Macrothink Institute™

Business and Economic Research
ISSN 2162-4860
2012, Vol. 2, No. 1

Macroeconomic Determinants of the Stock Market Index for a Major Latin American Country and Policy Implications

Yu Hsing

Department of Management & Business Administration, Southeastern Louisiana University

SLU 10813, Hammond, Louisiana 70402, U.S.A.

Tel: 1-985-549-2086 E-mail: yhsing@selu.edu

Michael C. Budden

Department of Marketing & Supply Chain Management, Southeastern Louisiana University

SLU 10844, Hammond, Louisiana 70402, U.S.A.

Tel: 1-985-549-2277 E-mail: mbudden@selu.edu

Antoinette S. Phillips

Department of Management & Business Administration, Southeastern Louisiana University

SLU 10813, Hammond, Louisiana 70402, U.S.A.

Tel: 1-985-549-2086 E-mail: aphillips@selu.edu

Received: December 8, 2011 Accepted: December 23, 2011

doi:10.5296/ber.v2i1.1152 URL: http://dx.doi.org/10.5296/ber.v2i1.1152

Abstract

Applying the exponential GARCH model and based on a quarterly sample during 1998.Q1-2011.Q2, we find that the Argentine stock market index is positively associated with real GDP, the ratio of M2 money supply to GDP, the peso/USD exchange rate and the U.S. stock market index. It is negatively influenced by the money market rate, government spending as a percent of GDP and the inflation rate. Hence, a strong domestic economy, a lower interest rate, an increased money supply as a percent of GDP, lower government spending as a percent of GDP, depreciation of the Argentine peso, a lower inflation rate, or a robust U.S. stock market would help the Argentine stock market.

Keywords: EGARCH, Monetary policy, Fiscal policy, Currency depreciation, Contagion effect

1. Introduction

Due to the global financial crisis, a possible default of sovereign debt in Greece and several other EU member states, a huge national debt, a potential double-dip recession in the U.S. and other concerns, stock indexes in many countries have experienced a high degree of volatility. Argentina is no exception. Before the global financial crisis, the Argentine Merval stock index reached a high of 2,248.63 on May 22, 2008. Due in part to the 2008 global financial crisis, the stock index plunged 63.13% to a low of 828.99 on November 21, 2008. At one point since then, the stock index had risen 342.08%, reaching a high of 3,664.82 on January 20, 2011. Due to recent concerns about potential default of sovereign debt in Greece and other financial related issues, the index dropped to 2,558.11 on December 7, 2011. Although the index rose slightly recently, we expect that the stock index would follow the trends in the U.S. and other advanced countries and continue to exhibit some degree of volatility in the near future.

The objective of the paper is to determine potential impacts of several selected macroeconomic variables on the Argentine Merval stock index. We select Argentina as a case study mainly because of its being the second largest country in Latin America, rising economic status, and valuable experiences in economic development. It has several focuses. First, the study investigates the respective impacts of a change in the interest rate, government spending and the exchange rate on the Argentine stock market index. Maintaining a lower interest rate, fiscal prudence leading to less tax burdens or an appropriate exchange rate level promoting exports and price stability would help the stock market. Second, the sensitivity of the Argentine stock index to a change in the U.S. stock market index is investigated. It is widely believed that most stock market indexes in Latin American countries are highly correlated with the U.S. stock market index due to the contagion effect (Fernández-Serrano and Sosvilla-Rivero1, 2003). Third, the conventional GARCH model imposes the restriction of non-negative parameters on the variance equation. In this paper, the exponential GARCH (EGARCH) model (Nelson, 1991) is employed in empirical work in order to have fewer restrictions on the parameters and to allow the parameters to have negative values in the variance equation, and to respond to the good and bad news asymmetrically. Therefore, the EGARCH model can capture the behavior of the stock market better than the conventional GARCH model.

2. Literature Survey

There have been several recent studies examining the impacts of macroeconomic factors on stock prices, international linkages of stock markets, the random walk hypothesis, short-run and long-run relationships for Argentina and related countries. Spyrou (2004) analyzes the relationship between the stock price and inflation for 10 selected emerging markets. For Argentina, he finds that the relationship was positive and significant during 1989M1–1995M12 and 1989M1–2000M8 but positive and insignificant during 1995M12–2000M6. Abugri (2008) examines the impact of macroeconomic variables on stock market indexes for four selected Latin American countries. For Argentina, the VAR estimation reveals that the stock market index is positively influenced by the MSCI global

equity index, negatively affected by the U.S. Treasury bill rate, the domestic interest rate and the money supply, and not impacted by industrial production and the exchange rate. Studying real stock returns for seven Latin American countries, Araújo (2009) shows that for Argentina, the supply shock, the portfolio shock and the demand shock can explain 60.37%, 24.11% and 8.32% of the variation in real stock returns, respectively. He also indicates the correlation coefficient of 0.3703 between real stock returns in Argentina and the U.S. is significant at the 1% level.

Investigating the linkage between the U.S. and selected Latin American stock markets, Fernández-Serrano and Sosvilla-Rivero1 (2003) find strong evidence of a long-run cointegrating relationship between the DJIA index and the Argentine, Venezuelan and Chilean indexes after the 1998 financial crisis and a cointegrating relationship between the U.S. S&P 500 index and the Argentine, Mexican and Chilean indexes from August 1998, April 1999 and October 1999, respectively.

Diamandis (2009) indicates that 4 selected Latin American stock markets including Argentina and the U.S. stock market exhibit 4 common permanent components, are partially integrated, and have relatively small benefits in the long run with international diversification due to very sluggish adjustments. Jawadi, Arouri and Nguyen (2010) find strong evidence that the Argentine and Mexican stock markets are influenced by the U.S. stock market in the short run whereas there are no linkages found in the long run. Hence, they conclude that stock markets in Argentina and Mexico are determined by the fundamentals in the long run.

Hasan, Kadapakkam and Ma (2003) examine whether the random walk hypothesis may hold for 8 selected Latin American countries including Argentina. They reveal that the random walk hypothesis applies to Argentina, does not apply to Peru, and may or may not apply to the remaining 6 countries.

Some of the above findings may need to be further studied. For example, the positive significant or insignificant coefficient for the inflation rate (Spyrou, 2004), the relatively low correlation between stock market indexes between Argentina and the U.S. (Araújo, 2009), lack of a long-term stable relationship between the stock market indexes in Argentina and the U.S. (Jawadi, Arouri and Nguyen, 2010), the insignificant coefficients of industrial production and the exchange rate and the negative significant coefficient of the money supply for Argentina reported by Abugri (2008) need to be reexamined to determine whether a different methodology and a more recent sample with 10 more years of data may yield different results.

3. The Model

Extending previous studies, we can express the Argentine stock market index as a function of the following macroeconomic and global variables:

$$MI = f(RO, IR, MS, GY, EXC, INF, SP^*) \quad (1)$$

$$\frac{\partial MI}{\partial RO} > 0, \frac{\partial MI}{\partial IR} < 0, \frac{\partial MI}{\partial MS} > or < 0, \frac{\partial MI}{\partial GY} > or < 0, \frac{\partial MI}{\partial EXC} > or < 0, \frac{\partial MI}{\partial INF} < 0, \frac{\partial MI}{\partial SP^*} > 0$$

where

MI = Argentine Merval stock market index,

RO = real GDP,

IR = the interest rate,

MS = the money supply,

GY = government consumption spending as a percent of GDP,

EXC = the nominal exchange rate,

INF = the inflation rate, and

SP^* = the stock market index in the U.S.

Note that $\frac{\partial MI}{\partial X}$ indicates the partial derivative of the Argentine stock market index with respect to any one of the explanatory variables.

We expect that the sign of real GDP (Chen, 1986; Fama, 1990; Abdullah and Hayworth, 1993; Mukherjee and Naka, 1995) and the U.S. stock price (Fernández-Serrano and Sosvilla-Rivero1, 2003; Araújo, 2009; Jawadi, Arouri and Nguyen, 2010) to be positive, the sign of the interest rate (Fama, 1981, 1990; Mukherjee and Naka, 1995; Ratanapakorn and Sharma, 2007; Humpe and Macmillan, 2009)and the inflation rate (Fama, 1981; Geske and Roll, 1983; Mukherjee and Naka, 1995) to be negative, and the sign of the money supply (Ratanapakorn and Sharma, 2007; Abugri , 2008; Humpe and Macmillan, 2009), the ratio of government spending to GDP (Darrat, 1990a, 1990b) and the exchange rate (Nieh and Lee, 2001; Kim, 2003; Ratanapakorn and Sharma, 2007; Abugri, 2008) to be unclear.

A moderate increase in the money supply would increase liquidity and credit and be conducive to business operations. On the other hand, too much money supply would cause inflation to rise, reduce buying power, hurt the economy, and harm stock prices

When government spending is at a reasonable level, it would help raise aggregate demand and stimulate the economy. On the other hand, when government spending as a percent of GDP rises beyond a certain threshold, a large government deficit or debt as a percent of GDP would cause a crowding-out effect, raise the long-term interest rate, hurt private spending, and reduce stock prices.

Currency depreciation may help or hurt stock prices. Currency depreciation would help exports, create more business opportunities, generate more earnings and raise stock prices. On the other hand, currency depreciation would raise import costs, increase domestic prices, cause higher inflation, reduce international capital inflows, and hurt stock prices.

Mathematically, these respective effects can be expressed as:

$$\frac{\partial MI}{\partial EXC}=\left(\frac{\partial MI}{\partial EP}\times\frac{\partial EP}{\partial EXC}\right)+\left(\frac{\partial MI}{\partial IC}\times\frac{\partial IC}{\partial EXC}\right)+\left(\frac{\partial MI}{\partial P}\times\frac{\partial P}{\partial EXC}\right)+\left(\frac{\partial MI}{\partial CF}\times\frac{\partial CF}{\partial EXC}\right)>or<0,\ (2)$$

where EP, IC, P, and CF denote exports, import costs, the price level, and the international capital inflow.

Except for the inflation rate with negative values, other variables are measured in the logarithmic scale so that estimated coefficients are elasticities. The regression to be estimated can be written as:

$$\begin{aligned}Log\,MI_t=\beta_0+\beta_1\log RO_t+\beta_2\log IR_t+\beta_3\log MS_t+\beta_4\log GY_t+\beta_5\log EXC_t\\+\beta_6\,INF_t+\beta_7\log SP_t^*+\varepsilon_t\end{aligned}\quad(3)$$

where $\beta's$ are the parameters to be estimated, ε is the error term of the regression, and t is time.

3. Data and Empirical Results

Data was collected from the October 2011 issue of the *International Financial Statistics*, which is published by the International Monetary Fund. MI is represented by the share price index with 2005 as the base year. RO or real GDP is measured in millions of pesos using 2005 as the base year. IR is represented by the money market rate, which is a policy rate that can be influenced by the central bank. MS is measured as the ratio of the M2 money supply to nominal GDP. GY is defined as government spending as a percent of GDP. EXC is measured as units of the peso one U.S. dollar can exchange. An increase in EXC means a deprecation of the Argentine peso, and a decrease in EXC indicates an appreciation of the Argentine peso. INF is represented by the inflation rate derived from the percent change in the consumer price index. The S&P 500 index in the U.S. is chosen to represent SP^*. The quarterly sample ranges from 1998.Q1 – 2011.Q2 with a total of 54 observations. The data for M2 before 1998.Q1 are not available. Monthly data are not used mainly because the data for real GDP are available on a quarterly basis.

According to the unit root test, all the variables have unit roots in the level form and are stationary in first difference. According to the Augmented Dickey-Fuller (ADF) test on the regression residuals with a lag length of 4, the test statistic is estimated to be -4.618, which is greater than the critical value of -2.613 in absolute values at the 1% level. This result suggests that variables in equation (1) are cointegrated and have a long-term stable relationship.

Table 1 presents estimated parameters and other related statistics. The exponential GARCH model is applied in empirical estimation in order to properly estimate the error variance and capture the behavior of the stock market.

Table 1. Estimated regression of the stock market index for Argentina

Variable	Coefficient	z-statistic
Constant	-27.070	-173.979
Real GDP	1.958*	61.955
Money market rate	-0.092*	-3.429
M2/GDP ratio	0.640*	9.858
Government spending/GDP ratio	-0.746*	-6.063
Peso/USD exchange rate	0.521*	26.495
Inflation rate	-0.016*	-3.136
U.S. stock market index	1.168*	18.085
Adjust R-squared	0.952	
Akaike information criterion	-0.972	
Schwarz criterion	-0.529	
Estimation method	EGARCH	
Sample period	1998.Q1 – 2011.Q2	
Sample size	54	

Note:
* indicates that the coefficient is significant at the 1% level.
EGARCH is the exponential GARCH model.
Because the inflation rate has negative values, the logarithmic scale is not used.

As shown, the adjusted R-squared is estimated to be 0.952, suggesting that 95.2% of the variation in the Argentine stock market index can be explained by the seven right-hand side variables. All the coefficients are significant at the 1% level. The Argentine stock market index has a positive relationship with real GDP, the M2/GDP ratio, the peso/USD exchange rate and the U.S. stock market index and a negative relationship with the money market rate, the ratio of government spending to GDP and the inflation rate.

Specifically, a 1% increase in real GDP, the M2/GDP ratio, the peso/USD exchange rate and the U.S. stock market index leads to an increase in the Argentine stock market index by 1.958%, 0.640%, 0.521% and 1.168%, respectively. A 1% increase in the money market rate and the ratio of government spending to GDP reduces the stock market index by 0.092% and 0.746%, respectively. The negative significant impact of a higher inflation rate on the Argentine stock market index is relatively small.

According to the estimated coefficients or elasticities in absolute values, the sensitivity of the Argentine stock market index to these explanatory variables in a descending order is real GDP, the U.S. stock market index, the ratio of government spending to GDP, the ratio of M2 to GDP, the peso/USD exchange rate and the money market rate. A strong economy as measured by real GDP growth has the highest percentage influence on the Argentine stock market index. As the U.S. stock market changes, the Argentine stock market would respond and change more proportionally.

Attempts were made to use different measurements or variables to determine whether the results may vary. Due to lack of the data for the lending rate in 2002.Q2, it cannot be included in empirical work. When the ratio of M1 to GDP replaces the ratio of M2 to GDP, its coefficient is estimated to be 0.738 and significant at the 1% level. However, the coefficient of the inflation rate is negative but insignificant. Because M2 is a broader measure of the money supply than M1, the choice of the ratio of M2 to GDP is appropriate. Because the data for the government deficit are unavailable after 2005.Q2, the ratio of the government deficit to GDP cannot be used to substitute for the ratio of government spending to GDP. The U.S. T-bill rate was included and tested. Its negative coefficient is found insignificant at the 10% level partly because the Argentine money market rate may contain the information.

4. Summary and Conclusions

This paper has examined the macroeconomic factors that are expected to influence the Argentine stock market index. These variables include real GDP, money policy, fiscal policy, the exchange rate, the world stock market as represented by the U.S. stock market index, and the inflation rate. The exponential GARCH model was employed in order to properly estimate the parameters in the variance equation and capture stock market movements.

A higher real GDP, a lower money market rate, a higher ratio of M2 to GDP, a lower ratio of government spending to GDP, a higher exchange rate or depreciation of the peso against the U.S. dollar, a lower inflation rate or a strong U.S. stock market would increase the Argentine stock market index. There are several policy implications. Authorities need to pursue fiscal discipline by keeping the government deficit or debt as a percent of GDP relatively low in order not to crowd out private spending and harm stock prices. The positive significant coefficient of the peso/USD exchange rate suggests that depreciation of the Argentine peso has a positive impact on stock prices. The exchange rate policy of gradual depreciation of the peso against the U.S. dollar seems to be consistent with empirical findings.

According to *The Economist*, the growth rate of real GDP, the inflation rate, and the prime lending rate for Argentina in 2011 are projected to be 6.3%, 10.6% and 12.5%, respectively. These statistics suggest that a relatively strong economy will be conducive to the stock market whereas authorities need to reduce the relatively high inflation rate and prime lending rate in order to increase real wealth, the buying power and the value of the peso, encourage household consumption and business investment spending, and increase business opportunities and stock prices.

References

Abdullah, D. A. & Hayworth, S. C. (1993). Macroeconometrics of stock price fluctuations. *Quarterly Journal of Business and Economics*, 32, 50–67.

Abugri, B. A. (2008). Empirical relationship between macroeconomic volatility and stock returns: Evidence from Latin American markets. *International Review of Financial Analysis*, 17, 396–410. http://dx.doi.org/10.1016/j.irfa.2006.09.002

Adrangi, B., Chatrath, A., Pamplin, R. B., & Sanvicente, A. Z. (2002). Inflation, output, and stock prices: Evidence from Brazil. *Journal of Applied Business Research*, 18, 61-77.

Araújo, E. (2009). Macroeconomic shocks and the co-movement of stock returns in Latin America. *Emerging Markets Review*, 10, 331-344. http://dx.doi.org/10.1016/j.ememar.2009.08.003

Beer, F., Rafiq, R. B., & Robbani, M. G. (2008). Stock market and exchange rate dynamics: An empirical investigation on Brazil and US. *Journal of International Business & Economics*, 8, 115-122.

Bulmash, S. B. & Trivoli, G. W. (1991). Time-lagged interactions between stock prices and selected economic variables. *The Journal of Portfolio Management*, 17, 61–67. http://dx.doi.org/10.3905/jpm.1991.409351

Chaudhuri, K. & Smiles, S. (2004). Stock market and aggregate economic activity: Evidence from Australia. *Applied Financial Economics*, 14, 121-129. http://dx.doi.org/10.1080/0960310042000176399

Chen, N.-F., Roll, R., & Ross, S. A. (1986). Economic forces and the stock market. *Journal of Business*, 59, 383–403. http://dx.doi.org/10.1086/296344

Chen, G.-M., Firth, M., & Rui, O. M. (2002). Stock market linkages: Evidence from Latin America, *Journal of Banking & Finance*, 26, 1113-1140. http://dx.doi.org/10.1016/S0378-4266(01)00160-1

Darrat, A. F. (1990a). Stock returns, money and fiscal deficits. *Journal of Financial and Quantitative Analysis*, 25, 387-398. http://dx.doi.org/10.2307/2330703

Darrat, A. F. (1990b). The impact of federal debt upon stock prices in the United States. *Journal of Post Keynesian Economics*, 12, 375-389.

Dhakal**,** D., Kandil**,** M., & Sharma, S. C. (1993). Causality between the money supply and share prices: A VAR investigation. *Quarterly Journal of Business & Economics*, 32, 52-74.

Diamandis, P. F. (2009). International stock market linkages: Evidence from Latin America. *Global Finance Journal*, 20, 13-30. http://dx.doi.org/10.1016/j.gfj.2009.03.005

Fama, E. F. (1981). Stock returns, real activity, inflation and money. *American Economic Review*, 71, 545–565.

Fama, E. F. (1990). Stock returns, expected returns, and real activity. *Journal of Finance*, 45, 1089–1108. http://dx.doi.org/10.2307/2328716

Fama, E. F. & French, K. R. (1989). Business conditions and expected returns on stocks and bonds. *Journal of Financial Economics*, 25, 23–49. http://dx.doi.org/10.1016/0304-405X(89)90095-0

Fernández-Serrano, J. L. & Sosvilla-Rivero1, S. (2003). Modelling the linkages between US and Latin American stock markets. *Applied Economics*, 35, 1423-1434. http://dx.doi.org/10.1080/0003684032000100409

Geske, R. & Roll, R. (1983). The fiscal and monetary linkages between stock returns and inflation. *Journal of Finance*, 38, 1–31. http://dx.doi.org/10.2307/2327635

Hasan, T., Kadapakkam, P.-R., & Ma, Y. (2003). Tests of random walk for Latin American stock markets: Additional evidence. *Latin American Business Review*, 4, 37-53. http://dx.doi.org/10.1300/J140v04n02_03

Humpe, A. & Macmillan, P. (2009). Can macroeconomic variables explain long-term stock market movements? A comparison of the US and Japan. *Applied Financial Economics*, 19, 111-119. http://dx.doi.org/10.1080/09603100701748956

Jawadi, F., Arouri, M. E. H., & Nguyen, D. K. (2010). Stock market integration in Mexico and Argentina: are short- and long-term considerations different? *Applied Economics Letters*, 17, 1503-1507. http://dx.doi.org/10.1080/13504850903035899

Kerr, R. B., L. Perera, C. J., Kimura, H., & Lima, F. G. (2009). Evidence of stock market realignment in Brazil, France and the United States. *Journal of International Finance & Economics*, 9, 139-147.

Kim, K.-h. (2003). Dollar exchange rate and stock price: Evidence from multivariate cointegration and error correction model. *Review of Financial Economics*, 12, 301-313. http://dx.doi.org/10.1016/S1058-3300(03)00026-0

Kerr, R. B., Perera, L. C. J., Kimura, H., & Lima, F. G. (2009). Evidence of stock market realignment In Brazil, France and the United States. *Journal of International Finance & Economics*, 9, 139-147.

Mukherjee, T. K. & Naka, A. (1995). Dynamic relations between macroeconomic variables and the japanese stock market: an application of a vector error correction model. *The Journal of Financial Research*, 18, 223–237.

Nelson, D. B. (1991). Conditional heteroskedasticity in asset returns: A new approach. *Econometrica*, 59, 347-370. http://dx.doi.org/10.2307/2938260

Nieh, C.-C. & Lee, C.-f. (2001). Dynamic relationship between stock prices and exchange rates for G-7 countries. *Quarterly Review of Economics and Finance*, 41, 477-490. http://dx.doi.org/10.1016/S1062-9769(01)00085-0

Ozun, A. (2007). Are the reactions of emerging equity markets to the volatility in advanced markets similar? comparative Evidence from Brazil and Turkey. *International Research Journal of Finance & Economics*, 9, 220-230.

Ratanapakorn, O. & Sharma, S. C. (2007). Dynamic analysis between the US stock returns and the macroeconomic variables. *Applied Financial Economics*, 17, 369-337. http://dx.doi.org/10.1080/09603100600638944

Rivas, A., Verma, R., Rodriguez, A., & Verma, P. (2008). International transmission mechanism of stock market volatilities. *Latin American Business Review*, 9, 33-68. http://dx.doi.org/10.1080/10978520802189302

Robitaille, P. & Roush, J. (2006). How do FOMC actions and U.S. macroeconomic data announcements move Brazilian sovereign yield spreads and stock prices? Working Papers, US Federal Reserve Board's International Finance Discussion Papers, 1-52,

Slater, J., Lyons, J., Barta, P., & Davis, A. (2007). Contagion effect: Markets fear U.S. woes will hit global growth; overseas stocks dive, commodities down; metals ventures at risk. *Wall Street Journal* - Eastern Edition, August 17, A1.

Spyrou, S. I. (2004). Are stocks a good hedge against inflation? Evidence from emerging markets. *Applied Economics*, 36, 41-48. http://dx.doi.org/10.1080/0003684042000177189

Tabak, B. M. (2006). The dynamic relationship between stock prices and exchange rates:

Evidence for Brazil. *International Journal of Theoretical & Applied Finance*, 9, 1377-1396. http://dx.doi.org/10.1142/S0219024906003974

Wang, G. & Lim, C. (2010). Effects of macroeconomic factors on share prices. *Journal of International Finance and Economics*, 10, 113-123.

Copyright Disclaimer