

## ANALYSIS OF CHANGES IN THE PROTECTIVEFACE MASKS MARKET DURING THE COVID-19 PANDEMIC

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**Abstract:** The aim of this article is to portray the evolution of the prices for facial masks. The market analysis covers the changes in supply and demand curves following the public announcement of health precautions caused by the COVID-19.

**Keywords:** supply curve, demand curve, equilibrium price, COVID-19, curve shift, customer behavior, price ceiling, shortage, elasticity, regulation, government

Protective Face Masks Market Overview. In the past, researchers have paid attention to the demand for face masks, but the COVID-19 crisis has brought the issue to the center. There are, basically, 3 types of protective masks: surgical, also known as procedure masks, non-surgical and respiratory masks. Masks were already being worn by healthcare workers, and they are now (mainly) mandated to be worn by all frontline employees. This includes police officers, as well as those working in other related fields. They are being suggested to others, and in some cases, requested of them, particularly in situations where social distance cannot be achieved. In a slightly larger sense, the usage of masks has evolved into a preventative technique that is complimentary to a wide variety of precautions that are advised or regulated across various countries. In 2021 protection face masks market was valued at about USD 16.6 billion, and it is anticipated to expand by 3.3% from 2022 to 2030 (Rupali Swain, 2022). The values associated with procedure masks, such as avoiding contact with dusts, air-borne microorganisms, and other disease-carrying germs, are anticipated to drive market expansion. In addition, increasing public knowledge of the benefits of protective face masks is anticipated to boost the market outlook. In addition, governments such as the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) are encouraging the use of masks in public spaces to prevent the spread of infectious diseases, including the COVID-19 pandemic.

### Major Determinants of Demand for the Facial Masks

In order to avoid the spread of respiratory illnesses, surgical masks and N95 respirators are utilized. They are part of the personal protective equipment (PPE) worn by health care professionals and are distinct from masks intended to guard against pollution or dust. Surgical masks are constructed with a loose fit to collect coughing and sneezing sprays and droplets. N95 respirators fit more snugly and are also capable

of protecting against tiny airborne particles. While N95 respirators are set up to protect the user from diseases, procedure masks are typically worn to limit the spread of pathogens. Although surgical masks do not provide complete protection against the coronavirus, they are advised for health care professionals, especially when both the patient and the worker wear one. As the coronavirus is spread through droplets of fluid from the nose or mouth, face masks are required for health care personnel who have direct contact with infected patients. They can also play a part in limiting the transmission of the infection by coughing, talking, or just breathing. While the initial guideline was to wear masks solely when caring for persons suspected of COVID-19 infection, on April 6, 2020, WHO announced updated guidance on the use of masks for healthy people in community settings, and health authorities are now suggesting a wider application of masks. Meeting the demand for face masks has become a top priority for governments combating the pandemic. In the next phase of the crisis, when lockdowns are gradually lifted and economic activity restarts, while the virus remains a concern, masks may play an even larger role.

Due to the fact that both N95 respirators and face masks are disposable, the demand is both strong and frequent. Their outer surface may become contaminated after use. In addition, moisture from the mouth gradually modifies their filtering characteristics. Masks are consequently only effective for a limited amount of time (4 hours for medical masks and a day for N95 respirators), and there is a danger of contamination while manipulating or reusing them. Therefore, the objective is to provide inexpensive, disposable safety gear that may be discarded and replaced without risk. It has been discovered that reusable masks increase the danger of contamination. Face shields are found not to be practical for a daily use.

#### Major Determinants of Supply of Procedure Masks

The outbreak of COVID-19 has had a detrimental effect on global industrial production, procurement, and logistics. According to the World Health Organization, global face mask production must be raised by 40 percent to meet worldwide demand. The pandemic has already diffused to more than 213 nations, prompting many governments to prohibit the export of protective gear, including face masks (Franssen,2020). As a result, numerous businesses are exerting additional efforts to meet the demand for these surgical masks.

Surgical masks are fundamental and relatively inexpensive products (pre-COVID period). However, their manufacturing process is relatively complex, requiring multiple types of raw materials and the assembly of numerous components (Chellamani, 2013). Oil and metal are the most important inputs to produce non-woven components, metal strips, and ear loops. In addition, paper mash (forestry) is required for packaging cardboard. Metal is necessary only for the nose strips, and a wide range

of metallic materials may be employed. In terms of inputs, the main constraint in the value chain has been polypropylene nonwoven fabric production (Wall Street Journal, 2020).

As a polymer derived from petroleum, Polypropylene (PP) is readily available and one of the most widely produced plastics in the world. In addition to diapers, feminine hygiene products, and disposable wipes, PP non-woven garment is also widely used in the construction and automotive industries. Notwithstanding, PP electret melt-blown non-woven is a specialized fiber that is produced by a small number of companies worldwide due to the high initial investment required for heavy machinery, such as extruders, melt spinning systems and hoppers. For this, it has been even harder to increase supply during the crisis or to find businesses that can change to this manufacturing in a timely manner without requiring huge investments.

Since variety of industries utilizes ultrasonic welding (automotive market), the rest of the supply chain is more available, although assembly still requires specialized machines. Some producers purchase non-woven fabric and simply weld its layers together (in particular, those entrepreneurs who transformed into mask production during the crisis). According to the number of companies in various countries that were capable of switching their production plants, the assembly phase appears to be less of a constraint (OECD,2020). Many new prospective manufacturers are now hampered by the lack of PP non-woven fibers.

In the United States, France, Chinese Taipei, Turkey, Germany, and China, for instance, the demand for mask assembly line machinery has increased, as has the demand for testing machines (the safety of masks is guaranteed by testing) (Nielsen Retail, 2020). Even though some business owners are investing in the creation of new capacity for the future, significant proportion of supply rises during the crisis have resulted from the switching of existing manufacturing systems.

#### Events Affecting the Medical Masks Market Equilibrium

The global market for respiratory masks (surgical masks, N95 respirators, non-surgical, etc.) is projected to increase from 14.6 billion units in 2019 to 33.36 billion units in 2023 growing at a compound annual rate (CAGR) of 22.9 percent, according to a report by The Business Research Company (Figure 3). As demand stabilizes, the market is anticipated to decline to 29.62 billion units in 2025 and continue growing at a CAGR of 0.1 percent to 29.81 billion units in 2030.

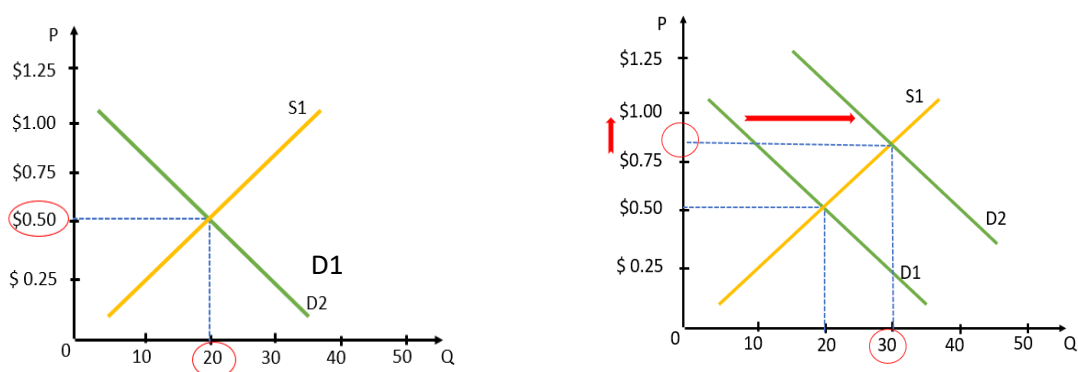
China and other Asian nations, which typically supply surgical and N95 respirators masks, have seen increased domestic and international demand. The majority of the demand originates from health systems in their fight against COVID-19 and their obligation to equip staff with the proper PPE (personal protective equipment). Nevertheless, there is a substantial demand from members of the general

public who seek protection and believe that medical masks provide the highest level of protection. The impact of the events that resulted in the market equilibrium change can be portrayed in the example of 2 big marketplaces: the USA and China.

#### Events Affecting the Demand Curve

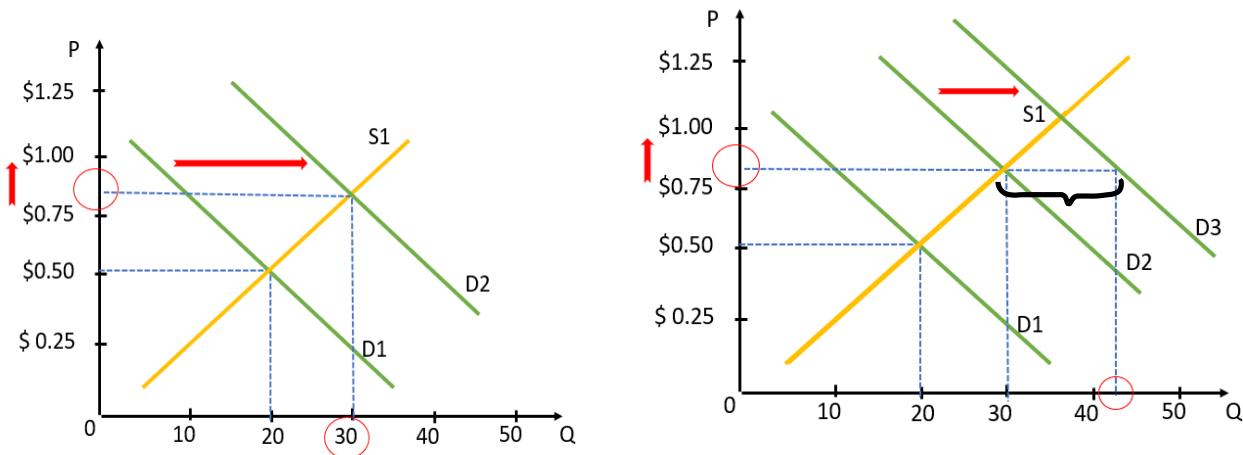
After the announcement of the effectiveness of the facial masks as a measure of protection from the coronavirus, Americans, the rest of the world as well, rushed to purchase the protective gears. This, in turn, caused a double blow to the US trade in the short-run: export of masks has increased as the worldwide demand besides the domestic one was growing whereas import decreased as China, main importer, saw a skyrocketing demand for the PPE domestically (Dian Zhang, 2020). China implemented export restrictions on its masks and other medical equipment in order to treat thousands and thousands of diseased citizens, causing a decline in imports. To prevent the spread of the virus, the country shut down a significant portion of its economy, including mask production facilities. Later on, the lockdown was imposed; the workers were quarantined. China is the largest supplier of medical face masks worldwide. In 2018, it produced roughly half of the world's \$11.7 billion supply, according to the United Nations' most recent trade data. The United States has long been its biggest client. A USA TODAY analysis of Census trade data reveals that the United States imported \$203.1 million worth of face masks from China in February 2020, a decrease of more than 20 percent from the \$261 million worth of masks imported during the same month last year. Since 2015, it was the lowest February import of protective masks from China. Similarly, U.S. exports of masks to China increased to \$15.8 million in February, the highest level in a decade (Figure 5). As a result, American pharmacies and mask producers (3M, Honeywell, Ambu, etc.) depleted all stocks quickly. The above-mentioned events caused the demand curve shift to the right resulting in the increase of the price and quantity demanded given that the quantity supplied does not change in the short-run. New market equilibrium is created. Please, see the charts below (Quantity is given in millions of units).

**Figure 1. The Change in Tastes and Expectations of the Consumers**



Few months later in the same year, the US government imposed strict regulations to combat the fast spreading of the contagious virus. The mandate wearing of face masks was imposed followed by the lockdown ultimately. People started stocking the face coverings up. All educational programs, food services and retail businesses are suspended, and public or open-to-the-public gatherings are forbidden. The only permitted activity was grocery shopping while wearing a face mask.

**Figure 2. Intervention of the Government**

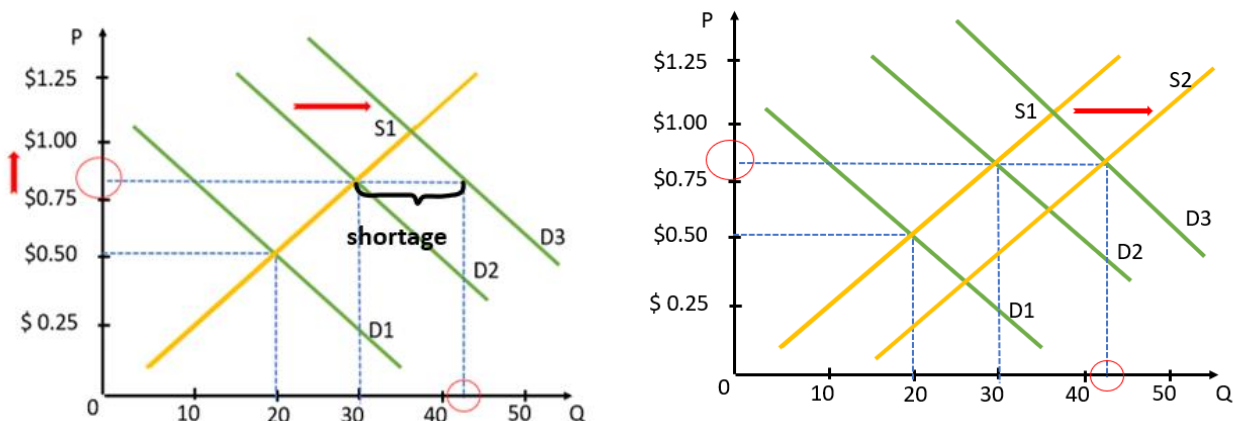


During the shutdown, a particular effect occurred: the demand curve became very inelastic (almost vertical). This occurred as a result of the face mask becoming a "fundamental" as opposed to a "nice-to-have" good. Demand, in contrast, had increased globally while supply remained unchanged. The outcome is severe shortage of the protective face masks.

**Events Affecting the Supply Curve**

In the middle of 2020, many companies, including luxury brands, started the conversion process by switching the production from original product to the protective face masks, sanitary gloves, hand sanitizers to fill the gap. Newly transformed fashion, parfum, cosmetics, shoes manufacturers were able to increase the production by 22 million units of masks along with the leading mask suppliers, such as Honeywell, 3M, Ambu, etc (Pike, 2020). Nevertheless, the pharmaceutical leaders were working hard on finding the cure from the COVID-19, vaccine that would stabilize the worldwide economic and social statements. This started shifting the supply curve rightward.

**Figure 3. The Change in the Number of Suppliers and Expectations**



By the beginning of 2021, the government was considering the plan to lift the lockdown and prepare a transition to a normal life given that the citizens are vaccinated, except those with health restrictions. This will follow to a fall in the price for the facial coverings, ultimately, stabilizing the industry of the PPE production because the demand for masks will decrease slightly after the lifting the regulation of mandate mask wearing.

#### Conclusion

The COVID-19 caused economic fluctuations almost in all its aspects following by the severe consequences. As the recommendation for the preventing the shortage of one of the most fundamental goods as facial mask would be the imposing of price ceiling. Yet, considering the harshness and the time frame of the COVID-19 spread this policy would burden the mask manufacturers even more, the outcome of which is devastating. Therefore, it is very hard to provide policy advice on this. But what we should focus on is the disposal of those billions of masks that end up in the oceans. We should fight together on the increased pollution. Pollution is a negative externality because the social cost is astronomical.

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