COVID-19: REVIEW OF RECENT ACADEMIC LITERATURE

EDC Economics

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EXECUTIVE SUMMARY

In this report, EDC Economics reviews the rapidly-expanding research on the macroeconomic impacts of COVID-19. Studies have found major pandemics cause significant and persistent negative economic impacts. Stricter containment measures generally lower infection rates. Lockdowns enacted earlier and with more stringency can increase economic recovery sooner, while easing containment measures too early can lead to a resurgence in infections.

Households that experience lower incomes and negative wealth shocks are likely to increase their savings by spending less on durable goods, like housing and cars. This can slow economic recovery. Meanwhile, many businesses have experienced a significant loss of revenue, which can lead to store closures and temporary layoffs becoming permanent, particularly for smaller companies. Elevated uncertainty may limit research and training investments and overall capital expenditure, which can reduce the medium- and long-term capital stock and future growth prospects.

The ability to work remotely varies widely across industries, and differences in a country's sector breakdown can help explain the varied economic disruptions experienced around the world. Complete labour market adjustments and recoveries will likely take time.

Countries with flexible exchange rates and deeper currency holdings are better positioned to weather the storm. Countries reliant on oil and other commodities to earn foreign currency are likely to struggle, given the drop in global commodity prices. Declining export volumes and fiscal support measures have created significant deficits and worsened sovereign and corporate bond ratings. With considerable central bank interventions, corporate bond yields have improved noticeably, but haven't recovered to baseline levels yet.

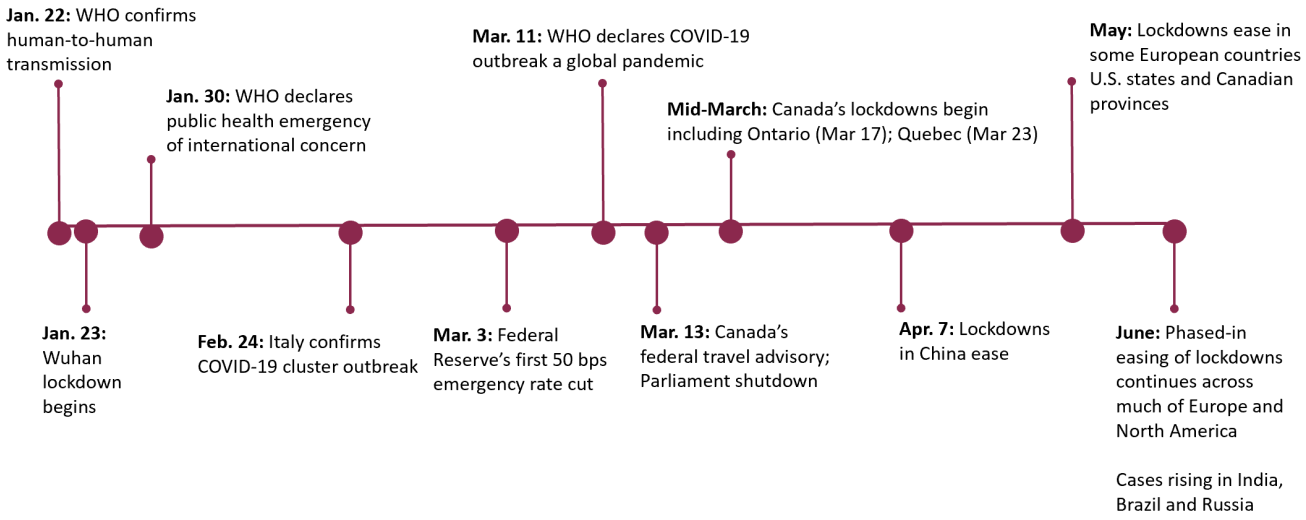
The unprecedented monetary and fiscal policy measures implemented across developed markets were swift. These policies have prevented a significant tightening of financial market conditions and provided massive financial support to households and businesses. However, they have come at a significant fiscal cost. It's still too early to determine the long-term impacts of these policies and the extent to which they can and will be rolled back as economies recover.

INTRODUCTION

As COVID-19 spreads around the world, the global economic outlook has become highly uncertain. Strict lockdown measures to contain the virus suffocated economic activity, resulting in the sharpest contraction on record. Governments and central banks have cushioned the blow with unprecedented monetary and fiscal policy actions. There's still much we don't know about the virus, and the situation continues to rapidly change as the virus spreads at different rates in different countries. Official economic statistics take time to be released, while timelier COVID-19 case data might not be fully accurate given limited population testing. Financial markets have been highly volatile; households and firms are experiencing behavioural shifts, some of which may be permanent, and the oil price crash has further disrupted the global economy. In this context, this report reviews the ongoing research on COVID-19 and its economic impacts.

Figure 1 provides a general timeline of key events as the virus spread around the world since January 2020.

FIGURE 1: COVID-19 MAJOR EVENTS TIMELINE



Source: EDC Economics

This report begins by describing some key channels through which COVID-19 is impacting economic activity (figure 2). The Bank of England's recent *Monetary Policy Report* describes several of these mechanisms:

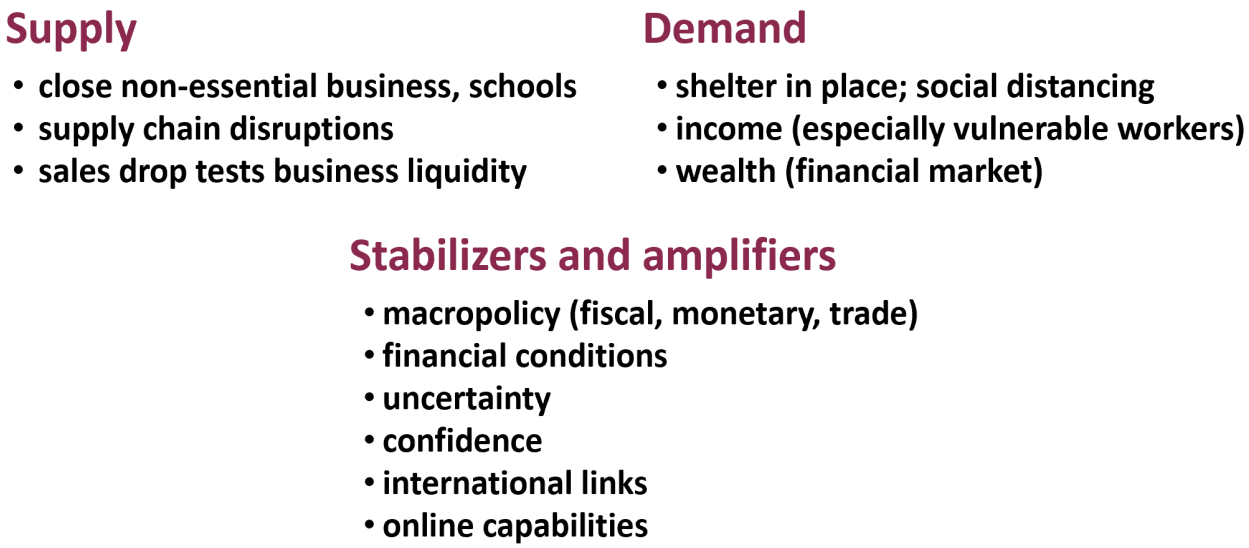
- The pandemic began with the initial spread of the virus.
- Lockdown measures have reduced both aggregate supply and aggregate demand. The economic impact of lockdowns is amplified due to heightened uncertainty and tighter financial conditions.

- As the impact spreads around the world, a slowdown in global economic activity puts new pressures on many countries that rely heavily on foreign capital inflows. Nations that are particularly vulnerable will be impacted

through depreciations of their exchange rates as capital flows out. Commodity exporters will be hit by lower global prices and deteriorating terms-of-trade. Others will be hurt by falling remittances from citizens working abroad.

- More than 90 countries have approached the International Monetary Fund for short-term emergency assistance, in addition to countries applying for debt moratoriums from the Paris Club and seeking restructuring from private creditors. Furthermore, some countries are highly sensitive to downgrades in their sovereign debt ratings, which raise borrowing costs and weaken long-term government finances.
- Finally, policy actions, both fiscal and monetary, help ease the severity of the downturn, but their effectiveness can vary, particularly for untested programs developed in real time.

FIGURE 2: COVID-19 AFFECTS THE ECONOMY THROUGH SEVERAL CHANNELS



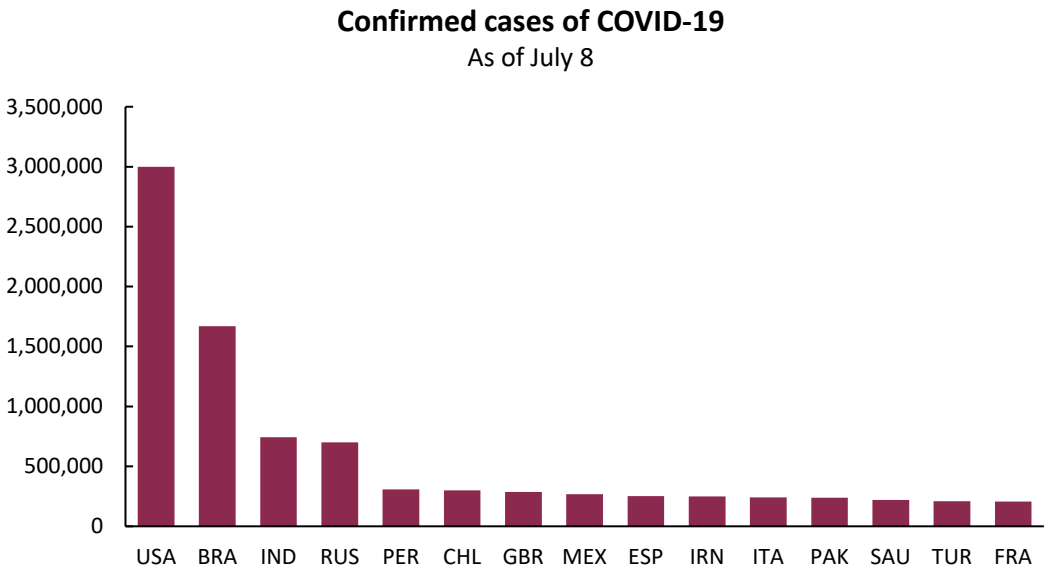
Source: EDC Economics

Our survey of recent economic literature related to the pandemic is broadly organized around a brief initial discussion of the viral spread, and then focuses on describing these key mechanisms.

1. SPREAD OF COVID-19 AND PUBLIC HEALTH INTERVENTIONS

According to Johns Hopkins data, as of July 8 total confirmed cases of COVID-19 infection have surpassed 11 million, with the U.S. experiencing the highest number at nearly three million (see figure 3). The global death toll exceeds 500,000, with the U.S., Eurozone, and Brazil experiencing the most casualties, while other countries, like Russia and India, are suspected of under-reporting cases.

FIGURE 3: COVID-19 GLOBAL CONFIRMED CASES BY COUNTRY

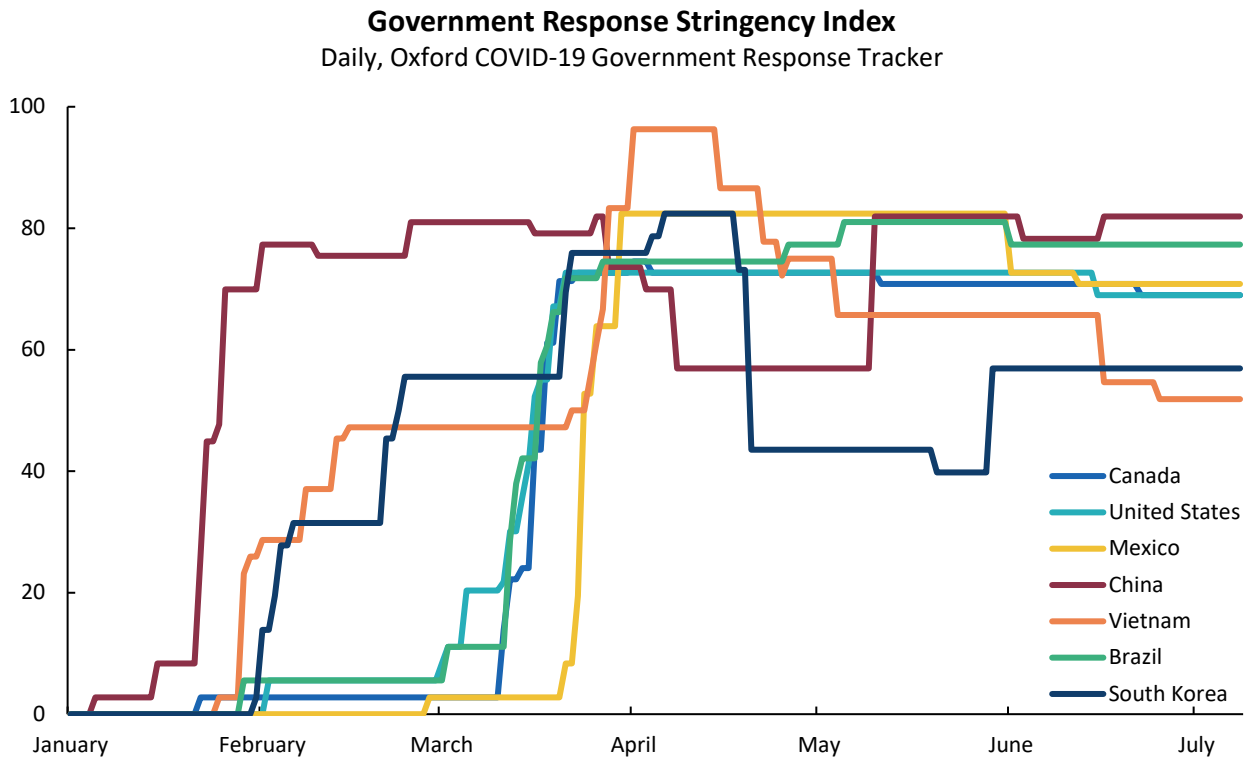


Source: Johns Hopkins University

Countries have enacted a variety of measures to contain the spread of the virus (figure 4). Many Asian countries were better prepared, drawing on experiences dealing with prior pandemics. Countries such as South Korea and Taiwan quickly adopted stringent measures and successfully lowered the number of active cases.[1]

On the other hand, other developing economies such as Brazil and Mexico were slow to enact containment measures and are now experiencing surges in new cases. Federal and provincial governments in these countries deferred lockdown decisions to local level administration with mixed responses. It's still too early to judge the effectiveness of responses. As countries begin to ease restrictions, many are experiencing new surges in cases, such as South Korea. France also has recorded new cases in schools that recently reopened; those schools were promptly closed again. Countries, like Sweden, that didn't introduce strict lockdown measures and believed a higher infection rate would generate greater herd immunity earlier are now recording higher mortality ratios than elsewhere.

FIGURE 4: GOVERNMENT RESPONSE STRINGENCY INDEX



Sources: Oxford University, EDC Economics

2. PRIOR PANDEMICS

Table 1 below outlines the timing, spread, and death toll of prior pandemics to provide context for the current one. Although early comparisons between COVID-19 and SARS were prevalent, these have since been replaced with comparisons to the 1918 flu pandemic, also known as the Spanish flu, or the 1957 pandemic or Asian flu.

TABLE 1: IMPACT FROM PRIOR PANDEMICS

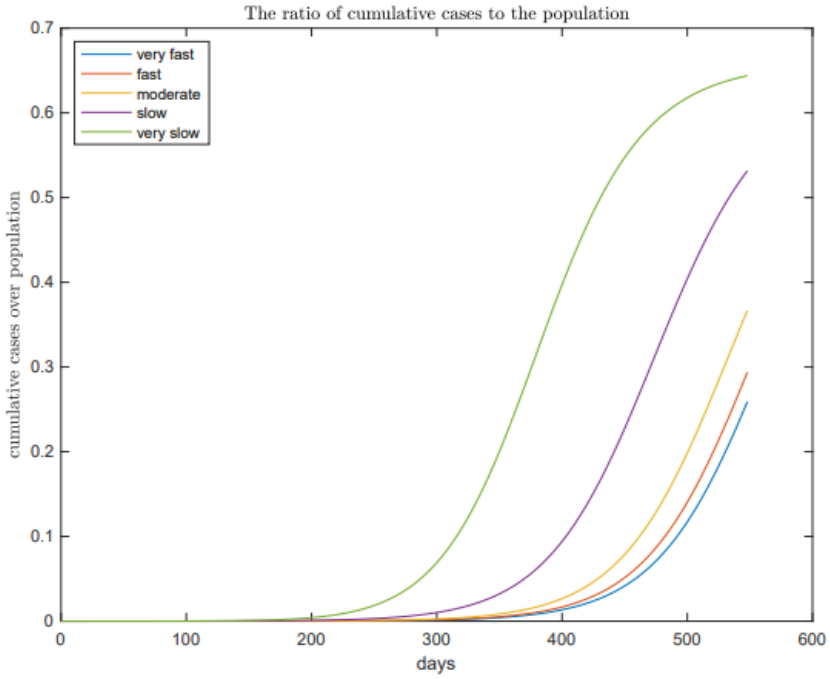
Pandemic	Time Period	Death Toll
Zika	2015-present	Less than 100
Ebola	2013-2016	11,323
MERS	2012-present	858
H1N1	2009-2010	203,000
SARS	2002-2004	774
Hong Kong flu	1968-1969	1 million
Asian flu	1957-1958	2 million
1918 flu pandemic	1918-1920	Estimates range from 50 million to 100 million

Sources: Jorda et al. (2020), Barro et al. (2020), World Health Organization.

3. PREDICTING HOW THE VIRUS MAY EVOLVE

The most common model used by epidemiologists and economists is the "Susceptible, Infected, Recovered, or Dead" (SIR) model to predict COVID-19's progression, based on disease characteristics and mitigation measures. U.S. researcher Andrew Atkeson (2020) uses a modified SIR model and estimates that different speed of mitigation will result in different levels of population infection rates. Under most scenarios without a vaccine, he estimates that between 25%-65% of the population will eventually contract COVID within 18 months of the initial outbreak (see figure 5).

FIGURE 5: CUMULATIVE CASES AS A FRACTION OF THE POPULATION UNDER DIFFERENT SPEEDS OF MITIGATION EFFORTS



Source: Atkeson (2020)

4. MACROECONOMIC IMPACTS OF COVID-19

Several recent papers estimate the macroeconomic impact of COVID-19. They usually employ the SIR model and base their assumptions on prior pandemics, such as the 1918 flu pandemic. Atkeson (2020) points out that social distancing measures help delay the peak of active cases, which provides countries time to strengthen their health-care systems for future peaks. Pierre-Olivier Gourinchas, an U.S. professor, agrees that flattening the curve is the best short-run public health policy, but notes that doing so steepens the macroeconomic recession curve. Gourinchas (2020) provides an early, illustrative example where economic activity is constrained by 50% one month and 25% for another month before a return to baseline. In that scenario, annual output growth declines 6.5% relative to the previous year. For context, the U.S. experienced only a 2.5% annual decline in output growth during the 2008-2009 financial crisis. The IMF's April 2020 World Economic Outlook predicted an annual output

decline of nearly 6% for the U.S. and more recent estimates, such as the OECD's June Economic Outlook, forecast a drop of 7.3%, or to up to 8.5% in the case of a second wave of infections.

U.S. economics professor Martin Eichenbaum et al. (2020) argue the pandemic has both demand and supply effects. As people risk contracting the virus when they purchase goods in person, they're likely to reduce their consumption (and shift activities online as much as feasible). People who are working risk contracting the virus, subsequently they reduce their labour supply. Both effects reinforce each other to create a large, persistent recession.

Robert Barro, José Ursúa and Joanna Weng (2020) use the 1918 flu pandemic as a baseline to estimate the macroeconomic impact of COVID-19. They find the 1918 flu pandemic averaged a 2.1% death rate between 1918 and 1921, and reduced world real gross domestic product (GDP) per capita by 6.2%. A one-for-one extension of those results to the current context implies 150 million deaths worldwide (about 2% of the total global population), with the average country experiencing a 6% GDP contraction.[2]

Australia's Warwick McKibbin and Roshen Fernando (2020) model macroeconomic impacts and conclude that (1) a low-impact scenario would be similar to the 1968 Hong Kong flu, (2) a medium scenario would be comparable to the 1957 Asian flu, and (3) a worst-case scenario would be similar to the 1918 flu pandemic. Adapting these scenarios, projections show Canada's 2020 GDP would contract between US$74-$126 billion (4.1%-7.1% drop from baseline), while the U.S.'s GDP would contract between US$1,004-$1,769 billion (4.8%-8.4% negative deviation from baseline), and global GDP would contract between (US$5,305-$9,170 billion). (The authors didn't refer to a baseline for global GDP.) In the event that the virus becomes a recurring shock with no available vaccine or treatment, Canada would experience an "permanent" annual loss of $28 billion GDP (1.6% negative deviation from baseline), the U.S. would face a $314 billion annual loss in GDP (1.5% negative deviation from baseline), and the global economy a $2,230 billion loss (nearly 3% of current global GDP). Table 2 provides EDC Economics' GDP forecasts as of June 26, along with IMF Economic Outlook data and consensus estimates from Bloomberg surveys.

TABLE 2: FORECASTED 2020 REAL GDP GROWTH, %
As of June 26, 2020

	Canada	U.S.	Advanced economies	Emerging economies	World
EDC Economics (June 26)	-9.0	-5.0	-5.4	-3.6	-4.3
IMF (June 24)	-8.4	-8.0	-8.0	-3.0	-4.9
Consensus minimum	-11.5	-10.5			-5.1
Consensus median	-7.1	-5.7	-6.0	-0.1	-3.1
Consensus maximum	-3.0	-2.5			2.6

Sources: EDC Economics, IMF WEO, Bloomberg

While most research focuses on short-term impacts, U.S. researcher Òscar Jordà et al. (2020) explore the effect of pandemics on medium- and long-term economic activity. They use a sample of historical interest rates in Europe beginning in the 14th century, allowing them to focus on 15 pandemics that each killed at least 100,000 people. Their paper finds a severe pandemic will likely reduce the natural rate of interest for decades —reaching a trough about 20 years after the pandemic ends, and returning to expected levels only around 40 years later.

5. MACROECONOMIC IMPACTS OF VIRUS PREVENTION MEASURES

Containment measures have shut down businesses and required consumers to shelter-in-place. More restrictive social distancing policies aimed at flattening the infection curve are likely to impose larger short-term economic costs (Gourinchas, 2020). Sergio Correia, Stephan Luck and Emil Verner (2020) studied the economic effects of mitigation measures in America during the 1918 flu pandemic. They find that early and forceful containment measures didn't worsen the economic downturn in cities that followed this approach. In fact, cities that implemented measures *earlier* and more aggressively experienced an *increase* in manufacturing employment and output. Cities with *more aggressive* containment rules had higher manufacturing employment years later and experienced lower mortality rates without a reduction in economic activity. By contrast, cities with lax interventions generally lagged behind in economic growth. However, these findings should be taken with caution as some question their validity. Andrew Lilley, Matthew Lilley and Gianluca Rinaldi (2020) controlled for city-specific time trends and population growth, and they found the intensity and speed of containment measures did *not* have a statistically significant effect on employment growth.[3]

There are two important caveats when comparing COVID-19 with the 1918 flu pandemic. First, a sizable portion of COVID-19 patients are asymptomatic. Without widespread and frequent testing, it is impossible to detect asymptomatic cases. The asymptomatic nature of some COVID-19 patients makes it harder for containment efforts to be as effective. Another key difference is that the 1918 flu pandemic was especially lethal for those between the ages of 20-40 (Morens et al., 2009). Containment measures in the 1918 flu pandemic could have had

a larger marginal effect on output, since more working age adults would be able to return to work after the pandemic.[4]

Eichenbaum et al. (2020) use current data and find that large-scale containment measures are optimal, despite causing a sustained, sharp drop in aggregate output. These measures will result in a 10% peak-to-trough decline in consumption and hours worked peaking at after half a year. Ending containment too early will cause a 17% temporary rise in consumption, but result in a much larger rise in infection rates, and the economy would likely fall into a deeper, more persistent recession.

In a survey, Olivier Coibion, Yuriy Gorodnichenko and Michael Weber (2020), find that 42% of U.S. households have experienced a significant loss in employment income due to COVID-19, averaging US$5,000 (median of $1,500) between January 2020 to April 2020. Similarly, 50% of households lost significant financial wealth (excluding housing) from COVID-19, averaging US$33,000 (median of $9,000). Analysis of household sentiment shows areas that went into lockdown earlier expect a 13% increase in the unemployment rate for the next 12 months and a 2.4% increase in the unemployment rate over the next three to five years. Given the long-term negative outlook, households aren't confident in a V-shaped economic recovery.

David Berger et al. (2020) modelled two policy measures: A blanket quarantine with limited testing versus a targeted quarantine with lots of testing. They find that under the targeted approach, "fewer individuals need to be quarantined, [and] output is significantly higher in the first 100 days of the pandemic and recovers more quickly." Output is 10% higher under the testing policy. In the long run, they find that output changes only reflect the loss of life over the pandemic, and both policies deliver the same loss of life, while long-run output is the same.

Some economists expect a vaccine could be developed and ready for mass production between 12 to 18 months (Atkeson, 2020). However, many question if households and firms would revert to pre-COVID-19 behaviour or adapt to new habits, and whether this change in behaviour would lead to permanent changes to the economy (Barreo, Bloom, and Davis, 2020). Households may continue to purchase items online, business travel may transition to teleconferencing, and governments may continue to tighten border controls for years to come.[5] Table 3 summarizes the findings of papers mentioned in this section.

TABLE 3: SUMMARY OF FINDINGS

Study	Main Findings
Gourchinas (2020)	The purpose of flattening the pandemic curve is to lower the peak infection numbers within the health-care system's capacity to lower mortality rate.
Correia, Luck and Verner (2020)	Households will lower consumption and labour supply during a pandemic. Early and stringent containment measures speed up economic growth post-pandemic.
Eichenbaum et al. (2020)	Containment measures cause a sustained, large decline in output, but ending containment too early will cause an even worse recession.
Coibion, Gorodnichenko and Weber (2020)	Many U.S. households under lockdown have already experienced significant income losses and an not confident in a strong economic recovery.
Berger et al. (2020)	Targeted quarantine and testing mean fewer individuals needs to be quarantined, higher output during the pandemic and faster economy recovery after pandemic.
Atkeson (2020)	Social distancing delays the peak of active cases, giving more time for countries to strengthen their health care systems. Vaccines are expected in 12-18 months.
Barreo, Bloom, and Davis, (2020)	Households and businesses may change their behaviour permanently after the pandemic ends.

6. REDUCED AGGREGATE SUPPLY

COVID-19 has resulted in a large spike in unemployment, with the officially-reported American unemployment rate at 13.3% in May 2020, higher than at any time since the Great Depression. Jose Maria Barrero, Nicholas Bloom and Steven Davis (2020) categorize these job losses into three types: (1) COVID-19-induced demand shifts, (2) jobs at marginal firms that didn't survive the recession caused by COVID-19, and (3) intra-industry reallocation due to COVID-19.

Of all recently unemployed workers, 78% are temporarily laid off and expect to return to their jobs once the lockdowns are lifted and business resumes. However, this may not be the case, as Lawrence Katz and Bruce Meyer (1990) find temporary layoffs and furloughs may end up being permanent. Their results show 72% of workers who were temporarily laid off ended up being called back to work, while 28% were permanently laid off. Of all workers who were initially permanently laid off, 13% ended up being called back for work. Using American labour statistics from April 2020 and adjusting for the above ratios, 11.6 million of all current unemployment claims would turn into permanent job losses. Given the high number of temporary layoffs from COVID-19, a significant portion may be permanently laid off while facing a dismal job market.

For Canada, Statistics Canada researchers Ping Ching Winnie Chan, René Morissette and Hanqing Qiu (2020) report that in the last three Canadian recessions roughly 45% of all layoffs were permanent. However, even temporarily laid-off workers were not insulated from subsequent job loss, as 15% of them lost their job year the following year. Permanent job loss has historically had large, negative, long-term impacts on earnings. From the late 1970s to the early 2010s, at least 25% of permanently laid-off workers saw their real earnings fall significantly (by at least 25%) five years after their job loss. Thus, the extent to which temporary layoffs ultimately become permanent will be a key issue in determining the shape of the economic recovery in Canada.

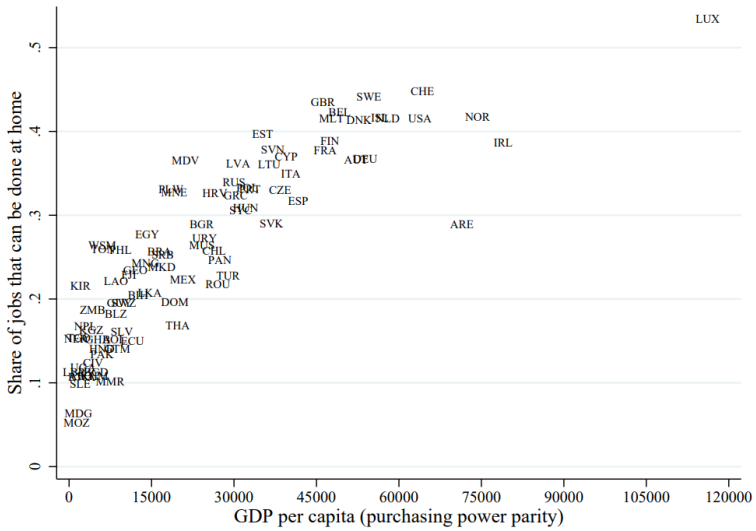
One phenomena triggered by COVID-19 is companies' mass shift to remote and online work. Dingel and Neil (2020) estimate that 37% of all U.S. jobs can be done from home. Clearly, the nature of some industries makes it easier to perform work remotely: in education and corporate management, about 80% of jobs can be done remotely. Other industries fare much worse: construction and agriculture are all below 20%, while only 4% of jobs in accommodation and food industries can be done from home. Zechuan Deng et al. (2020) from Statistics Canada estimate that nearly four in ten Canadian workers are in jobs that can be carried out from home, with similarly wide variation across industries.

Jonathan Dingel and Brent Neiman (2020) looked across different countries and found a positive relationship between income levels and the share of jobs that can be done from home (figure 6). In higher income countries, like Sweden and the United Kingdom, over 45% of jobs can be done remotely, whereas less than 25% of jobs in Mexico and Turkey can be done from home. This plays a role in how economies will recover post-COVID-19, as emerging economies will have a tougher time maintaining economic activity during containment measures.

Steven Davis and John Haltiwanger (1994) find that in response to reallocation shocks, there is a one- to two-year lag between job destruction and subsequent job creation. Interpreting COVID-19 as a "reallocation shock" with highly differential impacts across sectors and occupations, suggests it can depress employment and output until 2021. In its most recent *Monetary Policy Review*, the Bank of Canada noted the heightened vulnerability of

Canadian labour, which tends to recover more slowly after a crisis than in other economies. If firms postpone rehiring, then these vulnerabilities could be amplified.

FIGURE 6: SHARE OF JOBS THAT CAN BE DONE AT HOME, BY GDP PER CAPITA



Source: Dingel and Neiman (2020)

Building on Dingel and Neiman's work, Barthélémy Bonadio et al. (2020) examined how global production and trade are affected by supply chain and labour disruptions caused by COVID-19. They found that global supply chains can transmit the economic effects of the lockdowns across borders. On average, foreign labour shocks contributed over one third (34.7%) of the total domestic real GDP contraction across all countries.

7. REDUCED AGGREGATE DEMAND

The spread of the virus and subsequent lockdown measures will negatively impact aggregate demand as a fall in household income will naturally reduce consumption, while increased uncertainty should increase precautionary savings. Some forms of consumption will be directly restricted by lockdown measures. Additionally, consumers may become more risk averse. This will be magnified by uncertainty in the corporate sector (see section 8), which will decrease investment demand as firms defer training, intangible and fixed-asset investments until there's more clarity (Barrero et al., 2020).

Coibion, Gorodnichenko and Weber's (2020) survey shows U.S. households in lockdown are spending an average of roughly 30% less than other households, signalling a large drop in aggregate demand. Households are 5% less likely to purchase durables during COVID-19, translating to a drop on average of US$1,000 per household. When deciding whether to purchase a good, households are 3.5% less likely to purchase big ticket items in the next 12 months, and they plan to spend 26% less on the goods they do buy.

The COVID-19 crisis was initially seen as a short-term supply shock as lockdowns prevented many from working. However, as the crisis deepened and lengthened, these impacts were amplified. Guerrieri et al. (2020) describe a "Keynesian supply shock" in which a sufficiently large negative supply shock triggers a demand contraction which

is larger than the initial supply shock. The authors argue that as workers lose their income, they reduce their spending and cause a contraction in demand.

8. ECONOMIC AMPLIFIERS

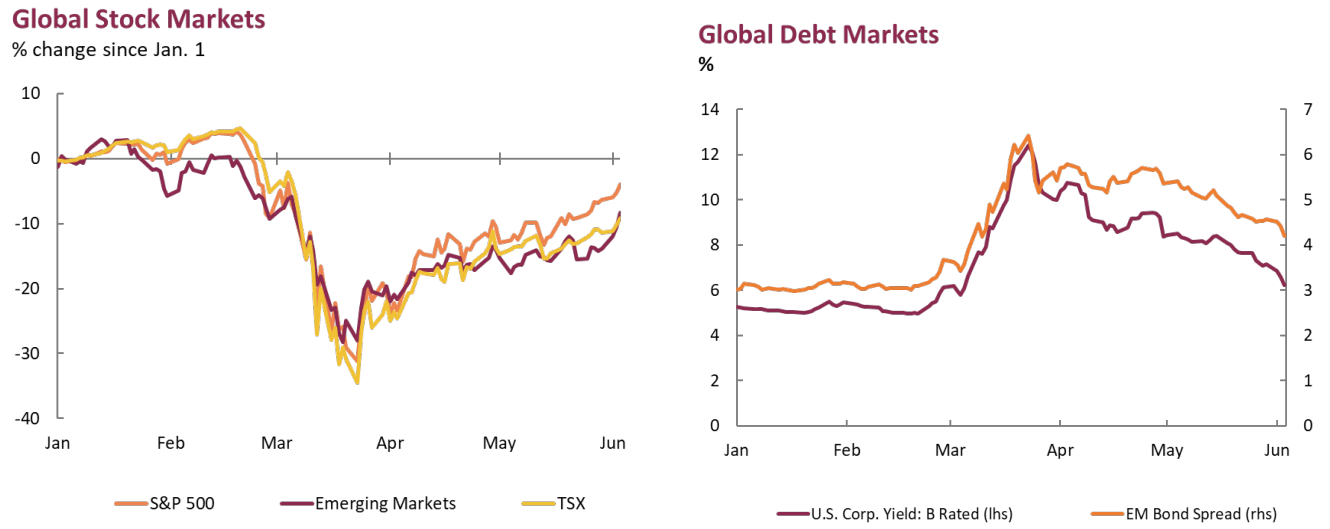
UNCERTAINTY

While the crisis and subsequent response measures will have direct impacts on the macroeconomy, the increased uncertainty will also have an indirect impact. The Chicago Board Options Exchange's Volatility Index (VIX), a key indicator of financial market uncertainty, reached record highs at the end of March 2020. Sylvain Leduc and Zheng Liu of the Federal Reserve Bank of San Francisco (2020) find that COVID-19-related uncertainty has an unemployment and inflation impact similar to a negative aggregate demand shock. In addition, Scott Baker et al. (2020) found more than half of the COVID-19-induced output contraction in the U.S. can be attributed to COVID-19-related uncertainty.

FINANCIAL MARKETS

During the onset of this pandemic, global stock markets, corporate debt markets and international financial flows exhibited significant financial stress (figure 7). Many firms now face increased difficulties accessing credit and raising capital, while many developing countries face financial market outflows. Large firms with access to the capital markets are often finding financing to be more expensive. Meanwhile, sovereigns face downgrade pressures that make available credit more expensive, despite the decline in benchmark global interest rates.

FIGURE 7: IMPACT OF COVID-19 ON FINANCIAL MARKETS



Sources: EDC Economics, Haver Analytics

The cost of issuing new debt spiked in mid-March as the pandemic spread and investors fled from riskier corporate bonds. In response, the Fed introduced several facilities to support corporate bond markets. As the crisis worsened, dealers were less willing to provide liquidity. The situation improved after the Fed intervened, but conditions haven't yet returned to pre-COVID-19 levels. Mahyar Kargar et al. (2020) found that trading costs doubled during peak volatility, and settled at 50% higher than normal levels.

CORPORATE LIQUIDITY

In April, EDC Economics published a report on sectoral borrowing pressures entitled *COVID-19 crisis: Challenges mount for many Canadian sectors*. In that paper, we analyzed a variety of economic data, aggregated balance sheet and income statement data, and stock market valuation changes by sector. We concluded that some Canadian sectors are particularly vulnerable financially during the crisis, namely (1) oil and gas, (2) manufacturing, and (3) several services sectors such as accommodation and food services, entertainment and tourism, personal services, and information and cultural industries (table 4).[6]

TABLE 4: POTENTIAL BORROWING PRESSURE BY SECTOR

Sector	Total borrowing*, 2019Q4	Assumed borrowing increase, %	Implied borrowing pressure*	Implied borrowing pressure as a share of 2019 working capital, %
Agriculture, forestry, fishing	59.2	43	25.5	61.9
Oil and gas and support activities	144.8	50	72.4	177.5
Mining and quarrying	26.1	16	4.2	3.9
Utilities	81.9	26	21.3	42.2
Construction	111.8	32	35.8	24.8
Manufacturing	177.2	42	74.4	23.3
Wholesale trade	81.0	19	15.4	9.6
Retail trade	90.4	29	26.2	26.0
Transportation and warehousing	159.5	36	57.4	32.3
Information and cultural industries	106.6	29	30.9	136.2
Real estate and rental and leasing**	331.8	30	99.5	93.6
Professional, scientific, technical services	36.1	28	10.1	8.0
Administrative and support services	23.4	48	11.2	28.7
Educational, health care and social assistance services	31.9	45	14.3	20.9
Arts, entertainment and recreation	8.4	48	4.0	182.4
Accommodation and food services	29.7	48	14.2	547.9
Personal services	8.3	48	4.0	50.1
Finance and insurance	501.2		Excluded	
Total, all industries	**2,009.3**			
Total, excluding finance	**1,508.1**		**521.0 (+34.5%)**	**1,469.3**

Source: EDC Economics

Abhijit Banerjee et al. (2020) use a similar approach to estimate funding gaps that would arise from revenue contractions due to COVID-19. The authors note that firms will have difficulty selling or borrowing against current inventories, trade credit may freeze, and banks may be reluctant to renew credit lines. At the end of 2019, at least one quarter of firms didn't hold enough cash to cover all debt obligations due in 2020. However, corporate

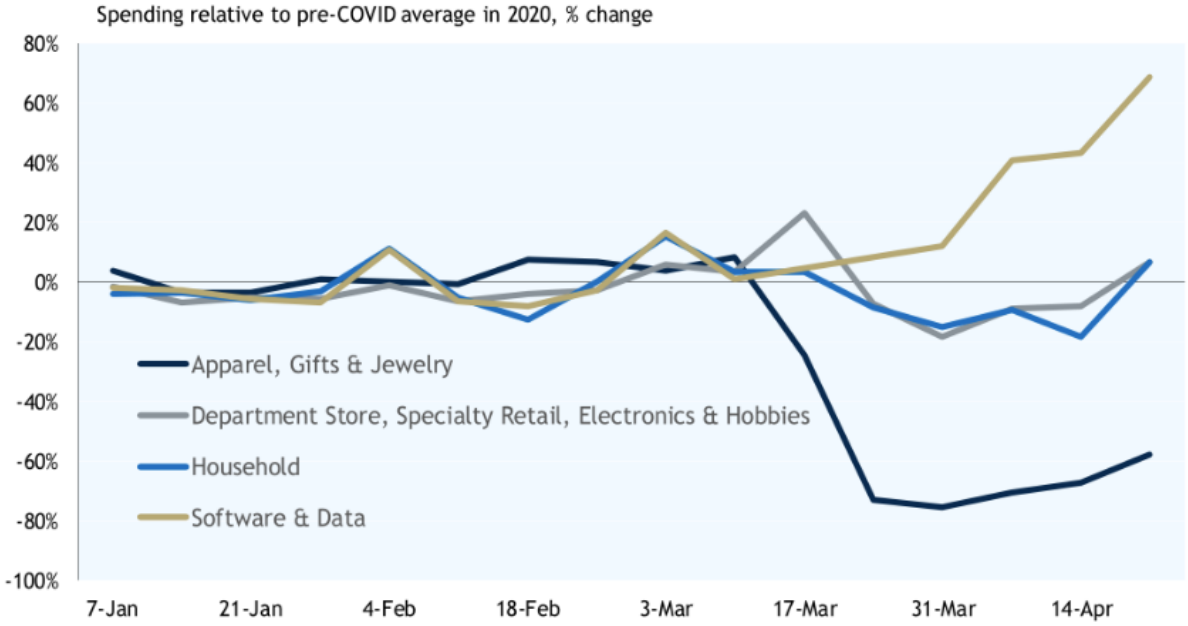
liquidity seems stronger than it was before the 2008-2009 financial crisis. Their results show that industries with the sharpest equity declines generally also have the worst financial ratios. Fortunately, they estimate that the median firm had sufficient cash and available credit to service total debt coming due within a year. For firms in Canada and the U.S., where cash to short-term debt ratios were low, undrawn credit was very high.

9. HOUSEHOLD BEHAVIOUR

Coibion, Gorodnichenko, and Weber (2020) found household debt payments plummeted during the lockdowns; the portion of households surveyed that stopped paying debt and making housing rent payments increased by 12% and 15%, respectively. Among those with debt payments, the size of their payments declined by 15%. Households in lockdown increased the share of liquid savings in their portfolios by 1.7% and decreased their share of foreign assets by 0.7%. These actions reflect a flight to safety and quality during turbulent and uncertain times.

Credit and debit card purchases data from Earnest Research shows spending on airlines, hotels and movie theatres in the U.S. fell by 75%-95% during the lockdowns (Barrero et al., 2020). Canadian credit card spending data from RBC shows similar patterns (figure 8), with declines in expenditure on arts, movies and dining, along with increases in purchases of groceries and software.

FIGURE 8: SHIFT IN SPENDING HABITS SINCE COVID-19



Source: RBC Economics

10. FIRM BEHAVIOUR

Firm behaviour during COVID-19 has been estimated quickly using surveys to gauge companies' actions and expectations for the future. Barrero, Bloom and Davis (2020) using data from the *Survey of Business Uncertainty* found that from January to April 2020, expected sales growth fell 7.3% and expected employment growth for 12 months ahead fell 2.2%.

An EDC COVID-19 research panel survey conducted in April found that 73% of Canadian exporters experienced a negative sales impact from COVID-19, with over one-third experiencing a decline in sales of more than 50%.

Alexander Bartik et al. (2020) surveyed 5,800 small businesses located in the U.S., finding that 41% of businesses surveyed have temporarily closed, and 1.4% have permanently closed. A quarter of firms have less than one month's worth of pre-COVID-19 expenses as cash on hand, while half of firms can cover between one to two months of their pre-COVID-19 level of expenses. Only 30% of firms in the tourism, lodging and restaurant industries expect to remain open (at least by year-end) if lockdown and social and physical distancing measures last for up to four months. If the four months extends to six, only 15% of those firms are expected to stay open.

Robert Fairlie (2020) used the Census Bureau's *Current Population Survey* to estimate the number of American businesses lost due to COVID-19. He finds that from February to April, the number of active business owners in the United states fell by 22%, representing more than 3 million lost businesses. For comparison, the number of business owners fell by 730,000, or 5%, during the 2008-2009 recession. It is still too early to tell if recent business shutdowns are temporary or permanent.

11. COMMODITY PRICES AND EXTERNAL PRESSURES

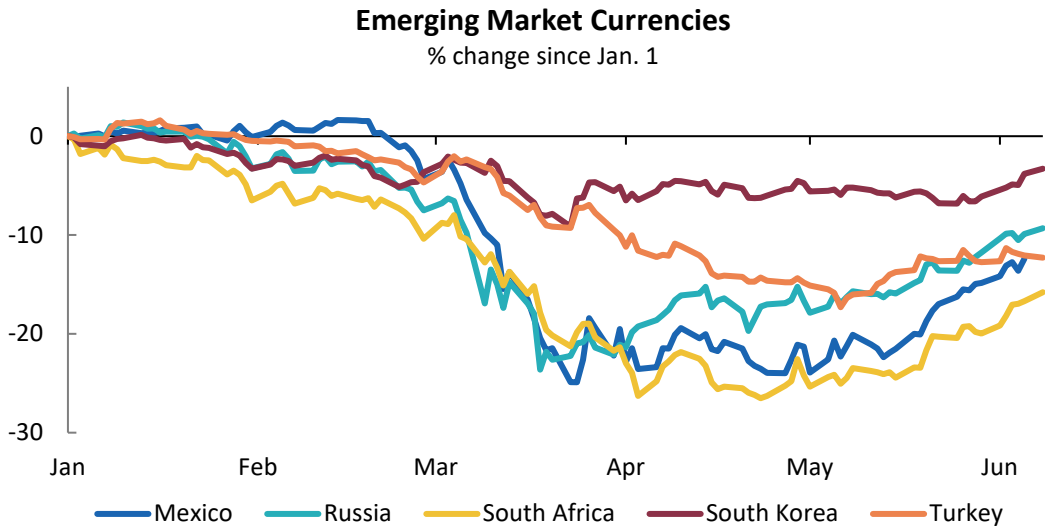
The COVID-19 crisis, combined with the oil and related commodity price shock, has placed many countries in a vulnerable financial position. Crude prices are well below breakeven levels for most oil exporting countries, although this is benefiting net importers. Manufacturing trade has slowed significantly with widespread closures of factories, and tourism, transportation, retail and wholesale trade, and other services have been widely disrupted. Emerging market economies face significant financial outflows, and there has been a decrease in the availability of cross-border dollar financing.

The severity of balance of payment pressures differ across countries. Countries such as Russia have a floating currency, low levels of government debt, and significant dollar reserves, allowing them to better weather rock-bottom oil prices (figure 9).

A key metric to follow is the rate of decline in currency reserves. As Russia depends heavily on oil and gas exports to generate foreign exchange reserves, that alone can't make up for the absence of other foreign currency-generating sources. Smaller Gulf Cooperation Council countries collectively have large amounts in their sovereign wealth funds, but are also quickly running out of foreign exchange reserves for similar reasons of limited diversification. Asian economies such as Taiwan, Japan, and South Korea have large current account surpluses and foreign exchange reserves to draw on, while Japan has also long demonstrated its ability to leverage domestic borrowing to sustain its economic needs. However, some countries will not fare as well, and external financing

will be needed. South Africa is facing a terms-of-trade shock, while Lebanon is facing a run on its banking system. Multilateral support will be needed to address issues such as those.

FIGURE 9: VARYING LEVELS OF COVID-19 IMPACT REFLECTED IN EXCHANGE RATE MOVEMENTS



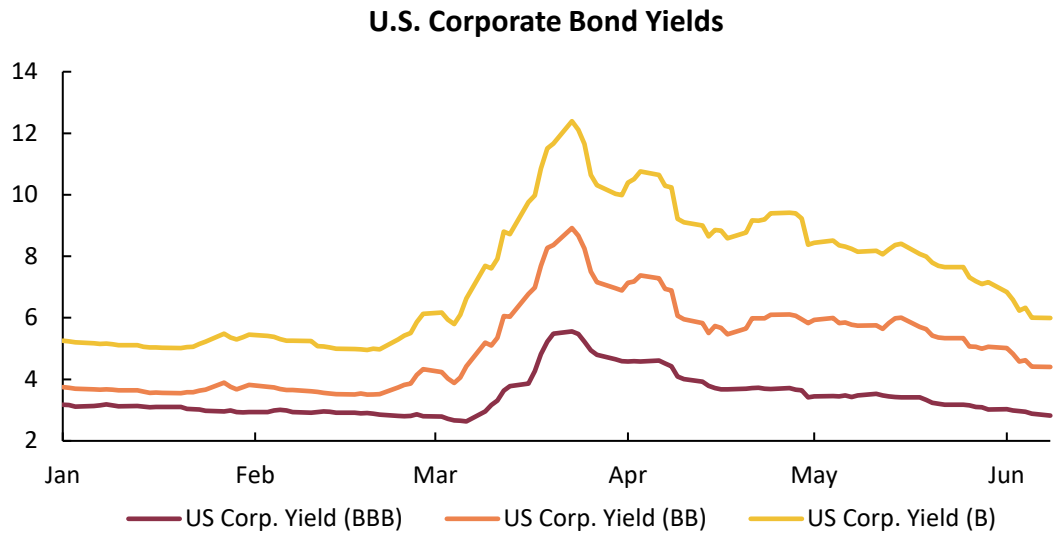
Sources: EDC Economics, Haver Analytics

12. FISCAL AND MONETARY POLICIES

Governments and central banks have rapidly responded to the current crisis with unprecedented measures. This has resulted in policy rates rapidly bottoming out to effective lower bounds, and COVID response measures often exceeding 10% of GDP. Experience in the U.S. and elsewhere shows that the timing of fiscal and monetary stimulus is important, as support is desperately needed when the economy is in shutdown mode. Waiting too long could amplify labour market disruptions and corporate defaults, as occurred in the Great Depression.

Figure 10 shows the impact of the U.S. Federal Reserve's announcement of its bond purchasing programs on yields in corporate debt markets. While yields remain elevated, reflecting the heightened uncertainty and risk of the moment, they have fallen significantly since their peak—an easing of funding conditions for many cash-strapped firms.

FIGURE 10: EASING BOND YIELDS SINCE PEAK IN MARCH



Sources: EDC Economics, Haver Analytics

Similarly, governments have responded on the fiscal side by making payments to workers who have been laid off or furloughed. These programs have been applauded for the speed at which they were deployed, but criticized by some for their potentially distortionary impacts. Barrero et al. (2020) note that America's Paycheck Protection Program provides unemployment insurance that exceeds 90% of average weekly wages in every state. At the time of their writing, 50% of all workers would receive more income staying home than working. They note that the program likely encouraged some companies to furlough employees.

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ENDNOTES

[1] Vietnam focused early on prevention and has recorded very few deaths. Their practices included (1) sealing their border with China, (2) aggressively testing and isolating those who had re-entered from abroad, and (3) actively tracing contacts of those infected by conducting door-to-door interviews and testing individuals who had been in contact with those testing positively for the virus.
[2] The authors caveat the problems associated with using the 1918 flu pandemic as a baseline comparator as it appears to be deadlier, and it occurred shortly after economic disruptions due to the First World War that likely compromised immune systems at a time when health care systems and medical research was not nearly as advanced as today.
[3] Correia, Luck and Verner have responded to these claims by pointing out the measurement error of population data and pre-trends in manufacturing output.
[4] In general, comparing the current situation to past pandemics is difficult. Modern health and related infrastructure have greatly improved. More people were also immuno-compromised in the years following the First World War. Conversely, the world is more integrated due to travel and trade, and this can spread a virus further and faster.
[5] It's difficult to infer whether current household and firm behaviour would continue in a post- COVID-19 world with a working vaccine based on current data. At a minimum, we can expect that some of the new approaches to more remote working conditions will continue. This, alone, will have an economic effect (e.g., commercial property usage and rates, accelerated innovations in telecommunications), although the real impact on productivity has yet to be comprehensively assessed.

ABOUT THIS REPORT

This report is part of a publication series written by EDC Economics staff on the economic impacts of COVID-19. The views expressed in this report are those of the authors and shouldn't be attributed to Export Development Canada or its Board of Directors.

This report was written by Jerry Wang and Mohammed Rajpar, with review and input by Michael Borish and Stephen Tapp, and copy-edited by Janet Wilson.