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The Cross-Provincial Data of Life Expectancy Effect on Pension Fund in Indonesia

Sari Lestari Zainal Ridho[1]*, Habsah Binti Haji Mohamad Sabli[2], Heri Setiawan[3]

[1,3] *Business Administration Department, Politeknik Negeri Sriwijaya, Palembang, Indonesia*
[2] *Commerce Department, Politeknik Mukah Sarawak, Malaysia*

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ABSTRACT

Based on theory life cycle hypothesis of saving and consumption, it is believed that this increase in life expectancy is to be one of the reasons for participating in investing; one form of investment is pension fund. Nonetheless, there was a contrary condition between the slightly increase in life expectancy and decrease in pension fund during period of 2015 to 2019 in Indonesia. Therefore, the purpose of this study is to analyse the effect of life expectancy on pension fund total participation and the number of pension fund in provinces in Indonesia. The data presented in this research is a cross-province data of life expectancy and pension funds. The data were extracted from the published database of Statistic Indonesia and Indonesia Financial Services Authority, covering a period of 2015 to 2019. The approach in this research is a quantitative approach; with the type of research used is verification research. The collected data were analysed; using a panel data regression model on random effect assumptions with Generalized Least Squares. The finding of this research it can be concluded that there is a positive and significant effect of life expectancy on pension fund. This research paper data will assist in promoting the opportunity for pensions fund business or institution. The finding of the processed and analysed data are beneficial for the stakeholder, among other the entrepreneur, pensions fund institution, or business in order to develop precise strategy. Hence, these related institutions may better prepare for the coming opportunity in creating better future, welfare in line with the sustainability.

1. INTRODUCTION

The dynamics of the population has the potential to be affected by the Covid-19 pandemic (Ridho & Yusuf, 2021), based on the rationale that the mortality caused by the pandemic Covid-19 is quite high, and the high mortality rate was predominantly suffered by the elderly population. According to data from the Ministry of Health of the Republic of Indonesia, the death rate related to Covid-19 infection consists of 0.9% of the population aged 0-5 years, 1,8% 1-18 years, 6,1% 19-30 years, 15,3% 31-45 years, 35,7% were aged 46-59 years, and 40,.2% were over 60 years. Nonetheless, data for the period 2015 to 2019 shows that life expectancy in Indonesia shows an increasing trend. Life expectancy is one of health variable(Clarke & Erreygers, 2020). An increasing in life expectancy is an important indicator of improving health of a population over time(Valverde et al., 2021), and healthy life expectancy is a crucial measurement of years of one life spent in a good health (Abbafati et al., 2020). In Indonesia over period of 2015-2019, life expectancy at birth, respectively in 2015, 2016, 2017, 2018 and 2019 was 70.78; 70.9; 71.06; 71.2 and 71.34 years (Statistics Indonesia, 2021). Globally, the increase in life expectancy occurred approximately between the 19th and 20th centuries(Chewe & Hangoma, 2020). Based on the theory put forward by Ando and Modigliani in 1963, namely the life cycle hypothesis of saving (Ando & Modigliani, 1963), it is believed that this increase in life expectancy is to be one of the reasons for participating in investing, as a desire to be in the future, when someone at his old age is unable to or do not want to work anymore, they still have money to consume the things they need (Deaton, 2005).

More recent findings confirm that changes in demographic variables are statistically significant for changes in certain macroeconomic variables, including savings and investment (Goh, McNown, & Wong, 2020). There are many program or product of investments that can be made with the goal of having an income in old age or after reaching retirement age, such as life insurance (Strzelecka, KurdyS-

*Corresponding author.
E-mail: sarilestari@polsri.ac.id

Kujawska, & Zawadzka, 2020) and pension fund (Simandl & Lesek, 2003). Since as people age, health, social care and pension provision is paramount (Welsh, Matthews, & Jagger, 2021). Pension fund implemented investment programs and managed assets, it provide benefit for their participants, investor and economy (Kasri, Haidlir, Amin, & Prasetyo, 2017). It has a fundamental and important role in determining long-term welfare (Ertuğrul & Gebeşoğlu, 2020). For the households with elderly members, pensions have become the most crucial source of income(Li, Wang, Xu, & Yuan, 2020).

However, the cross-province data in Indonesia during the same period (2015-2019) shows a decrease in the number of pension fund institutions, while the total number of pension fund participants increased from 2015 to 2017, but then slightly decreased in 2018 and 2019. This contrary condition between the slightly increase in life expectancy and decrease in pension fund, is the reason for examining the association between life expectancy and pension funds in Indonesia; therefore, the purpose of this study is to analyse the effect of life expectancy on pension fund total participation and the number of pension fund in provinces in Indonesia. In addition to several other important reasons which are also strengthen the objectives to be achieved in this study. This research is also important for several other reasons, as the following: first, the data are important since this is the first data set that involved many regions in Indonesia that examine life expectancy and pensions fund among provinces in Indonesia; second, the data will be useful for researchers who want to compare with similar studies on life expectancy and pensions fund from other region; third, the data will be valuable to researcher who want investigate the association between demographic variable and finance variable in general, or life expectancy and pensions fund in particular; and four, the finding of the processed and analysed data are beneficial for the stakeholder, among other the entrepreneur, pensions fund institution, and government in order to develop precise policy. Hence, these related institutions may better prepare for the coming opportunity in creating better future, welfare in line with the sustainability.

2. METHODS

The data consists of (1) life expectancy at birth, male life expectancy and female life expectancy from the Statistic Indonesia; and (2) total participation of pension fund and total pensions fund from the Indonesia Financial Services Authority database for 28 Indonesia Provinces (Bali, Banten, Bengkulu, DI Yogyakarta, DKI Jakarta, Jambi, Jawa Barat, Jawa Tengah, Jawa Timur, Kalimantan Barat, Kalimantan Selatan, Kalimantan Tengah, Kalimantan Timur, Kepulauan Riau, Lampung, Maluku, Naggroe Aceh Darussalam, Nusa Tenggara Barat, Nusa Tenggara Timur, Papua, Riau, Sulawesi Selatan, Sulawesi Tengah, Sulawesi Tenggara, Sulawesi Utara, Sumatera Barat, Sumatera Selatan and Sumatera Utara) covering a period of 2015 to 2019. Life expectancy is expressed in year, while pensions fund and total participation of pension fund are expressed in number of institution and person (in thousands). The data on the life expectancy was obtained from the Statistics Indonesia. Life expectancy is an important measure of increasing population health(Valverde et al., 2021). It is not only a measure of health but also related to other things such as wealth and retirement income (Hendi, Elo, & Martikainen, 2021). Data on pension funds, both the number of institutions and the total participants were extracted from the database of the Indonesia Financial Services Authority Indonesia, Pensions Fund Statistic (Indonesia Financial Services Authority, 2015, 2016, 2017, 2018, 2019). The relationship between life expectancy and investment is based on the ideas put forward by Ando & Franco Modigliani, which are stated in theory of *the life cycle hypothesis of consumption*, that one of the reasons for setting aside some of the money in youth is for use or consumption in pension age (Deaton, 2005). The number of total participations was expressed as a function of life expectancy at birth, male life expectancy, and female life expectancy respectively. The number of pension fund was also expressed as a function of life expectancy at birth, male life expectancy, and female life expectancy respectively

3. RESULTS AND DISCUSSIONS

The overview of cross provincial data of life expectancy and pension fund in Indonesia is depicted in Figure 1. Moreover, the descriptive statistic shows the trends each of the variable are presented in Table 1. The F tests for the coefficient of significance and the goodness-of-fit or the coefficient of determination (R^2) of regression model are presented in Table 2.

Table 1. Descriptive Statistics Analysis Results

Statistics	x_1	x_2	x_3	y_1	y_2
Mean	69.7984	67.9839	71.8179	157.5936	8.5786
Median	69.8300	67.9500	71.8250	1.6525	1.0000

Statistics	x_1	x_2	x_3	y_1	y_2
Maximum	74.9200	73.1300	76.7600	4109.6040	165.0000
Minimum	58.8400	63.3000	66.9700	0.0570	1.0000
Std.dev	2.6130	2.4507	2.4396	708.5345	27.8079
Skewness	-0.5005	-0.0118	-0.0888	4.9703	4.8522
Kurtosis	4.2903	2.6696	2.6784	25.9642	25.2140
Jarque-Bera	15.5556	0.6400	0.7873	3652.6500	3427.8770
(P-value)	(0.0004)	(0.7261)	(0.6746)	(0.0000)	(0.0000)

Where Y_1 is the number of pension fund total participation, Y2 is Number of Pension Fund, X1 represent Life Expectation at Birth, X_2 represent Male Life Expectancy, and X3 represent Female Life Expectancy.

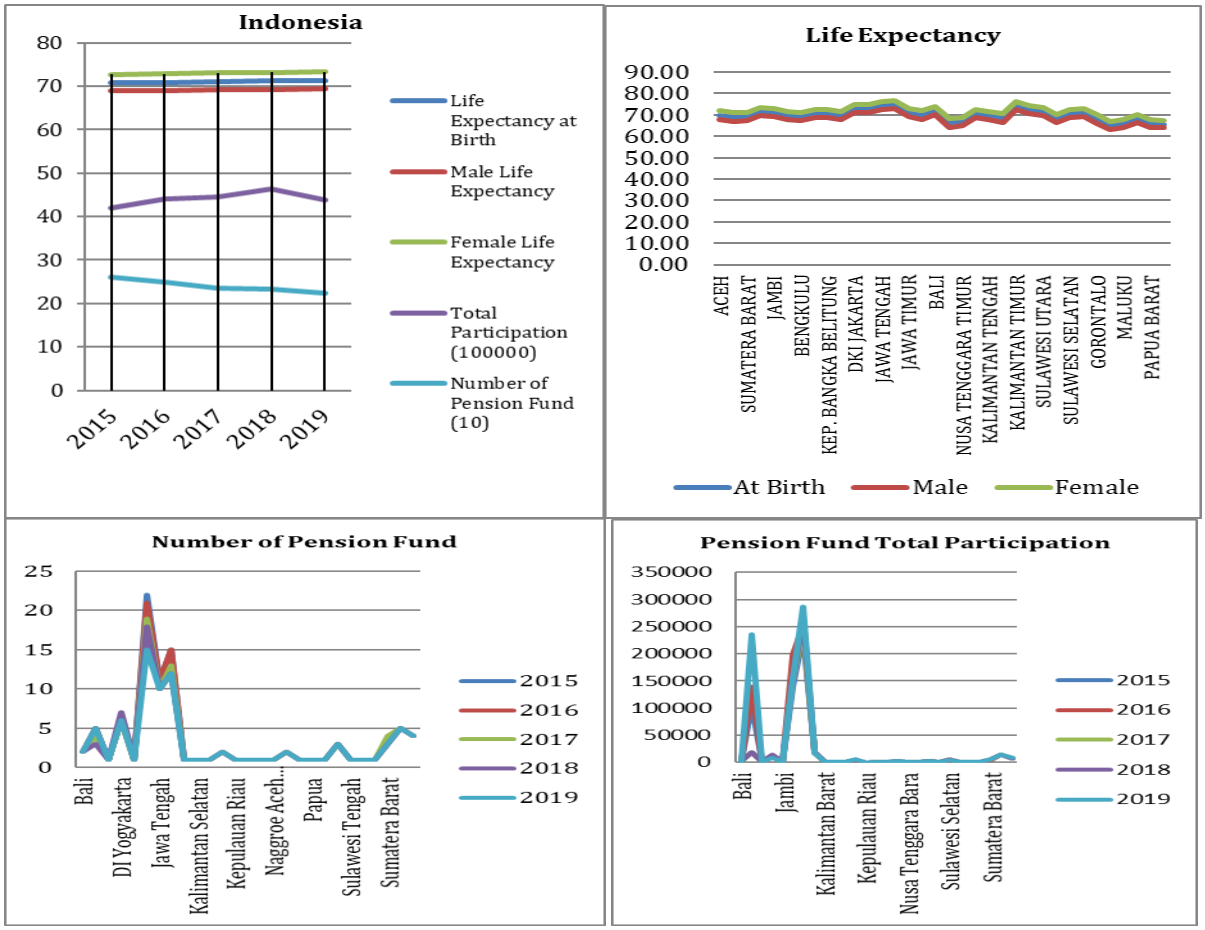

Figure 1. The Overview of Cross Provincial Data Of Life Expectancy And Pension Fund In Indonesia

In the simultaneous testing of the model coefficient with the F test, a significant effect was given when the P-value ≤ α and α was determined to be 5%. From the output results, the F test results with the P-value are obtained as presented in Table 2.

Table 2. The F-tests Results

Equation	F-statistic	P-value [Prob(F-statistic)]	R-Square
1	2314.657	0.0000*	0.9913
2	2349.199	0.0000*	0.9717
3	2353.978	0.0000*	0.9717
4	2929.863	0.0000*	0.9772
5	2971.155	0.0000*	0.9775
6	2970.289	0.0000*	0.9775

*Significance at (α) 5%.

Based on Table 3, it is concluded that the results of the F test show that there is a simultaneous influence on all coefficients including the predictor variable coefficients on the response variables for the first, second, and third equations, as well as the fourth, fifth and sixth equations. From the results of data processing, which are also shown in Table 3, it can also be seen that the goodness-of-fit measure, namely the R-Square, produces a very good value. The obtained R-Square value close to 1 means that the diversity of Y_1, Y_2 which can be explained all predictor variables simultaneously is very good. In partial / individual testing the model coefficient with the t test is given a significant effect when the P-value ≤ α and α is determined to be 10%, 5%, or 1%. The t-test results for the significance of the regression model coefficients are provided in Table 3 using Generalized Least Squares

Table 3. The t-test result for the significance of the regression model coefficients

Equation	Dependent Variable	Independent Variable	Coefficient	Std. Error	*t*-Statistic	P-value (Prob.)
1	Y_1	c	-387.5989	222.1056	-1.7451	0.0832*
		X_1	5.8824	3.1833	1.8479	0.0668*
		d_1	3769.0500	56.2071	67.0565	0.0000***
2	Y_1	c	-669.6996	285.4469	-2.3461	0.0204**
		X_2	10.1956	4.2023	2.4262	0.0166**
		d_1	3756.4270	56.7999	66.1344	0.0000***
3	Y_1	c	-692.2248	302.2876	-2.2900	0.0236**
		X_3	9.9639	4.2123	2.3654	0.0194**
		d_1	3758.5070	56.6144	66.3879	0.0000***
4	Y_2	c	-45.4457	9.8512	-4.6132	0.0000***
		X_1	0.6997	0.1412	4.9535	0.0000***
		d_1	145.2588	1.9818	73.2981	0.0000***
5	Y_2	c	-49.3598	10.1780	-4.8497	0.0000***
		X_2	0.7760	0.1498	5.1790	0.0000***
		d_1	145.0263	1.9717	73.5523	0.0000***
6	Y_2	c	-52.4293	10.7819	-4.8627	0.0000***
		X_3	0.7773	0.1503	5.1734	0.0000***
		d_1	145.1324	1.9681	73.7425	0.0000***

* Significance at (α) 10%.
** Significance at (α) 5%.
*** Significance at (α) 1%.

Where Y_1 is the number of pension fund total participation, Y_2 is Number of Pension Fund, X_1 represent Life Expectation at Birth, X_2 represent Male Life Expectancy, X_3 represent Female Life Expectancy and d_1 represent dummy variable, d_1 equal to 1, if Jakarta, d_1 equal to 0, otherwise.

Discussion

From the results of the regression model output with the response variable Y_1, the following test results are obtained: **First**, there is a significant effect of X_1 on Y_1 with the X_1 coefficient of 5.8824 (positive). This result implies that if Male Life increases by 1 unit, then Total Participants will increase by 5,8824 thousand or 5,882.4; on the other hand, if the Male Life decreases by 1 unit, the Total Participants will decrease by 5,8824 thousand or 5,882.4; **Second,** there is a significant effect of X_2 on Y_1 with the X_2 coefficient of 10.1956 (positive). This result implies that if Male Life increases by 1 unit, then Total Participants will increase by 10.1956 thousand or 10,195.6; conversely, if the Male Life decreases by 1 unit, then the Total Participants will decrease by 10,1956 thousand or 10,195.6. **Third,** there is a significant effect of X_3 on Y_1 with the X_3 coefficient of 9.9639 (positive). This result means that if Female Life increases by 1 unit, then Total Participants will increase by 9.9639 thousand or 9,963.9; conversely, if Female Life decreased by 1 unit, then Total Participants would decrease by 9.9639 thousand or 9,963.9. **Fourth, t**here is a significant effect of d_1 on Y_1 because of the resulting p-value <0.05. This result means that there is a difference between Total Participants in Jakarta and other cities where Total Participants are very large.

It can be simply say that there is a positive and significant effect of X_1, X_2 and X_3 on Y_1 and that there is a significant effect of d1 on y1 since all p-values are <0.05. This result means that there is a difference between Total Participants in Jakarta and other cities where Total Participants are very large. This is supported by data that the capital city has a much higher life expectancy and average income compared to other regions in Indonesia. Empirically, similar things that the capital city has a much higher

life expectancy and average income compared to other regions happened in other parts of the world (Shkolnikov, Andreev, Tursun-zade, & Leon, 2019). Learning from the large spatial differences in life expectancy in cities and towns in other countries and often linked to social factors (Mackenbach et al., 2019; Valverde et al., 2021), makes it important for stakeholders to develop policies with a region-based approach (Bilal et al., 2019).

Furthermore, from the results of the regression model output with the Y_2 response variable, the following test results are obtained: **First,** there is a significant effect of X_1 on Y_2 with the X_1 coefficient of 0.6997 (positive). This result means that if Life Expectation increases by 1 unit, the Number of Pension Fund will increase by 0.6997; conversely, if Life Expectation decreases by 1 unit, then the Number of Pension Funds will decrease by 0.6997. **Second,** there is a significant effect of X_2 on Y_2 with the X_2 coefficient of 0.7760 (positive). This result means that if Male Life increases by 1 unit, the Number of Pension Funds will increase by 0.7760; conversely if Male Life decreases by 1 unit, the Number of Pension Fund will decrease by 0.7760. **Third**, there is a significant effect of X_3 on Y_2 with the X_3 coefficient of 0.7773 (positive). This result means that if Female Life increases by 1 unit, the Number of Pension Fund will increase by 0.7773; conversely, if Female Life decreases by 1 unit, then the Number of Pension Funds will decrease by 0.7773. **Fourth**, there is a significant effect of d_1 on Y_2 because of the resulting p-value <0.05. This result means that there is a difference between the Number of Pension Funds in Jakarta and other cities where the Number of Pension Funds is very large. Overall, that there is a positive and significant effect of X_1, X_2 and X_3 on Y_2 and that there is a significant effect of d_1 on Y_2since the p-value <0.05. This result means that there is a difference between the Number of Pension Funds in Jakarta and other cities where the Number of Pension Funds is very large.

The results show that there is a positive and significant effect of Life Expectation at Birth, Male Life Expectancy and Female Life Expectancy on pension fund total participationand also there is a positive and significant effect of Life Expectation at Birth, Male Life Expectancy and Female Life Expectancy on Number of Pension Fund. The result also shows the greater effect come from Male life expectancy compare to Female life expectancy and life expectancy at birth on number of pension fund total participation. It is empirically proven from previous studies that there is the heterogeneity of risk preferences in pension programs (Alserda, Dellaert, Swinkels, & van der Lecq, 2019). Heterogeneity was predicted using socio-demographic (gender and age) information. Demographically, based on cross-province life expectancy data in Indonesia, the life expectancy of male is lower than female. If the reasons for caution over uncertainty regarding life expectancy lead to a higher propensity to save or to invest, hence it is reasonable that the higher risk of mortality in male and the elderly in certain circumstance, for instance like nowadays, the pandemic will have a greater impact on the total participation in pension fund of these population (Hanlon et al., 2020; Yang et al., 2020).

The positive and significant effect of life expectancy on pension fund implies that the people in provinces of Indonesia concern regarding there are welfare on the future, they willing to sacrifice the current consumption for the future welfare. This condition in line with the theory of the life cycle hypothesis of saving and the theory of the life cycle hypothesis of consumption (Deaton, 2005; Goh et al., 2020). Working age individuals save to accumulate wealth to support their expenses in retirement. There is a higher tendency to save due to precautionary motives to deal with uncertainties and changes about income and life expectancy. This is the reason why savings can be a positive function of life expectancy (Goh et al., 2020). This positive relationship, between saving and life expectancy, due to the reason that an individual manages their consumption and saving behaviour with the aim of allocating them ideally for their whole life. This is in accordance with the theory of the life cycle which begins with a life plan that develops into an economic theory of their consumption and saving behaviour (Alp & Seven, 2019). Although the objective of transferring consumption between time periods, not only can be met by reducing current consumption and increasing current savings, based on the lifecycle theory, it but also can be fulfilled by using credit facilities (Çepni, Hacıhasanoğlu, & Yılmaz, 2020).

Moreover, there is a significant difference between the total number of participants and the number of pension funds in Jakarta compared to other provinces in Indonesia, which deserves special attention. This shows the great interest of the public in capital city or big city to set aside their current consumption in pension funds so that they can use them in old age or in the future, becoming an opportunity for institutions and businesses in pension fund financial service providers to develop their business. However, these results are also a challenge to foster public interest in preparing for sustainable welfare in old age by participating in investing in pension funds. Of course, it requires a special planned strategy from an institution or business that provides pension fund financial services to increase the desire of the community in the form of participation in pension fund investment. It is important for the government to implement the precise policies because pension funds are something that has long-term consequences or impact (Bernal & Olivera, 2020). This also requires a policy or regulation from the

government that is able to support these efforts, on the rationales that the readiness of the elderly population in living their old age in prosperity will reduce the government's burden or ineffectiveness related to spending on public services or public sector (Peña, 2020). Since if life expectancy increases, and dependency ratio worsening, then a precise policy is needed in an attempt to overcome the high costs of the population (Parker, Bucknall, Jagger, & Wilkie, 2020).

4. CONCLUSION

There is a positive and significant effect of Life Expectation at Birth, Male Life Expectancyand Female Life Expectancy on pension fund total participationand that there is a difference between Total Participants in Jakarta and other cities where Total Participants are very large. The result also shows the greater effect come from female life expectancy compare to male life expectancy and life expectancy at birth. In addition, there is a positive and significant effect of Life Expectation at Birth, Male Life Expectancy and Female Life Expectancy on Number of Pension Fund, and that there is a difference between the Number of Pension Funds in Jakarta and other cities where the Number of Pension Funds is very large. Further research should be conducted due to the limitation in this research, for instance due to the short period of time, the type of technical analysis, the region of research location. Hence, these limitations can be elaborate in carried out the next research agenda, as the effort to enhance the contribution to the knowledge.

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