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ARE INTEREST RATES A CAUSE OR A RESULT IN JAPAN?

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ABSTRACT

Japan implemented the uncommon monetary policy of low interest rates to combat the economic stagnation that began in the 1990s. Between 2007 and 2024, it further encouraged spending through negative interest rates. However, in 2024, the Bank of Japan abandoned this policy and, as Governor Ueda stated, initiated a transition to a "normal monetary policy" targeting short-term interest rates. This study examines the impact of economic stagnation on interest rates in Japan during the period from 1990 to 2023. The ARDL model was employed as the method in this study. The Japanese economy during the period from 1990 to 2023 using variables such as growth, inflation, and public debt. In the long term, inflation rates have a strong effect on interest rates. In the short term, changes in GDP and public debt ratios have a reducing effect on interest rates, while changes in inflation have a positive effect. Interest rates are influenced by their lagged values and variables such as public debt and inflation.

Keywords: *Interest, Japan, GDP, Inflation, Public Debt*

JEL Codes: *B22, C01, E52.*

1. INTRODUCTION

There are different views in economic theory regarding the role of interest in economic activity (Wicksell 1936, Keynes 1937, Spahija 2016). Interest rates became particularly important as a policy tool throughout the 1960s, 1970s, and 1980s. The high inflation rates during these periods led many central banks, especially the Federal Reserve (FED), to make changes to interest rates. These periods, in a way, supported Fisher's (1930) view that nominal interest rates move in conjunction with monetary expansion, inflation, and expected inflation rates. Additionally, most theoretical models share the common belief that interest rates can be reduced by manipulating expected monetary growth and inflation (Goodfriend, 1991: 26). In other words, the relationship between interest rates and inflation is strong, and they influence each other. This rule applies not only to inflation but also to deflation, the opposite of inflation. During periods of deflation, which indicate economic stagnation, monetary policy tools have been used as an intervention measure, just as they are in inflationary periods. In particular, central banks in developed countries have implemented expansionary monetary policies to prevent the economy from entering a deflationary process. According to this approach, expansionary monetary

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policies that increase market demand will inject more money into the market, which will boost demand and raise prices, thereby preventing stagnation (Dağlaroğlu, 2020: 58).

From June 2015 to June 2016, the nominal effective exchange rate of the Japanese Yen appreciated by 19.4% due to external negative shocks, largely originating from abroad. At the same time, many other Japanese macroeconomic indicators, including the inflation rate, deteriorated. In response to this economic weakening, the Bank of Japan (BoJ) decided in January 2016 to implement a negative interest rate policy (NIRP), following the lead of the European Central Bank (ECB) and three other European central banks (Honda and Inoue, 2019: 142). With the introduction of NIRP, the BoJ established a system that divided the commercial banks' reserves into three tiers, each subject to a different interest rate: (1) A basic balance with a positive rate of 0.1%, (2) A macro-additional balance with a zero rate, (3) A policy-rate balance with a negative rate of -0.1% (Angrick and Nemoto, 2017: 434).

Over the last 25 years, the list of expansionary monetary policies, stabilization measures, and financial reform proposals offered by mainstream macroeconomists for Japan has made Japan a critical test case for such prescriptions (Kuttner and Posen, 2001: 156). Japan, which had stood out for its stable economic growth and success until the 1990s, entered a period of stagnation in the 1990s and was blamed for the 1997 major Asian crisis (Çakır, 2001: 79). Japan's situation can be explained by the concept of "secular stagnation." Secular stagnation refers to a scenario in developed economies where there is no growth despite low interest rates and low inflation, and where the expected growth rates cannot be achieved. Japan, along with other economies like the UK and Germany, which have implemented zero or negative interest rates during certain periods, can be cited as examples. In these countries, the observed trend has been an increase in savings and a decline in investments (Koç, 2020: 417).

This article aims to contribute to the discussions on the policies to combat stagnation in Japan over the past 25 years and provide a contemporary contribution to the relevant literature. The effects of low and/or negative interest rate policies on the Japanese economy have been examined within a broad framework. The second section of the study analyzes the post-World War II period, the stagnation that began in the 1990s, and the years when low and/or negative interest rates were applied to combat stagnation, with the help of some key indicators, tables, and graphs. The third section includes discussions from the relevant literature. The fourth section estimates the relationship between macroeconomic indicators during these periods using an econometric model. In the conclusion, policy recommendations are made for the economic stagnation that Japan is trying to overcome.

2. THE GREAT JAPANESE RECESSION: 1990 – 2023

Undoubtedly, the foundations of modern Japan can be traced back to the Tokugawa and Meiji periods. Particularly during the 44-year Meiji era, Japan entered a development process through institutionalization and a series of economic reforms (Horie 1937, Webb 1955, Togo 2005, Özdemir 2005, Palacıoğlu 2018, Seval 2017, Ötken and Özden 2023).

Japan's development process was interrupted by World War II, during which the Japanese economy experienced one of the greatest crises in history. After Japan's defeat in 1945, American forces occupied the Japanese Empire, and Japan's industry and government were subjected to American attacks. In response, the Japanese military administration dismantled many facilities, production lines, and already scarce mineral resources from civilian sectors for munitions production (Takada, 2011: 4). The atomic bombs dropped on Hiroshima and Nagasaki destroyed much of the country's industrial facilities and strategic infrastructure. Approximately 1.5 million people returned to Japan from former colonies, and the disbanded army left behind 11.5 million soldiers, creating a total of 13 million additional unemployed individuals. As a result, Japan was forced to temporarily revert to an agricultural economy (Takada, 2011: 6). The war's toll was devastating: 2.8 million deaths, material losses amounting to 25% of national income, and a 10% loss in industrial production (Otsubo, 2007: 4).

After this severe defeat and destruction, Japan embarked on a new reform process to restore economic vitality, utilizing its human and material resources. The priority was recovery rather than development, and issues such as land reform and combating unemployment became central topics. Taxes from the agricultural sector supported the industrial sector. During this period, Japan benefited from the U.S. involvement in the Korean War, with demand for military supplies providing a boost to Japan's industrial production, which increased by 70%. With this growth, Japan's economy expanded by an average of 10% from the 1950s to the 1970s (Kıncal, 2016: 83). Additionally, rapid developments in the real estate and stock markets during the 1980s led to an average economic growth of 4.5%. However, by the 1990s, this momentum slowed, with average growth dropping to 1.3%. Japan entered a serious period of stagnation, with imports rising and exports declining, and the Japanese Yen began losing value against the U.S. Dollar. This outcome was primarily due to current account surpluses. As Japan's trade surpluses grew, the excessive appreciation of the Yen caused imports to exceed exports, creating a 25-year cycle (Çakır, 2001: 81).

In the 1980s, the excessively strong U.S. Dollar boosted global demand for Japanese goods, leading to a 3.9% GDP growth by 1986. Japan accumulated significant foreign reserves, causing money supply to grow faster than GDP. Additionally, interest rates fell continuously. In September 1985, the Plaza Accord was signed between the G5 countries to counteract the negative effects of the strong U.S. Dollar on the American economy, leading to measures aimed at reducing the Dollar's value. Over the

next three years, the Japanese Yen doubled in value. To mitigate the negative impact, Japan's central bank took steps in February 1987, cutting interest rates to a record low of 2.5%.

From 1987 to 1991, an average excess of 2.5% in money supply emerged, and interest rates were lowered to restore the supply-demand balance (Sato, 2002: 215). Low interest rates expanded the supply of money and credit, increasing speculative demand for stocks and real estate, and causing persistent inflation in asset prices. However, this inflation did not translate into the real sector. With the enormous rise in asset prices, everyone involved in these markets was benefiting by the late 1980s. In May 1989, the Bank of Japan took a radical step by implementing a tight monetary policy, sharply raising interest rates. In February 1991, the "Heisei Recession" began, lasting 32 months until October 1993. Despite the contraction of money supply by the fourth quarter of 1992, the recovery remained weak due to an increasingly fragile financial system (Sato, 2002: 216). While Hayashi and Prescott (2002) attributed Japan's economic stagnation to low productivity growth, it is difficult to ignore the financial instability resulting from the oversupply in response to the Dollar-Yen balance and the subsequent increase in money supply to address it, as contributing factors to the prolonged recession of the 1990s.

Japan, which had achieved rapid growth with low inflation in the 1980s and entered the G7, experienced stagnation between 1990 and 2000 despite low interest rates and low inflation.

Table 1. Key Indicators of the Japanese Economy During the 1990–2000 Period

Year	GDP Growth Rate (%)	Public Debt (as % of GDP)	10-Year Bond Yield (June)	Inflation (%)	Unemployment Rate (%)	Savings (as % of GDP)
1990	4.89	52	6.42	3.1	—	35.29
1991	3.42	38.2	6.73	3.3	2.1	34.54
1992	0.85	38.9	5.64	1.8	2.2	32.82
1993	-0.52	42.1	4.83	1.2	2.5	31.45
1994	0.99	55.1	4.27	0.7	2.9	31.45
1995	2.74	60.8	3.024	-0.1	3.1	31.15
1996	3.1	65.4	3.252	0.1	3.4	31.3
1997	1.08	73	2.684	1.7	3.4	31.01
1998	-1.13	80.5	1.54	0.7	4.1	30.33
1999	-0.25	90.7	1.63	-0.3	4.7	28.67
2000	2.78	98.9	1.66	-0.7	4.7	28.74

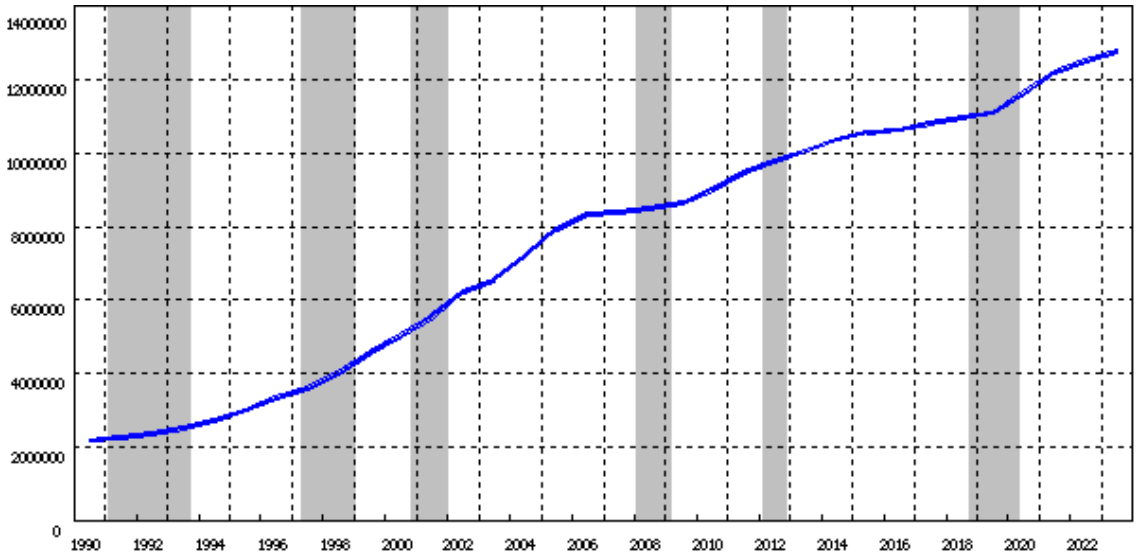
Source: World Bank, 2020.

As can be seen from Table 1, despite the increase in public borrowing, the decline in interest rates, and negative inflation between 1992 and 1995, the economy contracted while the savings rate remained constant as a percentage of GDP. This suggests that the Bank of Japan's expansionary monetary policy led to price inflation in sectors such as stocks and real estate, but failed to stimulate demand in the real economy, resulting in stagnation and contraction.

During the period from 1995 to 2000, while stagnation and contraction persisted, public borrowing continued to rise, indicating an attempt to close the demand gap through government

spending. This outcome is also evident when considering the deflationary process, which led to increased unemployment despite the low-interest-rate policy. As indicated in the table, the rapid increase in public debt relative to income shows that the low-interest-rate policy was not effective enough to reverse the stagnation.

Figure 1. Japan's Public Debt (1990–2022)



Source: Bank of Japan Statistical Search, 2023.

Looking at Figure 1.**,** it is evident that the Japanese government adopted a public borrowing policy in response to the stagnation that began in the 1990s. During the same period, the government implemented a low-interest-rate policy to encourage borrowing, spending, and investment. However, when we examine the growth figures, it becomes clear that despite the low-interest policy, high levels of public debt failed to spur growth.

Krugman (2019) attributes the stagnation that started in Japan in the 1990s to asset bubbles in the real estate market and stock exchange. Supporting this view, one can point to the fact that in 1987, while inflation was around 0.1%, land prices in Tokyo increased by 57.1%. In 1988, when inflation was 0.7%, land prices in the same region rose by 24.1%. A similar imbalance was observed not only in Tokyo but also in Osaka, where real estate price increases reached 26.9%, 37.3%, and 48.2% in 1988, 1989, and 1990, respectively.

The bursting of this massive real estate bubble was largely driven by the Japanese banking system, which had extended excessive credit and taken risky positions (Çakır, 2001: 86). In response, the Bank of Japan reduced interest rates, and the Japanese government announced nine different fiscal stimulus packages, but these measures were not enough to revive the economy. The situation worsened further in 1997 with the onset of the East Asian financial crisis, placing additional pressure on the already stagnant Japanese economy.

Kutlu and Darıcı (2021) highlight that situations like the ones in Tokyo and Osaka, *"where expansionary monetary policies of low interest rates and abundant liquidity played a major macroeconomic role in the formation of real estate bubbles"*, have led central banks to increasingly consider asset prices as an important factor when trying to maintain financial stability. This emphasizes the risk that macroeconomic conditions and financial instability can exacerbate each other.

The stagnation that began in the 1990s persisted despite the stable trends in both interest rates and inflation. In 2009, the global financial crisis, which started in 2008, led to a significant economic contraction of -5.6%. This decline occurred even though there were no notable changes in interest rates or inflation, and a similar contraction occurred in 2020 at a rate of -4.1% due to the effects of the COVID-19 pandemic, which emerged at the end of 2019. The global crisis, which began in the U.S. and spread to developed economies, caused a drop in Japanese exports in 2009, leading to negative inflation and initiating a deflationary period that lasted until 2013 (Yılmaz & Şahin, 2020: 30).

Looking at the past 25 years, it is evident that the core issue in Japan's economy has been low inflation. The persistence of low inflation has fostered an expectation among consumers that prices will continue to fall. This mirrors the *"adaptive expectations"* hypothesis of monetarists, leading to a reduction in spending, delayed consumption, and a continuous rise in savings rates. In such an economic environment, falling wages, rising unemployment, and supply constraints inevitably become some of the most significant problems. This vicious cycle of low inflation, stagnation in consumer demand, and an overemphasis on savings exacerbates the economic downturn, preventing recovery and growth from taking root.

Table 2. Key Indicators of the Japanese Economy (1995–2023)

Year	Savings Rate (% of GDP)	Average Annual Real Income Growth Rate (%)	Unemployment Rate (%)	Exports of Goods and Services (% of GDP)
1995	32.2	3.4	-2.4	—
2000	29.8	4.47	4.75	-3.6
2005	27.5	4.58	4.45	9
2010	23.9	4.47	5.05	-18.8
2015	24.6	4.37	3.7	6.2
2020	25.0	4.52	2.81	-6.8
2023	28.0	4.42	2.58	15.5

Source: BoJ (2024, World Bank (2024), Statista (2024).

Table 2. shows that the high savings rates indicate that domestic consumption has not reached the desired level. Looking at the growth trend in Figure 2, it can be concluded that the monetary and fiscal steps taken to revive the economy had a more significant effect on financial markets than on the real economy. The increase in money demand due to low interest rates primarily led to investment in higher-yielding foreign assets, as evidenced by the carry trade phenomenon. According to estimates by UBS, one of the world's leading securities managers, the volume of carry trade operations through the

Dollar/Yen has exceeded $500 billion between 2011 and 2024. Considering other countries and emerging investment areas, trillions of dollars of Japanese capital have flowed abroad through carry trade transactions. In an effort to reverse this trend and end the ongoing stagnation, the Bank of Japan (BoJ) has altered its continuous negative interest rate policy, which it has been implementing since 2007. The BoJ raised the policy rate from -0.1% to a range of 0 to 0.1%. Before this decision, Japan experienced a 5.28% increase in wages, marking the highest wage increase in 33 years. By abandoning the negative interest rate, the aim is to establish a preventive policy against inflation, gradually reduce government bond issuance, and redirect capital that has left Japan back into the domestic economy.

This study examines Japan's economic development phases through its historical process. In addition, to understand Japan's current economic situation and evaluate the effectiveness of policies to combat economic stagnation, time series from the 1990–2023 period were selected for econometric analysis. Prior to that, key contemporary studies in the relevant literature are reviewed under the literature heading.

3. LITERATURE REVİEW

Chang and Huang (2010) studied the relationship between interest rates and GDP in Japan during the period 1981Q2–2008Q3 using multiple regression analysis. The study aimed to measure the impact of banks on firm growth. It was found that when banks applied rates higher than the real interest rate, they contributed more to GDP growth. Low or negative interest rate policies did not stimulate firm GDP growth.

Fukuda (2018) examined the impact of Japan’s negative interest rate policy on daily stock prices in Asian markets using a multivariate GARCH model. He found that Japan’s negative interest rate policy had a positive effect on the stock markets in Korea, Singapore, Thailand, Taipei, China, and Hong Kong, highlighting the effectiveness of carry trade transactions.

Kurihara (2015) examined the causality between public debt and growth in Japan for the 1980–2013 period. The study found a negative relationship between public debt and economic growth, while also suggesting that growth increases debt.

Lee and Werner (2018) analyzed the relationship between nominal GDP, 3-month interest rates, and 10-year government bond yields in the U.K., U.S., and Japan for the 1957Q1–2008Q4 period. Their results indicated that growth was positively correlated with other variables in the long term, with both long-term and short-term interest rates moving in the same direction as growth.

Okina and Shiratsuka (2004) analyzed the relationship between interest rates and growth in Japan for the March 1998–February 2003 period using the Extended Nelson-Siegel model. They concluded that the interest rate policy flattened the yield curve in the short term but failed to reverse low economic growth in the long term.

Sinan (2022) investigated the relationship between public sector debt and GDP for Japan during the 1980–2000 period using ARDL and Granger causality tests. The findings indicated a negative long-term relationship between public debt and growth, along with a bidirectional causality relationship between the variables.

Yalçınkaya and Kaya (2019) conducted a panel data analysis on the effect of negative interest rate policies on growth for ECB member countries, as well as Sweden, Switzerland, and Japan, covering the 2001Q1–2016Q4 period. They concluded that nominal negative interest rate policies had a positive effect on growth between 2012Q3 and 2016Q4.

Yoshino et al. (2017) used simulation methods to explore the impact of Japan's negative interest rate policy on economic growth. They found that negative interest rates had no positive effect on growth, with the primary reason being the larger retired population compared to the working population. The study emphasized that the effectiveness of monetary policies is hindered by the lower number of working people compared to retirees, suggesting the need for older individuals to be reintroduced into the workforce by eliminating seniority-based wages and flattening the wage curve.

4. DATA SET AND MODEL

In this study, the following variables are used: GDP Growth Rate: Represents the percentage change in Japan’s Gross Domestic Product (GDP). 10-Year Government Bond Yield (Averaged): Represents the average yield of 10-year government bonds, serving as an indicator of long-term interest rates. Annual Average Inflation Rate (Based on Consumer Price Index): Reflects inflation as calculated based on changes in the Consumer Price Index (CPI). Public Sector Debt as a Percentage of GDP: Indicates the ratio of Japan’s public sector debt to its GDP. The data were accessed on October 3, 2023.

Table 3. Information on Variables Used in the Analysis

Period	Variable	Country	Data Source
1990 - 2023	GDP	Japan	World Bank
1990 - 2023	Interest	Japan	Bank of Japan
1990 - 2023	Inflation	Japan	World Bank
1990 - 2023	Public Debt	Japan	Bank of Japan

The choice of which model to use in the analysis depends on whether the series are stationary or not. Stationarity in a time series, denoted as I(0), means that the variance, covariance, and mean of the series remain constant over time. For non-stationary I(1) series, tests for stationarity can be applied, and it is also possible to establish certain models in their non-stationary form. Some of these models include cointegration tests, vector error correction models, and ARDL tests.

The established ARDL model is as follows:

$$Interest_t = \alpha + \sum_{i=1}^{p} \beta_i Interest_{t-i} + \sum_{j=0}^{q_1} \delta_{1j} GDP_{t-j} + \sum_{k=0}^{q_2} \delta_{2k} Debt_{t-k} + \sum_{l=0}^{q_3} \delta_{3l} Inflation_{t-l} + \epsilon_t$$

In the model, α represents the constant term, β_i represents the coefficients of the lagged interest rate, $\delta_1 j$, $\delta_2 k$, and $\delta_3 l$ represent the coefficients of the lagged and current independent variables, and ϵ_t represents the error term. The ARDL test hypothesis is as follows:

- H_0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$ (No cointegration)
- H_1: $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$ (There is cointegration)

In the model, significance levels are compared using the F-statistic. Accordingly, if the F-statistic is below the lower bound, H_0 is accepted; if it is above the upper bound, H_0 is rejected, and H_1 is accepted. In other words, it is assumed that there is a long-term relationship between the variables. Another possibility is for the F-statistic to fall between the critical lower and upper bounds. In this case, the model is unstable, and it is inappropriate to interpret whether cointegration exists or not. If H_1 is accepted in the model, it is necessary to estimate the long-term coefficients of the variables.

5. FINDINGS

The unit root test results for the variables selected for Japan from the period 1990 to 2023 are presented in Table 4. The tests applied to the series are the ADF test developed by Dickey and Fuller (1979) and the PP unit root tests developed by Phillips and Perron (1988).

Table 4. Unit Root Test Results

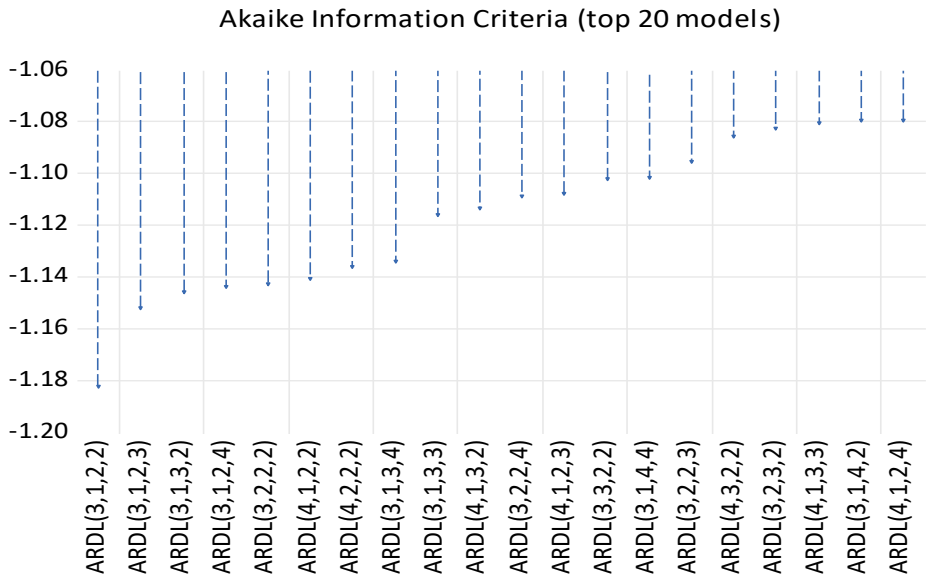
Variables	**ADF (1979)** I(0)	**ADF (1979)** I(1)	**PP (1988)** I(0)	**PP (1988)** I(1)
GDP	-5.777 (0.0000)***	-6.171 (0.0000)***	-6.945 (0.0000)***	-18.699 (0.0001)***
Interest	-7.275 (0.0000)***	-2.961 (0.0495)*	-10.026 (0.0000)***	-2.724 (0.0810)*
Public Debt	-2.480 (0.1311)	-4.335 (0.0018)**	-0.911 (0.7719)	-4.305 (0.0019)**
Inflation	-2.920 (0.0537)*	-6.167 (0.0000)***	-2.674 (0.0891)	-6.510 (0.0000)***

***Note:** The table shows t-statistics (in italics) and p-values. It is observed that the series are stationary at I(1) between 1% and 5% significance levels. The lag length for each observation in the unit root test was selected as 8 based on the Schwarz Information Criterion for the ADF test. For the PP test, the lag length was selected according to the Newey-West Bandwidth criterion. The series are I(1) stationary with constant, constant with trend, and trendless. The results of the constant model are presented. *** 1% significance, ** 5% significance, * 10% significance.

According to Table 4, GDP, interest rates, and inflation are stationary at level I(0) based on both test results. However, since public debt is not stationary at level, differencing has been applied to the series. Looking at the first differences, it can be seen that all series have become stationary at I(1). One of the models used for the estimation of non-stationary series is the ARDL model. The ARDL model has been applied to the mentioned series. The model includes lagged values of the dependent variable while incorporating both lagged and current values of the independent variables.

The ARDL model determined according to the Akaike Information Criterion is in the form of (3,1,2,2). The most suitable model is shown in Figure 2.

Figure 2. Akaike Information Criterion



After selecting the model, an investigation was conducted to determine whether there is cointegration among the variables. The results are shown in Table 5.

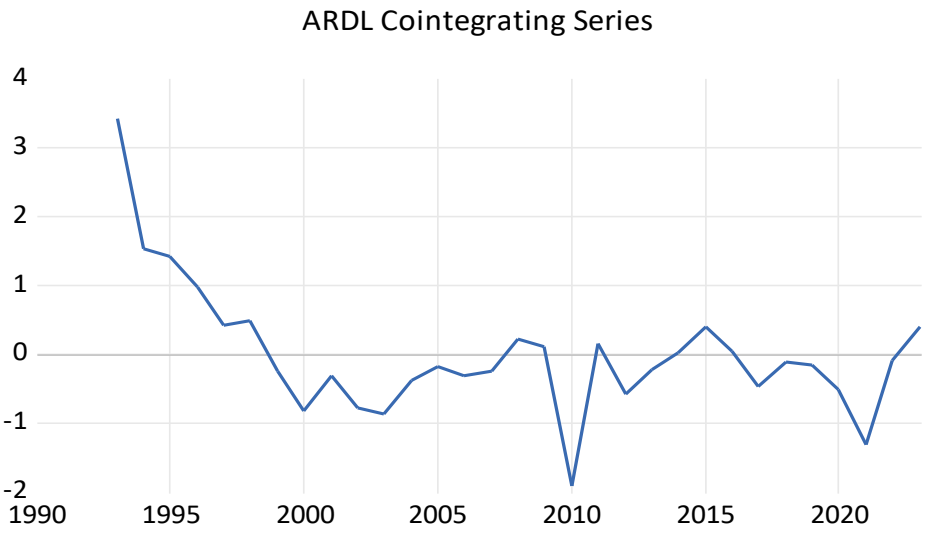
Table 5. ARDL Bound Test Results: Cointegration Test and Long-Term Coefficients and Robustness Tests

Estimated Equation: faiz = f(gdp, publicdebt, inflation)				
F-statistic	18.226281 (F-statistic is greater than 1)			
Optimum Lag Lenght	(3,1,2,2) (Akaike Information Criterion)			
Significance Level	**Critical Value**			
	Lower Bound	**Upper Bound**		
%1	3.650	4.660		
%5	2.790	3.670		
%10	2.370	3.200		
Explanation: *Since the estimated model (3,1,2,2) is less than the upper bound F-statistic at the 1%, 5%, and 10% significance levels, it has been determined that there is cointegration among the variables*				
Long-Term Coefficients				
Variables*	**Coefficient**	**Std. Error**	**t-statistic**	**P-value**
GDP(-1)	-0.190470	0.059320	-3.210904	0.0034
DEBTRATIO(-1)	-0.001829	0.001245	-1.469165	0.1533
INFLATION(-1)	-0.295178	0.131352	-2.247224	0.0330
C	0.906240	0.292613	3.097066	0.0045
Explanation: *Looking at the long-term coefficients, GDP is significantly related to the dependent variable interest at the 1% level, while inflation is significantly related at the 5% level. The results of the diagnostic tests indicate the robustness of the model.*				
Diagnostic Tests	**Statistics**			
R^2	0.927441			
Adjusted R2	0.905358			

F-statistic	41.99784
F-statistic (p-value)	0.000000
Breusch - Pagan - Godfrey	*0.5495 (greater than 5%)*
LM Test	*0.2408 (greater than 5%)*
Ramsey Reset	*0.2291(F-statistic greater than 5%)*

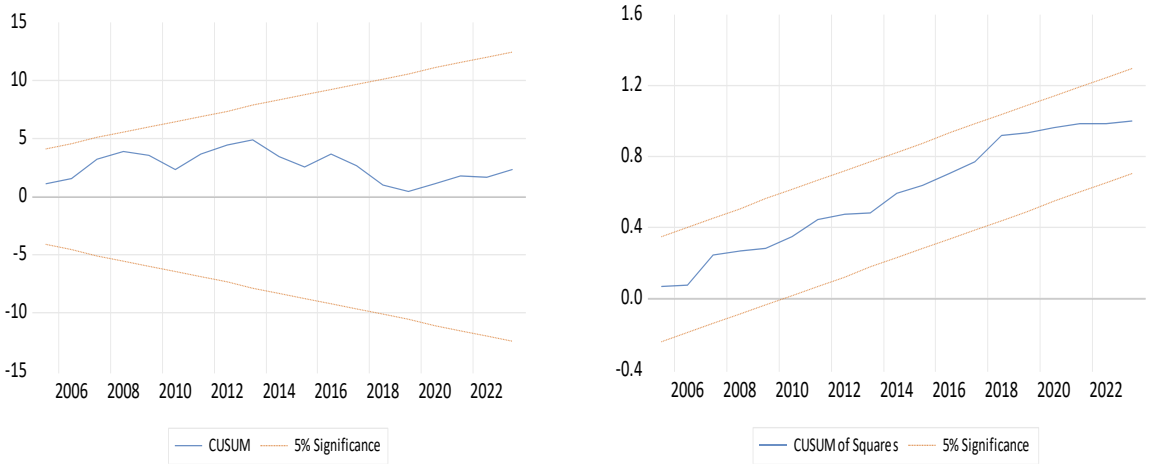
In Table 5, the F-statistic value (18.22) calculated at the 5% significance level is greater than the upper limit (4.66). Based on this result, the null hypothesis (H0), which states that there is no cointegration among the variables, is rejected. The robustness tests of the model have also been conducted, and the results are presented in Table 5. Accordingly, it is observed that there is no autocorrelation, no heteroscedasticity, and no specification error in the model. After determining the existence of a long-term equilibrium relationship between the variables through the F-test, the estimation of parameters indicating the long-term relationship was carried out. Looking at the long-term estimation parameters in Table 5, it is seen that, except for public debt, the independent variables have a significant relationship with the dependent variable in the long term. Accordingly, a 1% increase in income leads to a decrease in interest rates by 19.047%. In other words, when income increases, interest rates decrease. A 1% change in inflation explains a change in interest rates of -29.518%. A 1% increase in inflation decreases the interest rate by 29.518%. It should be noted here that the inflation data for Japan have negative values and are close to zero.

Figure 3. ARDL Cointegrating Series



The CUSUM and CUSUMQ test results shown in Figure 1 indicate the stability of the estimated ARDL model and whether there are structural breaks. According to the test results, the model is stable, and there are no structural breaks.

Figure 4. CUSUM and CUSUMQ Test Results



According to Figure 4., the CUSUM and CUSUMQ statistics are within the critical boundaries at the 5% significance level. This indicates that the null hypothesis (H0), which states that the coefficients of the ARDL model are stable, is accepted. Following this result, an ARDL error correction model was established to investigate the short-term dynamics among the relevant variables. The results are presented in Table 6.

Table 6. Error Correction Model

Dependent Variable: Interest

Variable	**Coefficient**	**t-statistic**	**p-value**
Cointegration	-0.472969	-10.50319	0.0000
D(Interest(-1))	-0.094087	-1.226431	0.2324
D(Interest(-2))	-0.292547	-5.702041	0.0000
D(GDP)	-0.026526	-2.330924	0.0289
D(Public Debt Ratio)	-0.012243	-3.053552	0.7880
D(Public Debt Ratio(-1))	-0.017925	-4.079360	0.0006
D(Inflation)	0.005730	0.272128	0.0056
D(Inflation(-1))	0.078801	3.983410	0.0005
R-squared	0.927441		
Adjusted R-squared	0.905358		
F-statistic	41.99784		

According to the results of the ARDL error correction model, the dependent variable interest is explained by the other variables. The high t-statistic of the cointegration coefficient indicates a strong relationship among the variables. Accordingly, the tendency of the interest rate to return to long-term equilibrium is 47%. This means that 47% of the interest rate reaches equilibrium in one period. Lagged changes in interest rates have not shown a significant effect on the current interest rate, as the p-value is

above 0.05 and thus statistically insignificant. The change in interest two periods ago has a negative effect of 29.3% on the current interest rate, indicating that interest rates experience a noticeable lag effect over time. A 1% increase in GDP leads to a decrease in the interest rate of approximately 2.65%. This indicates an inverse relationship between economic growth and interest rates. Changes in the public debt ratio do not have a significant impact on interest rates.

A 1% increase in the lagged public debt ratio results in a decrease of 1.79% in the interest rate, demonstrating that public debt has a significant long-term effect on interest rates. Changes in inflation have a small positive effect on interest rates. Although the p-value is significant, the coefficient is very low, indicating that the change in inflation during this period does not have a major impact on interest rates. The change in inflation from one period ago increases the interest rate by 7.88%. This shows that inflation has a lagged effect on interest rates, and this relationship is positive. Looking at the adjusted R-squared of the model, it can be seen that the independent variables explain 90.53% of the changes in the interest rate. This is strong evidence of the model's goodness of fit.

In conclusion, changes in GDP and the public debt ratio have a reducing effect on interest rates, while changes in inflation have a positive effect. The interest rate is influenced by its own lagged values and variables such as public debt and inflation.

6. CONCLUSION

This study analyzes the economic situation of Japan, which has experienced a long period of economic stagnation since the 1990s, in the context of the economic conditions that began with World War II and continue to the present day. According to the findings, it can be said that, during this period, growth in Japan has led to lower interest rates; however, since the growth is not at the desired level, keeping interest rates low has not provided sufficient support for growth. Furthermore, the increase in public debt levels puts downward pressure on interest rates, which negatively affects growth at this point. To accelerate growth, the low inflation and interest rates have triggered capital outflows from the Japanese economy. As a policy recommendation, growth-enhancing policies should be reassessed. Japan's public debt is currently at a very high level, approximately 250% of GDP. The effects of the deflationary period on the increase in public debt can be observed. Therefore, to emerge from the deflationary process, interest rates have shifted from negative to positive after 17 years. This is expected to increase the tendency to spend. Additionally, financial instruments that will reduce the public debt ratio are also expected to be implemented.

Another long-standing issue that Japan has been struggling with is low inflation. While the Bank of Japan's target of 2% inflation still seems distant, it appears that policies beyond interest rates are needed to stimulate consumer confidence and spending. For instance, increasing wages could accelerate inflation upward. Moreover, fiscal policies that support demand can be implemented. Reforms in the labor market could provide a significant breakthrough. By incorporating the elderly and women into the

workforce in a more formal manner, income can be increased. This, in turn, will raise inflation and have a reducing effect on the real value of public debt.

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