THE FAMA FRENCH MODEL OR THE CAPITAL ASSET PRICING MODEL: INTERNATIONAL EVIDENCE

Paulo Alves, Lisbon Accounting and Management Institute (ISCAL), Lusofona University and CMVM

ABSTRACT

This research paper attempts to evaluate the benefits of using the Fama and French Model by comparing them with those resulting from the use of the Capital Asset Pricing Model. Local, International, and European Monetary Union functional forms were considered, in an attempt to raise the following questions: Does the calculation method to determine size and financial distress premium have any significance for the financial analyst? Do the foreign risk premiums of the Fama and French Model have any importance for the financial analyst? Firstly, models based on European Monetary Union factors produce the worst results, independently of any Capital Asset Pricing Model or Fama and French Model consideration. Secondly, independently of the model, the expected return of big and low book-to-market stocks is more reliable. This is particularly observable for big firms, as it does not occur for low book-to-market firms using Fama and French Models. Finally, the Fama and French Model is notoriously preferable in comparison with the Capital Asset Pricing Model for small and high-book to market firms: in this case, the introduction of international factors increases the reliability of expected returns.

JEL: G12; G15

KEYWORDS: CAPM, FFM, Local Factors, International Factors

INTRODUCTION

The analysis of the cost of capital has, for the past decades, been a very important topic for academia and practitioners. It is well known that the expected return should be put to several different uses: in event studies, to parameterize managerial incentive schemes, to evaluate financial assets, to assess the quality of investments, and to infer market efficiency. The improper (use of an) estimate of the cost of capital may mean accepting investment projects without quality, carelessly acquiring or selling shares (without adequate fundamentals), drawing the wrong conclusions from events studies, among other financial economics problems of great relevance.

This is a matter of great importance for academia and practitioners, and also for society as a whole. Noticeably, bad investment decisions made by Governments, resulting from inadequate assessments capital costs, have a profound future impact on taxes and sovereign debts paid by citizens. In consequence of these concerns this research compares the Capital Asset Pricing Model (CAPM) and the Fama and French Model (FFM). Apparently, CAPM continues to be widely used (Bruner *et al* (1998), Graham and Harvey (2001) and Estrada (2011)), but this does not mean it has more explanatory power than the FFM.

In this research we consider a sample of firms from ten countries of the European Monetary Union and use Griffin's (2002) approach to evaluate both models. Fundamentally, he considers the FFM, that is, a model that expands CAPM by taking into account size and value factors in addition to the market risk factor of CAPM. Also, he expands on FFM by considering local, international, and global factors. In this research paper CAPM is used considering also local, international, and global risk premium. We analyze which has a greater explanatory power, considering the functional forms described above: Are local

CAPMs better than local FFMs?; Do international factors grant any reliability?; Do global factors add any value?. The comparison between the two models is the main contribution of this research.

This paper proceeds as follows. The next section presents the relevant literature and develops the scope of this research-paper. Subsequently we describe the data and methodology and discuss the results of our empirical tests. The final section concludes.

LITERATURE REVIEW

Since the 1960s, Sharpe (1964) and Lintner's (1965) CAPM has been the most favored model to evaluate financial assets. However, since the 1970s and particularly in the 1980s, authors have identified many misspecifications of the CAPM. Basu (1977) found a positive connection between expected stock returns and earnings to price ratio. Banz (1981) concluded that small firms have, on average, higher risk-adjusted returns than large firms. Bhandari (1988) showed a positive connection between debt to equity and expected stock returns, even when controlling such variables as systematic risk, firm size and the January effect. Chan *et al* (1991), analyzing the relationship between expected stock returns and different fundamental variables, found a significantly positive impact on expected returns by market-to-book and cash flow yield. In the face of those misspecifications, Fama and French (1993), extended their 1992 research by developing an asset pricing model (FFM), in which the stock excess return is not only explained by market excess return, but also by two other variables: size (measured by market capitalization) and book-to-market ratio.

We have two portfolios: a Small minus Big (SMB) portfolio and a High minus Low (HML) portfolio, depending respectively on market capitalization and book-to-market. Whereas book-to-market is related to financial distress problems, size is associated with profitability. Smaller stocks lead to lower earnings than larger stocks, and consequently to a higher expected return, after book-to-market's control. On the other hand, book-to-market is related to financial distress problems. Firms with high book-to-market systematically present lower earnings on book equity, indicating signals of financial distress problems.

The two factors have been criticized since the mid 1990s. Berk (1995) claims that size does not result from misspecification of CAPM, but it is a consequence of economic risk. If two firms have the same size at time t and consequently the same expected cash-flows at time $t+1$, the firm with higher risk will have a lower market value in that period; Lakonishok *et al* (1994) explain that high book-to-market stocks (or value stocks) do not present higher average returns than growth stocks as a reward for bearing a higher risk, but as a result of systematic mispricing by naive investors, who tend to extrapolate past earnings growth into the future, leading to under-pricing of value stocks and over-pricing of growth stocks.

Fama and French (1998) expand the debate between growth and value stocks to thirteen major capital markets around the world. They find that in twelve markets - Italy is the exception - there is a value premium; moreover, they confirm that value stocks present higher returns than growth stocks and conclude that the world CAPM does not capture the referred premium, reasserting the CAPM misspecification. Still in the international field, Griffin (2002), resorting to the three-factor model of Fama and French (1993), compares that FFM, using country factors and global factors, and concludes that the former explains excess stock returns with more accuracy. Moerman (2005), using a similar approach to the one adopted in this research, but using monthly returns, concludes that the Local FFM outperforms the EMU FFM. It must be highlighted, however, that there is an important difference between both research papers. Whilst we debate the use of CAPM and FFM, he focuses solely on FFM. In fact, the main objective of this research paper is to evaluate the benefits of using FFM in comparison with CAPM. This field of investigation has also been done by many other authors: Bartholdy and Peare (2005) concluded that the small gain of using FFM in terms of explanatory time does not justify the work involved in calculating two more factors; Gharghori *et al* (2009), comparing the results of both models,

also concluded that the performance of the FFM is less than satisfactory in Australia; Vassalou (2003), considering a sample of 10 countries, concluded that FFM explains asset returns better than the CAPM; Kothari and Warner (2001), evaluating mutual fund performances, found that procedures based on the FFM are somewhat better than CAPM-based measures; Estrada (2011) considers that value and size matters and practitioners should understand and know how to apply the FFM.

DATA AND METHODOLOGY

Data was downloaded from Datastream (DS) and includes a significant number of firms from the following EMU members: Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, and Spain. Luxembourg, a founding member, is excluded as a result of its small capital market. Greece was also not included because it only adopted the Euro currency at the beginning of 2001. Additionally, we also exclude (1) firms from the financial sector, since they have some capital requirements which offer them special features, and (2) firms whose book-to-market is negative, indicating some financial distress problems.

This analysis focuses on the period from 1990 to 2003 and represents the debates, the arrangements and the results from the euro implementation. The period reflects the preliminary discussion of the single currency, from 1990 to 1995; a second period, from 1996 to 1998, characterized by many economic policies introduced by local countries in order to enter (in) the single currency; and finally, a period of four years of results from the euro implementation.

Panel A of Table 1 reveals a stable market share among those countries in the period between 1990 and 2003. France and Germany are the biggest markets with more than half the EMU market capitalization. Italy, the Netherlands, and Spain are median-sized markets. Their market shares vary from 8% to 16%. Austria, Belgium, Finland, Ireland, and Portugal are the smallest markets. All of them present less than 5% of the EMU portfolio. Austria, Ireland, and Portugal, with less than 2%, are particularly small.

Table 1: Sample Description by Countries

Panel A: Datastream Country Weights (%)									
AU	BG	FL	FR	GR	IR	IT	NL	PT	SP
1.2	4.3	2.9	25.2	27.5	1.4	12.1	15.7	1.2	8.3
Panel B: Number of Firms									
AU	BG	FL	FR	GR	IR	IT	NL	PT	SP
39	52	68	350	391	25	114	88	34	60
Panel C: Median Market Capitalization by Firm (€ millions)									
AU	BG	FL	FR	GR	IR	IT	NL	PT	SP
45	131	112	65	63	97	148	145	47	262
Panel D: Median Book-to-Market by Firm									
AU	BG	FL	FR	GR	IR	IT	NL	PT	SP
0.82	0.61	0.63	0.58	0.51	0.59	0.75	0.54	0.94	0.66

AU, BG, FL, FR, GR, IR, IT, NL, PT, and SP are respectively Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, and Spain. Panel A shows Datastream country weights in the EMU portfolio. Panel B indicates the annual average number of firms by period used to build the size and the distress risk premiums. Panel C indicates the median size of firms in Panel B. Panels D indicates the median book-to-market of firms in Panel B.

Panel B shows the number of firms by country. Germany and France respectively with 391 and 350 firms (61% of the sample), on an annual average, are the most represented countries. Austria, Ireland and Portugal are the least represented. For example, the sample only considers, on average, 25 Irish firms per year. The expressive representation of the biggest markets can be explained as a reaction to the development of some new markets, particularly the *Neuer Market* and the *Nouveau Marché*, the German and French regulated platforms, created respectively in 1997 and in 1996, which target young, small, and high growth stocks (e.g., technology, biotechnology, media and financial services stocks). The remaining countries created secondary markets with the same objective, although without the same success.

Panel C shows the median market capitalization by firm, downloaded from DS, during each sub-period. The large number of new firms in French and German stock markets caused a decrease in the median firm size. Spanish firms experienced an increase in their market capitalization, as a result of a comparatively lower increase in the number of firms. Austrian and Portuguese stock markets are characterized by a relatively large number of small firms. Book-to-market by firm, also downloaded from DS, is exhibited in Panel D. Austrian and Portuguese stocks present the highest median value for the book-to-market ratio.

This paper uses the three-factor model of Fama and French (1993) with the adjustments adopted by Griffin (2002). The main objective is to clarify whether local or global factors are forces that might best explain stock returns. Basically, FFM is built using the following procedure: (i) We use weekly returns from January of 1990 to December of 2003; (ii) The market excess return (MER) is obtained through the difference between the stock market return and the risk free asset. Datastream (DS) stock market indices, German Deutschmarks denominated, are used as a proxy of local market return. DS indices were chosen because they represent, in general, more than 99% of local market value. Germany Euro one-month interest rate is used as the risk free asset; (iii) Stocks were classified by market capitalization in June of year t, using the sample median value, dividing them into Big (B) and Small (S) portfolios - delisted firms were also ranked, avoiding survivorship bias; (iv) Independently of (iii), the sample is divided into three groups of stocks (using the 30% and 70% percentiles), according to their book-to market, using the preceding values of December (year t-1) for that ratio, creating the high (H), medium (M), and low (L) book-to-market portfolios; (v) Portfolios are reallocated on an annual basis; (vi) Portfolios are value-weighted and amount to six: SL, SM, SH, BL, BM, and BH; (vii) Size premium is obtained, controlling the firm's book-to-market, from the difference between S ((SL+SM+SH)/3) and B ((BL+BM+BH)/3), resulting in portfolio SMB (small minus big); (viii) Book-to-market equity is obtained, controlling the firm's size, through the difference between H ((SH+BH)/2) and L ((SL+BL)/2), resulting in portfolio HML (high minus low).

Next, following Griffin (2002), different functional forms of FFM, using either global or local factors or both, are reported. First, a model based on EMU factors is presented in German Deutschmarks:

$$r_{i,t} = \alpha_i + b_i EMER_t + s_i ESMB_t + h_i EHML_t + \varepsilon_{i,t} \quad (1)$$

in which $r_{i,t}$ is the weekly excess stock return, b_i, s_i, and h_i are the unconditional sensitivities of asset *i* to the factors $EMER_t$, and, $ESMB_t$, and $EHML_t$ represent the EMU factors. They are calculated considering the countries' weight in the EMU portfolio, in which $EMER_t = W_{Dt-1}\, DMER_t + W_{Ft-1}\, FMER_t$. W_{Dt-1} and W_{Ft-1} are respectively the weight of local and foreign portfolios in the EMU portfolio in the week *t-1*. The same procedures for the size and distress premium are used.

This research also considers an international model, based on local and international sensitivities:

$$r_{i,t} = \alpha_i + b_{Di}\, W_{Dt-1}\, DMER_t + s_{Di}\, W_{Dt-1}\, DSMB_t + h_{Di}\, W_{Dt-1}\, DHML_t + b_{Fi}\, W_{Ft-1}\, FMER_t + s_{Fi}\, W_{Ft-1}\, FSMB_t + h_{Fi}\, W_{Ft-1}\, FHML_t + \varepsilon_{i,t} \quad (2)$$

in which $DMER$, $DSMB$, $DHML$ are local factors and $FMER$ $FSMB$, and $FHML$ are international factors.

Finally, a local model is shown, in which the international factors do not play any role:

$$r_{i,t} = \alpha_i + b_{Di}\, W_{Dt-1}\, DMER_t + s_{Di}\, W_{Dt-1}\, DSMB_t + h_{Di}\, W_{Dt-1}\, DHML_t + \varepsilon_{i,t} \quad (3)$$

Thus, if model (2) does not grant any explanatory power to model (3), there are signs suggesting that the excess return is fundamentally explained by local factors.

EMPIRICAL RESULTS

The analysis debates the results of CAPM versus FFM considering different portfolios (High, Low, Small, and Big). The absolute value of the intercept or Jensen's alpha, meaning the pricing error, and the adjusted R^2, indicating explanatory power are used to evaluate the robustness of each model. The discussion is carried out based on the following procedures: First, market excess return, size, and distress risk premiums, which are used in the local FFM application, are presented (see table 2); Secondly, the results obtained for local, international, and EMU CAPM models, using High, Low, Small, and Big portfolios, ranked by quintiles, are confronted (see tables 3 and 4); Thirdly, the previous exercise is repeated, now considering FFM, in order to assess how accurate the models based on EMU factors are and to evaluate how size and financial distress international premiums increase the accuracy of FFM (see tables 5 and 6); and finally, we compare CAPM with FFM specifications in order to evaluate how useful both models are. Table 2 shows the weekly local market risk premium or domestic market excess return (DMER), size (DSMB), and distress risk premium (DHML) by country from 1990 to 2003.

Table 2: Descriptive Statistics of Variables

	DMER		SMB		HML	
	Mean	**Stdev**	**Mean**	**Stdev**	**Mean**	**Stdev**
Austria	-0.025	1.707	0.067	2.311	0.234	2.572
Belgium	0.000	2.436	0.128	2.026	0.050	2.258
Finland	0.220	4.538	0.148	2.810	-0.102	3.207
France	0.045	2.770	0.281	3.163	0.144	3.479
Germany	0.010	2.724	0.140	2.044	0.259	1.880
Ireland	0.090	2.615	0.055	2.878	0.056	2.917
Italy	0.018	3.131	0.108	2.059	0.000	2.262
Netherlands	0.055	2.545	0.097	2.056	-0.004	2.178
Portugal	-0.017	2.352	0.078	2.394	-0.092	2.677
Spain	0.080	2.699	0.014	2.236	0.249	2.365
E.M.U.	0.053	2.433	0.142	1.735	0.120	1.638

Domestic market excess return (DMER) is obtained, considering a DS country indices and Germany Euro-mark one month, as proxies for market return and risk-free-asset. Small minus big (DSMB) is the return difference between S (small firms) and B (big firms) domestic portfolios. High minus low (DHML) is the return difference between H (high book-to-market firms) and L (low book-to-market firms) domestic portfolios. EMU results are value-weighted. Variables are weekly means, calculated on a value-weighted basis. Results are a weekly percentage.

Finland, with a 0.22% (1.59%) of weekly (annual) risk premium presents the highest value. The remaining countries present weaker results. Some of the smallest markets present the poorest performance. Austria, Belgium, and Portugal present a weekly DMER of -0.025%, 0.000%, and -0.017% respectively. The equity risk premium varies from 0.010% (Germany) to 0.080% (Spain). These figures are abnormally low, when compared with the traditional results for equity risk premium. Damodoran (1992), advises an annual equity risk premium of 4.5%-5.5%, for developed markets with limited listings, and 3.5%-4.0% for Germany. However, some facts, namely the tech bubble in the late 1990s and ensuing fall in early 2000, offer a valuable explanation for such trend.

Size premium (DSMB) reveals, in line with DMER, a consistent behavior across European countries. It is possible to observe signs of the existence of that type of premium. Size premium is particularly high in Finland, France, and Germany. In the French case, the difference between Small and Big portfolios excess return is 0.281%, on a weekly basis. The emergence of platforms for small and medium enterprises in these countries, particularly France and Germany, may be an explanation for what happened.

Relating to book-to-market premium (DHML), our results are less consistent than those obtained by Fama and French (1998). They find a book-to-market premium in 11 out of 12 stock markets of their own sample, whereas we only find the book-to-market premium in 6 - Austria, Belgium, France, Germany, Ireland, and Spain – out of the 10 stock markets analyzed. Previous findings are the result of institutional and economic changes that European capital markets witnessed after the single currency. In fact, the

single currency and subsequent lower interest rates, in addition to the high-tech euphoria during the second half of the 1990s, can explain the stock price behavior of growth firms. In all probability, asset managers did not use the more advisable fundamentals, namely the cost of equity of growth firms. They estimated a lower cost of equity for growth stocks, which substantially increased their market prices; that is, asset managers used a lower estimate for cost-of-equity, creating the ideal conditions for stock prices to overreact. That explains what happened after 1999, a sustainable correction of stock market throughout this period of time, which would end in 2002.

Tables 3 and 4 show how international factors in comparison with local factors, regardless of the type of stock, have a small role in the reliability of some estimates of the CAPM. The introduction of international factors sometimes deteriorates the estimates. This can be observed in Table 3 for high book-to-market stocks (Jensen's alpha increases, in average, from 0.324 to 0.325 with the inclusion of the international factor). However, this result is not extensible to all countries. For example, Austria benefits from the inclusion of international factors.

Table 3: Excess Returns of High and Low Portfolios using CAPM

	Local CAPM		**International CAPM**		**EMU CAPM**	
	|α|	**Adj. R^2**	**|α|**	**Adj. R^2**	**|α|**	**Adj. R^2**
High						
Austria	0.382	0.229	0.371	0.235	0.333	0.084
Belgium	0.293	0.387	0.288	0.389	0.259	0.269
Finland	0.335	0.080	0.352	0.165	0.363	0.163
France	0.455	0.444	0.453	0.444	0.440	0.397
Germany	0.404	0.350	0.409	0.351	0.380	0.277
Ireland	0.504	0.046	0.504	0.045	0.534	0.016
Italy	0.013	0.589	0.008	0.591	0.038	0.370
Netherlands	0.052	0.236	0.068	0.268	0.076	0.265
Portugal	0.482	0.009	0.476	0.012	0.481	0.012
Spain	0.319	0.409	0.319	0.408	0.360	0.282
Mean	0.324	0.278	0.325	0.291	0.326	0.213
Low						
Austria	0.029	0.434	0.034	0.436	0.073	0.121
Belgium	0.162	0.532	0.163	0.532	0.130	0.323
Finland	0.207	0.743	0.215	0.750	0.420	0.336
France	0.185	0.808	0.185	0.808	0.167	0.706
Germany	0.095	0.520	0.073	0.548	0.057	0.531
Ireland	0.242	0.338	0.245	0.382	0.278	0.284
Italy	0.125	0.685	0.120	0.688	0.097	0.515
Netherlands	0.066	0.701	0.067	0.701	0.099	0.575
Portugal	0.186	0.554	0.182	0.564	0.210	0.241
Spain	0.044	0.525	0.040	0.530	0.000	0.413
Mean	0.134	0.584	0.132	0.594	0.153	0.404
t-stat	3.27***		3.33***		2.70**	

High and Low portfolios excess returns are dependent variables representing the top and bottom quintile. Variables are value-weighted, calculated on a weekly basis. DS country indices are used as a local market proxy. Germany Euro-Mark one-month is the risk-free asset proxy. The method of estimation is ordinary least squares, using the Newey and West (1987) covariance estimator that is consistent in the presence of both heteroskedasticity and autocorrelation of unknown form. Domestic Model is a result of regression $r_{i,t} = \alpha_i + b_{Di}\, W_{Dt-1}\, DMER_t + \varepsilon_{i,t}$, *where ri,t is the portfolio (High or Low) excess return in period t, DMER is the domestic excess return, and* α_i *is a constant. wDt-1 is the weight of a local portfolio in EMU. b Di is the unconditional sensitivity of asset i to the factor. EMU Model is a result of regression:* $r_{i,t} = \alpha_i + b_i EMER_t + \varepsilon_{i,t}$, *where EMERt represents the EMU factor. It is also calculated using a value-weighted basis.* $EMER_t = W_{Dt-1}\, DMER_t + W_{Ft-1}\, FMER_t$, *where* w_{Dt-1} *and* w_{Ft-1} *are respectively the weight of local and foreign portfolios in the EMU portfolio in the week t-1. International Model is the result of regression:* $r_{i,t} = \alpha_i + b_{Di}\, W_{Dt-1}\, DMER_t + b_{Fi}\, W_{Ft-1}\, FMER_t + \varepsilon_{i,t}$. **, **, and ***, indicate significance at the 10, 5 and 1 percent level.*

On the other hand, when the model is based on EMU factors, the reliability of the CAPM is considerably worse, particularly for big and low book-to-market stocks. The Jensen's alpha of EMU CAPM increases

in comparison with Local CAPM from 0.134 to 0.153 for low book-to-market stocks (see Table 3). For big stocks it changes from 0.111 to 0.130 (see Table 4).

The CAPM model, regardless of its functional form, presents better adherence to big and low book-to-market stocks. The results presented in Tables 3 and 4 show a lower Jensen's alpha for that type of stocks rather than small and high book-to-market stocks, with statistical significance (see table 3 and 4, particularly t-stat). For example, for local model low-book-to-market firms with 0.134 of Jensen's alpha compares with 0.324 for high-book-to-market firms (t-stat = 3.27).

Table 4: Excess Returns of Small and Big Portfolios Using CAPM

	Local CAPM		**International CAPM**		**EMU CAPM**	
	$\|\alpha\|$	**Adj. R^2**	**$\|\alpha\|$**	**Adj. R^2**	**$\|\alpha\|$**	**Adj. R^2**
Small						
Austria	0.362	0.062	0.363	0.061	0.335	0.010
Belgium	0.255	0.084	0.252	0.085	0.243	0.064
Finland	0.570	0.037	0.581	0.062	0.596	0.060
France	0.530	0.254	0.522	0.271	0.520	0.269
Germany	0.654	0.123	0.653	0.122	0.642	0.106
Ireland	1.250	0.011	1.252	0.011	1.270	0.009
Italy	0.370	0.205	0.368	0.204	0.353	0.146
Netherlands	0.233	0.204	0.240	0.218	0.249	0.210
Portugal	0.927	0.010	0.919	0.013	0.930	0.011
Spain	0.599	0.118	0.603	0.119	0.631	0.095
Mean	0.575	0.111	0.575	0.116	0.577	0.098
Big						
Austria	0.092	0.768	0.085	0.774	0.037	0.224
Belgium	0.067	0.729	0.071	0.732	0.037	0.402
Finland	0.155	0.769	0.165	0.783	0.338	0.384
France	0.167	0.954	0.168	0.954	0.149	0.817
Germany	0.109	0.907	0.098	0.917	0.068	0.830
Ireland	0.187	0.621	0.188	0.624	0.248	0.295
Italy	0.061	0.835	0.065	0.836	0.036	0.538
Netherlands	0.065	0.905	0.064	0.905	0.104	0.701
Portugal	0.135	0.488	0.135	0.487	0.162	0.152
Spain	0.069	0.790	0.068	0.790	0.120	0.532
Mean	0.111	0.777	0.111	0.780	0.130	0.487
t-stat	4.60***		4.62***		4.17***	

*Small and Big portfolios excess returns are dependent variables. The functional forms are similar to those applied in table 3. *, **, and ***, indicate significance at the 10, 5 and 1 percent level*

The inclusion of international factors in FFM, contrarily to CAPM, improves the reliability of the model. For all kinds of stocks, the introduction of international factors reduces the Jensen's alpha (see tables 5 and 6). For example, the Jensen's alpha of small stocks decreases from 0.358 to 0.307 (see table 6). Also for FFM does a model based on EMU factors deteriorate the reliability of the estimates in comparison with their peers. Big stocks are the exception as the Jensen's alpha is lower than that obtained for local and international FFM (see table 6)

Unlike the CAPM, the reliability of estimates for high and low book-to-market stocks is constant using FFM (see table 5, namely the t-stat's). The same does not occur when big and small stocks are taken into account. In this case, the Jensen's alpha of big socks is considerably lower, with statistical significance, than the one observed for small stocks (see table 6).

In Table 7 we compare CAPM and FFM for all stocks by functional form. In the case of the local form, the FFM only presents a lower Jensen's alpha, with statistical significance, for small stocks (t-stat = 1.77).

For the international form, an improvement is observed in high and small stocks. Relatively to EMU factors, there is no evidence, with statistical significance, of more reliability using FFM, independently of the type of stock considered.

Table 5: Excess Returns of High and Low Portfolios Using FFM

	Local FFM		**International FFM**		**EMU FFM**	
	|α|	**Adj. R^2**	**|α|**	**Adj. R^2**	**|α|**	**Adj. R^2**
High						
Austria	0.279	0.340	0.226	0.348	0.230	0.104
Belgium	0.289	0.526	0.224	0.538	0.190	0.307
Finland	0.266	0.369	0.215	0.421	0.269	0.197
France	0.452	0.497	0.361	0.524	0.377	0.440
Germany	0.157	0.633	0.167	0.635	0.236	0.388
Ireland	0.325	0.208	0.283	0.213	0.394	0.050
Italy	0.032	0.731	0.073	0.734	0.173	0.412
Netherlands	0.055	0.459	0.026	0.485	0.017	0.308
Portugal	0.055	0.593	0.138	0.605	0.247	0.051
Spain	0.182	0.549	0.147	0.552	0.254	0.323
Mean	0.212	0.484	0.190	0.500	0.239	0.258
Low						
Austria	0.027	0.497	0.004	0.499	0.164	0.143
Belgium	0.183	0.601	0.159	0.604	0.121	0.322
Finland	0.244	0.748	0.259	0.757	0.528	0.380
France	0.177	0.834	0.210	0.842	0.233	0.747
Germany	0.173	0.585	0.089	0.638	0.022	0.596
Ireland	0.271	0.366	0.233	0.418	0.210	0.309
Italy	0.154	0.768	0.121	0.786	0.070	0.554
Netherlands	0.066	0.723	0.065	0.725	0.113	0.575
Portugal	0.194	0.559	0.165	0.581	0.134	0.278
Spain	0.050	0.588	0.009	0.621	0.009	0.454
Mean	0.154	0.627	0.131	0.647	0.160	0.436
t-stat	1.10		1.30		1.36	

High and Low portfolios excess returns are dependent variables. They represent the top and bottom quintile. Variables are value-weighted, calculated on a weekly basis. DS country indices are used as local market proxy. Germany Euro-Mark one-month is the risk-free asset proxy. The method of estimation is ordinary least squares, using the Newey and West (1987) covariance estimator that is consistent in the presence of both heteroskedasticity and autocorrelation of unknown form. Domestic Model is a result of regression $r_{i,t} = \alpha_i + b_{Di}\, W_{Dt-1}\, DMER_t + s_{Di}\, W_{Dt-1}\, DSMB_t + h_{Di}\, W_{Dt-1}\, DHML_t + \varepsilon_{i,t}$, *where ri,t is the portfolio (High or Low) excess return in period t, DMER is the domestic excess return, DSMB is the return difference between S (local small firms) and B (logal big firms), DHML is the return difference between H (high book-to-market firms) and L (low book-to-market firms), and* α_i *is a constant.* w_{Dt-1} *is the weight of a local portfolio in EMU.* b_{Di}, s_{Di},, *and* h_{Di} *are the unconditional sensitivities of asset i to the factors. EMU Model is a result of regression:* $r_{i,t} = \alpha_i + b_i EMER_t + s_i ESMB_t + h_i EHML_t + \varepsilon_{i,t}$ *, where EMER, ESMB, and EHML represent EMU factors. They are calculated considering the countries weight in the EMU portfolio. Thus, we have, for example,* $EMER_t = W_{Dt-1}\, DMER_t + W_{Ft-1}\, FMER_t$, *where* w_{Dt-1} *and* w_{Ft-1} *are respectively the weight of local and foreign portfolios in the EMU portfolio in the week t-1. International Model is the result of regression:* $r_{i,t} = \alpha_i + b_{Di}\, W_{Dt-1}\, DMER_t + s_{Di}\, W_{Dt-1}\, DSMB_t + h_{Di}\, W_{Dt-1}\, DHML_t + b_{Fi}\, W_{Ft-1}\, FMER_t + s_{Fi}\, W_{Ft-1}\, FSMB_t + h_{Fi}\, W_{Ft-1}\, FHML_t + \varepsilon_{i,t}$.*, **, and ***, indicate significance at the 10, 5 and 1 percent level.*

Table 6: Excess Returns of Small and Big Portfolios using FFM

	Local FFM		International FFM		EMU FFM	
	$\|\alpha\|$	Adj. R^2	$\|\alpha\|$	Adj. R^2	$\|\alpha\|$	Adj. R^2
Small						
Austria	0.148	0.269	0.079	0.270	0.183	0.030
Belgium	0.223	0.218	0.186	0.226	0.172	0.096
Finland	0.317	0.496	0.289	0.501	0.413	0.141
France	0.423	0.400	0.339	0.457	0.371	0.398
Germany	0.473	0.334	0.424	0.351	0.476	0.240
Ireland	0.882	0.310	0.885	0.307	1.175	0.019
Italy	0.153	0.561	0.104	0.574	0.097	0.276
Netherlands	0.174	0.336	0.122	0.353	0.121	0.280
Portugal	0.299	0.311	0.120	0.326	0.567	0.052
Spain	0.487	0.340	0.523	0.341	0.498	0.113
Mean	0.358	0.357	0.307	0.371	0.407	0.164
Big						
Austria	0.125	0.803	0.113	0.809	0.031	0.256
Belgium	0.087	0.779	0.084	0.780	0.045	0.409
Finland	0.173	0.781	0.163	0.794	0.399	0.409
France	0.170	0.955	0.177	0.955	0.201	0.828
Germany	0.152	0.916	0.144	0.924	0.080	0.830
Ireland	0.286	0.694	0.246	0.701	0.171	0.311
Italy	0.101	0.850	0.078	0.854	0.006	0.542
Netherlands	0.082	0.918	0.075	0.918	0.135	0.706
Portugal	0.148	0.487	0.109	0.497	0.076	0.189
Spain	0.106	0.807	0.073	0.818	0.106	0.539
Mean	0.143	0.799	0.126	0.805	0.125	0.502
t-stat	2.92**		2.21**		2.63**	

*Small and Big portfolios excess returns are dependent variables. The functional forms are similar to those applied in table 5. *, **, and ***, indicate significance at the 10, 5 and 1 percent level*

Table 7: Excess Returns of All Portfolios using FFM and CAPM

	High	Low	Small	Big
Local CAPM	0.324	0.134	0.575	0.111
Local FFM	0.209	0.154	0.358	0.143
t-stat	1.67	-0.57	1.77*	-1.33
International CAPM	0.325	0.132	0.575	0.111
International FFM	0.186	0.131	0.307	0.126
t-stat	2.27**	0.03	2.10*	-0.65
EMU CAPM	0.326	0.153	0.577	0.130
EMU FFM	0.239	0.160	0.407	0.125
t-stat	1.43	-0.11	1.18	0.10

This table compares the Jensen's alpha of CAPM and FFM, considering different perspectives: Local, International and EMU models ., **, and ***, indicate significance at the 10, 5 and 1 percent level.*

CONCLUSION

This research compares the reliability of CAPM and FFM, considering a sample of firms from ten countries of the European Monetary Union, between January 1990 and December 2003. We have resortedto Griffin's (2002) approach to evaluate both models. Fundamentally, he expands on FFM considering local, international and global factors. In this research, CAPM is used also considering local, international, and global risk premium and its comparison with the different functional forms of FFM, previously described, is its main contribution. Our goal has been to shed some light on which functional forms of both models have more explanatory power and to answer the questions that we put forward at the outset of our research.

First, models based on EMU factors, a global functional form, independently of any CAPM or FFM consideration, produce the worst results. In fact, the reliability of such models is negligible when compared with the other functional forms. Secondly, independently of the functional form of both models, the expected return of big and low book-to-market stocks is more reliable. This is particularly observable for big firms.

Finally, FFM is notoriously preferable in comparison with CAPM for small and high-book to market firms: in this case, the introduction of international factors increases the reliability of expected returns. Summing up (After careful consideration of all these different scenarios), we advise using FFM for small and high book to market firms.

The nature of the sample, with very different firms from very different countries, limits the reliability of size and financial distress premiums, but it would be worse to solely consider firms from France and Germany. In that case, we would only draw conclusions regarding those two countries, far from being international evidence.

In the future, we plan to introduce winner minus loser premium to FFM and, resorting to Griffin's (2002) approach, develop a study very similar to this one.

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BIOGRAPHY

Dr. Paulo Alves is a Senior Financial Economist at the Portuguese Securities and Exchange Commission (CMVM). He is also an Assistant Professor of Finance at Lisbon Accounting and Management Institute (ISCAL) and Lusofona University. Numerous articles stemming from his research have been published in journals such as the Journal of Multinational Financial Management, the Applied Financial Economics, the International Research Journal of Finance and Economics, the ICFAI Journal of Applied Finance and the Portuguese Journal of Management Studies. He can be contacted at: Lisbon Accounting and Management Institute (ISCAL), Av. Miguel Bombarda, no. 20 1069 - 035 Lisbon. Phone: 00351 91 7308049. Email: pfalves@iscal.ipl.pt