Business Cycle: Is next Depression coming in the United States?

Cheng-Lin Li[1], YuCheng Guo[1], and Sovan Rath[1]

University of Southern California, CA 90007, USA,
chenglil@usc.edu,yuchengg@usc.edu,sovanrat@usc.edu,
Project page: https://github.com/INF554Fall17/project-i2i

Abstract. Despite the stock market keeps climbing in the United States, the growing number of financial institutes warn the next economic depression may come in next few years. This paper will particularly base on the business cycle theory to examine the S&P500 index which is widely used in the field of financial industry to evaluate the health status of economic activities in the United States. According to the results, existing stock markets is in Boom stage and the depression may come in next two to three years.

Keywords: Prediction, Business Cycle, S&P500, GDP, Depression, the United States economic.

1 Introduction:

S&P 500 closes at record high, hits 2,600 for the first time as tech rallies on Nov 24, 2017, the 7th milestone in 2017. The Dow, and NASDAQ hit record highs in 2017 too.

The phenomenon of overheat stock market in the United States is the motivation to develop the project to proof the concern of next depression in economic activities. S&P 500 index is a widely used evaluation index for the health status of the United Status. Morgan Stanley Capital International Index (MSCI) World index is a common benchmark for global to evaluate economic variation of each country. GDP growth rate and GDP contribute of each industry can be used to measure the variation of each country and impact to industries.

1.1 The Business Cycle Theory

In 1860 French economist Clement Juglar first identified economic cycles 7 to 11 years long, although he cautiously did not claim any rigid regularity.[6]In the mid-20th century, Schumpeter and others proposed a typology of business cycles according to their periodicity, so that a number of particular cycles were named after their discoverers or proposers[7]:

For example, the fixed-investment cycle of 7 to 11 years by Juglar (often identified as "the" business cycle), the Kuznets infrastructural investment cycle of 15 to 25 years (after Simon Kuznets also called "building cycle"), and the Kondratiev wave or long technological cycle of 45 to 60 years (after the Soviet economist Nikolai Kondratiev).[8]

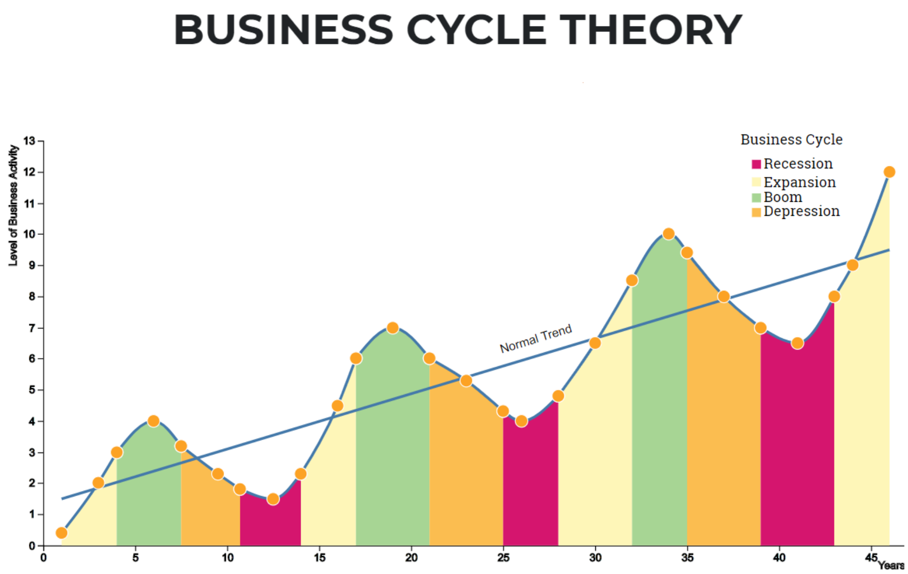

Fig. 1. Infographic to understand the theory of Business cycle.

1.2 Standard and Poor's 500 (S&P 500) Index

The Standard and Poor's 500, often abbreviated as the S&P 500, or just the S&P, is an American stock market index based on the market capitalizations of 500 large companies having common stock listed on the NYSE or NASDAQ. The S&P 500 index components and their weightings are determined by S&P Dow Jones Indices. It differs from other U.S. stock market indices, such as the Dow Jones Industrial Average or the NASDAQ Composite index, because of its diverse constituency and weighting methodology. It is one of the most commonly followed equity indices, and many consider it one of the best representations of the U.S. stock market, and a bellwether for the U.S. economy. The National Bureau of Economic Research has classified common stocks as a leading indicator of business cycles.[11]

1.3 Morgan Stanley Capital International Index (MSCI)

MSCI indexes includes a collection of stocks of all the development countries in globe. The index includes securities from developed, emerging and frontier economies markets.[12]

1.4 GDP Change Rate

Gross domestic product (GDP) is the monetary value of all the finished goods and services produced within a country's borders in a specific time period. Though GDP is usually calculated on an annual basis, it can be calculated on a quarterly basis as well (in the United States, for example, the government releases an annualized GDP estimate for each quarter and also for an entire year). GDP includes all private and public consumption, government outlays, investments,private inventories, paid-in construction costs and the foreign balance of trade(exports are added,imports are subtracted). Put simply, GDP is a broad measurement of a nations overall economic activity the godfather of the indicator world. GDP helps to understand the valuation each industry adds to the economy and how the business cycle affects each industry individually. Change in GDP over the years describe the overall health of a country's economy and is used as a visualization tool to understand the economy.

1.5 The Fact of Existing Stock Market in the United States.

This project adopts a number of mental models to better understand markets and the world. These models, such as Debt Cycle theory, the Capital and Kuhn Soros cycle, and the Five Sentiment Stages of a bull market, amongst others, The other valuable mental model, called the Investment Clock is widely used. This clock first introduces to the idea in a research paper put out by Merrill Lynch. Its a simple yet useful framework for understanding the various stages of a business cycle and which asset classes perform best in each stage. A similar framework is used at Bridgewater Associates, one of the most successful hedge funds of all time. The concept can be applied to the current market to see which assets are likely to perform best going forward. The Investment Clock splits the business cycle into four phases. Each phase is comprised of the direction of growth and inflation relative to their trends.

2 Approach

The audience of this project are individual investors. Leverage the power of visualization, this project present the business cycle with evidents to convince audience to believe next Depression may come in few years.

2.1 Previous and Related Work

Except business cycle suggests a spatial analysis of the cycle. The other theory, Dragon King Theory, provides a model based on exponential growth of the observations like prices or indices to evaluate the market[2]. Recently works from Quantitative Finance and Economics focus on the Volatility from most famous 40 historical bubble to detect the signal of recession[1]. The Financial Crisis Observatory (FCO) [4] and the website provide a regular release of their observation report to publics.

2.2 Spatial Analysis

This project provide a different perspectives, combine observation growth and spatial relationship between business stages to provide predictions and impacts via a information visualization system to evaluate the stage of current market in the United States.

2.3 Design and Forms.

First of all, four famous bubbles was presented by donut charts with redundancy. Secondly, by leveraging comparison of line charts, the two charts show the business cycle theory and the trend of S&P 500 by familiarity and density. Third, presenting the globe economic trend by choropleth chart with bar chart for multidimensionality and Figuration. Last but not least, adopting heat map presents the cycle by functionality.We have also added a stream chart to present the information formidably. Please refer figure2

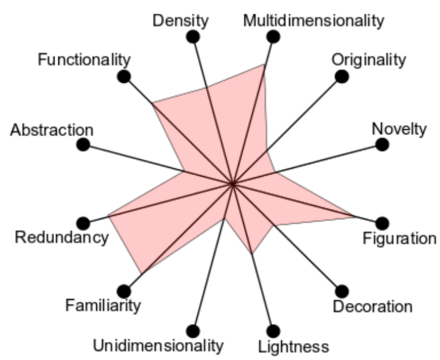

Fig. 2. The visualization wheel presents the design and forms

Several visual cues were well thought in accordance to the classroom lecture and reading material. Information was presented in a palatable format to put easy comprehension. Further information was provided with enough layers to provide an intellectual sense of accomplishment for the person comprehending the information. Information was provided to make the data palatable for the audience; with due attention being given to not to make the information boring or mundane.

2.4 Data

1. S & P index US (1950 - 2016)[11] 2. MSCI Index of Different Countries (Developed Market, Emerging Markets, Gulf nations, BRICS Nations.) [12] 3. US Industries affected during 2001 (Dot com bubble burst and 2008 Housing bubble).[10].

interactivity and responsiveness. The models include S&P500 with line chart and sliding window to exam the economic trend of the United States in different period, GDP change rate presents by choropleth chart and bar chart to show the changes. MSCI change rate of selected each country presents by head map to evaluate the pattern of changing, and fours animation donut charts to demonstrate the serious impact by percentage of each disaster in the history.

development plan. The project takes four weeks with 3 man power to compete. First week designs the draft system and perform data collection, second week starts on system development, Third involves critic group to provide feed back and internal testing, the last week focus on design improvements.

2.5 System and Models.

This project includes bootstrap version 4 as responsiveness design framework. Angular version 4 is adopted to implement Model-View-Controller (MVC) design pattern model. D3.js, topojson, d3-scale-chromatic, d3-geo-projection, D3-tip, d3-simple-slider as development tools for the visualization system.

3 Evaluation

Comparing with the S&P500 line chart from 1995 to 2017 with the theory chart, the trend is likely go to boom stage in the United States. Another perspective from the globe, the heat map proofs the cycle of economic activities did exist and next recession may come within 2 to 3 years.

3.1 History Impacts

Variations in investment spending is one of the important factors in business cycles. Investment spending is considered the most volatile component of the aggregate or total demand (it varies much more from year to year than the largest component of the aggregate demand, the consumption spending), and empirical studies by economists have revealed that the volatility of the investment component is an important factor in explaining business cycles in the United States. According to these studies, increases in investment spur a subsequent increase in aggregate demand, leading to economic expansion. Decreases in investment have the opposite effect. Indeed, economists can point to several points in American history in which the importance of investment spending was made quite evident. The Great Depression, for instance, was caused by a collapse in investment spending in the aftermath of the stock market crash of 1929. Similarly, the prosperity of the late 1950s was attributed to a capital goods boom. [9].

4 Conclusion

The project intends to present our audience with a comprehensive insight about business cycle. All those charts provide enough visual cues to fill the audience with a vivid picture about the business cycle. The theory chart, S & P 500 and the MSCI index should help users become informed investors. Further; we hope that the impact of recession on individual industries should provide valuable insight towards diversifying the investment portfolio of a potential investor.

References

1. Didier Sornette, Peter Cauwels and Georgi Smilyanov.: Can We Use Volatility to Diagnose Financial Bubbles? Lessons from 40 historical bubbles. Quantitative Finance and Economics, 9–10, 20–26 (2017)
   https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3006642
2. Didier Sornette, and Guy Ouillon.: Dragon-kings: mechanisms, statistical methods and empirical evidence. The European Physical Journal Special Topics 205.1, 1–26, (2012) http://en.wikipedia.org/wiki/Dragon_King_Theory
3. Didier Sornette, Peter Cauwels.: Financial bubbles: mechanisms and diagnostics. ETH Zurich, 15 (2014)
   https://arxiv.org/ftp/arxiv/papers/1404/1404.2140.pdf
4. Website.: Financial Crisis Observatory website.
   http://www.er.ethz.ch/financial-crisis-observatory.html
5. Rabinowitz, P.: On subharmonic solutions of a Hamiltonian system. Comm. Pure Appl. Math. 33, 609–633 (1980)
6. M. W. Lee: Economic fluctuations. Homewood, IL, Richard D. Irwin (1955)
7. Schumpeter, J. A. History of Economic Analysis. London George Allen & Unwin (1954)
   https://www.investopedia.com/terms/g/gdp.asp
8. Kondratieff, N. D.; Stolper, W. F. "The Long Waves in Economic Life". Review of Economics and Statistics. The MIT Press. 17 (6): 105115. doi:10.2307/1928486. JSTOR 1928486 (1935)
   https://www.investopedia.com/terms/g/gdp.asp
9. Volatility of Investment Spending.
   https://www.inc.com/encyclopedia/business-cycles.html
10. Bureau of Economic analysis.
    https://www.bea.gov/industry/factsheet/
11. S&P 500.
    http://us.spindices.com/indices/equity/sp-500
12. MSCI Index.
    https://www.msci.com/end-of-day-data-search