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Surayya Mukhtar* | Abdul Rashid†

Fisher Hypothesis in the Stock Market: An Alternative Specification

Abstract *The stock market plays a pivotal role in the sustainable development of an economy. Fisher's hypothesis in the stock market specifies that stock returns are directly linked to the rate of inflation. The objective of this paper is to explore this relationship using panel dataset for 56 countries from 1950-2018 and applying general to a specific technique for above-average Money Supply/GDP countries and below-average Money Supply/GDP countries separately and for different income group countries i.e. high-income countries, upper-middle-income countries, and lower-middle-income countries. Our analysis indicates that the Fisher hypothesis holds in the world economies except for lower-middle-income countries but it holds in its weak form.*

Key Words: Fisher Hypothesis, Stock Market, Inflation, General to Specific Technique.

JEL Classification: G12, G14

Introduction

Macroeconomic variables especially inflation is an important element of stock market performance. The relationship between stock market returns and inflation dates back to Fisher (1930). This link is later on known as the Fisher hypothesis. The Fisher hypothesis provides a theoretical framework for this connection. The effects of inflation can be positive as well as negative. Positive effects ensure that central banks regulate nominal interest rates to alleviate downturns, and hence promote investment in physical capital. Negative effects include a decrease in the real value of money and other monetary assets; a decrease in investment and savings. Inflation causes a dearth of goods as consumers activate hoarding apprehending that prices will increase further. Economists have the same opinion that high rates of inflation are triggered through unnecessary growth in the money supply. Investment is undertaken to accomplish a sound profit. Thus, profit maximization on investment demands accurate consideration related to the existing rate of inflation to evade loss of an investment over time. (Uwubanmwen and Eghosa, 2015).

The Fisher hypothesis is supportive in finding the competency of the markets as it specifies that stock returns should be directly associated with the anticipated inflation. Equities should provide a hedge for unanticipated inflation, which symbolizes possession of real assets. The nominal anticipated return on assets is the aggregate of a real rate of interest, real risk premium, and anticipated inflation.

Fisher hypothesis asserts that to preserve the equilibrium real rate of interest, the rate of inflation must be equivalent to a nominal rate of interest. The most important function of the interest rate is demonstrated by the portfolio effect, which ensures that money and all other financial assets are substitute forms of keeping wealth. A change in the growth rate of money stock leads to disparity among preferred and real money balance that in turn affects the demand for other financial assets that are eradicated by variation in their returns. If the world markets are not fully integrated and stock prices do not incorporate the changes in goods prices, the nominal stock returns will not change with expected inflation. In such situations the common stocks will not provide a hedge against inflation that has great

* Lecturer Economics, Department of Economics, International Institute of Islamic Economics, International Islamic University, Islamabad, Pakistan. Email: surayya.mukhtar@gmail.com
† Associate Professor, Department of Economics, International Institute of Islamic Economics, International Islamic University, Islamabad, Pakistan.

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implications; first, the variations in the price of stocks are a symbol of a firm's efficiency. Declines in stock prices indicate that a firm's performance is poor. Second, it decreases household consumption Demand. Third, investment spending falls with a decrease in the stock price as there is an adverse relationship from the price of stocks and goods which impedes capital stock growth and hence productivity and output.

Aims and Objectives

Several financial economists have tested the stock return – inflation link by using different techniques leading to contradictory results. Some studies accept a positive relationship (Omotor, 2010 and Opera, 2014), while others find a negative relationship or mixed results (Bhatti & Oglo, 2013; Eghosa, 2015; Silva, 2016; Phiri, 2017). Fisher hypothesis has never been studied for above-average Money Supply/GDP countries and below-average Money Supply/GDP countries separately. Similarly, it has never been studied for different income group countries *i.e*; high-income countries, upper-middle-income countries, and lower-middle-income countries. Singh, 2008 and Maxfield, 2009 show that features of stock markets are different among different income group countries. The present study is an attempt to fill this gap. We have applied general to specific estimation technique to a panel of 56 countries to solve the issues observed in previous studies.

Theoretical Foundations

Fisher hypothesis in the stock market implies that the one-period expected nominal return on stocks reveals fully anticipated future inflation so that the *ex-ante* real return remains fixed over the holding period (Nelson, 1976).

$$\alpha_t = E(R_t / I_t) - E(\rho_t / I_t) \quad (1)$$

here

α_t : *ex ante* real interest rate,

R_t : actual realized return during time t,

I_t : information set available at time t,

E : expectations operator, and

ρ_t : inflation realized in time t.

Testing of Fisher hypothesis is based on realized returns R_t and inflation (ρ_t), these are connected to their *ex-ante* counterparts by relationships mentioned in equation (2) and (3) as follows:

$$R_t = E(R_t / I_t) + u_t \quad (2)$$

$$\rho_t = E(\rho_t / I_t) + \varepsilon_t \quad (3)$$

Here u_t and ε_t are prediction errors. These are not related to their predicted values. Splitting the *ex-ante* real interest rate α_t into average and variable parts α and $\tilde{\alpha}_t$ respectively and using equations (1), (2) and (3), link amid returns and rates of inflation is given as:

$$R_t = \alpha + \beta\rho_t + (\tilde{\alpha}_t + u_t - \beta\varepsilon_t) \quad (4)$$

Fisher hypothesis implies that β is unitary.

Literature Review

Early studies of the Fisher hypothesis in stock market described a meager performance of stocks as a hedge for inflation in the United States. The studies showed the negative link between anticipated stock returns and anticipated inflation in the United States included Reilly *et al.* (1970), Oudet, (1973), Nelson (1976), Jaffe and Madelker (1976), Bodie (1976), and Fama and Schwert (1977). Reilly *et al.,* used The data from 1937 to 1968 and found that almost all net returns were negative. Oudet used quarterly data from 1953 to 1970 and applied a simultaneous two equations model, computed Pearson correlation coefficient which was negative and significant. Nelson argued a negative link between stock returns and inflation. Jaffe and Madelker employed Lawrence Fisher Index for stock returns. They found that the short-term returns were inversely related to coexistent, anticipated and unanticipated inflation and real and nominal stock market returns were a poor hedge against inflation. They also found that long-term returns were positively associated with anticipated and unanticipated inflation. Bodie applied Markowitz-Tobin's mean-variance model of a portfolio. He found that short-run real return on equity was inversely related to both anticipated and unanticipated inflation. Fama and Schwert used stocks, government instruments for debt, residential investment and labor income in their study. They found that residential investment was providing a hedge against both anticipated and unanticipated inflation. Government instruments for debt were hedge for anticipated inflation only. While labor income was a partial hedge for anticipated and unanticipated inflation and stock market returns were inversely linked to both anticipated and unanticipated inflation.

Bai (2014), Uwubanmwen and Eghosa (2015), Silva (2016), and Phiri (2017) found a negative effect between inflation and stock market returns. Bai used the Shanghai Composite Index of stock prices. He applied the VAR model on 2000-2010 data and concluded the absence of a positive correlation. Uwubanmwen and Eghosa used monthly data from 1995 to 2010 of Nigerian Stock Exchange Fact Book and Central Bank of Nigerian Statistical Bulletin. Through the ARDL approach, they found a negative and weak relationship amid inflation and stock returns. Silva used monthly data from 2004 through 2014. Phiri used monthly data from 2003 through 2014 of Johannesburg stock exchange. He applied the momentum threshold autoregressive model.

Akmal (2007) and Bhatti and Pak (2013) found mixed results. Akmal used Pakistan's monthly data set from 1971 to 2006. He applied co-integration and Error Correction (ECM) techniques. He found that stock returns provided hedge in the long run. Bhatti and Pak used monthly data on stock market prices and goods prices for the period 2001M1 through 2012M10. They employed Cochrane-Orcutt error-correction and cointegration techniques and found that the Fisher hypothesis holds only in Kazakhstan. Their results did not show the long-run relationship of stock prices and goods prices and a significant error correction representation for Russia. They showed that it took less than two years to reestablish the equilibrium amid stock prices and goods prices.

The studies confirmed the Fisher hypothesis in the stock market included Cagan, (1974), Firth (1979), Gultekin (1983), Omotor (2010), and Opera (2014). Cagan discussed the history of common stock market values and inflation for many countries and calculated the percentage changes in the real value of stocks from 1939 through 1969. He found that a wide-ranging group of stocks protected against inflation only in peace times and did not protect against inflation during the hyperinflation or wartime destruction. He also concluded that as compared to bonds or other fixed-value assets, stock prices passed the test of hedge for long-term holdings only. Firth used British data for the years 1955 through 1976. He obtained stock returns from the London Business School's share price databank. He measured the inflation with the help of monthly Index of Retail Prices and extended back his monthly and annual data from 1935 and 1919. He calculated the monthly stock returns from the Financial Times Ordinary Share Index since 1935. He found that the Fisher hypothesis holds. Gultekin used US annual and semiannual data for the period 1952:6 through 1979:12. He applied the OLS technique. He found a direct link between anticipated stock returns and unanticipated inflation. Omotor used the Central Bank of Nigeria data from1985 through 2008 and applied the Johansen cointegration technique. Opera used monthly stock indices of the Bucharest Stock Exchange (BSE) and CPI from September 1997 through January 2011 and GAARCH (1, 1) model and found a positive and significant impact on the return of indices. He found the Fisher effect for the top ten liquid companies and investment funds.

Panel data studies have also found contradictory results. Solnik and Solnik (1997) used monthly data from eight countries from 1958:12 to 1996:1. They applied the Instrumental variable approach on one to twelve months holding periods and GMM techniques. The Fisher hypothesis is not rejected in their study. Cross-sectional regression showed strong support for the Fisher hypothesis during the whole Period. GMM results accepted the Fisher hypothesis in a long period. While Tripathy (2014) studied the Fisher hypothesis for BRICS countries using quarterly data from March 2000 through September 2013 and applied panel cointegration tests. He found a positive relationship for China and India and negative for Russia but no cointegrating relationship in the long run.

Research Methodology

The literature review reveals that present models of the Fisher hypothesis in the stock market provide only a partial description. There is an essential need to develop a general model. This model will enhance and widen our understanding and vision of the stock market. This paper is an attempt towards this end. A general model for the stock market is given as:

$$R_{i,t} = a \ + b_0 R_{i,t-1} + b_1 \rho_{i,t} + b_2 \rho_{i,t-1} + \left(\widetilde{a}_t + u_t - b\varepsilon_t\right) \quad (5)$$

Here

$R_{i,t}$; Actual realized return on the portfolio in *ith* country during t,

$R_{i,t-1}$; Actual realized return on the portfolio in *ith* country during $t-1$,

$\rho_{i,t}$; Inflation realized in *ith* country during t,

$\rho_{i,t-1}$; Inflation realized in *ith* country during $t-1$.

General to specific technique is used in this paper. The data is analyzed in three strands:

i) Fisher hypothesis in the stock market is tested for all countries in the sample.

ii) The data is divided into two groups according to the Money Supply/GDP ratio *i.e*; above-average Money Supply/GDP countries and below-average Money Supply/GDP countries.

iii) The data is divided into three groups according to the World Bank classification of countries *i.e*; high-income countries, upper-middle-income countries, and lower-middle-income countries. Data was not available in low-income countries.

Data and Variables

In this study, unbalanced yearly data from International Financial Statistics (IFS) from 1950 through 2018 is being used. Consumer Price Index (CPI) or Producer Price Index (PPI) is used as inflation. Financial Market Price Index (FPE) is used as stock returns. The base year is 2010.

Results and Discussions

I'm, Pesaran and Shin (IPS), panel unit root is used for the stationarity of variables in our model. The null hypothesis of no unit root for CPI/PPI and FPE data is accepted at the first difference (Table 1).

Table 1. Results of IPS Panel Unit Root Tests Results

	H_0 : Non-Stationary Series			
Levels			**First Difference**	
Variables	**Statistics**	**P-Values**	**Statistics**	**P-Values**
$\rho_{i,t}$	11.01	1.00	-5.46	0.00
$R_{i,t}$	5.03	1.00	-18.92	0.00

Table 2. Fisher Hypothesis in the Stock Market

	General Model		Specific Model	
Regressors	**Co-efficient**	**t-Statistic**	**Co-efficient**	**t-Statistic**
Constant	4.66	(5.74)**	4.97	(6.21) **
$R_{i,t-1}$	0.11	(4.56)**	0.12	(5.07)**
$\rho_{i,t}$	0.47	(-7.57)**	0.43	(-9.5)**
$\rho_{i,t-1}$	0.04	(0.61)	-	-
R^2	0.07		0.06	
$\overline{R}^2$	0.07		0.06	
Durbin Watson	1.99		2	
Wald Test Prob.	0.55		-	
F-Statistic	38.75		53.14	
Prob. (F-Statistic)	0.00		0.00	

**significant at 1%.

Our model is a cross-section random-effects model. The reliability of the results is ensured through diagnostic tests. Results (Table 2) reveal that the constant term and the variables of the model real returns on assets last year, inflation and inflation last year are directly related to real returns. All variables of our model except inflation last year are significant at 1%. Wald test is used to test the effects of inflation last year in determining the real returns. The results indicate that the null hypothesis is rejected at 5% and we can safely remove this variable from our model.

Estimation results of the specific model of the Fisher hypothesis show that the constant term and the variables of the model real returns on assets last year and inflation are statistically significant at 1%. Constant is 4.97. Real returns on assets last year and inflation have a direct significant effect on real returns. 1% increase in returns last year increases real returns to 0.12% whereas a 1% increase in inflation increases real returns to 0.43%. So we can say that the Fisher hypothesis is prevalent in the world economies but its weak form.

Our analysis for above-average Money Supply/GDP countries (Table 3), shows that in general model only inflation in last year is a significant variable in determining the real returns. Wald test results show that we can remove the real returns last year from our model.

Once again our results of a specific model (1) indicate that both inflation and inflation last year has a positive effect on real returns but this effect is statistically not significant. Wald test results show that we can safely remove inflation in the last year from our model as well.

Our results of a specific model (2) of the Fisher Hypothesis for above-average Money Supply/GDP countries show that the value of the constant is 5.54 and it is significant at a 5% level. Inflation is also directly related to real returns. A 1% increase in inflation increases the real returns to 0.95%. This effect is statistically insignificant.

Table 3. Fisher Hypothesis in the Stock Market of above Average Money Supply/GDP countries

	General Model		Specific Model 1		Specific Model 2	
Regressor	**Co-efficient**	**t-Stat.**	**Co-efficient**	**t-Stat.**	**Co-efficient**	**t-Stat.**
Constant	3.38	(1.13)	4.20	(1.42)	5.54	(1.97) *
$R_{i,t-1}$	-0.03	(-0.40)	-	-	-	-
$\rho_{i,t}$	0.47	(-1.61)	0.54	(-1.48)*	0.95	(-0.31)
$\rho_{i,t-1}$	0.79	(2.15)*	0.55	(1.57)	-	-

R^2	0.16	0.14	0.13
$\overline{R}^2$	0.15	0.13	0.13
Durbin Watson	2.04	2.11	2.12
Wald Test Prob.	0.69	0.12	-
F-Statistic	13.29	17.44	33.12 Prob. (F-Statistic) 0.00
	0.00	0.00	

*significant at 5%.
**significant at 1%.

Table 4. Fisher Hypothesis in the Stock Market of below Average Money Supply/GDP Countries

	General Model		Specific Model	
Regressor	**Co-efficient**	**t-Statistic**	**Co-efficient**	**t-Statistic**
Constant	4.67	(5.66)**	4.85	(5.96) **
$R_{i,t-1}$	0.14	(5.25)**	0.14	(5.56)**
$\rho_{i,t}$	0.38	(-7.75)**	0.31	(-11.5)**
$\rho_{i,t-1}$	-0.01	(-0.22)	-	-
R^2	0.06		0.05	
$\overline{R}^2$	0.05		0.05	
Durbin Watson	1.97		1.97	
Wald Test Prob.	0.83		-	
F-Statistic	26.52		36.68	
Prob. (F-Statistic)	0.00		0.00	

**indicates significance at 1%.

Our results of general model of the Fisher hypothesis for below-average Money Supply/GDP countries (Table 4) show that returns in last year and inflation have a positive and significant effect in determining the real returns whereas inflation last year has a negative and insignificant effect on real returns. Wald test results indicate that we can eliminate inflation last year from our analysis. The result of the specific model shows that constant is 5.96 and it statistically significant at 1%. The variables of the model, real returns on assets last year and inflation are also statistically significant at 1%. Real returns on assets last year and inflation are directly related to real returns. A 1% increase in real returns last year increases the real returns to 0.14% while a 1% increase in inflation increases the real returns to 0.31%.

Table 5. Fisher Hypothesis in the Stock Market of High-income countries

	General Model		Specific Model	
Regressor	**Co-efficient**	**t-Statistic**	**Co-efficient**	**t-Statistic**
Constant	3.63	(4.14)**	3.70	(4.27) **
$R_{i,t-1}$	0.16	(4.95)**	0.16	(5.00)**
$\rho_{i,t}$	0.39	(-4.69)**	0.46	(-6.75)**
$\rho_{i,t-1}$	0.08	(0.64)	-	-
R^2	0.08		0.08	
$\overline{R}^2$	0.08		0.08	

Durbin Watson	1.96	1.96
Wald Test Prob.	0.52	-
F-Statistic	25.46	38.00
Prob. (F-Statistic)	0.00	0.00

**significant at 1%.

Results of the Fisher hypothesis in the stock market of high-income countries (Table 5), reveals that the constant term and the variables of the model real returns on assets last year, inflation and inflation in the last year are directly related to real returns. All variables of the model except inflation last year are statistically significant at 1%. Wald test results indicate that we can safely remove this variable from our model. The results of the specific model show that the constant is 3.70 and it is significant at 1%. The variables of the model, real returns on assets last year and inflation are also significant at 1%. Real returns on assets last year and inflation are directly related to real returns. A 1% increase in real returns last year increases the real returns to 0.16%, while a 1% increase in inflation increases the real returns to 0.46%. Fisher hypothesis holds here but in its weak form.

Results of the Fisher hypothesis in the stock market of upper-middle-income countries (Table 6) shows that constant term and variables of model real returns on assets last year, inflation and inflation in last year are directly related to real returns. All variables of the model except inflation last year are statistically significant at 1%. Wald test is used to test the effects of inflation in last year in determining real returns. The results indicate that the null hypothesis is rejected at 5% and we can safely remove this variable from our model. The result of the specific model shows that constant is 6.56 and it is statistically significant. Real returns on assets last year and inflation are also statistically significant. A 1% increase in real returns last year increases real returns to 0.15% while a 1% increase in inflation increases real returns to 0.47%. Fisher hypothesis holds here but in its weak form.

Table 6. Fisher Hypothesis in the Stock Market of Upper middle-income countries

General Model			**Specific Model**	
Regressor	**Co-efficient**	**t-Statistic**	**Co-efficient**	**t-Statistic**
Constant	6.39	(3.35)**	6.56	(3.48) **
$R_{i,t-1}$	0.13	(2.47)**	0.15	(3.07)**
$\rho_{i,t}$	0.64	(-3.27)**	0.47	(-5.30)**
$\rho_{i,t-1}$	-0.05	(-0.60)	-	-
R^2	0.14	0.12		
$\overline{R}^2$	0.13	0.11		
Durbin Watson	1.95		1.95	
Wald Test Prob.	0.55		-	
F-Statistic	4.14		6.18	
Prob. (F-Statistic)	0.00		0.00	

** Significant at 1%.

Results of the Fisher hypothesis in the stock market of lower-middle-income countries (Table 7) show that the constant term returns last year and inflation last year are positively related to real returns. Inflation is negatively and significantly related to real returns. All the variables except real returns last year are significant at 1%. Wald test results indicate that we can safely remove this variable from our model. A result of the specific model shows that constant is 13.34 and it is statistically significant at 1%. Inflation and inflation last year are also significant at 1% and 5% level respectively. Inflation last year is directly related to real returns while inflation is inversely related to real returns. 1% increase in inflation increases the real returns to 0.69% while a 1% increase in inflation decreases the real returns

by 1.17%. So the Fisher hypothesis does not hold in these economies. Stock returns do not provide any hedge against inflation.

Table 7. Fisher Hypothesis in the Stock Market of Lower middle-income countries

General Model			Specific Model	
Regressor	**Co-efficient**	**t-Statistic**	**Co-efficient**	**t-Statistic**
Constant	13.11	(3.62)**	13.34	(3.78) **
$R_{i,t-1}$	0.02	(0.30)	-	-
$\rho_{i,t}$	-1.18	(-6.41)**	-1.17	(-6.38)**
$\rho_{i,t-1}$	0.71	(2.20)*	0.69	(2.08)*
R^2	0.04		0.04	
$\overline{R}^2$	0.03		0.03	
Durbin Watson	2.06		2.02	
Wald Test Prob.	0.77		-	
F-Statistic	4.14		6.18	
Prob. (F-Statistic)	0.00		0.00	

**significant at 1%.

* Significant at 5%.

Conclusions

We have estimated a general to a specific model of the Fisher hypothesis in the stock market. The unbalanced yearly data set of International Financial Statistics (IFS) from the year 1950 through 2018 is used. IPS panel unit root test shows that the CPI, and financial market price index data is stationary at first difference. Our results indicate; firstly, the Fisher hypothesis holds in the world economies except for lower-middle-income economies but it holds in its weak form. So the stocks provide a hedge against inflation but they are not perfect hedge. Secondly, inflation has a positive and significant effect on real returns except for lower-middle-income countries. Here inflation has a significant but negative effect on real returns in the stock market. Thirdly, inflation last year is directly but insignificantly affecting real returns in all cases under study except lower-middle-income countries. In these countries inflation last year has a positive and significant effect on real returns. Fourthly, real returns last year has a direct and significant effect in all cases except above-average Money Supply/GDP countries and lower-middle-income countries. In above average Money Supply/GDP countries this effect is negative while in lower-middle-income countries it is positive and insignificant.

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APPENDIX

List of Countries

Table A1

Types	Countries	Data
Above Average Money Supply/GDP Countries	Australia (AUS)	1958-2017
	Bangladesh (BGD)	1988-2017
	Mauritius (MUS)	1990-2017
	Mexico (MEX)	1979-2018
	Pakistan (PAK)	1973-2017
	Ukraine(UKR)	1998-2017
	Venezuela (VEN)	2008-2016
Below Average Money Supply/GDP Countries	Argentina (ARG)	1993-2014
	Bahrain (BAH)	2004-2016
	Bosnia and Herzegovina (BIH)	2005-2017
	Botswana (BWA)	1996-2017
	Brazil (BRA)	1993-2016
	Bulgaria(BGA)	2001-2017
	Colombia (COL)	2002-2018
	Croatia (HRV)	1998-2016
	Czech Republic	1998-2017
	Denmark (DNK)	1996-2018
	Estonia (EST)	1997-2016
	Fiji (FJI)	2000-2017
	France (FRA)	1988-2016
	Germany (DEU)	1970-2012
	Hungary (HUN)	2000-2017
	Iceland (ISL)	2003-2017
	Indonesia (IDN)	1996-2017
	Japan (JPN)	1957-2016
	India (IDN)	1960-2017
	Iran (IRN)	1992-2016
	Italy (ITA)	1950-2017
	Kenya (KEN)	1997-2016
	Korea (KOR)	1978-2017
	Kuwait (KWT)	1996-2017
	Latvia (LVA)	1997-2016
	Malaysia (MYS)	1980-2017
	Maldives (MDV)	2003-2017
	Netherlands (NLD)	1957-2018
	Newzealand (NZL)	1987-2017
	Papua New Guinea (PNG)	2001-2017
	Peru (PER)	1988-2016
	Philippines (PHL)	1957-2017
	Poland (POL)	1993-2017
	Portugal (PRT)	1988-2017
	Qatar (QAT)	1998-2017

	Singapore (SGP)	1985-2017
	South Africa (ZAF)	1960-2017
	Sri Lanka (LKA)	2002-2016
	Sweeden (SWE)	1957-2017
	Thailand (THA)	1997-2018
	UK (GBR)	1955-2016
	United States (US)	1950-2016
	Vietnam (VNM)	2000-2016
	Zambia (ZMB)	1997-2017
	Serbia (SRB)	2004-2013
	Russian Federation (RUS)	1998-2012
	Hong Kong (HKG)	1990-2012
	China (CHN)	1990-2013
	Israel (ISR)	1976-2012

List of Countries by Income Level

Table A2

Types	Countries	Data
High Income Countries	Argentina (ARG)	1993-2014
	Australia (AUS)	1958-2017
	Bahrain (BAH)	2004-2016
	Croatia (HRV)	1998-2016
	Czech Republic(CZE)	1998-2017
	Denmark (DNK)	1996-2018
	Estonia (EST)	1997-2016
	France (FRA)	1988-2016
	Germany (DEU)	1970-2012
	UK (GBR)	1955-2016
	Hungary (HUN)	2000-2017
	Hong Kong (HKG)	1990-2012
	Iceland (ISL)	2003-2017
	Israel (ISR)	1976-2012
	Japan (JPN)	1957-2016
	Italy (ITA)	1950-2017
	Korea (KOR)	1978-2017
	Kuwait (KWT)	1996-2017
	Latvia (LVA)	1997-2016
	Netherlands (NLD)	1957-2018
	Newzealand (NZL)	1987-2017
	Poland (POL)	1993-2017
	Portugal (PRT)	1988-2017
	Qatar (QAT)	1998-2017
	Singapore (SGP)	1985-2017
	Sweeden (SWE)	1957-2017
	United States (US)	1950-2016
Upper Middle Income Countries	Bosnia and Herzegovina (BIH)	2005-2017
	Brazil (BRA)	1993-2016

	Botswana (BWA)	1996-2017
	Bulgaria(BGA)	2001-2017
	China (CHN)	1990-2013
	Colombia (COL)	2002-2018
	Fiji (FJI)	2000-2017
	Iran (IRN)	1992-2016
	Malaysia (MYS)	1980-2017
	Maldives (MDV)	2003-2017
	Mauritius (MUS)	1990-2017
	Mexico (MEX)	1979-2018
	Serbia (SRB)	2004-2013
	Russian Federation (RUS)	1998-2012
	South Africa (ZAF)	1960-2017
	Venezuela (VEN)	2008-2016
	Thailand (THA)	1997-2018
	Peru (PER)	1988-2016
Lower-Middle- Income Countries	Bangladesh (BGD)	1988-2017
	Indonesia (IDN)	1996-2017
	India (IND)	1960-2017
	Pakistan (PAK)	1973-2017
	Kenya (KEN)	1997-2016
	Papua New Guinea (PNG)	2001-2017
	Philippines (PHL)	1957-2017
	Sri Lanka (LKA)	2002-2016
	Ukraine(UKR)	1998-2017
	Vietnam (VNM)	2000-2016
	Zambia (ZMB)	1997-2017