UK GDP Research

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Abstract. The paper analyzes the UK GDP trend and the relationship between the GDP growth and the investment or the consumption. In order to process and analyze the data, we compared the UK fiscal data from 1995 to 2021, which is from IMF. The HP filter is used when we need to find the overall trend of the data. We also study the standard deviation between the various indicators, and try to find the relationship by using the correlation. We found that there is positive relationship between the GDP and the consumption or the investment. From the result, we outline that when the UK government wants to promote the recovery of the economy in the short run, investment is a kind of proper way. However, in the long run, the best choice is to encourage the consumption.

Keywords: GDP, UK, the correlation

1 Introduction

GDP, which stands for gross domestic product, measures the total monetary or market value of all the finished goods and services produced within a country's borders in a specific period. It reveals the health of a country's economy. It is meaningful to study a country's GDP when it has been dramatically affected by COVID-19 and give suggestions on recovering the economy.

The United Kingdom, one of the top five GDP earners worth studying, has always been sustaining its GDP level until the outbreak of COVID-19 when its figure was undergoing a significant drop. This has triggered a discussion, among academics, concerning how to appropriately measure UK GDP and other relevant indexes or factors that may affect the UK economy. This paper aims for spotting some of the essential measures, indexes, or factors mentioned in the following literature section. Based on the UK GDP data ranging from 1995 to 2021, and explores the relationship between UK consumption, investment, and the UK economy.

HP filter is used in the research to determine the overall trend of data collected from the IMF. To summarize, stimulating investment to increase GDP growth is effective in

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the short run; however, only encouraging consumption can lead to GDP growth in the long run.

2 Literature Review

This paper examines the correlations and standard deviation regarding UK GDP. A higher value of Cyclical Component Correlation indicates a tighter relationship between consumption and a particular nation's GDP. In addition, the standard deviation, shortened as 'SD,' is often referred to as the fluctuation range based on the average line. In this essay, UK GDP will be used as a subject of study. Research concerning the various approaches to measuring UK GDP will first be mentioned. In this category of study, abundant literature is now available. Venetia et al. propose early estimates, referred to as 'nowcasts,' of GDP growth, a more practical approach by Bank staff than a simple statistical model, to address the lagged published official estimates of UK growth [1,2].

In order to accurately assess UK's inflation and output, Alina et al, initiated time-varying parameters playing a role in predicting inflation, output growth and a short rate for enhancing the relationship between conventional economic models and studying UK GDP [3,4]. Anita et al examine in their paper the type of additional funds that are required for the UK, during the current COVID-19 pandemic, to resolve the issues of acute shocks and major threats to public health, and the same paper reports that a similar growth, at least, is needed to improve the overall level of social care [5,6]. Catherine, however, in her writing adopts a model taking into account two specific indexes and survey data from various sectors and focuses on a new leading measure of estimating quarterly authentic GDP rise, based on monthly or daily data analysis[7]. The same paper concludes that the indicator merely offers a limited extent of satisfactory predictions concerning GDP fluctuations on a seasonal basis, though it introduces two coincident variables to guarantee the stability of the equation mentioned within. Based on the above discussion, it is apparent that UK GDP can in fact be assessed in various ways, and taking these measures into consideration implications can be obtained, particularly during current epidemics.

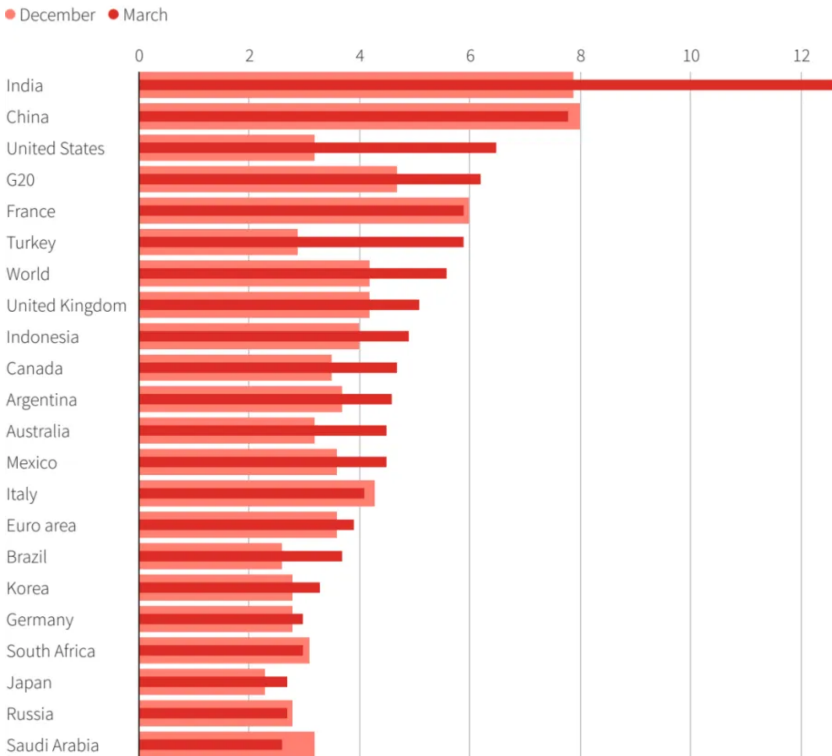

Fig. 1. GDP growth forecast for 2021[8].

The Figure 1 shows the OECD's 2021 annual growth estimates (change from the previous year) (December 2020 estimates in light red, March estimates in dark red). While vaccinations will help the global economy, the impact of the $1.9tn US stimulus package will spread to other countries, adding more than 1 percentage point to global growth.

The OECD said the US economy would grow 6.5 per cent this year and 4.0 per cent next year, up from its December forecast of 3.2 per cent and 3.5 per cent. The OECD estimates that the US stimulus will boost output by about 3-4% on average in the first full year after its introduction. The stimulus package is expected to create up to 3m jobs by the end of the year as public money flows into the economy, but it is also likely to add an average of 0.75 percentage point to annual inflation over the first two years.

At the same time, the stimulus will be a boon to major U.S. trading partners, adding between 0.5 and 1 percentage point to growth in Canada and Mexico, and between 0.25 and 0.5 percentage point to the euro zone and China. The OECD expects euro area GDP

to grow 3.9 percent in 2021 (up 0.3 percentage points from its December forecast) and 3.8 percent in 2022 (up 0.5 percentage points from its December forecast). The OECD forecast UK GDP growth of 5.1 per cent in 2021 (up 0.9 percentage points from its December forecast) and 4.7 per cent in 2022 (up 0.6 percentage points from its December forecast). The OECD believes global GDP should be higher than pre-pandemic levels by mid-2021, although not all countries will be able to do so.

3 Methodology

In this research, a few concepts and equations are used. GDP refers to gross domestic product, which includes consumption, investment, government spending and net export. Correlation tells the degree of how two variables move in relation. Usually, when the value of correlation approaches 1 or -1, the two variables are more closely related to each other. The standard deviation is a quantity expressed by how much the members of a group differ from the mean value for the group. It measures the amount of variation or dispersion of a set of values. The trend is the overall direction of a market or an asset's price. The cyclical component is defined as the difference between the real and the trend component of GDP. The formula that connects the two is cyclical component= real component - trend component/trend component. Another important method used in the research is the HP Filter This data-smoothing technique is applied to remove the short-term fluctuations associated with business cycles in analysis. The data used in the research is collected from International Financial Statistics (IFS) as shown in Table 1.

Table 1. Date of consumption and investment [Owner-draw].

Consumption SD / GDP SD	1.15
Investment SD / GDP SD	2.06
GDP&Consumption Cyclical Component Correlation	0.958
GDP&Investment Cyclical Component Correlation	0.898

4 Results and discussion

First of all, based on UK GDP from 1995 to 2021in UK government we find that the standard deviation between U.K.'s consumption Cyclical Component and GDP Cyclical Component is nearly 1.15, meanwhile, the standard deviation between U.K.s' Investment Cyclical Component and GDP Cyclical Component is around 2.06, which delineates that the fluctuation between Investment Cyclical Component SD and GDP Cyclical Component SD (2.06times) is much greater than the Consumption and GDP (1.15times). What's more, in this case, during the recessional time, the U.K government is being advised to promote consumption rather than investment in the long run, since the consumption will approximately increase to a similar extent to the U.K GDP.

Moreover, the correlation between U.K. GDP and Investment shows a relatively weaker relationship around 0.898. Last but not least, the government might boost investment in the short run, because the fluctuation of U.K. investment is more drastic, so promoting investment will be more effective to increase GDP in a short period.

In our opinion, in the future, the UK government may increase investment in the short term to quickly promote the recovery of the UK economy, but in the long term, the UK government will continue to encourage consumption so as to better drive the growth of GDP.

According to the UK government's practice after the 2008 economic crisis, investment in the UK picked up in the short term until 2017, and the growth of consumption gradually accelerated in the same period. Together, they have led to a steady increase in UK GDP. This point is distinctly reflected in the novel coronavirus19 pandemic in 2020. Compared with 2019, the consumption amount of the UK in 2020 decreased significantly (-9.3%), which also led to a significant decline in GDP. On the contrary, the economic globalization from 2000 to 2007 enabled consumers to obtain cheaper and high-quality products, which stimulated the improvement of consumption level and drove the annual steady growth (1.9%/ever year) of the GDP for the UK until the financial crisis in 2008. The data shows the correlation between GDP and Consumption Cyclical Component of the U.K. from 1995 to 2021 which is 0.958, which means that the movement of GDP and consumption had a strong relationship, while GDP increases, consumption as a part of the GDP will always increase.

5 Conclusion

According to the UK government's development of the UK economy, increasing investment in the short term is conducive to improving the level of economic development and promoting the recovery of GDP. However, GDP growth can only be sustained in the long run by boosting consumption. Therefore, investment is the benefit of promoting the recovery of GDP in the short term, and consumption is the benefit of improving GDP in the long term.

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All authors contributed equally to this work and should be considered co-first authors.

References

1. Bell, V., Stone, S., Wah Co, L., &Wallis, G., (2014).Nowcasting UK GDP growth.
2. Barnett, A., Mumtaz, H., & Theodoridis, K. (2012). Forecasting UK GDP Growth, Inflation and Interest Rates under Structural Change: A Comparison of Models with Time-Varying Parameters. SSRN Electronic Journal.
3. F Barsoum. (2011). How useful is financial market data in forecasting uk real gdp.

4. Siliverstovs, B. . (2009). Are business tendency surveys useful for short-term forecasting of gdp? real-time evidence for switzerland.
5. Charlesworth, A., Anderson, M., Donaldson, C., Johnson, P., Knapp, M., McGuire, A., McKee, M., Mossialos, E., Smith, P., Street, A., & Woods, M. (2021). What is the right level of spending needed for health and care in the UK? The Lancet, 397(10288), 2012–2022.
6. Johnson, M. , & Cullen, J. . (2000). Solidarity put to the test: Health and social care in the UK.
7. Charpin, F., & Mathieu, C. (2004). A New Leading Indicator of UK Quarterly GDP Growth
8. Tencent. (2021) 2021 GDP Growth forecast: India first, US third, China?. https://new.qq.com/rain/a/20210310a07vrc00.

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