

# BASIC INDICATORS OF COLOMBIAN STOCK MARKET DEVELOPMENT\*

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Recent months have seen a much larger influx of funds into the Colombian stock market. For example, pension fund managers (PFM) added Col\$5.84 trillion (t) to their stock market investments between 2002 and 2006 (Financial Market Superintendent, 2007), and foreign portfolio investments (short and long term) are up by US\$1.213 million (m) (Banco de la República, 2007), with a major portion going to the stock market. This has sparked some important changes in the price of paper traded on that market, which means more risk. However, it also represents an opportunity to empower capital-market development. A stock market that is more profound offers new possibilities for financial-sector development and economic growth in general.

This situation obliges us to look at some of the indicators of stock market development (size, liquidity, concentration, risk, integration and efficiency) and to compare them to the international level. The principal findings for 2006 are summarized in the tables included in this article (Tables 1, 2 and 3).

## I. SIZE

The larger the market in terms of size, the more it is able to mobilize and diversify risk (Demirgüç-Kunt and Levine, 1995). The size of the stock market can be calculated with the help of two indicators: relative market capitalization (RC)<sup>1</sup> and the number of companies listed on the stock market in each country. These indicators are complementary: the first is relative, which means it can be used for international

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## SIZE, LIQUIDITY AND CONCENTRATION IN 2006

Country	Size		Liquidity		Concentration (5) (%)
	(1) (%)	(2) (number)	(3) (%)	(4) (%)	
<b>Regional Markets</b>					
Argentina	24.09	106	2.48	10.30	77.77
Brazil	66.52	350	25.86	38.88	52.23
Chile	120.12	246	20.40	16.98	48.29
<b>Colombia</b>	<b>41.61</b>	<b>94</b>	<b>10.99</b>	<b>26.41</b>	<b>67.37</b>
Mexico	41.47	335	11.48	27.68	76.94
Peru	42.91	221	5.88	13.71	61.53
Venezuela <sup>a/</sup>	3.50	50	0.16	4.58	n.a.
<b>International Markets as a Point of Comparison</b>					
Germany	56.53	760	94.48	167.15	40.89
Australia	145.18	1,829	113.88	78.44	31.10
Canada	134.01	3,842	101.00	75.37	23.36
China/Shanghai	34.88	842	28.00	80.26	56.63
Korea	93.94	1,689	151.09	160.84	36.29
España	107.93	3,272 <sup>a/</sup>	157.76	146.18	43.97
United States	116.43	2,280	164.42	141.30	16.11
Hong-Kong	904.81	1,173	439.17	48.54	66.30
India	87.29	1,156	47.76	54.72	34.12
Italy	55.41	311	85.89	155.01	54.47
Japan	105.65	2,416	133.22	126.20	20.06
New Zealand	43.35	182	21.51	49.63	57.57
United Kingdom	159.85	3,256	318.98	199.55	37.14
Switzerland	321.36	348	370.20	115.20	66.30
Turkey	41.38	316	56.76	137.15	48.72
<i>Euronext</i> <sup>b/</sup>	106.45	1,210	110.62	103.91	29.01

a/ 2005 data.

b/ Includes the stock markets in Portugal, Holland, France and Belgium.

Source: (1) stock market capitalization /nominal GDP; (2) number of companies listed on each stock market; (3) traded volume /nominal GDP; (4) turnover rate; (5) stock market capitalization of the 10 largest companies /total stock market capitalization. Source: (1)-(4) the author's calculations based on data from the World Federation of Exchanges (WFE), and the International Monetary Fund (IMF). The figures for Venezuela come from *World Development Indicators 2006* (WDI); (5) taken as they appear on the WFE website.

comparisons, while the second is of particular interest when it comes to analyzing extreme values. On the other hand, since speculative phenomena can be reflected in the first of these indicators, by including the market price in their construction, a combined analysis is crucial.

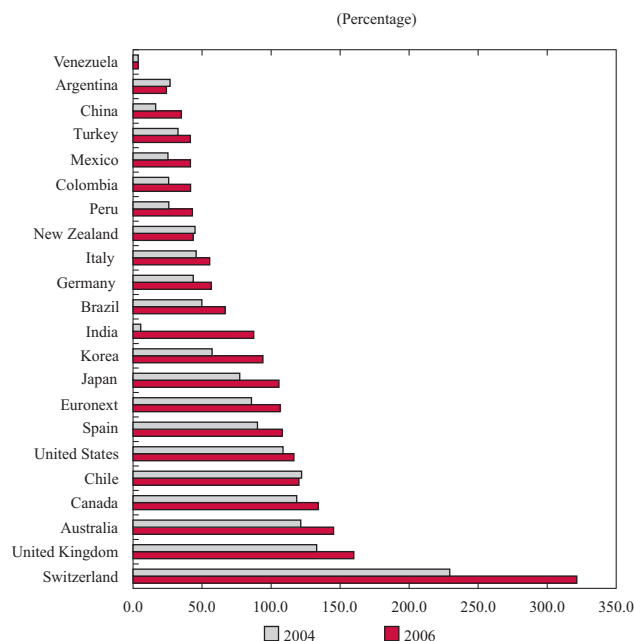
Graph 1 helps us to understand Colombia's situation in a world context. Ours is a small market in relative terms, with 41.61% market capitalization by 2006, which has been virtually constant for the last two years. It does not compare to the economies of developed markets such as Switzerland (321.36%), the United Kingdom (159.8%) or the United States (109.4%);<sup>2</sup> however, in the regional environment,

<sup>1</sup> The number of shares traded at their price on the stock market in each country; that is, stock market capitalization (SC), divided by nominal GDP for the period.

<sup>2</sup> In the case of Hong Kong, isolated from China, the size in terms of RC is up to 904.81%.

**GRAPH 1**

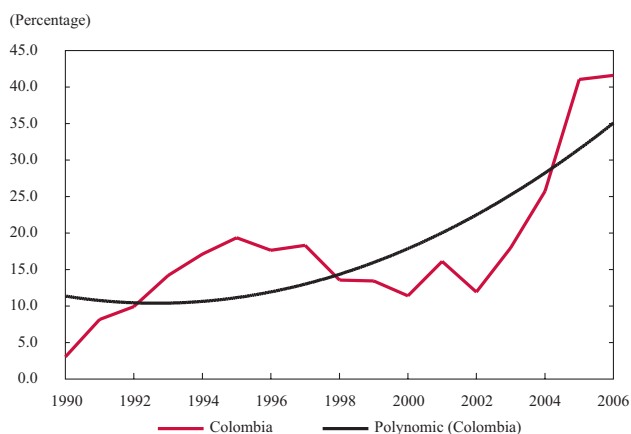
**RELATIVE CAPITALIZATION OF SELECTED COUNTRIES: 2004-2006**



Note: In the case of Venezuela, the figures are for 2004 and 2005.  
 Source: The author's calculations, are based on information taken from the websites of the World Federation of Exchanges (WFE) and the International Monetary Fund (FMI).

**GRAPH 2**

**RELATIVE CAPITALIZATION OF THE MARKET IN COLOMBIA**



Source: The author's calculations, are based on information taken from the websites of the WFE and (FMI).

thanks to the positive way the Colombian Stock Exchange (CSE) has performed in the past five years, the outlook is somewhat different. Colombia's stock market lags behind those in Chile (120.1%) and Brazil (66.5%), but is in a situation similar to the stock markets in Peru (42.9%) and Mexico (41.5%), and is better off than the markets in Argentina and Venezuela, which are the smallest in the study sample.

The CSE nearly tripled in size between 2000 and 2005 (a variation of 261% in RC). This was the most dynamic increase in the region. Furthermore, it was second in registering the most growth worldwide between 2004 and 2005, with 100.2% variation in stock market capitalization and 58.3% in relative capitalization (Graph 2), all despite a dramatic drop in the number of companies listed on the CSE, which went from 190 in 1995 to 94 in 2006. This demonstrates the appreciation of shares traded recently within the market.

This phenomenon is explained by the convergence of several factors; namely, the increased demand for securities, bolstered by the influx of foreign capital; the growing participation of pension fund managers (PFM) in stock purchases between 2002 and 2006; the efforts undertaken during the last five years to modernize the CSE (see Garavito, 2006),<sup>3</sup> thanks to the approval and application of fundamental framework legislation such as Law 964 of 2005; and an inelastic supply of shares that is incapable of responding to the growing demand.

**II. LIQUIDITY**

The question is one of measuring the facility that exists in the market to buy and sell stocks. In this case, there are two fundamental ratios: the trade volume divided by

<sup>3</sup> Mandatory pension funds increased their stock-market investments by Col\$5.84 t between December 2001 and December 2006, from Col\$0.43 t in 2002, or 2.79% of their total investments, to Col\$6.27 t in 2006, which represents 14.74% of their total investments (data taken from the website of the Colombian Financial Superintendent).

STOCK MARKET LIQUIDITY INDICATORS

nominal GDP (RV) and the turnover rate (TR), which is the trade volume divided by stock market capitalization. Again, both these ratios are complementary: the first is an indicator of broad liquidity, while the second is traditionally related to low stock-market transaction costs (Demirgüç-Kunt and Levine, 1995).

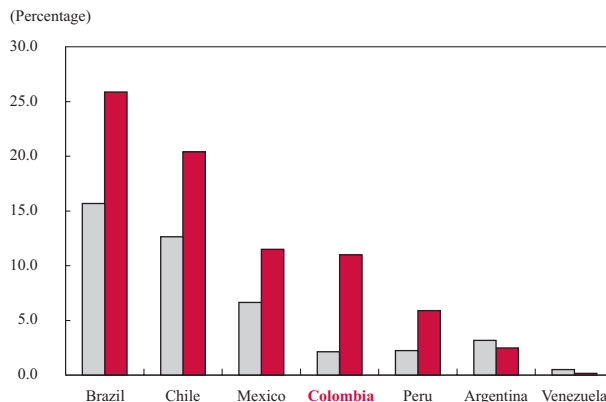
The Colombian situation, in terms of liquidity indicators, is similar to the one reflected by the size indicator. Colombia ranks fourth among the countries with the most liquid markets in the region, according to the RV (11%), and third according to the TR (26.4%), surpassed only by Brazil and Mexico. The development of liquidity over time has been positive as well. Colombia had one of the least liquid markets in 2004 (with a RV of 2.5% and a TR of 8.2%), even worse than Venezuela. However, by 2006, its stock market was one the most liquid in the region (Graph 3). This seems to be the result of lower transaction costs, thanks to the new electronic trading platforms that have been put in place (e.g., SETI in 2001, MEC-PLUS in 2006, SET-FX for foreign currency, and SIAM for market players, among others).

III. CONCENTRATION

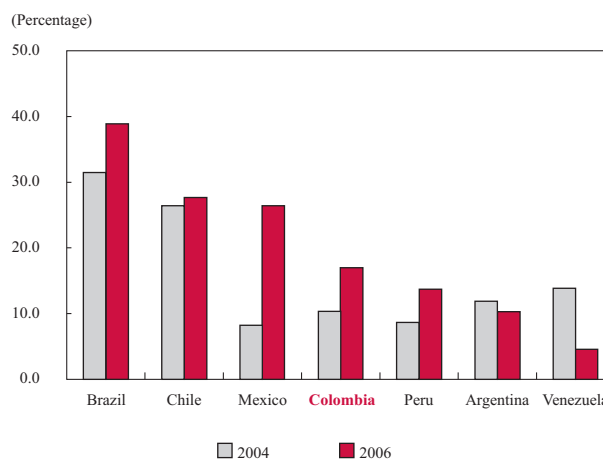
As to the concentration of stock holdings, the outlook is not so positive compared to the other indicators. Stock market capitalization (SC) of the ten largest companies in Colombia is 67.37% with respect to the total, making the Colombian stock market one of the most concentrated in the sample. The problem does not appear to be inherent in the CSE alone, but in the Latin American markets in general. The stock markets in Argentina and Mexico are even more concentrated (Graph 4).

The trouble with market concentration is mainly a question of differences in the interests of large and small stock holders, due to misallocation of company resources by the large shareholders (see Grossman and Hart, 1980). Oftentimes, the power exercised by major shareholders may eventually lead to political power, which can have a negative impact on conditions for competition in the local market.<sup>4</sup>

(A) VOLUME TRADED/GDP



(B) 2006 TURNOVER RATE



Source: The author's calculations, based on information taken from the websites of the World Federation of Exchanges (WFE) and the IMF.

<sup>4</sup> See Morck, Wolfenzon and Yeung (2004) for an analysis of how the economic power influences political power.

## IV. RISK

Several measurements that characterize the risk of investment in the stock markets

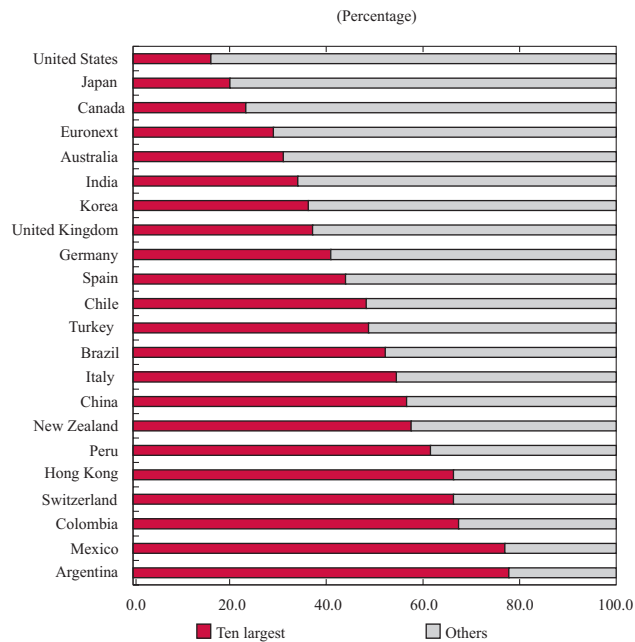
in the sample are presented in Table 2. Using the stock market indexes for each country, the capitalizable returns were calculated continuously (logarithm differences) and their variation was estimated to characterize the risk of investment ( $\hat{\sigma}_j$ ).<sup>5</sup> The half-life was found (the number of days it takes for a shock to be half its initial size, which is a measure of the market's memory), as was the daily value at risk (VaR) of an investment of Col\$100 million pesos in units of the stock market index in each country.<sup>6</sup> Finally, a coefficient was allocated to indicate the differential effect between good and bad news; that is, positive and negative shocks when they influence the range of returns.

<sup>5</sup> The GARCH and TARCH models were used to calculate the variations.

<sup>6</sup> VaR was calculated based on the assumption of normality. The exchange and credit risks that are necessary for a more precise estimate of the market risk facing an international investor were not taken into account.

GRAPH 4

### 2006 CONCENTRATION INDICATOR



Source: The author's calculations, based on information taken from the websites of the World Federation of Exchanges (WFE) and the IMF.

TABLE 2

### CHARACTERISTIC MEASUREMENTS OF INVESTMENT RISK

Country	Number of Days	$\hat{\sigma}_j$	Half-life	VaR 5%	$\hat{\phi}_j$
Daily returns 2001/07/03-2006/12/31					
<b>Regional Markets</b>					
Argentina	1,368	2.1	250.4	3,499,624	n.a.
Brazil	1,377	1.72	5.3	2,842,645	0.156
Chile	1,371	0.63	8.8	1,045,898	0.093
<b>Colombia</b>	<b>1,333</b>	1.46	22.0	<b>2,403,181</b>	0.071
Mexico	1,378	1.14	9.3	1,884,195	0.195
Peru	1,358	0.95	13.3	1,574,515	n.a.
Venezuela	1,304	1.46	2.3	2,410,879	(0.138)
<b>International Markets for Comparison</b>					
Australia	1,394	0.60	21.3	998,063	0.145
United States	1,380	0.89	69.1	1,472,733	0.124
Japan	1,352	1.36	65.1	2,249,546	0.062
United Kingdom	1,388	0.86	40.4	1,414,988	0.174

n.a.: Not applicable.

Source: The author's calculations based on the IGBC series and the other stock market indexes in the sample.

There are few differences among the Latin American countries with respect to this point. However, when the field of comparison is widened, it becomes evident that the risk of investment in most Latin American countries is greater than the risk in developed markets, where daily volatility is less than one digit (United States [0.89%], Australia [0.6%] and England [0.86%]). True, the case of Japan, with 1.39% daily volatility, is a reminder that low volatility is not necessarily a sign of a more developed market.

There is also the illustrative risk to anyone wanting to invest Col\$100 million pesos in units of the CSE index at Col\$2,403,181 a day, with 95% confidence. In other words, in a market that operates approximately 252 days a year, there are only 12 days with a probability of losing more than that amount. Compared to the other Latin American countries, Colombia is obviously on average, although it is more volatile than the developed markets.

## V. INTERNATIONAL INTEGRATION

The assumption underlying the construction of this indicator is that internationalization - capital market integration - is good for the development of those markets. The reason is because integration facilitates greater diversification of market risk, which makes it easier to assess investment risk more effectively.<sup>7</sup>

Theoretically, in financially integrated markets, capital flows across national borders to ensure the risk price of assets is equal in all markets, thus eliminating the possibility of switch trading. However, if there are impediments (institutional or otherwise) to that free flow, different economies would be expected to assess that risk differently.

One way to measure deviations from capital market integration is to measure deviations with respect to the return on assets, using an equilibrium model and based on the assumption that capital markets are integrated (the international capital asset pricing model [ICAPM]).<sup>8</sup> The further the indicator is from zero, the more detached the national market is from global financial markets.

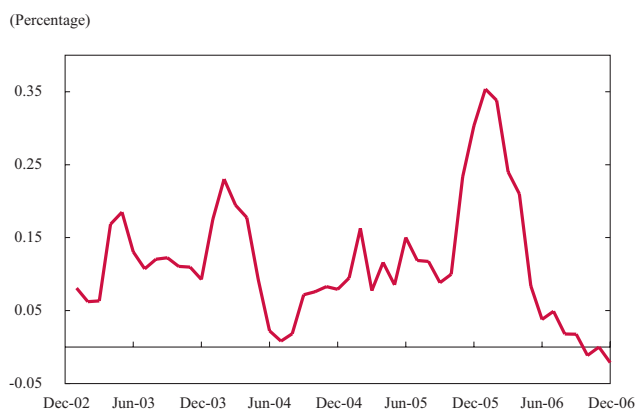
Graph 5 shows how this integration indicator has developed over time. The risk in Colombia is invariably assessed as being greater than in global financial markets.

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<sup>7</sup> See De la Torre, et al. (2007 for the opposite argument that internationalization does not always have a beneficial effect on the development of local markets in Latin America.

<sup>8</sup> Constructed with a model where the market portfolio is given by the S&P500, and the portfolios "to be appraised" are the indexes of each country in the sample, according to Korajczyk (1994).

**MEASURE OF INTEGRATION FOR COLOMBIA:  
JULY 3, 2001 TO DECEMBER 31, 2006**



Note: The further the indicator is from zero, the less the local market will be integrated into the global market. Each point is an ICAPM regression in the form of surplus returns, which involves 18 months. The indicator is an adjusted version of the intercept in the equation.  
Source: The authors' calculations.

This might be because it is a small, concentrated, rather illiquid and volatile market where international and local investors demand a higher risk premium than they would if the market were fully integrated.

The highest index levels for the period are found at the start of 2006, when assets on the national market were overvalued. The flow of funds moved the price away from its fundamental value and, consequently, from the reference portfolio. The indicator was historically low in December 2006, when it was statistically equally to zero, denoting an extremely positive change within the Colombian stock market in this respect.

**VI. EFFICIENCY**

Efficiency is crucial in any market, if good investment decisions are to be made. A market that does not take certain information into account when determining prices prevents the competitive forces that sustain it from reflecting the true value of each security that is traded.

A variance ratio is presented here as a measure of weak-form efficiency.<sup>9</sup> If the variance in the returns calculated for q periods differs substantially from the variance calculated for just one period q times, it is a sign of inefficiency.<sup>10</sup> The results are shown in Table 3.

In Colombia, the variance ratios are above one and appear to increase, depending on the number of lags taken. With 95% confidence, the Colombian stock market cannot be considered weak-form efficient, which means that certain relevant information is left out when stock prices are set on the CSE, particularly information on the history of the series.

The markets in Peru, Chile, Venezuela and México are not weak-form efficient. In contrast, the markets in Brazil, Argentina and all the developed countries in the sample are efficient from this standpoint.

<sup>9</sup> In other words, prices should involve all previous information on the series, so efficiency can be tested in light of that history.

<sup>10</sup> This is because the correlation between the returns of the series should be the only element differentiating both variances. Since the "weak" efficiency hypothesis implies that all these correlations are zero, there is expected to be no difference among them. Therefore, the variance ratio should be statistically equal to one, so as not to rule out the "weak" market-efficiency hypothesis.

## VARIANCE RATIOS FOR CONTINUOUSLY CAPITALIZABLE STOCK MARKET RETURNS

Country	Number of Days	Number $q$ of returns aggregated to form the variance ratios			
		2	4	8	16
Daily returns: 2001/07/03-2006/12/31					
<b>Regional Markets</b>					
Argentina	1,369	1.063	1.099	1.186	1.340
Brazil	1,385	1.010	0.960	0.928	0.963
Chile	1,372	1.226	1.436	1.712	2.028
Colombia	1,343	1.222	1.370	1.406	1.558
Mexico	1,380	1.102	1.102	1.098	1.106
Peru	1,368	1.233	1.383	1.524	1.796
Venezuela	1,306	1.156	1.330	1.560	1.893
<b>International Markets for Comparison</b>					
Australia	1,393	0.966	0.998	1.039	1.089
United States	1,380	0.974	0.941	0.883	0.859
Japan	1,352	0.972	0.951	0.942	0.892
United Kingdom	1,388	0.930	0.866	0.794	0.757

Note: With the "weak" efficiency hypothesis, the ratio should equal zero. The further the indicator is from one, the less efficient the market will be.  
Source: The author's calculations, based on the stock market indexes studied.

One exercise not included in this article, which consists of dividing the sample into three periods and calculating the variance ratios for each sub-sample, would appear to indicate the Colombian market has become more efficient over time, since the hypothesis of efficiency up to 95% confidence cannot be rejected for the last sub-sample, which pertains to 2005.2006.<sup>11</sup> This might be due to the technological and administrative changes made in the CSE during that period.

## VII. CONCLUSIONS

The Colombian stock market grew in liquidity and size between 2001 and 2005. In fact, it registered the most dynamic growth in Latin America, even though there is still a gap in its development compared to countries such as Chile or Brazil and, of course, compared to the most developed markets.

The stock market is becoming increasingly concentrated and the number of companies listed has declined. Therefore, the main problem identified with respect to its development is the limited supply of stocks, particularly since the number of

<sup>11</sup> This refers specifically to 447 statistics for the period from March 2005 to December 31, 2006. Each is the IGBC return for one trading day.



companies listed on the CSE is down and more than half of those now listed are closely held and register little or no trading volume (54% between both items<sup>12</sup>)

The Colombian stock market is not particularly volatile and is within the standards for the region. However, in terms of volatility, the difference that exists with the developed countries in the comparison is obvious.

There seems to be a tendency in the national market towards international integration. In fact, by the end of 2006, segregation was at historically low levels

The daily sample of returns for 2001-2006 shows the Colombian stock market is not weak-form efficient. Nevertheless, when the sample is divided into three sections and each is analyzed separately, there appears to have been a great deal of progress. It might be due to the technological and administrative changes made in the CSE during that period.

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<sup>12</sup> This figure is from the Financial Market Superintendent's website and was calculated at May 2006.

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