INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION & MANAGEMENT

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THE U.S. ECONOMIC GROWTH AND FORECAST FOR THE ECONOMY'S FUTURE

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ABSTRACT

In this study, the path of the U.S. Economy through 1948-2013 observed and its growth rate is analyzed. The study tries to figure out the reasons for slowdown of the U.S. economic growth. It further analyzes the long term trend of economic growth in the U.S. economy and attempt to forecast growth into the near future. The study undertakes econometric methods in modeling the path of the U.S. economy, estimating economic growth and forecasting the future economic path.

KEYWORDS

gross domestic product, path of the economy, business cycles, employment, capital, growth accounting, growth forecast.

JEL CODES

O51, F59, E44.

INTRODUCTION

Looking back into the history, there were many times when the U.S. economy significantly grew and flourished. But there were also times when the economy declined or had recession. In spite of quite a few recessions in U.S. history, the county's economy has grown substantially overall. This study will analyze the U.S. economic growth since 1948, the growth rate of the economy and the long term trend of economic growth in the U.S. Going further, the study also attempts to forecast growth into the near future. Modeling the U.S. economy path, estimating economic growth and forecasting is carried out using econometric techniques.

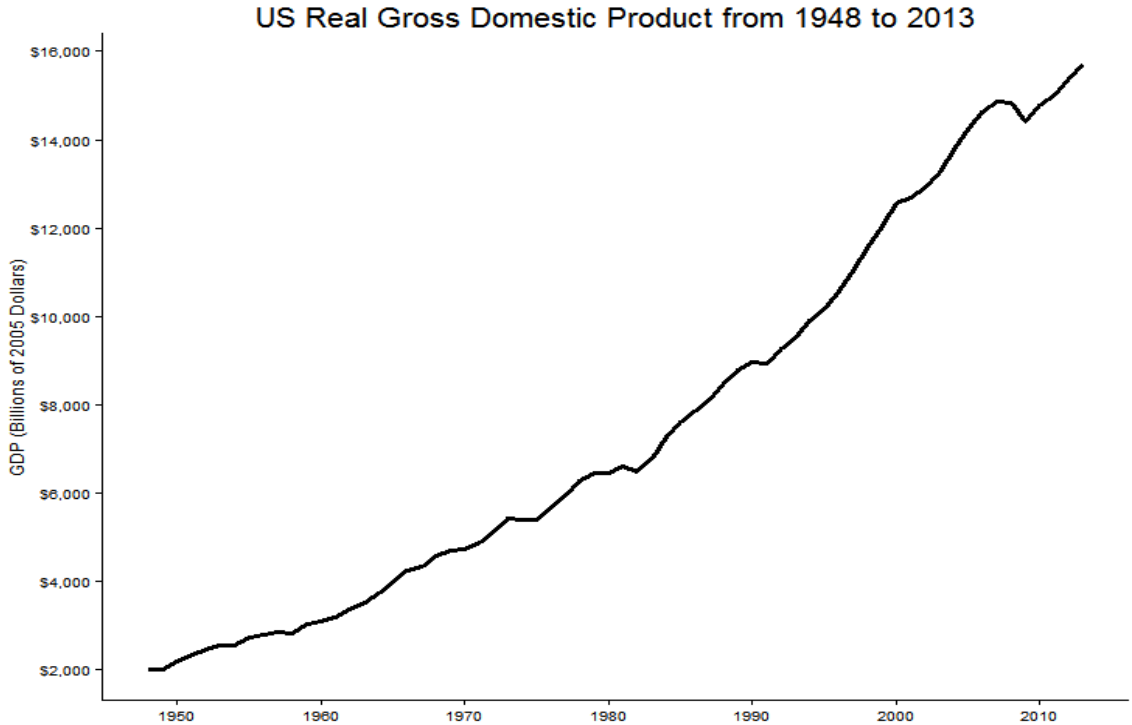
DATA DESCRIPTION

All the data series included in the analysis of this study can be described as follows: The U.S. Gross Domestic Product (GDP) will be used as a measure of the performance of the US economy. Specifically, real GDP (RGDP) will be used to measure the performance of the economy after adjusting for inflation. Employee compensation (COMP), full-time employment (EMP), capital stock (CAP), and capacity utilization (UTIL) will be used as explanatory variables to determine their interaction with real GDP. These variables play a major part in the national accounting model in economics where total output (RGDP) is equal to the sum of consumption, investment, and government spending.

THE PATH OF THE U.S. ECONOMY

Following figure depicts real GDP from 1948 to 2013. There exists an increasing trend over the entire time period. Beginning at $2.02 trillion in 1948, it reaches $16.77 trillion in 2013; thus growing more than eight times the level of GDP in 1948. To compare any two years during this time period, it is facilitated by equating the value of the US dollar from each year to the value of the dollar in 2005 i.e. using real GDP.

GRAPH 1



To account for average growth of the real GDP, a mathematical model, particularly the second order exponential model can be used. From the general understanding, the rate of growth of real GDP may not be constant. Using second order exponential model, it can be tested whether the growth rate is constant or not. Thus the second order exponential model is given as follows:

$$y_t = y_0 e^{r_1 t + r_2 t^2}$$

This model allows the growth rate to either increase or decrease which appears to be more practical. Above Equation can be linearized by using natural log as follows:

$$\ln(y_t) = \ln(y_0) + r_1 t + r_2 t^2$$

Using the linearized equation, the results of the regression are obtained as:

$\ln(RGDP) = 7.565a + 0.0417t - 0.0001t^2$ $R^2 = .9972$

(0.013)*** (0.0009)*** (0.0000)***

The results are a bit complicated to interpret. Here, the estimated values of r_1 and r_2 must be considered together. The first coefficient (r_1) shows that real GDP grew by 4.17% in 1949, the second coefficient (r_2) shows that that the growth rate decreases by 0.01 percentage points per year. The growth rate is not assumed to be constant here. Thus, even though the rate of growth in real GDP is estimated to be positive, it increases with a decreasing rate. The growth rate changes from year to year and it is no longer constant. Differentiating with respect to time gives an equation to find the estimated growth rate of a given year. This shows that there is not one value for the growth rate, but that the value is different depending on the time period

U.S. BUSINESS CYCLES

Taking the difference between the second order exponential model and the real GDP allows to de-trend the data, thus emerging with a picture of business cycles in the U.S. as shown in following figure. The path estimated by the regression represents the long term trend. Whenever actual real GDP is above the model path, the economy is doing better than average. On the other hand, when the actual path moves below the model, the economy is doing worse than average.

GRAPH 2

The peaks and troughs in the de-trended series above, depict the business cycles in the U.S. economy.

EXPLAINING AND FORECASTING ECONOMIC GROWTH

The real GDP is assumed as the primary indicator of the performance of a national economy in this study. As the real GDP growth has been determined to be non-constant, this study tries to disintegrate the real GDP growth into the factors playing a key role in determining its growth. Economic theory suggests that real GDP is explained by the levels of technology, labor and capital. The relationship of these factor is typically described by a Cobb-Douglas production function denoted as:

$Y = (AL)^{\beta} K^{\alpha}$

By linearizing equation we get, $g_Y = \beta g_A + \beta g_L + \alpha g_K$

Regressing g_Y on g_L and g_K yields:

$g_Y = 0.018 + 0.406 g_L + 0.249 g_K$ $R^2 = 0.8561$

(0.018)*** (0.077)*** (0.031)***

The estimates for the share of output that each factor contributes to real GDP can be obtained using the above results. A method of substituting the average growth rates of labor and capital from equation and dividing each term by the average growth rate of real GDP is provided by growth accounting.

TABLE 1: GROWTH ACCOUNTING

Output	Technology	Labor	Capital
3.16%	1.83%	0.60%	0.72%
100.00%	**58.04%**	**19.06%**	**22.90%**

Growth Accounting indicates that technological growth constitutes for 58.04% of the growth in output, labor growth constitutes for 19.06% and capital growth constitutes for 22.90%. This shows that technological growth has the majority impact on output growth compared to the other two factors, and capital growth contributes slightly more than labor growth.

Technological growth being a key factor in determining output growth rate in this model, thus expanding the technological growth model to allow further possible change would be given as:

$A = a_0 e^{r_1 t + r_2 t^2 + r_3 t^3 + r_4 r^4}$

Regressing of this model yields:

$g_Y = 0.0296 - 0.0012t + 0.00004t^2 - 0.0000004t^3 + 0.3641 g_L + 0.2548 g_K$ $R^2 = 0.8834$

(0.004)*** (0.001)** (0.000)* (0.000)** (0.074)*** (0.029)***

Thus, this model indicates that when accounting for changes in the growth rate of technology, a 1% increase in labor leads to a 0.36% increase in output and a 1% increase in capital leads to a 0.25% increase in output. The R^2 value indicates that the model explains 88.34% of the variation in the growth rate of real GDP. This model has the high explanatory power (R-square value) compared to most other models.

CONCLUSION

From this study, it can be seen that the output of the U.S. economy is growing currently at the rate of about 3%. However, the output growth is slowing and is predicted to go down further in the coming future. Disintegrating output growth, it is understood that the technological growth plays a vital part in contributing the output growth and the remaining share is held by the labor & capital growth. The technological growth rate is also further analyzed and forecasted. The forecast depends upon the model selected. Proceeding further, a concept of profit maximization, which is more common in micro-economics, is also brought into picture and analyzed.

From all the above procedures, it can be inferred that keeping the technological growth rate away from declining sharply i.e. by investing more funds into research and developmental sectors and supporting innovations would most likely keep the technological growth rate up. And as the technological growth rate plays a key role in maintaining the output growth rate of the economy, maintaining technological growth would interpret into maintaining output growth. Managing capital and labor growth rates would also complement the growth of output.

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