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FUNDAMENTALS AND THE ORIGIN OF FAMA-FRENCH FACTORS

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Fundamentals and the origin of Fama-French factors

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ABSTRACT

The interpretation of the Fama and French (1993) SMB and HML factors as risk factors is an open question that has carried a lot of controversy in the asset pricing literature and it is far from being solved. The aim of this study is to contribute to the understanding of this issue by analyzing a rational pricing explanation of this model in the Spanish Stock market. There is no empirical evidence around the relation between returns and fundamentals in this capital market, therefore it is necessary to study this relation in order to evaluate whether the use of this model is supported by a rational pricing explanation in non-US markets. Following the Fama and French (1995) approach we analyze whether there are size and book-to-market factors in fundamentals similar to those observed in returns and whether these factors in fundamentals drive stock returns. Our results show that there are factors in fundamentals similar to those observed in returns. Secondly, when Return on Capital is used as a proxy for fundamentals, factors in fundamentals drive factors in returns. Therefore, Return on Capital is a useful fundamental variable used by investors in the Spanish Stock Market. These results give support to the use of this model in the Spanish Capital Market.

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ABSTRACT

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RESUMEN

La interpretación de los factores SMB y HML de Fama y French (1993) con factores de riesgo es una cuestión abierta que ha provocado gran controversia en la literatura de valoración de activos y que está lejos de ser resuelta. El objetivo de este trabajo es contribuir al entendimiento de este asunto analizando para ello la explicación racional de este modelo en el mercado español. No hay evidencia empírica previa acerca de la relación entre las rentabilidades y los fundamentales en este mercado, por lo que se hace necesario estudiar esta relación con el fin de evaluar si el uso de este modelo es respaldado por una explicación racional en mercados distintos al norteamericano. Siguiendo el enfoque de Fama y French (1995) analizamos si en los fundamentales hay factores de tamaño y ratio book-to-market similares a los observados en las rentabilidades y si dichos factores en los fundamentales dirigen las rentabilidades. Nuestros resultados muestran que hay factores en los fundamentales similares a los observados en las rentabilidades. Además, cuando la Rentabilidad sobre el Capital es usada como proxy del fundamental, los factores en los fundamentales dirigen los factores en rentabilidades. Por tanto, la Rentabilidad sobre el Capital es una variable fundamental útil usada por los inversores del mercado español. Estos resultados dan apoyo al uso de este modelo en el mercado español.

Keywords: Fama and French (1993) factors, fundamentals, racional pricing

JEL classification: G12

FUNDAMENTALS AND THE ORIGIN OF FAMA-FRENCH FACTORS

1. INTRODUCTION

There is extensive U.S. evidence that the market beta is not able to fully capture the cross-sectional differences in average stock returns in the way the CAPM model predicts. However, the averaged stock returns seem to be highly related with some stock characteristics such as size and fundamental/market ratios. Fama and French (1992, 1993) show that size and book-to-market (hereafter BM) characteristics play a dominant role in capturing the cross-section of stock returns, and suggest an extension of the CAPM that includes two additional factors: a Small minus Big (SMB) zero-cost portfolio, which is based on firm size, and a High minus Low zero-cost portfolio based on the BM value of the stock. Fama and French (1993) demonstrate that this three-factor model (hereafter FF model) explains the averaged returns of U.S. stocks better than the CAPM.

There is also quite strong evidence that this model explains expected returns in widely different countries: Japan (Chan et al., 1991), countries in the Euro Area (Moerman, 2005), the Pacific Basin countries (Chui and Wei, 1998), Australia (Faff, 2004; Gaunt, 2004), China (Cao et al., 2005), Spain (Nieto and Rodríguez, 2005[1]) and wider sets of countries (Fama and French, 1998; Griffin, 2002; Moerman, 2005).[2] Given this growing empirical support of the FF model over performing the CAPM, the FF model has become highly popular among academics and practitioners.

Regarding the interpretation of the SMB and HML factors, Fama and French (1993, 1995) argue a rational-pricing story (that is, a risk-based explanation). In the context of a multifactorial version of the Merton (1973) Intertemporal Asset Pricing Model (ICAPM) or the Ross (1976) Arbitrage Pricing Theory (APT), they state that the SMB and HML factors proxy for sensitivity to common risk factors[3] in returns. The studies that show

[1] This study demonstrates that the FF model has the best coefficient of determination among the static models, showing that the SMB and HML factors have some outstanding information. Moreover, the coefficient of determination improves in a conditional version of the model that includes state variables.

[2] Although Fama and French (1998) advocate a global version of their model, Griffin (2002) documents that the local versions work better (in terms of adjusted R^2 and Jensen's alpha) for the stock markets of the U.S., Canada, the U.K. and Japan. Moerman (2005) also finds that even in the very integrated euro area, the domestic FF model outperforms the euro area FF model.

[3] Size may proxy for default risk and BM may be an indicator of the relative prospects of firms.

empirical evidence supporting this risk-based interpretation follow two different approaches.

On the one hand, Fama and French (1995), hereafter FF(1995), test the rational-pricing story by analyzing the relation of these factors with the underlying firm fundamentals. Following an APT interpretation, they argue that "if size and BM risk factors are the result of rational pricing, they must be driven by common factors in shocks to expected earnings that are related to size and BM". They find that high BM firms tend to be persistently distressed and low BM firms are associated with sustained profitability, and small stocks tend to be less profitable than large stocks. They find that this evidence supports the use of these factors to measure undiversifiable comovement in returns.

On the other hand, Liew and Vassalou (2000) show that the SMB and HML portfolios contain significant information about future growth in GDP in several countries.[4] Kelly (2003) presents evidence from 18 countries that HML and SMB portfolios are correlated with future innovations in inflation and real economic growth.[5] Brenan, Wang and Xia (2001) find, using US stock returns, that these portfolios do indeed have predictive power for both the real interest rate and the Sharpe ratio. All these results support the hypothesis that SMB and HML act as state variables of the ICAPM.

However, considerable controversy exists regarding the interpretation of the SMB and HML as risk factors. Firstly, some studies question the goodness of results obtained by the FF model, arguing biases and econometric shortcomings in the procedures used to test the model, or simply, that they are spurious. In this sense, Amihud, Christensen and Mendelson (1993) argue that a potential survivorship can partially explain the magnitude of the BM variable and that by using Generalized Least Squares (GLS) instead of Ordinary Least Squares the importance of the market beta increases. Berk, Green and Naik (1999) and Gomes, Koan and Zhang (2003) argue problems in the measurement of beta. Berk (1995) suggests that high BM and small market capitalization firms will, by default, earn higher mean returns. Loughran (1997) finds that HML has little explanatory power once controls for seasonality, size and exchange are included. Secondly, the FF model is strongly criticized because it is purely empirically motivated. There is no theory telling us

[4] Vassalou (1999) shows, however, that replacing the returns on the HML and SMB portfolios by their predicted innovation in GDP leads to a significant degradation of the FF three factor model power, meaning that the three factor model power does not rest on the ability of the two hedge portfolios' returns to predict GDP growth.

[5] Kelly (2003) includes the Spanish stock market, but this evidence is not supported in the Spanish case.

what gives rise to SMB and HML factors. In this sense, Ferson, Sarkissian, and Simin (1999) caution against using empirical regularities as "explanatory risk factors".[6]

Moreover, some authors suggest an opposed miss-pricing story. As with FF(1995), Lakonishock, Shleifer and Vishny (1994) find that the high fundamental/market stocks (including BM) tend to be distressed firms with persistently low earnings; and low fundamental/price stocks tend to be strong (growth) firms with persistently high earnings. But opposed to FF(1995), Lakonishock et al. (1994) argue that the BM premium comes from the fact that investors are overly pessimistic about distressed stocks and overly optimistic about growth stocks; thus they over extrapolate this performance to the future, underpricing (overpricing) distressed (growth) stocks. The posterior price adjustment will justify the BM premium.[7] Another salient study in this line is Daniel and Titman (1997), which shows that the characteristics, rather than the SMB and HML factor loadings, explain the cross-section in stock returns. This evidence is inconsistent with these factors reflecting common covariations in expected returns. Although Davis, Fama and French (2000) contradict this evidence in the US market using a longer sample, Daniel, Titman and Wei (2001) find supportive evidence in the Japanese market for their characteristic argument.

The true story behind the SMB and HML factors is an open question that carries a lot of controversy in the asset pricing literature and which is far from being resolved. However, this model is broadly applied among academics and practitioners in order to make accurate estimates of expected stock returns (e.g. for portfolio selection problems, cost-of-capital calculations, capital budgeting, portfolio evaluation and risk analysis decisions). The true origin of the Fama and French factors will affect, of course, the interpretation of studies that apply this model.

This drawback is also more important in non U.S. markets where there is little or no evidence around the real origin of the Fama and French factors. It seems reasonable that, before applying this model in other countries, it is necessary to find if the factors proxy

[6] It must be also mentioned that other studies such as, Bhardwaj and Brooks (1993); Jagannathan and Wang (1996); Pettengill et al. (1995); Grundy and Malkiel (1996) and Howton and Peterson (1998) found evidence which suggests that allowing for beta instability and up-market versus down-market conditions has a potential role in explaining the Fama and French results. Jagannathan and Wang (1996) test a conditional CAPM that allows betas and market risk premiums to be time-varying, as well as including a measure of the return on human capital as a component of the return on aggregate wealth. This model performs well, explaining 57% of the cross-sectional variation and, more importantly, leaving relative size unable to explain the remainder.

[7] Lakonishock et al. (1994) story is also supported by Cai (1997) and Chang, McLeavey and Rhee (1995) for Japan and by Gregory, Harris and Michou (2003) for the UK.

risk or not. However, this model has been applied in many different countries without evaluating this concern.

The aim of this study is to fill this gap in the Spanish Capital market. Following the FF(1995) approach, we analyze whether differences in size and BM determine differences in fundamentals. Since rational stock prices are discounted expected future earnings (net cash flows), if the size and BM factors in returns are the result of rational pricing, then they must be driven by common factors in shocks of expected earnings that are related to size and BM.

Moreover, the high controversy about the origin of the FF factors highlights the need to accumulate out-of-sample evidence. The FF model needs further empirical verification before it can be accepted as a credible (an ideally) theory-based model to replace the CAPM. This study also tries to contribute in this sense. Although the macroeconomic-related approach of Griffin (2002) has been tested in several countries, there is little evidence of the fundamental-related FF (1995) approach applied outside the U.S. Only Charitou and Constantinidis (2004) use this approach in the Japanese market, but their analysis is partial.

The rest of the paper proceeds as follows. Section 2 explains the data and methodology used in this work. Section 3 contains the results of the adequacy of this model for the Spanish capital market and Section 4 concludes.

2. DATA AND METHODOLOGY

2.1 Data

The sample consists of 162 non-financial stocks quoted in the Spanish Stock Market Interconnection System (SIBE) during the period January 1991 to December 2004. We ignore financial companies –banks and insurance companies- because their different leverage could disturb the results when forming portfolios with non-financial companies.

We form portfolios based on BM and size. When we form portfolios based on BM, we remove the companies with negative BM values. Regarding size, firm size or market value is measured as the number of outstanding shares times the stock closing price on the last trading day in June. The Dividend Yield of a portfolio is computed as the sum of stock dividends from January to December of year *y* divided by the sum of stock market equity on December year *y*. When needed, we take the 12-month Spanish Treasury Bills interest rate as the risk free rate.

The portfolios are formed and updated every June 30th of year *y*, and we compute value weighted monthly returns from July *y* to June *y+1*. Following FF (1995), we choose June 30th because most firms end the fiscal year in December and they do not present their audited annual reports to shareholders until June 30th. Even taking into account possible delays in the process, by the end of June the accounting information of the firms should be available for all investors in the market and they could take their investment decisions based on such audited information.

Throughout this paper, we form different ratios based on financial and accounting measures: Return on Assets, ROA; Return on Equity, ROE; Return on Capital and Earnings Yield. Whenever we compute profitability ratios, we compute the ratio of the corresponding earnings measure in year *y* to the corresponding company value in year *y-1*. We call this X_y.

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The accounting data used to compute these ratios comes from the CNMV (Comision Nacional del Mercado de Valores) database, available on its website (www.cnmv.es). Hence, Sales is "Importe Neto de la Cifra de Negocios", Earnings is "Resultado del ejercicio" (Net income), EBIT (Earnings before Interest and Taxes) is "Beneficio (Pérdida) de Explotación", Total Assets is "Total del Activo", Book Value is "Fondos Propios", Net Working Capital is "Activo Circulante" minus "Acreedores a Corto Plazo". The concept of Net Fixed Assets used by Greenblatt (2005) has to be adapted to Spanish Accounting Standards, therefore we have to adjust this measure in the following way: Net Fixed Assets = "Total Activo – Activo Circulante – Fondo de Comercio de Consolidación – Accionistas por Desembolsos No Exigidos – Acciones de la Sociedad Dominante a Largo Plazo – Gastos a Distribuir en Varios Ejercicios". Total Debt is the difference between Total Assets and Book Value (Total Activo – Fondos Propios).

2.2 Methodology

The goal of this study is to analyse the adequacy of the FF (1993) model to the Spanish stock market. Therefore we do not focus on studying the performance of the model, but on whether this model captures differences in returns caused by differences in fundamentals. This would give support to the use of this model in the Spanish Capital Market.

Following the approach of FF (1995), we analyze if differences in size and BM determine differences in fundamentals. Since rational stock prices are discounted expected

future earnings (net cash flows), if the size and BM related factors in returns are the result of rational pricing, then they must be driven by common factors in shocks of expected earnings that are related to size and BM.

In this work, we use different measures of profitability of a firm as proxies for the fundamentals. First, we use the standard ROA and ROE ratios:

$$ROA = \frac{Earnings}{Total\ Assets}$$

$$ROE = \frac{Earnings}{Book\ Value}$$

Following FF(1995), we use another version of ROE ratio taking EBIT (Earnings Before Interests and Taxes) instead of Earnings (Net Income) because EBIT is not affected by different levels of debt and differing tax rates.[8]

$$ROE = \frac{EBIT}{Book\ Value}$$

Another proxy for the fundamentals of a firm, used by FF (1995) and in this work, is the natural logarithm of sales ($\ln(sales)$).

On the other hand, Greenblatt (2005) describes in his book two ratios to estimate the fundamentals of a firm. This author proposes ranking companies based on these two ratios (called "magic formula") in order to make large returns in the capital market. The ratios are the following:

$$\text{Return on Capital} = \frac{EBIT}{Net\ Working\ Capital + Net\ Fixed\ Assets}$$

$$Earnings\ Yield = \frac{EBIT}{Enterprise\ Value}$$

EBIT is used in place of Net Income (Earnings) because companies operate with different levels of debt and tax rates. The computation of Net Fixed Assets is explained in section 2.1. The idea behind the first ratio, *Return on Capital*, is to compare current earnings from operations (EBIT) with the cost of the assets used to produce those earnings (tangible capital employed) computed as *Net Working Capital* plus *Net Fixed Assets*. In other words, the idea of this ratio is to figure out how much capital is needed to conduct the company's business. As Greenblatt (2005) proposes and explains, goodwill is excluded from the tangible capital employed.

[8] The results presented in the paper are computed using the ROE ratio used by FF (1995) because this ratio is more robust to proxy the fundamentals of a firm. Notwithstanding, the results are similar using the standard ROE and they are available upon request.

The basic idea behind the second ratio is simple: The goal is to figure out how much a business earns relative to the purchase price of the business (enterprise value).[9] The enterprise value of a company is computed as the sum of the market value equity plus net interest-bearing debt. To compute the second term, taking into account Spanish accounting standards, we have to deduct "Gastos a distribuir en varios ejercicios" from the total debt.

The first step of the empirical analysis is to evaluate the factors in returns in the Spanish Capital Market; therefore, we run the following regression:

$$R_t - RF_t = \alpha + \beta_{MKT} MKT_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t + e_t \quad (1)$$

where R_t is the return on a certain portfolio in month *t*, RF_t is the return on the risk-free asset and e_t is an error term in month *t*, which we assume to be independent of the risk factors. MKT_t is the market factor, computed as the difference between the market portfolio return and *RF*. SMB and HML factors are constructed as in FF(1993). SMB is the difference between the value-weighted average returns on the three portfolios containing the smallest cap stocks (S/L, S/M and S/H) and the three portfolios containing the highest cap stocks (B/L, B/M and B/H); and the HML is the difference between the value-weighted average returns on the two stock portfolios with a high BM ratio (S/H and B/H) and the portfolios with a low BM ratio (S/L and B/L).

Portfolios are based on size, taking into account median size to classify as Small or Big, and on BM, taking into account the 30th and the 70th percentiles to classify as Low, Medium and High respectively. Therefore, six portfolios are computed taking into account size and BM simultaneously.

Following the approach of FF (1995), we analyze if there is a pattern in fundamentals similar to that observed in returns. The following regression is run for each portfolio and for each proxy for fundamentals (ROA, ROE, Return on Capital, Earnings Yield and natural logarithm of sales):

$$\Delta X_y = \alpha + \beta_{MKT} \Delta MKT_y + \beta_{SMB} \Delta SMB_y + \beta_{HML} \Delta HML_y + e_y \quad (2)$$

where ΔX_y is the change in fundamentals of the portfolio from year *y-1* to year y. ΔMKT is the market factor in fundamentals: For ROA, ROE, Return on Capital and

[9] Enterprise value takes into account the price paid for the equity as well as the debt financing used by a company to help generate operating earnings.

Earnings Yield, the market is the mean taking into account all observations, and for sales it is the natural logarithm of total sales in the market, as in FF(1995). ΔSMB, the size factor in ΔX, is the simple average of ΔX for the three small-stock portfolios (S/L, S/M and S/H) minus the average for the three big-stock portfolios (B/L, B/M and B/H). The BM factor, ΔHML, is the simple average of ΔX for the two stock portfolios with a high BM ratio (S/H and B/H) minus the average for the two stock portfolios with a low BM ratio (S/L and B/L).

In the next step, in order to analyse if changes in fundamentals are captured by investors, the relation between returns and changes in fundamentals is studied with the following regression by each portfolio, factor and proxy for fundamental:

$$R_t = \alpha_0 + \alpha_1 DYLY_{y-1} + \alpha_2 \Delta X_y + e_t \quad (3)$$

where the dependent variables are the monthly returns at month t on the six size-BM portfolios (S/L, S/M, S/H, B/L, B/M and B/H) and the Market (MKT), Size (SMB) and BM (HML) factors in returns. $DYLY_{y-1}$ is the dividend yield of the value-weighted portfolio on the Spanish Stock Market for year *y-1*. ΔX_y is the change in a fundamental variable from year *y-1* to year *y* divided by 12[10]. As *DYLY* and ΔX are year-frequency data, they remain constant from January to December. For example, for $R_{01/2000}$ to $R_{12/2000}$ the explicative variables are the dividend yield computed at the end of year 1999 and the change in the fundamental variable from year 1999 to year 2000.[11]

Since rational stock prices are discounted expected future earnings, if the size and BM related factors in returns are the result of rational pricing, then they must be driven by these factors in fundamentals. This question is analyzed by running the following regression:

$$R_t = \alpha + \beta_D DYLY_{y-1} + \beta_{MKT} \Delta MKT_y + \beta_{SMB} \Delta SMB_y + \beta_{HML} \Delta HML_y + e_t \quad (4)$$

where the dependent variables in the regression are the returns in month t on the six size-BM portfolios (S/L, S/M, S/H, B/L, B/M and B/H). ΔMKT is the market factor change in

[10] This implies that the accounting numbers have been generated in a uniform way during the year.

[11] In contradistinction to FF(1995) we run this regression with monthly observations. As the explicative variables are year frequency they remain constant during the year. Moreover, we use ΔX_y instead of ΔX_{y+1}, as we use monthly observations, we keep to some extent the one-year ahead spirit of the regression used by FF(1995). For example, for the January return of year *y* the explicative variable is the change in fundamental from December year *y-1* to December year *y*. Given that our sample period is quite short than the studied by FF(1995), the use of yearly observations, instead of monthly, it would suppose to run the regression with only 11 observations.

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fundamentals: For ROA, ROE, Return on Capital, Earnings Yield, the market is the mean taking into account all observations and for sales it is the natural logarithm of total sales in the market. The changes are in monthly terms, dividing the annual accounting numbers by 12. ΔSMB, the size factor in the fundamental variable is the simple average of the fundamental variable for the three small-stock portfolios (S/L, S/M and S/H) minus the average for the three big-stock portfolios (B/L, B/M and B/H). The BM factor, ΔHML, is the simple average of the fundamental variable for the two stock portfolios with a high BM ratio (S/H and B/H) minus the average for the stock portfolios with a low BM ratio (S/L and B/L). *DYLY* is the dividend yield of the value-weighted portfolio on the Spanish Stock Market.

3. RESULTS

3.1 Descriptive statistics

Table 1 presents descriptive statistics of the portfolios' monthly returns used in this study. The results show that the worldwide evidence for a positive relation between BM ratio and returns holds. High BM stocks yield on average higher returns than low BM stocks regardless of the size level, and the HML return is positive, although only significant at a 10 % level. Regarding the size effect, the results show a positive, rather than the expected negative, relation between size and returns. Big stocks yield higher returns than small stocks independently of the BM level, and the SMB return is negative, although not statistically significant. This evidence is in line with the more recent worldwide evidence of a decrease or even a reversion in the size effect [Dichev (1998), Davis, Fama and French (2000), Faff (2001), Gustafson and Miller (1999)].[12]

3.2. The persistence of profitability

Following a simple dividend discount model, FF(1995) demonstrate that high BM should be associated with a persistently low earnings to book equity, while low BM should be associated with persistently strong ratio of earnings to book equity.

Figure 1 shows mean values of profitability for size-BM portfolios for 11 years around portfolio formation. Consistent with the prediction and results of FF (1995), when we use the returns on equity ratio, calculated in the same way as FF(1995), we find that

[12] Dimson and Marsh (1999) argue that given the wave of recent evidence, the size effect is best interpreted as a tendency for small companies to perform differently to (as opposed to outperform) large companies.

big-low stocks are persistently more profitable than both the high stocks (small and big) and the small-low stocks. However, the small-low stocks are the least profitable in the years prior to formation date, although they show a sharp reversion after the formation date, becoming highly profitable at a similar level to the big-low stocks. This last result is also observed by Charitou and Constantinidis (2004) in the Japanese Market.

Moreover, Figure 1 shows that profitability is also related to size. The big stocks are persistently more profitable than small stocks, although in the post-ranking years this is only true conditional on BM (given that BM is high, or low, big stocks have higher ROE ratios than small stocks).

When profitability is measured by the return on capital, the results are more consistent with the prediction and evidence of FF(1995). Low-BM stocks are on average more profitable than high-BM stocks, and big stocks are more profitable than small stocks conditional to BM.

Finally, the results with the earnings yield measure are quite similar to those observed with ROE ratio. The results with the ROA ratio tell us that the Big-Low portfolio is the most profitable, but the difference with the other portfolios declines over time, specifically after the formation date. It seems that after the formation date there are no differences in ROA between portfolios, therefore it could not be an adequate proxy for the fundamentals of a company. We should keep in mind that this proxy for the fundamentals of a firm is affected by different levels of debt and differing tax rates.[13]

3.3. Common Factors in Returns and Earnings

We have observed how size and BM ratio are related to both profitability and average stock returns in the Spanish Stock Market. This evidence points to a rational pricing story. As FF(1995) state, with rational pricing, size and BM risk factors in returns must be due to common factors in shocks to expected earnings (net cash flows). To test such a possibility, in the next sections we analyze the relation between risk factors in returns and earnings. First, we confirm the relevance of market, size and BM factors in stock returns. Next, we examine whether there are market, size and BM factors in earnings shocks like those in stock returns. Finally, we test whether return variability is driven by a common factor in earnings.

[13] Not only are there differences in debt and capital structures, but the firms listed in the Spanish stock market have investments in foreign countries, therefore they can suffer different tax rates. On the other hand, some companies in Spain pay their corporate tax using tax consolidation, and this affects the effective tax rate of firms following this procedure.

Market, Size and BM factors in Stock returns

In this section we check whether the FF model explains the cross-section of Spanish stock returns for the period January 1991 to June 2004. Table 2 presents the results of regressing this model in each of the six size-BM portfolios. In general, the SMB and HML factor loadings are statistically significant. So, we confirm that these factors capture common variation in stock returns missed by the market return. Controlling for BM, the slopes on SMB decrease monotonically with the size of the portfolios, and controlling on size the slopes on HML increase monotonically from the low- to the high-BM portfolios. Moreover, except for the medium BM stocks, the regression alphas are not statistically significant. Thus, as in FF (1993) for the US market, this last result suggests that the model captures most of the strong spread in the average returns on the six size-BM portfolios. The explanatory power is high in all the regressions, with R^2 between 0.73 and 0.86.

Market, Size and BM factors in Earnings and Sales

In rational asset pricing, stock prices are the present value of expected future net cash flows. Therefore, unexpected changes in stock returns should be caused by shocks in expected future net cash flows or in the discount rates. Therefore, if the SMB and HML portfolios mimic some unknown risk factors in returns related to size and BM, we should expect to observe similar factors in the shocks to expected net cash flows.

We measure these shocks as the year-to-year change in the different profitability ratios described in subsection 2.2, as well as in logarithm of sales. Table 3 presents the results of regressing changes in profitability measures on market, SMB and HML factors in profitability changes. The common factors in profitability changes are constructed like those in stock returns, although in this case the periodicity is annual, so we only have 13 annual changes in profitability instead of the 150 monthly stock returns. This, and the fact that the common information is incorporated slower on reported earnings than on stock prices, cause the measure of common factors in profitability to be less accurate than the common factors in stock returns, as reflected in the lower p-values of the estimated coefficients and R^2 of the regressions.

Table 3 shows that the loadings on size and BM factors in profitability follow a similar pattern to those in stock returns. Controlling on BM, the SMB loadings decrease monotonically with the portfolio size. Controlling for size, HML loadings increase from the low to the high BM portfolios, with the exception of the B/H portfolio. When we use

the ln(sales) as a dependent variable the results are even more consistent with the results observed with stock returns in Table 2.

Given the low number of observations in the regressions of Table 3, we check the robustness of these results using a bootstrap approach. Following Horowitz (1997), given the regression $y = X\beta + u$ we select 10,000 par-bootstrap samples with replacement $(y, X)_b, b = 1, 2, ..., 10000$, with the same size as the original sample. Next, the statistic $t_b = (\beta_b - \beta)/\sigma_b$ is calculated for each of the par-bootstrap samples, where β_b and σ_b are the estimations of each bootstrap sample, and β the estimation for the original sample. Finally, this bootstrap sample of statistics $\{t_b : b = 1, 2, ..., 10000\}$ is ranked and used to obtain the bootstrap p-values of the traditional t-statistic from the original sample. The results are quite similar to those shown in Table 3 and are available to any interested party.

Relation between returns and profitability factors

The results in Tables 2 and 3 show that the explanatory powers of the SMB and HML factors in fundamentals (profitability and sales) are similar to those in stock returns. This evidence suggests that the common factors in returns could be driven by the common factors in fundamentals.

Table 4 presents time-series regressions of the six size-BM portfolios monthly returns on the portfolio specific changes one year ahead in fundamentals (profitability and sales). The last three rows of each panel show the results of this same regression for the market, SMB and HML portfolios. In order to obtain monthly observations of the explanatory variables we divide the annual data by twelve, so we are assuming that the accounting numbers have been generated in a uniform way during the year. As a rough control for variation in expected returns, the regressions also include the dividend yield (DYLY) of the value-weighted portfolio on the Spanish Stock Market at the end of the last year.

The results of Table 4 show that there is some relation between the returns on the six size-BM portfolios and the changes in their own fundamentals, mainly when the change in ln(sales) is used as an explanatory variable. This fact tells us that investors are pricing changes in sales.

However, although we find that generally the market factor in returns is related to the market factor in fundamentals, the results do not show a consistent relation between the

SMB and HML factors in returns and fundamentals. These results are similar to those obtained by FF(1995).

Table 5 shows the results of the monthly returns of the six size-BM portfolios regressed on the changes one year ahead of the market, SMB and HML factors in fundamentals. As in Table 4, accounting data is divided by twelve in order to have monthly data and the dividend yield is included as a control variable. The results show that the market factor in return on assets and return on capital are relevant to explain the portfolio returns. Moreover, the coefficients of the SMB factor are significant when the Return on Capital or ln(sales) are used. Regarding the coefficients of the HML factor on fundamentals, they are statistically significant when the return on assets, return on equity and return on capital are used as fundamental variables. The important result is related to the Return on Capital: it seems that this ratio is driving the stock returns. This is important because FF(1995) do not use this ratio as a possible value driver, therefore the ratio proposed by Greenblatt (2005) affects stock returns.

In brief, the results of Table 4 show that changes in sales are captured by investors and the results of Table 5 report that Return on Capital could be driving stock returns on the Spanish Stock Market. Therefore, there is a relation between factors in fundamentals and factors in returns, and this fact gives support to the use of the FF(1993) model in this market.

Notwithstanding, the evidence is somewhat weaker for the other fundamental variables. These results have some similarity to those obtained by FF (1995). As they suggest, the low observation frequency of the accounting data and the smooth incorporation of the shocks in expected future cash flows in the accounting data makes it very difficult to have good measures of shocks to fundamentals, and therefore, good measures of the links between stock returns and the common factors in fundamentals.

4. CONCLUSIONS

There is also quite strong evidence that the FF(1993) model explains expected returns in widely different countries: Japan (Chan et al., 1991), countries in the Euro Area (Moerman, 2005), the Pacific Basin countries (Chui and Wei, 1998), Australia (Faff, 2004; Gaunt, 2004), China (Cao et al., 2005) and wider sets of countries (Fama and French, 1998; Griffin, 2002; Moerman, 2005). Given this growing empirical support of the FF model overperforming the CAPM, the FF (1993) model has become highly popular among academics and practitioners.

Regarding the interpretation of the SMB and HML factors, FF (1993, 1995) argue a rational-pricing story (that is, a risk-based explanation). They state that the SMB and HML factors proxy for sensitivity to common risk factors in returns in the context of a multifactorial version of the Intertemporal Asset Pricing Model (ICAPM) of Merton (1973) or the Arbitrage Pricing Theory (APT) of Ross (1976).

In this context, is interesting to analyze whether the relation between fundamentals and returns observed in the US market exist in non U.S. markets, where there is little or no evidence testing the real origin of the Fama and French factors. It seems reasonable that, before applying this model in other countries, it is necessary to evaluate whether the factors proxy risk in other countries or not. However, this model has been applied in many different countries without checking this concern.

The goal of this study is to analyze the adequacy of the FF (1993) model to the Spanish Stock Market. Firstly, the results show that there are factors in fundamentals similar to those observed in returns. Secondly, when Return on Capital is used as a proxy for fundamentals, factors in fundamentals drive factors in returns. Therefore, Return on Capital is a useful fundamental variable used by investors in the Spanish Stock Market. These results would give support to the use of this model in the Spanish Capital Market.

Notwithstanding, the evidence is weaker for the other fundamental variables. These last results have some similarity to those obtained by FF (1995). As they suggest, the low observation frequency of the accounting data and the smooth incorporation of the shocks in expected future cash flows in the accounting data makes it very difficult to have good measures of shocks to fundamentals, and therefore, good measures of the links between stock returns and the common factors in fundamentals.

TABLE 1
Summary Statistics

	Mean	p-value	Median	Minimun	Maximun
RM-RF	0.0036	0.45	0.0042	-0.1970	0.1502
SMB	-0.0045	0.18	-0.0072	-0.1059	0.1060
HML	0.0050	0.09	0.0062	-0.1296	0.1257
S/L-RF	0.0022	0.65	-0.0021	-0.1462	0.2183
S/M-RF	0.0059	0.23	-0.0003	-0.1621	0.1933
S/H-RF	0.0054	0.30	-0.0041	-0.1704	0.2001
B/L-RF	0.0045	0.36	0.0058	-0.1865	0.2247
B/M-RF	**0.0110**	0.01	0.0103	-0.1534	0.1604
B/H-RF	**0.0113**	0.04	0.0073	-0.2632	0.2713

Notes:

1. The table is based on all sample observations (firm-monthly) during the period January 1991- June 2004. Extreme returns observations (top and bottom 0.5%) are deleted.
2. Portfolios are based on size, taking into account median size for classifying as Small or Big, and on BM, taking into account the 30th and 70th percentiles for classifying as Low, Medium and High respectively. S/L is the portfolio containing Small and Low BM stocks and B/H is the portfolio containing Big and High BM stocks.
3. SMB is the difference between the average returns, value-weighted, on the three portfolios containing the smallest cap stocks (S/L, S/M and S/H) and the three portfolios containing the highest cap stocks (B/L, B/M and B/H), and the HML is the difference between the average returns, value-weighted, on the two stock portfolios with a high BM ratio (S/H and B/H) and the average performance of the stock portfolios with a low BM ratio (S/L and B/L). RF is the return on the risk-free asset.

TABLE 2
Monthly Excess Returns on the Six Size-BM Portfolios Regressed on Market, Size and BM Factors

$$R_t - RF_t = \alpha + \beta_{MKT} MKT_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t + e_t$$

	α	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	0.0031	0.24	**0.7900**	0.00	**0.7008**	0.00	-0.1226	0.08	0.73
S/M	**0.0056**	0.01	**0.8069**	0.00	**0.7801**	0.00	**0.1750**	0.00	0.80
S/H	0.0034	0.10	**0.8617**	0.00	**0.8762**	0.00	**0.5838**	0.00	0.86
B/L	0.0027	0.21	**0.8810**	0.00	**-0.2096**	0.00	**-0.4413**	0.00	0.83
B/M	**0.0069**	0.00	**0.7682**	0.00	-0.0483	0.38	**0.2253**	0.00	0.73
B/H	0.0025	0.37	**0.8093**	0.00	**-0.3850**	0.00	**0.8523**	0.00	0.77

Notes:

1. The table is based on all sample observations (firm-monthly) during the period January 1991- June 2004. Extreme returns observations (top and bottom 0.5%) are removed.
2. Portfolios are based on size, taking into account median size to classify as Small or Big, and on BM, taking into account the 30th and 70th percentiles to classify as Low, Medium and High respectively. Return is in monthly terms.
3. SMB is the difference between the average returns, value-weighted, on the three portfolios containing the smallest cap stocks (S/L, S/M and S/H) and the three portfolios containing the highest cap stocks (B/L, B/M and B/H), and the HML is the difference between the average returns, value-weighted, on the two stock portfolios with a high BM ratio (S/H and B/H) and the average performance of the stock portfolios with a low BM ratio (S/L and B/L). RF is the return on the risk-free asset.

TABLE 3
Changes in Fundamentals for the Six Size-BM Portfolios Regressed on Proxies for Market, Size and BM Factors in the Changes in Fundamentals

$$\Delta X_y = \alpha + \beta_{MKT}\Delta MKT_y + \beta_{SMB}\Delta SMB_y + \beta_{HML}\Delta HML_y + e_y$$

PANEL A. ΔX = Return on Assets

	α	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	-0.0035	0.62	0.5736	0.11	0.2419	0.27	**-1.3592**	0.01	0.83
S/M	0.0038	0.69	**1.5445**	0.01	**0.8081**	0.02	0.4844	0.38	0.74
S/H	-0.0028	0.61	**0.6368**	0.03	**0.4887**	0.01	0.5127	0.13	0.63
B/L	-0.0049	0.46	0.4017	0.21	0.1263	0.53	-0.3436	0.37	0.48
B/M	0.0081	0.45	**2.0146**	0.00	**-1.4672**	0.00	0.1971	0.74	0.84
B/H	-0.0056	0.45	0.3386	0.34	-0.1204	0.59	-0.2155	0.61	0.27

PANEL B. ΔX = Return on Equity

	α	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	0.0017	0.92	**-1.0674**	0.02	**1.5249**	0.00	**-1.2509**	0.00	0.99
S/M	-0.0060	0.80	**3.0254**	0.00	-0.4406	0.42	0.3605	0.17	0.91
S/H	0.0066	0.71	-0.5729	0.21	**1.1996**	0.01	**0.6414**	0.01	0.61
B/L	0.0006	0.95	**0.9403**	0.00	**-0.6618**	0.02	**-0.2827**	0.02	0.79
B/M	0.0060	0.43	-0.0012	0.99	0.2822	0.12	**0.2088**	0.02	0.52
B/H	-0.0044	0.68	0.4459	0.11	-0.3365	0.18	-0.1750	0.13	0.55

PANEL C. ΔX = Return on Capital

	α	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	-0.0045	0.63	0.8342	0.21	0.5108	0.10	**-0.8363**	0.01	0.80
S/M	0.0002	0.98	1.1291	0.22	**1.0286**	0.03	0.4581	0.21	0.74
S/H	-0.0003	0.97	0.9971	0.06	0.4518	0.06	**0.7001**	0.00	0.81
B/L	-0.0014	0.76	**1.0006**	0.01	**-0.4424**	0.01	-0.2427	0.07	0.77
B/M	0.0025	0.68	**1.1220**	0.02	-0.1830	0.35	0.3436	0.07	0.51
B/H	-0.0056	0.46	0.8378	0.13	-0.3834	0.13	0.2210	0.30	0.27

PANEL D. ΔX = Earnings Yield

	α	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	-0.0006	0.94	0.5382	0.49	0.7786	0.20	**-0.7837**	0.01	0.75
S/M	0.0005	0.90	**2.7599**	0.00	-0.5241	0.18	-0.2182	0.20	0.93
S/H	-0.0011	0.57	-0.3950	0.08	**1.3232**	0.00	**0.8476**	0.00	0.98
B/L	-0.0017	0.48	0.4936	0.08	-0.1872	0.36	**-0.3867**	0.00	0.76
B/M	0.0018	0.65	**0.9826**	0.04	-0.5032	0.15	0.2504	0.11	0.53
B/H	-0.0012	0.86	1.4269	0.08	-0.7319	0.21	-0.0180	0.94	0.36

PANEL E. ΔX = $\ln(sales)$

	α	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	-0.0030	0.99	0.6022	0.35	0.8182	0.14	-0.2209	0.49	0.52
S/M	-0.1010	0.49	**1.1489**	0.04	0.5289	0.22	0.1329	0.60	0.43
S/H	0.1334	0.15	-0.2989	0.34	**0.5405**	0.05	**0.3595**	0.04	0.49
B/L	0.0227	0.79	0.2081	0.49	**-0.7170**	0.01	**-0.4555**	0.01	0.59
B/M	0.1205	0.35	0.1348	0.76	0.0438	0.90	-0.2373	0.29	0.25
B/H	-0.1138	0.52	1.1092	0.09	-0.4393	0.39	**0.9642**	0.01	0.79

Notes:

1. The table is based on all sample observations (firm-annual) during the period 1992- June 2004. Extreme returns observations (top and bottom 0.5%) are removed.
2. Portfolios are based on size, taking into account median size to classify as Small or Big, and on BM, taking into account the 30th and 70th percentiles to classify as Low, Medium and High respectively. Return is in monthly terms.
3. ΔSMB, the size factor in ΔX, is the simple average of ΔX for the three small-stock portfolios (S/L, S/M and S/H) minus the average for the three big-stock portfolios (B/L, B/M and B/H). The BM factor, ΔHML, is the simple average of ΔX for the two stock portfolios with a high BM ratio (S/H and B/H) minus the average for the stock portfolios with a low BM ratio (S/L and B/L).
4. For ROA, ROE, Return on Capital, Earnings Yield, the market is the mean taking into account all observations and for sales it is the natural logarithm of total sales in the market.

Table 4
Portfolio Returns Regressed on the Market Dividend Yield and on the Portfolio Changes in Fundamentals

$$R_t = \alpha_0 + \alpha_1 DYLY_{y-1} + \alpha_2 \Delta X_y + e_t$$

PANEL A. ΔX = Return on Assets

	α_0	p-value	α_1	p-value	α_2	p-value	R^2
S/L	-0.0203	0.73	**2.4667**	0.01	**14.4535**	0.04	0.15
S/M	0.0389	0.46	**1.7924**	0.04	**-12.2620**	0.04	0.04
S/H	0.0945	0.10	0.4823	0.61	-15.7366	0.25	0.01
B/L	-0.0492	0.32	**3.2237**	0.00	-0.8606	0.94	0.15
B/M	0.0040	0.91	**3.9777**	0.00	4.2395	0.16	0.22
B/H	-0.0567	0.32	**4.8091**	0.00	-26.4368	0.08	0.18
MKT	-0.0768	0.06	**2.2493**	0.00	16.9534	0.06	0.14
SMB	0.0293	0.22	**-1.6679**	0.00	**10.0019**	0.02	0.11
HML	**0.1508**	0.00	**-1.8912**	0.00	-1.2449	0.84	0.17

PANEL B. ΔX = Return on Equity

	α_0	p-value	α_1	p-value	α_2	p-value	R^2
S/L	-0.0548	0.26	**2.9925**	0.00	**1.2106**	0.01	0.16
S/M	0.0452	0.43	**1.7497**	0.07	-1.7066	0.27	0.02
S/H	0.0877	0.10	0.6838	0.44	**-10.8313**	0.00	0.05
B/L	-0.0410	0.30	**3.0508**	0.00	1.8492	0.62	0.15
B/M	0.0117	0.76	**3.8057**	0.00	9.0782	0.22	0.21
B/H	0.0369	0.43	**3.2227**	0.00	5.5940	0.38	0.17
MKT	-0.0652	0.11	**1.9209**	0.01	**4.8938**	0.01	0.16
SMB	0.0290	0.24	**-1.6840**	0.00	1.1250	0.09	0.10
HML	**0.1442**	0.00	**-1.7578**	0.00	0.3876	0.34	0.17

PANEL C. ΔX = Return on Capital

	α_0	p-value	α_1	p-value	α_2	p-value	R^2
S/L	**-0.2084**	0.00	**7.9011**	0.00	**13.2114**	0.00	0.38
S/M	**-0.1358**	0.04	**7.0351**	0.00	-2.4141	0.45	0.18
S/H	-0.0961	0.16	**6.5522**	0.00	13.5618	0.08	0.16
B/L	**-0.2301**	0.00	**7.4420**	0.00	**-5.5098**	0.00	0.32
B/M	**-0.1229**	0.01	**7.8417**	0.00	10.2907	0.23	0.35
B/H	**-0.2374**	0.00	**9.2275**	0.00	**-27.1852**	0.00	0.32
MKT	**-0.2918**	0.00	**6.9866**	0.00	**-16.6554**	0.00	0.26
SMB	**-0.0643**	0.05	0.6839	0.31	1.6518	0.26	0.01
HML	**0.1635**	0.00	**-2.0925**	0.00	-1.9061	0.26	0.08

PANEL D. ΔX = Earnings Yield

	α_0	p-value	α_1	p-value	α_2	p-value	R^2
S/L	-0.0613	0.27	**3.1760**	0.00	8.0506	0.32	0.13
S/M	0.0401	0.47	1.7893	0.06	-10.4794	0.14	0.03
S/H	**0.1137**	0.04	0.1961	0.83	-3.3799	0.66	0.00
B/L	-0.0456	0.24	**3.1632**	0.00	2.4149	0.88	0.15
B/M	0.0109	0.77	**3.8542**	0.00	11.6911	0.40	0.21
B/H	-0.0013	0.98	**3.9245**	0.00	-6.6031	0.61	0.17
MKT	-0.0661	0.12	**2.0564**	0.00	**24.7388**	0.04	0.15
SMB	0.0278	0.27	**-1.6195**	0.00	7.8275	0.14	0.09
HML	**0.1503**	0.00	**-1.8643**	0.00	3.7926	0.38	0.17

Panel E. ΔX = $\ln(sales)$

	α_0	p-value	α_1	p-value	α_2	p-value	R^2

S/L	**-0.1301**	0.00	**4.4911**	0.00	**2.1882**	0.00	0.22
S/M	0.0904	0.08	1.0737	0.20	-1.2857	0.09	0.03
S/H	**0.1013**	0.05	0.5146	0.55	**4.4775**	0.00	0.08
B/L	-0.0103	0.79	**2.9965**	0.00	**-2.0257**	0.01	0.19
B/M	-0.0579	0.09	**4.0497**	0.00	**4.6535**	0.00	0.42
B/H	0.0587	0.22	**2.9111**	0.00	-0.5638	0.12	0.18
MKT	-0.0204	0.63	**2.3386**	0.00	**-3.9898**	0.00	0.21
SMB	0.0258	0.31	**-1.5308**	0.00	0.4995	0.22	0.09
HML	**0.1347**	0.00	**-1.5671**	0.00	**0.6492**	0.00	0.22

Notes:

1. The table is based on all sample observations (firm-monthly) during the period January 1991- June 2004. Extreme returns observations (top and bottom 0.5%) are removed.
2. Portfolios are based on size, taking into account median size to classify as Small or Big, and on BM, taking into account the 30th and 70th percentiles to classify as Low, Medium and High respectively. Return is in monthly terms.
3. The dependent variables in the regression are the returns of the last twelve months on the six size-BM portfolios (S/L, S/M, S/H, B/L, B/M and B/H) and the Market (MKT), Size (SMB) and BM (HML) factors in returns. $DYLY$ is the dividend yield of the value-weighted portfolio on the Spanish Stock Market at the end of last year. ΔX_y is the change in a fundamental variable from year $y-1$ to y divided by 12. $\ln(sales)$ is the natural logarithm of sales.

Table 5
Portfolio Returns Regressed on the Market Dividend Yield and on Market, Size and BM Factors in the Changes in Fundamentals

$$R_t = \alpha + \beta_D DYLY_{y-1} + \beta_{MKT}\Delta MKT_y + \beta_{SMB}\Delta SMB_y + \beta_{HML}\Delta HML_y + e_t$$

PANEL A. Fundamental variable is the Return on Assets

	α	p-value	β_D	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	-0.05	0.28	**2.75**	0.00	**-48.8**	0.00	0.55	0.95	**-85.3**	0.00	0.28
S/M	0.10	0.07	0.41	0.65	**-61.0**	0.00	-0.24	0.98	**-95.9**	0.00	0.21
S/H	**0.14**	0.02	**-0.54**	0.58	**-52.8**	0.00	7.19	0.44	**-74.4**	0.00	0.13
B/L	-0.05	0.20	**3.19**	0.00	**-23.6**	0.03	-8.32	0.23	**-33.9**	0.01	0.19
B/M	0.00	0.99	**3.78**	0.00	**-35.9**	0.00	**-23.8**	0.00	**-66.8**	0.00	0.37
B/H	0.05	0.25	**2.81**	0.00	**-35.9**	0.00	**14.5**	0.04	**-54.5**	0.00	0.29

PANEL B. Fundamental variable is the Return on Equity

	α	p-value	β_D	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	**-0.13**	0.02	**4.31**	0.00	-13.0	0.08	0.92	0.88	**-5.87**	0.04	0.21
S/M	0.01	0.85	**2.25**	0.02	-11.6	0.13	-5.16	0.43	**-9.46**	0.00	0.13
S/H	0.07	0.23	0.89	0.40	-8.74	0.29	-1.84	0.80	-5.00	0.13	0.04
B/L	**-0.09**	0.03	**3.79**	0.00	5.21	0.36	**-13.6**	0.00	**-7.79**	0.00	0.22
B/M	-0.03	0.50	**4.27**	0.00	8.96	0.11	**-18.6**	0.00	**-11.1**	0.00	0.33
B/H	-0.00	0.97	**3.95**	0.00	-7.91	0.21	2.61	0.62	-1.72	0.49	0.19

PANEL C. Fundamental variable is the Return on Capital

	α	p-value	β_D	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	**-0.30**	0.00	**9.42**	0.00	**-24.7**	0.00	**12.9**	0.00	**-22.1**	0.00	0.44
S/M	**-0.21**	0.00	**8.44**	0.00	**-30.6**	0.00	**13.3**	0.00	**-19.3**	0.00	0.39
S/H	**-0.14**	0.04	**7.23**	0.00	-15.5	0.12	**17.7**	0.00	**-17.5**	0.00	0.33
B/L	**-0.25**	0.00	**7.64**	0.00	**-27.9**	0.00	**6.61**	0.03	**-10.1**	0.00	0.39
B/M	**-0.24**	0.00	**9.60**	0.00	**-32.9**	0.00	4.64	0.09	**-11.9**	0.00	0.53
B/H	**-0.11**	0.05	**6.90**	0.00	**-20.4**	0.01	**14.0**	0.00	**-19.1**	0.00	0.42

PANEL D. Fundamental variable is the Earnings Yield

	α	p-value	β_D	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	-0.08	0.16	**3.46**	0.00	20.7	0.56	-13.6	0.58	-12.1	0.25	0.14
S/M	0.04	0.53	1.80	0.08	-29.5	0.43	11.4	0.66	-11.2	0.32	0.03
S/H	0.12	0.06	0.09	0.93	15.1	0.70	-16.3	0.55	4.99	0.67	0.01
B/L	-0.07	0.11	**3.53**	0.00	13.0	0.63	-25.6	0.18	-5.06	0.53	0.18
B/M	0.00	0.90	**3.78**	0.00	**61.8**	0.02	**-59.3**	0.00	**-20.2**	0.01	0.32
B/H	0.01	0.78	**3.61**	0.00	-1.23	0.97	3.01	0.88	-15.2	0.09	0.18

PANEL E. Fundamental variable is the natural logarithm of sales

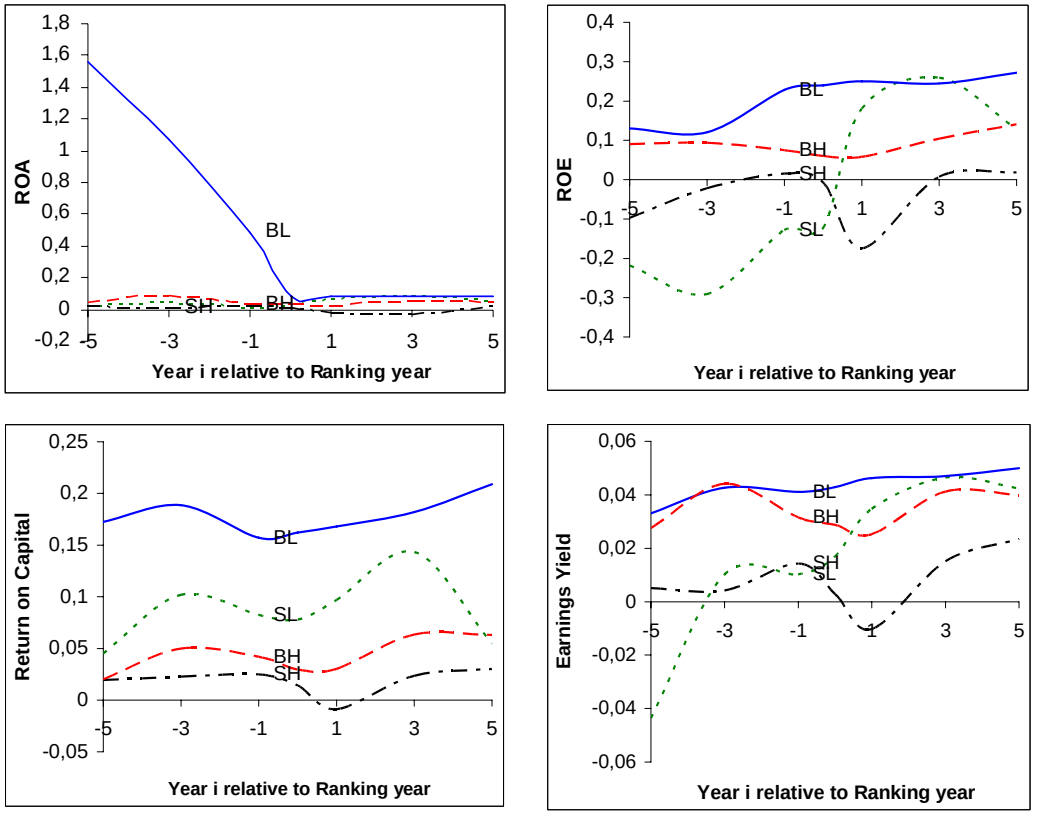
	α	p-value	β_D	p-value	β_{MKT}	p-value	β_{SMB}	p-value	β_{HML}	p-value	R^2
S/L	0.01	0.85	**2.84**	0.00	-1.30	0.33	**3.34**	0.00	0.51	0.45	0.20
S/M	**0.21**	0.00	0.23	0.79	**-2.83**	0.04	**3.23**	0.00	0.50	0.48	0.11
S/H	**0.27**	0.00	-0.88	0.32	-2.43	0.09	**5.19**	0.00	**1.59**	0.03	0.15
B/L	0.03	0.44	**2.30**	0.00	-1.23	0.24	1.56	0.07	-0.72	0.16	0.24
B/M	**0.11**	0.01	**2.83**	0.00	-1.08	0.29	**2.92**	0.00	-0.37	0.46	0.35
B/H	**0.11**	0.02	**2.96**	0.00	**-2.84**	0.01	1.65	0.07	0.26	0.64	0.23

Notes:

1. The table is based on all sample observations (firm-monthly) during the period January 1991- June 2004. Extreme returns observations (top and bottom 0.5%) are removed.
2. Portfolios are based on size, taking into account median size to classify as Small or Big, and on BM, taking into account the 30th and 70th percentiles to classify as Low, Medium and High respectively. Return is in monthly terms.
3. ΔSMB, the size factor in the fundamental variable, is the simple average of the fundamental variable for the three small-stock portfolios (S/L, S/M and S/H) minus the average for the three big-stock portfolios (B/L, B/M and B/H). The BM factor, ΔHML, is the simple average of the fundamental variable for the two stock portfolios with a high BM ratio (S/H and B/H) minus the average for the stock portfolios with a low BM ratio (S/L and B/L). $DYLY$ is the dividend yield of the value-weighted portfolio on the Spanish Stock Market at the end of last year. $\ln(sales)$ is the natural logarithm of sales.
4. For ROA, ROE, Return on Capital, Earnings Yield, the market is the mean taking into account all observations and for sales it is the natural logarithm of total sales in the market.
5. The changes are in monthly terms, dividing the annual accounting numbers by 12.

FIGURE 1.

11-year evolution of profitability for size-BM portfolios



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