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The Latin American and Spanish Stock markets

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Abstract

In this article I analyze the Spanish stock market in an international setting. Using a simple Markov regime switching model I get a time varying measure of the effect of the return on a Latin American portfolio on the Spanish stock returns. The evidence can be summarized as follows. First, I find that this effect is positive and no so large. However, it has increased since the mid-nineties. Second, evidence for the returns on size portfolios shows that most of the effect accrues indirectly through common risk factors. The portfolio composes of stocks with small capitalization is the most affected. Nevertheless, the relative effect of the Latin America to the effect of the world only increases for the portfolio composes of stocks with big capitalization since the mid-nineties. Third, evidence for the returns on sector portfolios shows that the most active sectors investing in Latin America are the most affected. Fourth, I conclude that there is no a positive relationship between $\beta-$risk and flows of foreign direct investment.

Keywords: Markov switching model, maximum likelihood estimation, stock returns.

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1 Introduction

The globalization of economic activity and the acceleration of international economic interdependence were certainly two of the main features of the world economy in the 1980s and 1990s.[1] Along with the opening up of so many emerging markets, this offers researchers a unique testing ground for the economic and financial implications of market integration, as pointed out by Kearney and Lucey (2004) and financial contagion.

The structural changes undertaken by most Latin American countries over the last decade have drastically increased the interest of international investors. Thus, most of the main countries in the region are nowadays characterized by trade and financial market deregulation.

While this can be said to be a global process, the role of Spain should be highlighted. The historical cultural links between Latin America and Spain have taken on economic dimension. In fact, Spain has become one of the major foreign investors in Latin America and trade relations are increasing quickly. Moreover, since December 1st 1999 a new market (called Latibex) for the main Latin American securities in euros is operating through the Spanish electronic trading system.[2] This new market allows Spanish investors (and European investors in general) to overcome the legal, fiscal, time, information and currency difficulties that they would face if they invested directly in Latin American markets. Besides, since the consolidation of European Monetary Union, Spain has played a key role as a channel for trade between Europe and Latin America and for financial relationships, as pointed out by De Busturia (2000) and Levy and Sturzenegger (2000).

It is also widely known that the main Latin American countries have suffered from political, financial and economic instability since the mid eighties, and some countries have yet not overcome those problems: they perform relatively calmly for some periods of time but with underlying financial and economic pressures that in some case have led to crises.[3] In this sense, the

[1] Advances in communications and information technology, deregulation of financial markets and the rising importance of institutional investors able and willing to invest internationally are some of the main forces driving this process. See The World Bank (1997).

[2] A report of the Federación Iberoamericana de Bolsas de Valores (1999) reflects the interest of Latin American countries in this and other current processes of stock exchange integration.

[3] See Kaminsky (1999) and reference therein for a review of the relevant literature.

region is thought to be highly risky.

For all these reasons Spanish assets in Latin America are believed to be quite exposed to such risk. Despite the belief in and often suggested relationship between Spanish and Latin American stock markets, there are no articles formally analyzing this fact.

Considering that stock indexes reflect the risk of economies, they are assumed to be the transmission channel for risk between financial markets. In this paper I therefore analyze the Spanish stock market in an international setting by allowing Spanish stock returns to be affected not only by domestic macroeconomic and financial variables but also by the returns on foreign indexes. Broadly speaking, the aim of the article can be seen to be measuring financial contagion.

My approach relies on a Markov switching model, but is different from that of Beckaert and Harvey (1995), who used a conditional CAPM in a Markov regimen switching model to show how market integration performed in several emerging markets. I am especially interested in how the sensitivity of Spanish stock returns to Latin American stock returns (β-risk) has varied over time, in order to shed light on the widespread intuition that the Spanish stock market is more and more highly exposed to Latin American countries. In this way, my specification could be understood as a factor model with time-varying coefficients.

Several exercises are carried out. First, I use a simple model and show evidence of the effect of the return on a Latin American portfolio on the return on the Spanish market portfolio. Second, I develop a factor model for the returns on Spanish size and sector portfolios and show some striking evidence. The model aims to find a measure of how much Latin America is affecting Spanish stock markets. Finally, I am especially interested in searching if there exist any relationship between the time varying β-risk and the flows of foreign direct investment (FDI).

The article is organized as follows. Section 2 presents evidence of the trade and financial relations between Spain and Latin America. The econometric model is developed in Section 3. Sections 4 and 5 show the data used and the empirical results respectively. Some concluding remarks are provided in Section 6.

2 Trade and Financial Flows between Latin America and Spain

Financial market openness is associated with the removal of barriers to direct and portfolio investments. Thus, the evolution of net capital flows could be an indicator of market integration.[4]

The favorable climate for foreign investments following the policy reformulation throughout Latin America in the 1990s led FDI inflows into the region by transnational corporations[5] to increase four-fold in 2000 compared to the early 1990s.[6] The four largest economies of Latin America (Brazil, Argentina, Mexico and Chile) have been receiving over 70% of the total inward FDI in the region since the 1990s.

While the United States has been historically the largest foreign investor in the region, Spain has become very active since the mid-1990s. First panel of Table 1 makes this trend clear. Since 1996 Spanish investment in Latin America accounted for more than 38% of total Spanish foreign investment. In 1999 it was especially high at 26. 571 billions Euros (61%). A very large proportion of this went to the service sector as show in second panel of Table 1.

The increasing involvement of Spain in Latin American economies can also be seen in the significant presence of some of the most important Spanish firms in the region as it is shown in Table 2. According to the ECLAC Report (2004), TELEFÓNICA had the second biggest consolidated sales of any multinational enterprise in the region in 2003 (14. 112 billion US dollars). Other Spanish transnational corporations near the top of this ranking include REPSOL-YPF (7th) and ENDESA (8h). In the banking industry, the presence of Spanish banks is also noteworthy: Banco Santander Central Hispano (BSCH) was first in consolidated assets in June 2004 (73. 039 billion US dollars), and Banco Bilbao Vizcaya Argentaria (BBVA) was second in the same ranking.

The scale of Spanish investment in the region is shown in Table 3. In the period 1996-2003, Spain was the biggest investor in Argentina, the second

[4] See Bekaert *et al.* (2002) and the references therein.

[5] According to the World Investment Report (2000) foreign direct investment is defined as an investment involving management control of a resident entity in one economy by an enterprise in another country.

[6] See the ECLAC Report 2000.

biggest in Brazil, Chile, Colombia, Dominican Republic, Peru and Venezuela, and the third biggest in Mexico.

Regarding trade relationships, Latin America was the second biggest recipient of Spanish exports in the 1990s (after the European Union). Table 4 shows the evolution of trade.

According to the statistics, Spain and Latin America have strong economic links, so the Spanish Stock market might be expected to be affected by Latin American Stock Markets.

3 The Econometric Model

3.1 Basic Benchmark

Characterizing the dynamics of stock returns is a difficult task in empirical finance. While AR and GARCH models describe the conditional mean and variance as a linear function, the Markov switching model allows us to model stock returns as a nonlinear stationary process rather than a linear one.[7] Rydén *et al.*(1998) shows that the Markov switching model is suited to explaining the temporal and distributional properties of stock returns and Hamilton and Susmel (1994) suggest that stock returns are characterized by different ARCH process at different points in time with the changes between the processes governed by an unobserved Markov process. The fact is that there are events such as financial panics, political instability and changes in the government policies that seem to drive stock returns to undergo breaks, that is, stock returns can switch from one state to another when they are observed for a sufficiently long period.

The underlying idea of the Markov switching model as a time series model is that once the process has changed in the past, it can change again in the future. However, the change in regime does not obey a deterministic rule, but is rather a random variable.

Following Hamilton (1989), let the return on a stock i, r_t^i, be generated from a mixture of K Gaussian distributions at each time, each one with a positive probability, and let S_t be a stochastic unobservable state variable indicating whether the current regime is j, where $j = 1, 2, ..., K$. S_t is as-

[7] Although switching regression was introduced in econometrics in the late fifties, it was not until the article by Hamilton (1989) that this approach started being widely used in economics and finance.

sumed to follow a first order Markov process, that is, only the information in $t-1$ matters. At each point in time there may be a probability of a regime switch that is governed by switching probabilities. The basic idea underlying this model is that the conditional mean and variance of the stock return are allowed to take different values according to the K distributions and the latent regime indicator S_t. One of the main advantages of this model is that it allows variation not only in the parameters but also in the functional forms. Therefore, a model for stock return can be given by

$$r_t^i = \sum_{j=1}^{K} p_{jt}^i \mu_{jt}^i + e_t^i \tag{1}$$

where μ_{jt}^i is the mean in regime j, e_t^i is a normal disturbances and $p_{jt}^i = \Pr\left(S_t = j \backslash \Omega_{t-1}; \Theta\right)$ is the conditional probability of being in regime j at time t. Ω_{t-1} is the information set in $t-1$ and Θ brings together the parameters of the means and variances in each distribution and the transition matrix to be estimated. Notice that p_{jt}^i varies over time as new information arrives, hence Markov switching model is a special case of a general finite mixture distribution model with time-varying weights. Moreover, p_{jt}^i also varies with each stock.

Gray (1996), derives a recursive representation for the regime probability when $K=2$, that it can be generalized for K regimes

$$p_{jt}^i = \sum_{h=1}^{K} \left(\frac{\rho_{hj}^i f_{ht-1}^i p_{ht-1}^i}{\sum\limits_{g=1}^{K} f_{gt-1}^i p_{gt-1}^i} \right) \qquad \text{for} \quad j = 1, 2, ..., K \tag{2}$$

where f_{ht}^i (f_{gt}^i) is a normal density function at time t conditional on being in regime h (g) and time *t-1* information, Ω_{t-1}, and ρ_{hj}^i is the transition probability, that is

$$\rho_{hj}^i = Pr(S_t = j / S_{t-1} = h)$$

The log-likelihood function with normal disturbances to be maximized is,

$$Log\left(r_t^i, \Theta\right) = \sum_{t=1}^{T} Log \left\{ \sum_{j=1}^{K} p_{jt}^i f_{jt}^i \right\} \tag{3}$$

subject to

$$\sum_{j=1}^{K} p_{jt}^{i} = 1$$

where

$$f_{jt}^{i} = \frac{1}{\sqrt{2\pi v_j^i}} \exp\left(-\frac{\left(e_{jt}^{i}\right)^2}{2v_j^i}\right)$$

and v_j^i is the conditional variance in each distribution of stock i.

3.2 The model for the return on the market portfolio

In this section I set a simple model for the return on the Spanish market portfolio, r_t^m. I assume a three-regime model, $K = 3$.

$$r_t^m = \sum_{j=1}^{3} p_{jt}^m \mu_{jt}^m + e_t^m \tag{4}$$

the conditional mean in regime j is defined as ,

$$\mu_{jt}^m = X_{jt}' \phi_j^m \qquad \text{for } j = 1, 2, 3$$

where X_{jt} is a $(k_j \text{x} 1)$ vector of explanatory variables in the regime j and ϕ_j^m is a vector of parameters.

I consider, r_t^m, in regime 1, determined by Spanish financial and macroeconomic variables that are collected in X_{1t}. In regime 2, r_t^m is determined by the return on the world portfolio, $X_{2t} = (r_1^w, r_2^w, ...r_t^w)'$, and in regime 3, r_t^m is determined by the return on the Latin American portfolio, $X_{3t} = \left(r_1^l, r_2^l, ...r_t^l\right)'$.

According to this specification, the conditional mean at time t of the return on the Spanish market portfolio is a weighted sum of the conditional means in each regime, with the probabilities of the regimes being time-varying weights. Thus, the effect of X_{jt} on r_t^m is time varying and measured by $\beta_{jt}^m = p_{jt}^m \phi_j^m$ which is a time varying β-risk..

In order to measure the importance of the evolution of the effect of Latin American I not only consider the absolute effect but also the relative effect respect to the effect of the world,

$$RE_t^m = \frac{\beta_{3t}^m}{\beta_{2t}^m}.$$

Note that in this specification the effect of the return on the world portfolio on the return on the Latin American portfolio is disregarded. One explanation could be the following. Until the early 1990s emerging markets, especially Latin American markets, were considered segmented markets. After the reforms undergone by these countries in the 1990s, which led their stock markets to be more open to investors, the perception of their segmentation has changed. However, the evidence presented in Bekaert and Harvey (1995) shows that, contrary to that perception, the stock markets of Mexico and Chile, which were the first to carry out liberalization processes and which account for 60% of Latin American market capitalization, have become less integrated than before. Along the same lines, Garcia and Ghysels (1998) find evidence in favor of local CAPM against an international CAPM for the same Latin American countries. On the other hand, Barari (2004) shows that during late 1980s and the first half of the 1990s most Latin American Markets moved towards regional integration and away from global integration. The last article also points out that although the pace of global to regional integration accelerated around the mid-1990s, the timing suggests a cross region contagion effect resulting from the Asian crisis.

3.3 The model for the returns on size and sector portfolios

The model is basically the same as the one in the previous section, except that in regime 1 common risk factors[8] are included in the mean equation. By controlling for these factors, I can eliminate that part of the observed returns that corresponds to the effect of common risks affecting all stocks. I bring together the common risk factors in a (nx1) vector F_t and specify the model as

$$r_t^i = p_{1t}^i \left(\alpha_1^i + F_t'\pi^i + X_{1t}'\phi_1^i\right) + p_{2t}^i \left(\alpha_2^i + X_{2t}'\phi_2^i\right) + p_{3t}^i \left(\alpha_3^i + X_{3t}'\phi_3^i\right) + e_t^i \quad (5)$$

With this specification stock returns, r_t^i, are allowed to be affected in regimen 1 by domestic common risk factors and financial and macroeconomic

[8]The common risk factors that I include are market factors, specifically the Fama-French factors, as I will describe later on.

variables, in regimen 2 by the return on the world portfolio and in regimen 3 by the return on the Latin American portfolio.

As shown in the previous section, the vector X_{1t}, X_{2t} and, X_{3t}, can affect the return on the market portfolio, therefore I assume that, in general, the common risk factors can be modeled as

$$F_t = \sum_{j=1}^{3} P_{jt} \odot (\Pi_j X_{jt}) + U_t \tag{6}$$

Where $\odot$ represents element-by-element Hadamard multiplication, P_{jt} is a $(n\text{x}1)$ vector of probabilities of being in regimen j, Π_j is a $(n\text{x}k_j)$ matrix of parameters and U_t is a $(n\text{x}1)$ vector of orthogonal disturbances.

Substituting (6) in (5), the stock return can be written as[9]

$$\begin{aligned} r_t^i &= p_{1t}^i \left(\alpha_1^i + \sum_{j=1}^{3} X_{jt}' \gamma_{jt}^i + U_t' \pi^i + X_{1t}' \phi_1^i \right) + \\ & \quad p_{2t}^i \left(\alpha_2^i + X_{2t}' \phi_2^i \right) + p_{3t}^i \left(\alpha_3^i + X_{3t}' \phi_3^i \right) + e_t^i \end{aligned} \tag{7}$$

where

$$\gamma_{jt}^i = \Pi_j' \left(\pi^i \odot P_{jt} \right) \qquad \text{for } j = 1, 2, 3$$

Define

$$\begin{aligned} \delta_{jt}^i &= p_{1t}^i \gamma_{jt}^i \\ \lambda_{jt}^i &= p_{jt}^i \phi_j^i \\ \beta_{jt}^i &= \delta_{jt}^i + \lambda_{jt}^i \end{aligned} \tag{8}$$

Note that when common risk factors are taken into account, different effects come up. Therefore, δ_{jt}^i and λ_{jt}^i can be interpreted as time varying indirect and direct effects of X_{jt} on r_t^i respectively, with β_{jt}^i being a total effect.

It can be seen in equation (7) that in regime 1, when only domestic factors are accounted for, stock returns are affected indirectly by macroeconomic and financial variables and the return on foreign portfolios through the common risk factors. That is measured by δ_{jt}^i. Note that δ_{jt}^i is doubly time varying

[9] See Appendix A.

through γ^i_{jt} and p^i_{1t}, while λ^i_{jt} is time varying because of p^i_{jt}. Finally I can consider β^i_{jt} as a time-varying β-risk

To calculate those effects, the equation (7) can be transformed as follows[10]

$$\begin{aligned} r^i_t &= p^i_{1t}\left(\alpha^i_1 + \sum_{j=1}^{3} \mathbf{1}'_n \left(\Lambda^i_j \odot X^*_{jt}\right)\mathbf{1}_{k_j} + U'_t\pi^i + X'_{1t}\phi^i_1\right) + \\ & \quad p^i_{2t}\left(\alpha^i_2 + X'_{2t}\phi^i_2\right) + p^i_{3t}\left(\alpha^i_3 + X'_{3t}\phi^i_3\right) + e^i_t \end{aligned} \tag{9}$$

where,

$$\begin{aligned} \Lambda^i_j &= \left(\pi^i\mathbf{1}'_{k_j}\right) \odot \Pi_j \\ X^*_{jt} &= P_{jt}X'_{jt} \end{aligned}$$

And $\mathbf{1}_n$ and $\mathbf{1}_{k_j}$ are $(n\text{x}1)$ and $(k_j\text{x}1)$ vector of ones respectively.

The model is estimated in stages. First I estimate equation (6) and obtain the vectors P_{1t}, P_{2t}, P_{3t} and U_t. Next I construct the matrix of variables X^*_{jt} and estimate the parameters of equation (9) and the probabilities in each regime, p^i_{jt}, for each stock. Finally, as I am especially interested in the time varying effects, I calculate λ^i_{jt} directly as in (8) and $\delta^i_{jt} = p^i_{1t}\left(\Lambda^i_j\right)' P_{jt}$,[11] taking into account that if and only if the parameters in Λ^i_j and ϕ^i_j are significant at the 10% level, they account for the construction of δ^i_{jt} and λ^i_{jt}, otherwise they are assumed to be zero.

Note that many parameters are to be estimated. According to Aray and Gardeazabal (2006) most of the effect of the unexpected component of the macroeconomic variables is stock-specific, thus, in general, the restriction $\Lambda^i_1 = \mathbf{0}_{k_1\text{x}n}$ is imposed. This is a very strong assumption, but it allows the set of parameters to be reduced by nk_1 parameters. Thus, the financial and macroeconomic variables affect stock returns only directly.

Finally, I am interested not only in the absolute effect of the return on the Latin American portfolio on the Spanish stock returns, but also in the pace of it to the effect of the world, that is

$$RE^i_t = \frac{\beta^i_{3t}}{\beta^i_{2t}}$$

[10]See Appendix B.

[11]See Appendix C.

4 Data

I use monthly data from January 1985 to December 2000. Data for Spain is in Spanish pesetas.[12] I use the excess return on the Spanish market portfolio (IGBM) and excess returns on three size portfolios as calculated in Martínez *et al.* (2005). I call portfolios *small, medium and big,* which are composed with a set of stocks with small, medium and big market capitalization respectively. The returns on sector portfolios that are included are that of *Banking*, *Electrical*, *Food*, *Construction*, *Real Estate*, *Telecommunications*, *Metal Products*, *Chemical products* and *Others*.

The Spanish financial variables included in X_1 are the dividend yield, DY, and the term structure of interest rate, $TEIR$, as calculated in Martínez *et al.* (2005) and the macroeconomic variables are the unexpected components of inflation rate, UIR, and the unexpected rate of growth of the industrial production, UIP, as estimated in Aray and Gardeazabal (2006). For the variables included in X_2 and X_3, I use the monthly US dollar returns for the world markets from Morgan Stanley Capital International (MSCI)[13] and overall Latin American market returns from the Standard and Poor Emerging Market Database (S&P EMDB),[14] both in excess of the 30-day Eurodollar rate. Since I consider stock returns in Spanish pesetas, US dollar returns for the world and Latin America are converted to this currency.

When I fit the model for size portfolios, I consider F as the three-factor model of Fama and French (1993,1996). According to this model, returns are fairly well explained by three factors: the excess return on the market portfolio, r^m, the return on a portfolio of small size firms minus the return on a portfolio of big size firms, SMB, where size is the market value of outstanding shares, and the return on a portfolio of high book-to-market firms minus the return on a portfolio of low book-to-market firms, HML, where book-to-market is the ratio of book value to market value of a firm. The returns on the size and book-to-market portfolios are meant to capture risk factors related to size and book-to-market equity. However, at fitting

[12] I thank Miguel Angel Martínez for providing the data on the Spanish Stock Market.

[13] The MSCI Developed Market Index is market capitalization weighted and covers 23 developed countries and more than 2,600 securities.

[14] The Latin American Global index is the Latin America 40 Index, which includes highly liquid securities, representing 30% of the estimated total market capitalization for the region's largest countries as of August 31, 1999. Companies from Mexico, Brazil, Argentina, and Chile are represented in the index.

the model for the return on sector portfolios I consider that the factor SMB and HML do not account for, as commonly assumed in the literature. That implies the following restriction, $\pi^i = (\pi^i_1, 0, 0)'$.[15]

5 Estimation Issues

In the estimation, the standard errors reported are robust to heteroskedasticity. Moreover, to ensure that the probabilities in each state are positive and lower than one, I use the reparametrization of the transition probabilities given by Hamilton and Susmel (1994).

Table 5 shows the parameter estimates of equation (4). It can be seen that the coefficient for the return on the Latin America portfolio is positive and significant, as expected from intuition. Figure 1 shows the estimation of conditional probabilities. I obtain an average probability of being in regime 3 of about 0.24. I split the sample period into two sub-samples according to the trend of the Spanish investment in Latin America, one from January 1985 to December 1995 and the other from January 1996 to December 2000. In the first I obtain an average of 0.22 and in the second of 0.28, which is a variation of almost 27%. There are peaks in the regime probability, all them related to important events in Latin American countries. As in Bekaert and Harvey (1995) and Bekaert *et al.* (2002), I will attempt to identify these dates with events in Latin America. In the period from February 1986 to June 1987 Argentina and Brazil announced changes in their exchange rate policies and Argentina, especially, underwent a major exchange rate crisis. In the same period, bank debt restructuring agreements were arranged by Brazil and Venezuela. In the period June 1987 to September 1987, Argentina, Chile and Mexico agreed to restructure their debts. In the same period, foreign direct investment was limited through special conditions in Brazil. In the period June 1992 to September 1992, most news from the Latin American countries were positive. Argentina, Chile and Mexico were upgraded by international classification agencies such as Moody´s and Standard&Poor, reflecting the high expectations on the part of investors in these countries.

[15]Naturally, I specify F_t as

$$F_t = \begin{bmatrix} r_t^m \\ SMB_t \\ HML_t \end{bmatrix}$$

Moreover, new financial instruments, such as warrants, were introduced in the main countries and a consensus on NAFTA was announced. At the end of 1996 and the beginning of 1997, international investors, especially Spanish investors, played a very important role in the privatization process and acquisition of private firms in Latin America, mainly in the banking and telecommunication sectors. At the end of the sample, there is another peak again related to acquisition of Latin American banks by Spanish banks, and more flexible rules for investors in some stock and derivate markets were announced.

According to the evidence, the return on the Spanish market portfolio does seem to be affected by the return on the Latin American market portfolio. Although the average of this effect is not so large as is commonly believed (0.1459), it has increased in some periods as described above and the average in the second half of the 1990s is 17% larger than for the whole sample period (0.1702). Moreover, I wonder how this effect relative to the effect of the world (RE_t^m) has evolved over time. In the total sample the average is 0.3083. In the first sub-sample period the average is 0.2995 and in the second is 0.3277 which is a 6% and 9% respect to the total sample and to the first sub-sample. In general, I attribute this fact to the growth of the flows of investment from Spain to Latin America. If my intuition is completely correct, I would expect a positive relationship between the coefficient RE_t^m and flows of FDI. Figure 2 shows in the x-axis the quarterly average of RE_t^m and in the y-axis quarterly data the proportion of the total Spanish FDI that goes to Latin America.[16] I can not see a clear positive relationship, even for the two sub-samples, as it can be seen in Figure 2, so I conclude that although the $\beta-$risk of the Spanish stock return to Latin American stock return has increased as a consequence of the Spanish FDI to Latin America comparing the two sub-sample periods described above, I can say by no means that there exist a direct positive relationship between the flows of FDI and $\beta-$risk.

Figure 3 shows the total effect of the return on the Latin American portfolio on the return on size portfolios, β_{3t}^i, for the whole sample period from equation (9). It can be seen that the coefficients are highly time varying and positive throughout the sample period. The time varying $\beta-$risk does not follow the same pattern for all portfolios. Portfolio *small* is the most

[16]Quarterly data of the Spanish FDI is available from the first quarterly of 1993 to the fourth quarterly of 2000.

variable, while the *medium* is the least variable.

Table 6 shows the average of the total, direct and indirect effects of the return on the Latin American market portfolio on the return on size portfolios$\left(\beta_{3t}^{i}, \lambda_{3t}^{i}, \delta_{3t}^{i}\right)$. It can be noticed that they are positive and the indirect effect is more important than the direct effect, that is, most of the total effect accrues indirectly through the common risk factors. Although it could seem striking that the portfolio *small* is the most affected, standard results in financial economics suggest that small portfolios are more risky to common factors.

Table 7 shows the average of the total effect of the returns of foreign indexes on the returns on size portfolios in different sub-samples. The period from January 1985 to December 1995 is shown in the second column and that from January 1996 to December 2000 in the third one. Although these effects by no means follow a trend according to Figure 3, it should be noticed that the average of the total effect in the second sub-sample increases for portfolio *big* and diminishes for *small* and *medium.* The fourth column shows the percent variation. The fifth and sixth columns show the average of the total effect of the return on the world portfolio in each sub-sample. These effects are also positive, as expected, and the percent variations are positive for all portfolios. Notice that, according to the percent variations, the effect of Latin America relative to the effect of the world, RE_t^i, shows a slightly increases only for portfolio *big* and diminishes for portfolios *small* and *medium,* that could mean that the changes of response of the return on the market portfolio (r_t^m) to return on the Latin American portfolio is totally determined by portfolio *big* and therefore by the big firms, which have undertaken important investment project.

Figure 4 plots the coefficient RE_t^i and the proportion of the total Spanish FDI that goes to Latin America. The previous result is confirmed.

Regarding the evidence for the return on sector portfolios, I find positive effect of the return on the Latin American portfolio for all sectors, except for *Chemical Products* for which I can find no effect. Figure 5 shows the total effect, β_{3t}^{i}, for those sector portfolios which I do get effect. As in the case of size portfolios, β_{3t}^{i} is highly time varying. *Banking, Electrical*, *Food*, *Real Estate* and *Telecommunications* seem to follow basically the same pattern, mainly, because the indirect effect is much more important, as can be seen in Table 8, while for *Construction*, *Metal Products* and *Others* the direct effect is the only accounting for and therefore they behave differently. Table 8 also shows that the effect is larger for *Telecommunications* and *Banking* which have been the most active sector investing in Latin America in the period 1993-2000 as shown in second panel of Table 1

Again, I present the results for the two sub-sample period. Tables 9 shows that in the second sub-sample all sectors increase their $\beta-$risk to Latin America and the coefficient RE_t^i, except to the sector *Others*. However, the most active sectors investing in Latin America are not which have increased more.

Finally, as I am especially interested in the relationship between $\beta-$risk and the flows of FDI, Figure 6 plots for each sector the coefficient RE_t^i and its proportion of the FDI in Latin America respect to its total FDI. In general, it can be seen that no relationship exists except to a slightly positive relationship in the Electrical sector. Therefore the results at a sectorial level are in line with the aggregated results, that is, although the effect of Latin America on sector portfolios has increased, no positive relationship there exist with the pattern of FDI flows.

6 Conclusions

This article develops a regime switching model to measure the effect of Latin American stock markets on the Spanish stock market. Using market indexes, I find evidence supporting the intuition that return on the Latin American portfolio affects the return on the Spanish market portfolio. Despite the significant presence of Spanish companies in the region, the effect is not so large as is commonly believed. The measure shows a low average for the whole sample, although in the period 1996-2000 there is a moderate increase. I also present evidence for size and sector portfolios. I find that size portfolios are mainly affected indirectly through common risk factors and, in general, a portfolio composed by firms with low capitalization is the most affected. However, since the mid-nineties the portfolio composed by big firms has increased its β-risk, whereas the others have decreased. On the other hand, the effect of Latin America relative to the effect of the world has only increased for portfolio big. Regarding sector portfolios, the most affected are Telecommunications and Banking, which are the most active investing in Latin America and in general all sectors increased the β-risk respect to Latin America since mid-nineties. However, I find that there not exist a positive relationship between β-risk and flows of FDI.

Appendix A: **Obtaining equation (7)**

Define

$$P_{jt} = \begin{bmatrix} P_{jt}^{1} \\ P_{jt}^{2} \\ P_{jt}^{3} \end{bmatrix}$$

P_{jt}^{f}, for $j = 1, 2, 3$ and $f = 1, 2, 3$ is the conditional probability of being in state j of the factor f.

$$X_j = \begin{bmatrix} x_{j1} \\ x_{j2} \\ . \\ . \\ x_{jk_j} \end{bmatrix}$$

x_{jl} for $l = 1, 2, ...k_j$ is variable l of state j.

$$\Pi_j = \begin{bmatrix} \pi_{j1}^{1} & \pi_{j2}^{1}.... & \pi_{jk_j}^{1} \\ \pi_{j1}^{2} & \pi_{j2}^{2}.... & \pi_{jk_j}^{2} \\ \pi_{j1}^{3} & \pi_{j2}^{3}.... & \pi_{jk_j}^{3} \end{bmatrix}$$

π_{jl}^{f} is the sensitivity of factor f to variable l of state j.

$$\pi^{i} = \begin{bmatrix} \pi_{1}^{i} \\ \pi_{2}^{i} \\ \pi_{3}^{i} \end{bmatrix}$$

π_{f}^{i} is the sensitivity of the return of stock i to factor f .
Notice that trasposing the equation (6) gives

$$F_t' = \sum_{j=1}^{3} P_{jt}' \odot \left(X_{jt}' \Pi_j'\right) + U_t'$$

and substituting in (5) I obtain

$$
\begin{aligned}
r_t^i &= p_{1t}^i\left(\alpha_1^i+\left(\sum_{j=1}^{3}P'_{jt}\odot\left(X'_{jt}\Pi'_j\right)+U'_t\right)\pi^i+X'_{1t}\phi_1^i\right)\\
&\quad +p_{2t}^i\left(\alpha_2^i+X'_{2t}\phi_2^i\right)+p_{3t}^i\left(\alpha_3^i+X'_{3t}\phi_3^i\right)+e_t^i\\
&= p_{1t}^i\left(\alpha_1^i+\left(\sum_{j=1}^{3}P'_{jt}\odot\left(X'_{jt}\Pi'_j\right)\right)\pi^i+U'_t\pi^i+X'_{1t}\phi_1^i\right)\\
&\quad +p_{2t}^i\left(\alpha_2^i+X'_{2t}\phi_2^i\right)+p_{3t}^i\left(\alpha_3^i+X'_{3t}\phi_3^i\right)+e_t^i
\end{aligned}
$$

It can be shown that $\left(\sum_{j=1}^{3}P'_{jt}\odot\left(X'_{jt}\Pi'_j\right)\right)\pi^i=\sum_{j=1}^{3}X'_{jt}\Pi'_j\left(P_{jt}\odot\pi^i\right)$ for $j=1,2,3$ as follows

$$
\left[\begin{bmatrix} P_{jt}^1 & P_{jt}^2 & P_{jt}^3\end{bmatrix}\odot\left(\begin{bmatrix} x_{j1} & x_{j2}.... & x_{jk_j}\end{bmatrix}\begin{bmatrix}\pi_{j1}^1 & \pi_{j1}^2 & \pi_{j1}^3\\ \pi_{j2}^1 & \pi_{j2}^2 & \pi_{j2}^3\\ \vdots & \vdots & \vdots\\ \pi_{jk_j}^1 & \pi_{jk_j}^2 & \pi_{jk_j}^3\end{bmatrix}\right)\right]\begin{bmatrix}\pi_1^i\\ \pi_2^i\\ \pi_3^i\end{bmatrix}
$$

$$
=\left[\begin{bmatrix} P_{jt}^1 & P_{jt}^2 & P_{jt}^3\end{bmatrix}\odot\begin{bmatrix}\sum_{l=1}^{k_j}x_{jl}\pi_{jl}^1 & \sum_{l=1}^{k_j}x_{jl}\pi_{jl}^2 & \sum_{l=1}^{k_j}x_{jl}\pi_{jl}^3\end{bmatrix}\right]\begin{bmatrix}\pi_1^i\\ \pi_2^i\\ \pi_3^i\end{bmatrix}
$$

$$
=P_{jt}^1\pi_1^i\sum_{l=1}^{k_j}x_{jl}\pi_{jl}^1+P_{jt}^2\pi_2^i\sum_{l=1}^{k_j}x_{jl}\pi_{jl}^2+P_{jt}^3\pi_3^i\sum_{l=1}^{k_j}x_{jl}\pi_{jl}^3
$$

Notice that this expression can be written as

$$
\begin{aligned}
&\begin{bmatrix}\sum_{l=1}^{k_j}x_{jl}\pi_{jl}^1 & \sum_{l=1}^{k_j}x_{jl}\pi_{jl}^2 & \sum_{l=1}^{k_j}x_{jl}\pi_{jl}^3\end{bmatrix}\left[\begin{bmatrix}\pi_1^i\\ \pi_2^i\\ \pi_3^i\end{bmatrix}\odot\begin{bmatrix}P_{jt}^1\\ P_{jt}^2\\ P_{jt}^3\end{bmatrix}\right]\\
&= P_{jt}^1\pi_1^i\sum_{l=1}^{k_j}x_{jl}\pi_{jl}^1+P_{jt}^2\pi_2^i\sum_{l=1}^{k_j}x_{jl}\pi_{jl}^2+P_{jt}^3\pi_3^i\sum_{l=1}^{k_j}x_{jl}\pi_{jl}^3 \qquad \text{(A.1)}
\end{aligned}
$$

Appendix B: Obtaining equation (9)

For $j = 1, 2, 3$ it is shown that

$$\begin{aligned}
\Lambda_j^i &= \left(\pi^i \mathbf{1}'_{k_j}\right) \odot \Pi_j \\
&= \left(\begin{bmatrix} \pi_1^i \\ \pi_2^i \\ \pi_3^i \end{bmatrix} \begin{bmatrix} 1 & 1.... & 1 \end{bmatrix} \right) \odot \begin{bmatrix} \pi_{j1}^1 & \pi_{j2}^1.... & \pi_{jk_j}^1 \\ \pi_{j1}^2 & \pi_{j2}^2.... & \pi_{jk_j}^2 \\ \pi_{j1}^3 & \pi_{j2}^3.... & \pi_{jk_j}^3 \end{bmatrix} \\
&= \begin{bmatrix} \pi_1^i & \pi_1^i.... & \pi_1^i \\ \pi_2^i & \pi_2^i.... & \pi_2^i \\ \pi_3^i & \pi_3^i.... & \pi_3^i \end{bmatrix} \odot \begin{bmatrix} \pi_{j1}^1 & \pi_{j2}^1.... & \pi_{jk_j}^1 \\ \pi_{j1}^2 & \pi_{j2}^2.... & \pi_{jk_j}^2 \\ \pi_{j1}^3 & \pi_{j2}^3.... & \pi_{jk_j}^3 \end{bmatrix} \\
&= \begin{bmatrix} \pi_1^i\pi_{j1}^1 & \pi_1^i\pi_{j2}^1.... & \pi_1^i\pi_{jk_j}^1 \\ \pi_2^i\pi_{j1}^2 & \pi_2^i\pi_{j2}^2.... & \pi_2^i\pi_{jk_j}^2 \\ \pi_3^i\pi_{j1}^3 & \pi_3^i\pi_{j2}^3.... & \pi_3^i\pi_{jk_j}^3 \end{bmatrix}
\end{aligned}$$

$$X_{jt}^* = \begin{bmatrix} P_j^1 x_{j1} & P_j^1 x_{j2}.... & P_j^1 x_{jk_j} \\ P_j^2 x_{j1} & P_j^2 x_{j2}.... & P_j^2 x_{jk_j} \\ P_j^3 x_{j1} & P_j^3 x_{j2}.... & P_j^3 x_{jk_j} \end{bmatrix}$$

$$\Lambda_j^i \odot X_{jt}^* = \begin{bmatrix} \pi_1^i\pi_{j1}^1 P_j^1 x_{j1} & \pi_1^i\pi_{j2}^1 P_j^1 x_{j2}.... & \pi_1^i\pi_{jk_j}^1 P_j^1 x_{jk_j} \\ \pi_2^i\pi_{j1}^2 P_j^2 x_{j1} & \pi_2^i\pi_{j2}^2 P_j^2 x_{j2}.... & \pi_2^i\pi_{jk_j}^2 P_j^2 x_{jk_j} \\ \pi_3^i\pi_{j1}^3 P_j^3 x_{j1} & \pi_3^i\pi_{j2}^3 P_j^3 x_{j1}.... & \pi_3^i\pi_{jk_j}^3 P_j^3 x_{jk_j} \end{bmatrix}$$

$$\mathbf{1}'_n \left(\Lambda_j^i \odot X_{jt}^*\right) = \begin{bmatrix} \pi_1^i\pi_{j1}^1 P_j^1 x_{j1} + & \pi_1^i\pi_{j2}^1 P_j^1 x_{j2} + & & \pi_1^i\pi_{jk_j}^1 P_j^1 x_{jk_j} + \\ \pi_2^i\pi_{j1}^2 P_j^2 x_{j1} + & \pi_2^i\pi_{j2}^2 P_j^2 x_{j2} + & .... & \pi_2^i\pi_{jk_j}^2 P_j^2 x_{jk_j} + \\ \pi_3^i\pi_{j1}^3 P_j^3 x_{j1} & \pi_3^i\pi_{j2}^3 P_j^3 x_{j1} & & \pi_3^i\pi_{jk_j}^3 P_j^3 x_{jk_j} \end{bmatrix}$$

$$\begin{aligned}
\mathbf{1}'_n \left(\Lambda_j^i \odot X_{jt}^*\right) \mathbf{1}_{k_j} &= P_{jt}^1 \pi_1^i \sum_{l=1}^{k_j} x_{jl}\pi_{jl}^1 + P_{jt}^2 \pi_2^i \sum_{l=1}^{k_j} x_{jl}\pi_{jl}^2 + P_{jt}^3 \pi_3^i \sum_{l=1}^{k_j} x_{jl}\pi_{jl}^3 \\
&= \sum_{j=1}^{3} X'_{jt} \Pi'_j \left(P_{jt} \odot \pi^i\right)
\end{aligned}$$

Notice that this is exactly equation (A.1).

Appendix C. **Final form of calculating the indirect effect**

There are two ways of writing δ^i_{jt} for $j = 1, 2, 3$.

$$\begin{aligned}\delta^i_{jt} &= p^i_{1t}\Pi'_j\left(\pi^i \odot P_{jt}\right)\\ \delta^i_{jt} &= p^i_{1t}\left(\Lambda^i_j\right)' P_{jt}\end{aligned}$$

According to these expressions, notice that $\Pi'_j\left(\pi^i \odot P_{jt}\right) = \left(\Lambda^i_j\right)' P_{jt}$.

$$\begin{aligned}\Pi'_j\left(\pi^i \odot P_{jt}\right) &= \begin{bmatrix} \pi^1_{j1} & \pi^2_{j1} & \pi^3_{j1} \\ \pi^1_{j2} & \pi^2_{j2} & \pi^3_{j2} \\ \vdots & \vdots & \vdots \\ \pi^1_{jk_j} & \pi^2_{jk_j} & \pi^3_{jk_j} \end{bmatrix} \left(\begin{bmatrix} \pi^i_1 \\ \pi^i_2 \\ \pi^i_3 \end{bmatrix} \odot \begin{bmatrix} P^1_{jt} \\ P^2_{jt} \\ P^3_{jt} \end{bmatrix} \right)\\ &= \begin{bmatrix} \pi^i_1\pi^1_{j1}P^1_{jt}+ & \pi^i_2\pi^2_{j1}P^2_{jt}+ & \pi^i_3\pi^3_{j1}P^3_{jt} \\ \pi^i_1\pi^1_{j2}P^1_{jt}+ & \pi^i_2\pi^2_{j2}P^2_{jt}+ & \pi^i_3\pi^3_{j2}P^3_{jt} \\ \vdots & \vdots & \vdots \\ \pi^i_1\pi^1_{jk_j}P^1_{jt}+ & \pi^i_2\pi^2_{jk_j}P^2_{jt}+ & \pi^i_3\pi^3_{jk_j}P^3_{jt} \end{bmatrix}\\ &= \begin{bmatrix} \pi^i_1\pi^1_{j1} & \pi^i_2\pi^2_{j1} & \pi^i_3\pi^3_{j1} \\ \pi^i_1\pi^1_{j2} & \pi^i_2\pi^2_{j2} & \pi^i_3\pi^3_{j2} \\ \vdots & \vdots & \vdots \\ \pi^i_1\pi^1_{jk_j} & \pi^i_2\pi^2_{jk_j} & \pi^i_3\pi^3_{jk_j} \end{bmatrix} \begin{bmatrix} P^1_{jt} \\ P^2_{jt} \\ P^3_{jt} \end{bmatrix} = \left(\Lambda^i_j\right)' P_{jt}\end{aligned}$$

References

[1] Aray, H. and J. Gardeazabal. Macroeconomics Announcements and Stock Return: The Case of Spain. Mimeo. 2006.

[2] Barari, M. 2004. Equity Market Integration in Latin America: A Time-Varying Integration Score Analysis. *International Review of Financial Analysis*, 13, 649-668.

[3] Bekaert, G. and C. Harvey. 1995. Time-varying World Market Integration. *The Journal of Finance* 50, 403-444.

[4] Bekaert, G., Campbell R. Harvey and Robin L. Lumsdaine, 2002. Dating the Integration of World Equity Markets. *Journal of Financial Economics* 65, 203-249.

[5] De Busturia, D., 2000. La Unión Europea e Iberoamérica: referencia y globalización. Iberoamérica y España en el umbral del nuevo siglo. Círculo de Empresarios, 65, 131-168.

[6] ECLAC Report. 2000. The Foreign Investment in Latin America and the Caribbean. The Economic Commission for Latin America an the Caribbean (ECLAC), United Nations.

[7] ECLAC Report. 2004. The Foreign Investment in Latin America and the Caribbean. The Economic Commission for Latin America an the Caribbean (ECLAC), United Nations.

[8] Fama, E.F. and F.R. French. 1993. Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics* 33, 3-56.

[9] Fama, E.F. and F.R. French. 1996. Multifactor Explanations of Asset Pricing Anomalies. *The Journal of Finance* 51(1), 55-84

[10] Federación Iberoamericana de Bolsas de Valores (FIABV). 1999, "Análisis sobre Integración de Mercados."

[11] Garcia, R. and Eric Ghysels. 1998. Structural Change and Asset Pricing in Emerging Markets. *Journal of International Money and Finance* 17, 455-473.

[12] Gray, S. 1996. Modelling the Conditional Distribution of Interest Rate as a Regime-switching Process. *Journal of Financial Economics* 42, 26-62.

[13] Hamilton, J. 1989. A new Approach of the Economic Analysis of Nonstationary Time Series and the Business Cycle. *Econometrica* 57, 357-384.

[14] Hamilton, J., and Susmel, R. 1994. Autorregresive Conditional Heteroskedasticity and Changes in Regime. *Journal of Econometrics*, 64, 307-333.

[15] Kaminsky, G.L. 1999. Currency and Banking Crisis. The Early Warnings of Distress. IMF Working Paper, 99/178.

[16] Kearney, C and B.M. Lucey. 2004. International Equity Market Integration: Theory, Evidence and Implications. *International Review of Financial Analysis*, 13, 571-583.

[17] Martínez, M.A, Belén Nieto, Gonzalo Rubio and Mikel Tapia. 2005. Asset Pricing and Systematic Liquidity Risk: an Empirical Investigation of the Spanish Stock Market. *International Review of Economics and Finance*, 14(1), 81-103.

[18] Levy, E. and F. Sturzenegger. 2000. Implications of the euro for Latin America's financial and banking systems. *Emerging Markets Review*, 1, 53-81.

[19] Rydén, T., Teräsvirta, T., and Åsbrink, S. 1998. Stylized Facts of Daily Returns Series and the Hidden Markov Model. *Journal of Applied Econometrics*, 13, 217-244.

[20] The World Bank, 1997. Private Capital Flows to Developing Countries: The Road to Financial Integration. The World Bank and Oxford Economic Press.

[21] The World Investment Report. 2000. Cross-border Mergers and Acquisitions and Development. UNCTAD.

Table 1: Spanish Foreign Direct Investments in Latin America
1993-2000

Year	Billions Euros	% Spanish FDI outflows
1993	0.058	6.13
1994	1. 898	60.95
1995	0.160	5.44
1996	1. 572	47.09
1997	5. 157	56.80
1998	6. 007	49.17
1999	26. 571	60.92
2000	18. 436	38.09
Main Sectors		
Telecommunications	15%	
Banking	15%	
Electrical	10%	

Source: Dirección General de Comercio e Inversiones.
Ministerio de Industria, Turismo y Comercio.

Table 2: Spanish Transnational Corporations in Latin America

Corporation	Industry	Rank	Sales 2003
			(Billion US dollars)
TELEFÓNICA	Telecommunications	2	14. 112
REPSOL-YPF	Oil	7	7. 345
ENDESA	Electrical	8	7. 257
			Consolidated Assets 2004 (Billion US dollars)
BSCH	Banking	1	73. 039
BBVA	Banking	2	66. 260

Source: The Foreign Investment in Latin America and the Caribbean. ECLAC Report, 2004.

Table 3: Ranking of Spanish Investment in Latin America 1996-2003

Argentina	1
Brazil	2
Bolivia	5
Chile	2
Colombia	2
Dominican Republic	2
Ecuador	4
El Salvador	4
Mexico	3
Peru	2
Venezuela	2

Source: The Foreign Investment in Latin America and the Caribbean. ECLAC Report, 2004.

Table 4: Spanish Trade Balance with Latin America, 1993-2000. (Billions Euros)

Year	Exports	% over total Exports	Imports	% over total Imports
1993	2. 648	5.68	2. 685	4.41
1994	3. 520	6.01	3. 124	4.22
1995	3. 661	5.16	3. 480	3.99
1996	4. 220	5.40	3. 585	3.81
1997	5. 643	6.04	4. 343	3.97
1998	6. 361	6.37	4. 370	3.56
1999	6. 078	5.80	4. 834	3.48
2000	7. 012	5.65	6. 352	3.75

Source: Dirección General de Comercio e Inversiones. Ministerio de Industria, Turismo y Comercio.

Table 5: Markov Switching Estimation for the Return on the Market Portfolio

	Estimate	Standard Error
State 1		
DY_t	-0.0015	0.1065
$TEIR_t$	-2.9283	2.2766
UIR_t	-1.8566	1.9112
UIP_t	-0.3958*	0.1610
v_1	0.0011*	0.0003
State 2		
r_t^w	1.5090*	0.1210
v_2	0.0014*	0.0003
State 3		
r_t^l	0.6079*	0.1192
v_3	0.0019*	0.0005
* Significant at 5%.		

Table 6: Average Effects on the Return on Size Portfolios for the whole sample period

Size Portfolios	Total	Direct	Indirect
Small	0.2058	0.0104	0.1954
Medium	0.1037	0.0027	0.1010
Big	0.1428	0.0052	0.1376

Table 7: Average Effects on the Return on Size Portfolios across sub-sample periods

	Latin America			World		
Size Portfolios	1985-1995	1996-2000	Variation (%)	1985-1995	1996-2000	Variation (%)
Small	0.2095	0.1980	-5.49	0.6828	0.7392	8.26
Medium	0.1083	0.0938	-13.39	0.5531	0.5937	7.35
Big	0.1398	0.1497	7.08	0.8269	0.8451	6.96

Table 8: Average Effects on the Return on Sector Portfolios for the whole sample period

Sector Portfolios	Total	Direct	Indirect
Banking	0.1437	-0.0055	0.1492
Electrical	0.0749	0	0.0749
Food	0.1192	-0.0044	0.1236
Construction	0.0309	0.0309	0
Real Estate	0.1306	0.0363	0.0943
Telecommunications	0.2263	0.0415	0.1949
Metal Products	0.0213	0.0213	0
Others	0.0391	0.0391	0

Table 9: Average Effects on the Return on Sector Portfolios across sub-sample periods

	Latin America			World		
Sector Portfolios	1985-1995	1996-2000	Variation (%)	1985-1995	1996-2000	Variation (%)
Banking	0.1354	0.1621	19.72	0.6524	0.7658	17.38
Electrical	0.0692	0.0874	26.30	0.4509	0.4721	4.7
Food	0.1077	0.1445	34.17	0.6541	0.6163	-5.78
Construction	0.0304	0.0321	5.59	0.9940	1.0387	4.5
Real Estate	0.1219	0.1499	22.97	0.6482	0.6629	2.27
Telecommunications	0.2218	0.2685	21.06	0.4482	0.4819	7.52
Metal Products	0.0196	0.0252	28.57	0.7446	0.7452	0.08
Others	0.0393	0.0388	-1.27	0.6398	0.6848	7.03

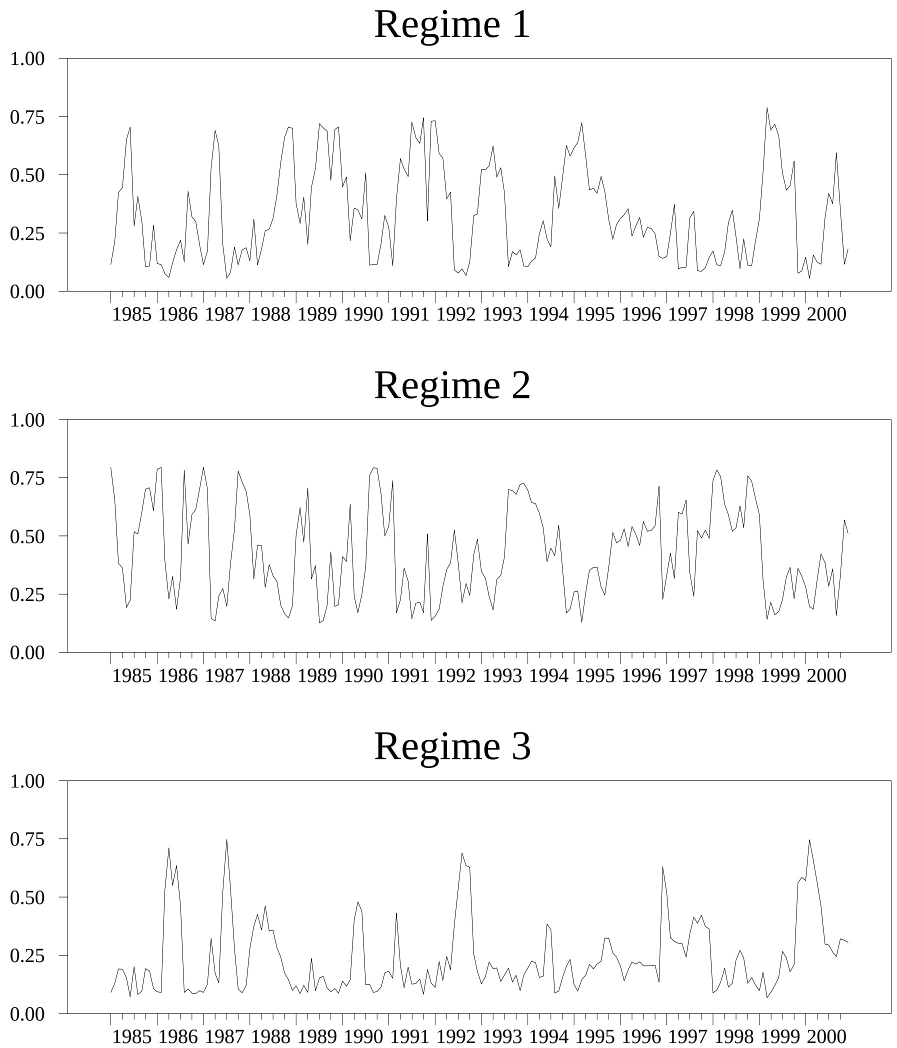

Figure 1: Regime probabilities for the return on the Spanish stock market portfolio

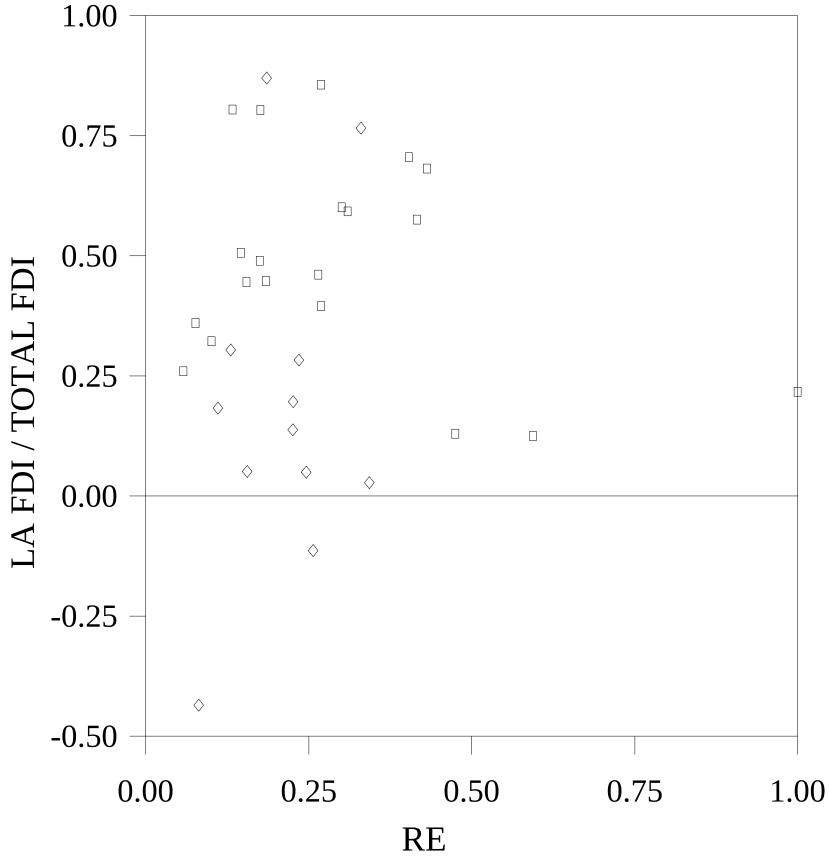

Figure 2: FDI and Relative Effect for the return on the Spanish stock market portfolio. ◊ 1993-1995. □ 1996-2000

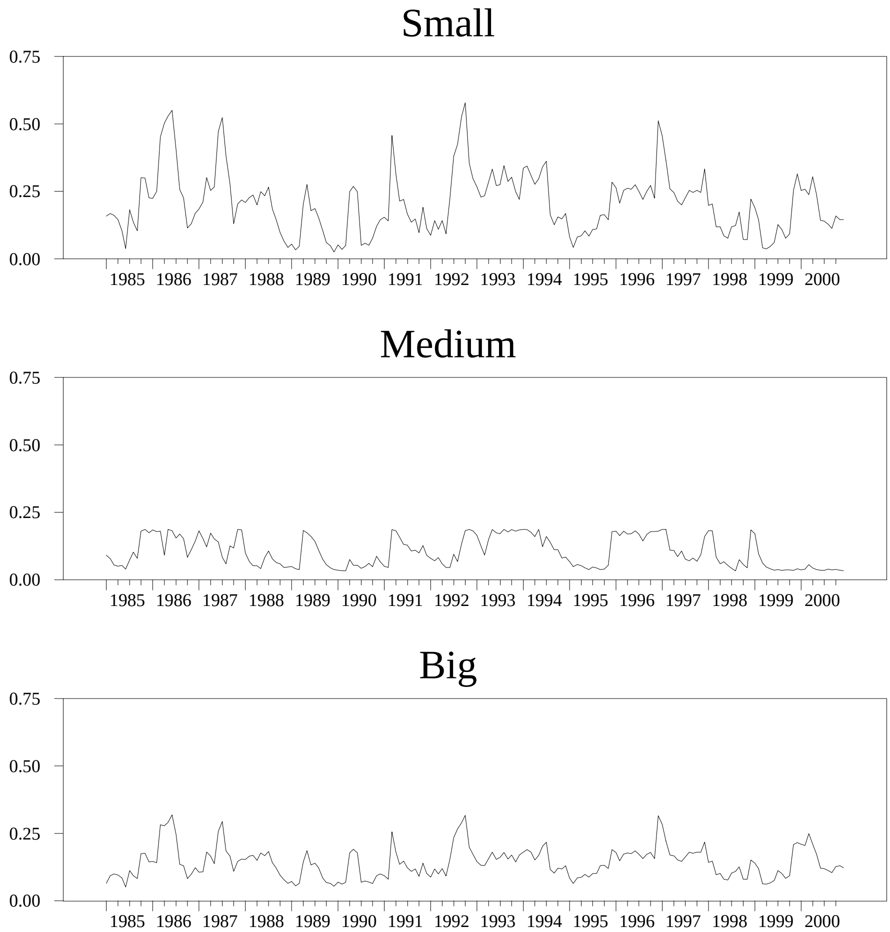

Figure 3: Total effect of the return on the Latin America portfolio on the return on the Spanish size portfolios.

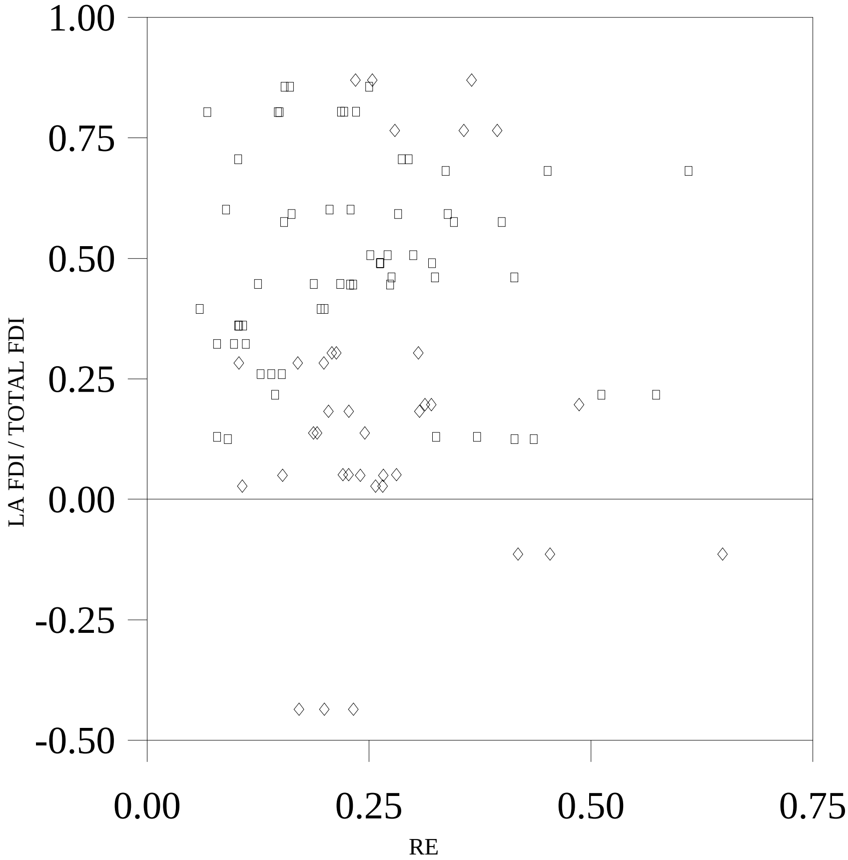

Figure 4: FDI and Relative Effect for the return on the Spanish size portfolios. ◇ 1993-1995 □ 1996-2000

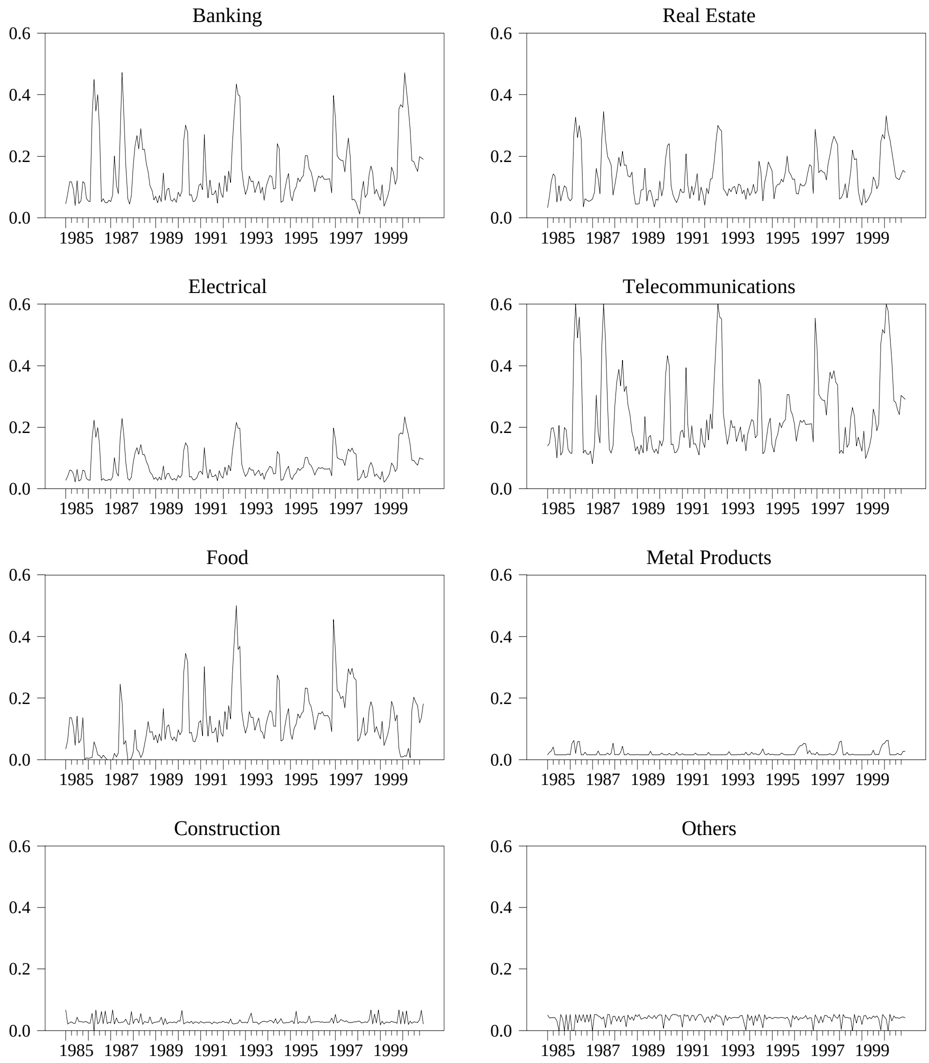

Figure 5: Total effect of the return on the Latin America portfolio on the return on the Spanish sector portfolios.

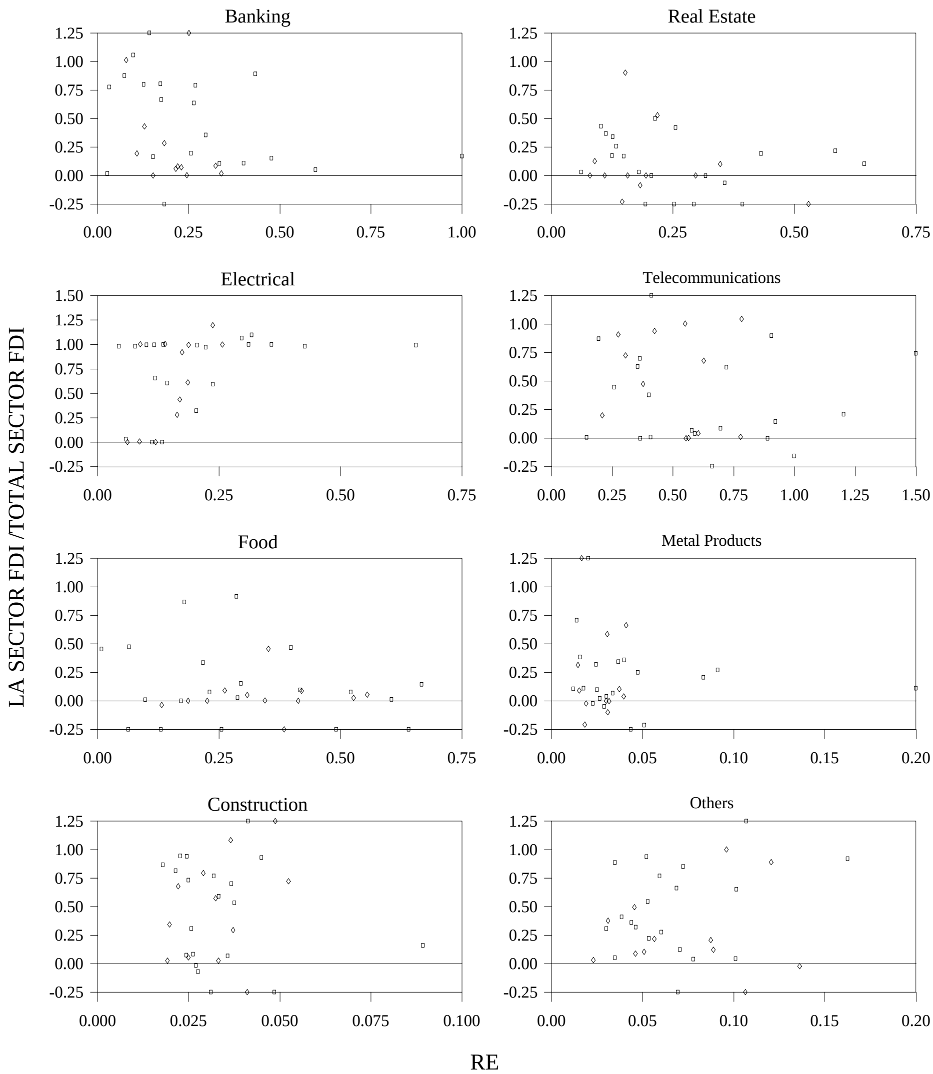

Figure 6: FDI and Relative Effect for the return on the Spanish sector portfolios.◊ 1993-1995 □ 1996-2000