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THE CONDITIONAL RELATIONSHIP BETWEEN PORTFOLIO BETA AND RETURN: EVIDENCE FROM LATIN AMERICA

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ABSTRACT

Using the approach of Pettengill et al. (1995), we analyze the unconditional versus conditional cross-sectional CAPM relationship between portfolio beta-risk and return in the Argentinean, Brazilian, Chilean, and Mexican stock markets. We develop extensions to the original model to control for extra risk factors documented in the empirical literature: size, book-to-market ratio and momentum. The paper also presents the first testing of the market integration hypothesis among the Latin American stock markets.

The results show that the conditional CAPM is a dominant approach even after controlling for risk factors different from beta. Statistically significant asymmetries are found, however, in the beta-risk premium between up and down markets. Additional findings suggest that the degree of stock market integration among Latin American markets falls during downturns.

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RESUMEN

Siguiendo la metodología propuesta por Pettengil et al. (1995), analizamos la relación condicional y no-condicional entre riesgo sistemático –medido por beta– y retorno en los mercados de capitales de Argentina, Brasil, Chile y México. Adicionalmente, controlamos nuestro estudio por otras variables que son documentadas en la literatura como factores extra de riesgo: tamaño, razón bolsa-libro y momento. El artículo también incluye una primera aproximación a la hipótesis de integración en los mercados accionarios latinoamericanos.

Los resultados señalan la predominancia del enfoque CAPM condicional, aún después de controlar por factores adicionales de riesgo, diferentes de beta. La evidencia encontrada denota, sin embargo, la existencia de asimetrías estadísticamente significativas en el premio por riesgo entre mercados al alza y a la baja. Resultados complementarios indican que el grado de integración en el mercado latinoamericano disminuye durante caídas en los mercados accionarios.

1. INTRODUCTION

One of the main drawbacks of the CAPM studies based on the unconditional relationship between return and beta risk is the lack of an appropriate statistical methodology to evaluate this relation.[1] Fama and French (1992), using nearly 50 years of US stock return data, find that there is no cross-sectional relationship between return and beta. Fletcher (1997, 2000) obtains similar results using UK and international stock market returns, respectively. Ferson and Harvey (1993) also find a weak association between beta risk and return in an international setting. An appropriate methodology, however, requires adjustment to take into account that realized returns and not expected (*ex-ante*) returns should be used in the tests. Pettengill *et al*. (1995) suggest a potential explanation of the observed flat relationship between beta and return. They derive a conditional relationship for these two variables, which depends on whether the excess market return is positive or negative. In periods when the excess market return is positive (up market) there should be a positive relationship whereas when the market return is negative (down market) there should be a negative relationship.

Pettengill *et al*. (1995), using 55 years of US monthly stock return data, show evidence that beta risk is priced in the U.S. stock market when the sample period is divided into up and down market months. In an international setting, some studies have also examined the implication of this conditional relationship.

[1] Other relevant models of risk and return include the Arbitrage Pricing Theory (Ross, 1976), and different extensions of the CAPM model e.g., the multi-beta CAPM (Merton, 1973), the consumption CAPM (Breeden, 1979), and tests allowing for time-varying betas and risk premiums e.g., Gibbons and Ferson (1985), Harvey (1989) and Ferson and Harvey (1993).

Fletcher (1997, 2000) and Hodoshima *et al*. (2000) find that there is support for a significant positive relationship between beta and return in up month and a significant negative relationship between beta and return in down market months in UK, international stock markets and Japan, respectively.

This paper examines the unconditional versus conditional relationship between beta and return in the most equity capitalized Latin American markets between January 1995 and December 2002. However, our study differs from previous research in at least two ways. First, with the exception of Hodoshima *et al*. (2000), previous studies have analyzed the conditional versus unconditional relationship between portfolio beta and return without controlling for empirical extra risk factors that have been identified in the literature as anomalies of the CAPM model. In this study, in addition to examine the conditional versus unconditional relationship between portfolio beta and return, we control for risk factors such as: size, book-to-market value and momentum.

Second, pricing models that explain the cross section return variation represent useful tools for evaluating one issue that scarcely has been treated in previous research; that is, the degree of market integration across Latin American stock markets. As Harvey (1995) pointed out, risk refers to exposure to some common world factor. If Latin American markets are completely integrated, then two assets with the same risk in different markets have identical expected returns, regardless of the market.

Thus, this study will cover two main objectives: (1) to analyze unconditional versus conditional CAPM models (before and after controlling for additional risk factors) as explanatory frameworks for the cross-sectional relationship between systematic risk and return across a selected group of Latin American stock markets, and (2) to study the degree of integration across the above markets.

This paper is organized as follows. Section 2 is divided into two subsections. Subsection 2.1 shows descriptive statistics for the Latin American companies in the sample and subsection 2.2 examines positive and negative market excess returns in the U.S. stock market compared with the Latin American stock markets. Model specification and econometric methodology are presented in section 3. Section 4 documents empirical results of the unconditional versus conditional CAPM models as applied to Latin American equity markets. Results of the conditional CAPM after controlling for additional risk factors are documented in section 5. Section 6 shows the empirical results of stock market integration tests across the Argentinean, Brazilian, Chilean and Mexican stock markets. Finally, conclusions and implications are presented in section 7.

2. Data and Descriptive Statistics

2.1. Data and Descriptive Statistics for Latin American Companies in the Sample

The sample period for this research begins the first week of January 1990 and finishes the last week of December 2002. Weekly returns in U.S. dollars for the securities included in the sample, stock market indexes, and government bond rates for each country were obtained from Economatica™ [2], International Financial Statistics, and Datastream™ databases. The U.S. Treasury bill rates were collected from the Federal Reserve Bulletin. The number of companies considered in the sample varies according to the data available for each stock market. Argentina has 48 companies. Brazil exhibits 188 companies, Chile 68 and Mexico 49.[3] Table 1 shows the distribution of Argentinean, Brazilian, Chilean and Mexican companies according to their industrial classification and market equity capitalization at the end of 2002.

For the Argentinean stock market, chemical, agriculture and paper-pulp sectors are the most important industries in terms of the number of companies. However, the ranking varies in terms of market equity capitalization. In this case, oil-gas, basic-metal and telecommunications rank among the most relevant. In the case of the Brazilian stock market, basic-metal, bank-finance and textile sectors rank among the most important according to the number of companies in each industry. In terms of market equity capitalization, the ranking is led by the oil-gas sector followed by the bank and finance and mining industries. For the Chilean stock market, electric power, funds and food-beverage sectors concentrate the highest number of companies. In terms of market-equity capitalization, the ranking is led by the electric power industry and then by the oil-gas and telecommunication sectors. Finally, for the Mexican stock market, trade, food-beverage and bank-finance sectors account for the most relevant companies. In terms of the relative importance of market equity, the ranking is dominated by the telecommunications industry followed by the trade and food-beverage sectors.

Notice that one of the main common features across the Latin American emerging stock markets in the sample is their high industrial concentration. The Argentinean and Mexican cases are the most concentrated stock markets in the region. Argentina has 8 companies that account for more than 68% of its total market-equity capitalization at the end of 2002. Mexico has 19 companies sharing approximately 72% of the total market capitalization at the end of the same year. This indicates that the size variable and, therefore, market concentration, might be an important factor in explaining the firm-specific cross-sectional return variations within each stock market.

2 ECONOMATICA™ is a historical database, which tracks prices, financial statements, company reports, and local news on Latin American countries.

3 Appendix 1 shows the companies included in the sample and their industrial sector.

TABLE 1
DESCRIPTIVE STATISTICS OF LATIN AMERICAN COMPANIES

Sector	Argentina				Brazil				Chile				Mexico			
	Firms[a]	%[b]	Value[c]	%[d]	Firms[a]	%[b]	Value[c]	%[d]	Firms[a]	%[b]	Value[c]	%[d]	Firms[a]	%[b]	Value[c]	%[d]
Agriculture	4	8.3	328.1	2.4	-	-	-	-	4	5.9	373.9	1.4	1	2.0	234.7	0.2
Bank and finance	3	6.3	672.7	5.0	22	11.7	24,141.3	18.6	1	1.5	14.8	0.1	5	10.2	7,495.6	7.0
Basic and metal	3	6.3	1,625.0	12.1	26	13.8	4,797.4	3.7	3	4.4	360.6	1.4	5	10.2	1,701.0	1.6
Chemical	6	12.5	379.1	2.8	13	6.9	898.2	0.7	2	2.9	403.8	1.5	1	2.0	22.8	0.0
Construction	2	4.2	36.1	0.3	8	4.3	167.5	0.1	-	-	-	-	2	4.1	152.9	0.1
Electronics	2	4.2	11.0	0.1	8	4.3	906.6	0.7	1	1.5	74.6	0.3	-	-	-	-
Electric power	2	4.2	142.3	1.1	6	3.2	7,104.5	5.5	14	20.6	6,019.9	22.9	-	-	-	-
Food and beverage	3	6.3	367.5	2.7	13	6.9	11,747.9	9.0	9	13.2	2,129.7	8.1	8	16.3	10,963.3	10.3
Funds	-	-	-	-	-	-	-	-	10	14.7	2,542.4	9.7	-	-	-	-
Industrial machines	1	2.1	1.8	0.0	9	4.8	1,028.8	0.8	-	-	-	-	2	4.1	680.0	0.6
Mining	-	-	-	-	4	2.1	22,682.7	17.5	1	1.5	161.5	0.6	1	2.0	742.0	0.7
Nonmetal	3	6.3	86.6	0.6	3	1.6	842.3	0.6	2	2.9	586,9	2.2	5	10.2	9,591.2	9.0
Oil and gas	3	6.3	6,525.6	48.6	6	3.2	30,819	23.7	2	2.9	5,284.1	20.1	-	-	-	-
Pulp and paper	4	8.3	126.8	0.9	8	4.3	5,491.0	4.2	2	2.9	2,015.9	7.7	1	2.0	2,802.1	2.6
Telecommunications	2	4.2	1,086.3	8.1	3	1.6	10,559.0	8.1	4	5.9	3,505.3	13.3	2	4.1	41,629.1	39.1
Textile	2	4.2	70.9	0.5	21	11.2	432.9	0.3	-	-	-	-	-	-	-	-
Trade	1	2.1	51.0	0.4	5	2.7	364.0	0.3	3	4.4	137.8	0.5	9	18.4	23,696.8	22.2
Transport service	-	-	-	-	2	1.1	20.0	-	2	2.9	417.8	1.6	1	2.0	316.3	0.3
Vehicle and parts	1	2.1	75.5	0.6	11	5.9	4834.0	0.4	-	-	-	-	-	-	-	-
Other	6	12.5	1,835.2	13.7	20	10.6	7,344.2	5.7	8	11.8	2,275.1	8.6	6	12.2	6,540.0	6.1
Total	48	100.0[e]	13,420.4	100.0[e]	188	100.0[e]	129,831.3	100.0[e]	68	100.0[e]	26,304.1	100.0[e]	49	100.0[e]	106,567.8	100.0[e]

Notes:

[a] Number of companies in the stock market sample at the end of 2002.

[b] Percentage of companies on the total stock market sample at the end of 2002.

[c] Market equity capitalization (in millions of U.S. dollars) at the end of 2002.

[d] Percentage of equity capitalization on the total stock market sample at the end of 2002.

[e] 100% approximately due to decimals rounding.

2.2. Positive and Negative Market Excess Return

Pettengill *et al.* (1995) point out that a systematic relationship must exist between beta risk and return for beta to be a useful measure of risk. The CAPM model shows an *unconditional* systematic and positive relationship between beta and *expected* return. According to previous authors, however, the CAPM model also implies a *conditional* relationship between *realized* returns and beta (i.e., a positive relationship during positive market excess return periods and a negative relationship during negative market excess return periods). If *realized* market returns were barely less than the risk-free rate, this *conditional* relationship would have no significant impact on tests of the relationship between beta and returns. This condition, however, occurs frequently. A month-by-month comparison of the CRSP equally-weighted index (as the proxy for the market portfolio return) and the monthly equivalent 90-day Treasury Bill rate (as the measure for the risk-free return) over the period 1936 through 1990 indicates that the Treasury Bill rate exceeds the market return in 280 out of 660 total observations (42%).

A similar situation occurs in Latin America where a week-by-week comparison of each stock market index return in U.S. dollars and the weekly equivalent 90-day Treasury Bill rate shows that during 417 weeks over the period 1995 through 2002, the risk free rate exceeds the market return by 50%, 48%, 53% and 46% for the Argentinean, Brazilian, Chilean and Mexican stock market, respectively.

As Pettengill *et al.* (1995) state, the presence of a large number of negative market excess return periods suggests that those studies that test for an *unconditional* positive association between beta risk and *realized* returns are biased against finding a systematic relationship.

3. Model Specification and Econometric Methodology

This section describes model specification and econometric methodology used in testing the CAPM models considered in this research. The model specification begins with the zero-beta CAPM of Black (1972), which predicts that:

(1) $$E(R_i) = \gamma_0 + \gamma_1 \beta_i$$

where $E(R_i)$ is the expected return on portfolio i, $\beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)}$ is the beta of portfolio *i*, γ_0 is the expected return on the portfolio which has a zero covariance with the market portfolio, and γ_1 is the expected risk premium of the market portfolio.[4]

[4] If a risk-free asset exists, γ_0 is the risk-free return, and this is the traditional form of the CAPM of Sharpe (1964).

In order to analyze whether the CAPM model tested by Fama and MacBeth (1973) for the U.S. case (hereafter, *the unconditional CAPM model, UCAPM*) exhibits a positive relationship between realized portfolio returns and betas in the case of Latin American equity portfolios, econometric tests are conducted in three stages. In the first stage, because of the presence of infrequent trading in Latin American's stocks, we estimate individual betas according to the aggregated coefficients method proposed by Dimson (1979)[5]. Consequently, these betas are estimated for each company's equity in the sample through the period of January 1990 to December 1992. After obtaining consistent estimates of individual betas, securities with the lowest betas are assigned to the first portfolio, and so on. The number of portfolio varies according to the number of available companies on each stock market under study. For Argentina, Brazil, Chile and Mexico there are 48, 188, 68 and 49 companies, respectively. As such, portfolios with five/six companies in each are considered for construction purposes. This procedure yields 9, 37, 11 and 9 different portfolios for the Argentinean, Brazilian, Chilean and Mexican stock markets, respectively. Betas for each portfolio are estimated in the second subsequent period from January 1993 to December 2001, again using Dimson's methodology. In order to incorporate the time-varying nature of portfolio betas, eight portfolio beta estimation periods (1993-94, 94-95, 95-96, 96-97, 97-98, 98-99, 99-00, 00-01) are considered. The portfolio betas estimated for each pairs of years are used as explanatory variables further in the immediate next year. For instance, the portfolio betas estimated based on the 1993-94 period, are used as predictors in 1995 and so on. This is the second stage, the portfolio beta estimation period.

In the last stage, a pooled cross-sectional regression for equation (2) is estimated for the subsequent testing period, 1995 through 2002. The regression equation (2), which is based on the CAPM of Black (1972), is specified as:

$$(2) \qquad R_{jt} = \gamma_{0t} + \gamma_{1t}\beta_j + \mu_{jt}$$

where R_{jt} is the return on portfolio j in week t, β_j is the beta of portfolio j, which is estimated in the portfolio beta estimation period and μ_{jt} is a random error term. Equation (2) is estimated by a pooled cross-sectional OLS, which gives estimates of the average values of weekly coefficients γ_{0t} and γ_{1t} in the testing period. The average values of the weekly coefficients are then tested to analyze whether they are significantly different from zero. The main prediction obtained from equation (2) is that β_j should be the only cross-sectional variable that explains the relationship between portfolio returns and risk. If other variables are included in order to explain return, these should have no explanatory power.

5 Following Dimson's approach, we regress individual security returns against five lagged, matching and five leading market return terms. As proxies for the market portfolio we use both the Latin American Stock Market Index made by MSCI and S&P 500 Index, respectively. In order to take into account the estimation error of each of the synchronous and nonsynchronous coefficients these estimates are adjusted according to the method proposed by Vasicek (1973).

To test the Pettengill *et al*. (1995) version of the CAPM (*hereafter the conditional CAPM model, CCAPM*), testing periods are split into up and down market weeks. If the realized market return is above the risk-free return (up market), portfolio betas and returns should be positively related, but if the realized market return is below the risk-free return (down market), portfolio betas and returns should be inversely related. Therefore, in order to study whether a systematic relationship between beta and returns exists, regression coefficients for equation (3) are estimated,

$$(3) \qquad R_{jt} = \gamma_{0t} + \gamma_{2t} D\beta_i + \gamma_{3t}(1-D)\beta_i + e_{it}$$

where D = 1 if $(R_{Mt} - R_{ft}) \geq 0$, and D = 0 if $(R_{Mt} - R_{ft}) < 0$. R_{Mt} is the market portfolio return and R_{ft} is the risk-free rate, in week t. The predicted hypotheses in this case are: $H_0 : \gamma_2 = 0$ versus $H_A : \gamma_2 > 0$ and $H_0 : \gamma_3 = 0$ versus $H_A : \gamma_3 < 0$. Herein γ_2 and γ_3 are the average values of the coefficients γ_{2t} and γ_{3t}, respectively. Using standard t-tests, the statistical significance of these coefficients can be tested.

Pettengill *et al*. (1995) point out that the conditional relationship [equation (3)] does not imply a positive relationship between risk and return. According to them, in order to test a positive relationship between risk and return, two conditions are necessary. Collectively, these are that (1) the excess market return should be positive on average and (2) the beta risk premium in up markets and down markets should be symmetrical. Given that $\gamma_3 \leq 0$ the symmetry hypothesis can be specified as follows: $H_0 : \gamma_2 + \gamma_3 = 0$ versus $H_A : \gamma_2 + \gamma_3 \neq 0$. These two previous hypotheses can be tested by a Wald test, which tests for an absolute significant difference between the γ_2 and γ_3 coefficients.

This paper also examines additional sources of return variation others than the market risk-premium. There is increasing empirical evidence that multiple factors are cross-sectionally correlated with average returns in the U.S. market. Jegadeesh and Titman (1993) conclude that stocks with high return over the past three months to one year continue outperforming stocks with poor prior performance. Additionally, Banz (1981) shows that small stocks earn higher average returns than large stocks and Fama and French (1992, 1996) also report that value stocks with high book-to-market ratio (B/M) outperform growth stocks with low B/M ratio.

The literature examining this issue in Latin American markets is limited. In a seminal contribution, Rouwenhorst (1999) analyzes three additional risk factors as sources of return variation in emerging stock markets. His results, mainly based on univariate tests, strongly favor the hypothesis that size, value and momentum are common risk factors, which *on average* are priced in emerging markets. However, his evidence varies across individual stock markets. In the case of Latin American stock markets, he finds that size factor is priced in Argentina and Brazil but not in the case of Colombia, Chile, Mexico and Venezuela. The Book-to-Market factor is priced only in Brazil and Momentum is priced in Colombia and Chile. Using aggregate indexes and quintiles rated by size, Marshall and Walker (2000) also study the size-effect for the case of Chilean stock market. Their results show that for this particu-

lar market the existence of this effect is not clear. However, the methodologies used in previous works omit controlling for the sign of the market premium. Thus, one of the objectives of our research is to test whether factors such as value, momentum and size are still present in Latin American stock markets after using a conditional CAPM.

In order to analyze whether additional risk factors documented in the asset pricing literature contribute to explain the *conditional* cross-sectional return variations, equation (3) is expanded to include the following variables: size, book-to-market equity ratio and momentum, as shown in equation (4). According to the CAPM previous empirical studies, it is possible to hypothesize that the week average coefficients on each explanatory variable should be significantly positive for book-to-market equity ratio (Chan *et al*., 1991; Fama and French, 1992 and 1996) and momentum (Jegadeesh and Titman, 1993). They also should be significantly negative on size (Banz, 1981).[6]

The econometric specification to be tested is as follows:[7]

$$(4) \qquad R_{it} = \gamma_{0t} + \gamma_{2t} D\beta_i + \gamma_{3t}(1-D)\beta_i + \gamma_{4t} Size_i + \gamma_{5t} BM_i + \gamma_{6t} Mom_i + e_{it}$$

where,

$Size_i$: Size associated to each portfolio i.
BM_i : Value associated to each portfolio i.
Mom_i : Momentum associated to each portfolio i.
e_{it} : Random error term.

To ensure that the accounting variables are known before the returns they are used to explain, accounting data for all fiscal yearends in calendar year t-1 (1995-2002) are matched with returns for July of year t to June of t + 1. The 6-month (minimum) gap between fiscal yearend and return tests is realistic for companies of emerging countries. The firm's market equity at the end of December of year t-1 is used to estimate its book-to-market ratio for t-1, and its market equity for June of year *t* is used to measure its size.[8]

6 Using the earning-to-price ratio, the empirical evidence also shows that for developed markets value stocks outperform growth stocks (for example, Ball, 1978 and Basu, 1983).

7 Size and value correspond to the natural logarithms of the market equity capitalization and the book to market ratio of each portfolio, respectively. Following Rouwenhorst (1999) the momentum risk factor is measured at the beginning of each week t on the sum of prior 24-week returns between week t-24 and week t-1.

8 Previous studies (e.g., Basu, 1983) assume that accounting data are available within three months of fiscal yearends. Although, the U.S. firms are required to file their financial reports with the SEC within 90 days of their fiscal yearends, on average, 20% do not comply. Furthermore, more than 40% of the December fiscal yearend firms that do comply with the 90-day rule file on March 31, and their reports are not made public until April (Alford *et al.*, 1992).

Since size, book-to-market equity ratio and momentum are measured for individual companies (stocks), to be consistent with Fama-MacBeth (1973) analysis, it is necessary to group this information into portfolios. In this study, the average of the previous financial measures -based on individual firms in each portfolio- is used as an estimator of the financial variables for each portfolio. Finally, in order to evaluate whether the Latin American stock markets are integrated, two regression equations are estimated. First, equation (3) is extended to incorporate the four stock markets studied into one single equation (5). Then, using the MSCI-LATAM and S&P 500 indexes as alternative proxies for the market portfolio, this equation is estimated to test whether the beta coefficients associated with up and down markets are statistically different across the markets. Then, equation (5) is extended in order to control for those additional variables, other than up and down betas, that result significantly priced across periods for the Latin American stock markets. Thus, equation (5) is defined as:

$$(5)\quad R_{jt} = \delta_{1t}D_{BRA} + \delta_{2t}D_{CH} + \delta_{3t}D_{MEX} + \delta_{4t}D_{ARG} + \delta_{5t}D\beta_j D_{BRA} + \delta_{6t}(1-D)\beta_j D_{BRA} + \delta_{7t}D\beta_j D_{CH} + \delta_{8t}(1-D)\beta_j D_{CH} + \delta_{9t}D\beta_j D_{MEX} + \delta_{10t}(1-D)\beta_j D_{MEX} + \delta_{11t}D\beta_j D_{ARG} + \delta_{12t}(1-D)\beta_j D_{ARG} + \eta_{jt}$$

where D = 1 if $(R_{Mt} - R_{ft}) \geq 0$, and D = 0 if $(R_{Mt} - R_{ft}) < 0$

D_{BRA} = 1, if portfolio j belongs to the Brazilian Stock Market, and 0, otherwise.
D_{CH} = 1, if portfolio j belongs to the Chilean Stock Market, and 0, otherwise.
D_{MX} = 1, if portfolio j belongs to the Mexican Stock Market, and 0, otherwise.
D_{ARG} = 1, if portfolio j belongs to the Argentinean Stock Market, and 0, otherwise.
η_{jt} = A random error term.

The above regression equation allows us to test for market integration across Latin American stock markets.[9] It is important to point out that equation (5) does not include additional variables other than up and down betas. To assess the effect that other potential risk factors might have on portfolio returns across these markets, equation (5) is extended to take into account those variables that result to be priced after estimating equation (3) for each stock market under study.

9 The null hypothesis in this case is given by H_0: $\delta_5 = \delta_7 = \delta_9 = \delta_{11}$ during up markets or $\delta_6 = \delta_8 = \delta_{10} = \delta_{12}$ during down markets.

4. Empirical Results of the Unconditional versus Conditional CAPM Models in Latin American Equity Markets

4.1. The Unconditional CAPM Model

This section presents empirical results of estimating the unconditional cross-sectional relationship between portfolio betas and returns for the Argentinean, Brazilian, Chilean and Mexican equity markets. First, we analyze whether the unconditional CAPM model (UCAPM) exhibits a positive relationship between realized portfolio returns and portfolio betas using the MSCI-LATAM stock market index as proxy for the market portfolio.[10] The econometric specifications to test the UCAPM model are based on the three stages estimation method described in section 3.

TABLE 2
TEST OF THE UNCONDITIONAL BETA AND RETURN RELATIONSHIP

$$R_{jt} = \gamma_{0t} + \gamma_{1t}\beta_j + \mu_{jt}$$

Coefficient/Country	Argentina	Brazil	Chile	Mexico
g_0	0.0064* (0.0027)	0.0102* (0.0016)	0.0039* (0.0017)	-0.0045 (0.0025)
g_1	-0.0039 (0.0026)	-0.0055* (0.0018)	-0.0058 (0.0032)	0.0069* (0.0021)
R-squared	0.0006	0.0007	0.0007	0.0020
Total panel observations	3753	15428	4587	3753

Note: Following Fama and MacBeth (1973), a weakly pooled cross-sectional regression is estimated using U.S. dollars-weekly portfolio returns on a constant and the estimated portfolio betas for 1995-2002 period (Eq. (2)). Betas of each portfolio are estimated over the whole sample period using the MSCI-LATAM index weakly returns. The table includes the pooled mean of the weakly intercept (γ_0) and slope (γ_1). The standard errors are reported in parentheses and * indicates statistical significance at the 5% level.

Tables 2 present results of cross-sectional regressions between portfolio returns and betas associated to the Latin American stock markets under study. With the exception of the Mexican stock market, results are inconsistent with a positive and significant relationship between portfolio betas and returns. Moreover, the low R-squares exhibited by the cross-sectional regressions suggest that the model might be either misspecified or additional risk factors other than beta might be required to explain the tradeoff between risk and return.

[10] In addition, we split the sample into two sub-periods 1995-1998/1999-2002 and also estimate the regressions using the S&P 500 index as proxy for the market portfolio. Even though the results (not reported here) present relatively lower R^2 they are qualitatively the same.

4.2. Empirical Results of the Conditional CAPM Model (CCAPM)

This section shows empirical results based on estimating the conditional cross-sectional relationship between portfolio betas and returns for the Argentinean, Brazilian, Chilean and Mexican equity markets. Pettengill *et al*. (1995) argue that the flat unconditional relationship between beta and return found in previous studies can be explained by the bias that is created due to the aggregation of positive and negative market excess return periods. The main prediction from the Pettengill *et al*. (1995) model is that if the realized market return is above the risk-free rate (up markets), portfolio betas and returns should be positively related, but if the realized market return is below the risk free rate (down markets), portfolio betas and returns should be negatively related.

Panel A and B of table 3 show results of the conditional cross-sectional regressions between portfolio returns and betas for period 1995-2002 as well as the Wald test used to analyze whether the absolute difference on the average values for up and down market coefficients are significantly different from zero.

Results reported in Panel A are based on returns estimated in U.S. dollars with the MSCI-LATAM stock market index[11] and the 90-days U.S. Treasury bill as proxies for their market portfolio and the risk free rate, respectively. For the emerging markets under study the results show that the estimates for γ_2 and γ_3 are highly significant. The average value of γ_{2t} and γ_{3t} are 1.33% and -2.78% (Argentina); 2.02% and -3.12% (Brazil); 1.43% and -2.90% (Chile); and 2.06% and -1.76% (Mexico), respectively. All the tests are significant at the 5% level.

These findings show that in these four Latin American countries the stock markets present a significant and positive beta risk premium during up markets and a significant but negative beta risk premium during down markets, providing a strong support for a systematic but *conditional* relationship between portfolio betas and realized returns in each of the Latin American stock markets. We also report the adjusted R-squared. Neither Pettengill *et al*. (1995) nor Fletcher (1997, 2000) show goodness of fit measures and, thus, there is no interpretation about them. In terms of adjusted R-squared, our results range between 9.2% and 18.8% for the Argentinean and Mexican stock markets, respectively.

Panel B of Table 3 shows results based on the Wald test. The values of this test show that the null hypothesis of a symmetrical relationship between risk and return during periods of positive and negative stock market excess returns is rejected at the 5% level for the Latin American stock markets with exception of Mexico. This finding suggests that Latin American stock markets react more to downs than to ups markets. Overall, our results are consistent with previous research documenting that Latin American stock markets present a less symmetrical

11 These results are in line with Fletcher (2000) and Hodoshima *et al.* (2000).

relationship between beta risk premium and return during positive and negative excess market returns compared to those reported for the U.S. market.[12]

TABLE 3
TEST OF THE CONDITIONAL BETA AND RETURN RELATIONSHIP

$$R_{it} = \gamma_{0t} + \gamma_{2t} D\beta_i + \gamma_{3t}(1-D)\beta_i + e_{it}$$

where $D=1$ if $(R_{Mt} - R_{ft}) \geq 0$ and $D=0$ if $(R_{Mt} - R_{ft}) < 0$

Panel A

Coefficient/Country	Argentina	Brazil	Chile	Mexico
g_0	0.0084* (0.0027)	0.0094* (0.0015)	0.0041* (0.0016)	-0.0002 (0.0024)
g_2	0.0133* (0.0027)	0.0202* (0.0018)	0.0143* (0.0032)	0.0206* (0.0020)
g_3	-0.0278* (0.0029)	-0.0312* (0.0019)	-0.0290* (0.0032)	-0.0176* (0.0022)
Adjusted R-squared	0.0917	0.0933	0.1144	0.1882
Total panel observation	3753	15428	4587	3753

Panel B

Coefficient/Country	Argentina	Brazil	Chile	Mexico
Wald test	7.5851*	10.0747*	5.6585*	0.5376
P-Value	0.0059	0.0015	0.0174	0.4634

Notes:

Panel A: Following Pettengill *et al.* (1995), a pooled conditional relationship between portfolio beta and return is estimated over 1995-2002 period using weakly Latin American portfolio returns. Betas of each portfolio are estimated over the whole sample period using the MSCI-LATAM index weakly return. The table includes the mean of the weakly pooled portfolio beta in up market weeks γ_2 and in down market weeks γ_3.

Panel B: Wald test for a symmetrical-conditional relationship between Beta and Return (whether $\gamma_2 - |\gamma_3| = 0$). Standard errors are reported in parentheses and * indicates statistical significance at the 5% level.

12 For example, Pagán and Soydemir (2001) analyze market interconnectedness in Latin America and find that reactions of Argentina, Brazil and Chile to changes in the Mexican stock market is more pronounced when the market is going down than up. These results are consistent with pessimism about the prospect of high returns in these markets (Skinner and Sloan, 1999). For the U.S. stock market, however, according to Pettengill *et al.* (1995) results, the regression equation (3) presents statistically significant average values of 3.36% for γ_{2t} and -3.37% for γ_{3t} for period 1936-1990 which are not statistically different in absolute terms.

5. Empirical Results of the Conditional CAPM Model After Controlling for Additional Risk Factors

This section documents empirical results based on estimating the conditional cross-sectional relationship between portfolio betas and returns for the Latin American equity markets. This time, however, we control for additional risk factors that according to the asset pricing literature contribute to explain cross-sectional portfolio returns. In order to perform reliable tests, equation (3)[13] is expanded to include size, book-to-market equity ratio and momentum. The effects of these factors are examined by testing whether the average values of their weekly coefficients are significantly different from zero.

Panel A of table 4 documents results of the conditional cross-sectional regression for the relationship between portfolio returns and portfolio betas after controlling for additional risk factors. These results reject, at the 5% level, the hypothesis of no relationship between portfolio returns and portfolio betas even after controlling for size, book-to-market ratio and momentum. For the other three risk factors, evidence is not conclusive at the same previous level of statistical significance.

Panel B of table 4 show that the null hypothesis of a symmetrical relationship between portfolio beta and return for up and down markets can't be rejected for the Argentinean, Chilean and Mexican stock markets. This hypothesis is only rejected for the Brazilian stock market at the 5% level.

In summary, the results reported in this section show that for Latin American stock markets the conditional relationship between beta and return is robust even after controlling for additional factors such us size, value and momentum. The significant positive (negative) relationship between beta and return in up (down) market weeks are also consistent with results documented by previous research. Notice that any extra risk factor is not commonly priced across the Latin American stock markets as well as do not contribute to explain significantly the cross sectional stock return variations in Latin American equity markets[14].

13 In addition, we follow the same approach as before in the cases of the UCAPM and CCAPM models with no control for extra risk factors. Although we split the sample into two sub-periods 1995-1998/1999-2000, the results (not reported here) turn out to be the same.

14 These results are not in line with Rouwenhorst (1999) due to the multivariate nature of our regressions. We also perform cross sectional pooled portfolio return regressions controlling for unconditional portfolio betas and extra risk factors. We obtain on these regressions similar results to those reported in Table 2. Extra risk factors are not commonly priced across the stock markets under study.

TABLE 4
CONDITIONAL CAPM AFTER CONTROLLING FOR ADDITIONAL RISK FACTORS

$$R_{it} = \gamma_{0t} + \gamma_{2t} D\beta_i + \gamma_{3t}(1-D)\beta_i + \gamma_{4t} Size_i + \gamma_{5t} BM_i + \gamma_{6t} Mom_i + \varepsilon_{it}$$

where $D=1 \;\; if (R_{Mt} - R_{ft}) \geq 0$ and $D=0 \;\; if (R_{Mt} - R_{ft}) < 0$

Panel A

Coefficient/Country	Argentina	Brazil	Chile	Mexico
γ_0	0.0009	0.0094	0.0017	0.0003
	(0.0208)	(0.0090)	(0.0097)	(0.0148)
γ_2	0.0135*	0.0203*	0.0170*	0.0223*
	(0.0031)	(0.0021)	(0.0034)	(0.0023)
γ_3	-0.0253*	-0.0303*	-0.0238*	-0.0137*
	(0.0033)	(0.0021)	(0.0034)	(0.0024)
γ_4	0.0003	-0.0001	0.0000	0.0034*
	(0.0010)	(0.0005)	(0.0005)	(0.0016)
γ_5	0.0022	0.0006	0.0047*	-0.0007
	(0.0029)	(0.0004)	(0.0008)	(0.0043)
γ_6	0.0015	0.0059*	0.0038	-0.0001
	(0.0051)	(0.0017)	(0.0026)	(0.0007
Adjusted R-squared	0.0876	0.09120	0.1130	0.1917
Panel observations	3537	14418	4323	3537

Panel B

Coefficient/Country	Argentina	Brazil	Chile	Mexico
Wald test	3.8571	6.5284	1.0862	3.6343
P-Value	0.0500*	0.0106	0.2974*	0.0567*

Notes:

Panel A: Following Pettengill *et al.* (1995) and Rouwenhorst (1999), a pooled conditional relationship between beta and return is estimated over the 1995-2002 period using weakly Latin American portfolio returns after controlling for size (γ_4), book-to-market ratio (γ_5) and momentum (γ_6). The table includes the mean of the weakly pooled portfolio beta in up market weeks (γ_2) and in down market weeks (γ_3). Standard errors are reported in parentheses and * indicates statistical significance at the 5% level.

Panel B: Wald test for a symmetrical-conditional relationship between Beta and Return (whether $\gamma_2 - |\gamma_3| = 0$).

6. Stock Market Integration in Latin America: Empirical Results

If Latin American stock markets are integrated, same future cash flows generated by a firm will be priced in a same way in any of the markets in the sample and, therefore, investors could not capture diversification benefits by investing in the region. On the other hand, if these stock markets are segmented, Latin American investors could capture some benefits from regional diversification by choosing those stocks that are regionally cross-listed and that are most highly correlated with their local market portfolios.

In an international set up, as Harvey (1995) pointed out, risk refers to exposure to some common world factors. In this context, if markets are completely integrated, two assets with the same risk in different markets have identical expect returns, regardless of the market. Conversely, if markets are segmented from the rest of the world, their covariance with a common world risk-factor may have scarce or no capacity to explain its expected return.

In this section, using the CCAPM, we test the hypothesis that assets with identical risk characteristics have the same conditional expected returns in different Latin American equity markets. We assume that if the Latin American stock markets are integrated there should be common rewards to risk associated with risk exposures and that, consequently, the reward to risk should be the same. Our work, however, is subject to some difficulties. As Campbell and Hamao (1992) and Lefort and Walker (2002) argue, we may falsely reject the integration hypothesis if equity markets are in fact integrated but our assumptions about the common risk-factors fail to hold. For example, if firms are exposed to a specific local market risk other than the common risks and if the prices of these risks move independently, then expected excess return would move independently even if the prices were set in a single world capital market. On the other hand, Latin American markets could be completely segmented but subject to common shocks that move expect returns in similar ways and, therefore, we may falsely accept the integration hypothesis.

We estimate two regression equations. First, equation (3) is extended to incorporate into a single equation (5) all the stock markets studied and then using the MSCI LATAM as proxy for the market portfolio we test whether the beta coefficients associated with up and down markets are statistically different across the selected stock markets in the sample[15]. Second, we extend equation (5) in order to control for those additional variables, other than up and down betas, which were significantly priced across the test periods. Then, we repeat the testing procedures already explained by estimating the extension of equation (5) and compare the results.

15 In addition, we again split the sample into two sub-periods 1995-1998/1999-2002 and also estimate the regressions using the S&P 500 index as proxy for the market portfolio. The results (not reported here), despite presenting comparative lower R^2, are qualitatively the same.

TABLE 5
WALD TEST FOR A SYMMETRICAL RELATIONSHIP BETWEEN RISK AND RETURN DURING UP AND DOWN MARKETS

Panel A

	Up Markets[a]	Down Markets [a]	Down Markets [b]
Wald Test	2.5317	8.0534*	0.5025
P-Value	0.0552	0.0000	0.6050

Panel B

	Up Markets[a]	Down Markets [a]	Down Markets [b]
Wald Test	1.9981	9.7257*	1.9109
P-Value	0.1119	0.0000	0.1479

Notes:
[a] The test includes all Latin American stock markets under study.
[b] The test does not include the Mexican stock markets.
Note: H_0: $\delta_5 = \delta_7 = \delta_9 = \delta_{11}$, for up markets.
Note: H_0: $\delta_6 = \delta_8 = \delta_{10} = \delta_{12}$, for down markets.
*: Significant at the 5 % level.

Table 5 shows the results of Wald test coefficients after estimating equation (5) under two scenarios. First, the Wald test coefficients are reported after estimating equation (5) alone (Table 5 – Panel A). This means that no additional variables other than up and down betas are taken into account when testing integration across the selected Latin American stock markets. Second, the same tests are reported once equation (5) is extended to take into consideration variables such as size, book-to-market ratio and momentum (Table 5 – Panel B).

For upturns in the Latin American stock market, the results reported in Table 5 - Panel A are consistent with a relative high degree of stock market integration across Latin American stock markets. We can't reject the hypothesis of non stock market integration at the 5% level. For downturns in the Latin American stock market index the results reported in Table 5 – Panel A are also consistent with a relative high degree of stock market integration, especially among Brazilian, Chilean and Argentinean markets. Table 5 – Panel B shows similar results in favor of the integration hypothesis are obtained after controlling for additional risk factors.

7. Conclusions and Implications

In this paper, we study both the *conditional and unconditional* CAPM versions as applied to the most important emerging stock markets in Latin America, namely those of Argentina, Brazil, Chile and Mexico. As extensions of these CAPM versions, we control for extra risk factors, which might also explain the *conditional* cross-sectional portfolio return variation on each of the above stock markets, and test the hypothesis of stock market integration. This study provides a framework for a better understanding about how securities are priced across Latin American stock markets and may also help investors to improve their results in terms of portfolio performance.

On the one hand, our results based on the *unconditional* CAPM model show that, on average, there is not a positive relationship between portfolio betas and returns. These findings suggest that the *unconditional* CAPM model might be either misspecified or additional risk factors other than beta might be required to explain the tradeoff between risk and return.

On the other hand, our results also show strong support for a beta risk premium before and after controlling for extra risk factors when the *conditional* relationship between beta and realized returns is considered. Consistent with previous research, however, we find a non-symmetrical conditional relationship between portfolio betas and returns. With exception of the Mexican stock market, our findings suggest that Latin American stock markets react more to downs than to ups markets.

In periods when the market returns go up, there is not a statistical difference in terms of beta risk premium across Latin American stock markets. However, when Latin America's market returns go down, investors feel relatively more pessimistic investing in Argentinean, Brazilian and Chilean stocks than investing in similar securities in Mexico. Therefore, the Mexican stock markets might offer benefits in terms of portfolio diversification conditional to downturns experienced in Latin America's market returns as a whole. One financial recommendation derived from the previous results is that investors should invest relatively more in T-bills or Mexican stocks than in other Latin American stock markets when Latin America's market returns fall. Of course, this active portfolio strategy assumes certain ability among investors in terms of market timing and it is likely to lose their effectiveness if these markets become more integrated.

Overall, the results show that the asymmetries in the beta risk premium and also the incomplete integration across Latin American stock markets can have important implications for using adequate policies for stabilizing the financial sector in such markets. Financial policies (for instance, the creation of a center for free cross-listing and trading of Latin American stocks) that support an increase in the degree of integration across these markets are beneficial for Latin America as a whole. Moreover, under full stock market integration, the cost of capital on average could fall, contributing to an increase in Latin America's economic growth.

APPENDIX 1

	Argentinean Companies in the Sample		Brazilian Companies in the Sample	
Number	Company	Economatica Industrial Classification	Company	Economatica Industrial Classification
1	Acindar ORD	Basic & Fab Metal	Acesita ON	Basic & Fab Metal
2	Agrometal ORD	Basic & Fab Metal	Acesita PN	Basic & Fab Metal
3	Alpargatas ORD	Textile	Aco Altona PN	Basic & Fab Metal
4	Atanor ORD	Chemical	Acos Villares PN	Basic & Fab Metal
5	Bansud ORD	Banks & Finance	Adubos Trevo PN	Chemical
6	Caputo ORD	Construction	Albarus ON	Vehicle & Parts
7	Carlos Casado ORD	Agriculture	Alfa Consorcio PNF	Other
8	Celulosa ORD	Pulp & Paper	Alfa Financeira ON	Banks & Finance
9	Central Costanera ORD	Electric Power	Alfa Financeira PN	Banks & Finance
10	Central Puerto ORD	Electric Power	Alfa Holding PNB	Other
11	CINBA ORD	Food & Beverage	Alfa Investimentos ON	Banks & Finance
12	Colorin ORD	Chemical	Alfa Investimentos PN	Banks & Finance
13	Comercial del Plata ORD	Other	Alpargatas ON	Textile
14	Cresud ORD	Agriculture	Alpargatas PN	Textile
15	Della Penna ORD	Pulp & Paper	Amazonia ON	Banks & Finance
16	Domec ORD	Electric Electron	Ambev ON	Food & Beverage
17	Estrada ORD	Pulp & Paper	Ambev PN	Food & Beverage
18	Ferrum ORD	Other	Aracruz ON	Pulp & Paper
19	Fiplasto ORD	Other	Aracruz PNB	Pulp & Paper
20	Frances Bco ORD	Banks & Finance	Arthur Lange PN	Other
21	Galicia Bco ORD	Banks & Finance	Avipal ON	Food & Beverage
22	Garovaglio ORD	Chemical	Azevedo PN	Construction
23	Grimoldi ORD	Textile	Bahema Equipament PN	Trade
24	Introductora ORD	Nonmetallic Min	Bahema PN	Industrial Machin
25	IRSA ORD	Other	Banespa ON	Banks & Finance
26	Ledesma ORD	Agriculture	Banespa PN	Banks & Finance
27	Longvie ORD	Electric Electron	Banrisul PN	Banks & Finance
28	Massuh ORD	Pulp & Paper	Bardella PN	Industrial Machin
29	Minetti Juan ORD	Nonmetallic Min	Belgo Mineira ON	Basic & Fab Metal
30	Molinos Rio ORD	Food & Beverage	Belgo Mineira PN	Basic & Fab Metal
31	Morixe ORD	Food & Beverage	Bemge ON	Banks & Finance
32	N Piccardo ORD	Other	Besc PNB	Banks & Finance
33	Patagonia ORD	Trade	Bic Caloi PNB	Vehicle & Parts
34	Perkins ORD	Industrial Machin	Bombril PN	Chemical
35	Petrobras EnergiaSA ORD	Oil & Gas	Bradesco ON	Banks & Finance
36	Polledo ORD	Construction	Bradesco PN	Banks & Finance
37	Quim Estrella ORD	Chemical	Brasil ON	Banks & Finance
38	Renault Argentina ORD	Vehicle & Parts	Brasil PN	Banks & Finance
39	Rigolleau ORD	Nonmetallic Min	Braskem PNA	Chemical
40	Rosenbusch ORD	Chemical	Brasmotor ON	Electric Electron
41	Semino, Mol J ORD	Agriculture	Brasmotor PN	Electric Electron
42	Siderca ORD	Basic & Fab Metal	Brasperola PNA	Textile
43	Sol Petroleo ORD	Oil & Gas	Buettner PN	Textile
44	Solvay Indupa ORD	Chemical	Bunge Brasil ON	Other
45	Telecom ORD	Telecommunication	Bunge Brasil PN	Other
46	Telef.Hold.Arg. S.A ORD	Other	Cacique PN	Food & Beverage
47	Telefonica de Arg. ORD	Telecommunication	Caemi Metal PN	Mining
48	YPF ORD	Oil & Gas	Cafe Brasilia PN	Food & Beverage

Brazilian Companies in the Sample (cont.)

Number	Company	Economatica Industrial Classification	Number	Company	Economatica Industrial Classification
49	Cambuci PN	Textile	100	Itaubanco ON	Banks & Finance
50	Cargill Fertilizant PN	Chemical	101	Itaubanco PN	Banks & Finance
51	CBC Cartucho PN	Basic & Fab Metal	102	Itausa ON	Other
52	Cedro PNB	Textile	103	Itausa PN	Other
53	Celulose Irani ON	Pulp & Paper	104	Itautec ON	Electric Electron
54	Cemig ON	Electric Power	105	J B Duarte PN	Food & Beverage
55	Cemig PN	Electric Power	106	Karsten PN	Textile
56	Cesp PN	Electric Power	107	Kepler Weber PN	Industrial Machin
57	Chapeco PN	Food & Beverage	108	Klabin PN	Pulp & Paper
58	Cia Hering PN	Textile	109	Kuala ON	Textile
59	Cim Itau ON	Nonmetallic Min	110	Leco PN	Food & Beverage
60	Cim Itau PN	Nonmetallic Min	111	Light ON	Electric Power
61	Ciquine PNA	Chemical	112	Lix da Cunha PN	Construction
62	CMA Part PN	Other	113	Loi Americanas ON	Trade
63	Coinvest PN	Basic & Fab Metal	114	Loj Americanas PN	Trade
64	Confab PN	Basic & Fab Metal	115	Lojas Hering PN	Trade
65	Const Beter PNB	Construction	116	Magnesita PNA	Mining
66	Correa Ribeiro ON	Other	117	Maio Gallo PN	Vehicle & Parts
67	Cremer PN	Textile	118	Manasa PN	Other
68	Docas PN	Other	119	Mangels PN	Basic & Fab Metal
69	Duratex PN	Other	120	Marcopolo PN	Vehicle & Parts
70	Eberle PN	Industrial Machin	121	Marisol PN	Textile
71	Electrolux PN	Electric Electron	122	Mendes Jr PNA	Construction
72	Eletrobras PNB	Electric Power	123	Mendes Jr PNB	Construction
73	Eluma PN	Basic & Fab Metal	124	Merc Brasil PN	Banks & Finance
74	Embraco PN	Industrial Machin	125	Merc S Paulo PN	Banks & Finance
75	Estrela PN	Other	126	Met Duque PN	Basic & Fab Metal
76	Eternit ON	Nonmetallic Min	127	Metal Leve PN	Vehicle & Parts
77	Eucatex PN	Other	128	Metisa PN	Basic & Fab Metal
78	Fab C Renaux PN	Textile	129	Micheletto PNA	Basic & Fab Metal
79	Ferbasa PN	Basic & Fab Metal	130	Millennium PNA	Chemical
80	Fertibras PN	Chemical	131	Mont Aranha ON	Pulp & Paper
81	Fibam PN	Basic & Fab Metal	132	Multibras PN	Electric Electron
82	Forjas Taurus PN	Basic & Fab Metal	133	Nord Brasil PN	Banks & Finance
83	Fras-Le PN	Vehicle & Parts	134	Nordon Met ON	Industrial Machin
84	Gerdau Met PN	Basic & Fab Metal	135	Paranapanema PN	Basic & Fab Metal
85	Gerdau ON	Basic & Fab Metal	136	Paul F Luz ON	Electric Power
86	Gerdau PN	Basic & Fab Metal	137	Perdigao PN	Food & Beverage
87	Gradiente PNA	Electric Electron	138	Petrobras ON	Oil & Gas
88	Granoleo PN	Food & Beverage	139	Petrobras PN	Oil & Gas
89	Grazziotin PN	Trade	140	Petropar PN	Other
90	Guararapes ON	Textile	141	Pettenati PN	Textile
91	Hercules PN	Basic & Fab Metal	142	Polipropileno PN	Chemical
92	Iguacu Cafe PNA	Food & Beverage	143	Politeno PNA	Chemical
93	Inds Romi PN	Industrial Machin	144	Pronor PNA	Chemical
94	Inepar Construcoes PN	Electric Electron	145	Randon Part PN	Vehicle & Parts
95	Iochp-Maxion PN	Industrial Machin	146	Recrusul PN	Vehicle & Parts
96	Ipiranga Dist PN	Oil & Gas	147	Rimet PN	Basic & Fab Metal
97	Ipiranga Pet ON	Oil & Gas	148	Ripasa PN	Pulp & Paper
98	Ipiranga Pet PN	Oil & Gas	149	Sadia SA ON	Food & Beverage
99	Ipiranga Ref PN	Chemical	150	Sam Industr PN	Basic & Fab Metal

Brazilian Companies in the Sample (cont.)

Number	Company	Economatica Industrial Classification
151	Sansuy PN	Other
152	Schlosser PN	Textile
153	Sifco PN	Vehicle & Parts
154	Sondotecnica PNA	Construction
155	Souto Vidig ON	Other
156	Souza Cruz ON	Other
157	SPSCS Industrial PN	Vehicle & Parts
158	Staroup PN	Textile
159	Sudameris ON	Banks & Finance
160	Sultepa PN	Construction
161	Supergasbras PN	Oil & Gas
162	Suzano PN	Pulp & Paper
163	Tecel.S.Jose PN	Textile
164	Technos Rel ON	Other
165	Tecnosolo PN	Construction
166	Teka PN	Textile
167	Telemar Norte Leste ON	Telecommunication
168	Telesp Operac ON	Telecommunication
169	Telesp Operac PN	Telecommunication
170	Tex Renaux PN	Textile
171	Trafo PN	Electric Electron
172	Transbrasil PN	Transportat Serv
173	Trevisa PN	Other
174	Trikem PN	Chemical
175	Tupy PN	Vehicle & Parts
176	Unibanco ON	Banks & Finance
177	Unibanco PN	Banks & Finance
178	Unipar PNB	Chemical
179	Usiminas ON	Basic & Fab Metal
180	Vale Rio Doce ON	Mining
181	Vale Rio Doce PNA	Mining
182	Varig PN	Transportat Serv
183	Vigor PN	Food & Beverage
184	Votorantim C P PN	Pulp & Paper
185	Vulcabras PN	Textile
186	Weg PN	Industrial Machin
187	Wembley PN	Textile
188	Zivi PN	Basic & Fab Metal

Chilean Companies in the Sample

Number	Company	Economatica Industrial Classification	Number	Company	Economatica Industrial Classification
1	Aguas A	Other	35	Eperva	Agriculture
2	Banmedica	Other	36	Fosforos	Other
3	Calichera A	Funds	37	Gasco	Oil & Gas
4	Campos	Banks & Finance	38	Gener	Electric Power
5	Cap	Basic & Fab Metal	39	Habitat	Funds
6	Carolina A	Food & Beverage	40	Iansa	Food & Beverage
7	Cct	Other	41	Inforsa	Pulp & Paper
8	Cem	Trade	42	Jucosa	Food & Beverage
9	Cementos	Nonmetallic Min	43	Labchile	Chemical
10	Cervezas	Food & Beverage	44	Lucchetti	Food & Beverage
11	Cge	Electric Power	45	Madeco	Basic & Fab Metal
12	Chilectra	Electric Power	46	Marinsa	Funds
13	Cholguan	Agriculture	47	Masisa	Other
14	Cic	Other	48	Minera	Funds
15	Cmpc	Pulp & Paper	49	Oroblanco	Funds
16	Colbun	Electric Power	50	Pasur	Funds
17	Coloso	Agriculture	51	Pehuenche	Electric Power
18	Conchatoro	Food & Beverage	52	Pizarreno	Trade
19	Copec	Oil & Gas	53	Provida	Funds
20	Cristales	Nonmetallic Min	54	Pucobre A	Mining
21	Ctc A	Telecommunication	55	Puerto	Transportat Serv
22	Cti	Electric Electron	56	Rio Maipo	Electric Power
23	Cuprum	Funds	57	San Pedro	Food & Beverage
24	Edelnor	Electric Power	58	Santa Rita	Food & Beverage
25	Elecda	Electric Power	59	Santamaria	Funds
26	Elecmetal	Basic & Fab Metal	60	Siemel	Agriculture
27	Eliqsa	Electric Power	61	Sipsa	Funds
28	Emec	Electric Power	62	Sm Chile A	Other
29	Emel	Electric Power	63	Tattersall	Other
30	Emelari	Electric Power	64	Telex	Telecommunication
31	Emelat	Electric Power	65	Telsur	Telecommunication
32	Emiliana	Food & Beverage	66	Tricolor	Chemical
33	Endesa	Electric Power	67	Vapores	Transportat Serv
34	Entel	Telecommunication	68	Zofri	Trade

Mexican Companies in the Sample

Number	Company	Economatica Industrial Classification
1	Accel S.A. B	Other
2	Alfa S.A. A	Basic & Fab Metal
3	Apasco S.A.	Nonmetallic Min
4	Bimbo Gpo A	Food & Beverage
5	Cementos Chihuahua	Nonmetallic Min
6	Cemex S.A. CPO	Nonmetallic Min
7	Comercial Mexicana UBC	Trade
8	Continental Grupo	Food & Beverage
9	Cydsa S.A. A	Chemical
10	Desc Soc Fom Ind B	Industrial Machin
11	Ekco	Basic & Fab Metal
12	Far-ben B	Trade
13	Fomento Econ Mex UBD	Food & Beverage
14	G Carso A1	Other
15	General de Seguros A	Banks & Finance
16	General de Seguros B	Banks & Finance
17	GFBBVA Bancomer B	Banks & Finance
18	Gigante Gpo	Trade
19	GInd Saltillo	Nonmetallic Min
20	GModerna	Food & Beverage
21	GNacional Provincia	Banks & Finance
22	GPalacio de Hierro 1	Trade
23	Herdez S.A.	Food & Beverage
24	ICA Soc Controlad	Construction
25	Industrias CH B	Basic & Fab Metal
26	Kimberly Clark Mex A	Pulp & Paper
27	KOF Coca-Cola L	Food & Beverage
28	Liverpool Puerto de C-1	Trade
29	Maseca GI B	Food & Beverage
30	Penoles Industrias	Mining
31	Pepsigx (Gemex) B	Food & Beverage
32	Posadas Gpo L	Other
33	Radio Centro CPO	Other
34	Saba Casa Grupo	Trade
35	San Luis Corp A	Industrial Machin
36	Santander Serfin GF B	Banks & Finance
37	Savia A	Agriculture
38	Simec Grupo B	Basic & Fab Metal
39	Situr Grupo B	Other
40	Soriana Organizacio B	Trade
41	Telefs de Mex A	Telecommunication
42	Telefs de Mex L	Telecommunication
43	Televisa Gpo CPO	Other
44	TMM GRUPO A	Transportat Serv
45	Tribasa Grupo	Construction
46	Tubos de Acero Mex	Basic & Fab Metal
47	Vitro A	Nonmetallic Min
48	Wal Mart de Mexico C	Trade
49	Wal Mart de Mexico V	Trade

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