-ante observable information to estimate expected future HML factor loading of stocks. We regress each stock's returns on the three factor portfolios for the period -42 to -7 relative to the portfolio formation date. We use the Fama and French factor portfolios with variable weights to estimate preformation factor loadings, as is described in section 2.2. At each yearly formation date, the average size and book to market for each portfolio is calculated using value weighting:

$$\overline{SZ_t} = \frac{1}{\sum_i ME_{i,t}} \sum_i ME_{i,t}^2$$

$$\overline{BM_t} = \frac{1}{\sum_i ME_{i,t}} \sum_i ME_{i,t} BM_{i,t}.$$

Then at each point, and are divided by the median market equity and median book to market of French market. The two time series are then averaged to get numbers that are presented in the table below.

	Char. Prot.	Factor Loading Portfolio	
BM	SZ	Low	High
	Book to market relative to median		
L	S	0.606	0.623
L	B	0.456	0.573
H	S	1.810	2.115
H	B	1.407	2.017
	Market equity relative to median		
L	S	0.650	0.668
L	B	30.150	20.321
H	S	0.548	0.615
H	B	14.013	15.128

The three factor risk model predicts that the high factor loading portfolios have higher average returns than low factor loading portfolios. However, Daniel and Titman (1997) explain this positive relation between mean excess returns and factor loadings as follows: when we sort stocks on the HML factor loading, we may pick up variation in the book to market ratio. Like them, we examine this possibility by calculating the average book to market ratios and the sizes of each of the 8 portfolios. At each yearly formation date, the average book to market ratios and sizes, presented in table 8, are calculated relative to the median French market.

TABLE 9.

Regressions for portfolios formed from sorts on size, book to market and HML slopes: July 1980 to June 2001 (252 months)

Portfolios are formed based on size, book to market and preformation HML factor loadings. At the end of June of each year t, we allocate stocks to two size groups (small S and big B) based on their June market capitalisation. We allocate stocks in an independent sort to two book to market groups (low L and high H) based on book to market ratio of December of the preceding year. We form four portfolios (LS, LB, HS, and HB) as the intersection of the two size and the two book to market groups. The four portfolios are each subdivided onto two portfolios (low l and high h)using pre-formation HML slopes. This table presents each of the coefficients estimates and t-statistics from the following time series regression:

$$R_i - R_f = \alpha_i + \beta_i(R_M - R_f) + s_i SMB + h_i HML + \epsilon_i.$$

Ptf.	α	β	s	h	Adj. R^2
LSl	0.003	1.182	1.033	-0.781	0.618
	(0.827)	*(14.455)*	*(8.194)*	*(-7.323)*	
LSh	-0.000	0.928	0.809	0.118	0.610
	(-0.312)	*(17.763)*	*(10.048)*	*(1.736)*	
LBl	0.000	0.959	-0.139	-0.118	0.860
	(0.420)	*(38.003)*	*(-3.551)*	*(-3.560)*	
LBh	-0.001	0.966	-0.047	-0.086	0.863
	(-1.125)	*(38.961)*	*(-1.217)*	*(-2.633)*	
HSl	-0.001	1.034	0.872	0.534	0.777
	(-0.558)	*(27.185)*	*(14.733)*	*(10.647)*	
HSh	0.001	1.009	0.991	0.725	0.799
	(0.497)	*(27.475)*	*(17.335)*	*(14.979)*	
HBl	-0.001	0.929	-0.012	0.264	0.688
	(-0.646)	*(22.977)*	*(-0.205)*	*(4.951)*	
HBh	0.002	1.065	0.136	0.482	0.718
	(1.039)	*(24.371)*	*(1.996)*	*(8.371)*	

Like Daniel and Titman, we find some covariation between the average book to market ratio and the HML factor loading, especially for the high book to market portfolios. Indeed, HB portfolio (high book to market and large stocks) has the strongest covariation, which has also the strongest positive relation between factor loadings and returns. For low book to market portfolios, the average book to market is roughly constant. Moreover, we have no regular pattern for mean size.

The results reported in tables 7 and 8 indicate that the weak positive relation between average excess returns and factor loading for HB portfolios can be explained by the covariation between factor and characteristic. Otherwise, there is no significant relation between factor loadings and returns. Daniel and Titman report that this pattern suppose that the preformation factor loadings are good predictors of post-formation loadings. We will show that it is the case for our sample (table 9).

In table 9, we report the three factor regressions applied to each of the 8 test portfolios. The market βs are all more than 14 standard errors from zero and adjusted R^2 ranges from 61.0% to 86.3%. Moreover, HML slopes are related to book to market ratio. Indeed, for each size-HML loading group, but one, HML slopes increase from negative values for low book to market class to positive values for high book to market class and their t-statistics are greater than two. Similarly, SMB slopes are related to size. In every book to market-HML loading group, SMB slopes decrease from small to big capitalisation.

Table 9 shows also that the post-formation HML slopes do reproduce the ordering of the preformation slopes, so pre-formation slopes are informative about post-formation slopes. Indeed, within each size and book to market grouping, HML coefficient (h) is higher for high factor loading portfolio than that of low factor loading portfolio. Second, the factor model predicts that the regression intercepts should be zero. All intercepts have t-statistics with an absolute value less than 2. This evidence is in favor of the factor model. Third, the characteristic model predicts that the intercepts of the low factor loading portfolios should be positive and that those of the high factor loading portfolios should be negative. Our results indicate that this is the case only for low book to market portfolios.

3.2. **Empirical Results: The Characteristic-Balanced Portfolios Regressions.** Like Daniel and Titman (1997), our formal test of the factor model against the characteristic model is based on the intercepts in the regressions of the characteristic-balanced portfolio returns on the three factor Fama and French portfolio returns. We calculate the returns of "characteristic-balanced" portfolios $(h - l)$. Our version of $(h-l)$ portfolios is simply the difference between the returns on the high and the low portfolio of each size-book to market group. We form four characteristic-balanced portfolios.

The three factor risk model predicts that the intercepts of regressions of the returns of these characteristic-balanced portfolios on the Fama and French factor portfolios are indistinguishable from zero. In contrast, the alternative hypothesis of the characteristic model says that the intercepts in the $(h-l)$ regressions should be negative. In addition, the characteristic-based model predicts that the average return of characteristic-balanced portfolios should be indistinguishable from zero. The explanation is that the characteristic balanced portfolios are long and short assets with equal characteristics. However, the factor model says that these returns should be positive because the characteristic-balanced portfolios have high loading on the HML factor. The results of the average returns of the characteristic balanced portfolios as well as their regressions are reported in table 10.

TABLE 10.

Regressions Results for the Characteristic-Balanced Portfolios: July 1980 to June 2001

Portfolios are formed based on size, book to market and preformation HML factor loadings. At the end of June of each year t, we allocate stocks to two size groups (small S and big B) based on their June market capitalisation. We allocate stocks in an independent sort to two book to market groups (low L and high H) based on book to market ratio of December of the preceding year. We form four portfolios (LS, LB, HS, and HB) as the intersection of the two size and the two book to market groups. The four portfolios are each subdivided onto two portfolios (low l and high h)using pre-formation HML slopes. Our version of $(h-l)$ portfolios is simply the difference between the returns on the high and the low portfolio of each size-book to market group. The average monthly returns and their t-statistic of the four portfolios are reported here. Moreover, this table presents each of the coefficients estimates and t-statistics from the following time series regression:

$$R_i - R_f = \alpha_i + \beta_i(R_M - R_f) + s_i SMB + h_i HML + \epsilon_i.$$

Ptf.	Mean	α	β	s	h	Adj. R^2
LS(h-l)	-0.007	-0.004	-0.254	-0.224	0.899	0.239
	(-1.106)	*(-0.857)*	*(-2.595)*	*(-1.482)*	*(7.045)*	
LB(h-l)	-0.001	-0.002	0.007	0.092	0.032	-0.003
	(-0.831)	*(-0.958)*	*(0.176)*	*(1.479)*	*(0.611)*	
HS(h-l)	0.002	0.002	-0.024	0.119	0.191	0.013
	(0.744)	*(0.641)*	*(-0.404)*	*(1.238)*	*(2.357)*	
HB(h-l)	0.006	0.004	0.136	0.149	0.218	0.031
	(1.752)	*(1.152)*	*(2.189)*	*(1.539)*	*(2.667)*	

The mean returns of the four characteristic-balanced portfolios, reported in the first column of table 10, reveal that two of the four portfolios have positive mean returns. In addition, all of these means are indistinguishable from zero because they have t-statistics below two. In other words, this pattern does not reject the characteristic model.

In contrast, the results reported in table 10 reveal that all the intercepts from the time-series regressions of the four characteristic-balanced portfolio returns on the three factor returns have t-statistics below two. These results are consistent with the factor pricing model and inconsistent with the characteristic-based pricing model. However, because the value premium (see table 3)[21] is relatively small, we can not produce a conclusive contest between the risk model and the characteristic model.

[21]The value premium for July 1980 to June 2001, is 0.16 percent per month with t-statistic= 0.555.

4. Size, Book to Market and other Factor Loadings Sorted Portfolios

We construct a set of portfolios in the manner described in the last section. However, rather than using the preformation HML factor loading, we consider SMB and Mkt factor loadings. The upper panels of table 11 give the intercepts, the coefficients and the associated t-statistics, for the regressions of the eight SMB factor loadings portfolios on the three factors. The lower panels of the table provide the intercepts, the coefficients and the t-statistics for the regression of the four characteristic-balanced portfolio returns on the three factors.

First, the post-formation SMB slopes do reproduce the ordering of the preformation slopes, so pre-formation slopes are informative about post-formation slopes. Second, the characteristic-balanced model suggests that the intercepts should be negative, the results show that only two intercepts are negative, however all the t-statistics are not large. However, again, because the size premium (see table 3)[22] is relatively small, we can't produce a conclusive contest between the risk model and the characteristic model.

The results presented in table 12 are the same, only we use the Mkt loadings. In contrast to the value and the size premiums, the market premium is 1.04% per month with t-statistic=2.93 (see table 3)[23], so we can make tests between the risk model and the characteristic model. Again, the pre-formation slopes are informative about the post-formation slopes because the post-formation Mkt slopes do reproduce the ordering of the preformation ones. The t-statistics for the characteristic-balanced portfolios, which are negative but close to zero, indicate that the characteristic-based model is rejected in favor of the factor model.

[22]The size premium for July 1980 to June 2001, is 0.24 percent per month with t-statistic= 0.936.

[23]The market premium for July 1980 to June 2001, is 1.09 percent per month with t-statistic= 2.885.

TABLE 11.

Regressions for portfolios formed from sorts on size, book to market and SMB slopes: July 1980 to June 2001 (252 months)

Portfolios are formed based on size, book to market and preformation SMB factor loadings. We form 4 portfolios (LS, LB, HS, and HB) as the intersection of the two size and the two book to market groups. The 4 portfolios are each subdivided onto 2 portfolios (low l and high h)using pre-formation SMB slopes. Our version of characteristic-balanced (CB) portfolios is simply the difference between the returns on the high and the low portfolio of each size-book to market group. The mean returns of CB portfolios are given here. This table presents also each of the coefficients estimates and t-statistics from the following time series regression: $R_i - R_f = \alpha_i + \beta_i(R_M - R_f) + s_i SMB + h_i HML + \epsilon_i$.

Regression Results from Portfolios sorted by SMB loading

Ptf.	α	β	s	h	Adj. R^2
LSl	0.003	0.932	0.772	0.171	0.582
	(1.196)	*(17.058)*	*(9.166)*	*(2.395)*	
LSh	0.001	1.156	1.029	-0.708	0.625
	(0.244)	*(14.868)*	*(8.591)*	*(-6.988)*	
LBl	0.000	0.906	-0.157	-0.094	0.883
	(0.014)	*(42.012)*	*(-4.667)*	*(-3.313)*	
LBh	-0.001	1.015	0.113	-0.256	0.834
	(-0.616)	*(33.957)*	*(2.420)*	*(-6.499)*	
HSl	-0.001	0.950	0.863	0.515	0.787
	(-0.617)	*(27.555)*	*(16.068)*	*(11.316)*	
HSh	0.001	1.085	1.008	0.739	0.804
	(0.450)	*(28.376)*	*(16.929)*	*(14.661)*	
HBl	-0.000	0.926	-0.131	0.277	0.727
	(-0.122)	*(24.703)*	*(-2.250)*	*(5.599)*	
HBh	0.000	1.038	0.405	0.419	0.697
	(0.282)	*(23.630)*	*(5.924)*	*(7.241)*	

Mean and Regression Results from the CB Portfolios

Ptf.	Mean	α	β	s	h	Adj. R^2
LS(h-l)	-0.000	-0.002	0.224	0.258	-0.879	0.229
	(-0.109)	*(-0.470)*	*(2.268)*	*(1.693)*	*(-6.822)*	
LB(h-l)	0.000	-0.001	0.108	0.269	-0.162	0.132
	(0.154)	*(-0.428)*	*(2.474)*	*(3.960)*	*(-2.808)*	
HS(h-l)	0.004	0.002	0.135	0.145	0.225	0.036
	(1.278)	*(0.655)*	*(2.294)*	*(1.586)*	*(2.898)*	
HB(h-l)	0.003	0.001	0.112	0.536	0.143	0.114
	(1.019)	*(0.286)*	*(1.893)*	*(5.831)*	*(1.830)*	

Table 12.

Regressions for portfolios formed from sorts on size, book to market and Mkt slopes: July 1980 to June 2001 (252 months)

Portfolios are formed based on size, book to market and preformation Mkt factor loadings. We form 4 portfolios (LS, LB, HS, and HB) as the intersection of the two size and the two book to market groups. The 4 portfolios are each subdivided onto 2 portfolios (low l and high h)using pre-formation SMB slopes. Our version of characteristic-balanced (CB) portfolios is simply the difference between the returns on the high and the low portfolio of each size-book to market group. The mean returns of CB portfolios are given here. This table presents also each of the coefficients estimates and t-statistics from the following time series regression: $R_i - R_f = \alpha_i + \beta_i(R_M - R_f) + s_i SMB + h_i HML + \epsilon_i$.

Regression Results from Portfolios sorted by Mkt loading

Ptf.	α	β	s	h	Adj. R^2
LSl	0.002	0.886	0.708	0.138	0.598
	(0.798)	*(17.697)*	*(9.169)*	*(2.121)*	
LSh	-0.000	1.245	1.066	-0.675	0.633
	(-0.056)	*(15.656)*	*(8.700)*	*(-6.512)*	
LBl	-0.000	0.911	-0.124	-0.118	0.858
	(-0.302)	*(37.594)*	*(-3.278)*	*(-3.692)*	
LBh	-0.000	0.990	-0.076	-0.084	0.853
	(-0.447)	*(37.328)*	*(-1.858)*	*(-2.409)*	
HSl	-0.000	0.920	0.977	0.673	0.774
	(-0.097)	*(25.087)*	*(17.114)*	*(13.918)*	
HSh	-0.000	1.111	0.894	0.587	0.795
	(-0.216)	*(28.856)*	*(14.921)*	*(11.565)*	
HBl	0.001	0.850	0.082	0.335	0.688
	(0.794)	*(22.881)*	*(1.431)*	*(6.842)*	
HBh	-0.001	1.088	0.126	0.414	0.755
	(-0.493)	*(27.172)*	*(2.028)*	*(7.840)*	

Mean and Regression Results from the CB Portfolios

Ptf.	Mean	α	β	s	h	Adj. R^2
LS(h-l)	0.000	-0.002	0.359	0.359	-0.813	0.250
	(0.148)	*(-0.456)*	*(3.684)*	*(2.389)*	*(-6.406)*	
LB(h-l)	0.000	-0.000	0.079	0.046	0.033	0.004
	(0.308)	*(-0.110)*	*(1.908)*	*(0.727)*	*(0.616)*	
HS(h-l)	0.001	-0.000	0.191	-0.082	-0.085	0.035
	(0.390)	*(-0.077)*	*(3.088)*	*(-0.854)*	*(-1.048)*	
HB(h-l)	-0.000	-0.002	0.238	0.043	0.078	0.063
	(-0.043)	*(-0.908)*	*(4.395)*	*(0.517)*	*(1.104)*	

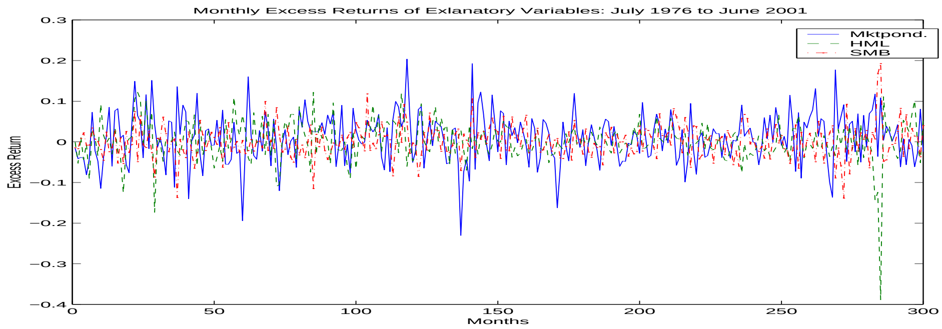
5. Summary and Conclusions

This paper examines French stock returns in the 1976 to 2001 period. The results indicate that the value premium in average stock returns is only about 0.20 % per month (t-statistic=0.72). The size effect in average returns, measured by SMB, is also small. However, the market premium is robust. Although the small value premium, we make tests to compare the risk model of Fama and French (1993) and the characteristic-based model of Daniel and Titman (1997).

To test the two models, we use Daniel and Titman methodology to construct our characteristic-balanced portfolios. The characteristic-based model predicts that these portfolios should have a return of zero on average, because they are long and short assets with equal characteristics. However, the factor model says that these returns should be positive because the characteristic-balanced portfolios have high loading on the HML factor. Our results reject the factor model with characteristic balanced portfolios that load on the HML, SMB and MKt factors.

Moreover, the three factor risk model predicts that the intercepts of regressions of the returns of these characteristic-balanced portfolios on the Fama and French factor portfolios are indistinguishable from zero. In contrast, the alternative hypothesis of the characteristic model says that these intercepts should be negative. Our results reveal that all the intercepts have t-statistics below two. These results are consistent with the factor pricing model and inconsistent with the characteristic-based pricing model.

6. Appendix



Monthly Excess Returns of Exlanatory Variables: July 1976 to June 2001
Mktpond.
HML
SMB
Excess Return
Months
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
0
50
100
150
200
250
300

References

Ajili, S. (2002). 'The Capital Asset Pricing Model and the three Factor Model of Fama and French revisited in the case of France.' *Cahier de Recherche du CEREG, Université Paris IX Dauphine*, **(2002-10)**: pp. 1–26.

Banz, R. (1981). 'The Relationship between Return and Market Value of Common Stocks.' *Journal of Financial Economics*, **(9)**: pp. 3–18.

Barber, B. and J. Lyon (1997). 'Firm size, book-to-market ratio, and security returns : a holdout sample of financial firms.' *The Journal of Finance*, **LII (2)**: pp. 875–83.

Basu, S. (1977). 'Investment Performance of Common Stocks in Relation to their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis.' *Journal of Finance*, **XXXII (3)**: pp. 663–82.

Berk, J. (1995). 'A critique of size-related anomalies.' *The Review of Financial Studies*, **8 (2)**: pp. 275–86.

Berk, J. (1997). 'Does Size Really Matter?' *Financial Analysts Journal*, pp. 12–18.

Berk, J., R. Green and V. Naik (1999). 'Optimal Investment, Growth Options, and Security Returns.' *Journal of Finance*, **LIV (5)**: pp. 1553–607.

Bhandari, L. (1988). 'Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence.' *Journal of Finance*, **XLIII (2)**: pp. 507–28.

Black, F. (????). 'Beta and Return.' *Journal of Portfolio Management*, **(1)**.

Black, F. (1972). 'Capital Market Equilibrium with Restricted Borrowing.' *Journal of Business*, **(45)**: pp. 444–55.

Black, F. (1993). 'Estimating Expected Return.' *Financial Analysts Journal*, **49**: pp. 36–38.

Breeden, D. (1979). 'An Intertemporal Asset Pricing Model With Stochastic Consumption and Investment Opportunities.' *Journal of Financial Economics*, **(7)**: pp. 265–96.

Chan, K. and N. Chen (1991). 'Structural and return characteristics of small and large firms.' *The Journal of Finance*, **XLVI (4)**: pp. 1467–84.

Chan, L., Y. Hamao and J. Lakonishok (1991). 'Fundamentals and stock returns in Japan.' *The Journal of Finance*, **XLVI (5)**: pp. 1739–64.

Chen, N. (1991). 'Financial investment opportunities and the macroeconomy.' *The Journal of Finance*, **XLVI (2)**: pp. 529–54.

Cochrane, J. (2001). *Asset Pricing*. Princeton University Press.

Daniel, K. and S. Titman (1997). 'Evidence on the characteristic of cross sectional variation in stock return.' *The Journal of Finance*, **LII (1)**: pp. 1–33.

Daniel, K. and S. Titman (1998). 'Characteristics or covariances?' *The Journal of Portfolio Management*, pp. 24–33.

Daniel, K., S. Titman and K. Wei (2000). 'Explaining the Cross-Section of Stock Returns in Japan: Factors or Characteristics?' *Working Papers*, pp. 1–30.

Davis, J., E. Fama and K. French (2000). 'Characteristics, covariances, and average returns : 1929 to 1997.' *The Journal of Finance*, **LV (1)**: pp. 389–406.

Fama, E. and K. French (1992). 'The cross section of expected stock returns.' *The Journal of Finance*, **XLVII (2)**: pp. 427–65.

Fama, E. and K. French (1993). 'Common risk factors in the returns on stocks

and bonds.' *Journal of Financial Economics*, **33**: pp. 3–56.
Fama, E. and K. French (1996a). 'The CAPM is wanted, dead or alive.' *The Journal of Finance*, **LI (5)**: pp. 1947–58.
Fama, E. and K. French (1996b). 'Multifactor explanations of asset pricing anomalies.' *The Journal of Finance*, **LI (1)**: pp. 55–84.
Fama, E. and K. French (1998). 'Value versus growth : the international evidence.' *The Journal of Finance*, **LIII (6)**: pp. 1975–99.
Ferguson, M. and R. Shockley (2003). 'Equilibrium "Anomalies".' *Journal of Finance*, **Forthcoming**: pp. 1–49.
Heston, S., K. Rouwenhorst and R. Wessels (1999). 'The role of beta and size in the cross-section of european stock returns.' *European Financial Management*, **5 (1)**: pp. 9–27.
Huberman, G. and S. Kandel (1987). 'Mean-Variance Spanning.' *Journal of Finance*, **XLII (4)**: pp. 873–88.
Kim, D. (1997). 'A reexamination of firm size, book to market, and earnings price in the cross-section of expected stock returns.' *Journal of Financial and Quantitative Analysis*, **32 (4)**: pp. 463–89.
Kothari, S., J. Shanken and R. Sloan (1995). 'Another look at the cross-section of expected stock returns.' *The Journal of Finance*, **L (1)**: pp. 185–224.
Lakonishok, J., A. Shleifer and R. Vishny (1994). 'Contrarian Investment, Extrapolation, and Risk.' *Journal of Finance*, **XLIX (5)**: pp. 1541–78.
Lewellen, J. (1999). 'the time series relations among expected return, risk, and book to market.' *Journal of Financial Economics*, **54**: pp. 5–43.
Lintner, J. (1965). 'The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets.' *Review of Economics and Statistics*, **(47)**: pp. 13–37.
Lo, A. and A. MacKinlay (1990). 'Data-Snooping Biases in Tests of Financial Asset Pricing Models.' *Review of Financial Studies*, **3 (3)**: pp. 431–67.
Lucas, R. (1978). 'Asset Prices in an Exchange Economy.' *Econometrica*, **46 (6)**: pp. 1429–45.
MacKinlay, A. (1995). 'Multifactor models do not explain deviations from the CAPM.' *Journal of Financial Economics*, **38**: pp. 3–28.
Merton, R. (1973). 'An Intertemporal Capital Asset Pricing Model.' *Econometrica*, **41 (5)**: pp. 867–87.
Molay, E. (1999). 'le modèle de rentabilité à trois facteurs de Fama et French (1993) : le cas français.' *Working Papers, CEROG, Aix-Marseille*, pp. 1–27.
Molay, E. (2001). *Modélisation Empirique de la Rentabilité: Le Modèle à Trois Facteurs, Une Alternative au Modèle de Marché?*. Thèse en sciences de gestion, Université de Droit, d'Economie et des Sciences d'Aix-Marseille.
Mossin, J. (1966). 'Equilibrium In A Capital Asset Market.' *Econometrica*, **34 (4)**: pp. 768–83.
Roll, R. (1977). 'A Critique Of The Asset Pricing Theory's Tests.' *Journal of Financial Economics*, **(4)**: pp. 129–76.
Ross, S. (1976). 'The Arbitrage Theory of Capital Asset Pricing.' *Journal of Economic Theory*, **(13)**: pp. 341–60.
Rubinstein, M. (1976). 'The Strong Case for The Generalized Logarithmic Utility

Model as the Premier Model of Financial Markets.' *Journal of Finance*, **(2)**: pp. 551–71.

Sharpe, W. (1964). 'Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk.' *The Journal of Finance*, **XIX (3)**: pp. 425–42.