### University of Zurich

# Correlation between stock market and GDP: empirical evidence from Switzerland

Siyang Tian 21-739-446 Jincan Wang 21-739-685 Zeen Wang 21-741-038 Zi Ye 21-737-119

Due Date: December 19, 2022

Submitted: December 19, 2022

# Contents

1	Introduction	1
2	Literatures	1
3	Empirical Analysis	2
	3.1 Data and Model	2
	3.2 Results	3
4	Conclusion	8

## 1 Introduction

The Organization for Economic Cooperation and Development is an intergovernmental international economic organization composed of 38 market-economy countries, aiming to jointly address the economic, social and governance challenges brought about by globalization.

GDP is an important indicator to measure the economic status and development level of a country or region, and it is closely related to economic policies and markets. Some past studies have explored the impact of the stock market on GDP. We hope to extend these studies and explore whether GDP will in turn affect the stock market. Most of the OECD countries are developed economies, which are ideal samples for studying the relationship between the stock market and GDP.

The industrial structure of GDP has changed significantly over the past few decades. In the same time span, the stock index has also undergone large changes. However, changes in stock indices are sometimes out of sync with changes in GDP. A more obvious example is the creation and bursting of stock market bubbles. Exploring the relationship between the stock market and GDP is a breakthrough in the study of such issues.

## 2 Literatures

A theoretical relationship between stock prices and productivity within a country is derived by Kung and Schmid (2015)[1]. They construct a general equilibrium stochastic growth model with endogenous productivity growth and asset prices. The model shows that favorable economic conditions boost innovation and the development of new technologies. Since technological progress fosters long-run economic growth, endogenous innovation generates a powerful propagation mechanism for shocks reflected in persistent variation in long-term growth prospects.

Empirically, there is evidence that stock returns are strongly related (though opposite signs) to measures of future real activity[2]. This is consistent with a rational expectations view in which markets for goods and securities set current prices on the basis of forecasts of relevant real variables. in 17 advanced economics between 1870 and 2016, the data reveals two broad eras of stock market growth: the stock market grew at the same rate long-run rate as GDP during the period before the 1980s; and the capitalization growth accelerated far beyond that in GDP after the 1980s[3]. From 1991 to 2012, changes in share prices provide reliable predictions of near term future economic growth in the USA and the UK. However, changes in economic growth are not related to share price movements, while in the case of Japan, share price movements do not appear to be a useful leading predictor for near term economic growth and vice-versa[4].

This paper studies the long run equilibrium relationship between stock prices and domestic GDP for the OECD countries. We expect to find higher stock price growth in countries high GDP growth than in countries with low GDP growth.

## 3 Empirical Analysis

#### 3.1 Data and Model

This study uses quarterly GDP growth rates and stock price from the OECD. The stock price is standardized with 2015=100. This study period is from 1960Q2 to 2022Q3. Also, we removed rows with missing values to keep the data frame tidy.

Based on the topics we explored, we constructed the following model:

$$R_{Index} = \alpha + \beta * R_{GDP,t+3} + \varepsilon$$

Among them,  $R_{Index}$  is the quarterly growth rate of the stock index, and  $R_{GDP,t+3}$  is the quarterly growth rate of GDP. Since the share price may respond to GDP changes in advance, we choose GDP data for three periods in advance.

#### 3.2 Results

In the long run, the relationship between GDP and stock markets in OECD countries is not always consistent. As shown in the Figure 1–2, most of the changes in the stock price are in the same direction as the changes in  $R_{GDP,t+3}$ , but the magnitude of the changes greater than the change in GDP.

Switzerland is one of the most important financial markets in the world, with relatively open and transparent market information, making it a reasonable and typical research sample. Therefore, we used Switzerland as an example to perform regression.

The following Table 1 is the descriptive statistics of the sample. As far as Switzerland is concerned, GDP fluctuates around -7% to 7%, with an average of 0.55% and a standard deviation of 1.23, indicating that Switzerland's GDP growth is relatively stable. In Switzerland, the change in the stock market is greater than GDP, with an average of 1.59%, which is more consistent with the previous conclusion drawn from the chart, that is, the change in the stock market is greater than GDP.

In order to further explore the relationship between the two, we regressed the model and obtained the Figure 3, from which it can be observed that there is indeed a certain correlation between the two.

Regarding to the results or regression (Figure 4), the coefficient of  $R_{GDP,t+3}$  is 0.0250, which is significant within the 95% confidence interval, which means that according to our model, for every 1% increase of GDP in t+3 period, the stock index will increase by 0.0250% in t period. This result is in line with our expectation. The stock index is positively correlated with the growth of GDP, but the growth rate is much smaller than that of GDP.

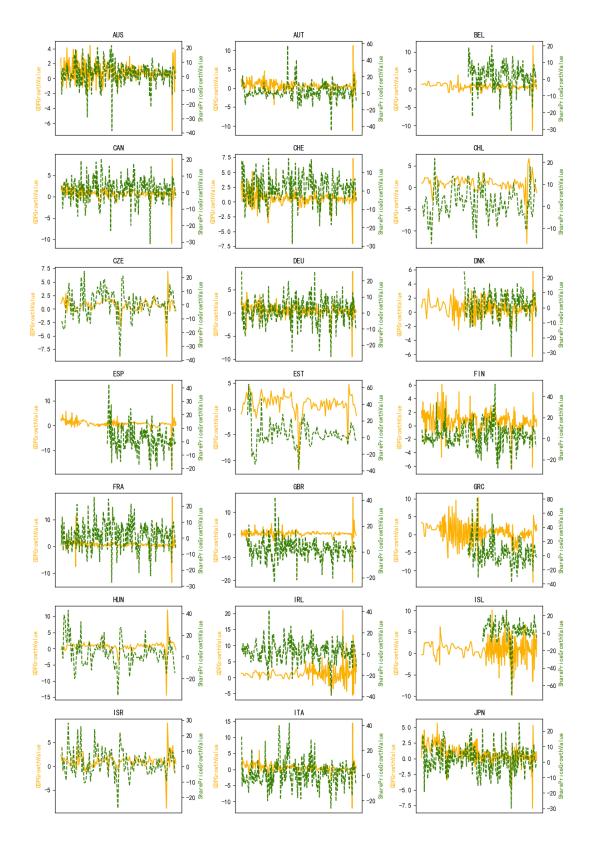


Figure 1: Relationship between GDP and stock market

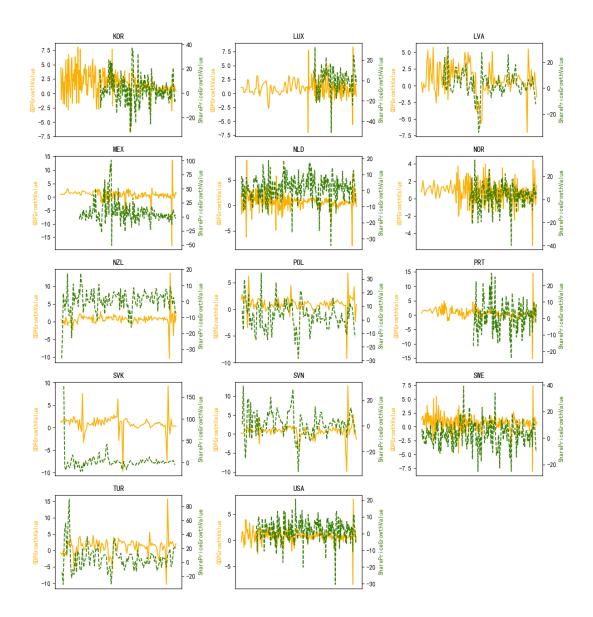


Figure 2: Relationship between GDP and stock market continued

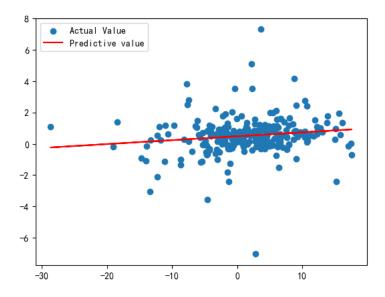


Figure 3: Regression Results

#### OLS Regression Results

=======================================		=====	=====		=======	========	
Dep. Variable:	GDPGrowthVal	ue	R-squ	Jared:		0.022	
Model:	(	DLS	Adj.	R-squared:		0.018	
Method:	Least Squar	res	F-sta	atistic:		5.361	
Date:	Sat, 17 Dec 20	922	Prob	(F-statistic):		0.0214	
Time:	17:35	11	Log-l	Likelihood:		-391.29	
No. Observations:	2	245	AIC:			786.6	
Df Residuals:	2	243	BIC:			793.6	
Df Model:		1					
Covariance Type:	nonrobu	ıst					
=======================================		====	=====		======		=======
				t			
				6.132			
SharePriceGrowthValu	e 0.0250	0	.011	2.315	0.021	0.004	0.046
=======================================		====	=====		======	========	
Omnibus:	59.6	521	Durb	in-Watson:		1.989	
Prob(Omnibus):	0.0	000	Jarqu	ue-Bera (JB):		1307.480	
Skew:	-0.1	L02	Prob	(JB):		1.21e-284	
Kurtosis:	14.3	315	Cond	. No.		7.50	
=======================================	=========		=====	=========	======	=======	

Figure 4: Regression Results Table

Table 1: Statistical Summary

Location     mas     min     mean     stab     mas     min     mean     7.62001       AUS     4.418808     -7.020018     8.33787     1.81843     21.612014     -3.667600     1.704808     7.582943       AUT     11.322721     -11.243780     6.673663     1.447553     2.448000     -3.039600     1.672180     7.57670       CH     1.731267     -1.042570     7.59495     12.62440     20.38360     -3.09457     1.672180     6.75763       CH     7.315925     -1.047200     0.51725     12.34857     17.50840     -20.80800     1.59323     7.03834       CH     6.65273     12.91519     0.90503     1.92714     21.82406     -17.05582     1.70700     9.00700     -8.84873     0.90503     1.416782     24.297150     -27.59745     1.24117     7.810240       CCE     6.95320     -8.81451     0.807150     1.90800     2.414773     -2.525974     2.724747     7.862466       EST     16.666731     1.179160     1.072202     2.38534     2.621412			GDPGrow		SharePriceGrowthRate				
AUT     11.232721     -11.243786     0.673663     1.447525     7.487000     -1.539630     1.539874     -9.1397830     -0.64568     1.271786     20.898676     -30.939630     1.654958     7.58937       CAN     8.983958     -11.042537     0.759495     1.262450     20.838706     -31.904573     1.672189     6.875708       CHE     7.315925     -7.047209     0.551725     1.234857     17.589432     -28.66806     1.593233     7.103834       CHE     6.652302     -8.848739     0.52175     1.248172     24.297158     37.608644     0.918209     0.607779       DEU     9.04695     -9.81134     0.578683     1.173002     24.297158     37.608644     0.918209     0.60779       DEV     9.04695     -8.813136     0.57868     1.173002     24.247148     22.598745     2.424174     7.502204     2.640436       ESP     16.637941     -18.72626     0.027202     2.03853     63.787282     23.691141     2.124174     7.502204     2.244165     2.031319     1.614516     1.614516 <t< td=""><td>Location</td><td>max</td><td>min</td><td>mean</td><td>std</td><td>max</td><td>min</td><td>mean</td><td>std</td></t<>	Location	max	min	mean	std	max	min	mean	std
BEL     11.731267     -1.397832     0.45568     2.271786     2.089567     3.093630     1.645918     7.58737       CAN     8.983958     -1.1042537     0.759495     1.262450     20.383706     3.104573     1.672189     6.875763       CHE     7.315925     -7.047209     0.551725     1.234857     17.589432     28.68690     1.59333     7.103834       CHE     6.655278     -1.251959     0.905039     1.92714     21.824056     -17.105582     1.75674     7.07079       CZE     6.953209     -8.848739     0.627159     1.416782     24.297158     37.60844     0.916299     9.607779       DEU     9.040695     -9.481134     0.578693     1.636080     25.897645     27.25945     1.248174     7.80246       ESP     16.637934     -17.826256     0.80796     1.908249     42.641475     20.89174     2.022089     9.64405       ESP     16.637634     -17.81020     0.91202     20.85234     63.78240     2.940139     2.96411     1.021136       ESP     16.63664	AUS	4.418806	-7.020018	0.837857	1.181453	21.642014	-38.676460	1.704898	7.538439
CAN     8.983958     -1.042537     0.759495     1.262450     2.0383706     -3.109457     1.672180     6.87730       CHE     7.315925     -7.047209     0.551725     1.234857     17.589432     2.8668096     1.593233     7.103834       CHL     6.665278     -1.251959     0.905039     1.92714     21.824056     -17.105582     1.576754     7.07079       CZE     6.953209     -8.848739     0.62159     1.416782     24.297158     37.60844     0.918629     9.607779       DEU     9.040695     -9.481134     0.578683     1.73001     24.14773     23.258907     2.724747     7.863246       EST     16.637934     17.826256     0.80790     1.98249     42.641475     20.89171     2.022089     9.64405       EST     4.775670     -1.1798107     0.98120     1.516922     25.03985     27.77778     1.642906     1.63616       FRA     1.635164     -1.352335     0.654100     1.686277     25.50398     27.77770     1.642906     1.526176       GRA     1.042788	AUT	11.232721	-11.243786	0.673663	1.447553	57.487021	-45.421095	1.539374	9.111118
CHE     7.315925     7.047209     0.551725     1.234857     1.7589432     2.8668096     1.593233     7.107809       CHE     6.665278     -1.2515199     0.905039     1.927714     21.824056     -1.105582     1.756754     7.07079       CZE     6.653209     -8.848739     0.627159     1.416782     24.297158     3.760844     0.918629     9.604777       DEU     9.004695     -9.481134     0.578807     1.366080     25.87645     27.25745     1.248174     7.810244       DNK     5.77693     -6.312451     0.578683     1.17300     24.14774     23.288907     2.24747     7.86246       ESP     16.63734     -1.782626     0.802796     1.90849     42.641475     20.891714     2.022089     9.64016       ESP     4.775670     -1.1798107     0.972202     2.38354     63.787282     23.601089     2.940139     2.96411     1.021136       ESP     4.660413     -6.477610     0.861190     1.510952     51.58402     29.401091     2.727778     1.62290     8.15265	BEL	11.731267	-11.397832	0.645568	1.271786	20.089567	-30.939630	1.654958	7.582937
CHL     6.665278     21.951959     0.905039     1.927714     21.824056     21.105828     1.765754     7.07079       CZE     6.953209     8.848739     0.627159     1.416782     24.297158     3.7608644     0.918629     9.607779       DEU     9.004695     9.481134     0.78807     1.366080     25.897645     27.259745     1.241717     7.803244       DNK     5.776993     6.312451     0.78683     1.17300     24.14773     32.58807     2.724747     7.863246       ESP     16.637934     1.7.82626     0.80279     1.908249     42.641475     20.80113     2.021316       EST     4.775670     21.798107     0.97220     2.038534     6.378728     3.660103     2.64113       FR     6.094493     6.477614     0.68190     1.568277     25.503985     27.777780     1.642906     8.152656       GBR     16.608614     20.91373     0.58370     1.94663     42.213488     23.731214     1.974376     7.642617       GRC     10.427888     3.1317789     0.64010 <td>CAN</td> <td>8.983958</td> <td>-11.042537</td> <td>0.759495</td> <td>1.262450</td> <td>20.383706</td> <td>-31.094573</td> <td>1.672189</td> <td>6.875763</td>	CAN	8.983958	-11.042537	0.759495	1.262450	20.383706	-31.094573	1.672189	6.875763
CCE     6.953209     8.848739     0.627159     1.416782     24.297158     3.760864     0.918629     9.601779       DEU     9.004695     -9.481134     0.578807     1.366080     25.897645     -27.259745     1.248174     7.803246       DNK     5.776993     -6.312451     0.578683     1.173001     24.147734     -32.588907     2.724747     7.863246       ESP     16.637394     -17.89167     0.92202     2.038534     63.787282     -38.01018     3.64111     15.021136       FIN     6.094493     -6.477614     0.681190     1.510952     51.582402     -29.403193     2.59351     10.345085       FRA     18.351564     -13.317780     0.654490     1.862875     25.503985     -27.77770     1.642906     8.152525       GRC     10.427888     -13.317789     0.664052     2.683935     82.429455     -38.75847     31.45555     1.740183       HUN     11.90000     -14.40000     0.647653     2.358156     41.199881     -38.45606     2.35390     9.342773       ISL	CHE	7.315925	-7.047209	0.551725	1.234857	17.589432	-28.668096	1.593233	7.103834
DEU     9.004695     -9.481134     0.578807     1.366080     25.87645     -27.259745     1.248174     7.810346       DNK     5.776993     -6.312451     0.578683     1.173001     24.147734     -32.588907     2.724747     7.863246       ESP     16.637934     -17.826256     0.802796     1.908249     42.641475     20.891741     2.022089     9.640506       EST     4.775670     -11.798107     0.972202     20.38534     63.787282     28.600189     3.964111     5.021136       FIN     6.09493     -6.477614     0.681190     1.510952     51.582402     29.403193     2596351     10.345035       FRA     18.351564     -13.523350     0.654190     1.862877     25.503985     27.777780     1.642906     8.156265       GRC     10.427888     -13.317789     0.664010     2.683935     82.429455     38.075847     3.185550     17.401837       GRC     10.427888     -13.317789     0.664010     2.333316     23.23565     82.429455     38.04506     23.51390     9.342773	CHL	6.665278	-12.951959	0.905039	1.927714	21.824056	-17.105582	1.756754	7.070759
DNK     5.776993     -6.312451     0.576883     1.17301     2.141773     -3.58807     2.724747     7.863266       ESP     16.637934     -17.826256     0.802796     1.908249     42.641475     -20.891714     2.022089     9.644056       EST     4.775670     -11.798107     0.972202     2.038534     63.787282     3.8600189     3.96411     15.021136       FIN     6.09493     -6.477614     0.681190     1.510952     51.582402     -29.403193     2.59653     10.34236       FRA     18.351564     -13.523350     0.654490     1.862877     25.503985     -27.777780     1.64206     8.156255       GBR     16.608614     -20.991373     0.58303     1.944663     42.213488     -23.731214     1.974376     7.642617       GRC     10.427888     -13.317789     0.664010     2.683935     82.429455     -38.075847     3.418555     1.7401837       HUN     11.90000     -14.40000     0.647632     2.358158     41.199881     -38.84560     2.31309     9.342773       ISL	CZE	6.953209	-8.848739	0.627159	1.416782	24.297158	-37.608644	0.918629	9.607779
ESP     16.637934     -17.826256     0.802796     1.908249     -2.641475     -2.081714     2.022089     9.644076       EST     4.775670     -11.798107     0.972202     2.038534     63.787282     -38.600189     3.964411     15.021136       FIN     6.094493     -6.477614     0.681190     1.510952     51.582402     -29.403193     2.596351     10.345035       FRA     18.551564     -13.523350     0.654490     1.862877     25.503985     -27.777780     1.64206     7.642617       GRA     16.608614     -20.991373     0.583703     1.944663     42.213488     -23.731214     1.974376     7.641817       GRC     10.427888     -13.317789     0.66401     2.683935     82.429455     -38.075847     3.418555     17.401837       HUN     11.900000     -14.400000     0.647635     2.032294     43.123207     -35.48960     3.88780     12.070427       IRL     21.013320     -5.29750     1.254536     23.3316     26.035626     1.489961     2.728491       ISL     10.06	DEU	9.004695	-9.481134	0.578807	1.366080	25.897645	-27.259745	1.248174	7.810234
EST     4.775670     -1.798107     0.972202     2.038534     63.787282     -38.600189     3.964411     15.021136       FIN     6.094493     -6.477614     0.681190     1.510952     51.582402     -29.403193     2.596351     10.345035       FRA     18.351564     -13.523350     0.654490     1.862877     25.503985     -27.777780     1.64290     8.156255       GBR     16.608614     -20.991373     0.583703     1.944663     42.213488     -23.731214     1.974376     7.642617       GRC     10.427888     -13.317789     0.664010     2.683935     82.429455     38.075847     3.418555     1.7401837       HUN     11.900000     -14.40000     0.647653     2.032294     43.123207     -35.489609     3.880780     12.070427       IRL     21.018326     -5.529750     1.254536     2.331818     41.199881     -38.45606     2.351309     9.342773       ISL     10.067048     -8.97409     0.991620     1.574280     28.047522     26.934116     2.442914     8.484191 <td< td=""><td>DNK</td><td>5.776993</td><td>-6.312451</td><td>0.578683</td><td>1.173001</td><td>24.147734</td><td>-32.588907</td><td>2.724747</td><td>7.863246</td></td<>	DNK	5.776993	-6.312451	0.578683	1.173001	24.147734	-32.588907	2.724747	7.863246
FIN     6.094493     -6.477614     0.681190     1.510952     51.582402     2.9403193     2.59351     10.345035       FRA     18.351564     -13.523350     0.654490     1.862877     25.503985     -27.777780     1.642906     8.156255       GBR     16.608614     -20.991373     0.583703     1.944663     42.213488     -23.731214     1.974376     7.642617       GRC     10.427888     -13.317789     0.664010     2.683935     82.429455     -38.075847     3.41855     17.401837       HUN     11.90000     -14.40000     0.647653     2.338158     41.199881     -38.45606     2.35130     9.342773       ISL     10.067048     -9.839834     0.916751     2.33316     26.033609     -71.236371     2.704795     12.284945       ISR     9.039196     -8.797409     0.991620     1.574280     28.047522     26.934116     2.44291     8.484191       ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.489991     1.221840       KOR	ESP	16.637934	-17.826256	0.802796	1.908249	42.641475	-20.891714	2.022089	9.644056
FRA     18.351564     -13.523350     0.654490     1.862877     25.503985     -27.777780     1.642906     8.15625       GBR     16.608614     -20.991373     0.583703     1.944663     42.213488     -23.731214     1.974376     7.642617       GRC     10.427888     -13.317789     0.664010     2.683935     82.429455     -38.075847     3.418555     17.401837       HUN     11.900000     -14.40000     0.647653     2.032294     43.123207     -35.489609     3.80780     12.070427       IRL     21.018326     -5.529750     1.254536     2.33316     26.033609     -71.236371     27.04795     12.284945       ISR     9.039196     -8.797409     0.991620     15.74280     28.047522     -26.934116     2.442914     8.484191       ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.48991     10.221810       JPN     5.69756     -7.93803     0.86606     1.439967     25.163725     -29.888141     1.60030     1.797765       L	EST	4.775670	-11.798107	0.972202	2.038534	63.787282	-38.600189	3.964411	15.021136
GBR     16.608614     -20.991373     0.583703     1.944663     42.213488     -23.731214     1.974376     7.642617       GRC     10.427888     -13.317789     0.664010     2.683393     82.429455     -38.075847     3.418555     17.401837       HUN     11.90000     -14.40000     0.647653     2.03294     43.123207     -35.48960     2.851309     9.342773       IRL     21.018326     -5.529750     1.254536     2.358158     41.199881     -38.845606     2.351309     9.342773       ISL     10.067048     -9.839834     0.916751     2.333316     26.033609     -71.236371     2.704795     12.284945       ISR     9.039196     -8.797409     0.991620     1.574280     28.047522     -26.934116     2.42914     8.484191       ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.489691     10.221810       JPN     5.697546     -7.938036     0.86606     1.439967     25.163725     -29.888141     1.600391     1.191628	FIN	6.094493	-6.477614	0.681190	1.510952	51.582402	-29.403193	2.596351	10.345035
GRC     10.427888     -13.317789     0.664010     2.683935     82.429455     -38.075847     3.41855     17.401878       HUN     11.90000     -14.40000     0.647633     2.032294     43.123207     -35.48960     3.880780     12.070427       IRL     21.018326     -5.529750     1.254536     2.358158     41.199881     -38.845606     2.351390     9.342773       ISL     10.067048     -9.839834     0.916751     2.333316     26.033609     -71.236371     2.704795     12.284945       ISR     9.039196     -8.797409     0.991620     1.574280     28.047522     -26.934116     2.442914     8.484191       ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.489691     10.221810       JPN     5.697546     -7.938036     0.86606     1.439967     25.163725     -29.888141     1.600391     8.079274       KOR     8.061462     -6.818022     1.732345     1.95849     31.419969     -33.997673     3.032875     9.713881       L	FRA	18.351564	-13.523350	0.654490	1.862877	25.503985	-27.777780	1.642906	8.156255
HUN     11.900000     -14.400000     0.647653     2.032294     43.123207     -35.489609     3.80780     12.070427       IRL     21.018326     -5.529750     1.254536     2.358158     41.199881     -38.84560     2.351390     9.342773       ISL     10.067048     -9.839834     0.916751     2.333316     26.033609     -71.236371     2.704795     12.284945       ISR     9.039196     -8.797409     0.991620     1.574280     28.047522     -26.934116     2.442914     8.484191       ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.489691     10.221810       JPN     5.697546     -7.938036     0.866606     1.439967     25.163725     -29.888141     1.600391     8.079274       KOR     8.061462     -6.818022     1.732345     1.976849     37.779478     -32.305365     2.579035     11.91628       LUX     8.319050     -7.017609     0.887513     1.890981     100.788728     -51.124216     7.691543     18.606206 <t< td=""><td>GBR</td><td>16.608614</td><td>-20.991373</td><td>0.583703</td><td>1.944663</td><td>42.213488</td><td>-23.731214</td><td>1.974376</td><td>7.642617</td></t<>	GBR	16.608614	-20.991373	0.583703	1.944663	42.213488	-23.731214	1.974376	7.642617
IRL     21.018326     -5.529750     1.254536     2.358158     41.199881     -38.845606     2.351390     9.342773       ISL     10.067048     -9.839834     0.916751     2.33316     26.033609     -71.236371     2.704795     12.284945       ISR     9.039196     -8.797409     0.991620     1.574280     28.047522     -26.934116     2.442914     8.484191       ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.489691     10.221810       JPN     5.697546     -7.938036     0.866606     1.439967     25.163725     -29.888141     1.600391     8.079274       KOR     8.061462     -6.818022     1.732345     1.976849     37.779478     -32.305365     2.579035     11.191628       LUX     8.319050     -7.017609     0.875735     1.531374     32.698002     -51.003169     0.648093     11.797765       LVA     5.748584     -6.995186     0.887413     1.890981     100.788728     -51.124216     7.691543     18.606206 <t< td=""><td>GRC</td><td>10.427888</td><td>-13.317789</td><td>0.664010</td><td>2.683935</td><td>82.429455</td><td>-38.075847</td><td>3.418555</td><td>17.401837</td></t<>	GRC	10.427888	-13.317789	0.664010	2.683935	82.429455	-38.075847	3.418555	17.401837
ISL     10.067048     -9.839834     0.916751     2.333316     26.033609     -71.236371     2.704795     12.284945       ISR     9.039196     -8.797409     0.991620     1.574280     28.047522     -26.934116     2.442914     8.484191       ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.489691     10.221810       JPN     5.697546     -7.938036     0.866606     1.439967     25.163725     -29.888141     1.600391     8.079274       KOR     8.061462     -6.818022     1.732345     1.976849     37.779478     -32.305365     2.579035     11.91628       LUX     8.319050     -7.017609     0.875735     1.531374     32.698002     -51.003169     0.648093     11.797765       LVA     5.748584     -6.995186     0.885956     2.286839     31.419969     -33.997673     3.032875     9.713881       MEX     13.653575     -17.959204     0.887413     1.890981     10.0788728     -51.124216     7.691543     18.606206       <	HUN	11.900000	-14.400000	0.647653	2.032294	43.123207	-35.489609	3.880780	12.070427
ISR     9.039196     -8.797409     0.991620     1.574280     28.047522     -26.934116     2.442914     8.484191       ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.489691     10.221810       JPN     5.697546     -7.938036     0.866006     1.439967     25.163725     -29.888141     1.600391     8.079274       KOR     8.061462     -6.818022     1.732345     1.976849     37.779478     -32.305365     2.579035     11.191628       LUX     8.319050     -7.017609     0.875735     1.531374     32.698002     -51.003169     0.648093     11.797765       LVA     5.748584     -6.995186     0.887413     1.890981     100.788728     -51.124216     7.691543     18.606206       NLD     8.940364     -7.904426     0.678117     1.530104     18.927776     -34.21993     1.407653     7.523131       NOR     4.434557     -5.414676     0.761621     1.214504     33.991223     -39.924935     3.005149     10.131584	IRL	21.018326	-5.529750	1.254536	2.358158	41.199881	-38.845606	2.351390	9.342773
ITA     14.476293     -12.101330     0.572454     1.614337     41.689458     -26.205626     1.489691     10.221810       JPN     5.697546     -7.938036     0.866606     1.439967     25.163725     -29.888141     1.600391     8.079274       KOR     8.061462     -6.818022     1.732345     1.976849     37.779478     -32.305365     2.579035     11.191628       LUX     8.319050     -7.017609     0.875735     1.531374     32.698002     -51.003169     0.648093     11.797765       LVA     5.748584     -6.995186     0.885956     2.286839     31.419969     -33.997673     3.032875     9.713881       MEX     13.653575     -17.959204     0.887413     1.890981     100.788728     -51.124216     7.691543     18.606206       NLD     8.940364     -7.904426     0.678117     1.530104     18.927776     -34.21993     1.01653     7.523131       NOR     4.434557     -5.414676     0.761621     1.714997     17.646552     -35.670873     0.519457     6.737128	ISL	10.067048	-9.839834	0.916751	2.333316	26.033609	-71.236371	2.704795	12.284945
JPN     5.697546     -7.938036     0.866606     1.439967     25.163725     -29.888141     1.600391     8.079274       KOR     8.061462     -6.818022     1.732345     1.976849     37.779478     -32.305365     2.579035     11.191628       LUX     8.319050     -7.017609     0.875735     1.531374     32.698002     -51.003169     0.648093     11.797765       LVA     5.748584     -6.995186     0.885956     2.286839     31.419969     -33.997673     3.032875     9.713881       MEX     13.653575     -17.959204     0.887413     1.890981     100.788728     -51.124216     7.691543     18.606206       NLD     8.940364     -7.904426     0.678117     1.530104     18.927776     -34.219933     1.407653     7.523131       NOR     4.434557     -5.414676     0.761621     1.214504     33.991223     -39.924935     3.005149     10.131584       NZL     13.675110     -10.393865     0.653112     1.704997     17.646552     -35.670873     0.519457     6.737128 <t< td=""><td>ISR</td><td>9.039196</td><td>-8.797409</td><td>0.991620</td><td>1.574280</td><td>28.047522</td><td>-26.934116</td><td>2.442914</td><td>8.484191</td></t<>	ISR	9.039196	-8.797409	0.991620	1.574280	28.047522	-26.934116	2.442914	8.484191
KOR     8.061462     -6.818022     1.732345     1.976849     37.779478     -32.305365     2.579035     11.191628       LUX     8.319050     -7.017609     0.875735     1.531374     32.698002     -51.003169     0.648093     11.797765       LVA     5.748584     -6.995186     0.885956     2.286839     31.419969     -33.997673     3.032875     9.713881       MEX     13.653575     -17.959204     0.887413     1.890981     100.788728     -51.124216     7.691543     18.606206       NLD     8.940364     -7.904426     0.678117     1.530104     18.927776     -34.219933     1.407653     7.523131       NOR     4.434557     -5.414676     0.761621     1.214504     33.991223     -39.924935     3.005149     10.131584       NZL     13.675110     -10.393865     0.653112     1.704997     17.646552     -35.670873     0.519457     6.737128       PRT     14.588001     -15.119497     0.765960     1.823479     27.409212     -24.367060     1.531018     9.085552	ITA	14.476293	-12.101330	0.572454	1.614337	41.689458	-26.205626	1.489691	10.221810
LUX     8.319050     -7.017609     0.875735     1.531374     32.698002     -51.003169     0.648093     11.797765       LVA     5.748584     -6.995186     0.885956     2.286839     31.419969     -33.997673     3.032875     9.713881       MEX     13.653575     -17.959204     0.887413     1.890981     100.788728     -51.124216     7.691543     18.606206       NLD     8.940364     -7.904426     0.678117     1.530104     18.927776     -34.219933     1.407653     7.523131       NOR     4.434557     -5.414676     0.761621     1.214504     33.991223     -39.924935     3.005149     10.131584       NZL     13.675110     -10.393865     0.653112     1.704997     17.646552     -35.670873     0.519457     6.737128       POL     6.764794     -9.206071     1.013821     1.584297     34.294900     -28.498625     2.329534     10.107595       SVK     9.207307     -9.739807     0.914681     1.955863     174.737950     -20.295488     2.147537     18.652152	JPN	5.697546	-7.938036	0.866606	1.439967	25.163725	-29.888141	1.600391	8.079274
LVA     5.748584     -6.995186     0.885956     2.286839     31.419969     -33.997673     3.032875     9.713881       MEX     13.653575     -17.959204     0.887413     1.890981     100.788728     -51.124216     7.691543     18.606206       NLD     8.940364     -7.904426     0.678117     1.530104     18.927776     -34.219933     1.407653     7.523131       NOR     4.434557     -5.414676     0.761621     1.214504     33.991223     -39.924935     3.005149     10.131584       NZL     13.675110     -10.393865     0.653112     1.704997     17.646552     -35.670873     0.519457     6.737128       POL     6.764794     -9.206071     1.013821     1.584297     34.294900     -28.498625     2.329534     10.107595       PRT     14.588001     -15.119497     0.765960     1.823479     27.409212     -24.367060     1.531018     9.085552       SVN     12.617891     -9.888565     0.677273     2.027889     30.793790     -35.311504     1.928949     10.093353	KOR	8.061462	-6.818022	1.732345	1.976849	37.779478	-32.305365	2.579035	11.191628
MEX     13.653575     -17.959204     0.887413     1.890981     100.788728     -51.124216     7.691543     18.606206       NLD     8.940364     -7.904426     0.678117     1.530104     18.927776     -34.219933     1.407653     7.523131       NOR     4.434557     -5.414676     0.761621     1.214504     33.991223     -39.924935     3.005149     10.131584       NZL     13.675110     -10.393865     0.653112     1.704997     17.646552     -35.670873     0.519457     6.737128       POL     6.764794     -9.206071     1.013821     1.584297     34.294900     -28.498625     2.329534     10.107595       PRT     14.588001     -15.119497     0.765960     1.823479     27.409212     -24.367060     1.531018     9.085552       SVK     9.207307     -9.739807     0.914681     1.955863     174.737950     -20.295488     2.147537     18.652152       SVN     12.617891     -9.888565     0.677273     2.027889     30.793790     -35.311504     1.928949     10.093353	LUX	8.319050	-7.017609	0.875735	1.531374	32.698002	-51.003169	0.648093	11.797765
NLD     8.940364     -7.904426     0.678117     1.530104     18.927776     -34.219933     1.407653     7.523131       NOR     4.434557     -5.414676     0.761621     1.214504     33.991223     -39.924935     3.005149     10.131584       NZL     13.675110     -10.393865     0.653112     1.704997     17.646552     -35.670873     0.519457     6.737128       POL     6.764794     -9.206071     1.013821     1.584297     34.294900     -28.498625     2.329534     10.107595       PRT     14.588001     -15.119497     0.765960     1.823479     27.409212     -24.367060     1.531018     9.085552       SVK     9.207307     -9.739807     0.914681     1.955863     174.737950     -20.295488     2.147537     18.652152       SVN     12.617891     -9.888565     0.677273     2.027889     30.793790     -35.311504     1.928949     10.093353       SWE     7.325353     -8.058830     0.639892     1.406531     39.093618     -25.190601     2.683303     8.703745       <	LVA	5.748584	-6.995186	0.885956	2.286839	31.419969	-33.997673	3.032875	9.713881
NOR     4.434557     -5.414676     0.761621     1.214504     33.991223     -39.924935     3.005149     10.131584       NZL     13.675110     -10.393865     0.653112     1.704997     17.646552     -35.670873     0.519457     6.737128       POL     6.764794     -9.206071     1.013821     1.584297     34.294900     -28.498625     2.329534     10.107595       PRT     14.588001     -15.119497     0.765960     1.823479     27.409212     -24.367060     1.531018     9.085552       SVK     9.207307     -9.739807     0.914681     1.955863     174.737950     -20.295488     2.147537     18.652152       SVN     12.617891     -9.888565     0.677273     2.027889     30.793790     -35.311504     1.928949     10.093353       SWE     7.325353     -8.058830     0.639892     1.406531     39.093618     -25.190601     2.683303     8.703745       TUR     15.649318     -10.371753     1.161359     2.806978     90.295744     -31.817736     5.707367     17.528920	MEX	13.653575	-17.959204	0.887413	1.890981	100.788728	-51.124216	7.691543	18.606206
NZL     13.675110     -10.393865     0.653112     1.704997     17.646552     -35.670873     0.519457     6.737128       POL     6.764794     -9.206071     1.013821     1.584297     34.294900     -28.498625     2.329534     10.107595       PRT     14.588001     -15.119497     0.765960     1.823479     27.409212     -24.367060     1.531018     9.085552       SVK     9.207307     -9.739807     0.914681     1.955863     174.737950     -20.295488     2.147537     18.652152       SVN     12.617891     -9.888565     0.677273     2.027889     30.793790     -35.311504     1.928949     10.093353       SWE     7.325353     -8.058830     0.639892     1.406531     39.093618     -25.190601     2.683303     8.703745       TUR     15.649318     -10.371753     1.161359     2.806978     90.295744     -31.817736     5.707367     17.528920	NLD	8.940364	-7.904426	0.678117	1.530104	18.927776	-34.219933	1.407653	7.523131
POL     6.764794     -9.206071     1.013821     1.584297     34.294900     -28.498625     2.329534     10.107595       PRT     14.588001     -15.119497     0.765960     1.823479     27.409212     -24.367060     1.531018     9.085552       SVK     9.207307     -9.739807     0.914681     1.955863     174.737950     -20.295488     2.147537     18.652152       SVN     12.617891     -9.888565     0.677273     2.027889     30.793790     -35.311504     1.928949     10.093353       SWE     7.325353     -8.058830     0.639892     1.406531     39.093618     -25.190601     2.683303     8.703745       TUR     15.649318     -10.371753     1.161359     2.806978     90.295744     -31.817736     5.707367     17.528920	NOR	4.434557	-5.414676	0.761621	1.214504	33.991223	-39.924935	3.005149	10.131584
PRT   14.588001   -15.119497   0.765960   1.823479   27.409212   -24.367060   1.531018   9.085552     SVK   9.207307   -9.739807   0.914681   1.955863   174.737950   -20.295488   2.147537   18.652152     SVN   12.617891   -9.888565   0.677273   2.027889   30.793790   -35.311504   1.928949   10.093353     SWE   7.325353   -8.058830   0.639892   1.406531   39.093618   -25.190601   2.683303   8.703745     TUR   15.649318   -10.371753   1.161359   2.806978   90.295744   -31.817736   5.707367   17.528920	NZL	13.675110	-10.393865	0.653112	1.704997	17.646552	-35.670873	0.519457	6.737128
SVK     9.207307     -9.739807     0.914681     1.955863     174.737950     -20.295488     2.147537     18.652152       SVN     12.617891     -9.888565     0.677273     2.027889     30.793790     -35.311504     1.928949     10.093353       SWE     7.325353     -8.058830     0.639892     1.406531     39.093618     -25.190601     2.683303     8.703745       TUR     15.649318     -10.371753     1.161359     2.806978     90.295744     -31.817736     5.707367     17.528920	POL	6.764794	-9.206071	1.013821	1.584297	34.294900	-28.498625	2.329534	10.107595
SVN 12.617891 -9.888565 0.677273 2.027889 30.793790 -35.311504 1.928949 10.093353   SWE 7.325353 -8.058830 0.639892 1.406531 39.093618 -25.190601 2.683303 8.703745   TUR 15.649318 -10.371753 1.161359 2.806978 90.295744 -31.817736 5.707367 17.528920	PRT	14.588001	-15.119497	0.765960	1.823479	27.409212	-24.367060	1.531018	9.085552
SWE 7.325353 -8.058830 0.639892 1.406531 39.093618 -25.190601 2.683303 8.703745   TUR 15.649318 -10.371753 1.161359 2.806978 90.295744 -31.817736 5.707367 17.528920	SVK	9.207307	-9.739807	0.914681	1.955863	174.737950	-20.295488	2.147537	18.652152
TUR 15.649318 -10.371753 1.161359 2.806978 90.295744 -31.817736 5.707367 17.528920	SVN	12.617891	-9.888565	0.677273	2.027889	30.793790	-35.311504	1.928949	10.093353
	SWE	7.325353	-8.058830	0.639892	1.406531	39.093618	-25.190601	2.683303	8.703745
USA 7.854483 -8.484336 0.766620 1.149958 20.519865 -30.435154 1.764790 6.110438	TUR	15.649318	-10.371753	1.161359	2.806978	90.295744	-31.817736	5.707367	17.528920
	USA	7.854483	-8.484336	0.766620	1.149958	20.519865	-30.435154	1.764790	6.110438

# 4 Conclusion

Using share price data in the OECD group, this paper studies the long-horizon relationship between share price growth and GDP growth. Generally, the stock price increases when GDP grows in T+3 period and deceases when GDP declines in T+3 period. It may indicate the perfect capital market where the share price incorporates the future market information. However, the relationship and magnitude is not consistent across all sample countries. In Switzerland, there is significantly positive between stock price growth and GDP growth. 1% increase of GDP in T+3 periods will cause 0.025% rise of share price in T period.

# References

- [1] Howard Kung and Lukas Schmid. Innovation, growth, and asset prices. *The Journal of Finance*, 70:1001–1037, 6 2015.
- [2] Eugene F Fama. Stock returns, real activity, inflation, and money. *The American Economic Review*, 71:545–565, 1981.
- [3] Dmitry Kuvshinov and Kaspar Zimmermann. The big bang: Stock market capitalization in the long run. *Journal of Financial Economics*, 145(2, Part B):527–552, 2022.
- [4] Mohammad Hossain and Anowar Hossain. An empirical relationship between share price and economic growth: New evidence on selected industrial economies. *American Journal of Economics*, pages 353–362, 09 2015.