

# Impact of Coronavirus Disease (COVID-19) towards Economy and Vaccine Industry

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Received: 05 Nov 2020;

Received in revised form:

18 Jan 2021;

Accepted: 04 Feb 2021;

Available online: 12 Feb 2021

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**Keywords**— COVID-19, Economy, Vaccine,  
Supply-demand curve, Market equilibrium.

**Abstract**— As 20 January 2021, there have been 94,963,847 confirmed cases of COVID-19, including 2,050,857 deaths, reported to World Health Organization (WHO). The outbreak of coronavirus disease (COVID-19) creates significant impact to economy activities in worldwide. Most economic sectors including tourism industry facing with difficulties during the outbreak of COVID-19. The COVID-19 outbreak creates negative effect and slow down all economic activities in worldwide. This disease spread easily that transmitted through droplets generated when an infected person coughs, sneezes, or exhales. Therefore, in surviving for global economy, a few pharmaceutical companies developing vaccine to cure the disease. Vaccines function by training and preparing the immune system of human body, to recognize and fight off the target viruses and bacteria. If the body is exposed to those disease-causing germs later, the body is immediately ready to destroy them, preventing illness. This paper analyzed the demand-supply of COVID-19 vaccine towards price and quantity. Result shows the increments in demand for vaccine, creates increments in price of vaccine. The finding of this study is important for policy maker to develop proper strategy in monitoring vaccine implementation including the price behavior.

## I. INTRODUCTION

The increasing number of COVID-19 cases give a big impact on the industry sectors worldwide. As reported by World Health Organization (WHO), on 20 January 2021, the total confirmed cases of COVID-19 are 94,963,847 cases with the deaths cases is 2,050,857 cases. Thus, this number indicates the crucial level of economic and social impact toward COVID-19 pandemic. Therefore, a new strategic are needed in order to overcome the problem happened such as unemployment rate, bankruptcy and social impact. Many efforts have been done to reduce the spread of COVID-19 such as Movement Control Order (MCO) (Abu Bakar and Rosbi, 2020a), moratorium schemes, tax incentives and others. However, the number of COVID-19 cases is still increased. Therefore, several research teams were developed a vaccine that can protect human from COVID-19 virus. The main function of

vaccine is to prevent diseases that can be dangerous, or even deadly. Vaccination is important to stop the COVID-19 pandemic with help reduce spread of COVID-19 in communities.

The spread of COVID-19 worldwide give impact on the demand for COVID-19 vaccines. The high demand for COVID-19 vaccines give opportunities to vaccines' industry to develop a good quality of vaccines as soon as possible for protect human from suffer with COVID-19 virus. Thus, pharmaceutical companies involved in the vaccine enterprise play critical and often unrecognized roles in the global health management arena (Gordon and Robertson, 2017).

## II. LITERATURE REVIEW

COVID-19 give impact into all industry worldwide (Abu Bakar and Rosbi, 2020; Abu Bakar and Rosbi, 2020).

Therefore, a new vaccine needs to be introduced in order to reduce the high number of COVID-19 cases. According to WHO, researchers are trying to develop a vaccine of COVID-19 and WHO is supporting their efforts. This vaccination is highly recommended to protect human from COVID-19 virus. As suggested by Abu Bakar and Rosbi (2020) government need to improve their policy in order to be more effective and appropriate towards combating the spreading of COVID-19.

Pharmaceutical companies that are permissible to develop COVID-19 vaccine are Novavax, AstraZeneca, Johnson & Johnson, Sanofi & GlaxoSmithKline, Moderna and Pfizer & BioNTech. These pharmaceutical companies need to supply COVID-19 vaccine globally. Therefore, the demand for COVID-19 vaccines is high due to demand from worldwide country.

### III. IMPACT OF COVID-19 TOWARDS ECONOMY

The outbreak of COVID-19 gives significant negative impact towards economy activities in global level. The COVID-19 intensely damaging effects on both the country macroeconomy as well as on the economic welfare of the citizen. The sources of economic damage are two factors namely the first is the knock-on effect from the impacts of the coronavirus abroad, the second is generated domestically due to the newly-imposed movement control measures (Chudik, et al., 2020).

This pandemic COVID-19 devastating effects on the economy from both external factors (namely global supply and demand shocks) and domestic factors (considered for movement control order). Therefore, this factors disproportionately impact smaller businesses and vulnerable groups such as lower-income individuals and workers. Due to this scenario, many countries facing with high unemployment rate that reaching at alarming level.

The infection of COVID-19 not only considered become a public health crisis but also affected the global economy in critical level. Significant economic impact has already occurred across the globe due to reduced productivity, loss of life, business closures, trade disruption, and decimation of the tourism industry. The crisis highlights the need for urgent action to cushion the pandemic's health and economic consequences, protect vulnerable populations. The economic crisis ensuing from COVID-19 involves practically all the countries of the world and recovery is expected to take a long time.

The COVID-19 pandemic considered as a global shock that involving simultaneous disruptions to both supply and demand in an interconnected of globally for world economy activities. The negative impacts towards economy such as low demand for economic products. On

the supply side, infections reduce labor supply and productivity, while lockdowns, business closures, and social distancing also cause supply disruptions. On the demand side, layoffs and the loss of income (that generated from morbidity, quarantines, and unemployment) and worsened economic prospects reduce household consumption and firms' investment.

The effect of COVID-19 towards economy was illustrated using the movement of price index in S&P 500. Figure 1 shows the dynamic behavior of market price during outbreak of COVID-19. The S&P500 is a stock market index that measures the stock performance of 500 large companies listed on stock exchanges in the United States. The S&P500 is one of the most commonly followed equity indices in global level. The observation periods were selected in February and March 2020. The initial value of observation is 3248.92 on 3<sup>rd</sup> February 2020. The last observation shows the value of 2584.59 on 31<sup>st</sup> March 2020. The maximum value of market price index on 19<sup>th</sup> February 2020 (12th observation period). The minimum value of market price index is 2237.40 on 23<sup>rd</sup> March 2020. The percentage of change for market price index is -33.93 %. Therefore, the significant drop of index value indicates the outbreak of COVID-19 shows negative impact for economy activities at global level.

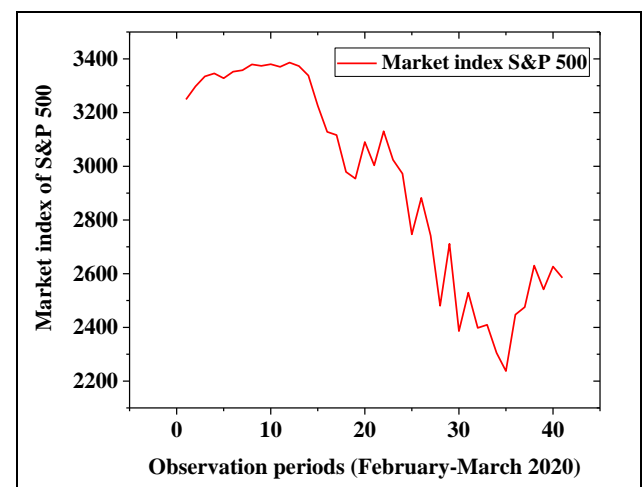


Fig. 1: Dynamic behavior of S&P500 during COVID-19.

In solving these issues, the government in global level started to provide economic stimulus packages in combating the economic issues. In the same time, government in countries provided more options to their citizens to participate in new job opportunities as digital commerce and electronic marketing segment to re-vitalize the economic situation. The financial sectors also offer lower interest rates to increase economic activities.

**IV. DEVELOPMENT OF COVID-19 VACCINE**

The COVID-19 can be infected by breathing in the virus if humans are within close proximity of someone who has COVID-19, or by touching a contaminated surface and then their eyes, nose or mouth. Most common symptoms for human that affected by COVID-19 are fever, dry cough and tiredness. COVID-19 is caused by infection with a new coronavirus (called SARS-CoV-2) and flu is caused by infection with influenza viruses.

Vaccines work by mimicking the infectious bacteria or viruses that cause disease. Vaccination stimulates the body’s immune system to build up defenses against the infectious bacteria or virus (organism) without causing the disease. The parts of the infectious organism that the immune system recognizes are foreign to the body and are called antigens. Vaccination exposes the body to these antigens (Vaccine Development – 101 (2021).

Some vaccines contain weakened versions of a bacteria or virus, other vaccines contain only part of the bacteria or virus. Some vaccines contain only the genetic material for a specific protein and direct the body to produce a small amount of that protein. The body’s immune system reacts defensively once it detects this protein.

After vaccination, the immune system is prepared to respond quickly and forcefully when the body encounters the real disease-causing organism.

The fundamental scientific advances that make vaccine development possible arise from basic research. The full implications and ultimate applications of discoveries made in the basic research laboratory may be unanticipated, even by the investigators involved. Basic research relevant to vaccine development includes such things as the identification and isolation of the protective antigens of a specific pathogen, methods for DNA cloning, the creation of new vector systems, and the development and immunologic evaluation of new adjuvant systems (6 Stages of Vaccine Development (2021).

The health committee believes that priority setting and characterization of desired vaccine products is a critical stage of vaccine development, particularly for vaccines of low commercial interest but acute public health need. In this regard, the committee urges all groups involved in vaccine R&D for international public health applications to focus on a common and complementary set of vaccine priorities (World Health Organization, 2021)

Good vaccines must meet basic criteria of safety, purity, potency, and efficacy. When a product has completed preclinical studies (usually involving animal models) and the sponsor is considering clinical trials in humans, an Investigational New Drug (IND) application is submitted to the U.S. Food and Drug Administration

(FDA). The IND application contains information on the vaccine's safety, purity, potency, and efficacy.

The development stage for each COVID-19 vaccine under development must first undergo screenings and evaluations to determine which antigen should be used to invoke an immune response. This preclinical phase is done without testing on humans. An experimental vaccine is first tested in animals to evaluate its safety and potential to prevent disease. If the vaccine triggers an immune response, it is then tested in human clinical trials in four phases as shown in Figure 2.

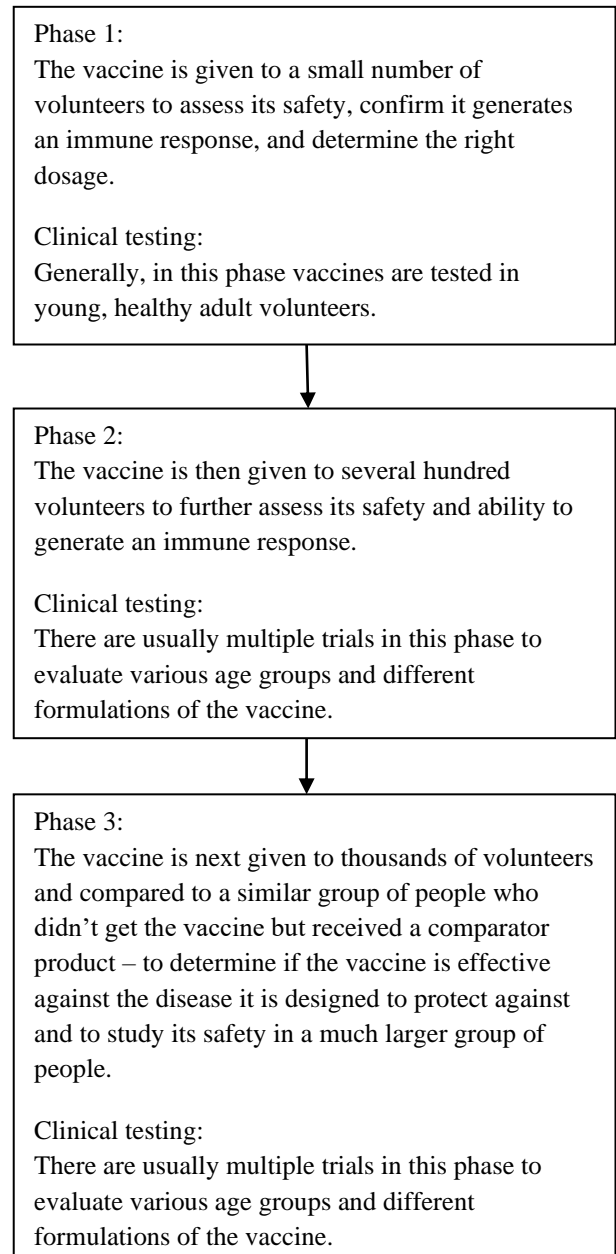


Fig. 2: Clinical Phases of Vaccine Research

**V. ANALYSIS OF SUPPLY AND DEMAND CURVE**

Outbreak of Coronavirus disease (COVID-19) affected all economic activities in worldwide. Therefore, a solution need to develop for combating this disease. A few companies develop vaccine in trying to solve this problem. The entity that involved in developing the vaccine is pharmaceuticals companies, government and medical and health organization. As market-authorized COVID-19 vaccines become available, specific recommendations for the use of these vaccines will need to be issued. The vaccine cooperation framework is important to offer guidance for considering data emerging from clinical trials in support of issuing vaccine-specific evidence-based recommendations. This information is valuable to countries and regions developing COVID-19 vaccination recommendations.

This study evaluated the economic impact of coronavirus disease(COVID-19) using demand and supply curve. The supply function is the ability and willingness of the firms to sell a specific quantity of a good or service at a given price in a given time period. Meanwhile, the demand function shows the relation between the quantity demanded of a commodity by the consumers and the price of the product (Cheng, 2020).

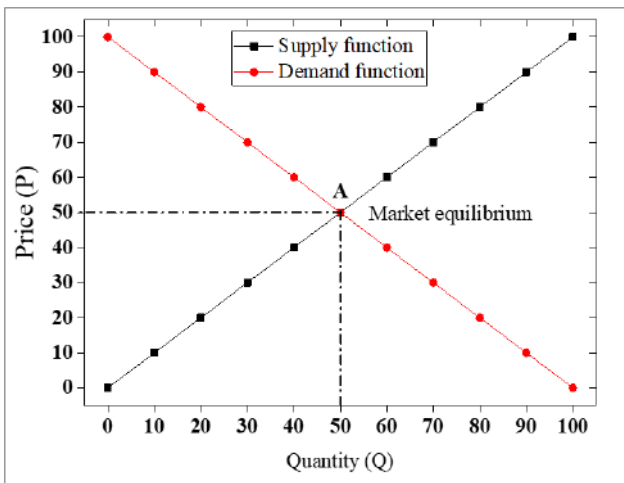


Fig. 3: Demand -Supply Curve for Vaccine

The price of a product is determined by the interaction of supply and demand in a market. The resulting price is referred to as the equilibrium price and represents an agreement between producers and consumers of the good. In equilibrium the quantity of a good supplied by producers equals the quantity demanded by consumers.

Figure 3 shows the market equilibrium for vaccine industry. In normal situation, the equilibrium is a state in which market supply and demand balance each other, and as a result, prices become stable. In this study, the price of vaccine is set at 50, and in the same time the value of

quantity is considered as 50. This value developed for understanding the mechanism of COVID-19 impacts towards vaccine industry.

However, the occurrence of coronavirus disease (COVID-19) changed the landscape of economic for vaccine industry. The COVID-19 give negative impact to all of sector of industries in worldwide. Therefore, an urgent solution need to be developed in combating this issue. Therefore, a few pharmaceutical companies increased facilities and capital to develop COVID-19 vaccine. The development of this vaccine is to re-align the economic activity to be same as before the pandemic outbreak (Principle of Economics, 2021).

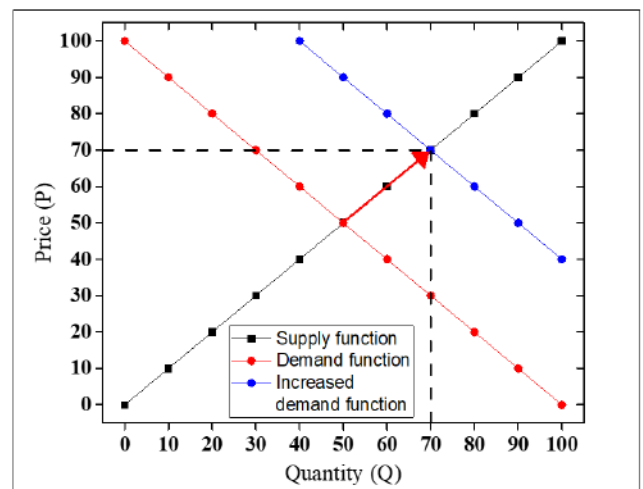


Fig.4: Demand -Supply Curve for Vaccine during COVID-19 outbreak

Figure 4 shows the demand and supply curve that after the COVID-19 outbreak towards vaccine industry. Figure 4 illustrates the price elasticity of demand for dynamic behavior of economic condition towards vaccine products.

The price elasticity calculation is represented using Equation (1). Price elasticity of demand is an economic measure of the change in the quantity demanded or purchased of a product in relation to its price change. In other word, price elasticity of demand is a measure of how sensitive the quantity demanded of it is to its price.

Price elasticity of demand (PED) illustrated using two main variables namely quantity of product, Q and price of that product, P, as shown in Equation (1).

$$PED = \frac{\frac{dQ}{Q}}{\frac{dP}{P}} \dots \dots \dots (1)$$

Equation (1) indicates the price elasticity of demand is the change in demand for a commodity due to a given change in the price of that commodity.



Based on Figure 4, the calculation of price elasticity of demand is shown in below calculation procedure.

$$PED = \frac{\frac{70-50}{50}}{\frac{20}{50}} = \frac{50}{20} = \frac{0.4}{0.4} = 1 \dots\dots\dots (2)$$

Equation (2) shows the value of price elasticity for vaccine product is 1. Revenue is highest at the quantity where the elasticity equals 1. The price elasticity for vaccine is considered as unitary elasticity means that a given percentage change in price leads to an equal percentage change in quantity demanded or supplied. In other word, the change in the ratio of the price of the vaccine is equal to the change in demand of the vaccine.

The demand for COVID-19 vaccine keep increasing because the total affected patients with this disease keep increasing sharply. Therefore, a mechanism need to accelerate the development and manufacture of COVID-19 vaccines, and to guarantee fair and equitable access for every country in the world.

**VI. CONCLUSION**

Main objective of this research is to evaluate the impact of COVID-19 towards economic and vaccine industry. The findings of this research are:

1. As 20 January 2021, there have been 94,963,847 confirmed cases of COVID-19, including 2,050,857 deaths, reported to World Health Organization (WHO). The outbreak of coronavirus disease (COVID-19) create significant impact to economy activities in worldwide.
2. The effect of COVID-19 towards economy was illustrated using the movement of price index in S&P 500. The observation periods were selected in February and March 2020. The initial value of observation is 3248.92 on 3<sup>rd</sup> February 2020. The last observation shows the value of 2584.59 on 31<sup>st</sup> March 2020. The maximum value of market price index on 19<sup>th</sup> February 2020. The minimum value of market price index is 2237.40 on 23<sup>rd</sup> March 2020. The percentage value of change for market price index is -33.93 %. Therefore, the significant drop of index value indicates the outbreak of COVID-19 contributes negative impact to the economy activities at global level.
3. The value of price elasticity for vaccine product is 1. Revenue is highest at the quantity where the elasticity equals 1. The price elasticity for vaccine is considered as unitary elasticity means that a given percentage change in price leads to an equal percentage change in quantity demanded or supplied.

**ACKNOWLEDGEMENTS**

The authors would like to thank Universiti Utara Malaysia (UUM) and Universiti Malaysia Perlis (UniMAP) for their research facilities support.

**REFERENCES**

- [1] Abu Bakar, N. and Rosbi, S. (2020a). Effectiveness of lockdown policy to control spreading of Coronavirus disease 2019 (COVID-19). *IOSR Journal of Business and Management (IOSR-JBM)*, 22(8), 34-41.
- [2] Abu Bakar, N. and Rosbi, S. (2020). Impact of Coronavirus Disease 2019 (COVID-19) to Equity Market and Currency Exchange Rate. *IOSR Journal of Economics and Finance*, 11 (2), 17-26.
- [3] Abu Bakar, N. and Rosbi, S. (2020). Effect of Coronavirus disease (COVID-19) to tourism industry. *International Journal of Advanced Engineering Research and Science*, 7(4), 189-193.
- [4] Gordon, D.M and Robertson, C.A. (2017). Vaccine manufacturer’s role in the global vaccine enterprise, *International Journal of Health Governance*, 22(3), 161-166.
- [5] World Health Organization (WHO) (2021). Available at: [https://covid19.who.int/?gclid=CjwKCAiA6aSABhApEiwA6Cbm\\_xBklD0dhPP-InJmrLrIBHM6cVhEzGOzpzERfJfAmp0mC7ZxtbpFKRoCWJ4QAvD\\_BwE](https://covid19.who.int/?gclid=CjwKCAiA6aSABhApEiwA6Cbm_xBklD0dhPP-InJmrLrIBHM6cVhEzGOzpzERfJfAmp0mC7ZxtbpFKRoCWJ4QAvD_BwE) (access on 22 January 2021)
- [6] World Health Organization (WHO) (2021). Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019> (access on 22 January 2021)
- [7] Vaccine Development – 101 (2021). Available at: <https://www.fda.gov/vaccines-blood-biologics/development-approval-process-cber/vaccine-development-101> (access on 22 January 2021)
- [8] 6 Stages of Vaccine Development (2021). Available at: <https://www.ncbi.nlm.nih.gov/books/NBK236428/> (access on 22 January 2021)
- [9] Cheng, C. (2020). COVID-19 in Malaysia: Economic Impacts & Fiscal Responses, available at: <https://www.isis.org.my/2020/03/26/covid-19-in-malaysia-economic-impacts-fiscal-responses/> (access on 22 January 2021)
- [10] Chudik, A., Mohaddes, K., Pesaran, M.H., Raissi, M. and Rebucci, A. (2020). Economic consequences of Covid-19: A counterfactual multi-country analysis. Available at: <https://voxeu.org/article/economic-consequences-covid-19-multi-country-analysis> (access on 22 January 2021)
- [11] Principles of Economics. Available at: <https://opentextbc.ca/principlesofeconomics/chapter/5-1-price-elasticity-of-demand-and-price-elasticity-of-supply/> (access on 22 January 2021)