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Arslan Qayyum* | Aniqa Arslan† | Kanwal Iqbal Khan‡

Investment of Pension Funds in Different Streams: Evidence from Low vs. High Growth Oriented OECD Countries

Abstract *Pension funds pools' investments have an impact on its growth. These investments can be either in equity stock, bonds, deposits, or in other miscellaneous assets that can generate different results with the involvement of some endogenous factors such as rate of return, inflation etc. To bring out the core investment factors determining pension fund growth, a stepwise regression technique was used on a dynamic panel data model. Moreover, to check the individual significance of the included variables in the model progressively, R2-change was observed. This study has found that the investment factors behave positively in high growth-oriented OECD economies and have a negative impact in low growth-oriented countries. Moreover, pension funds growth is slower due to market volatility in low-growth oriented economies. The study helps to know the utilization or investment factors that support the large asset-holding of financial-sector of OECD economies.*

Key Words: Pension Funds' Growth, Investment in Equity, Deposits, Investment on Bonds, Rate of Return, Inflation.

Introduction

Social security plays a vital role in the smooth functioning of social life of citizens specially the older segment of the society (Martí-Ballester, 2020). People wanted to have a surety of smooth, regular income at their old ages or in any risky situations particularly, when they are retired or out of work force (Shen, Zhu, Wu, & Chen, 2019). A number of studies have been observed in the past regarding the performance of pension funds and their governance (Bohl, Lischewski, & Voronkova, 2011; Singh & Mehta, 2015). However, the current study aims to highlight the key factors behind the pension funds' growth in relation to their utilization. OECD (Organization for Economic Co-operation and Development) pension funds outlook only describes through the descriptive analysis for the utilization of pension funds (Mellor, 2018). But it does not cover their individual significant impacts (such as investment in equities, bills and bonds, cash and deposits, infrastructure and in real estate etc.) on the growth of pension funds (Ooi, 2020).

Pension funds are an institutional form of investors that collect, invest and pool funds contributed by the fund sponsors and its beneficiaries to provide the future pension to entitled beneficiaries (Bashir, Khan, & Urooge, 2020; Davis, 1995). It will not be wrong to say that these are the institutions that help a worker to save in his active working life for his retirement (Bonizzi, & Guevara, 2019). In most of the countries it is not allowed to withdraw the pension funds on early stages which create a long run holding of the funds by the pension firms and open doors for a number of investment opportunities for investments in order to yield higher returns (Prammer, & Reiss, 2015).

Thus, the pension firms utilize their funds in corporate equities, real estate, government bonds, corporate debt (loans or bonds), securitized loans, money market instruments, foreign holdings instruments, and deposits in form of liquidity (Kumara, & Pfau, 2012). The perspective of pension funds cannot be ignored when viewing the OECD economies (Marcinkiewicz, & Chybalski, 2019). The

*Assistant Professor, Department of Management Sciences, Institute of Business Management (IOBM), Karachi, Pakistan.
†Assistant Professor, Department of Management Sciences, Shaheed Benazir Bhutto University, Karachi, Pakistan.
‡Assistant Professor, Institute of Business & Management, University of Engineering and Technology, Lahore, Punjab, Pakistan. Email: drkanwaliqbalkhan@gmail.com

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pension funds' assets weighted average has reached up to 89% in OECD economies (OECD, 2017). It is significant to consider the method of governance and identify the determinants of their growth. The problem of aging in OECD economies makes it even more important to look at the management of pension funds (Mellor, 2018).

This study tries to analyze and explain the factors that may have an effect on the growth of pension funds in the selected OECD countries. For the purpose of analyzing the utilization sources, and also for macro-level factors, this study takes into account a panel data of 24 selected OECD countries for last 43 years. This study divides the OECD countries into two parts on the basis of their pension funds' assets to GDP ratio. The countries above the median ratio are considered as higher-growth-oriented (HGO) and countries below median are called as lower-growth-oriented (LGO) countries.

There are numerous studies discussed the utilization factors of pension funds in selected-OECD countries. A brief description of them is depicted in table 1.

Table 1. Summary of Supporting Theories and Literature for Determinants of Utilization of Pension Funds

Symbol	Variable	Expected Relation	Literature Review	Supporting Theory
PFG	Pension Funds Growth	Dependent Variable	Alonso, et al. (2010); Roce, Kaminker, & Stewart (2011); Casey, (2014); Singh & Mehta, (2015); Açıkgöz, Uygurtürk, & Korkmaz, (2015).	Utility Theory+ Institutionists Approach+ Theory of Immunization
IEQ	Investments in Equity	+/-	Jones, (1950); Levy, & Gunthorpe, (1993); Diamond, & Geanakoplos, (2003); Diamond, & Geanakoplos, (1999); Chen et al. (2010).	Theory of Pooling + Theory of Immunization+ Theory of Intermediation
IBB	Investments in Bills and Bonds	+	Feldstein, (1981); Heller, (2013); Kumara, & Pfau, (2012); Udoka et al. (2012); Das, (2014).	Theory of Pooling + Theory of Immunization+ Theory of Intermediation
ICD	Investments in Cash Deposits	+/-	Smith et al. (2003); Coleman, Esho, & Wong, (2006).	Theory of Pooling + Theory of Immunization+ Theory of Intermediation
IMIS	Investments in Miscellaneous	+/-	Vittas, Impavido, & O'Connor, (2008); Croce, (2011); Stewart, & Yermo, (2012); Sievänen, Rita, & Scholtens, (2013); Gulland, (2016).	Theory of Pooling + Theory of Immunization+ Theory of Intermediation
OE	Operating Expenses	-	Obinata, (2000); Collins, (2003); Bateman, & Mitchell, (2004); Jiang, (2011); Militaru, (2015); Khan, Nasir, & Arslan, (2020).	Accounting Profitability Theory+ Absolute Matching Concept
NUMPF	Number of Pension Funds	+	Gökçen, & Yalçın, (2015); Bradley, Pantzalis, & Yuan, 2016); Thomas, & Spataro, (2016); Sievänen, Rita, & Scholtens, (2017); Andonov, Hochberg, & Rauh, (2018).	Theory of Pooling

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CPI	Consumer Price Index	+/-	Budd, & Seiders, (1971); Thompson, (1978); Heller, (1980); Pensions Commission. (2004); Aamir, Qayyum, Nasir, Hussain, Khan & Butt, (2011); Prammer, & Reiss, (2015); Bivens, (2015).	Theory of Immunization
RR	Rate of Return	+/-	Tepper, (1981); Reisen, (1997); Amir, & Benartzi, (1998); Antolin, Schich, & Yermo, (2011).	Theory of Immunization
FC	Financial Crisis	-	Ebbinghaus, (2015); Naczyk, & Domonkos, (2016); Mellor, (2018)	Keynesian Paradigm

Theoretical framework describes the conceptual model of the study that includes the purposeful linkage among included variables of the study and their consequential impact on dependent variable (variables). Figure-1 describes the factors for utilization of pension funds and their impact on the growth of pension funds in the selected-OECD countries. This model is build based on the literature and theories relevant to the utilization of pension fund growth.

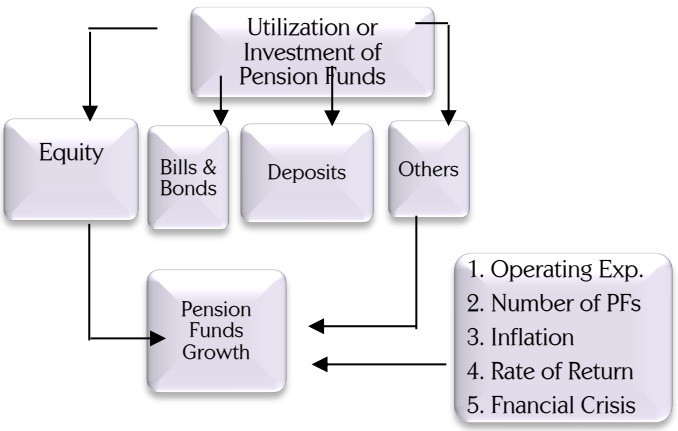

Figure1: Conceptual Model for Determinants of Utilization of Pension Funds and Their Impact on the Growth of Pension Funds.

Data and Methodology

Data Collection

For the purpose of empirical analysis of this study, data of the concerned variables (such as investments in equity, bonds, banks, other assets, inflation, rate of return, number of pension funds) were collected from different sources such as OECD data repository, OECD pension at a glance, statistical profile of each individual country, and from world bank (WB) data repository. There are total of 36 countries which are members of OECD at the end of 2018. Data were collected for the year end observations as on December of each year. After scrutiny, only 24 countries were selected that were became members of OECD before the year of 1975. It makes a panel of 24 selected OECD countries ranging data from 1975 to 2017 comprising of 43 years.

The total observations are 1032 in numbers of this balanced panel data. Among total of 36 OECD countries, 12 countries were dropped due to their delay in membership after 1975. The selected countries are then divided into two streams on the basis of median value of their pension funds to GDP ratio. For this purpose, first of all an average was calculated for each individual country's pension

funds to GDP ratio. In the next step, median value was calculated for these averages of 24 countries. 50% of the countries having their PF/GDP ratio above the median value are considered as HGO countries and whereas rest of the 50% of total countries having their median value below the threshold level are considered as LGO countries.

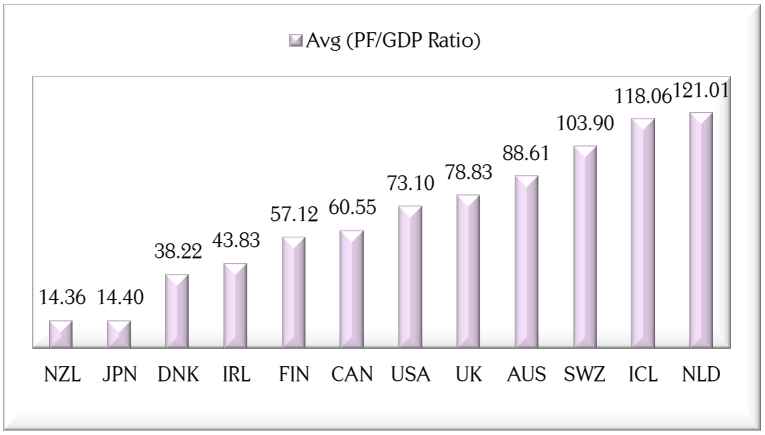

Figure 2a: Pension Funds in HGO Countries

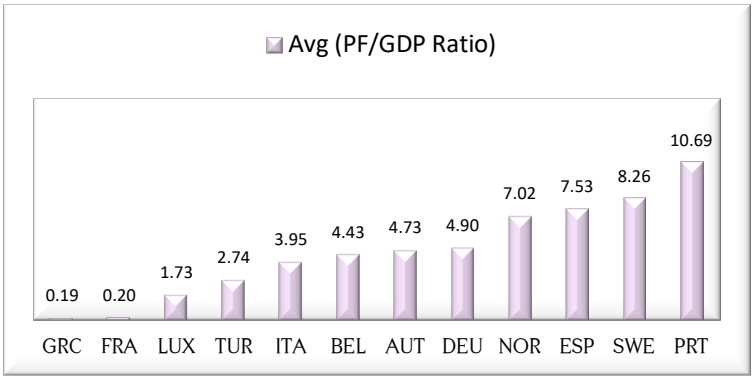

Figure 2b: Pension Funds in HGO Countries

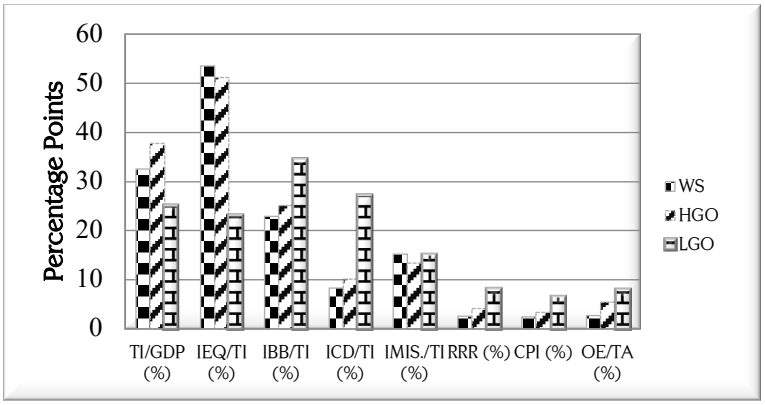

Figure 3: Comparison of Variables in Selected-OECD Countries

Econometric Model

In the literature, researchers have used different techniques for analyzing the effect of different utilization factors on pension funds sustainability and growth (Açıkgöz et al., 2015; Chen et al., 2010; Heller, 2013). This study will use the dynamic panel data technique along with forward step-wise regression for making a comparative analysis of high-growth-oriented (those countries which have higher ratio of PFG from median value) countries with LGO (those countries which have lower ratio of PFG from median value) countries of observed variables of selected-OECD countries on the financial sustainability of pension funds.

The following models provide the general economic functions for this study. Equation (1) describes the pension funds growth of a country as a function of utilization-factors that may have an influence on the growth of pension funds. Moreover, these country-specific factors are further elaborated in equation (2) which describes that these factors are pension funds' growth of last year (PFG_{t-1}); investments in equity markets (IEQ), investments in bills and bonds (IBB), investments in cash and bank deposits (ICD), investments in miscellaneous assets (IMISC), operating, administrative and legal expenses (OE), number of pension funds (NUMPF), inflation in the country (INF), rate of return (RR), financial crisis of 2008 (FC).

$$PFG = f(Utilization\ Factors\ of\ PF) \text{ ----- (1)}$$

$$PFG = (PFG_{t-1}, IEQ, IBB, ICD, IMISC, OE, NUMPF, INF, RR, FC) \text{ --- (2)}$$

On the basis of the above described model, dynamic panel data approach was used and the following six equations show the econometric models for this study i.e. equation (3, 4, 5, and 6) shows the effect of individual investments (i.e. equity, bills and bonds, cash and bank deposits, and other miscellaneous assets) along with the previous year's PFG on current year's PFG. Moreover, equation (7) and equation (8) are aggregated and extended models for this study respectively. Equation (7) testifies the effect of combined investments (i.e. equity, bills and bonds, cash and bank deposits, and other miscellaneous assets) on current year's PFG. In addition to that, equation (8) extended the above equation (7) and also includes some extraneous factors that can also impact the growth of pension funds i.e. operating expenses incurred for the management of pension funds, number of pension funds in each country, inflation, rate of return, and financial crisis of 2008 that hit the financial markets of the world.

$$PFG_{(OECD)\,it} = \beta_0 + \beta_1 (PFG)_{i,t-1} + \beta_2 (IEQ)_{it} + \varepsilon_{it} \quad (3)$$

$$PFG_{(OECD)\,it} = \beta_0 + \beta_1 (PFG)_{i,t-1} + \beta_3 (IBB)_{it} + \varepsilon_{it} \quad (4)$$

$$PFG_{(OECD)\,it} = \beta_0 + \beta_1 (PFG)_{i,t-1} + \beta_4 (ICD)_{it} + \varepsilon_{it} \quad (5)$$

$$PFG_{(OECD)\,it} = \beta_0 + \beta_1 (PFG)_{i,t-1} + \beta_5 (IMIS)_{it} + \varepsilon_{it} \quad (6)$$

$$PFG_{(OECD)\,it} = \beta_0 + \beta_1 (PFG)_{i,t-1} + \beta_2 (IEQ)_{it} + \beta_3 (IBB)_{it} + \beta_4 (ICD)_{it} + \beta_5 (IMIS)_{it} + \varepsilon_{it} \quad (7)$$

$$PFG_{(OECD)\,it} = \beta_0 + \beta_1 (PFG)_{i,t-1} + \beta_2 (IEQ)_{it} + \beta_3 (IBB)_{it} + \beta_4 (ICD)_{it} + \beta_5 (IMIS)_{it} + \beta_6 (OE)_{it} + \beta_7 (NUMPF)_{it} + \beta_8 (CPI)_{it} + \beta_9 (RR)_{it} + \beta_{10} (FC)_{it} + \varepsilon_{it} \quad (8)$$

Where PFG = Pension Funds Growth; IEQ = Investment in Equity Market; IBB = Investment in Bonds and Bills Market; ICD = Investments in Deposits; IMIS = Investments in other companies or securities or infrastructure etc.; OE = Operating, administrative and legal expenses; NUMPF = Number of pension funds registered in a country; CPI = Consumer price index; RR = Rate of return; FC = Financial Crisis Dummy (Assign "1" for 2008 year or "0" otherwise); ε = the error term. The measurement for determinants of utilization of pension funds is provided in Appendix A.

Results Analysis and Discussion

In appendix, Table-2 represents the descriptive or summary statistics of the data used in the sample. Moreover, Appendix B shows the correlation matrix along with VIF analysis of the data.

Table 2: Summary Statistics of Variables

Variable	All-OECD Countries		HGO-Countries		LGO-Countries	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
TPF (Bill. US $)	526.68	1860.91	631.34	2130.11	344.56	1214.22
TI/GDP (%)	32.52	39.76	37.78	30.82	25.18	44.37

Variable	All-OECD Countries		HGO-Countries		LGO-Countries	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
IEQ/TI (%)	53.54	14.93	51.25	33.66	23.12	23.76
IBB/TI (%)	22.86	19.81	25.12	71.01	34.54	59.66
ICD/TI (%)	8.35	10.26	10.17	13.95	27.15	83.65
IMIS/TI (%)	15.25	13.44	13.46	17.21	15.19	9.24
RR (%)	2.612	7.81	4.08	8.17	8.35	11.07
CPI (%)	2.413	2.35	3.38	4.18	6.69	3.46
NUMPF (Total)	29677.71	139000	24321.54	87000	15356.17	52000
OE/TPF (%)	2.683	1.178	5.44	3.59	8.23	5.77

Table-3, table-4 and table-5 show a comparative analysis of Whole-sample, HGO-countries and LGO-countries by applying DPD-Hierarchical regression analysis of the observed data for this study. Each analysis was further sub-divided into six models i.e. model-1 to model-6 based on the earlier mentioned six equations i.e. equation-3 to equation-8 respectively. Table-3, table-4 and table-5 also describe the diagnostic tests for checking the heteroskedasticity and serial correlation along with the goodness-of-fit for data and the model-fitness by using R-square and F-test respectively. Pension funds' growth is taken as the observed dependent variable for this study, whereas, lagged value of PFG, IEQ, IBB, ICD, IMIS, OE, NUMPF, CPI, and RR are taken as independent variables on the basis of the prior literature and theories.

Table 3. Forward-Step Wise DPD Regression Analysis for Whole-Sample

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	PFG	PFG	PFG	PFG	PFG	PFG
PFG (L1)	0.46*	0.11***	0.73**	0.77**	0.71**	0.65**
	(0.656)	(0.525)	(0.042)	(0.882)	(0.304)	(0.144)
IEQ	0.387***				0.245**	0.179**
	(0.0768)				(0.0624)	(0.0445)
IBB		0.830***			0.562***	0.299**
		(0.217)			(0.209)	(0.142)
ICD			0.372**		0.476**	0.120***
			(0.0707)		(0.0594)	(0.0325)
IMIS.				0.689**	0.490*	0.313**
				(0.0743)	(0.071)	(0.031)
OE						-0.706***
						(0.0314)
NUMPF						0.152*
						(0.03)
CPI						0.0826**
						(0.149)
RR						0.141*
						(0.16)
FC (Dummy)						-0.134**
						(0.155)
Constant	9.880***	18.00***	11.43***	9.515***	15.99***	11.148***
	(0.238)	(0.85)	(0.158)	(0.19)	(0.924)	(0.737)
Observations	1032	1033	1034	1035	1036	1037
Groups	24	24	24	24	24	24
R-squared	0.072	0.177	0.078	0.207	0.444	0.641
F-Test	67.94***	56.74***	56.03***	55.04***	70.74***	98.12***
Hetero (P-value)	0.0719	0.111	0.107	0.0831	0.108	0.183

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	PFG	PFG	PFG	PFG	PFG	PFG
Serial Auto (P-value)	0.08628	0.1332	0.1284	0.09972	0.1296	0.2196
Hausman-Test	FE	FE	FE	FE	FE	FE
AIC	263.52	159.84	154.08	119.664	155.52	103.536
BIC	259.128	157.176	151.512	117.6696	152.928	101.8104

Firstly, in the table-3, for the whole-sample, R-squared values of the six models explain the change in growth of pension funds by using observed the regresses as 7.2%, 17.7%, 7.8%, 20.7%, 44.4%, and 64.1% respectively. Here, the F-values in all six models show that each of the used models is significant at a 1% level of significance with the values of 67.94, 56.74, 56.03, 55.04, 70.74, and 98.12 respectively. *Secondly,* in table-4, for HGO-Countries sample, R-squared values of the six models explain the change in growth of pension funds by using observed regresses as 19.5%, 16.5%, 9.1%, 22.6%, 51.1%, and 71.1% respectively. Here, the F-test values in all six models show that each of the used models is significant at a 1% level of significance with the values of 60.31, 51.22, 53.33, 54.89, 72.07, and 95.88 respectively. *Thirdly,* in table-5, for the LGO-Countries sample, R-squared values of the three models explains the change in growth of pension funds by using observed regresses as 5.1%, 23.2%, 12.7%, 26.5%, 48.7%, and 62.2% respectively. Here, the F-test values in all six models show that each of the used models is significant at a 1% level of significance with the values of 61.32, 57.14, 57.17, 68.22, 74.78, and 92.65 respectively.

Table 4. Forward-Step Wise DPD Regression Analysis for HGO Countries

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	PFG	PFG	PFG	PFG	PFG	PFG
PFG (L1)	0.54*	0.20***	0.82**	0.86**	0.79**	0.74**
	(0.11)	(0.02)	(0.02)	(0.02)	(0.13)	(0.03)
IEQ	0.456**				0.314**	0.241***
	(0.065)				(0.062)	(0.104)
IBB		0.223**			0.344***	0.263**
		(0.30)			(0.20)	(0.041)
ICD			-0.082**		-0.077**	-0.090**
			(0.062)		(0.05)	(0.022)
IMIS.				-0.078**	-0.054**	-0.086***
				(0.054)	(0.07)	(0.051)
OE						-0.221***
						(0.045)
NUMPF						0.243**
						(0.023)
CPI						0.183**
						(0.261)
RR						0.422*
						(0.619)
FC Dummy						-0.066**
						(0.132)
Constant	5.751***	5.006***	4.879***	3.721**	5.744**	5.272***
	(0.21)	(0.32)	(0.33)	(0.76)	(0.13)	(0.45)
Observations	516	516	516	516	516	516
Groups	12	12	12	12	12	12
R-squared	0.195	0.165	0.091	0.226	0.511	0.711
F-Test	60.31***	51.22***	53.33***	54.89***	72.07***	95.88***
Hetero (P-value)	0.0712	0.0732	0.0633	0.082	0.192	0.1871

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	PFG	PFG	PFG	PFG	PFG	PFG
Serial Auto (P-value)	0.08544	0.08784	0.07596	0.0984	0.2304	0.22452
Hausman-Test	FE	FE	FE	FE	FE	FE
AIC	102.528	105.408	269.424	118.08	276.48	91.152
BIC	100.8192	103.6512	264.9336	116.112	271.872	89.6328

Moreover, in tables 3, 4 and 5, the test for heteroskedasticity and serial-correlation were also performed and did not find any evidence of having any type of such problems in the data. The null-hypothesis for heteroskedasticity is that there is no heteroskedasticity (means data is homoscedastic) against the alternative hypothesis of data has heteroskedasity. The results of p-values do not reject the null-hypothesis and shows that there is no problem of hetero. Moreover, the null-hypothesis for auto-correlation is that data has no-serial correlation against the hypothesis that data has serial correlation. By observing the p-values which are greater than 5% and hence we cannot reject the null-hypothesis and therefore data has no serial correlation problem. Hausman test was applied to check whether fixed effect or random effect is better and all models show the priority of fixed effect model. Moreover, Akike and Beysian information criterion were applied for the best model selection criteria and both criteria (AIC and BIC) support the preference of model-6 over all other models.

In table-3, table-4, and table-5, in all six models PFG for last year shows positive and significant relationship with the current year's PFG (with different levels of significance i.e. at 1%, 5%, and 10%) for whole-sample, HGO, and LGO countries respectively. In table-3, for the whole sample, it can be described as if last year's PFG will be increased by 1%, the current year's PFG will also be increased by 0.46%, 0.11%, 0.73%, 0.77%, 0.71%, and 0.65% in six models respectively. In table-4, for HGO-Countries, it can be described as if last year's PFG will be increased by 1%, the current year's PFG will also be increased by 0.54%, 0.20%, 0.82%, 0.86%, 0.79%, and 0.74% in six models respectively. In table-5, for the HGO-Countries, it can be described as if last year's PFG will be increased by 1%, the current year's PFG will also be increased by 0.38%, 0.07%, 0.65%, 0.69%, 0.83%, and 0.57% in six models respectively. By comparing HGO and LGO countries, it is clear that the coefficients of HGO countries are comparatively higher as compared to LGO countries. Hence, we can say that in LGO countries, the last year's pension growth rate is affecting the current year's pension growth but at a slower pace.

Table 5. Forward-Step Wise DPD Regression Analysis for LGO Countries

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	PFG	PFG	PFG	PFG	PFG	PFG
PFG (L1)	0.38*	0.07*	0.65**	0.69**	0.83**	0.57**
	(0.42)	(0.15)	(0.22)	(0.16)	(0.43)	(0.27)
IEQ	-0.291**				-0.153*	-0.181**
	(0.217)				(0.071)	(0.031)
IBB		0.751**			0.420**	0.345*
		(0.0768)			(0.0594)	(0.0325)
ICD			0.222***		0.413***	0.098**
			(0.0743)		(0.209)	(0.142)
IMIS.				0.429***	0.478**	0.198***
				(0.0707)	(0.0624)	(0.0445)
OE						-0.379***
						(0.525)
NUMPF						0.314*
						(0.042)
CPI						-0.432**
						(0.882)
RR						-0.741***
						(0.304)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	PFG	PFG	PFG	PFG	PFG	PFG
FC Dummy						-0.335**
						(0.144)
Constant	3.721**	5.744**	5.272***	2.232***	4.690**	4.842***
	(0.24)	(0.54)	(0.31)	(0.35)	(0.25)	(0.76)
Observations	516	516	516	516	516	516
Groups	12	12	12	12	12	12
R-squared	0.051	0.232	0.127	0.265	0.487	0.622
F-Test	61.32***	57.14***	57.17***	68.22***	74.78***	92.65***
Hetero (P-value)	0.0634	0.178	0.185	0.112	0.132	0.163
Serial Auto (P-value)	0.07608	0.2136	0.222	0.1344	0.1584	0.1956
Hausman-Test	FE	FE	FE	FE	FE	FE
AIC	234.72	256.32	266.4	161.28	190.08	91.296
BIC	230.808	252.048	261.96	158.592	186.912	89.7744

In table-3 and table-4 for the whole sample, and for HGO countries IEQ shows a significant and positive relationship. However, in table-5 for LGO-Countries, IEQ shows a significant and negative relationship with the growth of pension funds at5%, 10%, and 5% levels of significance in model-1, 5 and 6 respectively. By comparing HGO and LGO countries, it is clear that the coefficients of HGO countries are showing positive results as compared to LGO countries. Hence, we can say that in LGO countries, the investment in equity is decreasing with the passage of time. In addition to that, because of more volatility in equity markets of LGO countries, pension funds management companies are declining their funds' investments in equity markets.

In table-3, table-4, and table-5 for the whole sample; for HGO countries; and for LGO countries IBB shows a significant and positive relationship with the growth of pension funds. By comparing HGO and LGO countries, it can be deduced that the coefficients of IBB for LGO countries are higher as compared to HGO countries. It depicts that LGO countries have a more tendency towards investing in treasury bills and bonds as compared to equity markets because of their less or no volatility in the markets. This type of investment generates stable return over the longer period of time. In table-3 and table-5, for the whole sample and for LGO countries, ICD shows a significant and positive relationship with the growth of pension funds. However, in table-4 for the HGO-Countries, ICD shows a significant and negative relationship with the growth of pension funds. By comparing HGO and LGO countries, it is clear that HGO countries are showing negative relationship between ICD and PFG. It describes that the developed or HGO countries are decreasing their pension funds' investments in cash and bank deposits as compared to LGO countries.

In table-3 and table-5 for the whole sample and for LGO countries, IMIS shows a significant and positive relationship with the growth of pension funds. In table-4 for the HGO-countries, IMIS shows a significant and negative relationship with the growth of pension funds. In table-5 for LGO-Countries, IMIS shows a significant and negative relationship with the growth of pension funds. By comparing HGO and LGO countries, it is clear that HGO countries are showing negative relationship between IMIS and PFG. It describes that developed or HGO countries are decreasing their pension funds' investments in miscellaneous assets as compared to LGO countries. It may due to the reason that after financial crisis of 2008, investors become reluctant to invest in property or infrastructure.

In table-3, table-4, and table-5 for the whole sample, for HGO and LGO countries, operating expenses (OE) shows a significant and negative relationship with the growth of pension funds. By comparing HGO and LGO countries, it is clear that the coefficient of LGO countries is greater than that of HGO countries. It means that in LGO countries, OE are more due to high operational, legal, and administrative expenses and are affecting more to the PFG as compared to HGO countries. By looking at number of pension funds (NUMPF), it is clear that the coefficient of LGO countries is greater than that of HGO countries. It means that in LGO countries, NUMPF are affecting more to the PFG as compared to HGO countries. It may be due to the reason that in LGO countries, there is still a very

huge market to cover and, therefore, by introducing new pension schemes, more and more population can come under the umbrella of pension funds for getting retirement benefits.

Moreover, inflation has a positive relationship with PFG in HGO countries whereas it shows a negative sign in LGO countries. This may be due to the reason that in HGO countries the average inflation rate is no so high and it can be adjusted easily with pension benefits. On the other hand, in LGO countries, where the average inflation is comparatively higher and easily cannot be adjusted to the pension funds. Therefore, it shows it shows a negative sign in LGO countries. Real rate of return (RR) shows a positive sign in HGO and negative sign in LGO countries. It is due to the reason that in LGO countries combining with the inflation effect; weak monetary and fiscal policies; and volatile markets, the rate of return on pension funds is not growing comparatively faster as compared to HGO countries. These findings are in line with the literature such as (Antolin, Schich, & Yermo, 2011).

In table-3 for the whole sample, FC shows a significant and negative relationship with the growth of pension funds at 5% level of significance in model-6. It describes that a 1% increase in FC situation will decrease the PFG by 0.134%. In table-4 for the HGO-Countries, FC shows a significant and negative relationship with the growth of pension funds at 5% level of significance in model-6. It describes that a 1% increase in FC situation will decrease the PFG by 0.066%. In table-5 for LGO-Countries, FC shows a significant and negative relationship with the growth of pension funds at 5% level of significance in model-6. It describes that a 1% increase in FC situation will decrease the PFG by 0.335%. By comparing HGO and LGO countries, it is obvious that financial crisis significantly affected both HGO and LGO countries negatively. However, by looking at the coefficient's values of LGO and HGO countries, it is clear that 2008 financial crisis hit the LGO countries more badly as compared to HGO countries in terms of pension funds growth.

Conclusion

This study was conducted to analyze the importance of utilization-factors of pension funds that have an influence on the growth of pension funds. For the purpose of empirical analysis of this study, data were collected from different sources such as OECD data repository, OECD pension at a glance, and statistical profile of each individual country. The selected OECD countries are divided into two streams as HGO countries and LGO countries. A dynamic panel data regression model was applied by using fixed effect technique. Results indicate that PFG (lagged value); IBB, and NUMPF are showing positive and significant results with the growth of pension funds in HGO and LGO countries. However, IEQ, ICD, IMIS, CPI, and RR show mixed (positive and negative) and significant results i.e. IEQ, CPI, RR and (ICD, IMIS) are showing a positive (negative) and significant behavior in HGO countries but are negative (positive) and significant in LGO countries. It depicts that LGO countries have volatile equity markets, higher inflation rates and that's why investors demand high rate of return on their investments. Operating, legal and administrative expenses are also higher in LGO countries.

The results support the pre-established theories such as theory of pooling, utility theory, and Institutions approach, theory of immunization, accounting profitability theory and absolute matching concept. In sum, we can say that the above mentioned and described pension funds' utilization or investment factors have a significant and contributory effect on the growth of pension funds in the selected OECD countries. Moreover, the coefficients for HGO countries differ from the coefficients of LGO countries.

Research Implication or Contribution

This study contributes to the literature in the following manner that OECD countries were divided into HGO and LGO countries on the basis of their pension funds' growth pattern. LGO countries show a different behavior in the case of investments in equities, bonds, deposits, and miscellaneous investments as compared to HGO countries. Operating expenses (OE) for LGO countries are larger as compared to HGO countries which shows LGO have more legal and administrative charges for controlling of pension funds. All the possible utilization or investment factors were included in the research model by using DPD-hierarchical regression that was missing in the literature.

This study provides some practical implications as follows: OECD analytical officers can use this study for identifying the patterns of pension growth in HGO and LGO countries. OECD pension

outlook can report these results to show the different behavior of LGO countries for IEQ, IBB, ICD, IMIS, CPI, RR and OE as compared to HGO countries. Pension funds authorities can observe the change patterns of investments of pension funds in LGO countries and can suggest further policy recommendations to pension funds management companies for the benefit of the retired employees.

Research Limitations and Recommendations

It covers the data from 1975-2017 of 24 selected OECD countries. However, it can be extended to more years or by collecting semi-annual observations. This study divided OECD countries on the basis of pension funds growth; however, they can also be divided on the basis of other measures such as income equality by using Gini-coefficient. Further research can be conducted to analyze the difference in investment patterns of pension funds by incorporating legal reforms of the pension systems for LGO and HGO countries with respect to their causes and outcomes.

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Appendix A

Variables and Measurement for Determinants of Utilization of Pension Funds

Symbol	Variable	Unit of Measurement	Measurement of Variable
PFG	Pension Funds Growth	Percentage	(Current year funds-previous years funds)/ Previous year funds*100 from OECD Library Data. Singh & Mehta, (2015); Açıkgöz, Uygurtürk, & Korkmaz, (2015)
IEQ	Investments in Equity	Percentage	Total Investments in Equity markets divided by total investment. Chen et al. (2010); Levy, & Gunthorpe, (1993);
IBB	Investments in Bills and Bonds	Percentage	Total Investments in treasury bills and bonds divided by total investment. Udoka et al. (2012); Heller, (2013);
ICD	Investments in Cash Deposits	Percentage	Total Investments in cash and demand bank deposits divided by total investment. Smith et al. (2003); Coleman, Esho, & Wong, (2006);
IMIS	Investments in Miscellaneous	Percentage	Total Investments in real estate, infrastructure, manufacturing etc. divided by total investment. Sievänen, Rita, & Scholtens, (2013); Croce, (2011);
OE	Operating Expenses	Percentage	Total expenses incurred to manage pension funds including administrative and legal expenses divided by total PFs. Obinata, (2000); Militaru, (2015);
NUMPF	Number of Pension Funds	Numbers	Total number of penson funds by selected-OECD Counties. Thomas, & Spataro, (2016); Gökçen, & Yalçın, (2015);
CPI	Consumer Price Index	Percentage	Rate of Inflation in selected-OECD Countries. Prammer, & Reiss, (2015); Bivens, (2015)
RR	Rate of Return	Percentage	Rate of Return in selected-OECD countries. Tepper, (1981); Reisen, (1997)
FC	Financial Crisis	Dummy	Assign "1" for 2008 year or "0" otherwise. Ebbinghaus, (2015); Mellor, (2018)

Appendix B

Correlation Matrix and VIF Values

10 Variables	VIF	PFG	IEQ	IBB	ICD	IMISC.	OE	NUMPF	CPI	RR
PFG		1								
IEQ	5.66	0.461*	1							
IBB	5.43	0.447*	-0.383*	1						
ICD	3.56	0.369*	-0.402*	-0.176*	1					
IMISC.	2.22	0.353*	0.056	-0.491*	-0.057	1				
OE	1.99	-0.331*	0.152*	-0.064	-0.170*	0.054	1			
NUMPF	1.43	0.270*	0.149*	-0.105*	-0.143*	0.095*	0.456*	1		
CPI	1.23	0.246*	-0.003*	0.113*	-0.041	-0.131*	0.012	-0.278*	1	

RR	1.11	0.230*	0.411*	-0.403*	-0.116*	0.191*	-0.015	-0.01	-0.021	1
Table B2: Correlation Matrix of HGO-Countries										
PFG		1								
IEQ	6.43	0.769*	1							
IBB	5.33	0.761*	-0.252	1						
ICD	5.29	-0.680*	0.390*	-0.043	1					
IMIS	4.22	-0.561*	-0.113*	-0.101	-0.144*	1				
OE	3.54	-0.482*	0.121	-0.203	0.086*	-0.302*	1			
NUMPF	3.21	0.423*	-0.412	-0.112	0.202	-0.150*	0.411	1		
CPI	1.67	0.375*	0.324	0.209	-0.301	-0.116	-0.585	0.431	1	
RR	1.65	0.244*	0.146*	0.293	0.167*	-0.172*	0.246*	0.335*	0.272	1
Table B3: Correlation Matrix of LGO-Countries										
PFG		1								
IEQ	8.65	-0.715*	1							
IBB	8.32	0.641*	0.526	1						
ICD	8.12	0.624*	0.306*	0.002	1					
IMISC.	6.44	0.522*	0.178*	-0.233	-0.221*	1				
OE	3.22	-0.431*	-0.512	-0.101	0.331	-0.251*	1			
NUMPF	3.04	0.426*	0.150*	0.202	0.485*	-0.441*	-0.274	1		
CPI	1.22	-0.363*	0.333	-0.180*	-0.505	0.545	0.603	-0.174	1	
RR	1.02	-0.231*	-0.227	0.061*	0.213	-0.139	-0.111	-0.202	0.049*	1

* shows significance at the .1 level