

Effects of the Coronavirus Pandemic on Demand, Supply, and Policy

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Introduction

The unexpected coronavirus outbreak has struck fear in the hearts of people across the globe. As more and more cases of the virus are being confirmed worldwide, researchers and economists alike are taking the opportunity to study how buyers, suppliers, and policy makers are responding to the pandemic. Using what has been observed so far and our knowledge of economic concepts and theories, this paper discusses the potential effects of the coronavirus pandemic on consumer demand, supply, and policy.

The first section of this paper analyzes the short-term and long-term effects of the coronavirus pandemic on consumer demand for different services in the United States. In particular, we discuss how the demand for air transportation, streaming, and telecommunication services has changed, and will change, due to the outbreak. The predictions that we make regarding the long-term effects on consumer demand are supported by economic theories, but still remain subjective. Through our research, we found that demand for services that involve physical contact with others, such as air transportation, have been at an all-time low. On the other hand, demand for services that enhance the lives of people while they are stuck at home, like streaming and telecommunication services, has increased.

The second section of this paper addresses the supply-side portion. The Coronavirus pandemic will be discussed as pertaining to how it has affected three different supply chains: transportation, healthcare, and real estate. This will include how suppliers of air and ground transportation have adjusted to the pandemic by decreasing availability, and how the U.S. healthcare has not been able to produce hand sanitizer to meet demand because of disruptions to supply chains. This section will also analyze how China has the biggest manufacturing output and is aiding countries nationally. In addition, this section will examine how real estate markets have also made attempts to decrease supply to adjust for the new equilibrium in previous pandemics, anticipating what is ahead.

The last section of this paper discusses the effect of the U.S. government's policy responses to the pandemic. While there are many different proposed and approved responses, we have chosen to focus on the Fed's possible adoption of negative interest rates, small business loans sent directly from the federal government, and direct stimulus payments to the people of the U.S. We will examine the pro's and con's of each of these policy responses, and their effect on the overall economy. While some of these policies have been used before, such as stimulus payments, negative interest rates have never been used by the Fed before, and this leads to uncertainty on how effective they may be at helping to deter economic downturns.

Effects of the Coronavirus Pandemic on Consumer Demand

In this section, we will explore different ways of how consumer demand for services changed, and will change, as a result of the coronavirus pandemic with respect to three different industries: air transportation, recreation, and telecommunication.

Air Transportation

Since mid-March, the total number of people flying has plummeted to unprecedented levels. The figure below shows the total number of passengers U.S. airlines had this year compared to the same day a year before.



Figure 1. Graph of the Total Number of U.S. Airline Passengers for 2019 and 2020. Data from Transportation Security Administration (2020).

The total number of passengers started to decrease on March 12, the day that Trump announced the 30-day travel ban on Europe (Mulfati, 2020). Since then, U.S. airlines have seen a rapid decline in passengers as people became more unwilling to fly in fear of catching the virus. The last observation used in the graph, April 21, demonstrates a drop of 92% in consumption of air transportation services compared to the year before.

This drop in consumption is not unique to air transportation services. In fact, the outbreak has caused people to lower their consumption of most services, especially those that require them to come into physical contact with others. Due to this drop in aggregate demand, firms have lowered their demand for labor, causing them to reduce wages or lay off workers entirely (Feintzieg, 2020). This reduction in income causes people to lower their consumption spending further, perpetuating a cycle.

To understand how long it will take for air travel demand to recover, we can look at how the global airline industry has recovered from similar shocks from past outbreaks. Below is a graph by the IATA that shows how past outbreaks affected air travel demand in loss of RPKs (revenue passenger kilometers).

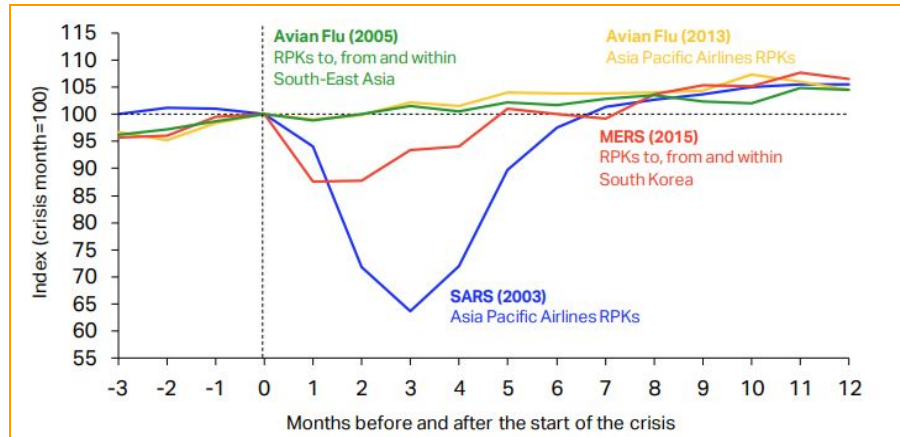


Figure 2. Graph of the Impact of Past Outbreaks on Aviation. Reprinted from *Air Passenger Market Analysis*, by IATA Economics, February 2020.

From Figure 2, we see that demand for air travel eventually rebounded to its pre-crisis level (where index = 100) in each outbreak episode. We expect to see the same thing with this pandemic; however, the recovery will take much longer. As the IATA points out, what separates this outbreak from past outbreaks are the travel restrictions and strict quarantine measures that play a role in dampening air travel now (“Air Passenger,” 2020). On top of that, we are seeing the highest unemployment rate the U.S. has seen since the Great Depression and a huge drop in consumer spending, both of which will prolong the recovery of air travel demand (“Air Passenger,” 2020; Siegel, 2020)

In the long run, we expect that business travel demand will fall to a lower level for two reasons. First, widespread business failures from the drop in aggregate demand mean that some companies that were previously paying for business travel are now gone (Reed, 2020). Second, we predict that existing companies will replace business meetings that would normally require travel with virtual ones using teleconferencing technologies. We will go into this topic more in-depth later.

Recreation

With local stay-at-home orders prevalent in the U.S. and across the world, the consumer demand for streaming services, unlike most other industries, has soared. In particular, Netflix has noticed an increase in consumer confidence through a rapid increase in common stock price. This is worth analyzing because the company’s stock price is moving in the opposite direction of the aggregate stock exchange. Thus, general market volatility is not a factor of concern in the measurement of consumer confidence for Netflix. The figure below will show the growth of Netflix’s stock price over the last few months compared to the price of the S&P 500 index fund, SPY:

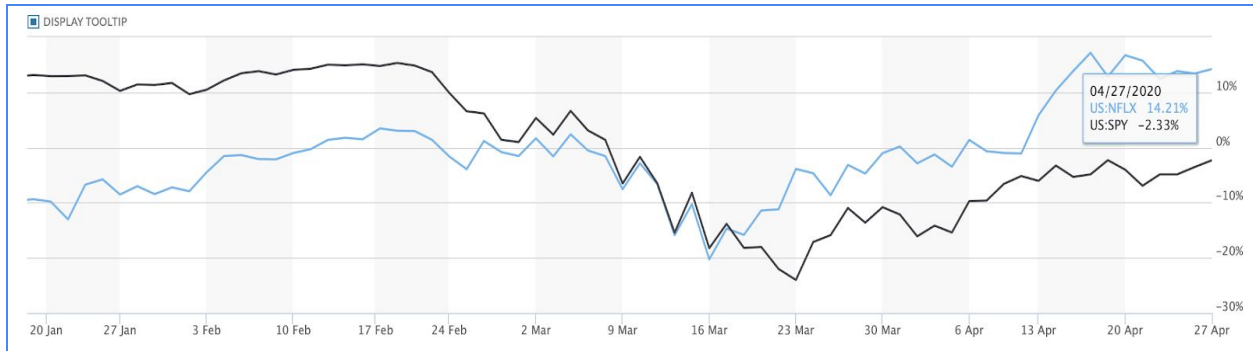


Figure 3. Graph of NFLX stock price growth compared to SPY since January 20th, 2020. Reprinted from *NFLX | Netflix Inc. Advanced Chart*, by Market Watch, April 20th, 2020.

This rise in consumer confidence for Netflix (derived from the growth of NFLX's stock price, located in Figure 3) has a positive effect on the consumer demand for their streaming services. Moreover, consumers are more likely to purchase a company's goods or services if the company is growing (Maverick, 2020). Growth can be a promising sign to consumers that Netflix, with its expenditures remaining relatively constant, will not soon become insolvent. This lack of risk for insolvency alleviates consumers' concerns that their service(s) could be inconveniently disrupted. Therefore, the increase in consumer confidence and lack of risk for insolvency leads to an overall increase in short-term consumer demand for Netflix.

Another quantitative assessment of COVID-19's impact on consumer demand for Netflix would be the change in the number of user subscriptions. During the first quarter of 2020, subscription growth for Netflix came in around 15.8 million which dwarfed estimates of 8 million (Nielson, 2020). Furthermore, subscription growth was up roughly 83.7% compared to the previous quarter (Nielson, 2020). Obviously, the safer-at-home effect has resulted in a short-term increase in consumer demand for, and the consumption of, Netflix's services. However, the question is, to what extent will this short-term increase in consumer demand affect long-term demand?

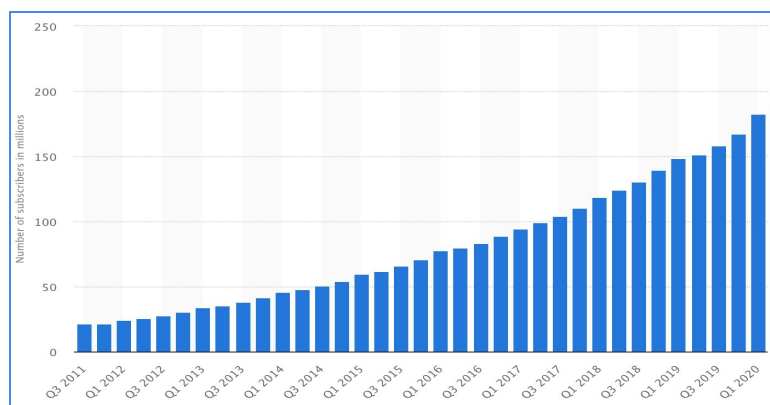


Figure 4. Bar graph of number of subscribers, in millions, to Netflix since Q3 2011. Reprinted from *Number of Netflix Paying Streaming Subscribers Worldwide from 3rd Quarter 2011 to 1st Quarter 2020*, by Statista, April, 2020.

Given that subscriptions to Netflix have consecutively increased since 2011 (as seen in Figure 4,) it is conceivable to presume that the majority of subscribers stay loyal due to quality content. In fact, Netflix has a retention rate of 91% which is one of the best among the streaming service industry (Young, n.d.). Therefore, it is relatively safe to assume that the new subscribers will largely continue their subscriptions to future quarters which will increase the long-term consumer demand for Netflix.

Telecommunication

With more people staying at home, we have seen an exponential rise in the usage of Zoom Video Communications, a teleconferencing app that allows people to interact with each other virtually. In December of last year, the number of people using Zoom per day was roughly 10 million. In March of this year, that number jumped to 200 million (Yuan, 2020). The graph below from LearnBonds shows the daily number of iOS and Android app downloads of Zoom between late February to late March of this year, illustrating the recent spike in demand.

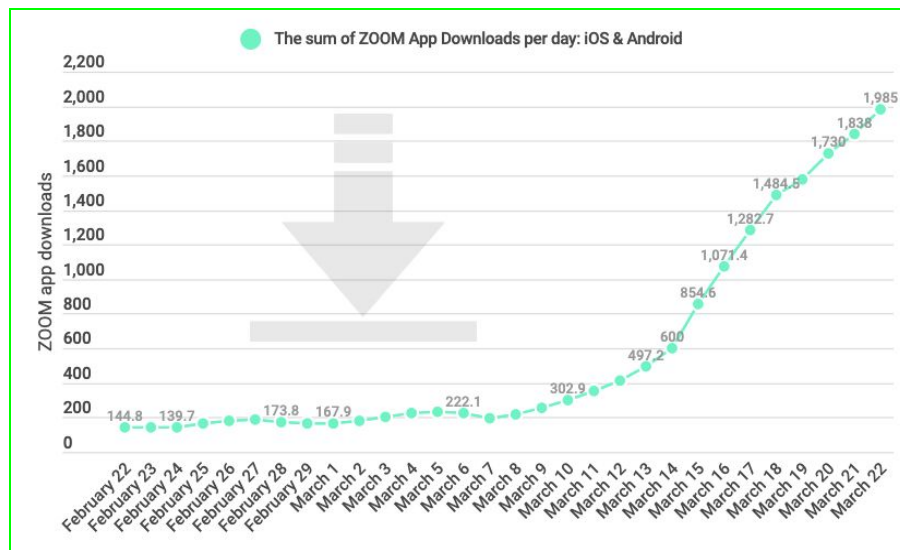


Figure 5. Graph of The Sum of ZOOM Cloud Meetings App Downloads per Day in Thousands (iOS and Android). Reprinted from *ZOOM Downloads Increase 1,270% from Employers Working from Home*, by Justinas Baltrusaitis, April 17, 2020.

This increase in the demand for Zoom correlates with the increase in the number of schools moving to an online platform and the number of people now working at home. As the founder of Zoom noted, there were over 90,000 schools worldwide using Zoom for remote learning by the end of March (Yuan, 2020). The danger of being in close proximity to others has also prompted many companies to have their employees work remotely. According to a Gallup poll, the percentage of people working at home increased from 31% mid-March to 62% at the end of the month (Brenan, 2020).

In spite of the millions of people using Zoom now, we expect that demand for the app will go back down post-coronavirus. Public opinion polls show that people aren't very optimistic

about replacing in-person meetings with the use of teleconferencing tools. Gallup found that 41% of employees who are working remotely said that they “would prefer to return to their workplace” once the pandemic is over (Brenan, 2020). Another survey by Niche shows that 67% of students said they believe that “online classes are not as effective as in-person classes” (Marcus, 2020).

However, we can expect that overall demand for Zoom will be greater than its pre-crisis level in the long run, specifically among businesses. As we mentioned earlier, companies are now realizing that they can substantially reduce expenses by using Zoom to replace business trips, which had previously cost roughly \$949 per person traveling domestically and \$2600 per person traveling internationally (“Understanding,” 2020).

Effects of the Coronavirus Pandemic on Supply

This section will examine potential effects of the Coronavirus pandemic on the supply side of the economic disruption of production and supply chains, pertaining to transportation, healthcare, and real estate.

Transportation

Perhaps the first change induced by the Coronavirus pandemic occurred in the transportation market. One of the first things people did was stop flying, due to an increased risk of infection. This has resulted in “thousands of grounded planes. Nearly empty flights. Airports that look like ghost towns” (Wallace, 2020). Some examples can be seen in the graphs below, where it is evident that people have stopped spending money on travel.



Figure 6: Graph portraying the rapid decrease in flight (based on stock market indices) from January 2020 to now

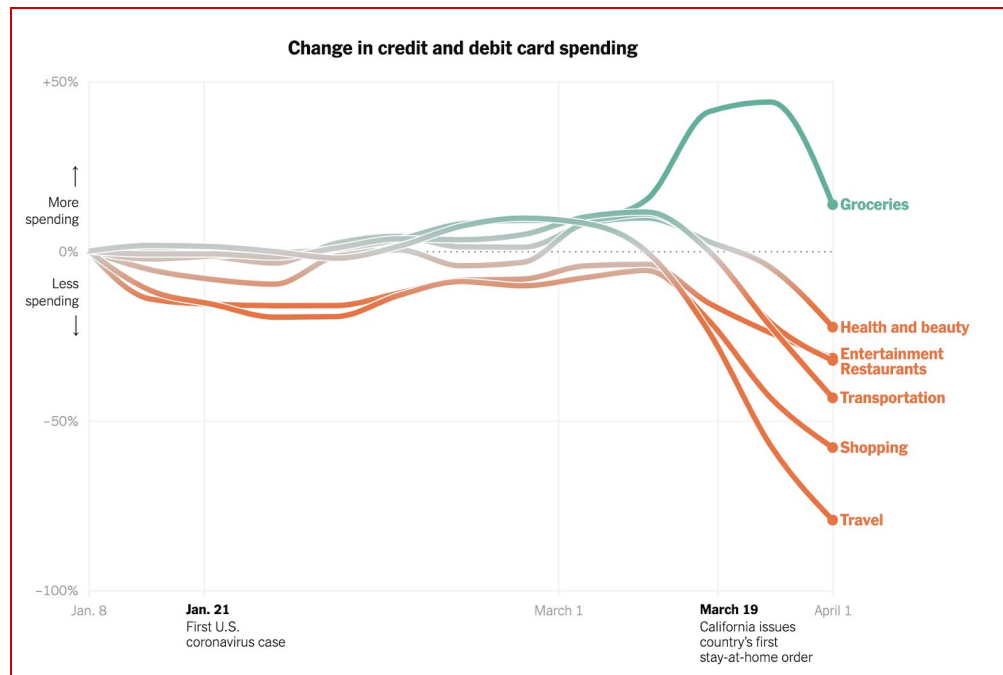


Figure 7. Graph of Change in Credit and Debit card spending from [January 2020-March 2020]. Graph portraying the changes in credit and debit card spending since COVID-19. Data is from New York Times 2020.

As seen in the charts there has been a, not only drastic, but also rapid decrease in demand for transportation, including an almost 80% drop in spending on transportation since January. This decrease in demand created a multitude of supply-side responses. Airlines have drastically lowered flight prices in order to potentially entice demand (Wallace, 2020). In addition, airlines have been trying to alleviate the stress of close proximity by making fewer seats available in order to practice social distancing. This, along with cancellation of flights, also work to decrease supply and adjust equilibrium. Examples of this effect in action can be seen through several airlines. “Across the industry, airlines have slashed from their schedules. Two operators of regional jet service that work for American, Delta and United Airlines, are closing their doors because the cuts and passenger declines were too deep” (Wallace, 2020).

In addition to air transportation, ground transportation has also taken some supply-side hits because of the pandemic. “Health checks and border controls introduced by over a dozen states are causing traffic jams at several European borders... Truck drivers are having a hard time since most of their dedicated rest and catering spots have shut under the measures” (Mereghetti, 2020). These quotes exemplify decreased supply in both air transportation and ground transportation alike.

Most states are on lockdown and a curfew was placed at eight pm EST. As a result, most restaurants, bars and gyms are closed. This has caused Uber and other ride sharing businesses to lose customers, face more risk, and lose profit. While many may still keep up with the business,

they are taking huge precautions on staying safe by reducing their labor supply and their supply of rides. For example, Uber is suspending licenses of drivers who have or had COVID-19 and is doing 70% fewer trips in cities that have been hit by the virus (Hawkins, 2020).

In the short run, the supply of rides from businesses like Uber will be down tremendously. Even at discounted prices, individuals will know the opportunity cost of going out and know what's at risk. As the virus takes more lives, more precautions will be taken, as the transportation industry will be running on its own risk to keep the business with minimal profits.

Healthcare

This section compares and contrasts how two of the world's biggest manufacturers, China and the United States, have dealt with the spike in demand of hand sanitizers. Hand sanitizer is primarily produced in the U.S but has been in high demand from all over the world due to the COVID-19 outbreak. According to Nielson, at one point during a week in March, "hand sanitizer sales [in the U.S.] shot up by 470% compared to the same week a year earlier" (Huddleson, 2020).

When China closed down their factories at the peak of the outbreak there, U.S. hand sanitizer companies saw a disruption to their supply chain. U.S. companies were not receiving enough of China's exports of plastic bottles, a key input in the production of hand sanitizers, to produce enough hand sanitizers to meet heightened demand (Klara, 2020). Once COVID-19 cases supposedly started to level off and China reopened their factories, the virus had hit the United States hard, and by then US supply of hand sanitizers had already fallen way behind (Klara, 2020).

China has had a huge advantage over the U.S. in producing more hand sanitizers because they are no longer on lockdown (Guardian, 2020). After the lockdown was lifted in mid-March, 95% of the industry's major manufacturing companies resumed operations (Klara, 2020). These companies have even made efforts towards improving their production processes, by allocating 30% of its staff to producing sanitizers and adding an additional 800 people as well as six production lines to meet demand (Qian, 2020). As a result, Chinese manufacturers are expected to be able to increase their supply of hand sanitizers substantially.

It's important to note that because China does not rely on imports for making most of their products, they did not experience disruptions to their supply chain to the extent that the U.S. did (Amadeo, 2020). Additionally, because they were the first to be attacked by the virus, they had the advantage of receiving aid from other countries before it hit the rest of the world (Shih, 2020). Therefore, they were able to recover their production processes much faster and make them more efficient.

Real estate

This pandemic has had quite an obvious effect on the economy in terms of money supply, interest rates, and investments, based on new public policy developments, but all of these factors

listed have had a collateral effect on the real estate market. Economically, real estate property can count as an investment in terms of residential investments. One potential effect that the Coronavirus pandemic will have on investments is that “the outlook for business investment is likely to look more U-shaped, Zentner says, with residential investment following a similar pattern” (Ahya, 2020).

The anticipated U-shape refers to the idea that investments will decrease and then increase. However, unlike a v-shaped curve, the switch from decreasing to increasing will be slow. According to Morgan Stanley, “many developers can’t obtain permits and they face construction delays, stoppages, and potentially shrinking rates of return. Meanwhile, many asset owners and operators face drastically reduced operating income, and almost all are nervous about how many tenants will struggle to make their lease payments” (Gujral et al. 2020). What this shows is that some real estate investors are already experiencing the downward slope of the U-curve.



Figure 8. Graph of Transaction and Real Property Price in Hong Kong [2001-2004]. Graph exemplifies the U-Curve Effect on the real estate market, from previous SARS pandemic. Data is from Zillow Economic Research 2020.

With the current and anticipated changes in demand for real estate, supply will also have to adjust to account for a new equilibrium. This is commonly done by selling houses for low prices in order to increase demand, and subsequently decrease supply, since more people will be buying. One prime example of this method was in Detroit, where, due to a failing housing market during the Great Recession, Detroit became infamous for ten-dollar houses (Mondry,

2020). These prices were meant to desaturate the housing market. Currently, with the Coronavirus pandemic, economists anticipate a similar trend due to the drop in demand.

In addition to this, people are also hesitant to put their homes on the market due to anticipation that they will not sell. “In an April survey of 216 prospective sellers, just one in five thought it was a good time to sell, down from one in two at the beginning of March, according to Redfin. At the end of March, existing home supply was at the lowest level in the history of the NAR’s monthly survey” (Olick, 2020). According to the National Association of Realtors, sellers who already have homes on the market are already working diligently to get them off. Sellers are reluctant to do in-person showings due to social distancing guidelines, thus limiting the pool of offers they may get for their home. This provides a good example of the market adjusting itself as the pandemic has discouraged buyers from buying, and subsequently, sellers from selling, adjusting equilibrium downwards.

Policy Responses

In this section, we will outline potential benefits and drawbacks to policy solutions that are either currently being implemented in the U.S., or potential solutions proposed by economists.

Negative Interest Rates

An idea that has been floated around in lessening the burden of the pandemic on the economy is the implementation of negative interest rates by central banks. The reason this policy is being brought up is that the U.S. is already at the zero lower bound of interest rates and there is not much the Fed can do as it relates to interest rates but lower them further into negative territory.

The advantage of this policy is that it incentivizes almost everyone to become a borrower because it essentially means that borrowers get paid money from the lender in order to borrow. Goldman Sachs estimates that GDP may fall by up to 34%, so preventing the absolute worst is a necessity (Carew, 2020). The implementation of negative interest rates would incentivize consumers to borrow and spend today instead of saving. In theory, this would make it attractive for consumers to buy real estate and other assets which stimulate economic activity.

The preliminary downside is that it could not be implemented right away and that the “effective negative interest rate policy requires legal, tax, and regulatory changes that typically require cooperation from the government” which could take months at a minimum to settle (Lilley, 2020).

Another large obstacle is avoiding a run on the banks with borrowers withdrawing cash. If negative interest rates are implemented, banks would charge individuals for saving accounts. Some banks may choose to eat the cost and have a 0% interest rate to avoid losing customers. According to the IMF, negative interest rates can hurt bank profitability which can undermine

the stability of the financial system (Haksar, 2020). This is supported by research done by the San Francisco Federal Reserve, which found that lowering interest rates into negative territory is less effective than lowering them in the positive territory due to a reduction in bank profits (Ulate Campos, 2019).

In conclusion, there is much uncertainty relating to the effectiveness of negative interest rates. However, in the coming months, it may emerge as an option for the Fed to consider in conjunction with fiscal policy.

Small Business Loans

As a part of the CARES Act, the Paycheck Protection Program (PPP) was established to be run by the Small Business Administration. The PPP authorizes up to 349 billion dollars to promote job retention and to cover other small business expenses (Department of the Treasury, 2020). Put simply, with the pause in economic activity, businesses must be able to pay their employees to avoid mass unemployment and ensure that the business can return after the economic shutdown is over.

In theory, providing loans to make it through the crisis and provide employees with wages is essentially the only option when many businesses cannot produce any output. The difference between small to midsize companies and major firms is that the major firms have access to capital reserves and large cash reserves that small to midsize businesses do not (Shambaugh, 2020). If administered effectively, the program would allocate hundreds of billions of dollars to companies who need the money to stay afloat. The positives of the policy are clear in that it has the ability to keep people employed and ensure that many small businesses can recover after the economy is opened back up.

While these loans to small businesses can seem very beneficial, there are some major drawbacks to this program. Firstly, the program's rollout has been considered by some economists to be quite rushed. One example of this was how the rules on how to give out these loans were sent out less than 24 hours before the loans were meant to be given out (Guina, 2020). This led to mass confusion and banks placing heavy restrictions which limited the ability of many small businesses to even get the loans they were entitled to.

In addition to a considerably poor rollout, the first round of loans, which consisted of approximately \$349 billion, were given out to many larger corporations that were not meant to have qualified. Companies such as Shake Shack and Ruth's Chris Steakhouse ended up getting tens of millions of dollars in loans from the money that was intended for smaller businesses (Sraders, 2020). This caused much of the money that would have helped out struggling small businesses to be tied up within these large corporations. Following the reporting of this, many people were outraged and it caused many to give the money back, but this delayed the rollout of the money to the deserving businesses. This delay has caused small businesses to make many tough decisions, including having to layoff employees (Sraders, 2020), which will inevitably lead to an increase in the unemployment level in the U.S.

Direct Payments

As part of the federal government's plan to stimulate the economy, a round of stimulus payments were made directly to the people of the U.S through the CARES Act. These payments are mostly directed to lower income residents, with the full \$1200 check going out to those who have an annual income of \$75,000 or less and then the payment lowering as the person's income increases, with a cap of \$99,000 where the payment would equal \$0. In addition, the payment increases by \$500 per child (Amadeo, 2020).

The goal of these payments was to increase consumer spending. This increase in spending is meant to increase demand, and work to mitigate the demand shock caused by quarantining and economic uncertainty. While it is still very early, and the overall effect of these policies is uncertain, projections for the effects see it as a good program, both for GDP, and for job growth.

The University of Pennsylvania Wharton School of Business has done some preliminary estimates of the benefits using fiscal multipliers from the 2009 relief bill. In their estimates of how the economy would suffer without any government intervention they have predicted, "An 11 percent annualized drop in 2020 Q1 GDP followed by a 37 percent annualized drop in 2020 Q2 GDP... The unemployment rate would reach about 12 percent in 2020 Q3" (Paulson, 2020). In contrast, "The CARES Act mitigates some of these losses, with GDP falling by 30 percent on an annualized basis in 2020 Q2 GDP and unemployment increasing to 11 percent in 2020 Q3. We estimate that the CARES Act would create about 1.5 million additional jobs by 2020 Q3" (Paulson, 2020).

This estimate shows how effective fiscal policy can be at stimulating the economy. While a 30 percent decrease in GDP is still very detrimental to the economy, a 7% difference when it comes to the GDP is staggering. In addition, a 1% reduction in the increase in unemployment would be extremely helpful to the millions of Americans who would be able to keep their jobs.

While the individual stimulus checks are helpful to the economy, some are worried that they are not enough. This has caused some members of Congress to propose a second set of stimulus payments. This time, the payments would be made to a larger set of people, and an increased amount of up to \$2000 would be sent. In addition to more money, this new stimulus would be focused more on long term relief in contrast to the one time payments provided by the CARES Act. Another drawback is that the sending of the payments has been slow for many recipients (Guina, 2020). Despite the drawbacks, the effects of the payments are predicted to be extremely helpful at providing aid to many Americans who have been struggling with job loss, loss of family members, and many other unpredictable events.

Conclusion

The streaming and telecommunication industries are banking large profits during this time of solitude, and we expect the long-term demand for these services to increase as a result. However, the airline industry is bearing the brunt of the damage inflicted by the coronavirus outbreak. There is a lot of uncertainty right now surrounding the discussion of how long it will take for air travel demand to rebound, especially since the demand shock has been unlike anything the industry has seen before. Moving forward, we should continue to track the number of passengers that airlines are receiving and study how future developments during this episode affect people's willingness to fly.

To conclude on the supply side, there is a plethora of research being done for the future. Some specific examples of this research include permanent impacts on air transportation (i.e. adjusted airfares in accordance with anticipated demand changes), or the aforementioned U-curve effect on the real estate market and how suppliers can adjust prices for potential housing market acceleration. Research is also being conducted to determine how much output will be needed in the healthcare market looking into the near future. Until the virus levels off, demand will exceed supply. This research, along with recovery strategies, from a supply perspective, are meant to prepare suppliers for future aftershock effects of this pandemic.

As it relates to policy solutions, fiscal policy is likely more effective and practical than monetary policy to combat the economic crisis. To measure the impacts of the PPP, the unemployment rate is important to watch along with bankruptcy numbers. For direct payments, the change in GDP growth should be evaluated and compared to baseline projections that do not include the direct payments. However, for the stimulus to be truly effective, there needs to be multiple iterations until individuals can safely return to work. This is to ensure that individuals can pay for their essential needs and that businesses can stay alive and still employ their workers after the crisis.

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