

# The Nexus Between Government Spending and Economic Growth in Saudi Arabia

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## Abstract:

This paper analyses the impact of government spending on economic growth in Saudi Arabia. A five variable of the Vector Error Correction model (VECM) is used to analyze the relationship between government spending, import, population, exchange rate, and economic growth (GDP). Data was obtained from the World Bank website from 1970 to 2022. Two of our variables were stationary at level alpha 5%, while the other three variables were not stationary at level alpha 5%. This makes us test them in the first difference where all the variables were stationary at alpha 5%. We also tested our lag length criteria, and we found out that the (\*) were many in lag three (3). Furthermore, the results from the impulse response, variance decomposition, and five-year forecasting indicate that in the short run, government spending and imports have improved Saudi Arabia's economic growth. The results also indicate that there was no four-way Granger causality among the variables but just two-way. Our results for cointegration also indicate there was one cointegration result, which resulted in us using the VECM. The forecasting results indicate that the country's GDP also tends to decrease by one percent from 2023-2025, and after that, it returns to its shock by increasing again by one percent from 2006 to 2008. (9% to 10%).

**Keywords:** GDP, Government expenditure, Exchange rate

## 1. INTRODUCTION

As a participant in the Organization of the Petroleum Exporting Countries (OPEC), Saudi Arabia has always mainly depended on oil earnings to support both its public spending and economic expansion. However, given the instability of oil prices and the need for economic diversification, government investment plays a critical role in promoting non-oil sectors and overall economic growth (Alshehry et al., 2009). There is a resurgence of

discussion regarding the role of government in the economy as a result of the current world economic crisis and the stark differences in rates of economic growth among global economies. A critical area of economic policy concern in the global economy is the effect of government actions on economic growth through fiscal policy tools like taxation, spending, and public debt. Since the 18th century, there has been discussion regarding the connection between fiscal policy—that is, taxation, spending, and public debt—and economic expansion.

Economic research has shown a great deal of interest in the relationship between government spending and economic growth, especially in the context of resource-rich economies such as Saudi Arabia. Policymakers and researchers alike must comprehend the relationship between government spending and economic growth in Saudi Arabia because of the country's enormous oil reserves and significant economic intervention. Nonetheless, there is still disagreement over this matter in the theoretical and empirical literature. Consequently, this can be seen in the growing differences in policy approaches amongst nations. As one of the most significant tools of fiscal policy, government spending has a significant impact on economic growth (Smith A, 1776). The purpose of this study is to examine how government expenditure affects economic growth in Saudi Arabia while taking into account different fiscal strategies and their effects on sustainable development.

### Research Objectives

- To determine the impact of government spending on economic growth.
- To analyze the relationship between imports and economic growth.
- To determine the impact of population growth on economic growth.
- To analyze how exchange rate fluctuation affects economic growth.

## 2. LITERATURE REVIEW

### The impact of government spending on economic growth

Although the effect flows from government spending to improve economic growth, Keynesians acknowledge that there is a relationship between government spending and growth in the economy. The founder of this school of thought, Keynes, contends that an expansionary fiscal policy will increase the amount of money in the economy, which will increase output and economic growth by increasing aggregate demand. Additionally, the rise in overall demand makes investors more upbeat and encourages them to make more significant investments. Proponents of this school of thought contend that the multiplier effect makes government expenditures beneficial to economic growth. As a result, they support fiscal expansion, particularly during recessionary times. This genre of writing typically rests on the notion that the government plays a significant role in correcting market failures and providing public goods (Keynes JM, 1936).

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## Other studies that observe the positive impact of government spending on economic growth

"The relationship between government expenditure and economic growth: An application on Turkish republics in transition process" is the title of a study by Esen and Bayrak that looks into this relationship between 1990 and 2012 in five Turkish republics: Azerbaijan, Kazakhstan, Kyrgyzstan, Uzbekistan, and Turkmenistan. They make use of the long-term coefficient, panel data analysis, panel unit root, panel cointegration, and panel causality tests. Additionally, they discover a long-term, statistically significant, and positive correlation between public spending and economic growth (Esen Ö, Bayrak M, 2015).

The impact of government spending on economic growth in Korea since the 1980s is examined by Choi and Son in their study, "A note on the effects of government spending on economic growth in Korea." Choi and Son found that government spending has a significant impact and statistical significance on economic growth using the time-varying parameter structural vector autoregression (TVP-SVAR) method (Choi J, Son M, 2016).

### 3. RESEARCH METHODOLOGY

In this paper, we use a quantitative method to estimate and analyze the impact of government spending on economic growth (GDP) using the Vector Error Correction Method (VECM). Secondary data was obtained from the World Bank database from 1970 to 2022. To achieve our research objectives, we use GDP per capita, Government Spending, Imports, and Population to determine how government spending will significantly improve economic growth. The variables that were used were GDP per capita as (a proxy of GDP), Government Spending (GOV), Imports (IMP), Population (POP), and Exchange Rate (XRate).

#### Definition of Variable

**GDP-** This is the total output of a nation's overall economic activity and the size of its economy. For different reasons, it is the most significant variable of a nation's financial health. The unique aspect of the Solow model is that developing nations can converge to a steady state level of gross domestic product (GDP) per capita under the presumption of declining returns to scale. This suggests that over time, two nations with comparable rates of saving, depreciation, and population growth can converge to comparable living standards (Ray, 1998). Furthermore, Harrison (1994) argues that the Solow model of international trade openness generates capital goods and technology inflows that increase industrial activity, trade in manufactured goods, and economic growth.

**Government Spending-** refers to funds used by the public sector for the purchase of products and the delivery of services, including social protection, education, healthcare, and defence. Indicators of the size of governments across nations include general government spending as a percentage of GDP and per capita. Nevertheless, the significant variance.

Instead of focusing on variations in the number of resources used, these ratios illustrate various strategies for supplying social protection and public goods and services. Spending/GDP ratios, for example, will inevitably be lower if support is provided through tax incentives rather than direct expenditures. Furthermore, it is crucial to understand that government productivity and efficiency are not reflected in the amount of money spent.

**Imports-** Oxford dictionaries define an import as a good or service that is brought into one nation from another. In most countries, international trade and imports account for a sizable portion of GDP, and GDP is the best indicator of a nation's economic health. Countries can access commodities and services from other countries through imports. A nation cannot be self-sufficient without imports, so it is determined to import goods and services. However, as is common knowledge, importations have both positive and negative aspects on economic growth.

**Population-** is also used to describe all living organisms of a specific kind or group that are found in a specific location or environment. Population expansion may impact the supply and demand for savings as well as the efficiency of capital, which could have an impact on economic performance (McNicoll, 1984; Hammer, 1986, 1987).

**Exchange rate-** The value of one currency expressed in terms of another is the exchange rate. The exchange rate, according to Mishkin (2007), is the cost of one currency relative to another. It has an impact on the standard of living and the economy. The fluctuation of the exchange rate has both positive and negative impacts on economic growth.

#### 4. MODEL SPECIFICATION

In order to obtain the econometric estimation and analysis of the determinants variables that influence the significant impact of government spending on the economic growth of Saudi Arabia, the model uses time series data using the Vector Error Correction model, which includes the following steps.

#### 5. RESULTS AND DISCUSSION

##### Unit Root Test at First Difference: (See Figure 1)

Since our model uses times series data, we first need to test the unit root test to determine the stationary of the data before estimating our regression model, which, if we fail to do so, may lead to spurious regression. Therefore, from our estimates, we found out that our data was not stationary at the level because GDP, government spending, and imports are non-stationary at alpha 5%. This made us proceed with the first difference, where all the variables were stationary at alpha 5%. The results from the first difference imply that we

should reject the null hypothesis of the individual variables as their p. values are less than alpha 5% (see Figure 1).

### **Vector Error Correction Model (VECM): (SEE FIGURE 2)**

The Vector error correction model for this paper followed the Engle-Granger two-step procedures because there is only one cointegrating test. The data was regressed in the first difference stationary was gained in log 3 form and later regressed using the VECM model to acquire the residual for the long-run relationship or an equilibrium error (Green, 2002; Gujarati, 2012). The results gained from the VECM are related to the test of the adjustment of the system toward the long-run equilibrium. The single coefficient of the difference terms obtains the short-run changes. The adjusted coefficient on VECM in the regression table is negative. It is statistically significant at alpha 1%, indicating that the importance of the error term also helps the existence of a long-term relationship between the independent variables and economic growth. The Vector Error-Correction model is statistically significant and contains a negative sign, which shows that there is no problem in the long-run equilibrium relation between the independent and dependent variables.

### **Johansen Cointegration Test: (SEE FIGURE 3)**

The results indicate that there is one cointegration, and only one maximum rank of this cointegration exists. This is because the first significant values where the trace statistic is less than the critical value at 5 percent were found at a maximum rank of one. This means that one cointegrating equation is required, which led me to run a vector Error Correction Model (VECM).

### **Granger Causality/Block Exogeneity Wald Test for Saudi Arabia: (SEE FIGURE 4)**

- The independent variables government spending, imports, and population have probability values of (0.6709, 0.5598, and 0.9917), indicating that all the variables do not have Granger causality with GDP because their p.value is  $>0.05$ .
- The independent variable exchange rate has a probability value of 0.0002, which indicates that the exchange rate does granger causality with GDP because the p.value is  $< 0.05$ .
- The independent variables GDP, import, population, and exchange rate have a probability value of (0.7283, 0.2834, 0.1223, and 0.1374) which means that the variables do not guarantee causality with government spending because their p.value is  $> 0.05$ .
- The independent variables GDP and government spending have a probability value of (0.8443 and 0.6427) which means that both variables do not granger causality with import because their p.value is  $> 0.05$ .
- The independent variables exchange rate and population have a probability value of (0.0724 and 0.0579), which means that both variables do granger causality with import because their p.value is  $< 5%$  and  $10%$ , respectively.

- The independent variables GDP and exchange rate have a probability value of (0.0682 and 0.0823), which means that they both have more significant causality with a population with a p.value < 10%.
- The Government spending and Import have a probability value of (0.3193 and 0.4328), which means the variables do not granger causality with population because their p.value is > 0.05.
- The independent variables GDP, government spending, and import have a probability value of (0.8369, 0.4613), which indicates that they all do not guarantee causality with the exchange rate because their p.value is > 0.05.
- The independent variables import and population both have a probability value of 0.1 and 0.1%, which is significant at <10%. This indicates that both variables have more significant causality with GDP.

### **In Summary**

We have concluded that there was no four-way Granger causality among the variables. Most of the variables have two-way causality, which includes exchange rate with Granger causality with most of the variables GDP, import, and the population at all levels. Therefore, we reject the null hypothesis. We have concluded that the direction of causality between government spending, import, population, and exchange rate indicators and economic growth in Saudi Arabia is generally unidirectional.

### **Impulse Response: (See Figure 5)**

The first impulse graph represents a long-run positive effect on GDP of a shock to GDP. This means that the increase in GDP starts from the first period through the seventh period, and later, it slightly decreases over time for the rest of the period, reaching a new equilibrium. The second graph shows that a shock to GDP has a short-run positive impact on government spending from the first to the second period. It decreases rapidly in the third period and continues through the sixth period. Later on, GDP returns to its pre-shock level after six periods, and after that, it declines in the following period. From there, the impact of the shock on GDP on government spending turns out to be statistically insignificant. The third impulse graph shows that shock to GDP leads to a decrease in imports from the second year through the fifth year; after the fifth year, GDP increases rapidly to its pre-shock level up to the eighth year and later declines over time. The fourth graph shows that the shock to population has a short-run positive impact on the GDP from the first year through the fifth year; after that, the shock on GDP increased till the sixth year and eventually declined rapidly over time. This impact was not significant over time. The Final GDP impulse graph shows that a shock to the exchange rate leads to a decrease in GDP from the second year through the rest of the years, and this shows that the impact of a shock to the exchange rate is not statistically significant.

The first to the last impulse graphs on government spending suggests that in the short run, a shock in government spending has a significant positive impact on GDP, imports, population, and exchange rates. The shock for the variables reaches a minimum level in the fourth period, except for government spending, which reaches a minimum level in the fifth period. GDP increases in the first period through the second period and later declines in the third period up to the fourth period; after that, the shock increases slightly over time. The response of government spending on government spending has a wavelike shape, it began to increase slightly and reached a maximum level in the fifth period. The shocks on government spending increased after the fifth period and later declined slightly over time. The standard deviation shocks given to government spending will result in a decrease in imports up to the fourth period. From the period, the shock increases up to the fifth period and later declines over time, leading the import to be not statistically significant. The shock to government spending has a short-run impact on the population from the fourth period through the fifth period; from there, the shock keeps declining and increases over the rest of the period. The shocks to government spending led to an increase in population after the fourth year, and later, the shocks declined over time. The shock of government spending led to an increase in the exchange rate in the first period. It later declined rapidly from the second period to the rest of the periods, showing a negative impact on the exchange rate.

The impulse graphs on import show that one standard deviation shock given to import will result in an increase in GDP from the first period through the rest of the period. This shows a long-run positive impact of imports on GDP. The shock of import on government spending has a positive significance from the second period to the third period; after that, it decreases rapidly from the third period through the tenth period, showing a negative significance on government spending. A shock to imports led to a decrease in government spending from the third period through the fourth period and later increased up to the fifth period. It fluctuated through the rest of the period with an increasing shock in the seventh period moving down during the rest of the periods. The shock given to import was low from the first period through the fourth period; later on, it increased to its peak in the fifth period and later in decreased rapidly from the sixth period through to the ninth period and eventually increased again in the tenth period. The response of import to export has a short-run positive impact from the first period through the second period. After the second period, it decreases rapidly showing a negative impact on imports till the sixth period and later again it increases slightly during the rest of the periods.

The impulse graph of the population indicates that The shock given to GDP on the population has a short-run negative impact on the population from the second period through the fifth period. After reaching the minimum level in the fifth period, GDP increases over time, reaching its peak in the seventh period. From the eighth period, the shock

decreased rapidly till the tenth period, showing a negative impact. The response of government spending on population has a short-run positive impact till the second period. Later on, the shock decreases till it reaches its minimum level in the sixth period. The shock later increases slightly within a period and finally decreases within the rest of the period. The impulse given to import has a short-run positive impact on the population as it increases slightly till the third period, and later on, the shock decreases rapidly till the fifth period. Afterward, the impulse increases rapidly to its maximum level in the eighth and ninth periods. After that, it decreases in the final period, showing a short-run negative impact. The shock of the population on population has a long-run negative impact on the population from the first period to the fourth period. The shock later increases slightly from the fifth period down to the seventh period and later falls from the eighth period to the rest of the periods, showing a short-run negative impact. The shock of the exchange rate on the population has a fluctuating trend, showing a short-run positive impact between the second and the fourth period, and later on, it decreases again after the fourth period down to the seventh period. The trend of thorough fluctuation continues, leading to a slight increase in the shock for the rest of the periods.

The final impulse response graph explains that the shock on GDP on the exchange rate has a long-run negative impact from the first period through the rest of the period. After the eighth period, the shock increased slightly and later decreased in the final period. The impulse given to government spending has a short-run negative impact on the exchange rate. It later increases slightly till the fifth period and afterward decreases till the sixth period. After the sixth period, the shock later increases positively till it reaches the tenth period. The shock of imports leads to an increase in the exchange rate till the fourth period. It later decreases rapidly till the eighth period, and after that, it increases again to its pre-shock level positively till the tenth period, reaching its new equilibrium. The shock of the population has a long-run negative impact on the exchange rate from the first period through the sixth period. The shock later increases positively after the sixth period till the ninth period, and afterward, it decreases till it reaches the new equilibrium. The impulse of the exchange rate has a long-run positive impact on the exchange rate. This trend continues from the first period through the tenth period, when it reaches the new equilibrium,

### **Variance Decomposition: (See Figure 6)**

The table shows the results from the variance decomposition of each endogenous variable. This table contains four parts. The first part reports the variance decomposition of GDP per capital L. The following parts present the variance decomposition of government spending, imports, population L, and honest exchange rate L, respectively. In each part, there are six columns. The first column lists the periods. The second column reports the standard error of the sample set. The remaining columns report the variance

proportion of the shock to each variable in each period. The number in the parenthesis reports the standard error of the coefficient of variance proportion.

In the first table, the fluctuation of GDP is explained by GDP shocks in the long run. GDP shocks account for 100% in the first year. Its proportion in the variance of GDP decreases in the fifth and sixth years but increases over time during the next three years. It eventually decreases again in the 10th year, accounting for 79%. After the 10 periods, again, 17.3% of the shock of GDP is explained by the exchange rate. The fluctuation is higher in the exchange rate than in the government spending, imports, and population. This shows that an increase in the shock of imports will lead to an increase in economic growth. Charan Singh (1999) states that. The traditional view considers that in the long run, domestic debt has a negative relationship with economic growth and can lead to the reduction of economic growth in the long run. This, if not controlled, might discourage private saving, increase interest rates, and minimize private investment, resulting in a decrease in economic growth.

In the second table, government spending shock is explained by itself, accounting for 44% in the first year and later having an increasing shock in the next two years. The shock returns to its decreasing state from the 4th year through the 6<sup>th</sup> year, and it later increases in the following three years with a constant shock in the 8th and 9th year, accounting for 48%, respectively. The shock later decreased again in the 10<sup>th</sup> year with a shock of 47%. In the third table, the fluctuation of imports is also explained by its shock. Import shocks account for 65% in the first year and later decrease over time and reach 44% in the 6<sup>th</sup> year; the shock increases afterward in the 7th year, accounting for 46%, and later decreases over the period, reaching 40% in the 10% year.

In the fourth table, the fluctuation of population is also explained by its shock in the long run. Population accounts for 46% in the first year. Its proportion in the variance of population decreases in the next two years and later increases slightly again within the next four years, accounting for 28<sup>th</sup> in the 7<sup>th</sup> year. From the 8<sup>th</sup> year, the shock starts to decrease again in the next two years, accounting for 23% and 20%, respectively. In the 10<sup>th</sup> year, the shock went back to 23% again, leading to an increase of 3% growth in the final year. Additionally, the final table shows that the exchange rate is the most significant factor explaining the exchange rate. The exchange rate presented a 90.6% shock at first. The variation in the exchange rate table declined by 56% in the ten years. This also indicates that it has a constant change from the 8<sup>th</sup> to the 10<sup>th</sup> year, recording 56% respectively for each year.

**In summary:**

GDP shocks are the most critical shocks by themselves. This was proven in the first year when it accounted for 100%. Its trend continued to decrease, but it later increased again in the subsequent years, accounting for 38% in the last year. This shows that GDP has drastically dropped from the second period to the tenth period. Shock to government spending, import, population, and the exchange rate is an essential source of variability for themselves at first, but this self-effect decreases for the variables over time.

**Forecasting :(See Figure 7)**

- ✓ The forecasted results indicate that the Population will decrease to 0.31% in 2023, -0.18% in 2024, and -1.90 in 2025. In the subsequent years of 2026, 2027, and 2028, the population growth will return to its shock with an increased value of 0.41%, 2.85%, and 2.76%, respectively. This increase has a positive impact on economic growth.
- ✓ The forecasted results indicate that GDP will decrease to 1% from 2023 through 2025. The decrease, which was constant during this period, accounted for a value of 9.99%, 9.55%, and 9.72%, respectively. In the following year, GDP will return to its shock with a 1% increase. However, this increase was constant in 2026, 2027 and 2028, accounting for a value of 10.4%, 10.97%, and 10.79%, respectively, and will have a positive impact on economic growth.
- ✓ The forecasted results indicate that government spending in Saudi Arabia will be constant in 2023 with a value of 2.89%. However, moving forward, government spending will increase to 3.11% in 2024, 3.33% in 2025, 3.33% in 2026, and 3.07% in 2027. After that period, government spending will decrease to 2.81% in 2028, showing a 1% decrease as it was in 2022, and it will reduce economic growth.
- ✓ The forecasted results indicate that imports in Saudi Arabia will be constant in 2023 with a value of 2.9%, but moving forward, imports will increase to 3.11% in 2024, 3.42% in 2025, 3.50% in 2026, and 3.23% in 2027. After that period, imports will decrease to 2.84% in 2028, showing a 1% decrease as it was in 2022, and will reduce economic growth.
- ✓ The forecasted results show that the exchange rate will be constant in 2023, going down through 2028, and will account for a 1% rate for the next five years. These results might not have any influence on economic growth but might affect the government spending more to improve economic growth.

**6. CONCLUSION**

This paper tries to find out the impact of government spending on economic growth in Saudi Arabia in the years 1970-2022. The unit root test was examined using the Augmented Dickey-Fuller (ADF), after which the cointegration and the Granger causality tests were also conducted. The vector error correction model was also estimated to examine the short-run changes. The findings were as follows.

- The unit root test indicates that only two variables (Population and exchange rate) were stationary at the level. However, the rest of the variables (GDP, government spending, and import) were all not stationary at the level after testing all the variables at first difference with a probability of less than 5%. These results opted us to use the VECM model.
- The cointegration test indicates that GDP, government spending, import, population, and exchange rates are cointegrated, indicating the existence of a long-run equilibrium relationship among the variables as indicated by the Johansen cointegration test results. Max – eigenvalue and trace test indicate one cointegration for each, respectively, which is below 5%. (0.0013 and 0.0081).
- We have concluded that there was no four-way Granger causality among the variables. Most of the variables have two-way causality, which includes exchange rate with Granger causality with most of the variables GDP, import, and the population at all levels. Therefore, we reject the null hypothesis. We have concluded that the direction of causality between government spending, import, population, and exchange rate indicators and economic growth in Saudi Arabia is generally unidirectional.
- The results gained from the VECM are related to the speed of the system's adjustment toward the long-run equilibrium. The individual coefficient of the difference terms obtains the short-run changes. The adjusted coefficient on VECM in the regression table is negative. It is statistically significant at alpha 1%, indicating that the importance of the error term also helps the existence of a long-term relationship between the independent variables and economic growth. The Vector Error-Correction model is statistically significant and has a negative sign, which indicates that there is no issue in the long-run equilibrium relation between the independent and dependent variables

These results indicate that Saudi government spending to boost their economic growth is low, as indicated in the VECM, impulse response, and variance decomposition. The Saudi government should allocate a considerable budget to build more infrastructure to attract more investors. This, if improved, will create much employment, increase foreign direct investments, and allow domestic investors to invest enough resources to improve economic growth. The government should also come up with an investment policy to attract donors and partners in terms of building more infrastructure for its citizens. Import, which has also played a key role in their economic growth, needs to be strengthened to boost their economic growth.

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**APPINDEX**

**UNIT ROOT TEST AT LEVEL: (FIGURE 1)**

Null Hypothesis: Unit root (individual unit root process)  
 Series: LPOP, LGDP, LGOV, LIMP, LXRATE  
 Date: 12/20/23 Time: 02:15  
 Sample: 1970 2022  
 Exogenous variables: Individual effects, individual linear trends  
 Newey-West automatic bandwidth selection and Bartlett...  
 Total (balanced) observations: 260  
 Cross-sections included: 5

Method	Statistic	Prob.**
PP - Fisher Chi-square	25.8149	0.0040
PP - Choi Z-stat	-2.67216	0.0038

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Intermediate Phillips-Perron test results UNTITLED**

Series	Prob.	Bandwidth	Obs
LPOP	0.0327	2.0	52
LGDP	0.0855	3.0	52
LGOV	0.5565	2.0	52
LIMP	0.4006	3.0	52
LXRATE	0.0040	1.0	52

**UNIT ROOT TEST AT FIRST DIFFERENCE**

Null Hypothesis: Unit root (individual unit root process)  
 Series: LGDP, LGOV, LIMP, LPOP, LXRATE  
 Date: 12/19/23 Time: 05:03  
 Sample: 1970 2022  
 Exogenous variables: Individual effects  
 Automatic selection of maximum lags  
 Automatic lag length selection based on SIC: 0 to 10  
 Total number of observations: 242  
 Cross-sections included: 5

Method	Statistic	Prob.**
ADF - Fisher Chi-square	129.958	0.0000
ADF - Choi Z-stat	-10.0736	0.0000

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Intermediate ADF test results D(UNTITLED)**

Series	Prob.	Lag	Max Lag	Obs
D(LGDP)	0.0002	0	10	51
D(LGOV)	0.0000	0	10	51
D(LIMP)	0.0003	2	10	49
D(LPOP)	0.0000	1	10	50
D(LXRATE)	0.0000	10	10	41

**LAG LENGTH CRITERIA**

VAR Lag Order Selection Criteria

Endogenous variables: LGDP LGOV LIMP LPOP LXRATE

Exogenous variables: C

Date: 12/20/23 Time: 01:06

Sample: 1970 2022

Included observations: 48

Lag	LogL	LR	FPE	AIC	SC	HQ
0	100.9067	NA	1.27e-08	-3.996113	-3.801197	-3.922454
1	318.6408	381.0347	4.14e-12	-12.02670	-10.85720*	-11.58474*
2	341.8569	35.79146	4.62e-12	-11.95237	-9.808287	-11.14212
3	370.6520	38.39347	4.32e-12	-12.11050	-8.991832	-10.93195
4	392.7901	24.90539	5.85e-12	-11.99126	-7.898003	-10.44441
5	438.6660	42.05290*	3.42e-12*	-12.86108*	-7.793248	-10.94594

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

**VECTOR ERROR CORRELATION MODEL/ESTIMATES: (FIGURE 2)**

Vector Error Correction Estimates  
 Date: 12/20/23 Time: 03:50  
 Sample (adjusted): 1974 2022  
 Included observations: 49 after adjustments  
 Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1				
LGDP(-1)	1.000000				
LGOV(-1)	1.294245 (0.17175) [ 7.53549]				
LIMP(-1)	-3.247824 (0.19182) [-16.9317]				
LPOP(-1)	1.981040 (0.08684) [ 22.8118]				
LXRATE(-1)	4.458784 (0.84684) [ 5.26523]				
C	-10.47959				
Error Correction:	D(LGDP)	D(LGOV)	D(LIMP)	D(LPOP)	D(LXRATE)
CointEq1	-0.113455 (0.16976) [-0.66833]	0.410068 (0.15455) [ 2.65323]	0.339168 (0.12749) [ 2.66038]	-0.796484 (0.30627) [-2.60062]	-0.016448 (0.00916) [-1.79618]
D(LGDP(-1))	0.213925 (0.32811) [ 0.65199]	-0.193916 (0.29873) [-0.64914]	0.102024 (0.24641) [ 0.41403]	1.552789 (0.59196) [ 2.62313]	0.004772 (0.01770) [ 0.26963]
D(LGDP(-2))	-0.203345 (0.32524) [-0.62522]	-0.172289 (0.29611) [-0.58184]	-0.019899 (0.24426) [-0.08147]	0.133132 (0.58678) [ 0.22689]	-0.004560 (0.01754) [-0.25994]
D(LGDP(-3))	0.066985 (0.25607) [ 0.26159]	-0.230370 (0.23314) [-0.98813]	-0.138118 (0.19231) [-0.71820]	0.141068 (0.46199) [ 0.30535]	0.010933 (0.01381) [ 0.79151]
D(LGOV(-1))	0.136267 (0.32768) [ 0.41585]	-0.340511 (0.29833) [-1.14137]	-0.316780 (0.24609) [-1.28725]	0.860731 (0.59119) [ 1.45594]	0.020397 (0.01768) [ 1.15391]
D(LGOV(-2))	-0.016740 (0.31970) [-0.05236]	-0.238867 (0.29107) [-0.82065]	-0.100061 (0.24010) [-0.41675]	-0.462106 (0.57679) [-0.80117]	-0.010201 (0.01725) [-0.59149]
D(LGOV(-3))	-0.322383 (0.29676) [-1.08634]	0.199086 (0.27018) [ 0.73685]	-0.028142 (0.22287) [-0.12627]	0.063310 (0.53540) [ 0.11825]	0.013922 (0.01601) [ 0.86967]
D(LIMP(-1))	-0.002396 (0.41479) [-0.00578]	0.582464 (0.37764) [ 1.54238]	0.626156 (0.31151) [ 2.01008]	-1.037688 (0.74834) [-1.38666]	-0.050252 (0.02238) [-2.24587]
D(LIMP(-2))	-0.291589 (0.36291) [-0.80349]	0.574200 (0.33040) [ 1.73787]	0.469806 (0.27254) [ 1.72378]	0.038432 (0.65473) [ 0.05870]	-0.014120 (0.01958) [-0.72127]
D(LIMP(-3))	0.285754 (0.26987) [ 1.05885]	0.030292 (0.24570) [ 0.12329]	-0.007398 (0.20268) [-0.03650]	-0.386226 (0.48689) [-0.79325]	-0.023086 (0.01456) [-1.58581]
D(LPOP(-1))	0.081777 (0.26069) [ 0.31369]	-0.549418 (0.23734) [-2.31486]	-0.507984 (0.19578) [-2.59466]	0.869242 (0.47033) [ 1.84817]	0.031562 (0.01406) [ 2.24436]
D(LPOP(-2))	0.057767 (0.23309) [ 0.24783]	-0.414548 (0.21221) [-1.95345]	-0.367403 (0.17505) [-2.09883]	0.632112 (0.42053) [ 1.50314]	0.021577 (0.01257) [ 1.71605]
D(LPOP(-3))	0.062574 (0.32806) [ 0.19074]	-0.566684 (0.29868) [-1.89727]	-0.465601 (0.24638) [-1.88978]	0.058159 (0.51988) [ 0.09826]	0.027313 (0.01770) [ 1.54338]
D(LXRATE(-1))	-9.923540 (2.46501) [-4.02576]	2.515911 (2.24424) [ 1.12105]	3.048659 (1.85123) [ 1.64683]	5.189793 (4.44723) [ 1.16697]	0.519453 (0.13297) [ 3.90651]
D(LXRATE(-2))	2.909364 (2.97034) [ 0.97947]	-0.768388 (2.70432) [-0.28413]	0.623749 (2.23074) [ 0.27962]	5.199036 (5.35892) [ 0.97016]	-0.030701 (0.16023) [-0.19161]
D(LXRATE(-3))	-1.342711 (2.53560) [-0.52954]	-2.871729 (2.30851) [-1.24397]	-1.726292 (1.90425) [-0.90655]	-4.240758 (4.57458) [-0.92703]	-0.162266 (0.13678) [-1.18634]
C	0.043411 (0.02672) [ 1.62460]	-0.011538 (0.02433) [-0.47426]	-0.033596 (0.02007) [-1.67415]	-0.058074 (0.04821) [-1.20464]	0.002600 (0.00144) [ 1.80354]
R-squared	0.699073	0.635989	0.731397	0.422216	0.705590
Adj. R-squared	0.548610	0.453984	0.597095	0.133325	0.558385
Sum sq. resids	0.590644	0.489586	0.333128	1.922509	0.001719
S.E. equation	0.135859	0.123691	0.102031	0.245109	0.007329
F-statistic	4.646134	3.494345	5.445931	1.461504	4.793242
Log likelihood	38.72189	43.31939	52.75269	9.807646	181.7930
Akaike AIC	-0.886608	-1.074261	-1.459293	0.293565	-6.726245
Schwarz SC	-0.230262	-0.417915	-0.802947	0.949911	-6.069899
Mean dependent	0.054482	0.007389	0.002129	-0.029122	0.000238
S.D. dependent	0.202214	0.167393	0.160742	0.263288	0.011028
Determinant resid covariance		1.17E-12			
Determinant resid covariance (dof adj.)		1.39E-13			
Log likelihood		377.6282			
Akaike information criterion		-11.73993			
Schwarz criterion		-8.265156			
Number of coefficients		90			

**GRANGER CAUSALITY /BLOCK HOMOGENEITY WALD TEST: (FIGURE 3)**

**VEC Granger Causality/Block Exogeneity Wald Tests**

Date: 12/20/23 Time: 03:52

Sample: 1970 2022

Included observations: 49

**Dependent variable: D(LGDP)**

Excluded	Chi-sq	df	Prob.
D(LGOV)	1.549388	3	0.6709
D(LIMP)	2.061113	3	0.5598
D(LPOP)	0.100758	3	0.9917
D(LXRATE)	20.13893	3	0.0002
All	46.85568	12	0.0000

**Dependent variable: D(LGOV)**

Excluded	Chi-sq	df	Prob.
D(LGDP)	1.303519	3	0.7283
D(LIMP)	3.804303	3	0.2834
D(LPOP)	5.789816	3	0.1223
D(LXRATE)	5.520415	3	0.1374
All	30.19566	12	0.0026

**Dependent variable: D(LIMP)**

Excluded	Chi-sq	df	Prob.
D(LGDP)	0.821469	3	0.8443
D(LGOV)	1.674165	3	0.6427
D(LPOP)	6.985831	3	0.0724
D(LXRATE)	7.485245	3	0.0579
All	51.10515	12	0.0000

**Dependent variable: D(LPOP)**

Excluded	Chi-sq	df	Prob.
D(LGDP)	7.119538	3	0.0682
D(LGOV)	3.511646	3	0.3193
D(LIMP)	2.744125	3	0.4328
D(LXRATE)	6.694929	3	0.0823
All	14.76099	12	0.2548

**Dependent variable: D(LXRATE)**

Excluded	Chi-sq	df	Prob.
D(LGDP)	0.852234	3	0.8369
D(LGOV)	2.578383	3	0.4613
D(LIMP)	5.937032	3	0.1147
D(LPOP)	5.291980	3	0.1516
All	16.22698	12	0.1811

**JOHANSON COINTEGRATION TEST: (FIGURE 4)**

Date: 12/20/23 Time: 03:53  
 Sample (adjusted): 1974 2022  
 Included observations: 49 after adjustments  
 Trend assumption: Linear deterministic trend  
 Series: LGDP LGOV LIMP LPOP LXRATE  
 Lags interval (in first differences): 1 to 3

**Unrestricted Cointegration Rank Test (Trace)**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.558409	86.72887	69.81889	0.0013
At most 1	0.468353	46.67764	27.58434	0.0642
At most 2	0.324319	25.53209	29.79707	0.1433
At most 3	0.119114	6.322382	15.49471	0.6574
At most 4	0.002198	0.107835	3.841465	0.7426

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level  
 \* denotes rejection of the hypothesis at the 0.05 level  
 \*\*MacKinnon-Haug-Michelis (1999) p-values

**Unrestricted Cointegration Rank Test (Maximum Eigenvalue)**

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.558409	40.05123	33.87687	0.0081
At most 1	0.350493	21.14550	27.58434	0.2675
At most 2	0.324319	19.20970	21.14550	0.0909
At most 3	0.119114	6.214547	14.26460	0.5858
At most 4	0.002198	0.107835	3.841465	0.7426

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level  
 \* denotes rejection of the hypothesis at the 0.05 level  
 \*\*MacKinnon-Haug-Michelis (1999) p-values

**Unrestricted Cointegrating Coefficients (normalized by b\*S11\*b=I):**

LGDP	LGOV	LIMP	LPOP	LXRATE
8.746598	11.32024	-28.40741	17.32736	38.99919
-1.024703	-8.195195	4.817492	-1.199068	-20.52933
7.265598	16.02151	-14.39971	10.63048	3.527018
0.751812	-2.289021	5.774639	0.929340	37.28421
0.020968	3.335689	-1.358551	3.836556	14.06007

**Unrestricted Adjustment Coefficients (alpha):**

D(LGDP)	D(LGOV)	D(LIMP)	D(LPOP)	D(LXRATE)
-0.012971	-0.014949	-0.021344	-0.010832	0.004422
0.468353	0.039824	-0.009885	-0.002763	-0.002763
0.038777	0.008986	-0.009281	-0.016897	-0.002444
-0.091062	-0.003764	-0.065942	-0.045446	-0.001804
-0.001881	0.002086	0.002382	-0.000528	8.18E-06

**1 Cointegrating Equation(s): Log likelihood 377.6282**

Normalized cointegrating coefficients (standard error in parentheses)				
LGDP	LGOV	LIMP	LPOP	LXRATE
1.000000	0.294245	-3.247824	0.981040	4.458784
	(0.17175)	(0.1932)	(0.36584)	(0.84684)
Adjustment coefficients (standard error in parentheses)				
D(LGDP)	-0.113455	0.16976	0.10668	0.15455
D(LGOV)	0.33916	0.12749	-0.796484	0.30627
D(LPOP)	-0.796484	0.30627	-0.016448	0.00916

**2 Cointegrating Equation(s): Log likelihood 388.2010**

Normalized cointegrating coefficients (standard error in parentheses)				
LGDP	LGOV	LIMP	LPOP	LXRATE
1.000000	0.000000	-2.967186	2.137600	1.451544
		(0.53256)	(0.24107)	(2.32717)
0.000000	1.000000	-0.216835	-0.120965	2.325817
		(0.37307)	(0.16888)	(1.63024)
Adjustment coefficients (standard error in parentheses)				
D(LGDP)	-0.098137	-0.024331	0.26831	0.369178
D(LGOV)	0.369178	0.203708	0.22642	0.329365
D(LIMP)	0.329365	0.20249	-1.00000	0.48932
D(LPOP)	-0.796268	0.48932	-0.038380	0.01369

**3 Cointegrating Equation(s): Log likelihood 397.8059**

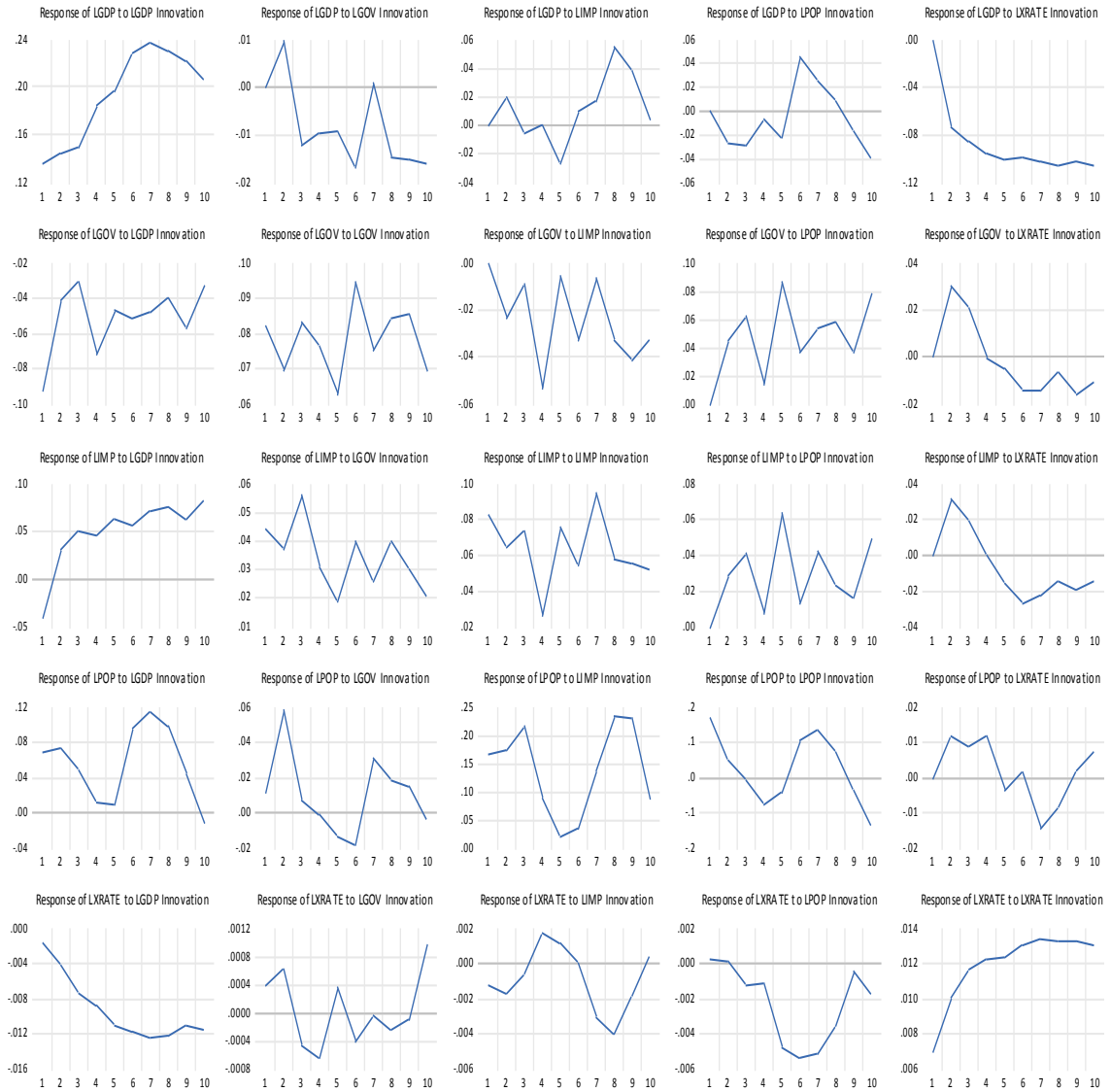
Normalized cointegrating coefficients (standard error in parentheses)				
LGDP	LGOV	LIMP	LPOP	LXRATE
1.000000	0.000000	0.000000	1.286901	-11.25436
			(0.54603)	(6.18132)
0.000000	1.000000	0.000000	-0.183133	1.395029
			(0.12633)	(1.43007)
0.000000	0.000000	1.000000	-0.286702	-4.282135
			(0.14282)	(1.61682)
Adjustment coefficients (standard error in parentheses)				
D(LGDP)	-0.253217	-0.366301	0.610222	0.370381
D(LGOV)	0.370381	0.186356	-1.103139	0.765365
D(LIMP)	0.366380	0.197537	-1.133930	0.32970
D(LPOP)	0.329365	0.34444	0.52404	0.54677
D(LXRATE)	-1.279002	-2.072515	3.552738	0.65138

**4 Cointegrating Equation(s): Log likelihood 400.9131**

Normalized cointegrating coefficients (standard error in parentheses)				
LGDP	LGOV	LIMP	LPOP	LXRATE
1.000000	0.000000	0.000000	0.000000	-90.37167
				(27.6903)
0.000000	1.000000	0.000000	0.000000	12.65384
				(4.09038)
0.000000	0.000000	1.000000	0.000000	13.34400
				(4.81130)
0.000000	0.000000	0.000000	1.000000	61.47892
				(18.9476)
Adjustment coefficients (standard error in parentheses)				
D(LGDP)	-0.261361	-0.341505	0.547669	-0.443802
D(LGOV)	0.21460	0.40107	0.61629	0.38235
D(LIMP)	0.370381	0.186356	-1.103139	0.765365
D(LPOP)	0.366380	0.197537	-1.133930	0.32970
D(LXRATE)	-1.313169	-1.968488	3.290303	-2.327216

**IMPULSE RESPONSE: (FIGURE 5)**

Response to Cholesky One S.D. (d.f. adjusted) Innovations



**VARIANCE DECOMPOSITION: (FIGURE 6)**

Variance Decomposition of LGDP:						
Period	S.E.	LGDP	LGOV	LIMP	LPOP	LXRATE
1	0.135859	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.214478	85.96157	0.203750	0.813155	1.504035	11.51749
3	0.277411	80.66891	0.309809	0.529343	1.974165	16.51777
4	0.346588	80.02101	0.276793	0.339523	1.299814	18.06286
5	0.412541	79.16563	0.247573	0.676200	1.204707	18.70589
6	0.484948	79.74444	0.301144	0.526211	1.790067	17.63813
7	0.550249	80.46730	0.234315	0.512025	1.615123	17.17124
8	0.608953	80.10651	0.248195	1.252246	1.337085	17.05596
9	0.657657	80.09488	0.266346	1.398387	1.217377	17.02301
10	0.698985	79.73486	0.289031	1.239038	1.416525	17.32055

Variance Decomposition of LGOV:						
Period	S.E.	LGDP	LGOV	LIMP	LPOP	LXRATE
1	0.123691	55.80638	44.19362	0.000000	0.000000	0.000000
2	0.159033	40.33285	45.74449	2.258628	8.029292	3.634736
3	0.193661	29.68677	49.33391	1.727058	15.68816	3.564094
4	0.227128	31.61551	47.23061	6.810155	11.75160	2.592130
5	0.255267	28.37093	43.37822	5.436714	20.72007	2.094065
6	0.281627	26.59352	46.89654	5.815989	18.70253	1.991421
7	0.300615	25.91076	47.43787	5.151965	19.53418	1.965225
8	0.321831	24.17738	48.26771	5.563400	20.23374	1.757766
9	0.342711	24.05252	48.78146	6.399992	18.99060	1.775425
10	0.361426	22.43560	47.50655	6.535010	21.84008	1.682756

Variance Decomposition of LIMP:						
Period	S.E.	LGDP	LGOV	LIMP	LPOP	LXRATE
1	0.102031	15.36817	18.77865	65.85318	0.000000	0.000000
2	0.136895	13.47934	17.67026	59.10742	4.336200	5.406785
3	0.178739	16.00445	20.17180	51.77433	7.715291	4.334128
4	0.189219	20.34218	20.65190	48.11302	7.024806	3.868098
5	0.223938	22.38687	15.43528	45.88900	13.00336	3.285491
6	0.242374	24.56197	15.90315	44.11685	11.40561	4.012424
7	0.275255	25.80092	13.22746	46.00908	11.19930	3.763246
8	0.295089	28.88416	13.31762	43.93261	10.35832	3.507284
9	0.309372	30.48734	13.08292	43.12409	9.713289	3.592366
10	0.329535	33.34898	11.90094	40.46755	10.90522	3.377309

Variance Decomposition of LPOP:						
Period	S.E.	LGDP	LGOV	LIMP	LPOP	LXRATE
1	0.245109	7.624205	0.204747	45.36187	46.80918	0.000000
2	0.319081	9.766757	3.467705	56.63540	30.00171	0.128429
3	0.389370	8.102826	2.359069	69.20196	20.19604	0.140104
4	0.406648	7.494658	2.163088	68.15919	21.96765	0.215412
5	0.409678	7.424018	2.246182	67.37601	22.73324	0.220547
6	0.435510	11.45714	2.167511	60.23154	25.94760	0.196216
7	0.491595	14.46814	2.081447	55.15676	28.05436	0.239290
8	0.558560	14.37549	1.724307	60.27714	23.41636	0.206702
9	0.607119	12.65998	1.518618	65.42922	20.21611	0.176077
10	0.628099	11.87483	1.424724	62.85329	23.67027	0.176891

Variance Decomposition of LXRATE:						
Period	S.E.	LGDP	LGOV	LIMP	LPOP	LXRATE
1	0.007329	6.206697	0.280742	2.731955	0.092598	90.68801
2	0.013325	12.48665	0.299355	2.374880	0.040844	84.79827
3	0.019279	20.98394	0.202019	1.220519	0.454731	77.13879
4	0.024601	25.99386	0.192674	1.228864	0.504075	72.08053
5	0.030085	31.03481	0.143993	0.978898	2.837934	65.00436
6	0.035241	33.84643	0.118417	0.713478	4.370422	60.95126
7	0.040110	35.64490	0.091526	1.120983	5.041045	58.10155
8	0.044310	36.93342	0.077916	1.718139	4.771980	56.49855
9	0.047576	37.36188	0.067935	1.633024	4.148319	56.78885
10	0.050705	38.11217	0.098574	1.447795	3.782928	56.55853

Cholesky One S.D. (d.f. adjusted)  
Cholesky ordering: LGDP LGOV LIMP LPOP LXRATE

**FORECASTING :(FIGURE 7)**

	LPOP_F	LGDP_F	LGOV_F	LIMP_F	LXRATE_F
1970					
1971					
1972					
1973					
1974	1.52617613...	8.66701109...	2.12968342...	2.56549988...	1.26555048...
1975	1.54368857...	8.85060355...	2.48003007...	2.89577079...	1.25404266...
1976	1.55179668...	8.98929434...	2.80062686...	3.15437248...	1.25705660...
1977	1.58732784...	8.99088103...	2.97035141...	3.51525651...	1.25625861...
1978	1.45261251...	9.01403381...	3.06299611...	3.58619864...	1.24422035...
1979	1.71472258...	9.13298174...	2.98264221...	3.45638029...	1.24034506...
1980	1.63542287...	9.20872162...	2.94054426...	3.34990469...	1.24167448...
1981	1.58218858...	9.21282165...	3.03502540...	3.38443212...	1.24628639...
1982	1.34219857...	9.21289344...	2.98231981...	3.36042670...	1.25468492...
1983	1.14003519...	9.13322785...	3.12713701...	3.50834914...	1.25287451...
1984	1.30634130...	9.26530932...	3.05399607...	3.42340273...	1.25105609...
1985	1.53158769...	9.32069634...	3.05841375...	3.43922593...	1.24928441...
1986	1.62773527...	9.36946736...	3.06135723...	3.38491901...	1.25127512...
1987	1.47407867...	9.34973192...	3.00133869...	3.33535712...	1.26169140...
1988	1.02981560...	9.25235380...	3.07201130...	3.38562159...	1.26759957...
1989	0.92128144...	9.28350761...	3.08834795...	3.39802340...	1.26872647...
1990	1.08977601...	9.37691601...	3.08271221...	3.41706507...	1.26418406...
1991	1.46056497...	9.48157826...	3.10656001...	3.41829845...	1.25875269...
1992	1.62684506...	9.55057748...	3.00940295...	3.31500290...	1.26441386...
1993	1.27280020...	9.44665535...	3.03787554...	3.31983363...	1.27457822...
1994	0.80713321...	9.37941254...	3.05625898...	3.31325053...	1.28384925...
1995	0.60566683...	9.38451772...	3.09211367...	3.37490988...	1.28410069...
1996	0.90542480...	9.50765870...	3.14223442...	3.42341059...	1.27440624...
1997	1.46616869...	9.68256568...	3.06979677...	3.35834313...	1.26944852...
1998	1.58327205...	9.69671988...	3.03145354...	3.29785989...	1.27468458...
1999	1.15377124...	9.59421409...	3.01853634...	3.24281918...	1.28926463...
2000	0.48530152...	9.47048890...	3.04573755...	3.26978265...	1.30135811...
2001	0.24942931...	9.47215462...	3.14571225...	3.37560475...	1.29795998...
2002	0.76774667...	9.67582500...	3.13800485...	3.39272854...	1.28567755...
2003	1.46788491...	9.85981114...	3.09142208...	3.35077362...	1.27724093...
2004	1.64797122...	9.88819949...	3.01870192...	3.23515947...	1.28502009...
2005	0.99946373...	9.72250933...	2.98410922...	3.16936528...	1.30562468...
2006	0.08049442...	9.53154897...	3.07768249...	3.24466271...	1.31890159...
2007	-0.1264465...	9.57479710...	3.15679021...	3.34895388...	1.31370164...
2008	0.59655459...	9.82352404...	3.17684321...	3.40723073...	1.29479366...
2009	1.58946516...	10.0794854...	3.10143203...	3.32304040...	1.28328051...
2010	1.77268562...	10.0911486...	2.97799093...	3.16044790...	1.29569955...
2011	0.80501966...	9.82493988...	2.97911900...	3.10631442...	1.32231846...
2012	-0.3893966...	9.58879470...	3.07567181...	3.18966620...	1.33951259...
2013	-0.6157911...	9.64136215...	3.20042490...	3.35940541...	1.32944366...
2014	0.47480951...	9.99609612...	3.22456591...	3.42446162...	1.30183860...
2015	1.83133783...	10.3339911...	3.08739918...	3.28782770...	1.28767485...
2016	1.96685744...	10.2968181...	2.95331852...	3.09022834...	1.30505104...
2017	0.59952948...	9.92710341...	2.94051227...	3.00650662...	1.34186170...
2018	-1.0233580...	9.59547279...	3.08861922...	3.15070281...	1.36276933...
2019	-1.1976610...	9.69329689...	3.26643309...	3.38522501...	1.34524370...
2020	0.41137255...	10.1970359...	3.26345614...	3.44900076...	1.30685219...
2021	2.22134137...	10.6197128...	3.08900838...	3.26707786...	1.28820177...
2022	2.29744932...	10.5358920...	2.89526533...	2.98321523...	1.31439283...
2023	0.31351065...	9.99389232...	2.89297654...	2.89521385...	1.36467825...
2024	-1.8524696...	9.55084939...	3.11905992...	3.11683320...	1.38939918...
2025	-1.9006322...	9.72961099...	3.33770260...	3.42651808...	1.36183980...
2026	0.41713499...	10.4218322...	3.33097273...	3.50896231...	1.30755735...
2027	2.85955882...	10.9744067...	3.07210821...	3.23135971...	1.28454551...
2028	2.76738097...	10.7956885...	2.81020392...	2.84932656...	1.32371505...