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Saving and Investment Nexus in Indonesia: Revisiting Feldstein-Horioka Hypothesis

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Abstract

The Indonesian economy cannot be separated from interaction with the economies of other countries, so changes in global conditions will also affect the Indonesian economy. A significant investment is needed to drive the domestic economy, while domestic capital accumulation is still insufficient. The relationship between savings and investment put forward by Feldstein and Horioka (FH) was reviewed for the case of Indonesia from 1981 to 2020. The VECM found a long-term and short-term relationship and a bidirectional Granger causality between saving and investment. The strength of the saving-investment correlation confirms the validity of the FH hypothesis in Indonesia. This Study provide an appropriate policy framework regarding international capital movements. This policy framework is important for Indonesia, because its economic policy must be proactive and not reactive to macro disturbances.

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1. Introduction

Since Feldstein and Horioka (1980) established the premise that there is a link between saves and investment and confirmed that changes in domestic investment are susceptible to changes in domestic savings, the relationship between savings and investment has been the subject of much research. The data indicates a strong connection between savings and investments (S-I), indicating a low level of capital mobility. The ratio of domestic savings to gross domestic product and the ratio of domestic gross domestic investment have a favorable connection over the long term. Feldstein and Harioka's (1980) research, which focused on 16 OECD developed nations between 1960 and 1974, revealed that, in their cross-sectional analysis, savings and investments were closely associated. This finding contradicted the conventional economic theory's premise of perfect capital mobility. its results are known as the F-H hypothesis; its premise is that a strong savings-investment correlation or a substantial coefficient of investment regression in savings suggests little international capital mobility and vice versa.

Their results present a problem since they defy the widespread assumption that there is a large degree of global capital mobility (after some developed nations liberalized their capital balances by the middle of the year. The results demonstrate that the strong national savings-investment correlation, which is almost one, is a reflection of the poor capital mobility seen in the 16 OECD nations. Accordingly, they contend that in a closed economy—one that is prohibited from the flow of foreign capital—all national savings should match all national investments. In such a scenario, the current account would be zero, and there would be a one-to-one connection between saves and investments. However, depending on whether the current account is in excess or deficit, the amount of savings and investment in an open economy may differ from the gap that capital flows can cover. The economy will run a current account surplus and export capital to the rest of the globe when there is a surplus of domestic savings over domestic investment. Conversely, when domestic savings fall short of domestic investment, the economy will have a current account deficit and need to import capital from around the globe. According to their results, in the case of complete capital mobility, there will be no association between saves and investments.

The presence of the Feldstein-Horioka hypothesis attracts researchers to prove, at different times and places, whether to produce the same thing. According to Apergis and Tsoumas (2009), studies that make reference to the Feldstein-Horioka hypothesis are known as Feldstein-Horioka puzzles. Khan and Saeed (2012) confirmed the existence of twin deficits and the Feldstein-Horioka hypothesis, as did Erdem et al. (2016), finding evidence from the Feldstein-Horioka hypothesis for Turkey using annual data from 1960-2014. In comparison, Bagheri et al. (2012) present weak support for the Feldstein-Horioka hypothesis in Iran from 1971 to 2007. The Feldstein-Horioka hypothesis was shown to hold true in the instance of Nigeria by Nasiru and Usman (2013), who employed the ARDL test to examine the cointegration of the long-term connection between savings and investments during the years 1980–2011. For Latin America and the Caribbean, Cavallo and Pedemonte (2016) evaluated savings retention parameters and discovered that big nations were larger and that savings deposit parameters declined with time.

Furthermore, according to Solow's growth model, investment plays a crucial role in determining economic growth. Kim (2005) examines the link between foreign capital inflows and rising national income using data from 16 OECD nations. This is a significant issue connected to economic growth since it explains how savings influence investment. Savings are analyzed by Hwang (2010) as a crucial factor in economic growth and an investment determinant in Korea. Understanding how savings affect investments is a key factor in understanding the link between saves and investments. Kaur and Sarin (2019) obtained data that support the Feldstein-Horioka hypothesis in the focus of their study in East Asian nations (China, Hong Kong, Japan, Korea, Macau, and Mongolia) during the period 1982-2015 utilizing the ARDL technique. According to their findings, there are both long- and short-term associations for nations whose savings and investments have a high degree of cointegration.

Overall, research into the Feldstein-Horioka hypothesis conundrum may still be done to explain the degree of international capital mobility, even if the theoretical discussion around it has greatly expanded. This is especially true when further statistical data is included. It is because savings and investment are essential pillars of a country's economic growth and development. Today many countries worldwide focus on savings and investments to achieve sustainable economic growth. However, achieving the required savings rate and expanding the investment sector is one of the significant obstacles for developing countries like Indonesia. Low savings rates in developing nations are caused by a number of factors, such as poor economic performance, a comparatively high unemployment rate, and the majority of the labor force working in the unorganized sector.

Indonesia's capital mobility is less connected with the global economy. Therein lies his predisposition towards investing and saving. Indonesia started to open up throughout its growth by taking part in trade and financial liberalization initiatives to promote capital flows (Marheni, 2018). Due to favorable market circumstances including high savings rates, Indonesia is becoming a more appealing option for investors as the country's investment climate continues to improve (Azwardi & Wijaya, 2022). It was recorded in the data collection by the Investment Coordinating Board (BKPM) in the first quarter of 2021 that the amount of foreign investment realization was higher than the realization of local investment, namely IDR 111.7 trillion for FDI and IDR 108 trillion for local investment.

We may infer from earlier research that different nations have different relationships between savings and investments. Similarly, with the economic background that is still growing, Indonesia also cannot be separated from savings and investment in driving the pace of development. Therefore, this study's fundamental problem is testing the Feldstein-Horioka hypothesis in Indonesia. This test has the ability to offer an appropriate foundation for international capital movement policy. Although Indonesia has not fully liberalized its capital account, as with certain OECD nations in the early 1970s, this policy framework is vital for Indonesia, where economic policies should be implemented proactively instead of reactive to macro disturbances. Based on the problems raised in the background, this research analyze relationship between savings and investment that proves the Feldstein-Harioka hypothesis

occurred in Indonesia and long-term and short-term relationship between savings and investment in Indonesia.

2. Literature Review

Savings and Investment Theory

The history of the relationship between savings and investment is theoretically traced starting from the mercantilist era and Adam Smith, namely the accumulation of wealth, where the concept is currently known as savings. Economic development is positively correlated with investment levels, according to Adam Smith's idea. Smith (1937) explains how the economy's savings rate contributes to the amount of investment, which is a crucial element in determining economic development. Further, how the accumulation of wealth (savings) can quickly turn itself into an investment is described by Solow (1967) and Romer (1986).

Thinking related to savings and investment continues to be discussed in traditional Keynesian theory; the relationship between savings and income levels implies that the savings rate increases with economic development. The hypothesis that money does not easily flow from one nation to another because of a variety of issues underlies the ideal link between domestic savings and investment. Economic agents and savers tend to invest their resources in domestic investments and require rewards compensating for the risks of investing in other countries. It is generally a situation that makes domestic investment opportunities more attractive and allows resources to be efficiently allocated for the most productive use.

While supporters of neoclassical economics argue that investment is positively related to the cost of renting real capital, this increase in rental expenses will reduce capital inventories and thus increase marginal capital products. As a result, there will be a flow of capital from high-income countries to low-income countries to secure a high rate of return on investment (Henrik and Herzog, 2015). In classical theory, as the amount of savings increases, this decrease in interest rates will drive investor demand more than the availability of funds, thus increasing investment. In short, on a theoretical level, both for classical and neoclassical economists, it is savings and investments that control the interests of the capital market, and it is the interest rate that balances savings and investments.

Contrary to classical theory, however, Keynes maintained that more investment causes production and income to rise, which in turn causes savings to eventually rise. According to the economics of the Keynes stream, savings are defined as the amount remaining after consumer spending, deducted from the disposable income consumers earn at a particular time. Savings are also part of *the disposable* income left over from consumption expenditures and are curated or invested directly. Investment is the acquisition of goods not consumed today but chosen to be used in the future to create wealth. In macroeconomics, domestic savings theory combines a country's public and private savings rates. In a country's economic development, savings are considered the basis of modal supplies, leading to increased investment (Taye, 2017).

Recent Research

Research on the link between savings and investments has been conducted both theoretically and statistically. However, the relationship will change based on a nation's economic setup. The purpose of this section is to examine empirical research on the link between savings and investment and determine if such research supports orthodox or heterodox economic theories of that relationship. The presence of a link between savings and investment will not occur with perfect capital mobility, according to Feldstein and Horioka's 1980 study (this conclusion is nicknamed FH or the FH conundrum in literature). In context, when exceptional capital mobility happens, national savings will follow whichever the highest returns are; consequently, the link between a country's savings and investments will dissolve. According to their article, empirical evidence supports the orthodox economic theory of the link between savings and investment that is, savings lead to investment in the absence of perfect capital mobility.

The Feldstein-Horioka hypothesis test (FH) literature is generally skewed in favor of advanced economics experience. The results of several of these studies have offered evidence that supports FH's perception that the high correlation between savings and investment rates is a consequence of the low level of international capital mobility (see Penati and Dooley, 1984; Frankel, 1985; Feldstein and Bachetta, 1990; Bayoumi and Rose, 1993; Taylor, 1996; Caceres, 1997; Khundrakpan and Rajan, 2010; Nasiru and Usman, 2013). Sanjib and Joice (2012) contrasted the United States, China, and the United Kingdom with India, looking at the link between savings and investment in each nation. According to his research, savings and investment in these nations have a cointegrated connection.

Instead of using conventional methods to assess financial development, Raheem (2017) looks at the role of financial development in the FH problem for 31 sub-Saharan African (SSA) countries. This is done by utilizing qualitative financial proxies to estimate models. The FH coefficient increased from 0.106 to 0.146, and it was determined that qualitative measurement was a more accurate proxy for financial progress in order to raise the FH puzzle's efficiency. Sinha and Sinha (2004), when analyzing the short- and long-term link between savings and investment rates throughout 123 countries utilizing an error correction model, discovered that capital is most mobile in 16 nations with low per capita incomes. The common belief that capital is more mobile in nations with high per capita income performance is refuted by these findings. Narayan (2005) discovered a correlation between savings and investments in the instance of China over two sample periods: 1952–1994 and 1952–1998. Nevertheless, in the first period, the correlation's coefficient was stronger when the exchange rate was constant. Therefore, the low mobility of capital (and strong savings-investment rate connection) seen in the Chinese economy during the period of fixed exchange rates are consistent with the FH hypothesis.

In their 2019 study, Alrasheedy and Alaidarous investigate the connection between savings and investment in Saudi Arabia, demonstrating a unidirectional causation direction from private savings to private investment as well as a two-way Granger causality link between

private savings and private GDP. At both the aggregate and private levels, there is, nonetheless, a missing and unclear link between investment and economic development.

3. Research Methods

This research adopts quantitative and explanatory descriptive research forms. Quantitative research is a type of research that focuses on numerical data (Baldin, 2018), where the data is processed using statistical methods. Meanwhile, explanatory research is also used to reflect the depth of research data analysis. This research is included in the basic research that aims to explore and find answers to the problems of economic phenomena. The basis of analysis in this study uses secondary data. Secondary data are research data obtained indirectly (from third parties) that have been published orally and in writing by official authorities. Data from the variables used in this study are savings and investments in time series data with an observation period from 1981 to 2020. The data used is sourced from official publications from the World Bank website.

The following is the operational definition for each variable utilized in this study's analysis:

1. The savings utilized are gross; they are computed as gross national income less net transfers plus total consumption. The data used in US dollars is sourced from worldbank.org.
2. Foreign direct investment is the type of investment made. The term "investment" refers to the total of equity capital, income reinvestments, and other capital that constitute the direct equity flows in the reporting economy. The data used in US dollars is sourced from worldbank.org.

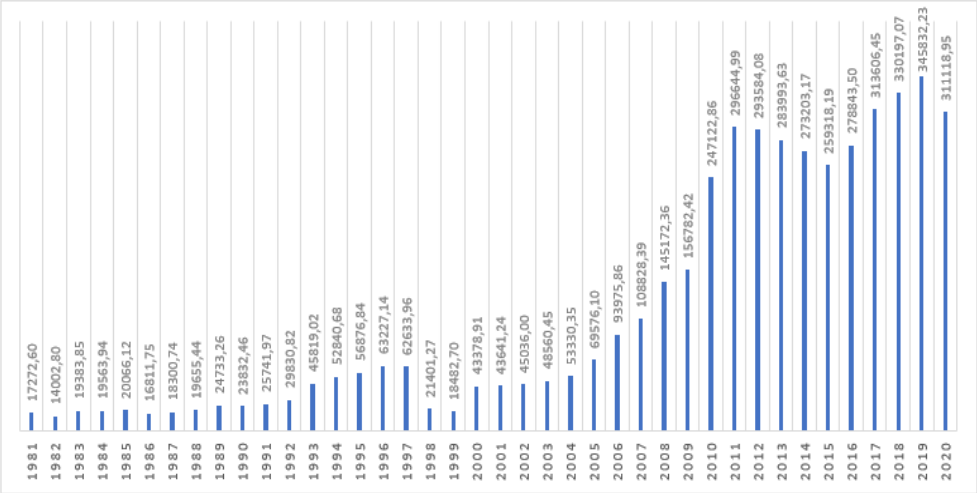
An approach with the *vector error correction model* (VECM) method is used to answer research questions. The VECM model is a development of the restricted form of the VAR method. The emergence of restrictions is due to non-stationary data. Therefore, VECM is better known as a VAR design with non-stationary data that has a cointegration relationship. Engle and Granger first popularized VECM as a correction to its short-term disequilibrium. The VECM model must meet the assumption that all variables must be stationers at the same level, characterized by *white noise* on all residues, i.e., the average is zero, the variance is constant, and there is no correlation between the dependent variables. Performing VECM estimation required the following steps: (1) unit root test or data stationarity test; (2) test Optimum lag length; (3) cointegration test; (4) causality test; (5) *Vector Error Correction Model* (VECM) Modeling; (6) *impulse response function* (IRF); and (7) *Variance Decomposition* (VD).

4. Results

Savings Rate in Indonesia

Savings are essential in economic growth, the benchmark for a country's welfare and progress. Harrod-Domar's theory states that investment is used to finance economic development and comes from the accumulation of domestic capital created by mobilizing savings. The financing needed by Indonesia for investments made in driving the economy towards takeoff and achieving sustainable development targets is still relatively small if it

only relies on domestic savings. The difference between funding and the availability of domestic funds results in an investment-savings gap. At the beginning of development in 1981, Indonesia's domestic savings amounted to 17,272.6 million US$. However, in the following year, it decreased, but savings led to an increase from year to year until 16 decades later, in 1997, it reached its first high of 63,227.14 million US$, and again reached the next highest point in 2011 with a savings value of 296,644.99 million US$. The increase in savings continued until it reached the third highest level in 2019, with a total savings of 345,832.23 million US$. The increase in domestic savings is supported by the increasing number of banks in Indonesia and the strengthening of Indonesia's economic growth so that people's income also increases and they can set aside their income for savings.

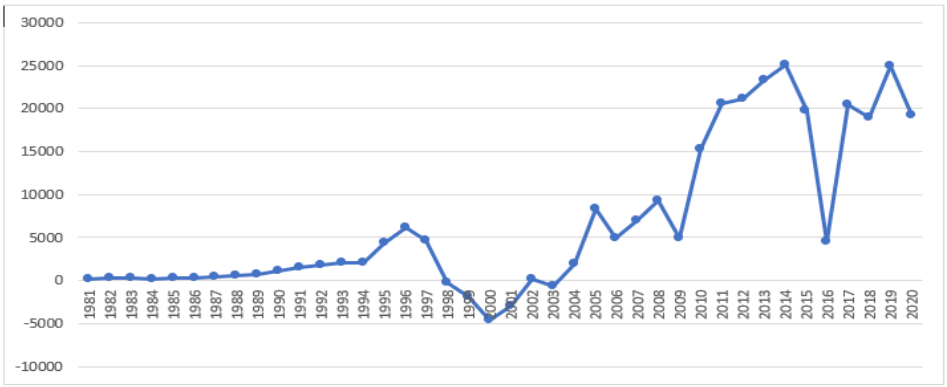


Source: Worldbank data, 2022.

Figure 1. Savings Rate in Indonesia 1981-2020 (in a million US$)

Indonesian Investment Level

The movement of investment flows in a country is the impact of economic openness. In the period of globalization of the economy, there is fierce rivalry in national enterprises as well as trade. The United Nations Conference on Trade and Development (UNCTAD, 2001) reports that there has been a notable surge in foreign investment flows globally, with sums of USD 209 million, USD 437 million, and USD 1,118 million recorded in 1990, 1997, and 2000. In contrast, from 1980 to 2006, foreign direct investment flows to developing nations increased thirtyfold, from US$8.4 billion to US$412 billion.



Source: Worldbank data, 2022.

Figure 2. Level of Foreign Direct Investment in Indonesia 1981-2020 (in a million US$)

Data Analysis and Hypothesis Testing

An analytical method known as a vector error correction model (VECM) was employed in this research. This model is a variation of the VAR model designed for non-stationary time-lapse data with one or more cointegrations. The reaction of each dependent variable to disturbances in the variable itself and in other dependent variables demonstrates the dynamic nature of VECM. It is done using the variance decomposition and impulse response function to see the properties of the VECM model.

Data Stationary Test

To ascertain if the data being utilized is stationary, a stationeryness test is performed. The data stationariness test is conducted using the Augmented Dicky Fuller (ADF) test, which has a critical value set at 5% significance level. The data is declared not to contain unit roots, so the data is stationary. In Tables 1 and 2, the test results are displayed.

Table 1. Stationer Test Results with ADF Test at Level

Variable	ADF Test	Probability	Information
FDI	-1. 482029	0.5321	p > 0.005 (non-Stationary data)
Savings	-0,5254430	0.8750	p > 0.005 (non-Stationary data)

Source: processed data, 2022.

Based on the results of stationer testing in Table 1., it is known that *Foreign Direct Investment* (FDI) and Savings data have not been stationed at the level, with the entire value of p > 0.05. Therefore, testing is carried out again on the first difference.

Table 2. Stationer Test Results with ADF Test on *First Difference*

Variable	ADF Test	Prob (1st Dif)	Information
FDI	-7.4999	0.0000	Stationary
Savings	-3.8017	0.0062	Stationary

Source: Data processed, 2022

The FDI variable obtained the Augmented Dickey-Fuller test statistics of -7.499900 with a probability of 0.000 at the level of 1st difference, according to the results of the stationarity test in Table 2, so it can be stated that the FDI variable has been stationary at the level of *1st difference.* Furthermore, the savings variable obtained an ADF test value with an absolute value of -3.801718 with a probability value of 0.0062 at the level of *1st* difference to declare it a static savings variable in the *first difference*. Based on stationarity tests using the Augmented Dickey-Fuller test on FDI variables and savings have been stationary at the first

difference level. Therefore, the stationary test requirements have been met, so the next test, namely optimum lag, can be used.

Determination of Optimum Lag Length

The amount of lag thought to have a substantial impact on preventing auto-correlation and heteroscedasticity issues is known as the optimal lag. The lag length in this study was determined using the Akaike Information Criterion (AIC). The latency is considered optimal when its AIC value is the lowest. Table 3 displays the lag length testing findings.

Based on determining the optimum lag length in Table 3, the smallest AIC value of 97.43982 at lag 1 was obtained. In addition, lag 1 has the most stars, meaning that out of 5 criteria, 4 choose lag one so that lag 1 becomes the optimal lag.

Table 3. Determination of Optimum Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1710,67	NA	1,94e+41	100,7458	100,8356	100,776
1	-1650,47	109,779*	7,13e+39*	97,43982*	97,70918*	97,53168*
2	-1648,41	3,525695	8,01e+39	97,55354	98,00247	97,70663
3	-1646,28	3,370871	9,02e+39	97,66398	98,29248	97,87832
4	-1642,49	5,581317	9,26e+39	97,67602	98,48410	97,95160

Source: Data processed, 2022

Determining the lag length is not enough, and it is necessary to do a lag stability test To interpret the Variance Decomposition (VD) and Impulse Response Function (IRF) correctly, this test is necessary. If the modulus value of each of the roots in the VAR model is less than one at a radius of one, it is stable; if it is greater than one, it is unstable.

Table 4. Optimum Lag Stability

Root	Modulus
0.315171	0.315171
0.292379	0.292379

Source: data processed, 2022

Table 4 clarifies the conditions of var models declared stable. This is based on the modulus value of all roots that are less than 1, and it is at an optimal point where the VAR model is stable and the composition is already in the ideal position. It means that the optimum lag is declared stable.

Cointegration Test

To find out if variables have a long-term connection, a cointegration test is run. The Johansen technique may be used to test for cointegration; if the statistical trace > critical value, it

indicates that there is a long-term link between the model variables. Table 5 displays the test results:

Table 5 Cointegration Test Results

	Hypothesized No. of CE(s)	Eigenvalue	Trace Stat.	Max-Eigen Stat.	Critical Value	Prob.
1. Unrestricted Cointegration Rank Test (Trace)	None *	0.469047	3.87304	-	15.49471	0.0000
	At most, 1 *	0.264964	11.08207	-	3.841466	0.0009
2. Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	None *	0,574450	-	31.62050	4.264605	0,0000
	At most, 1 *	0,289347	-	12.638131	3.841465	0,0004

Trace test indicates 2 cointegrating eqn(s) at the 0,05 level
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0,05 level
*Denotes rejection of the hypothesis at the 0,05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: data processed, 2022

Table 5's cointegration Johansen model test reveals that, at a significance level of 5%, the maximum eigenvalue values and trace statistical values in rows None and line at most 1 at r = 1 are more significant than the critical value. The cointegration model results from this condition, which states that the alternative hypothesis—which states that there is cointegration—is accepted and the null hypothesis, which states that there is no cointegration, is rejected. At least one variable in this model exhibits cointegration at the 5% significance level, suggesting that there is a long-term relationship of stability or equilibrium between the variables. Stated differently, every short-term period sees all variables adjusting to one another in order to reach a long-term equilibrium. This cointegration test's findings may be used to the estimated Vector Error Correction Model.

The Vector Error Correction Model

All variables have been shown to be stationary at the first difference level, and the data are integrated, according to the stationariness test findings. Based on the results that have been tested, the next test is the VECM test. The VECM test is performed to look at the long-term and short-term analysis. This VECM model uses a critical value of 5% and a t-table value of 2.022691. The value of t will be used to see the signification of the influence between variables, where if t-stat > 2.022691, then the variable has a significant effect, and conversely.

Additionally, the following table displays the short-term variables that are significantly influential:

Table 6. Short-Term and Long-Term Estimation Results

Short-Term			Long-Term	
Error Correction:	D(FDI)	D(Saving)	Cointegrating Eq:	CoinEq1
CointEq1	-0,836248	-1,875262	FDI(-1)	1.000000
	(0,22925)	(1,23335)	Saving(-1)	-0,065343
	[-3,64781]	[-1,50247]		(0,00502)
				[-13,0128]
D(FDI(-1))	-0,052915	-0,590872		
	(0,18863)	(1,01485)		
	[-0,28052]	[-0,58223]		
D(Saving(-1))	0,039608	0,450102		
	(0,03633)	(0,19547)		
	[1,090012]	[2,30261]		
R-squared	0,477064	0,24096		
F-statistic	0,447182	0,197590		

Source: data processed, 2022

With a coefficient value of -0.065343, savings accounts have a long-term negative and significant impact on foreign direct investment (FDI) (see Table 6). If there is a change of 1 US$ in savings, it will reduce FDI by 0.06 US$.

VECM estimation

The cointegration link between savings and FDI promotes the latter's continuation in the development of the VECM model. There is a short- and long-term association between savings and foreign direct investment, according to the estimation results in Table 5.8. Table 5.8's VECM model findings can be viewed in the following ways: (1) In the long run, Savings have a significant effect on foreign direct investment with a value of t |-13.0128| > critical value t |2.0222691|, (2) In the short term; Savings do not affect foreign direct investment, and vice versa. However, in the short term, the change in savings in the last 1 year significantly affected this year, with a t-statistical value of |2.30261| > critical value t |2.0222691|. It informs that if savings in the past year increased by 1 US$, it would cause a change in savings at this time to increase by 0.450102 US$. From the results of the estimation, the VECM equation (1) can be made for savings and investment variables in the following form:

D(Investment) = - 0.836247558536* (Investment(-1))

D(savings) = 0.450101701033*D (savings(-1))

Granger Causality Test

A test to establish the relationship between changes in a VAR system is called a causality test. Two variables affect one another if there is a causal link between them. If the Prob value of both variables, X and Y, is less than $\alpha = 5\%$ (0.05), then there exists a two-way causal

relationship. However, if just the variables X and Y have a probability value of < α = 5% (0.0), there is a one-way causation link. In contrast, a probability value greater than 0.05 indicates that there is no causal association between the variables X and Y or Y and X (Ariefianto, 2012).

Table 8. Granger Causality Test Results

Variables examined	Probability
FDI on Savings	0.000004
Savings against FDI	0.0095

Source: data processed, 2022

The causality test indicates a causal association between FDI and savings based on Table 8. The probability value of the effect of FDI on savings is 0.000004 > 0.05, meaning that FDI significantly affects savings. The probability value of savings and FDI is 0.0095 > 0.05, meaning savings significantly affect FDI. Thus, it may be said that FDI and savings are causally related in both directions.

Variant Decomposition (VD) Test

The difference between the variants before and after the shock occurs, either from the variable itself or other variables, and looking at the relative influence of the variables, used variance decomposition.

The findings of the analysis of variance decomposition for investments and savings from the shocks supplied by each variable, including itself, are shown in Table 9. At the commencement of the period, investment is still influenced by the investment; just starting the second period of savings influences investment. As the period increases, the ability of savings to affect investment is more remarkable, while the capacity of investment to influence itself decreases. The effect of investment on itself is mainly from the influence exerted by savings until the third period, after which things become reversed.

Table 9. Variance Decomposition of savings and investments variables

Variance Decomposition of investments				Variance Decomposition of savings		
Period	SE.	FDI	Saving	SE.	FDI	Saving
1	3.59E+09	100.00	0.00	2.02E+10	8.64	91.35
2	3.99E+09	82.81	17.18	3.56E+10	2.83	97.16
3	5.06E+09	52.34	47.65	4.86E+10	1.53	98.46
4	5.83E+09	39.96	60.03	5.77E+10	1.09	98.90
5	6.28E+09	34.47	65.52	6.47E+10	1.07	98.92
6	6.54E+09	31.89	68.10	7.08E+10	1.25	98.74
7	6.79E+09	30.01	69.98	7.67E+10	1.39	98.60
8	7.07E+09	27.98	72.01	8.25E+10	1.43	98.57
9	7.38E+09	25.83	74.16	8.81E+10	11.40	98.59

10	7.68E+09	23.89	76.10	9.33E+10	1.38	98.61

Cholesky one SD (d.f. adjusted)
Cholesky ordering: FDI Saving

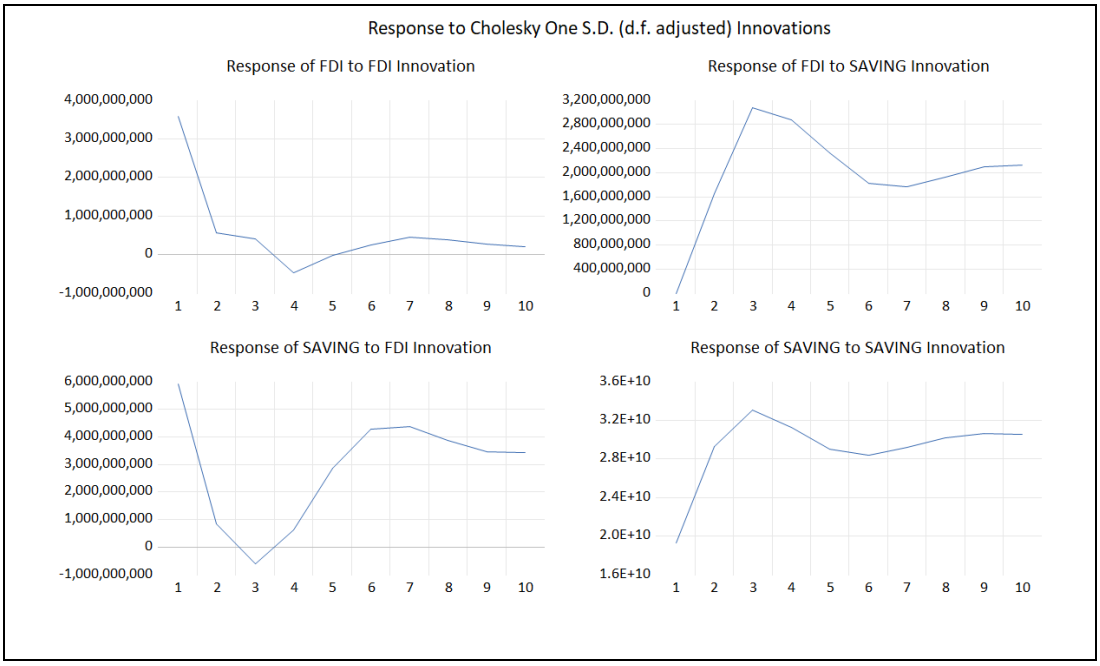
Source: data processed, 2022

Impulse Response Function

The response of a variable in the future, if there is a disturbance in one other variable, will be illustrated through the *impulse response function (IRF).* The following is presented as a graph to make it easier to interpret the analysis results using 10 periods. Suppose the movement indicated by the impulse response shows a movement that is getting closer to the previous equilibrium point. In that case, it means that the variable affected by the shock gives a critical response, or the shock disappears more and more and does not permanently influence the variable.

Based on the information from the chart, the impulse response analysis of savings and investments for the subsequent 10 periods is as follows:

1. The investment response to self-shock in the first period is enormous. However, it experienced a drastic decrease in influence in the second period and continued to decline until it reached the lowest response point in the fourth period. After that, the response again increased until the seventh period and decreased towards stable in the 10th period.
2. The investment response to savings in the third period was quite significant, although afterward, the effect decreased until the 7th period and slightly increased in the 8th to 10th period. It means that the reaction of investments to shocks in the value of savings tends to strengthen.
3. The savings response to investment was high in the 1st period but fell sharply in the 2nd period until it was negative in the 3rd period. However, the reaction of savings to investment shocks began to weaken from the 8th to the 10th period.
4. The savings response to self-shock in the early to 3rd period was quite strong, experienced a decrease in response in the 4th to 6th period, and again strengthened the reaction in the 7th period to the end of the period at 10.



Source: processed data, 2022.

Figure 3. Impulse Response Investment and Savings

5. Conclusion and Suggestion

Over the past ten years, there has been a great deal of controversy around the link between investments and savings. Using the Vector Error Correction Model (VECM) technique, this study examined the Feldstein-Horioka (FH) hypothesis on the link between savings and investment in Indonesia from 1981 to 2020. The mobility hypothesis of Feldstein and Horioka (1980) states that when capital mobility rises, the link between savings and investment will deteriorate and domestic savings will no longer be a limiting factor in a nation's level of investment.

Gaining an understanding of the correlation between investments and savings is crucial for comprehending economic progress. TThe reason for this is because investments that rely on the availability of both domestic and foreign money are the primary source of capital accumulation, which is a prerequisite for economic growth. As a result, greater capital formation from savings will result in better economic growth.. Harrod-domar, with his theory, explains the relationship between savings and investments. Although Havsey Domar and Roy Harrod conducted the study separately, they concluded that high savings and investment determine economic growth. The mechanism explains that when public or domestic savings are low, they cannot finance development, so outside parties need funding. If savings and investment are low, economic growth will also be low. As a developing country, Indonesia actively makes various breakthroughs to increase economic development by encouraging investment and creating investment conditions to thrive.

The connection between investments and savings is so fascinating that Feldstein and Horioka (1980) undertook a research on the subject. Research utilizing cross-sectional research and

items from 16 OECD member countries reveal that 85–95% of domestic savings are invested in the domestic economy. Feldstein and Horioka (1980) first contended that, in a nation where global capital is perfectly mobile, there is minimal correlation between domestic savings and domestic investment, and a certain quantity of savings is created in that nation. Any nation's excess funds will be directed onto the global capital market in order to finance other nations that provide an attractive investment environment. The evidence found in his study implies the national rate of return of domestic savings equals the marginal product of domestic capital before tax because such savings increase the domestic capital supply rather than flowing abroad or replacing foreign investment within the country.
The root unit test results in Table 5 indicate that savings and investments are integrated into the *first difference*. With this, the null hypothesis can be rejected. Furthermore, in Table 6, it is known that there is a long-term and short-term relationship between savings and investments. Meanwhile, in the short term, savings do not affect investment. The coefficient of savings that is less than 0.1 indicates that dependence on domestic savings is still high. It validates the hypothesis put forward by Feldstein-Horioka (1980), which postulates that low capital mobility is internationally appropriate for conditions in Indonesia for the period 1981-2020.

The evidence in this study is consistent with findings from investigations carried out in a number of other developing nations. Using the Autoregressive Distributed Lag (ARDL) analysis tool to test the long-term relationship, Nasiru et al. (2013) examined the relationship between domestic savings and investment in Nigeria during the period 1980-2011. The findings indicated a long-term relationship between savings and investments. Furthermore, research conducted in Iran by Tehranchian A. and Behravesh M. (2011) shows that savings and gross domestic investment have an equilibrium connection over the long run, with savings having a far higher direct impact on investment over the near term. Ahmed (2017) found that long-term savings-investment relationships occurred in India, Saudi Arabia, Pakistan, and Bangladesh, but not in Sri Lanka. The study looked at the long-term relationship between investment and savings using the ARDL approach in the economies of South Asian developing countries.

The evidence supporting the Feldstein-Horioka hypothesis for Indonesia from 1981 to 2020 shows that saves and investments have a robust long-term relationship, suggesting that changes in domestic savings will be strongly correlated with changes in investment. Policies in the financial sector that aim to mobilize domestic savings are therefore important for capital accumulation. It is important to note, nevertheless, that an excessive reliance on domestic savings may impede economic expansion and hence curb consumer spending when funds are diverted toward other goals. Thus, in addition to mobilizing resources in the local economy, authorities should concentrate on recruiting foreign capital as part of the development program.

Research findings indicate that investments and savings are cointegrated. It was discovered that there is a two-way link between savings and investments using the Granger causality test. Savings and direct investment were found to have a link, both short- and long-term, after the VECM test. With a coefficient value of less than 1, the long-term savings coefficient's

negative sign indicates that rising savings would result in falling investment, supporting the validity of the Feldstein-Horioka hypothesis in Indonesia. Savings have little effect on investment in the short term, but an increase in savings of one US dollar in the previous year can lead to an increase in current savings of 0.45 US dollars.

Although these prediction results support significant cointegration between savings and investment in Indonesia from 1981 to 2020, this does not mean that low capital mobility can occur. The link between savings and investments may also be influenced by other variables, such as the size of the nation, greater investment options, current account targeting, and financial limitations. Consequently, the Feldstein-Horioka hypothesis continues to be so enigmatics that research into the attachment aspects of the savings-investment link is required in order to develop sensible policies that will draw in quality investment possibilities.

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