



AREA: 2
TYPE: Application

Relation between the macroeconomic variables and the stock return in companies of the finance and insurance sector from Latin American stock market

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Relação entre as variáveis macroeconômicas e o volume de ações em empresas do setor financeiro e de seguros do mercado acionário latino-americano.

Relación entre las variables macroeconómicas y el volumen de acciones en empresas del sector financiero y de seguros del mercado accionario latinoamericano.

This paper aims to verify the relation between the macroeconomic indicators with the Stock Return (SR) in public companies of the finance and insurance sector from Latin America. Data were analyzed from 2010 to 2017 through dynamic panel analysis via Generalized Method of Moments (GMM) by two approaches: Arellano-Bond e System. Results pointed that the Stock Return showed a positive relation with Exchange Rate, but a negative relation with Gross Domestic Product. It is concluded that macroeconomic variables interfere with the shareholder return of companies in the Finance and Insurance sector.

Este trabalho tem como objetivo verificar a relação entre os indicadores macroeconômicos com o Retorno de Ações (SR) em empresas públicas do setor de finanças e seguros da América Latina. Os dados foram analisados de 2010 a 2017 por meio de análise dinâmica de painéis via Método Generalizado de Momentos (GMM) por duas abordagens: Arellano-Bond e System. Os resultados apontaram que o Retorno das Ações apresentou uma relação positiva com a Taxa de Câmbio, mas uma relação negativa com o Produto Interno Bruto. Conclui-se que as variáveis macroeconômicas interferem no retorno aos acionistas das empresas do setor de Finanças e Seguros.

Este trabajo tiene como objetivo verificar la relación entre los indicadores macroeconómicos con el Retorno de Acciones (SR) en empresas públicas del sector de finanzas y seguros de América Latina. Los datos fueron analizados de 2010 a 2017 por medio de análisis dinámico de paneles vía Método Generalizado de Momentos (GMM) por dos enfoques: Arellano-Bond y System. Los resultados apuntaron que el Retorno de las Acciones presentó una relación positiva con la Tasa de Cambio, pero una relación negativa con el Producto Interno Bruto. Se concluye que las variables macroeconómicas interfieren en el retorno a los accionistas de las empresas del sector de Finanzas y Seguros.

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DOI 10.3232/GCG.2018.V12.N3.01	RECEIVED 28.01.2018	ACCEPTED 26.03.2018
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1. Introduction

The expectations of the stock return may be measured from the changes of the economic variables (Brigham & Ehrhardt, 2010; Assaf Neto, 2011). In other words, Blanchard (2011) assured that macroeconomic variables may interfere on the stock return through (i) the increase of the economic activity, (ii) the reduction of the interest rate and (iii) the increase of public expenses. Under this perspective, Ross, Westerfield and Jordan (2008) described that there are several models for measuring the stock return, e.g. Capital Asset Pricing Model (CAPM), in which the expected return is related to its beta market; and Arbitrage Pricing Theory (APT), which consists on the relation of multiple factors to explain the stock returns, especially the macroeconomic.

In view of the exogenous factors, the Bernanke and Kuttner's (2005) study considers that the changes on monetary policies – when not anticipated – points to a relation with the variation on stocks prices. Other studies show the relation between the stock return and macroeconomic variables, like (i) inflation (e.g. Kaul, 1987; Adrangi, Drangi, Chatrath & Sanvicente, 2000; Rapach, 2001; Brown, Huang & Wang, 2016; Antonakakis, Gupta & Tiwari, 2017), gross domestic product (e.g. Croux & Reusens, 2013; Tiwari et al., 2015; Abusharbeh & Karin, 2016), exchange rate (e.g. Granger, Huang & Yang, 1998; Richards & Simpson, 2009; Zhao, 2010; Lin, 2012; Bahmani-Oskooee & Saha, 2016; Türsoy, 2017; Wong, 2017), interest rate (e.g. İzgi & Duran, 2016; Assefa, Esqueda & Mollick, 2017; Papadamou, Sidiropoulos & Spyromitros, 2017) and commodities (e.g. Park & Ratti, 2008; Kumar, Managi & Matsuda, 2012; Kang, Ratti & Vespignani, 2016).

According to International Monetary Fund (2017), Latin-American economy registered a low economic increase over the last years, though the economic-financial situation of financial institutions showed some improvement with high profitability due to the regional interest rate. Before the situation of the financial sector for Latin-American economy, as well as the relation of stock return relation with economic variables, the core question of our research sprang: What economic variables are related to stock return in companies of financial sector from Latin-American stock market?

Likewise, this paper aims to verify the relation of the macroeconomic indicators with the stock return of public companies from the financial sector of Latin America. B3's Financial sector, e.g., is composed by financial institutions (financial intermediates, security, diverse financial services and insurances) and is governed by specific normative acts (B3, 2017). Thus, the structure of this study encompasses introduction, theoretical construct about the relation of the macroeconomic variables and stock return, methodological procedures, data analysis and, finally, the final considerations.

2. Theoretical Construct

Macroeconomy relates big groups, represented by variables like inflation, gross domestic product, exchange rate and interest rate (Vasconcellos, 2011). As a complement, Blanchard (2011) states

KEY WORDS
Latin America, Dynamic Panel Analysis, Finance and Insurance Sector, Stock Return.

PALAVRAS-CHAVE
América Latina, Análise Dinâmica de Painéis, Setor de Finanças e Seguros, Retorno de Ações.

PALABRAS CLAVE
América Latina, Análisis Dinámico de Paneles, Sector de Finanzas y Seguros, Retorno de Acciones.

JEL CODES:
C23, N26

that as changes in macroeconomic variables, increase in economic activity, reduction of interest rates and increase in consumption spending, non-increased results of the expectation of public companies' profits, thus creating demand by shares, by the investors, and increase in the stock price. Moreover, the Exchange Rate may change the prices of goods and services (Froyen, 2001). As a result, changes in the exchange rate may affect investors' expectations of gains and change a demand for shares, impacting on the stock return.

In view of this, such variables end up reflecting on companies' stock return, or financial statements. Several researches were performed considering the relation between stock return and macroeconomic variables, such as inflation, interest and exchange rates, gross domestic products inter alia. Concomitantly, Abugri (2008) identified in countries from Latin America a significant relation between stock return and exogenous variables like: exchange rate, interest rate, industrial production and monetary supply. Likewise, and considering the capitals' market, Terra (2006) described the relation between stock return with some macroeconomic variables.

In turn, Bahmani-Oskoose and Saha (2016) performed a study that encompassed Brazil, Canada, Chile, South Korea, Indonesia, Japan, Malaysia, Mexico and United Kingdom, finding relation between stock prices and: (i) exchange rate (in Brazil and South Korea); (ii) economic activity (in Canada) and (iii) money supply (in South Korea, Malaysia and Mexico). Another similar study of Pradhan, Arvin and Bahmani (2015) highlighted that interest, inflation and exchange rates are related to stock prices in 34 countries from OECD - Organization for Economic Co-operation and Development.

2.1. Development of hypotheses

In this section, the hypothesis of this study on the relationship of the Real Interest Rate, Exchange Rate and Gross Domestic Product with the Return of Stock of Finance and Insurance companies in the Latin American stock market is presented.

2.1.1 Real Interest Rate

Vasconcellos (2011) assured that high inflation rates may interfere on both companies' stock market and profitability. Thorbecke and Coppock (1997) emphasized that inflation has a negative relation with stock market, what is in accordance with Fama and Schwert (1977), Chen (2009) and Oxman (2012) in US, with Durai and Bhaduri (2009) about Indian market and with Miyakoshi and Shimada (2017) about Asian market.

Likewise, Li, Narayan and Zheng, (2010) verified the existence of a negative relation of these variables in United Kingdom; and Antonakakis, Gupta and Tiwari (2017) related the price of the stocks and the inflation in US, considering the period from 1791 to 2015 and the relation is negative except in three decades (1840, 1860 and 1930), and in 2011. Therefore, research that reinforces the negative relation between inflation and stock returns.

On the other hand, monetary policy is related to stock return (e.g. Bernanke & Kuttner, 2005), and the interest rate consists on an instrument of such policy governed by State, what corroborates with researches of Atanasou (2016) and Bjørnland and Leitemo (2017) who found interaction between stock return and interest rate in US. In time, İzgi and Duran (2016) also confirmed that the prices of the stocks

negotiated in the American market are related to exchange rate. In other countries, Peiró (2016) found a positive relation between both variables in the biggest European economies (German, France and UK). Assefa, Esqueda and Mollik (2017) assessed 19 countries from 1999 to 2013 through dynamic panel and found a negative relation between the stocks prices and the interest rate; Papadamou, Sidiropoulos and Spyromitros (2017) found a negative relation between these variables in emerging countries; Apergis and Eleftheriou (2002) identified a negative relation between stocks prices and exogenous factors (interest rate and inflation) in Greek market. In this sense, the following hypothesis is confirmed:

H₁: There is a significant and negative relationship between the Real Interest Rate and the Shareholder Return of financial sector companies in the Latin American stock market.

2.1.2 Exchange Rate

The Exchange Rate is related to the shareholder return, mainly in companies that import or export goods and services. In this regard, Sui and Sun (2016) found a relation between the stocks prices and the exchange rate in BRICS countries (Brazil, Russia, China, South Africa). Lin (2012) considered the emerging Asian economies (South Korea, Philippines, India, Indonesia, Taiwan and Thailand), finding relation between these variables, especially during financial crisis.

With regard to Australian market, Richards and Simpson (2009) found positive relation between the stocks prices and exchange rate. On the one hand, Diamandis and Drakos (2011) analyzed Latin American countries during the 80's and 90's, finding a long-term positive relation between such variables, except in Brazil. On the other hand, Wong (2017) found a negative relation between these variables on stock markets from Singapore, South Korea, Malaysia and United Kingdom, though not significantly - at 5% - in German, Japan and Philippines. Thus, most of these researches pointed to the positive relation between exchange rate and stock return. In this context, the following hypothesis is confirmed:

H₂: There is a significant and positive relationship between the exchange rate and the stock return of financial sector companies in the Latin American stock market.

2.1.3 Gross Domestic Product

Gross Domestic Product may be a factor that can affect the equity return of financial market companies. Tiwari et al. (2015) found industrial growth affects GDP the share price in India. Florackis et al. (2014) found a positive relation between stock liquidity and the future expectations of Gross Domestic Product (GDP) in United Kingdom. However, Binswanger (2004) pointed that GPD in Canada, US and UK did not explain the stock return in the 80's, once the financial markets from this period were influenced by market bubbles. Tsouma (2009) mentioned the relation between stock return and economic activity considering 41 nations (22 developed countries and 19 emergent) and Horobet & Dumitrescu (2009) confirmed the positive relation between macroeconomic variable and stock return. Therefore, the following hypothesis is confirmed:

H₃: There is a significant and positive relationship between the Gross Domestic Product and the Stock Return of financial sector companies in the Latin American stock market.

3. Methodological Procedures

We opted by a quantitative approach whose variables were related through panel data analysis by focusing if stock return is related to exogenous variables and in which level this relation happens. To Creswell (2014), the quantitative approach aims to relate the variables of the study in order to assess the hypotheses through tests or surveys.

The sampling consists on intentional probability, in which the stock return data of 205 companies of Latin America were collected (Argentina, Brazil, Chile, Mexico and Peru). Under this perspective, the study was composed by companies that traded stocks from 2010 to 2017, once other studies pointed the relations between exogenous factors and stock prices (e.g. Piotroski, 2000; Dickinson; Sommers, 2012), in addition to Latin-American countries chose the international accountancy standards, but integrally, only after 2010.

The data were collected from the Thomson Reuters Eikon database, following a sectoral segregation proposed by the North American Industry Classification System (NAICS).

In turn, the explanatory variables of this model are exogenous, and consisted by: percentage change in annual gross domestic product (%ΔGDP); exchange rate of US dollar (ER); and annual real interest rate (%RIR). In sum, we established three hypotheses referring to the results of such relations, by depicting them in **Table 1**.

Table 1 - Study's Hipotheses

<i>Independent Variable</i>	<i>Explanatory Variable</i>	<i>Hipotesis</i>		<i>Previous researches</i>
<i>Stock Return (SR)</i>	Real Interest Rate	H_1	Significant and negative relation	Apergis & Eleftheriou (2002); Assefa, Esqueda & Mollik (2017), and Papadamou, Sidiropoulos & Spyromitros (2017)
	Exchange Rate	H_2	Significant and positive relation	Richards & Simpson (2009) e Diamandis & Drakos (2011)
	Gross Domestic Product	H_3	Significant and positive relation	Horobet & Dumitrescu (2009)

Source: Research Data

Initially, static panel data analysis was performed by three estimations: pooled OLS, fixed effects and random effects (Baltagi, 2005; Gujarati, 2006; Wooldridge, 2011). Due to the non-rejection of H_0 for the first-order autocorrelation hypothesis on both estimations, we performed estimations from dynamic models with a lag of an annual period ($t-1$). After that, data were submitted to dynamic panel using Generalized Method of Moments (GMM) of Arellano and Bond (AB), and the GMM System. Considering dynamic models analyzed in panel data, we performed tests which consisted in assumptions aiming the validation of such models; which encompassed first-order and second-order tests and Sargan test.

4. Results

In **Table 2**, we presented a descriptive statistic of the variables used in this study. Stock return averaged 6.86% per year, showing a valorization of assets in companies from Latin America financial sector. % Δ GDP showed an average of 2.2% with a standard deviation of 12%. First differences of Exchange Rate averaged US\$ 0.013 (± 0.039), considering the analyzed period; and %RIR averaged the result of -0.02% ($\pm 3.9\%$).

Table 2 - Descriptive Analysis

Variables	Mean	Maximum	Minimum	Standard Deviation
SR	0.0686	1.28	-99.78	0.20
%RIR	-0.0002	0.142	-0.094	0.039
D(ER)	0.013	0.054	-0.123	0.039
% Δ GDP	0.022	0.323	-0.265	0.12
D(%NI)	1.36	1,184.25	-935.76	62.20

Note: D(ER) - first differences of Exchange Rate; D(%NI) - represents the first difference of percentage change of net income; D(% Δ GDP) - first differences of percentage change of Gross Domestic Product.

Source: Research data.

From the descriptive analysis, we identified the assumptions (normality, stationarity, multicollinearity, heteroscedasticity and autocorrelation) in order to assess if the proposed model is valid for statistic inference. Taking into consideration that this research has more than 100 observations, based on Central Limit Theorem, we assumed that the sampling tends to data normality. Gujarati & Porter (2011) stated that samples whose number of observations is superior to 100 present normal distribution, thus, the normality test is not necessary for sets of such characteristics.

Posterior to that, data were submitted, according to each variable, to panel-based unit root tests: (i) Im, Pesaran, and Shin; (ii) Fisher-ADF and (iii) Fisher-PP (both with individual unit root processes), in order to assess if the variables are stationary at 1% significance.

The variables in **Table 3** presented stationarity at 1%.

Table 3 - Unit root test through Im, Pesaran, and Shin; Fisher-ADF and Fisher-PP

Variables	Im, Pesaran and Shin	Fisher-ADF	Fisher-PP
SR	0,0000* (-84.27)	0,0000* (267.52)	0,0000* (301.44)
% Δ GDP	0,0000* (-8.85)	0,0000* (726.72)	0,0000* (948.35)
D(ER)	0,0000* (-8.92)	0,0000* (739.20)	0,0000* (758.03)
%RIR	0,0000* (-15.47)	0,0000* (654.87)	0,0000* (724.69)
D(%NI)	0,0000* (-13.73)	0,0000* (481.50)	0,0000* (600.49)

*Indicators statistically significant at 1% (P<0,01)
Source: research data

From the results of the stationarity tests at 1% of significance over the variables, we also performed, as assumption of multiple regression in static and dynamic panel data analyses, the co-relation and variance inflation factor (FIV) tests over the macroeconomic variables in order to assess multicollinearity. The FIV test indicated absence of multicollinearity.

As we previously mentioned, before the no rejection of H_0 for autocorrelation of static models, data were submitted to dynamic models into two approaches considering 1 lag, relating (i) Stock Return to % Δ GDP, (ii) D(ER) and %RIR through GMM-AB and GMM System. Then, autocorrelation tests in first- and second-orders of dynamic models 1 and 2 were performed, robust estimations for heteroscedasticity in estimates 1 and 2 were done.

We also applied Sargan test, which is used for testing over-identifying restrictions in a statistical model (Arellano & Bond, 1991); by using estimates 1 and 2, results showed there is no restriction for their use, once both dynamic models are valid with regard to the relations of SR with % Δ GDP and D(ER) with %RIR (Table 5). The first lag of the dependent variable (SR_{t-1}) is negative and no significant at 10% level on both dynamic models.

%RIR pointed to a negative relation and no significant at 10% level with SR, with no confirmation of H_1 . The studies developed by Apergis and Eleftheriou (2002) and Assefa, Esqueda and Mollik (2017), in which the relation between these two variables was negative considering 19 countries, as well as with Papadamou, Sidiropoulos and Spyromitros (2017) in a study performed with emergent countries. Contrary to previous studies, a non-significant relationship at the 10% level is justified by different countries adopted in the research sample.

Variable D(ER) has a positive relation at 1% level with SR in the valid models, validating H_2 and corroborating with Richards and Simpson (2009) in Australia, as well as Diamandis and Drakos (2011), who considered countries from Latin America, like Argentina, Chile and Mexico. In turn, % Δ GDP pointed to a statistically negative relation at a 1%-level in model 1 and model 2 with SR, with no confirmation of H_3 , what disagreed with the research of Horobet and Dumitrescu (2009). Contraposition is justified by the samples and different countries assessed in the study.

The control variable D (%NI) was used, which presented a positive and significant to 1% relation in the estimates. The inclusion or not of the control variable did not interfere in the relation (be positive, be negative) of the macroeconomic variables with the stock return. Finally, the constant has a positive relation at 1% of significance in the valid estimates.

As such, SR pointed to a significant 1% relation with % Δ GDP, with D(ER), with D(%NI), besides the Constant. With these data, explanatory variables may be used, through GMM-AB and GMM-System, as predictors of SR.

Table 4 - Models estimated by GMM-AB and GMM System

Variables	(1) GMM-AB Robust	(2) GMM-System Robust
SR_{t-1}	-0.1835	-0.1839
% Δ GDP	-0.2829*	-0.2814*
D(ER)	1.3188*	0.9260*
%RIR	0.6423	0.7379
D(%NI)	-0.0009*	-0.0008*
Constant	0.0989*	0.1015*
P-Value of Wald Test	0,0000*	0,0000*
AB - H0 - There is no autocorrelation at first-order	0.1096 (-1.600)	0.1121 (-1.588)
AB - H0 - There is no autocorrelation at second-order	0.3059 (0.7597)	0.4462 (0.6554)
Sargan Test	0.6688	0.2593
Observations	274	341

*Indicators statistically significant at 1% (P<0,01)
 ** Indicators statistically significant at 5% (P<0,05)
 *** Indicators statistically significant at 10% (P<0,10)
 Source: research data

5. Conclusions

This study highlighted the importance of comprehending the relation of the stock return in companies of financial sector from Latin America and the macroeconomic variables, from three hypotheses (H_1 , H_2 and H_3) that permeate GMM-AB, GMM System for Dynamic Panel.

Results pointed to corroboration with international studies in which there is a relation between macroeconomic variables and Stock Return, however not confirming H_1 and H_3 . In other words, (i) the interest rate did not present a significant 10% relation to the stock return and (ii) the GDP showed a significant to 1% negative relation with the shareholder return

In this sense, H_2 is confirmed, which are in agreement with previous studies. The results, although confirming H_2 , cannot be extended to other sectors, due to the peculiarities of the companies and their activities.

Considering new researches, we suggest the focus on the relation between Stock Return and Macroeconomic variables, herein pointed out, with other sectors of financial market and, by a chance, with similar countries, considering their macroeconomic characteristics.

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