THE MARKET RETURNS' PREDICTABILITY OF GDP GROWTH – A CROSS-COUNTRY ANALYSIS

by

Yingyi Liao
Bachelor of Management, Sun Yat-sen University, 2017

and

Lingyun Fan
Bachelor of Economics, Southwestern University of finance and economics, 2018

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Approval

Name: **Yingyi Liao, Lingyun Fan**

Degree: **Master of Science in Finance**

Title of Project: **The market returns' predictability of GDP growth – a cross-country analysis**

Supervisory Committee:

_____

Amir Rubin
Senior Supervisor
Professor, Finance

_____

Alexander Vedrashko
Second Reader
Associate Professor, Finance

Date Approved: _____

Abstract

As the stock market is the barometer of the health of the economy and reflects the expectations of investors, it is recognized that the stock market return has a predictive power of future GDP growth.

In this paper, we examine the relation between GDP growth and stock market return within a country panel framework and analyze whether the following variables can improve the predictability of the market on future growth: 1. Rule of Law; 2. Government Effectiveness; 3. Market Capitalization; 4. Trade Openness. The analysis is done using a panel of 89 countries over the period 1989 to 2018 (30 years), which is a period of both rapid global development as well as that of the global financial crisis.

Our study indicates that political variables such as increased rule of law and greater government effectiveness increase the market return's predictability of GDP growth. We logically conclude that the GDP growth of developed countries is better predicted by market return because developed countries' growth is less affected by government idiosyncratic intervention and corruption and are more affected by the information economy and world growth factors.

Keywords: *stock market return; GDP growth; predictability; development level; political stability.*

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1. Introduction

As the stock market reflects investors' expectations, it can be a predictor of economic growth. A causal interpretation between stock market return and GDP growth is possible: if the stock market is booming, companies are expected to finance more easily, which in turn enhances the economic expansion and future growth rates. Therefore, the topic of predictability between GDP growth and stock market performance was of discussion as far back as the '70s.

Numerous studies have investigated different aspects of this relationship at both theoretical and empirical levels. The common view is that the stock market is a forward-looking indicator, so current stock prices can reflect the future earning profitability of the company, and hence in aggregate, predicts future GDP growth.

Based on this theory, Pearce (1983) furthered claimed that there is a "wealth effect" that an increase in market return will lead to an increase in consumption and result in further GDP expansion. The latter view is a causal interpretation of market return on GDP growth, rather than the stock market simply being a mechanism that reflects the information of the future.

Fama (1981), Geske and Roll (1983) and Kaul (1987) argued the positive relation between stock return and GDP by proving that the inflation has a negative effect on both stock market return and real activities. Moreover, a large fraction of annual stock-return variance can be used to forecast the economic growth and industrial production (Fama, 1990).

Filler, Hanousek, and Campos (1999) found that the market returns' predictability on GDP growth varies from country to country because of the different levels of development in the stock market.

Based on the analysis of Ross, Zervos, and Levine(1996), certain factors could be used as a measurement of stock markets' development and have direct relations with the economic growth of the country. The Developed countries tend to have a stronger effect than emerging economies because mature financial markets are more liquid, less volatile, and more internationally integrated. The FDI, savings, trade openness, legal rules (regulation and supervision), exchange rates and banking sector development are also positively correlated (Garcia and Liu, 1999; Tsaurai, 2018).

The regression then further depicted that foreign investors' portfolio investment and market volume are the positively significant variables towards the growth of the stock market, whereas the discount rate is an insignificant variable and negatively related (Dev and Shakeel, 2013).

So far, many empirical studies have demonstrated the existence of a positive correlation between market performance and economic growth. In this paper, we further examine whether stock return can be a leading indicator of GDP growth around the globe and find out the key variables that could provide insight into this predictive ability.

Our project is composed of two steps:

1) In an international setting, we analyze the extent to which the stock market return can predict/affect GDP growth in the following year.
2) We analyze what determinants affect the extent of predictive ability and influence.

The cross-sectional regression is conducted based on the information of 89 countries over the period 1989 to 2018. Since the latest 3 decades is a combination of quick development and financial crisis, the data of this period may provide more insights that are not limited to a particular trend in the world economy.

The rest of the paper proceeds as follows:

Section 2 describes the data and variables and section 3 analyzes the relation of GDP growth and stock market return. Based on the cross-sectional analysis, we explore some key variables that might explain why and how the stock market return predicts GDP growth. Finally, section 4 concludes our study and provide further research thoughts.

2. Data and variables

The sample data is extracted from the World Bank Database covering 89 countries from 1989 to 2018. The variables include annual stock market return (including dividends), GDP growth, rule of law and government effectiveness index, market capitalization, import, and export amounts out of total GDP. The Rule of law and government effectiveness are standardized grades measure by the World Bank.

(1) Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society. In particular, it measures the quality of contract enforcement, property rights, the police, the courts, as well as the likelihood of crime and violence. The score is in units of the standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

(2) Government effectiveness captures perceptions of the quality of public services, civil service, policy formulation and implementation, the degree of its independence from political pressures, and the credibility of the government's commitment to such policies.

(3) Trade openness is calculated as the total traded volume of both import and export as a percentage of GDP and is strongly correlated with underlying patterns of trade.

(4) The category of developed countries is based on Union Nation standards. WESP classifies all countries of the world into one of three broad categories: developed economies, economies in transition and developing economies. Therefore, we use dummy variable development to demonstrate and give 1 to developed countries and 0 to the developing and in-transition economies.

Table 1. *The table provides descriptive statistics of our data. For the annual market return, it has extreme value as high as 8173.69%. Therefore, we Winsorized the annual market return at 1% and 99% level. After Winsorization, market return is between -45.976% and 150.2%. For GDP growth, the average in the past 30 years is 3.404%, with the lowest of -14.814% and the highest of 25.163%, which is quite reasonable.*

Variables	N	Mean	Median	Std Dev.	Min	Max
Mkt Ret[1]	1642	17.961	8.858	205.559	-74.617	8173.69
Mkt Ret[2]	1642	11.792	8.858	29.499	-45.49	133.73
GDP Growth	1642	3.404	3.395	3.495	-14.814	25.163
Rule of Law	1455	.532	.505	.91	-1.821	2.1
Governance	1454	.626	.517	.85	-1.215	2.437
Market Cap	1241	72.898	45.746	114.839	.584	1273.391
Trade Openness	1628	93.977	79.99	65.446	13.753	442.62
Development	1642	.394	0	.489	0	1

[1] Raw market return without Winsorization.
[2] Market return after Winsorization.

3. Cross-section Analysis

3.1 Stock market return has predictability on GDP growth

To begin with, we examine the relationship between market return at time t-1 and GDP growth in year t using the following linear regression:

$$GDP\ Growth_{i,t} = \beta_1 \times Mkt_{i,t-1} + \alpha_i + \varepsilon_{i,t}$$

Where:

$GDP\ Growth_{i,t} =$ GDP growth rate of country i at year t;

$Mkt_{i,t-1} =$ market return of the country i at year t-1;

$\alpha_i =$ the constant term of country i;

$\varepsilon_{i,t} =$ the residual error of country i at year t.

Table 2 *The table provides regression results of the dependent variable GDP growth rate at time t and the independent variables market return at time t-1. Standard deviations are provided in parentheses, and standard errors are clustered at the year level. *** p<0.01, ** p<0.05, * p<0.1*

	(1)	(2)
	GDP growth rate	GDP growth rate
Market Return$_{(t-1)}$	0.0361***	0.0330***
	(0.00965)	(0.00602)
Constant	2.972***	3.009***
	(0.368)	(0.0719)
Year fixed effects	No	Yes
Observations	1,642	1,642
R-squared	0.097	0.252

We run the regression both with and without year indicators to see if the relation is consistent, and Table 2 shows that the market return has predictability on the growth of GDP in the following year. The relationship is positive and highly significant, indicating that a higher annual market return would result in a higher GDP growth in the following year. The coefficient is in the range of 0.0330-0.0361, which may seem to be economically small.

However, if we consider that the average growth rate in our sample is 0.034 (3.4%), the interpretation of the effect of these coefficients is rather high. For example, a 0.1 increase in market return (10% change in market return), will lead to a 0.0033 in growth rate (according to column (2) of Table 2), which is approximately a change of 10% in growth rate compared to the mean of 0.034.

In all, we interpret the results as the market return being both economically and statistically significant and explain future GDP growth, which implies the stock market return does have a predictive ability on economic growth and is consistent with our hypothesis.

3.2 The predictability grows over the years

We next analyze whether the relationship between market predictability and future return changed over the 30-year period.

In particular, we hypothesize that due to the increased ability of the market to process information (internet, iPhone, etc.) in recent years, the market is able to predict changes in future cash flows better. In other words, there will be a stronger relation between market return and future GDP growth in the latest period.

Therefore, we focus on the relation changes between the pre and post 2000 year, conducting the following regression with intersection term to test year effect:

$$GDP\ Growth_{i,t} = \beta_1 \times Mkt_{i,t-1} + \beta_2 \times Year_{t-1} + \beta_3 \times Mkt_{i,t-1} \times Year_{t-1} + \alpha_i + \varepsilon_{i,t}$$

Where:

$GDP\ Growth_{i,t} =$ GDP growth rate of country i at year t;

$Mkt_{i,t-1} =$ market return of the country i at year t-1;

$Year_{t-1} =$ year t-1;

$\beta_3 =$ coefficient of interest, which measure the change in the market predictability conditional on the magnitude of year t-1;

$\alpha_i =$ the constant term of country i;

$\varepsilon_i =$ the residual error of country i at year t.

For the following regression, Post2000 is a dummy variable, with a value of 0 if Year is less than 2000 or with a value of 1 if Year is 2000 or more. The Year 2000 is chosen because it identifies the beginning of a new century and that of a generation of rapid development.

Table 3 *The table provides regression results for whether the correlation between market return and GDP growth is enhanced over time. Standard deviations are provided in parenthesis, and standard errors are clustered at the year level. *** p<0.01, ** p<0.05, * p<0.1*

VARIABLES	(1) GDP growth rate	(2) GDP growth rate
Market Return(t-1)	0.0204**	0.0199**
	(0.00576)	(0.00588)
Post2000[1]	0.157	0.784
	(0.663)	(0.880)
Post2000*Market Return(t-1)	0.0197	
	(0.0127)	
Year		-0.0517
		0.0358
Market*Year		0.00000941
		(0.00000642)
Constant	2.830***	106.1
	(0.528)	(71.60)
Observations	1,642	1,642
R-squared	0.102	0.107

In the process of analysis, we run a regression using dummy variable Post2000, and results show as $\beta_1 = 0.0204$ and $\beta_3 = 0.0197$. It demonstrates that a 1% increase in market return would predict a 0.0204% increase in GDP growth in the following year. However, as β_3 has a confidence level of less than 90%, we cannot conclude that there are a difference in predictability between before and after 2000. Also, β_3 of interterm, *Market*Year* is not significant as well. Therefore,

we do not have sufficient evidence to prove that the annual market return would improve its predictability in GDP growth over the years.

3.3 Variables that influence the beta

Next, we analyze the determinants that affect the ability of market return to predict future growth. From the time-series analysis above, we learned that there is evidence that either information flow or increased transparency may affect the predictability. Therefore, we consider variables from both political and financial aspects, which capture frictions in markets that affect the information flow.

Hence, the variables we use as follows: 1) Rule of law; 2) Government effectiveness; 3) Market capitalization; 4) Trade openness. The first two variables are chosen as political factors and the rest are picked as financial factors.

To examine the variables and their effects on economic growth, we use the following regression to conduct cross-section analysis:

$$GDP\ Growth_{i,t} = \beta_1 \times Mkt_{i,t-1} + \beta_2 \times Variable_{i,t-1} + \beta_3 \times Mkt_{i,t-1} \times Variable_{i,t-1} + \alpha_i + \varepsilon_{i,t}$$

Where:

$GDP\ Growth_{i,t} =$ GDP growth rate of country i at year t;

$Mkt_{i,t-1} =$ market return of the country i at year t-1;

$Variable_{i,t-1} =$ a specific characteristic of country i at year t-1;

$\beta_3 =$ coefficient of interest, which measure the change in the market predictability conditional on the magnitude of the specific country variable;

$\alpha_i =$ the constant term of country i;

$\varepsilon_i =$ the residual error of country i at year t.

For countries with different levels of variables, the ability of their market return to predict GDP growth conditional on the variable is the sum of β_1 and $\beta_3 \times Variable_{i,t-1}$. Therefore, the performance of variables would have an impact on how well the market return predicts the GDP growth.

Table 4 *The table provides regression results for whether the relation between market return and GDP growth is enhanced as additional variables are taken into consideration. Standard deviations are provided in parenthesis, and standard errors are clustered at the year level. *** p<0.01, ** p<0.05, * p<0.1*

	(1)	(2)	(3)	(4)	(5)
	GDP growth	GDP growth	GDP growth	GDP growth	GDP growth
Market Return(t-1)	0.0276***	0.0265***	0.0388***	0.0308***	0.0380**
	(0.00663)	(0.00636)	(0.00773)	(0.00777)	(0.0110)
Rule of Law	-0.955***				-1.096**
	(0.144)				(0.326)
Law*Market	0.0139*				0.0233
	(0.00565)				(0.0147)
Government Effectiveness		-0.962***			-0.0613
		(0.153)			(0.303)
Government *Market		0.0119*			-0.0147
		(0.00548)			(0.0159)
Market Cap			0.000444		0.000188
			(0.000483)		(0.000866)
Market Cap *Market			-0.00000742		-0.0000115
			(0.0000278)		(0.0000302)
Trade openness				0.00364*	0.00852***
				(0.00138)	(0.00173)
Trade openness *Market				0.0000377	-0.0000266
				(0.0000661)	(0.0000787)
Constant	3.554***	3.649***	2.832***	2.659***	2.807***
	(0.0994)	(0.111)	(0.0920)	(0.133)	(0.199)
Observations	1455	1454	1241	1628	1083
Adjusted R-squared	0.302	0.297	0.229	0.244	0.324

According to the results of Table 4, the intersection terms *Law*Market* and *Government*Market* are significantly positive, which indicates both law and government effectiveness can affect market return's predictability in GDP growth. The ability of the market return to predict GDP growth conditional on the variable is the sum of β_1 and $\beta_3 \times Variable_{i,t-1}$, which is $0.0276 + 0.0139 \times Law_{i,t-1}$ for rules of law and $0.0265 + 0.0119 \times Government_{i,t-1}$ for government effectiveness.

The interpretation of the effects of these two variables become higher as they increase. For example, if the scoring of rules of law increases by 1 unit, the β of market return would increase by 0.0139, 50.4% higher than β_1 of 0.0276; if the scoring of government effectiveness increases by 1 unit, the β of market return would increase by 0.0119, 44.9% higher than β_1 of 0.0265. Therefore, we can conclude that a better rule of law and market effectiveness would improve the predictability of market return in GDP growth. For the combined regression, where we include all four of our country characteristics and the interaction terms, there is no significant variable, and it could be explained by collinearity between rule of law and government effectiveness. According to the results, both market capitalization and trade openness do not show enough evidence that they affect how market return predicts the growth of GDP to a large extent.

As we notice, β_2 of both the rule of law and government effectiveness are negative. The possible explanation is that developing countries, of which the growth rate is high, are usually underperforming in political variables.

3.4 Development level of countries

The development level of a country considers various aspects, including not only the degree of economic development but also political stability and market regulations, etc. From section 3.3, we learned that better performance of political variables, which are rules of law and government effectiveness, improves market return's ability to predict GDP growth. Therefore, the development level of a country might be able to improve the market return's predictability in GDP growth. In this section, we are to examine this hypothesis.

To maintain the comparison standard, we classified countries into developed and developing based on the *World Economic Situation and Prospects 2019* from the United Nations. We use dummy variable *Development* to conduct a cross-sectional analysis, using the following regression:

$$GDP\ Growth_{i,t} = \beta_1 \times Mkt_{i,t-1} + \beta_2 \times Development_{i,t-1} + \beta_3 \times Mkt_{i,t-1} \times Development_{i,t-1} + \alpha_i + \varepsilon_{i,t}$$

Where:

$GDP\ Growth_{i,t} =$ GDP growth rate of country i at year t;

$Mkt_{i,t-1} =$ market return of the country i at year t-1;

$Development_{i,t-1} =$ Development level of country i at year t-1, 1 for developed countries and 0 for developing countries;

$\beta_3 =$ coefficient of interest, which measure the change in the market predictability conditional on the magnitude of the specific country variable;

$\alpha_i =$ the constant term of country i;

$\varepsilon_i =$ the residual error of country i at year t.

The ability of the market return to predict GDP growth conditional on the development level is β_1 for developing countries and is the sum of β_1 and β_3 for developed countries. Table 5 provides the results.

Table 5 *The table provides regression results for whether the correlation between market return and GDP growth is enhanced as the development levels of countries vary. Standard deviations are provided in parenthesis, and standard errors are clustered at the year level. *** p<0.01, ** p<0.05, * p<0.1*

	(1)	(2)	(3)	(4)
	GDP growth	GDP growth	GDP growth	GDP growth
Market Return(t-1)	0.0297***	0.0322***	0.0235***	0.0338*
	(0.00503)	(0.00547)	(0.00461)	(0.0118)
Development	-1.595***		-1.866***	-1.633***
	(0.315)		(0.324)	(0.312)
Development*Mkt		0.00388	0.0269**	0.0129
		(0.0113)	(0.00739)	(0.00964)
Rule of Law				-0.376
				(0.323)
Law*Mkt				0.0168
				(0.0153)
Government Effectiveness				-0.0172
				(0.322)
Government*Mkt				-0.0142
				(0.0139)

Continued from Table 5

Market Capitalization				-0.00131
				(0.000788)
Market Cap*Mkt				0.00000604
				(0.0000285)
Openness				0.00707**
				(0.00184)
Openness # Mkt				-0.0000139
				(0.0000762)
Constant	3.677***	3.005***	3.763***	3.244***
	(0.119)	(0.0773)	(0.120)	(0.246)
Observations	1642	1642	1642	1083
Adjusted R-squared	0.288	0.238	0.297	0.344

From Table 5 above, we noticed β_1 is 0.0235 while β_3 of term *Development*Mkt* is 0.0269 with a confidence level of 95%. Therefore, the β of market return for developing countries is 0.0235 while that for developed countries is 0.0504. To put it better, a 1% increase in market return of developing countries predicts a 0.0235% increase in GDP growth; however, for developed countries, a 1% increase in market return predicts a 0.0504% increase in GDP growth, 114.5% higher than that of developing countries.

Also, we conduct a cross-section analysis along with the 4 variables from section 3.3, and all β_3 is not significant compared with the separate regressions, which could be explained by that the development level of a country captures its performance on political and/or financial aspects.

We noticed that β_2 of development negative. Referred to the β_2 of both rule of law and

government effectiveness in section 3.3, the results are consistent with the perception that developing countries have higher growth rates than developed countries, although they underperform in political aspects.

Through our analysis, we proved our hypothesis that the market return of developed countries has better predictability in the growth of GDP, which might because developed countries usually have better scoring in rules of law and government effectiveness.

4. Conclusion

The increasing importance of financial markets has reinforced researchers to study the impact of the stock market on economic growth. Our study is just an attempt to investigate its predictability on future growth around the globe by conducting a cross-country regression based on a panel data of 89 countries over a span of 30 years.

According to the "wealth effect", a higher stock price will increase the investors' wealth and in turn affect aggregate consumption and investment, which leads to GDP growth. A more developed financial market with a larger size, higher liquidity, less volatility, and better governance can also provide an impetus for economic expansion.

We calculated the coefficient between stock market return and GDP growth of last year through linear regression and use the rule of law, governance efficiency, market capitalization, and trade openness to measure the financial market development.

Our study shows that the market's predictability on GDP growth strengthens as political variables improve, which are the rule of law and government effectiveness as examined in our paper because

the market improved information transparency and lead to a larger coefficient. Of course, both judicial and administrative systems are important to how to market return predicts GDP growth in a country, but the rule of law dominates the connection. Moreover, the GDP growth of developed countries is more correlated with past market returns than developing countries, due to the distance of financial market development. Compared with emerging economies, developed countries usually have advantages in political stability, regulation and supervisor, and integration with global markets.

Based on our study, it is well recognized that stock performance can be a predictor of economic growth and they tend to have a stronger connection in a more developed financial market. However, this can also go the other direction that economic expansion leads to a higher stock price and promote financial market development. A continual economic expansion will require more liquidity, freedom, governance and information transparency, so more financial intermediaries will involve, and the stock market will grow bigger.

The stock price is the summation of investors' expectations on company and economy, so it is reasonable to assume a reciprocal relationship that financial development and economic growth positively affect each other. A developed stock market improves the efficiency of capital allocation and increases the productivity of the real sector. Simultaneously, the economy exerts a positive externality on the financial market through the volume of savings and investment.

This study can be further extended in two ways. One is to find the precise lag period of predictive ability since we assume it's one-year in our study. The other way is to include more variables that measure the financial market development into consideration, such as financial intermediaries, liquidity and human capital, etc.

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