

## MEXICAN ADRs IN THE 90s: AS GOOD AS EXPECTED?

---

FRANÇOIS BOYE\*

Independent Consultant

### Abstract

*In the 90s, Mexican firms issued more than ever American Depository Receipts (ADRs), i.e. certificates of Mexican stocks, traded in U.S. markets and managed by U.S. depositories. This paper is about testing the top Mexican firms' ADR for ability to: a) replicate the ups and downs of U.S. markets; b) outperform their U.S. peers; c) be an opportunity for diversification away from their U.S. peers. This paper's finding is that only Telmex's ADR passes the tests a), b) and c).*

*Keywords: ADRs, Emerging Markets, Portfolio Selection, Opportunity for Diversification, Test of Spanning.*

JEL Classification: *F36, G11, G14, G15.*

\* Economist. 2530 A. South Arlington Mill Drive, Arlington, VA 22206, U.S.A. E-mail: fcboye@hotmail.com. I am grateful to the two anonymous referees for remarks and suggestions on an earlier draft.

## I. Introduction

In the nineties, so-called emerging markets had their access to international financial markets facilitated by two complementary trends. On the one hand, the U.S. financial industry was reaching out to emerging market economies to diversify away from U.S. assets with low returns at the beginning of the 90s, and to ease foreign investors' access to the U.S. high tech driven financial boom after 1994. On the other hand, after a decade long period of stringent stabilization and structural adjustment, many developing countries were fit and willing to open up their economies.<sup>1</sup>

In Mexico, more and more firms could issue American depository receipts (ADR) from 1992 onwards, because the Carlos Salinas de Gortari Administration (1988-1994) solved previously the country risk problem that kept the economy cut off from international financial markets from 1982 through 1988. Taking advantage of the 1989 U.S. backed Brady plan in favor of debt reduction, it embarked on a debt restructuring negotiation with international creditors, which relieved Mexico's public finance so successfully that her debt reduction -14%<sup>2</sup>- became a model and case study for the heavily indebted countries from the developing world. In 1990, taking advantage of the implementation of the Brady plan and the reduction in the public sector deficit, Mexican policy makers allowed foreigners to purchase Mexican T-bills. Furthermore, for the sake of sending a message of structural reform to foreign investors, they launched the privatization of the largest Mexican company to this day, Telmex, and denationalized between 1991 and 1992 all the banks brought under public control in 1982 by the Lopez Portillo administration. So no wonder that Wall Street was willing to invest in Mexico and welcome Mexican ADRs.

The recently privatized banking sector, too much laden with non-performing loans and thereby financially vulnerable, could not join the first wave of ADR issuance between 1992 and 1994. Aside the largest Mexican firm to this day,<sup>3</sup> that first wave included industrial and media entities: Vitro (1992), a glass enterprise; Empresas ICA (1992), a construction enterprise; Transportacion Maritima (1992), a maritime transportation enterprise; Grupo Simec (1993), an iron and steel conglomerate; Grupo Radio Centro (1993), a Radio-TV conglomerate; Televisa (1994), a broadcasting and cable conglomerate; Grupo Tribasa (1994), a construction conglomerate.

After 1994, the ADRs issued by Mexican firms outnumbered the ones in the first wave, but reflected an altogether different need. Tapping the U.S. financial markets was no longer about supplementing domestic resources in the financing of the growth made possible by the softening of structural adjustment and the implementation of NAFTA. Instead, it became an opportunity to get around the credit crunch<sup>4</sup> enforced upon the Mexican economy since the 1994 collapse of its banking sector, due to the massive capital outflows triggered by the December 1994 devaluation of the peso. From then on, finding financing from the outside became key to the expansion of Mexican companies. Many Mexican banks, badly battered by the Tequila crisis, were sold to foreign banks.<sup>5</sup> As for the Mexican economy, it has been since then under a tremendous financial rationing that is countering the expansion of business activities.

This paper's purpose is not historical but financial. Instead of focusing on the Mexican stock market in the nineties and its reaction to international financial markets,

it compares the ADRs issued by Mexican firms in the NYSE from 1992 through 2001 with the market of which they are part, namely, the U.S. stock market. As a result, this writing does not belong to the ample literature on the integration of the Mexican into the United States financial market.

This paper's approach comes from finance as it was applied to securities issued by emerging markets all along the nineties.<sup>6</sup> Consequently, it addresses the three questions as follows: is the U.S. financial market driving the quotes and returns of Mexican ADRs? Are Mexican ADRs more profitable than their U.S. peers? Does it make sense for U.S. investors to diversify away from U.S. assets into Mexican ADRs of the same industry? The finance literature concentrated more on the last two questions than on the first, because emerging market stocks were advertised across the developed world in the nineties as providing a higher return and an opportunity for diversification. Even so, this paper emphasizes the first question since, from the point of view of a developing country, the rationale for issuing ADRs is to benefit from the stable and strong current of the U.S. financial markets. This point is not the only originality of this paper, because the Mexican stocks considered below are not aggregated into indices like the ones used by Campbell;<sup>7</sup> instead, they make up a panel of data upon which econometric tests are performed.

Only Mexican ADRs quoted in the NYSE and NASDAQ are to be considered. As a result, this paper disregards the ADRs quoted in the Over The Counter (OTC), unlike Domowitz *et al.* (1998). The reason lies in that they are not necessarily quoted each month, which precludes that each of them represents a dataset of at least twenty four observations.

The data analyzed below are all monthly time series related to the nineties. They do not share the same time range, although their last observation relates to September 2001, because not all of the ADRs under consideration were issued at the same time. The data source is Yahoo Finance website (<http://finance.yahoo.com>) where it is possible to access the quotes and other financial data of each and every company cited below using its acronym.

## II. Test of Integration into the U.S. Markets

The market model as conceived by William Sharpe can shed light upon an ADR's integration into the U.S. financial market. To be sure, it was a crafty device<sup>8</sup> to simplify Harry Markovitz's formulation of the optimal portfolio problem; but its bedrock assumption that stocks are correlated through their market elasticity fits quite well the purpose of ADRs issuing countries like Mexico. It can be construed more restrictively as meaning that the point of going public in the U.S. for a foreign company is not to stand out abroad as an outlier, but to be valued in accordance with the movements of the U.S. market. Hence Mexican ADRs can be considered as good as expected if and only if their quotes replicate the ups and downs of the U.S. market.

To test this integration condition, the S&P 500 Index is the proxy for the U.S. financial market. Each ADR quote is regressed on that proxy in level and in growth rate<sup>9</sup> to successively estimate its market elasticity and its beta coefficient, using the

OLS and SUR as econometric techniques. The first technique rules out what the second assumes, namely, that all Mexican ADRs are affected by correlated errors due to their being tied to underlying shares issued by companies located in the same country and thereby perceived as homogeneous by country risk analysts and investors.

TABLE 1  
MARKET ELASTICITY ESTIMATES

Companies	Ordinary Least Squares	Seemingly Unrelated Relations
Grupo Maseca (msk)	0.82 (t = 6.17)	0.82 (t = 7.73)
Grupo Tribasa (gtr)	- 3.31 (t = -24.4)	- 3.31 (t = -11)
Controladora Comercial de México (mcm)	0.3 (t = 1.1)	0.32 (t = 3.5)
Vitro (vto)	-0.49 (t = -3.7)	-0.49 (t = -4.1)
Empresas ICA (ica)	-1.58 (t = -11.8)	-1.58 (t = -8.3)
Savia (vai)	0.13 (t = 0.9)	0.13 (t = 0.6)
Tv Azteca (tza)	-1.13 (t = -2.7)	-1.13 (t = -3.7)
Transportación Marítima (tmm)	0.002 (t = 0.02)	0.002 (t = 0.02)
Tubos de Acero de México (tam)	0.78 (t = 5.8)	0.78 (t = 6.3)
Pepsi-Gemex (gem)	-0.54 (t = -4.0)	-0.54 (t = -5.4)
Internacional de Cerámica (icm)	-0.27 (t = -2.06)	-0.27 (t = -2.8)
Industrias Bachoco (iba)	-1.19 (t = -2.7)	-1.25 (t = -7.2)
Grupo Televisa (tv)	0.88 (t = 6.5)	0.88 (t = 12)
Grupo Simec (sim)	-1.07 (t = -6.6)	-1.15 (t = -7.7)
Grupo Radio Centro (rc)	0.05 (t = 0.4)	0.05 (t = 0.54)
Grupo Industrial de Durango (gid)	-0.03 (t = -0.27)	-0.03 (t = -0.3)
Grupo Elektra (ekt)	0.33 (t = 2.06)	0.39 (t = 3.0)
Gruma (gmk)	0.35 (t = 0.4)	0.19 (t = 0.32)
Fomento Económico de México (fmx)	1.49 (t = 2.5)	1.44 (t = 8.0)
Desc (des)	0.005 (t = 0.04)	0.005 (t = 0.04)
Coca-Cola Femsa (kof)	1.16 (t = 8.6)	1.16 (t = 18)
CEMEX (cx)	-0.27 (t = -0.3)	-0.02 (t = -0.10)
Grupo IMSA (imy)	-0.74 (t = -2.6)	-0.7 (t = -4.3)
Teléfonos de México (tmx)	1.46 (t = 10.9)	1.46 (t = 18)

NB: In parentheses are the acronyms.

The message from Table 1 does not leave room for ambiguity: the majority of Mexican ADRs either is insignificantly tied to the U.S. market or varies counter-cyclically compared to the U.S. market. This finding is all the more robust because it is independent from whether or not the assumption of correlated errors across ADRs is taken into account. Eight ADRs are exceptions to the inability of Mexican firms' stocks to vary in accordance with the U.S. market: Televisa (tv), Grupo Elektra (ekt), Controladora Comercial de México (mcm), Tubos de Acero de México (tam), Grupo Maseca (msk), Fomento Económico de México (fmx), Coca-Cola Femsa (kof) and Teléfonos de México (tmx). Based on their market elasticities, they by large under-react

to the U.S. market since only the quotes of Coca-Cola Femsa, Fomento Económico de Mexico and Telmex's share would increase by more than one per cent should the SP 500 index vary by one per cent. Save the property of low market elasticity, the eight star firms have not that much in common. They represent either the commercial sector (the second and third company), the industrial sector (from the fourth to the seventh company), or the service sector (Televisa, Telmex). Three are based in the industrial state of Nuevo León (Grupo Maseca, Fomento Económico de México, Coca-Cola Femsa), one in Vera Cruz (Tubos de Acero de México), and three in México City (Telmex, Elektra, Controladora Comercial de México, Televisa). Only the companies Fomento Económico de México and Coca-Cola Femsa are related by cross-shareholdings.<sup>10</sup>

TABLE 2

## BETA COEFFICIENT ESTIMATES

Companies	Ordinary Least Squares	Seemingly Unrelated Relations
Grupo Maseca (msk)	-0.70 (t = -1.9)	-0.78 (t = -1.81)
Grupo Tribasa (gtr)	1.48 (t = 1.3)	1.35 (t = 1.8)
Controladora Comercial de México (mcm)	1.08 (t = 2.6)	1.10 (t = 4.4)
Vitro (vto)	1.23 (t = 3.4)	1.23 (t = 3.6)
Empresas ICA (ica)	0.23 (t = 0.6)	0.23 (t = 0.6)
Savia (vai)	1.29 (t = 3.6)	1.31 (t = 6.9)
Tv Azteca (tza)	0.12 (t = 0.2)	0.25 (t = 0.3)
Transportación Marítima (tmm)	-1.29 (t = -3.6)	-1.29 (t = -3.3)
Tubos de Acero de México (tam)	1.51 (t = 4.2)	1.51 (t = 3.7)
Pepsi-Gemex (gem)	0.39 (t = 1.1)	0.44 (t = 1.7)
Internacional de Cerámica (icm)	-0.54 (t = -1.5)	-0.55 (t = -1.7)
Industrias Bachoco (iba)	-0.09 (t = -0.1)	-0.07 (t = -0.4)
Grupo Televisa (tv)	1.13 (t = 3.1)	1.13 (t = 3.0)
Grupo Simec (sim)	0.76 (t = 2.0)	0.55 (t = 0.9)
Gruporadio Centro (rc)	0.43 (t = 1.2)	0.43 (t = 0.9)
Grupo Industrial de Durango (gid)	1.13 (t = 3.1)	1.17 (t = 3.5)
Grupo Elektra (ekt)	1.19 (t = 3.1)	1.16 (t = 2.6)
Gruma (gmk)	-0.47 (t = -0.6)	-0.47 (t = -3.5)
Fomento Económico de México (fmx)	1.56 (t = 2.8)	1.40 (t = 6.1)
Desc (des)	1.53 (t = 4.2)	1.57 (t = 5.4)
Coca-Cola Femsa (kof)	0.84 (t = 2.4)	0.86 (t = 3.1)
Cemex (cx)	-0.63 (t = -0.5)	-0.40 (t = -1.1)
Grupo IMSA (imy)	0.98 (t = 2.3)	0.94 (t = 3.1)
Teléfonos de México (tmx)	0.7 (t = 1.97)	0.70 (t = 2.3)

NB: In parentheses are the acronyms.

Table 2 does confirm Table 1: save Grupo Maseca's ADR, all of the eight stars identified above as co-varying with the U.S. financial market have significantly posi-

tive beta coefficients by OLS as well as SUR's standard. By the standard of the more relevant<sup>11</sup> SUR estimation technique, Table 2 also adds five other stars to the set of Mexican ADRs replicating the ups and downs of the U.S. financial market: Vitro, Savia, Desc, Grupo Industrial de Durango, and IMSA. These extra assets relate to companies that are all industrial,<sup>12</sup> of which one is based in Mexico City (Desc S.A.) whereas the others have their headquarters in Durango (Grupo Industrial de Durango) and Nuevo León (IMSA, Savia, Vitro), two northern states.

Due to the political and financial shocks –called Tequila crisis– that affected Mexico from the end of March 1994 to the end of 1994, the results above may be time dependent. Therefore they must be replicated considering the period before and after the Tequila crisis. As proven by the first two graphs in Annex I, only eight ADRs were quoted before the Tequila crisis. They represent the following companies: Vitro (VTO), Simec (SIM), Telmex (TMX), Transportación Marítima (TMM), Empresas ICA (ICA), Radio Central (RC), Coca-Cola Femsa (KOF), and Tubos de Acero de México (TAM). The companies with acronym TMX, KOF, and TAM belong to the sub-group of thirteen stars identified above. All of them pass the test of stability, namely, they significantly replicate the ups and downs of the S&P index's level (TMX and KOF) or return (TAM) before as well as after the Tequila crisis. Among the other ADRs, only the quotes of the companies ICA and TMM's ADRs were really affected by the Tequila crisis in that their levels or returns fluctuated before 1995 in accordance with the S&P index's fluctuations. But such a result did not materialize in the post Tequila crisis period. As a result, one can conclude that the thirteen stars identified above are not time dependent.

What are the properties of the relationship between the U.S. financial market and each of the thirteen star ADRs identified by Tables 1 and 2? The rest of this first part is dedicated to providing an answer. It will address in the first place the question of whether ADRs issuing Mexican firms can influence their integration into the U.S. market through their news announcements. Second, it will assess whether the integration into the U.S. market holds in the long run. Last but not least, it will assess whether the integration into the U.S. market is significant of a causality running from American to Mexican stocks.

a) Testing the relevance of news announcements: a news announcement is an information conveyed to the financial market in order to change its information set and its trading decisions. It is relevant if and only if it is a watershed, i.e. an event that significantly modifies the market trading behavior. In the finance literature, public announcements pertain to the domain of event study analysis.<sup>13</sup> However, due to the lack of an objective yardstick to define unambiguously either an estimation window, an event window or a post-event window, this paper applies straightforwardly the structural break Chow test to the market model<sup>14</sup> using as a breakpoint the moment when each dividend or split announcement, listed in the Yahoo finance web-site, was made by a Mexican company.

Of the four star Mexican ADRs that announced a split in the nineties –Grupo Elektra in January 1998, Vitro in May 1995, Coca-Cola Femsa in January 1998, and Telmex in February 2000– only Vitro failed to significantly influence the U.S. market at a 5%

significance level. To be sure, this 75% success ratio is remarkable, but cannot hide the fact that most Mexican ADRs –twenty out of twenty four– could not announce a split, because they were not in great request in the nineties in spite of the phenomenal Wall Street boom in the last two years of the twentieth century.<sup>15</sup>

Table 3 presents two pieces of information regarding each of the thirteen star companies: on the left hand side, the total of dividend or split announcements; on the right hand side, the number of announcements that have structurally broken the market model of the company under consideration.

TABLE 3  
NUMBER OF RELEVANT DIVIDEND ANNOUNCEMENTS

Companies	Number of tested announcements	Number of significant announcements
Tubos de Acero de México	2	1
Vitro	10	4
Grupo Maseca	5	5
Savia	2	1
Desc	6	5
Grupo Elektra	4	3
Televisa	1	1
IMSA	3	1
Controladora Comercial de México	3	1
Fomento Económico de México	2	0
Grupo Industrial de Durango	0	0
Telmex	20	12
Coca-Cola Femsa	7	7

Its results convey an optimistic message: that the ratio of statistically significant dividend announcements is at least equal to 50% except for four companies, i.e., Fomento Económico de México, IMSA, Vitro and Controladora Comercial de México. This finding means that, although not ranked among the over-performing stocks of the market, the star Mexican ADRs were taken seriously by investors, because their news modified indeed trading decisions.

b) Testing the cointegration between the U.S. market and Mexican ADRs: the linear relation between the U.S. market's return ( $R_{sp}$ ) and that of each star Mexican ADR ( $R_{adr}$ ), documented by Table 2, even when statistically significant, is no guarantee of stability in the long term, since variables other than the S&P index also significantly impact upon Mexican ADRS' return. Those are lumped together into a catchall variable called error. That variable can drift over time and undo how tightly Mexican ADRs' returns are tied to the U.S. market's.

According to the Granger-Engle approach, testing for cointegration is about testing first that both the exogenous and endogenous variables in the following regression<sup>16</sup> have an order of integration equal to one. In the second place, the error variable associated with the same regression must be estimated.

$$\text{Radr}_t = a + b * \text{Rsp}_t + \epsilon_t \quad (1)$$

Last but not least, the error estimate has to be submitted to a unit root test to the effect of testing the cointegration hypothesis,<sup>17</sup> i.e. checking whether the null hypothesis of unit root is rejected by the data.

The first step of the cointegration test leads to a very positive result: the SP 500 index's return (Rsp) as well as that of each star Mexican ADR (Radr) is a I(1) variable, as shown in Annex II. Therefore, for each ADR whose return is significantly explained by the S&P index's, it is proper to raise the question of whether there is a I(0) linear combination of the two variables in the regression (1). The response in Table 4 is overwhelmingly positive. All the ADRs with a return significantly tied to the S&P index's return are indeed cointegrated with the S&P index at a five per cent significance level. This means that there is no risk of their relation to the U.S. financial market being disrupted in the long run by other exogenous variables. In other words, a significant fraction—twelve out of twenty four—of Mexican firms quoted in New York in the nineties really succeeded in being integrated into the U.S. financial market. To tap the U.S. market and get around the credit crunch in Mexico, they had to do more than issuing shares; they had to convince U.S. investors that they were trustworthy enough in the long term.

The twelve Mexican ADRs' cointegration with the U.S. financial market is a robust result, as shown in Annex III. At a five per cent significance level, it is also validated by the Johansen cointegration test, which is predicated upon a maximum likelihood and a vector error correction statistical model.

c) Testing the causality from the U.S. market to the Mexican ADRs: causality in the Granger sense of the word has to do with measuring the impact of a shock in the U.S. market upon how each star Mexican ADR evolves in the future. It differs from the concept of cointegration in that it does not capture instantaneous dependency. However, Granger and Engle, through their modeling of cointegrated variables,<sup>18</sup> establish an analytical relation between the two concepts as follows:

Let y and x be two cointegrated I(1) variables:

$$y_t - ax_t \quad (2)$$

is the cointegrating factor or equation. Its being a I(0) variable implies:

$$\Delta y_t = f + b (y_{t-1} - ax_{t-1}) + \sum c_j \Delta y_{t-j} + \sum d_k \Delta x_{t-k} \text{ with } j > 0 \text{ and } k \geq 0 \quad (3)$$

Equation (3) is what is usually called an error correction model (E.C.M). The lagged endogenous variables are called autoregressive. They capture the memory of the stochastic process. (3) collapses asymptotically into a cointegrated equation identical with (2), because the change in x as well as in y is null when t tends towards infinity. Whence (2) is called the long term equilibrium, i.e. the relation between x and y that obtains only in the long term.



TABLE 4  
UNIT ROOT TESTS FOR THE COINTEGRATED EQUATIONS

Companies	Cointegrated Equations	Lags
Controladora Comercial de México	$Rmcm + 0.065 - 1.083 * Rsp$ (0.7) (2.62) ADF = -2.19 5% Fractile = -1.94	1
Grupo Vitro	$Rvto + 0.17 - 0.89 * Rsp$ (2.54) (2.75) ADF = -2.26 5% Fractile = -1.94	1
Grupo Industrial de Durango	$Rgid + 0.17 - 1.13 * Rsp$ (3.0) (3.18) ADF = -2.46 5% Fractile = -1.94	1
Desc	$Rdes + 0.25 - 1.53 * rsp$ (3.0) (4.3) ADF = -2.92 5% Fractile = -1.94	1
Televisa	$Rtv + 0.094 - 1.16 * Rsp$ (1.91) (3.37) ADF = -2.23 5% Fractile = -1.94	1
Fomento Económico de México	$Rfmx - 0.12 - 1.56 * Rsp$ (1.3) (2.82) ADF = -2.12 5% Fractile = -1.94	6
Coca-Cola Femsa	$Rkof - 0.05 - 0.84 * Rsp$ (0.7) (2.4) ADF = -2.39 5% Fractile = -1.94	1
Telmex	$Rtmx - 0.11 - 0.66 * Rsp$ (1.7) (2.0) ADF = -2.73 5% Fractile = -1.94	1
Savia	$Rvai + 0.28 - 1.29 * Rsp$ (3.3) (3.6) ADF = -3.15 5% Fractile = -1.94	1
Tubos de Acero de México	$Rtam - 0.07 - 1.50 * Rsp$ (0.9) (4.4) ADF = -2.31 5% Fractile = -1.94	1
Grupo Elektra	$Rekt - 0.11 - 1.19 * Rsp$ (3.3) (1.3) (3.2) ADF = -2.1 5% Fractile = -1.94	3
IMSA	$Rimy + 0.24 - 0.98 * Rsp$ (2.7) (2.3) ADF = -2.06 5% Fractile = -1.94	1

NB: The absolute value of the student statistics are indicated below the coefficients. The Augmented Dickey Fuller (ADF) test is based on specifications without intercept because, by definition, the residuals in equation (1) average out to zero. The number of lags attached to the unit root test is determined by the minimization of the Schwarz criterion. The 5% Fractile in the table is MacKinnon's.

When  $t$  is finite, (3) allows to test the causality from the U.S. market to Mexican ADRs. Supposing that  $x$  stands for the S&P500 index's return and  $y$  for an ADR's return, it suffices to test whether each coefficient  $d_k$  with  $k > 0$  is statistically null. If not, there is causality in the Granger sense of the word.

TABLE 5  
THE ERROR CORRECTING MODEL TABLE

Companies	Cointegrating Factor in $t-1$	Autoregressive Variables	S&P500 Index	F Statistic (Number of Observations)
Tubos de Acero de México	-0.11 (t = -2.22)	Not significant	Lag = 0 2.03 (t = 4.5)	13.99 (N = 86)
Controladora Comercial de México	Not significant	Not significant	Lag = 0 1.84 (t = 4.7) Lag = 1 0.84 (t = 2.2)	11.60 (N = 47)
Vitro	-0.07 (t = -1.9)	Not significant	Lag = 0 1.26 (t = 4.3)	12.61 (N = 106)
Grupo Industrial de Durango	-0.11 (t = -2.3)	Lag = 1 0.22 (t = 2.08)	Lag = 0 1.09 (t = 3.4) Lag = 5 0.66 (t = 2.01)	5.74 (N = 73)
Coca-Cola Femsa	-0.16 (t = -2.6)	Not significant	Lag = 0 1.54 (t = 4.1)	14.84 (N = 84)
Fomento Económico de México	-0.45 (t = -2.9)	Not significant	Lag = 0 1.84 (t = 3.7)	12.82 (N = 28)
Desc	-0.14 (t = -2.7)	Lag = 1 0.34 (t = 2.6)	Lag = 0 1.49 (t = 4.7)	11.23 (N = 73)
Grupo Elektra	Not significant	Not significant	Lag = 0 2.34 (t = 4.5)	13.06 (N = 61)
Televisa	Not significant	Not significant	Lag = 0 2.01 (t = 4.9) Lag = 4 1.54 (t = 3.8)	32.59 (N = 93)
Savia	-0.15 (t = -2.82)	Not significant	Lag = 0 0.47 (t = 2.2)	6.65 (N = 79)

Table 5 demonstrates that an E.C.M. can significantly trace Mexican ADRs' processes except the ones of Controladora Comercial de México, Televisa and Elektra,

which have no finite limit in the long run. They are also the evidence that the star Mexican ADRs have no memory. Only Savia and Desc's ADRs are an exception to that conclusion, but their memory does not exceed one month. In other words, unlike the usual result of the literature on emerging markets<sup>19</sup> that stock quotes tend to be highly autocorrelated over time, Mexican ADRs behave like their peers from the developed world, whose autocorrelation over time is almost nonexistent.

Last but not least item of the causality test is the information that the S&P500 index impacts on each Mexican stellar ADR but does not Granger cause all of them, except Televisa, Grupo Industrial de Durango and Controladora Comercial de México's ADRs. Put differently, the U.S. market's variation has more often than not an instantaneous rather than a lasting effect on Mexican ADRs. This result is not puzzling *per se*: it just reflects that the dynamics of the star Mexican ADRs does not stand out by its complexity.

These causality results are also robust. Although grounded into the Granger Engle representation theorem, they are not contradicted by the vector error correction model underlying the Johansen cointegration test, the statistics of which are presented in Annex III.

### III. Testing the Superiority of Mexican ADRs

This third part draws more upon how financial analysts assess financial assets relatively with one another. As opposed to the approach above, rather than comparing the thirteen star Mexican ADRs with a portfolio made up of all the stocks included in the S&P 500 index, it compares each of them with a portfolio comprising four U.S. stocks from the same industry, which are the most similar in terms of market capitalization.<sup>20</sup> Those U.S. financial assets are listed in Annex IV. They are aggregated into a minimum variance portfolio<sup>21</sup> in accordance with the Lagrangian approach to mean-variance frontier, for the purpose of running a test of equal nominal return and risk among peers. The emerging market stock, represented by the Mexican ADR, is declared superior if its nominal return is higher compared with the portfolio made up of its U.S. peers. Hence Table 6.

The result that holds in each of the thirteen cases is that Mexican ADRs are by far more volatile than their U.S. peers, as documented by other publications on emerging markets. This evidence does not imply, however, that Mexican ADRs have necessarily higher returns than their U.S. peers to compensate for their higher risks. According to the equal mean test statistic and the p-value associated with it, in ten out of thirteen cases, the hypothesis of equal return fails to be rejected at a 5% significance level. In other words, only three Mexican ADRs display significantly higher returns. They are the following: Telmex, Coca-Cola Femsa and Fomento Económico de México. They can be called the superstars of Mexico, because they are the only ones that justify the purchase of Mexican ADRs by guaranteeing a higher return to compensate for a higher risk. Except Telmex, they all belong to the food sector and bear witness to the fact that Mexico is still an under-developed country in which relatively big families and a young population make feeding (Controladora Comercial de México) the masses and

TABLE 6

## THE COMPARATIVE TABLE

Companies	Average Return (%)	Risk (%)	Equal Mean Test Statistic	Equal Variance Test Statistic
Desc U.S. Peers	1.4 12.5	48 13.5	3.6 (pvalue = 5.6%)	12.71 (pvalue = 0)
Grupo Elektra U.S. Peers	10.2 -6.6	65 20	2.25 (pvalue = 13%)	10.63 (pvalue = 0)
Fomento Económico de México U.S. Peers	19.5 -0.5	34.9 13.1	8.31 (pvalue = 0.5%)	7.06 (pvalue = 0)
IMSA U.S. Peers	-13 -8	42 21	0.51 (pvalue = 47%)	3.96 (pvalue = 0)
Coca-Cola Femsa U.S. Peers	19 8.2	41 17	5.37 (pvalue = 2.1%)	5.27 (pvalue = 0)
Grupo Maseca U.S. Peers	28.8 16.1	56 14	3.09 (pvalue = 8%)	15.3 (pvalue = 0)
Tubos de Acero de México U.S. Peers	9.5 -8.1	58 16	3.91 (pvalue = 5.1%)	12.9 (pvalue = 0)
Grupo Industrial de Durango U.S. Peers	2.8 11	50 22	1.70 (pvalue = 19%)	5 (pvalue = 0)
Telmex U.S. Peers	38 -16	48 10	28.1 (pvalue 0)	20.3 (pvalue = 0)
Televisa U.S. Peers	23 39	57 38	2.7 (pvalue = 10%)	2.27 (pvalue = 0.5%)
Savia U.S. Peers	-5.6 8.4	33 24	9.08 (pvalue = 0)	1.96 (pvalue = 0.3%)
Vitro U.S. Peers	-3.1 3.6	48 16	1.82 (pvalue = 17%)	8.17 (pvalue = 0)
Controladora Comercial de México U.S. Peers	4.9 -0.9	37 8.7	0.82 (pvalue = 36%)	18.4 (pvalue = 0)

sating their thirst (Femsa and Coca-Cola Femsa) a very profitable business. Telmex's exceptional financial return would not surprise anybody knowledgeable about Mexican business: its privatization in 1991 sparked off a huge controversy over transparency and corruption; it has enjoyed to this day a monopoly over the telecommunications sector; it is by far the biggest Mexican company quoted in Wall Street; it is led by the richest man in Latin America. Telmex is not, however, the only company south of

the Rio Grande whose financial results benefited from a monopolistic or oligopolistic position in the nineties. Consequently, as far as the financial market is concerned, success –the ability to fulfill investors’ expectations– is unrelated to industrial structure. By the same token, growth is not a sufficient return boosting factor. Witness that all the Mexican companies were lifted by the rising tide that the implementation of NAFTA generated from 1994 to the 2001 recession. But only four out of the ones replicating the U.S. financial market could deliver higher returns. Unlike the literature on emerging markets, Table 6 demonstrates that compared with developed countries, emerging markets companies are not necessarily at an advantage to attract investors because of their higher growth.

That the three superstars have higher return than their U.S. peers is no guarantee, however, that they exemplify the capital asset pricing model. To do so, their expected excess return ( $R_{it}-R_f$ ) as much as their peers’ must be proportionate to their risk parameter ( $\beta$ ). In econometric terms, each stock, be it a superstar’s or a U.S. peer’s, has to pass the econometric test of the capital asset pricing model. Practically, this amounts to testing the hypothesis  $H_0: \alpha = 0$  using the estimates of the regression for any concerned stock  $i$ :

$$R_{it} - R_f = \alpha + \beta^*(R_{mt} - R_f) + \varepsilon_t \quad (4)$$

Table 7 is the outcome of that testing enterprise. It is predicated upon  $R_{mt}$  being the S&P 500 index return, and  $R_f$  the one year U.S. TB monthly average rate on the secondary market. The SUR estimation technique is used to factor in the common errors affecting the quote of Mexican and U.S. stocks from companies of the same industry.

TABLE 7

## THE SUR ESTIMATES

Companies	Estimated Constants	Estimated Betas	Test Statistic and P-value for $H_0$ : the expectation of each estimated constant is null	
Coca-Cola Femsá U.S. peers	0.04 (t = 0.78) -0.01 (t = -0.53)	0.90 (t = 3.22) 0.37 (t = 3.02)	1.23	0.53
Fomento Económico de México U.S. peers	0.15 (t = 3.58) -0.01 (t = -0.53)	1.61 (t = 5.78) 0.37 (t = 3.02)	13.19	0.001
Telmex U.S. peers	0.095 (t = 2.17) -0.20 (t = -10.63)	0.68 (t = 2.59) 0.34 (t = 2.47)	116.90	$\cong 0$

The message from Table 7 for U.S. investors takes issue with the optimism associated with investing in emerging markets in the nineties: only the difference in return between Coca-Cola Femsa and its U.S. peers can be accounted for by the capital asset pricing model at a 5% significance level. In other words, it is pure gamble buying Mexican ADRs since, save one of them, either their returns are low compared with their risks, or, when they outperform U.S. shares from the same industry, they do not significantly compensate for their own risks. This pessimism remains intact when U.S. investors compare Mexican ADRs not with their U.S. peers, but with one another. As evidenced by the SUR estimates and test statistics in the Annex V, the expected excess returns of Mexican ADRs are not proportional to their risk parameters, and consequently cannot be construed as consistent with the capital asset pricing model. Therefore, it is baseless to pick a portfolio of Mexican ADRs based on the excess return criterion.

#### IV. Testing for an Opportunity for Diversification

If the finance literature on emerging markets has got it right, each Mexican ADR should represent an opportunity for diversification for U.S. investors interested in its industry of origin: its inclusion into a portfolio of U.S. stocks should impact on the return and risk thereof. To test this idea, this paper considers the risk free asset  $R_f$  in (4) and the four U.S. peers associated with each Mexican ADR, as explained in the second part. At issue is to ascertain whether or not there exists a portfolio of U.S. stocks whose return equals that of its corresponding Mexican ADR. Only if the test is negative, can a Mexican ADR be an opportunity for diversification. Otherwise, it is absolutely superfluous.

In econometric terms, the approach above amounts to estimating and studying the following equation:

$$R_{it} = a + \sum b_u R_{ut} + \epsilon_t \quad (5)$$

with  $u \in \{1, 2, 3, 4, 5\}$ ,  $R_5$  being the risk free asset, and  $i$  the index for Mexican ADRs.

If the data cannot accept the dual null hypothesis  $H_0: a = 0$  and  $\sum b_u = 1$ , then the corresponding Mexican ADR  $i$  is an opportunity for diversification; otherwise, its return and risk could be deduced from or spanned by a portfolio of five U.S. stocks, which would prove the irrelevance of its inclusion into an ex-ante 100% U.S. portfolio.

In other words, the acceptance of the dual null hypothesis above, if expressed in terms of the mathematics of mean-variance efficient sets, implies that the weight associated with the Mexican ADR included in an ex-ante all U.S. portfolio –made up of four risky stocks and a risk free asset– is zero. To demonstrate this, it is necessary to have in mind that: a) the weights of the global minimum variance portfolio are the same as the components of the vector  $GM = [1_6 V^{-1} 1_6]^{-1} V^{-1} 1_6$ , with  $V$  being the variance matrix of the assets, and  $1_6$  a vector of six components each equal to one; b) the weights of the tangency portfolio when the risk free rate is equal to 0 are the components of  $TP = [1_6 V^{-1} M]^{-1} V^{-1} M$ , with  $M$  being the vector of expected returns;<sup>22</sup> c) the combination of any two non collinear optimal portfolios –like GM and TP– is a portfolio.

Using the partitioned matrix inverse formula and distinguishing between U.S. assets and the Mexican ADR, the vector  $M$  and the matrices  $V$  and  $V^{-1}$  can be transformed as follows<sup>23</sup> with “us” being the index for the United States, “mx” the index for Mexico, and “ux” or “ms” the index for the correlation between the United States’ assets and Mexico’s:

$$M = E(R_t) = [M_{us} \ M_{mx}] \quad V = \text{Var}(R_t) = \begin{bmatrix} V_{us} & V_{ux} \\ V_{ux} & V_{mx} \end{bmatrix} \quad IV = V^{-1}$$

$$V^{-1} = \begin{bmatrix} IV_{us} + IV_{us} V_{ux} H V_{ms} IV_{us} & -IV_{us} V_{ux} H \\ -H V_{ux} IV_{us} & H \end{bmatrix} \quad H = (IV_{mx} - V_{ms} IV_{us} V_{ux})^{-1}$$

It follows that the numerators of the last components of GM and TP are respectively:

$$NW_1 = H(1 - V_{ux} IV_{us})$$

$$NW_2 = H(M_{mx} - M_{us} V_{ux} IV_{us})$$

$V_{ux} IV_{us}$  and  $M_{mx} - M_{us} V_{ux} IV_{us}$  are respectively the OLS estimates for the transpose of the vector  $b$  (made up of the five  $b_u$  coefficients) and the coefficient  $a$  in the equation (5). As a result,  $NW_1$  and  $NW_2$  are both null if the dual null hypothesis  $H_0$  is not rejected by the data. In other words, the rational U.S. investor will not include any Mexican ADR in his portfolio if  $H_0$  is true, which was the purpose of the demonstration.<sup>24</sup>

Table 8 displays the results of the  $H_0$  test. The hypothesis  $H_0$  holds in the case of four out of the thirteen star ADRs at a five per cent significance level: Tubos de Acero de México, Grupo Vitro, Grupo Desc and Controladora Comercial de México. None of the four enumerated ADRs was established in the second part as one of the four superstars outperforming their U.S. peers in terms of both return and risk. Even so, they prove that any outstanding Mexican ADR is not necessarily an opportunity for portfolio diversification, which stands in stark contrast to how diversification away from U.S. into emerging markets stocks was advertised in the nineties.

Table 8 also rebuts another conventional wisdom from the 90s literature on emerging markets, namely, the idea that the lack of ex ante correlation with the U.S. financial market guarantees that emerging markets stocks represent an opportunity for diversification.

With Table 9, the inquiry into opportunities for diversification comes full circle. It reaches the point of checking whether or not the inclusion into an ex ante 100% U.S. portfolio of each of the nine exceptional Mexican ADRs, identified by Table 8 as opportunities for diversification, really generates either an increase in return or a decrease in risk. Unlike our expectations, only three ADRs – a 33% acceptance rate! – confirm the diversification opportunity test at a 5% significance level: Grupo Industrial de Durango, Grupo Maseca and Telmex. Save Telmex, all the star and

TABLE 8

## THE DIVERSIFICATION OPPORTUNITY TEST

Companies (Acronym)	Test Statistic	P-value (%)
Desc (desc)	2.02	14
Grupo Elektra (ekt)	8.65	≅ 0
Fomento Económico de México (fmx)	6.57	0.57
Grupo Industrial de Durango (gid)	18.17	≅ 0
IMSA (imy)	28.9	≅ 0
Coca-Cola Femsa (kof)	5.69	0.49
Controladora Comercial de México (mcm)	0.031	96
Grupo Maseca (msk)	40.54	≅ 0
Tubos de Acero de México (tam)	0.67	51
Telmex (tmx)	22.44	≅ 0
Grupo Televisa (tv)	4.31	1.97
Savia (vai)	19.27	≅ 0
Vitro (vto)	0.98	37

TABLE 9

## THE SPANNING TEST

Companies	Average Return	Risk	Identical Return Test Statistic (P-value)	Identical Risk Test Statistic (P-value)
U.S. peers U.S. peers+ekt	0.041 0.041	0.0030 0.0027	1.391 (0.24)	1.174 (0.63)
U.S. peers U.S. peers+gid	0.048 0.049	0.0059 0.0044	3.037 (0.08)	1.755 (0.01)
U.S. peers U.S. peers+imy	0.047 0.046	0.0065 0.0051	0.914 (0.34)	1.616 (0.11)
U.S. peers U.S. peers+kof	0.051 0.051	0.0059 0.0057	0.015 (0.90)	1.055 (0.80)
U.S. peers U.S. peers+msk	0.048 0.050	0.60 0.40	2.00 (0.046)	2.20 (0.002)
U.S. peers U.S. peers +tv	0.048 0.047	0.005 0.004	0.180 (0.66)	1.230 (0.47)
U.S. peers U.S. peers+vai	0.048 0.048	0.40 0.40	0.120 (0.72)	1.04 (0.84)
U.S. peers U.S. peers+tmx	0.037 0.037	0.0041 0.0025	0.076 (0.78)	2.731 (0.02)
U.S. peers U.S. peers+fmx	0.050 0.042	0.0080 0.0050	15.69 (≅ 0)	1.840 (0.11)



superstar ADRs identified in the second part are missing, which denotes that the results of this paper lack robustness and lead to pinpointing only one Mexican ADR as a success story.

That Telmex is the financial flagship of Mexico in the U.S. bears witness to the fact that Wall Street and the Mexican public opinion have the same perception of the telecommunications giant of Mexico. U.S. investors may not have been aware of the exceptionally contentious conditions in which Telmex was privatized in 1990 nor may they necessarily care about the economic muscle of its owner within corporate Mexico and the Mexican government. All along the nineties, they just reacted through the stock market to the outstanding financial performances of Telmex without probably paying attention to the monopolistic position in Mexico that made them possible. That's why they bought so many Telmex's shares that it is to this day the biggest Mexican ADR in terms of market capitalization; U.S. institutional investors own 37% of Telmex's ADRs;<sup>25</sup> and they significantly reacted to Telmex's news in twelve out of twenty cases.

## V. Conclusion

Mexican ADRs have not been, therefore, as good as expected by the literature that tried to account for the massive purchases of assets from emerging countries in the nineties. There is no denying that more than half the sample under consideration in this paper –thirteen out of twenty four– won the trust of U.S. investors in the nineties, so much so that their nominal returns or quotes replicated the fluctuations of the S&P500 index. But overwhelmingly, their nominal returns failed to compensate for their risks. By the same token, the high growth in Mexico from 1996 through 2000 did not boost the underlying shares of most Mexican ADRs so that their nominal returns could outperform their U.S. peers'. Last but not least, it is exceptionally that the inclusion of a Mexican ADR into an ex-ante 100% U.S. portfolio would have generated an increase in return or a decrease in risk.

Two views are candidates for the interpretation of this paper's results. The pessimistic view dismisses Mexican ADRs as lousy opportunities for investment and declares the purpose of financial globalization totally empty. In contrast, the optimistic view calls for a more sophisticated modeling of Mexican ADRs than the two moments CAPM to account for the stocks issued in the NYSE by Mexican firms.

There are several ways to go about improving on the results of this paper. First, it is possible to use quotes more significant of investors' expectations such as the ones in option contracts. Second, one can adopt a more sophisticated specification of the CAPM like the Fama-French three factor model<sup>26</sup> or the three moment model.<sup>27</sup> Third, the asset pricing models that are alternatives to the CAPM, such as the APT model,<sup>28</sup> can be explored.

It was not this paper's concern to adjudicate between the optimistic and pessimistic interpretation of its results, but its conclusion calls indeed for another paper to settle the issue.

## Notes

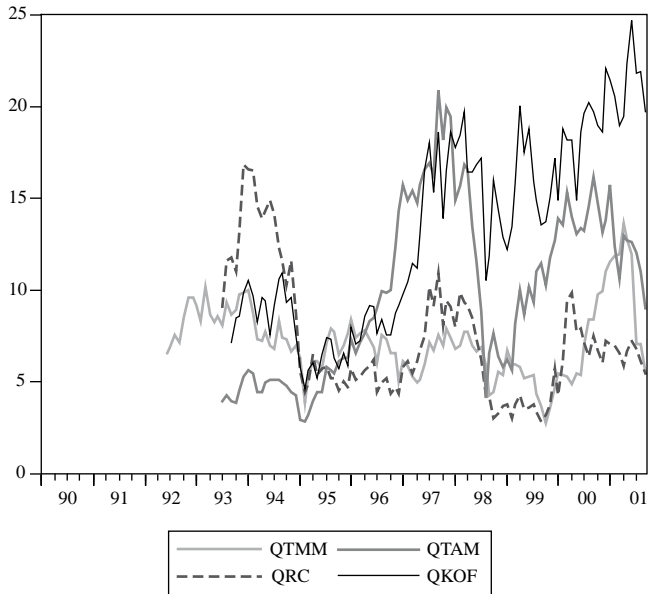
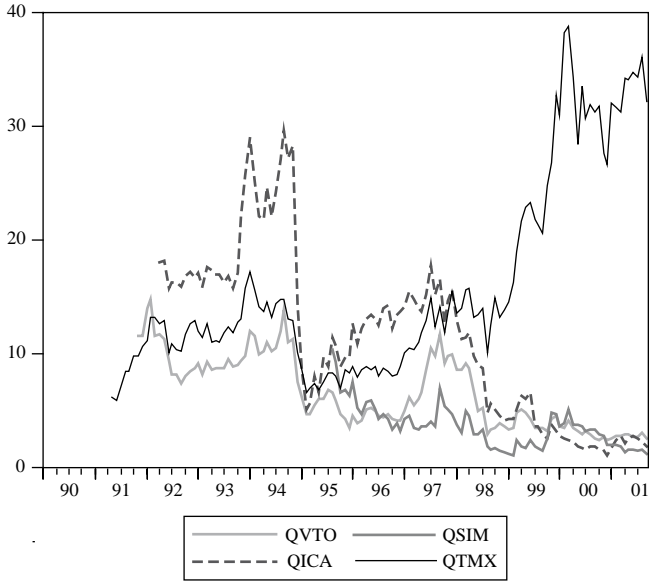
- <sup>1</sup> Edwards (1994).
- <sup>2</sup> Krugman (1994).
- <sup>3</sup> That company is, of course, Telmex, the main shareholder of which is the richest man in Latin America, Carlos Slim Helu.
- <sup>4</sup> Krueger and Tornell (1999).
- <sup>5</sup> Magazine Proceso (2001).
- <sup>6</sup> Bekaert (2000), Errunza (1997), and Harvey's website.
- <sup>7</sup> Harvey (1995).
- <sup>8</sup> See Elton and Gruber (1991).
- <sup>9</sup> The market model is not based on a regression in level but in growth rate.
- <sup>10</sup> Coca-Cola Femsa is only one component of the conglomerate Femsa.
- <sup>11</sup> Because the SUR estimation technique, as opposed to the OLS one, takes into account the common errors impacting on the stocks.
- <sup>12</sup> The web-site of Yahoo Finance supplies a thorough profile of each public company, be it American or foreign.
- <sup>13</sup> MacKinlay (1997).
- <sup>14</sup> The Chow test only requires that the date of the news be exactly known. That condition is met in this paper, due to the fact that no uncertainty is attached to the date of a split or dividend announcement. To be sure, the market can discount a split or a dividend announcement ahead of time, but it is this paper's assumption that investors' forward looking strategies do not extend to a period cutting across two months, which means they do not affect the generating process of the monthly data under consideration. Consequently, it is unnecessary to search for unknown breakpoints using either the Cusum test or Jushan Bai's approach to structural change.
- <sup>15</sup> The Nasdaq index moved from 2192 to 4069 points between December 1998 and December 1999.
- <sup>16</sup> Granger and Engle (1987).
- <sup>17</sup> The test in question is the augmented Dickey Fuller test.
- <sup>18</sup> Granger (1988).
- <sup>19</sup> Harvey (1995).
- <sup>20</sup> The U.S. companies listed in Annex IV come from the company report on each ADR issuing Mexican company, published by Market Guide Inc. (Web site: [www.marketguide.com](http://www.marketguide.com)). To the criterion of being close to a Mexican company in terms of market capitalization, we have added the criterion of having a stock that has been quoted for more than two years.
- <sup>21</sup> Campbell *et al.* (1997).
- <sup>22</sup> Campbell *et al.* (1997), Chap. 5, equations 5.2.10 and 5.2.28.
- <sup>23</sup> The return vector and the risk matrix are partitioned to highlight how the Mexican ADR contributes to the portfolio selection. This approach to testing an opportunity for diversification is more sophisticated than computing the low correlation between developed and emerging markets indexes as in Harvey (1995).
- <sup>24</sup> The result is exactly the same as the one demonstrated otherwise by Huberman and Kandel (1987).
- <sup>25</sup> See the profile of Telmex in the Web site of Yahoo Finance.
- <sup>26</sup> Fama and French (1995).
- <sup>27</sup> Friend *et al.* (1980) and Harvey *et al.* (2000).
- <sup>28</sup> Ross (1976).

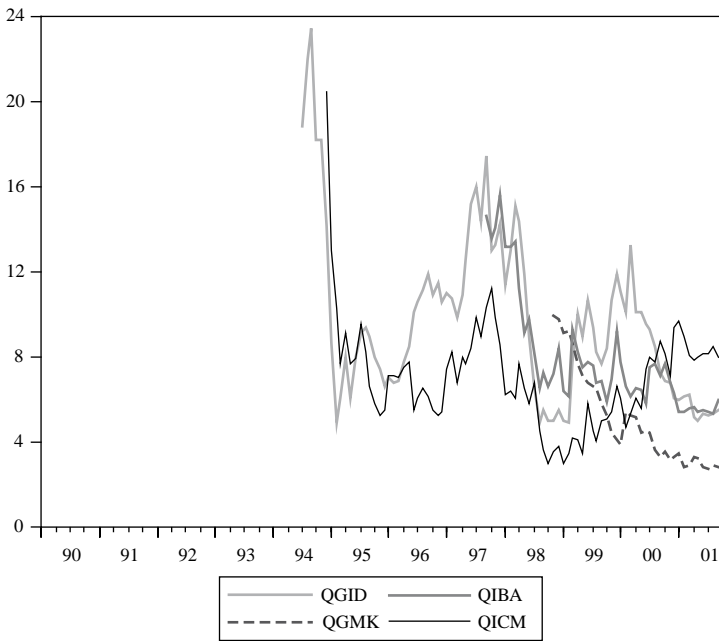
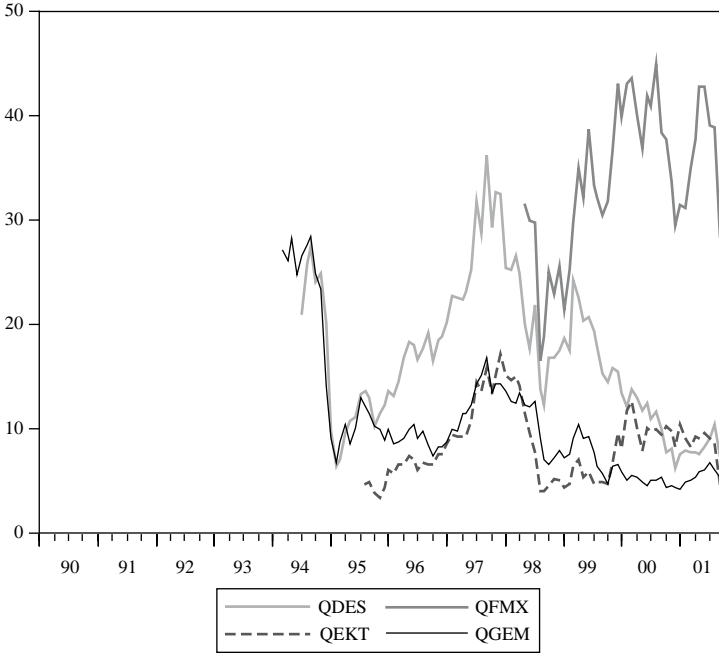
## References

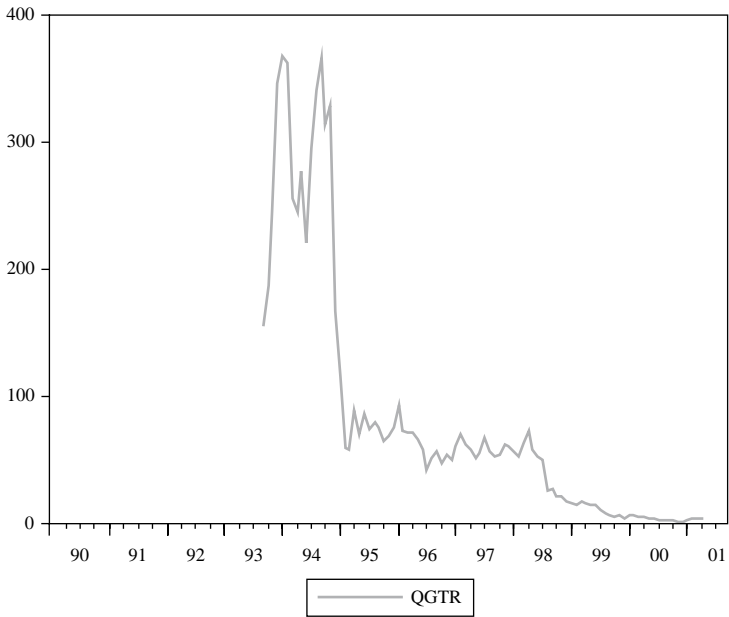
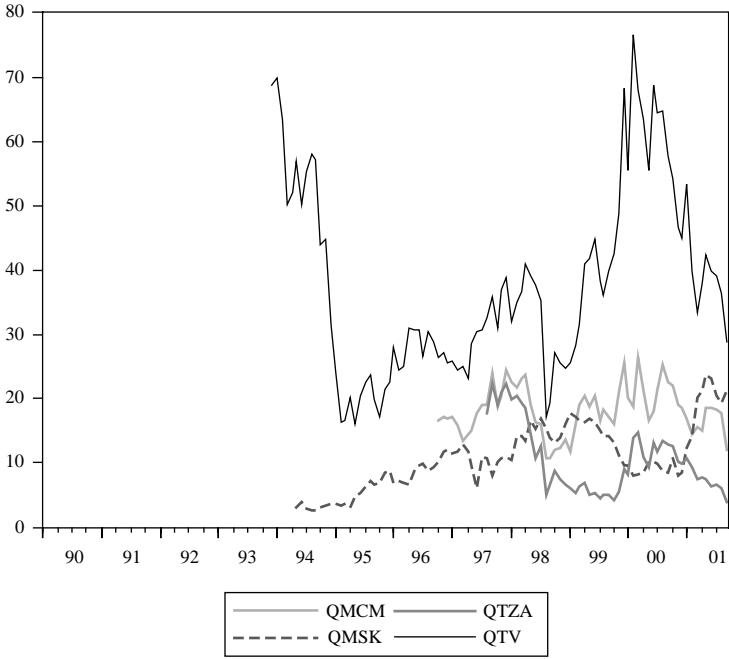
- BEKAERT, G. (2000). "Emerging Equity Markets and Market Integration", Summary *Research in NBER Reporter*, Winter.
- CAMPBELL, J., A. LO and C. MACKINLAY (1997). *The Econometrics of Financial Markets*, Princeton University Press.

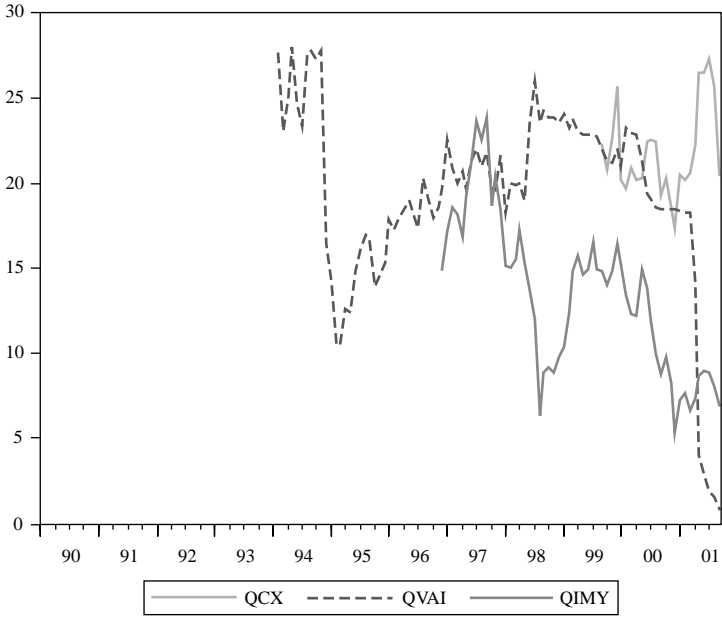
- DOMOVITZ, I., J. GLEN and A. MADHAVAN (1998). "International Cross-Listing and Order Flow Migration: Evidence from an Emerging Market", *Journal of Finance*, 53 (6), pp. 2001-2027.
- EDWARDS, S. (1994). "Economic Reform and Modernization in Latin America", *Research Summary in NBER Reporter*, Spring.
- ELTON, E. and M. GRUBER (1991). *Modern Portfolio Theory and Investment Analysis*, John Wiley, Chap. V, pp. 97-125.
- ERRUNZA, V. (1997). "Research on Emerging Markets: Past, Present and Future", *Emerging Markets Quarterly*, 1 (3), pp. 5-18.
- MAGAZINE PROCESO (2001). "En 20 Años, de la Nacionalización de la Banca a la Venta a Extranjeros", in the *Magazine Proceso* # 1281, May 20.
- FAMA, E. and K. FRENCH (1995). "Size and Book to Market Factors in Earnings and Returns", *Journal of Finance*, 50 (1), pp. 131-155.
- FRIEND, I. and R. WESTERFIELD (1980). "Co-skewness and Capital Asset Pricing", *Journal of Finance*, 35 (4), pp. 897-913.
- GRANGER, C. and R. ENGLE (1987). "Cointegration and Error Correction: Representation, Estimation, and Testing", *Econometrica*, 55 (2), pp. 251-276.
- GRANGER, C. (1988). "Some Recent Developments in a Concept of Causality", *Journal of Econometrics*, 39 (1-2), pp. 199-211.
- HARVEY, C. (2001). "Asset Pricing in Emerging Markets" in O. Ashenfelter, *International Encyclopedia of the Social and Behavioral Sciences*, Elsevier Science Limited, pp. 840-845.
- HARVEY, C. (1995). "The Risk Exposure of Emerging Equity Markets", *The World Bank Economic Review*, 9 (1), pp. 19-50.
- HARVEY, C. (1995). "Predictable Risk and Returns in Emerging Markets", *The Review of Financial Studies*, 8 (3), pp. 1263-1295.
- HARVEY, C. and S. SIDDIQUE (2000). "Conditional Skewness in Asset Pricing Tests", *Journal of Finance* 55 (3), pp. 1263-1295.
- HUBERMAN, G. and S. KANDEL (1987). "Mean-Variance Spanning", *The Journal of Finance*, 42 (4), pp. 873-888.
- KRUEGER, A. and A. TORNELL (1999). "The Role of Bank Restructuring in Recovering from Crises: Mexico 1995-98", *NBER Working Paper* # 7042.
- KRUGMAN, P. (1994). "Policy on Developing Country Debt" in Martin Feldstein *et al.*, *American Economic Policy in the 1980s*, Chap. IX, pp. 691-739, The University of Chicago Press, Chicago.
- MACKINLAY, A. (1997). "Event Study in Economics and Finance", *Journal of Economic Literature*, 35 (1), pp. 13-39.
- ROSS, S. (1976). "The Arbitrage Theory of Capital Asset Pricing", *Journal of Economic Theory*, 13 (3), pp. 341-360.

**ANNEX I**









**ANNEX II****TABLE 10**

UNIT ROOT TESTS FOR THE RETURN OF THE STAR ADRs

Companies	Acronym	LAGS	ADF Statistic	Mac-Kinnon 5% Fractile
Controladora Comercial de México	MCM	1	-5.42	-2.92
Tubos de Acero de México	TAM	1	-7.55	-2.89
Grupo Vitro	VTO	1	-6.82	-2.88
Grupo Maseca	MSK	1	-7.73	-2.90
Savia	VAI	1	-5.26	-2.89
Grupo Industrial de Durango	GID	1	-5.51	-2.90
Desc	DES	1	-5.97	-2.90
Grupo Elektra	EKT	1	-5.95	-2.91
Televisa	TV	1	-7.29	-2.89
Fomento Económico de México	FMX	5	-3.24	-3.00
Coca-Cola Femsa	KOF	1	-7.64	-2.89
IMSA	IMY	1	-5.32	-2.93
Telmex	TMX	1	-8.13	-2.88

**TABLE 11**

UNIT ROOT TEST FOR THE RETURN OF THE S&amp;P INDEX

LAG	ADF Statistic	Mac-Kinnon 5% Fractile
1	-8.70	-2.88



**ANNEX III****TABLE 12****THE JOHANSEN COINTEGRATION TEST RESULTS**

Companies	Acronym	Trace Statistic	5% Critical Value
Controladora Comercial de México	MCM	4.57	9.16
Grupo Vitro	VTO	0.61	9.16
Grupo Industrial de Durango	GID	2.14	9.16
Desc	DES	1.17	9.16
Televisa	TV	1.43	9.16
Fomento Económico de México	FMX	1.68	9.16
Coca-Cola Femsa	KOF	1.30	9.16
Telmex	TMX	0.76	9.16
SAVIA	VAI	1.60	9.16
Tubos de Acero de México	TAM	0.40	9.16
Grupo Elektra	EKT	3.50	9.16
IMSA	IMY	4.24	9.16

NB: The lag associated with each cointegration test is equal to five. The hypothesized number of cointegrated equations is equal to one. The Johansen approach to cointegration is exhaustively presented in James Hamilton, "Time Series Analysis", Chapter 20, Princeton University Press, 1994.

## ANNEX IV

TABLE 13

## THE U.S. PEERS TO ADR ISSUING MEXICAN COMPANIES

Mexican Companies (Acronym)	U.S. Companies
Controladora Comercial de México (MCM)	Sotheby's Holdings Sonic Automotive Inc. Carmax Group Ferrellgas Partners, L.P.
Vitro (VTO)	Myers Industries, Inc. Intertape Polymer Group Crown Cork and seal Co. Inc. Liquid-Box Corporation
Savia (VAI)	Capitol Transamerica Corp. Nymagic, Inc. Navigators Group, Inc. Pxre Group Ltd
Tubos de Acero de México (TAM)	Carbo Ceramics Inc. Elcor Corporation Bohler Uddeholm AG Lone Star Technologies
Grupo Televisa (TV)	USA Networks Univision Communications Adelphia Communications Cox Radio, Inc.
Grupo Industrial de Durango (GID)	American Israeli Paper Mercer International Inc. Gaylord Container Corp. FiberMark, inc.
Grupo Elektra (EKT)	Dillard's Inc. Saks, Inc. Shopko Stores, Inc. Pricesmart, Inc.
Fomento Económico de México (FMX)	Cadbury Schweppes plc Coca-cola Enterprises PepsiAmericas, Inc. Panamerican Beverages
Coca-Cola Femsa (KOF)	Cadbury Schweppes plc Coca-Cola Enterprises PepsiAmericas, Inc. Panamerican Beverages
Desc (DES)	San Juan Basin Royalty Thornburg Mortgage, Inc. Petroleum &Resource Fund Charter Municipal Mortg.
Grupo IMSA (IMY)	Gerdau S.A. Carpenter Technology Corp. Steel Dynamics, Inc. Ipsco Inc.
Telmex (TMX)	Qwest Communications Int. Sprint PCS Group Swisscom AG BCE, Inc.
Grupo Maseca (MSK)	Riviana Foods Inc. Sanderson Farms, Inc. J&J Snack Foods Corp. Nature's Sunshine Prod.

## ANNEX V

TABLE 14

## THE CAPM SUR ESTIMATION

Dependent Variable: RADR - U.S. TB RATE

Method: Seemingly Unrelated Regression

Sample: 1992:05 2001:08

Included observations: 112

Number of cross-sections used: 13

Total panel (unbalanced) observations: 953

Convergence achieved after 24 iteration(s)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MCM - C	-0.075564	0.047394	-1.594384	0.1112
FMX - C	0.014040	0.051008	0.275252	0.7832
KOF - C	0.086496	0.042225	2.048476	0.0408
TMX - C	0.095516	0.035692	2.676122	0.0076
VTO - C	-0.137801	0.043834	-3.143679	0.0017
VAI - C	-0.292577	0.037716	-7.757309	0.0000
TAM - C	0.087040	0.061119	1.424111	0.1548
TV - C	-0.133653	0.058682	-2.277571	0.0230
GID - C	-0.216868	0.057826	-3.750368	0.0002
EKT - C	0.145738	0.082659	1.763116	0.0782
DES - C	-0.246441	0.054510	-4.521061	0.0000
IMY - C	-0.279772	0.056705	-4.933818	0.0000
MSK - C	0.486333	0.084612	5.747796	0.0000
MCM - (RSP - US TB RATE)	0.933876	0.249150	3.748253	0.0002
FMX - (RSP - US TB RATE)	0.740488	0.319451	2.317999	0.0207
KOF - (RSP - US TB RATE)	0.683533	0.249225	2.742633	0.0062
TMX - (RSP - US TB RATE)	0.618037	0.238851	2.587539	0.0098
VTO - (RSP - US TB RATE)	0.748798	0.287693	2.602764	0.0094
VAI - (RSP - US TB RATE)	1.355924	0.197131	6.878296	0.0000
TAM - (RSP - US TB RATE)	1.327877	0.345268	3.845934	0.0001
TV - (RSP - US TB RATE)	1.177617	0.332074	3.546244	0.0004
GID - (RSP - US TB RATE)	1.131883	0.304149	3.721473	0.0002
EKT - (RSP - US TB RATE)	0.810466	0.428446	1.891641	0.0589
DES - (RSP - US TB RATE)	1.540637	0.288666	5.337097	0.0000
IMY - (RSP - US TB RATE)	0.867355	0.302783	2.864612	0.0043
MSK - (RSP - US TB RATE)	-0.587151	0.443982	-1.322466	0.1863
R-squared	0.188586	Mean dependent var.		0.08233
Adjusted R-squared	0.166704	S.D. dependent var.		0.51254
S.E. of regression	0.467873	Sum squared resid.		202.925
Durbin-Watson stat	0.250110			

NB: C stands for constant; U.S. TB RATE is the U.S. T Bill rate; RSP is the acronym for the return of the S&P500 Index; RADR stands for the return of an ADR. The first word in each row is the acronym of an ADR.

TABLE 15

## TESTING THE CAPM HYPOTHESES

Wald Test:			
Null Hypothesis:	$C(1) = 0$ $C(2) = 0$ $C(3) = 0$ $C(4) = 0$ $C(5) = 0$ $C(6) = 0$ $C(7) = 0$ $C(8) = 0$ $C(9) = 0$ $C(10) = 0$ $C(11) = 0$ $C(12) = 0$ $C(13) = 0$		
F-statistic	19.79045	Probability	0.000000
Chi-square	257.2758	Probability	0.000000

NB: The null hypothesis amounts to the statement that each estimated constant (in the regression above) has an expectation equal to zero.