



# The Correlations of America's Private Consumption and Private Investment to Real GDP Comparison

Hanson Hanxi Jin\*

High School Affiliated to Renmin University of China, Beijing, 100080, China

\*Corresponding author. Email: 2591681775@qq.com

**Abstract.** In the macro-side of readjusting and controlling economic activities, it is crucial for government to determine the relationship between private consumption and private investment with GDP (Gross Domestic Product) each. The greater understandings on how these two sectors fluctuate with GDP may allow the government to maximize its effectivity in macro-economic policy decision making. Collected from Bureau of Economic Analysis, data of America's consumption, investment, and GDP from 1981-2020 are analyzed through detrending to understand the correlations between. Based on the two figures, I find that the correlation between investment and GDP is less coherent and fluctuated than the correlation between consumption and GDP.

**Keywords:** consumption, investment, GDP, correlation

## 1 Introduction

Gross domestic product (GDP) is considered the best measure of how well an economy is performing. It is the measurement of the total income of everyone in the economy, whereas another representation it has is the total expenditure on the economy's output of goods and services.[1] In the circular flow diagram, GDP represents the flow of money in the economy, which includes income and expenditure from households and firms. Within the calculation of GDP, it is also important to consider inflation, which brings up the concept of real GDP. Nominal GDP is the value of goods and services measured at current prices, but real GDP considers the rate goods, and services are influenced by changes in prices. The components of GDP include Consumption (C), Investment (I), Government Purchases (G), and net exports (NX), which are shown in the equation below, letting Y stand for GDP.

$$Y = C + I + G + NX \quad (1)$$

People's consumption and investment are all affected by the Economic Cycle: Trough, Recovery, Peak, and Recession, but they are differentiated from many aspects. Firstly, consumption is a necessity for daily living and it's also the largest component of GDP. Consumption even accounts for about two thirds of GDP in some developed countries.[2] People rely on the consumption of food and accommodation no matter the

economic progress they encounter contemporarily. In contrast, investment is more of a luxury that highly depends on the prosperity and stability of society. People's investment behavior on consumption largely depends on several factors: attitudes to saving, risk bearing and uncertainty. The difficulty within investment made it largely effected by complex consideration at numerous aspects. Secondly, people have a rigid demand on consumption for living, thus consumption fluctuates much less than the undulation of investment when depression occurs. It is crucial to discover their relationship because it will help the government to implement more suitable fiscal policies on mitigating economic depressions or sustaining economic growth. America, having one of the most capitalistic characteristics and a comprehensive system to regulate economy, will be the main country to focus on in this research. Since America is the world's largest economic entity, it is important for its government to implement meticulous actions to mitigate economic problems for ensuring a sustainable economic development. In this essay specifically, the relationship of consumption and investment to America's real gross domestic product from 1981 to 2020 will be discussed through qualitative and quantitative data analysis, and I will provide firm data to support my reasoning that investment fluctuates fiercer than consumption, compared with the growth of America's real GDP.

## 2 Literature Review

Neo-classical Synthesis, while adopting the Keynes' theory, argued that aggregated demand is determined by consumption, investment, and net export. However, the New Keynesian's Harold Domar model emphasized the importance of investment to sustained economic growth specifically, believing that high investment rate brings high growth rate. [3] Thus, the importance of consumption and investment to gross domestic product should be analyzed which would provide the basis for further macro-economic policy decision making to boost economic growth.

Sugiarto, Teguh, Madu and Subagyo studied the short-long term between GDP and Consumption in the case of Indonesia.[4] The researchers found a highly correlated relationship between the two factors in both short and long term. Similarly, Anghelache uses linear regression model to demonstrate that the final consumption is an important factorial variable that impacts the GDP, which is the resultant variable.[5]

Empirical researchers also determined a strong correlation between investment and GDP. Zou studied a causality relationship in the direction of public investment to GDP.[6] Lucian shows the growth rate of investment is a crucial factor to the growth rate of GDP.[7]

In this study, the focus of research differs from any of the previous studies. Instead of focusing on the sole relationship between GDP and one factor, the research will be focusing on the correlational relationship of both consumption and investment with GDP and compare the two correlation results. This study is fundamental for government to alleviate the strike that economic regression brings to the economy through understanding which factor has the most importance on impact GDP. Therefore, the

government will be able to bring the economy back to the right path in a more effective way through macro-control.

### 3 Methodology & Data

Raw data of America's real gross domestic product (GDP), personal consumption expenditures, and gross private investments were collected from the U.S. Bureau of Economic Analysis in billions of chained dollars from 1981 to 2020. The Bureau of Economic Analysis (BEA) of the United States Department of Commerce is a U.S. government agency that provides official economic data, including U.S. gross domestic product, state and local numbers, and foreign trade and investment stats and industry data. The accurate and objective information of U.S. economy that BEA presents is essential to our study of understanding the relationship between macroeconomic fundamentals in the economic entity.

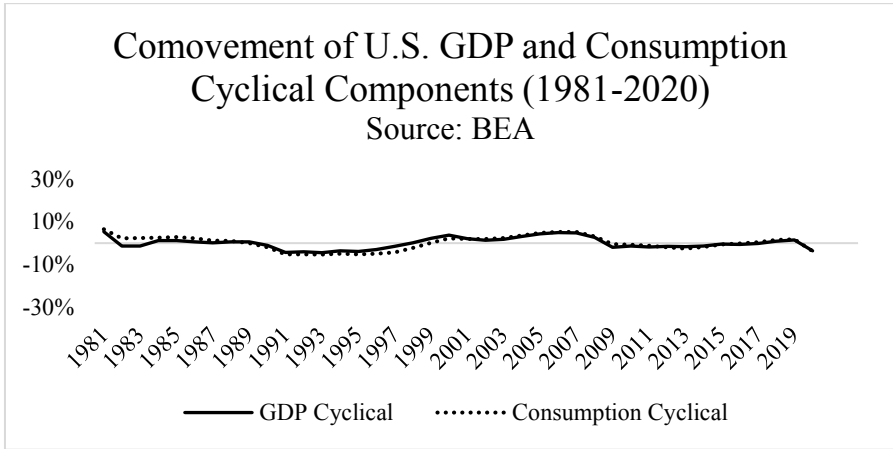
Through the process of detrending and making graphs, the cyclical of each was calculated. Then, the STDEV and CORREL function are applied to the cyclical to obtain the standard deviation and correlation. The correlation, presented in a numerical form from negative one to positive one, demonstrates the relationship between the two factors. If the number is negative, the correlation between is a regressive relationship; if it is positive, the correlation between is a progressive relationship. The absolute value of the number if closer to one, represents a highly correlated relationship; oppositely, if the number is closer to zero, the two factors is likely unrelated.

#### 3.1 Detrending

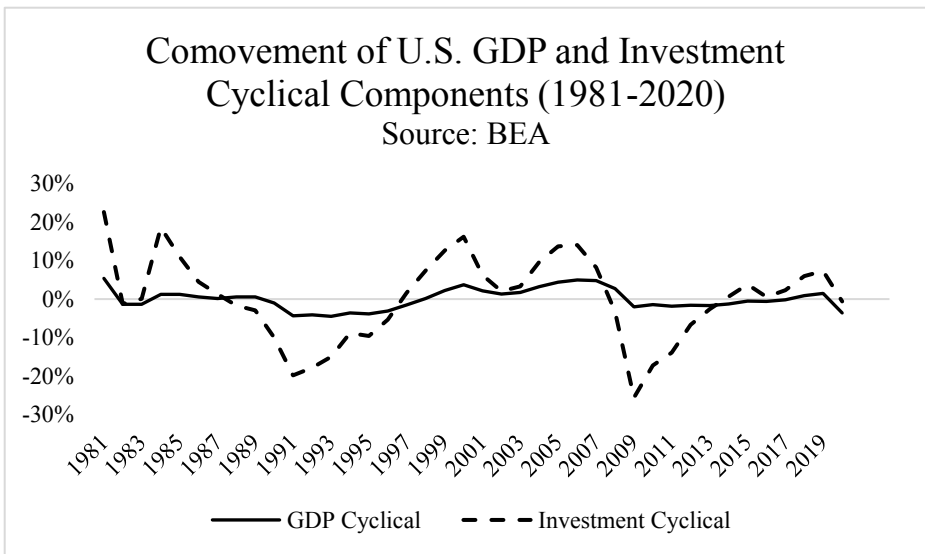
By transferring the GDP data into a graph, an equation in the form of  $y=kx+b$  was brought up to portray the overall trend of the GDP. Next, from calculation, we get the difference between the real GDP from our raw data and the data of the GDP trend. By dividing it over the GDP trend data, the result was given through percentage rate. This is GDP cyclical, which is the ratio change of GDP that is influenced by the fluctuation of economic activity. The consumption and Investment data were implemented the same method to get their cyclical components.

#### 3.2 Comovement

The next process, while we received results of all three cyclical components, is to portray the comovement of US GDP and Consumption Cyclical Components and comovement of U.S. GDP and Investment of Investment Cyclical Component through figures. As shown in figure 1, U.S. GDP and Consumption Cyclical Components show a strong positive correlation through the period of 1981-2020.



**Fig. 1.** Comovement of U.S. GDP and Consumption Cyclical Components (1981-2020) Source: BEA



**Fig. 2.** Comovement of U.S. GDP and Investment Cyclical Components (1981-2020) Source: BEA

In Figure 2, U.S. GDP and Investment cyclical components show a strong positive relationship as well, but it differs from its fluctuation rate. It was much more severe than the correlation demonstrated in Figure 1. This is the conclusion we receive from the qualitative data, but it's also important to support our thesis through quantitative data, which was the next process.

By using the STDEV function on the data of GDP cyclical component, the standard deviation was received, which is 0.0268. Through the same method, the standard deviation of cyclical components of Consumption and Investment were calculated as well, which are 0.0328 and 0.1092. Dividing the result of the standard deviation of consumption cyclical component over GDP's, it leads to the result that Consumption was 1.2 times over GDP. The exact method was used over Investment and GDP, and the result is that Investment was 4.1 times over GDP.

To understand more of the correlation between, another function, CORREL, was implemented. The correlation ranges from 0 to 1 in absolute value, and the closer the correlation is to 1 represents that a closer and more progressive relationship, whereas if the result was closer to 0, it means that the two subjects a more uncorrelated or regressive relationship. The GDP and consumption cyclical component correlation was 0.91, which compared to 0.81 of correlation between GDP and Investment, indicating that they have a tighter relationship and consumption fluctuates less than investment has on GDP.

## 4 Conclusion

The result shows that GDP has a more correlated relationship with consumption than with investment. Investment fluctuating more drastically compared to consumption could be explained by people's more rigid demand in consumption of common necessities like accommodation, water, and food. However, investment often occurs when people are optimistic about the economic entity and future development or when people have sufficient capitals to invest for returns.[8] Therefore, investment fluctuates more in accordance with the natural economic activity pattern because investments is highly correlated with individual's condition. When the economy is at a growth state, the investment rises because people are optimistic about the economy; whereas during a recession, it declines because people either go bankrupt or has no mood to invest in any products.[9] Therefore, the government should pay more attention to stimulating private investments to boost the economy, instead of encouraging consumption which has a more negligible effect on the economy because it fluctuates less with the economic cycle.

To be more specific, the government could implement a series of actions during a depression period. Firstly, government should implement a series of macroeconomic strategies such as lowering the discount rate or lowering the interest rate to encourage a larger flow of money in the market. With less incentive to save money into bank, people can invest the money into the place where it is needed, which is a highly effective way of allocating resources. Secondly, government should stimulate people incentive to invest during depression periods. By encouraging people with incentive to invest, government effectively enables people to invest out of motivations. Thirdly, receivership could be applied to assist creditors to recover in defaults and to help troubled companies to avoid bankruptcy. Especially in depression periods, receivership would play an effective role to protect lender's assets and pursue profitability.

In the contemporary world which the government is responsible for regulating and intervening the economy, it is especially important to implement the suitable actions in order to combat every situation in the most effective way. Although the passage only discusses that government should increase its focus on encouraging investment during depression periods to help the economy to go back to its right path, it's also important for the government to catch an attention on other situations as well. In the past, there were a lot of examples of the government mistakenly regulating and impacting the economy which caused catastrophic impacts to the country and even to the entire world such as the financial crisis in 2008.[10] The role of government directing the development of an economy and leading economy toward a right path will only become greater in the future.[11] Therefore, the government should be extremely careful in impacting the economy in the right way.

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