

From phase transitions to Modern Monetary Theory: A framework for analyzing the pandemic of 2020

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Abstract

Analyzing the economic impact of the COVID-19 pandemic of 2020 requires an appreciation that price signals were no longer primary determinants of supply and demand. Economic agents were acting out of health fears, government-mandated shutdown rules, and dealing with financial distress. The economy had entered a state that was far from equilibrium. Orthodox tools, such as comparative equilibrium analysis, can tell one about state “A” and state “B,” but provide no guidance as to how to analyze the phase transition. We turn to the physics of phase transitions to help us understand what essentially was a network collapse. The analysis is extended to examine whether the initial policy responses were more likely to cushion the blow or to accelerate the eventual economic recovery, which is extended into an examination of Modern Monetary Theory. Finally, we study the behavioral changes induced by the pandemic that are likely to be long-lasting and impact the pace of the recovery. And we note a variety of data anomalies that are sure to vex empirical researchers as they study the pandemic of 2020.

KEYWORDS

behavioral finance, Modern Monetary Theory, monetary policy, pandemic, phase transitions

JEL CLASSIFICATION

G01; D50; D85; E40; E52

1 | INTRODUCTION

The COVID-19 virus swept across the globe in 2020 stressing healthcare systems to the limits and causing economies to partially shutdown, closing bars, restaurants, hotels, and restricting air travel to a fraction of previous levels, resulting in a sharp and abrupt economic contraction. Millions of workers were either temporarily or permanently laid off. Economists from academia, business, and government were faced with analyzing an economic collapse with little to no useful parallels in modern times. This research attempts to build a framework for analyzing an economy in a “far from equilibrium” state, such as the pandemic created. Our focus is on the US economy; however, the framework provided has broader application for many countries around the world.

Our discussion of the applicable economic literature focuses on a few seminal works that aid our “far from equilibrium” analysis as well as some selected footnotes and references to provide context to key challenges that emerged during the pandemic. The economic literature references will be integrated into the different sections of this research as appropriate rather than as a background section of its own. The research is presented in the order that seems to create a seamless narrative for each of the key questions being examined.

The first section discusses the analytical tools for analyzing the pandemic's economic impact from the perspective of “far from equilibrium” economics. Specifically, the analysis turns first to the physics of state changes and phase transitions to help build a framework for answering many key questions about the economic impact of the pandemic. What is important to note is that during the critical phase transitions brought about by the pandemic, economic agents were responding to health fears, government orders for partial shutdowns, and the abrupt onset of financial distress suffered by many consumers and businesses. Price signals were not the primary input into decision making by economic agents, rendering most traditional economic models useless. In the second part of this section, we explore one of the implications of using the phase transition analysis, which is that traditional economic statistics may well be seriously flawed and that by using alternative data one can get a much broader, clearer, and more up to date picture of how the pandemic influenced economic activity.

The second section builds on the phase transition analysis to provide insights into how to interpret fiscal and monetary policy responses. First, we compare policy responses in 2020 to those in 2008–2009 and the 1930s. Next, we assess policies in terms of whether their likely impact is on (a) cushioning the economic contraction or (b) accelerating the rebuilding of the economy after the shutdown shocks. Third, there is an examination of potential data distortions related to the severity of the financial distress that was experienced. We close this section with an analysis of the issues raised by the fusion of fiscal and monetary policy—aka Modern Monetary Theory or MMT.

In the third section, we look at what types of behavioral changes may be long-lasting. Stressful periods require creativity and adaptability. Unexpected lessons may be learned and behaviors of both consumers and business may be impacted for long after the crisis has been contained. For example, lessons from white-collar businesses being forced into a “work from home” situation are likely to lead to permanent changes in the flexibility companies allow workers and to reduce the need for business travel. Both of these changes will mean that white-collar businesses will reduce their real estate footprint and tightly constrain travel budgets, which difficult implications for the economic recovery of downtown business districts and the travel industry.

The final section brings together a discussion of the implications of some of the key insights from our phase transition, policy, and behavioral change analysis. First, we want to reflect on the debate on the shape of the economic recovery—V, U, W—as compared to the V-shaped rebound in equity indexes. Then, we summarize a few warnings for future research due to the economic assumptions to be avoided and the data anomalies of which empirical researchers needs to be aware.

2 | FAR FROM EQUILIBRIUM ECONOMICS

Due to the pandemic-induced shutdown of 2020, the US and other economies around the globe abruptly shifted from a steady-state growth equilibrium to a state that might be best characterized as “far from equilibrium.” Getting back to a steady-state growth equilibrium appeared to involve three distinct phase transitions, with each phase having strikingly different characteristics that would need to be considered in the analysis.

The term “far from equilibrium” was made popular by Dr. John Rutledge's web blog (drjohnrutledge.com). Rutledge (2015) argues that economies can be seen as energy systems. When economies are far from a typical equilibrium state, they are likely to be involved in a major phase transition and that the analysis should follow the concepts proposed by physicists as they analyze state changes. Take for example, going from a liquid to a gas. In phase transitions, all the turbulence is at the boundary line. Think of a pot of water boiling and the bubbles forming in a chaotic manner on the surface of the liquid as they move into their new gaseous state. One may understand very well the characteristics of a liquid or a gaseous state, yet know little to nothing about the chaotic transition from one state to the next.

Bak (1996), in his classic book on *How Nature Works*, argues “that complex behavior in nature reflects the tendency of large systems with many components to evolve into a poised, ‘critical’ state, way out of balance, where minor disturbances may lead to many events, called avalanches, of all sizes. Most of the change takes place through catastrophic events rather than by following a smooth gradual path. The evolution to this very delicate state occurs without design from any outside agent. The state is established solely because of the dynamical interactions among individual elements of the system.” [p.1].

One of our key takeaways from Rutledge and Bak is that analyzing phase transitions relies on complexity theory and dynamic systems, which has little or nothing to do with the comparative equilibrium economics taught in universities. Understanding the equilibrium conditions in state “A” and in state “B” does not tell us anything about how an economy gets from state “A” to “B.” We need to think in terms of phase transitions to analyze the pandemic episode of 2020.

To challenge our thinking about “far from equilibrium” economic states, we also went back to great academics of the 1930s who were writing about The Great Depression as they experienced and observed it. Keynes (1936), in his classic *General Theory*, rejected classical equilibrium economic ideas to examine the likely efficacy of monetary and fiscal policy in handling

the massive unemployment of the decade. His disequilibrium perspective led him to the view that expansionary fiscal policy could be effective where low interest rates would not be able to energize the economy in this special situation. Later attempts to force Keynesian ideas into equilibrium models seem even more off the mark, in light of this new experience with the pandemic. The work of Minsky (1975) in interpreting Keynes is enlightening. Minsky observed that Keynes had mostly written about classical monetary policy and interest rates prior to the *General Theory*, and that many concessions to the classical ideas were intertwined with the new ideas on how to analyze a disequilibrium economic state. This same discordance will probably follow many economists as we attempt to analyze the 2020 pandemic. Indeed, Keynes was quite aware of this, as he states in his preface to the *General Theory*: “The composition of this book has been for the author a long struggle of escape ... from habitual modes of thought and expression” [p. viii].

We also found useful insights from the Richard T. Ely Lecture at the American Economic Association meetings by Joan Robinson (1972), a distinguished colleague of John Maynard Keynes at Cambridge University in the 1920s, 30s, and 40s. Joan Robinson was always direct with her words. The lecture was titled, “The Second Crisis of Economic Theory,” in which she was comparing the state of the economics profession before The Great Depression and then (at the time) just before the onset of a new currency regime and an inflationary spiral. In particular, Robinson was making the point that orthodox theory in the period before WWI and before the Great Depression was especially ill-suited to handle the analysis of the deep unemployment crisis. We found her observations about “normality” quite telling. “In 1918 the mood was nostalgia. The world before 1914 appeared as normality to which all must desire to return. Of course, this was an illusion. There is no such thing as a normal period of history. Normality is a fiction of economic textbooks. An economist sets up a model which is specified in such a way as to have a normal state. He takes a lot of trouble to prove the existence of normality in his model. The fact that evidently the world does exist is claimed as a strong point for the model. But the world does not exist in a state of normality. If the world of the nineteenth century had been normal, 1914 would not have happened.” [p. 2].

These observations about normality being a fiction and the need for disequilibrium thinking dovetail with our views that the 2020 pandemic cannot be appropriately analyzed with classical, comparative equilibrium economic theories. We take our inspiration from the physics of state transitions.

2.1 | State changes and phase transitions

First, there is the phase of the avalanche network collapse. Economic systems are a myriad of interconnected parts. During the 2020 pandemic, there were disruptions in employment, supply chains, transportation, consumer demand, healthcare, etc., that fed on themselves. With the partial shutdown, worker layoffs came thick and fast in unprecedented magnitude. During this chaotic transition phase, economic agents were not responding to price signals, but were responding to health fears, government-ordered shutdowns, and to the financial distress that the shutdowns caused. Economic theories based on how agents respond to price signals were not going to be a useful guide to analyzing the dynamics of this transition phase (Figure 1).

After the virus containment measures were relaxed and economies started to go back to work, we entered a second phase: financial distress and restructuring. Consumers, businesses, and governments assessed the financial damage from the avalanche network collapse phase, and they tried to develop strategies to go forward in an altered economic environment with severely limited resources for many agents. While some sectors, such as technology, online shopping, and delivery services, would see opportunity for expansion, other sectors would see delinquent payments, defaults, and bankruptcies.

The third phase was network rebuilding. Consumer and business patterns of behavior had been changed by the pandemic, in some cases for the very long-term, which we cover in detail in a later section in this research. Spending and investment model estimated parameters, empirically derived from the past, would be unlikely to apply in many cases. Lower income consumers were likely to spend what was required for the essentials of life, but wealthier consumers with discretionary choices started to save more to restore their financial positions. The work from home experience alerted white-collar businesses that they could allow more flexible work arrangements and save considerable money on their real estate footprint and business travel. As economies re-opened, businesses geared up cautiously, many had to right-size their business models to changing demand, and most companies focused on preserving their precious cash resources and prioritizing accordingly. Price signals started to re-assert themselves in terms of the decisions of economics agents; however, many economic agents were still dealing with financial distress and there were long-lasting changes in consumer behavior patterns related to the virus and newly established social norms not related to prices. Not until economies could achieve a steady-state equilibrium would price signals regain their primacy in terms of the decisions of consumers and businesses.

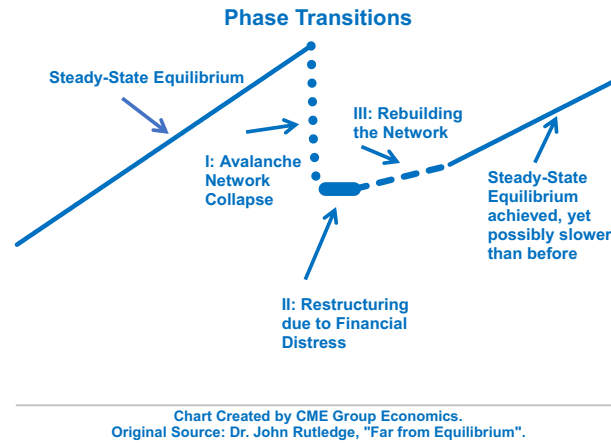


FIGURE 1 Phase transitions

2.2 | Using alternative data

In terms of the pandemic of 2020, traditional economic data, the message was one of staggering job losses and a slow recovery. The job losses were concentrated in the lower paid service industries hit hardest by the pandemic-induced shutdown with the closing of restaurants and bars, and with travel restrictions hitting hotels and airlines. With new unemployment insurance claims hovering near a million per week even in July and August 2020, it was obvious the economic recovery would be long, difficult, and nothing like a V-shaped economic recovery that some analysts had hoped might occur (Figures 2, 3).

There were an unusual variety of caveats included in the official reports from the US Department of Labor in its releases of jobs data. Data collection methods were impacted by the COVID-19 virus, especially the household survey, which was previously conducted with both in-person and telephone interviews and had to switch to virtually all telephone interviews in April 2020. As a result, the household response rate was well below prepandemic levels. There were also classification challenges. In the corporate payroll survey, workers that were paid for any part of the survey pay period including the 12th of the month were counted as employed even if they had been furloughed and were not working. The birth–death model used to adjust for the opening and closing of small businesses was altered in April 2020, as the previous method was viewed as unstable.¹ Seasonal adjustment of the data was causing some confusion too. Seasonal adjustment was designed for typical incremental patterns and not for a pandemic that re-arranged everything, especially the timing of educational hiring. Beginning with the unemployment claims data issued from September 2020, there was a switch to an additive method of seasonal adjustment from a multiplicative method.² This switch may lead to substantial data revisions when the Bureau of Labor reviews its seasonal adjustment process and may lead to substantial revisions to the historical data. That is, the data used in future research may not match well the data as reported during the pandemic episode. The point for future research is that economists working with the jobs data during the pandemic will have to grapple with the challenge of seasonal adjustment, revised methods, and potentially major data revisions. In short, the job data as reported during the pandemic period was often confusing and difficult to interpret.

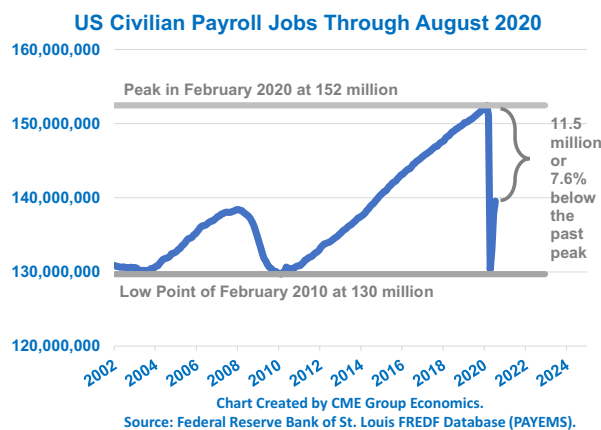


FIGURE 2 US payroll employment

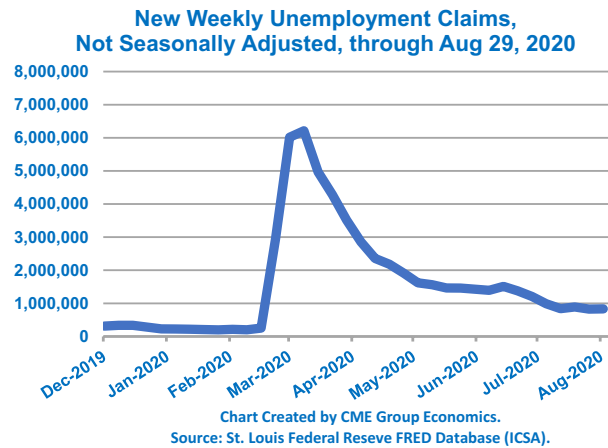


FIGURE 3 New weekly unemployment

To get more insights into critical changes brought on by the pandemic and the phase transitions the economy went through, it was useful to turn to alternative data sources that could paint a more complete picture. The pandemic forced governments around the world to restrict travel. As well, individuals became reluctant to get on an airplane, fearing they might catch the virus or would be required to quarantine when they landed. Where it was possible, business responded with work from home policies and dramatically curtailed business travel. Data from the US Transportation Security Administration (TSA) on the number of airline passengers passing through security checkpoints tells a clear story the behavior change that Per Bak would call an “avalanche.” One can also see from the slowness of the rebound in air travel that some behaviors may have been permanently changed, such as businesses learning that virtual meetings could allow for a dramatic decline in business travel even after the pandemic had run its course (Figure 4).

Another example of the use alternative data to track the phase transitions was data on dining in restaurants. As the pandemic built, many governments ordered restaurants to close. As the pandemic waned, the re-opening occurred in mandated stages from allowing outdoor seating, to capacity limits on indoor seating, and so forth. But what happened was not just about government mandates, there was also behavioral change in individuals’ desire to be in an enclosed space with many strangers. Data from Open Table, a major restaurant online reservation service, shows with great clarity the shutdown of the restaurant industry, then a rebound as the pandemic waned in May and June 2020, followed by a setback in July 2020 as the pandemic surged in US sun-belt states over the summer. The point here is that there was never going to be an on-off switch where governments could close restaurants, re-open them in stages, and expect individuals to flock back to re-opened restaurants as if nothing had happened. This was especially true since many restaurants financially collapsed during the shutdown period and never re-opened (Figure 5).

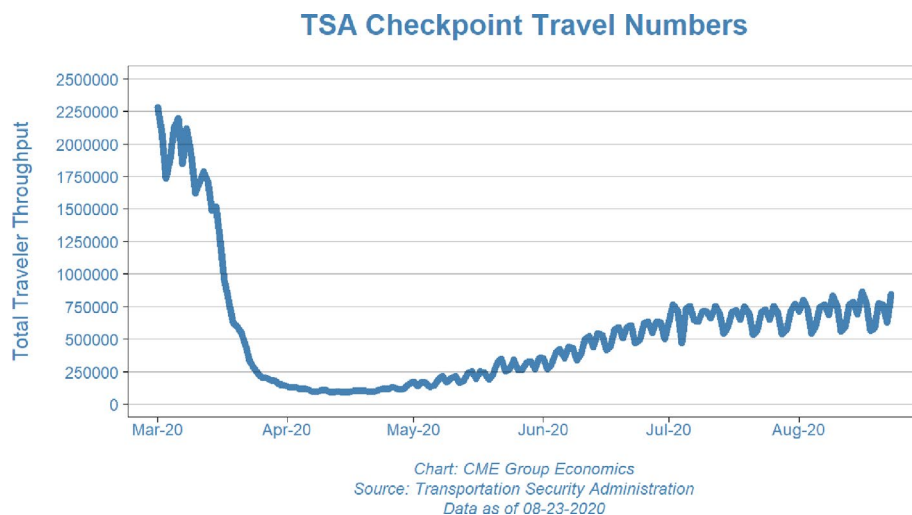


FIGURE 4 TSA security check points

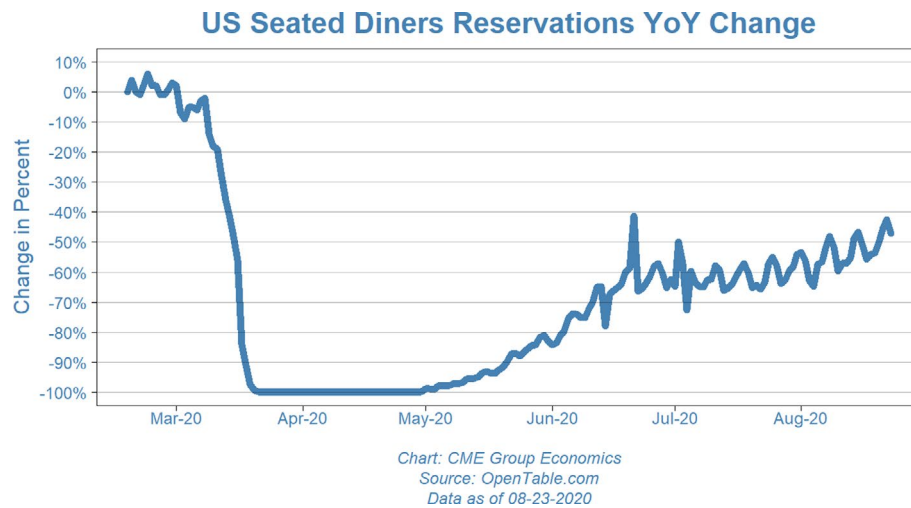


FIGURE 5 Restaurant dining

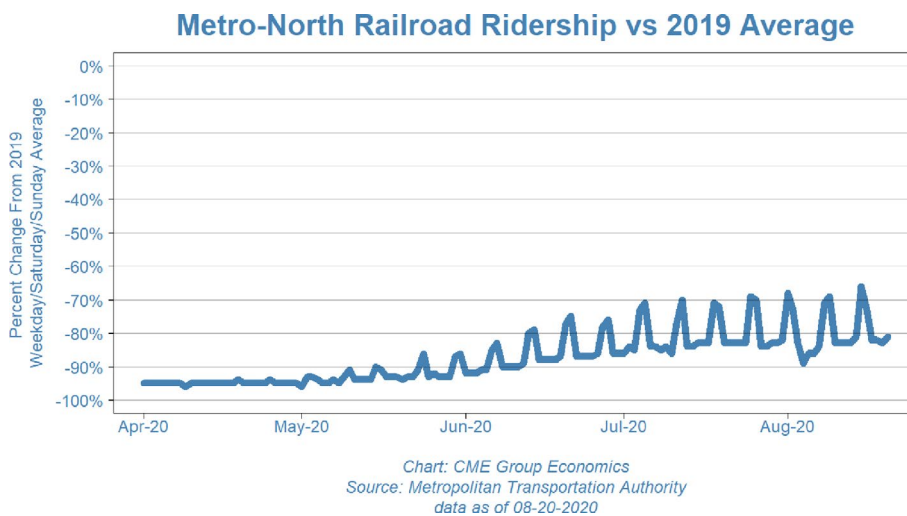


FIGURE 6 NYC MetroNorth ridership

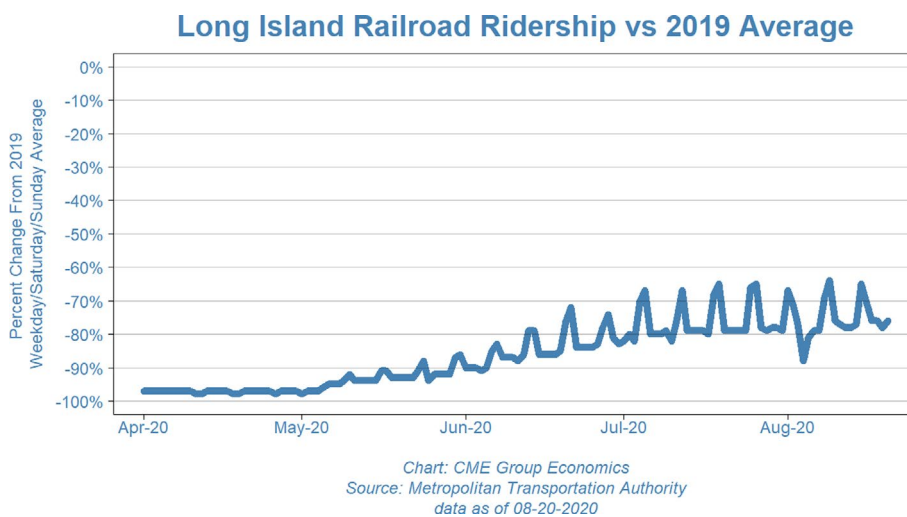


FIGURE 7 NYC Long Island RR ridership

A final example of using alternative data to analyze the phases of the pandemic was the use of data on commuter railroad traffic. This type of data gets at the challenge of understanding the work from home (WFH) phenomenon and how WFH reshaped business practices. Businesses that were able to offer the work from home alternative were slow to bring workers back to the office. This was only partly due to worker safety and security issues. Many workers enjoyed the flexibility of a work from home arrangement, and businesses observed that productivity went up in many cases. Businesses could then bring workers back to the office in drawn out stages, as well as to consider permanent reductions in required office space. The commuter rail data from a key city, such as New York, NY, brings the work from home effect into focus (Figures 6, 7).

By summer of 2020, it was obvious that there would be no quick return to the office from the suburbs, even as economies re-opened after the pandemic waned. This meant that downtown business districts filled with office towers would face serious economic headwinds for a long time to come. Without the foot traffic, everything from shoeshine stands to food vendors, to upscale restaurants with a business lunch clientele, to high-end fashion stores, etc., would not come back like the rest of the economy, making for a very uneven economic recovery, especially in urban areas dependent on a vibrant downtown.

3 | POLICY RESPONSE ANALYSIS

Our policy response analysis follows several different and intertwined paths. First, we want to compare policy responses to previous major economic downturns, namely the 2008–2009 Great Recession and the Great Depression of the 1930s. Second, we will examine the policy responses in terms of whether they mainly (a) cushioned the blow and helped to get consumers and business to the other side of the avalanche network collapse or (b) helped to accelerate the economic rebuilding. Third, we want to study the degree of financial distress and make note of certain data on credit delinquencies that might provide misleading information. Finally, given the fusion of fiscal and monetary policy, we will discuss the applicability of Modern Monetary Theory (MMT) and its implications for future inflation forecasting.

3.1 | Policy responses: 2020, 2008, 1930s

Fiscal and monetary policy responses were massive and immediate with the pandemic shutdown. The Fed quickly took its federal funds target rate to near zero. In addition, the Fed started expanding its balance sheet and added over \$3 trillion in assets in just three months, March, April, and May 2020. Simultaneously, the US federal government ramped up emergency spending at the same time as tax receipts were declining. The US federal government raised \$3 trillion in new debt securities in the first half of 2020 of which the Fed accounted for 46% of the purchases (Figures 8, 9).

To appreciate why past severe economic downturns might not provide good analytical parallels, we attempt to put the policy responses in 2020 in context by comparing them to the Great Recession of 2008–2009 and the Great Depression of the 1930s. Back in 1929–1933 in the US, the Fed stood by and watched banks fail by the thousands. This was especially unfortunate since the Fed had been created in 1913 after the financial panic of 1907 specifically to serve as the lender of last resort for the financial system to prevent future panics from turning into depressions. The Fed failed its first test spectacularly in the 1930s.

A key feature distinguishing 2008 from 1929 in the US was the response of the Fed. Once the extent of the financial panic was clear in September 2008 after the poorly managed bankruptcy of Lehman Brothers and the extremely messy bailout of the insurance giant, AIG, the Fed understood that decisive action was needed as the “lender of last resort,” to preserve the stability of the US financial system. Within just a few months, the Fed had purchased about \$1 trillion of distressed securities, lifting that burden from the books of the banking system, as well as reducing short-term rates to near zero and providing special support to several sectors of the financial system with emergency lending programs.

In 2020, the Fed pulled out the playbook from 2008 and then added several more trillion dollars of financial system support for good measure. The lesson from the 1930s was not to stand-by and watch helplessly. The lesson from 2008 was to act quickly, decisively, and with maximum force, taking a page from the military concepts espoused by General Colin Powell as described by Oren Harari (2004).

Fiscal policy responses were different between 1929 and 2020, as well. The depression was well underway before the Presidential election of November 1932. Both candidates affirmed a commitment to fiscal discipline in the face of the crisis. Franklin D. Roosevelt (FDR) won the election handily, and he was not long in office before he realized that massive stimulus and works programs were needed to reduce unemployment. FDR quickly forgot about any desire for balanced budgets. With the Fed on the sidelines in the 1930s, the fiscal stimulus was critical in rebuilding the economy. We do note, though, that in 1936–1937, there was a return to fiscal austerity which led to a setback in 1937 for the economy, and it was largely the war spending in the 1940s that conclusively ended the Great Depression in the United States.

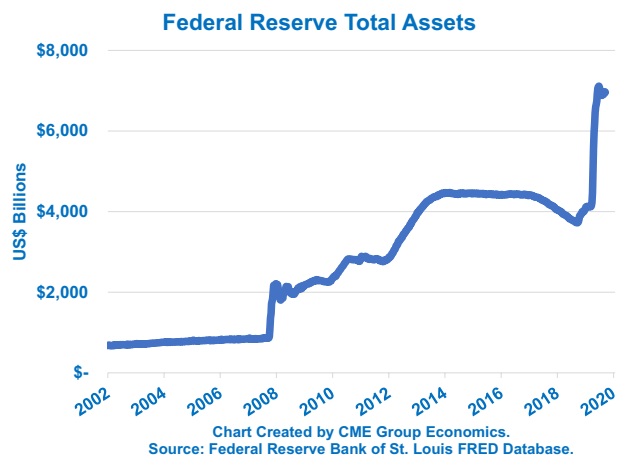


FIGURE 8 Federal reserve total assets

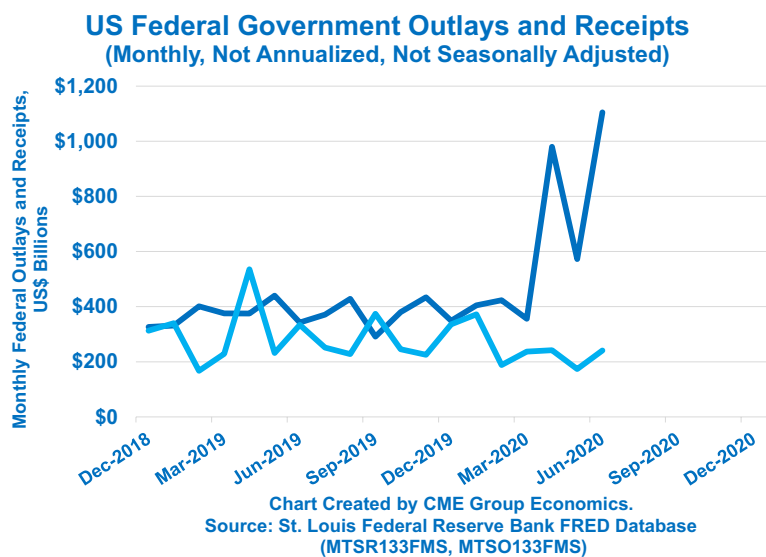


FIGURE 9 US Budget: receipts and spending

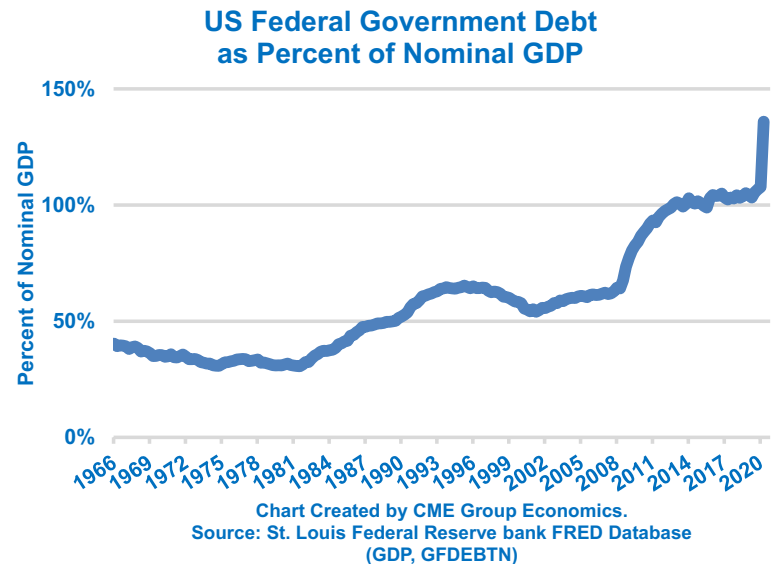
At the end of 2008, as the financial panic was in plain view, the US Congress enacted a trillion-dollar spending program, which helped get the economy back on its feet in 2009. After 2009, though, there was a period of austerity that took place largely as a result of political gridlock. Spending sequestration legislation went into effect in 2011, and the 2001 and 2003 tax cuts were allowed to expire at the end of 2012 and a 2009 payroll tax cut. Slower federal government spending growth and higher taxes helped to shrink the US budget deficit from 9.8% of GDP in fiscal 2009 to just 2.4% of GDP in fiscal year 2015. In doing so, it placed more political pressure for supporting growth on the Federal Reserve which kept short-term rates below 1% until the middle of 2017. In addition to the restraints on Federal spending, state and local governments also slashed spending in the wake of the 2008 financial crisis and they did not begin to contribute to employment gains until 2013 (Figure 10).

The spending restraint was lifted by the US Congress in 2017, and large corporate tax cuts were enacted in December 2017. The combination of higher spending and tax cuts incrementally grew the Federal debt as a percent of GDP from 105% in Q4/2016 to 107% of GDP on the eve of the pandemic in Q4/2019. In 2020, a divided and highly partisan gridlock in the US Congress was broken temporarily by the need to act decisively. The US federal government debt ballooned quickly to over 135% of GDP by Q2/2020.

3.2 | Support programs: cushioning the collapse

Most of the economic support programs provided or announced in March and April 2020 by the Fed and the US Federal Government were aimed at containing the damage during the first phase of the avalanche network collapse. These were

FIGURE 10 US Government Debt
(% GDP)



important monetary and fiscal policy programs that sought to cushion the impact on the economy than might otherwise have occurred without this assistance.

The economic support programs from the central bank were focused on maintaining the smooth functioning of financial markets so there would not be a banking system failure, as there was in the financial panic of September 2008 that led to the Great Recession. Measures included support for money market funds and primary dealers, as well as Treasury bill purchases and collateralized repurchase transactions (i.e., repos) to support the overnight and short-term money markets on whose smooth functioning the financial system depends. The Fed also bought massive amounts of intermediate and long-term US Treasury securities both to assist the federal government in selling large quantities of debt and to lower yields and dampen volatility at the longer-term end of the Treasury yield curve.

Fiscal policy efforts were aimed at helping consumers and businesses survive financially and to get them to the other side of the crisis. Fiscal policy initiatives in this category included (a) providing income to workers with paycheck replacement and expanded unemployment insurance programs, (b) making loans to companies to keep them in business, and (c) providing grants to state and local governments on the front lines of the pandemic crisis.

What is critical to appreciate is that support programs aimed at limiting the damage from the phase transition of the cascading network collapse, while essential to putting a floor under the damage, these monetary and fiscal emergency programs were not designed to accelerate the pace of economic recovery. Importantly though, the economy resets from a higher level of activity than if the avalanche network collapse had not been mitigated, at least to some extent.

For future research on the pandemic, there will be a need to pay special attention to what the Fed was buying and not just to the total size of the balance sheet. For example, the Fed paused its balance sheet expansion in mid-June 2020. After mid-June, the Fed re-allocated its assets, continuing its active purchase programs of mortgage-backed securities and medium and long-term US Treasuries, while reducing support of foreign central banks with a large reduction in FX swap lines. The Fed also recognized that its special purpose facilities for support of corporate credit and municipal bonds were not necessary working as planned, and so purchases were kept quite small relative to the activity in US Treasuries and mortgages (Figures 11, 12).

Our analysis suggests several key observations about the importance of focusing on what the Fed buys and not on the total size of the balance sheet.

First, the Fed's continued support of medium-term and longer-term US Treasury securities entrenched the shift to a fusion of monetary and fiscal policy (i.e., Modern Monetary Theory) and worked to dampen volatility in US Treasury prices, lower yields from what they would have been without the support and thus providing huge support for the equity markets. Thus, the Fed helped to create and sustain the gap between the depressed economy and equity market performance, with the S&P500® Index rising 56% from its low on March 23, 2020, through the end of August 2020. We will come back to the topic of the equity/economy disconnect in our concluding section when we discuss why some analysts persisted with V-shaped economic recovery forecasts long even as the evidence piled up for a more drawn out recovery.

Second, the Fed's small purchases of corporate credit and municipal bonds understate the impact of these programs. There was a large move in credit spreads relative to US Treasuries when the Fed announced it was, for the first time ever, expanding

Fed Pauses Asset Expansion from June 2020

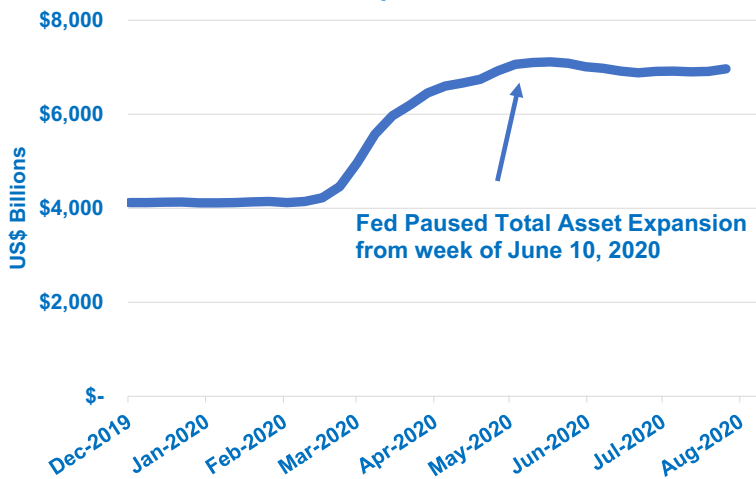
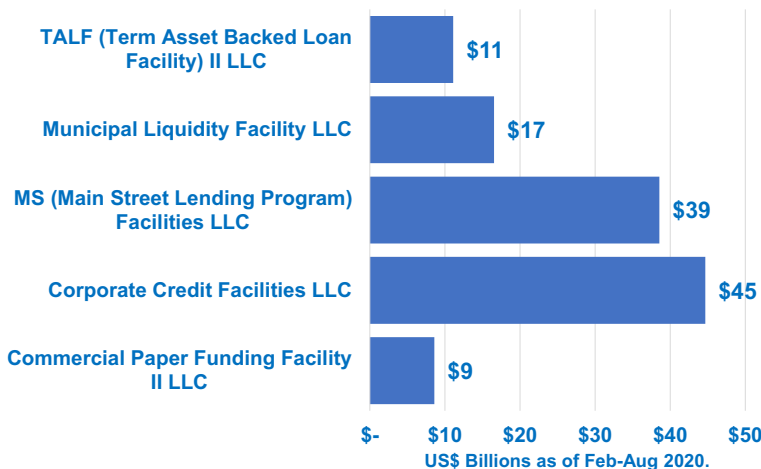


Chart Created by CME Group Economics.
Source: Federal Reserve Bank of St. Louis FRED Database.

FIGURE 11 Fed pauses asset expansion from June 2020

Federal Reserve Special Purchase Facilities



US\$ Billions as of Feb-Aug 2020.
Chart Created by CME Group Economics.
Source: Federal Reserve Bank of St. Louis FRED Database.

FIGURE 12 Fed special facilities

its activities into credit and municipal fixed income markets. That fact that actual purchases were small was rather insignificant compared to the announcement effect.

Third, the Fed's activity related to central bank FX swap lines was determined mostly by the path of the US dollar. When the pandemic-induced shutdown commenced, the US dollar was viewed as a "flight to quality" currency. As the extent of the Fed's long-term commitment to near-zero rates and continued support of US Treasury securities became clear, the US dollar started to depreciate. Central banks no longer needed the FX swap lines and the money flowed back to the Fed to be spent on Treasuries and mortgages (Figures 13, 14).

3.3 | Appreciating the depth of the financial distress

Even after an avalanche network failure has been contained, a complex system is likely to remain far from equilibrium as it stabilizes at a lower level of energy while many interconnected parts of the system need to be repaired. Essentially, in terms of an economic system, this phase involves assessing the financial distress and making the necessary decisions about how to restructure and adjust behavior to go forward and rebuild. This new phase includes the potential for long-term behavioral changes, defaults, bankruptcies, and significant corporate capital and business operations restructuring.

FIGURE 13 Asset changes February–June 2020

**Federal Reserve Asset Changes:
June 10, 2020 compared to February 26, 2020**

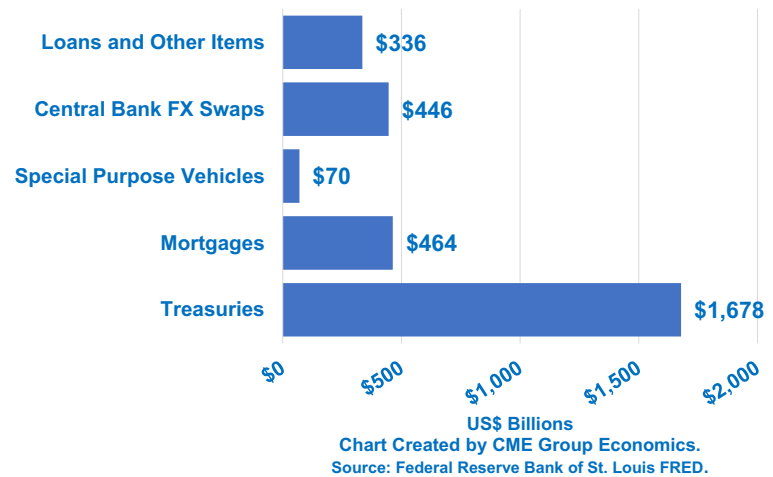
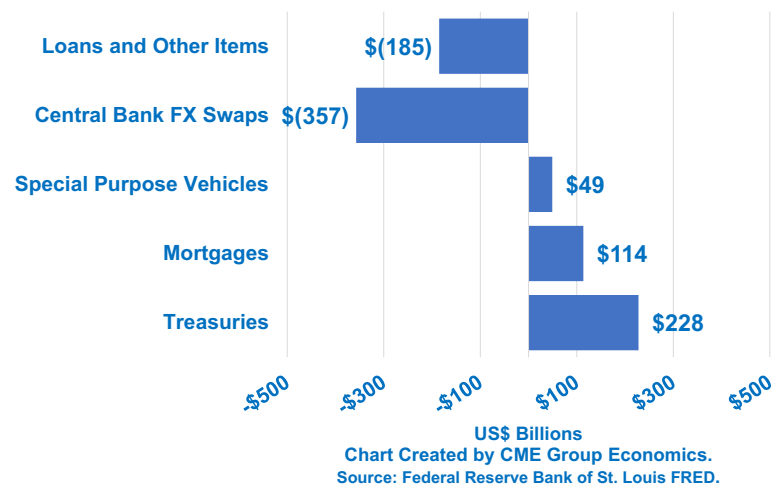


FIGURE 14 Asset Changes June–September 2020

**Federal Reserve Asset Changes:
Sept 2, 2020 compared to June 10, 2020**



What we saw in May and June 2020 in the US economy was that some individuals were not be able to pay rent, utilities, insurance premiums, car loans, mortgages, etc. As individuals worked through their newly diminished financial situation, spending in the economy rebounded yet stayed materially below what it was before the crisis. This meant that many businesses could not bounce back quickly, or at all, because their customers were financially impaired or were making different consumer spending decisions from the prepandemic period.

There was an added complication from various US Government programs to allow for missed student loan payments to not be considered delinquent and for forbearance rules about skipped mortgage payments. These forbearance rules meant that some types of skipped payments would not be considered delinquent for a considerable period of time and would not show up in credit data or individuals' credit reports until many months later. Forbearance does not resolve any problems; however, forbearance just delays the challenge. The debt piles up and the interest payments compound. Any future economic analysis will have to contend with the data distortions and the ultimate resolutions of these credit challenges (Figure 15).

In the Q2/2020 rebound period, many businesses felt challenges with cash flow to make monthly payments for wages, rents, insurance, loans, etc. There were many low-profile and some high-profile bankruptcies despite the fiscal policy support measures.³ Many dividend payments were cut or suspended. Credit rating agencies downgraded some "BBB" investment grade bonds into the "BB" category, which is below investment grade and would probably have triggered an even larger reaction in the high-yield debt markets if not for the Fed's intervention by creating a special credit facility.

Moreover, the provision of loans to large and small businesses by the Federal Government, even at very low interest rates, was a long-term burden on the capital structure of companies, which they had to consider as they assessed their cash flow

US Student Loan and Mortgage Debt 90 Day+ Delinquency Rate

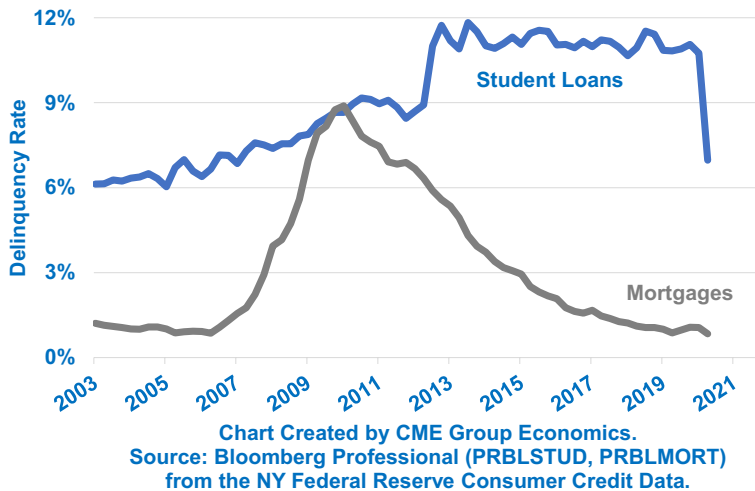


FIGURE 15 Delinquent loan percentages

potential and made plans to restart or adjust their business operations. That is, loans to businesses and individuals help them to stay afloat during the crisis and get to the other side, but loans do not necessarily assist in a rapid restart of businesses. The Federal Government's paycheck protection program for small businesses was a little different, as it started as a loan which could be potentially forgivable if the business was able to spend the loan proceeds on permissible expenses within a strict and short timetable, and meet complex rules for achieving loan forgiveness.

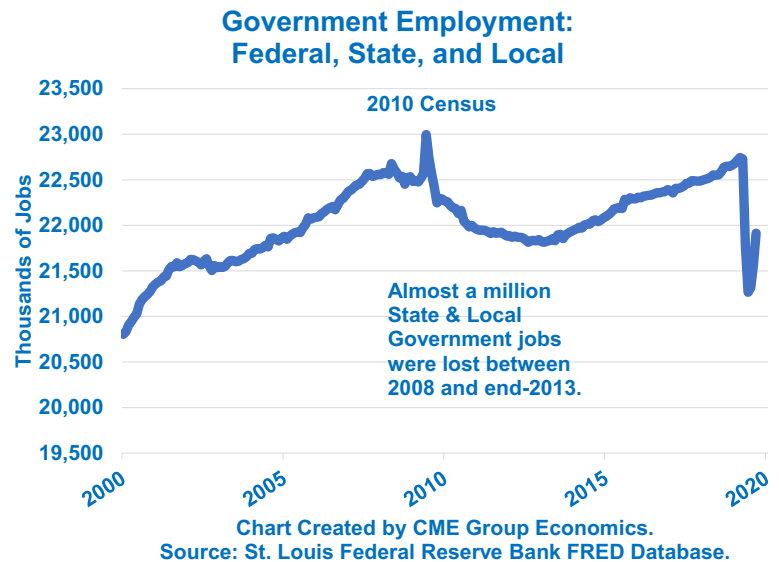
Financial institutions are only as healthy as their clients. With many of their clients hurting even after the worst of the crisis had past, many banks started to make plans to shrink their workforces. Again, assistance from the Fed or the Federal Government with loans meant financial institutions would remain liquid and able to keep their doors open. But the credit quality of their loan portfolios was impaired, and some borrowers, individuals, and businesses were missing loan and mortgage payments. Coming out of the second phase, despite massive Fed asset purchases creating excess reserves banks looked to be extremely cautious in extending new credit as they could not easily assess the risk of default.

Financial distress was also felt by state and local governments, potentially acutely for some states and cities. State and local governments are generally bound by law to run a balanced budget for operating purposes, with exceptions for long-term capital projects. The pandemic shutdown caused income tax receipts to decline as unemployment rose. Sales tax receipts declined with reduced consumption expenditures. Property tax receipts declined and payment dates were extended and some property owners missed payments. The financial challenges of state and local governments were a big item following the Great Recession. In the aftermath of the Great Recession, around 750,000 jobs were lost at the state and local government level, with the losses accumulating all the way through the summer of 2013, several years after the depths of the crisis (Figure 16).

3.4 | Modern Monetary Theory and consumer price patterns

The economic crisis stemming from the global pandemic of 2020 quickly exposed the limits of traditional monetary policy acting in isolation from fiscal policy. Lowering short-term interest rates to near zero would clearly not be enough to limit the economic damage from a cascading collapse of the economic network, akin to a disequilibrium phase transition in physics, as noted at the time by Putnam (2020). Central bank purchases of government bonds (i.e., Quantitative Easing or QE) was unlikely to help much either, given that this approach had failed to generate additional economic growth or inflation when tried in an aggressive fashion by the central banks in United States and Europe after the Great Recession of 2008, as examined by Putnam (2013, 2015). Arguably the Bank of Japan's (BoJ's) even more extreme version of QE, which took its balance sheet to over 100% of GDP and, unlike Europe or the United States, also included buying large quantities of corporate debt and even equities via exchange-traded funds, provided a very slight boost to Japanese inflation through the transmission mechanism of depreciating the yen in 2013 and 2014. Once the yen depreciation was capped and then reversed, though, the BoJ's aggressive QE had no further impact on growth or inflation. To see the possibility of inflation, one can go back to the tight coordination of monetary and fiscal in the UK in the 1940s, 50s, and 60s, which led to devaluations of the British pound, emergency IMF support programs, and considerable inflation.

FIGURE 16 Government jobs



Returning the pandemic of 2020, we observed and duly noted, many countries around the world, especially the United States, Europe, and Japan, embraced the idea that massive fiscal stimulus would be required to deal with the avalanche network collapse of the economic network. Many central banks responded to the fiscal stimulus by committing to expand their asset purchases in new directions, including corporate and local government debt.⁴ Voilà, the active collaboration of fiscal and monetary policy became a reality and the age of Modern Monetary Theory or MMT had begun, not by choice, but by necessity.

MMT has gained relevance in terms of tackling unemployment because it frees fiscal policy to run massive budget deficits as a percentage of GDP, and MMT frees the central bank to buy government debt in very large quantities, without regard to how large the balance sheet gets in terms of its ratio to GDP.

MMT also effectively recognizes asymmetries in policy effectiveness. That is, when economies are far from equilibrium, monetary policy may not be very useful in arresting the economic decline associated with a phase transition like the cascading network collapse caused by the pandemic. A catch phrase for this monetary policy asymmetry, often and perhaps incorrectly associated with John Maynard Keynes: “in times of high unemployment, monetary policy is like pushing on a string.”⁵ The solution in the 1930s in the United States was to lean on fiscal policy and launch a wide variety of massive public works and other spending programs, known as the New Deal.

This time around in 2020, the United States, Europe, and Japan were willing to intertwine fiscal and monetary policy to fight the huge abrupt increase in unemployment caused by the pandemic. Governments were trying to provide support for wage earners, and loans and grants to corporations. Central banks were not only expanding their loans to banks and buying more government bonds, they went beyond their traditional limits in lending to corporations and local government authorities. These programs were largely aimed at getting individuals and businesses through the worst of the pandemic and to put a floor under the economy.

Public policy programs to accelerate the pace of economic rebuilding would need to be massive spending that would create new jobs. For example, this might include spending on infrastructure improvements, from roads to airports to schools and hospitals, etc. Such spending programs would involve even larger budget deficits and more asset purchases from the central bank, but the key to their being proposed and implemented would be that they would get the economy moving at a much more rapid pace. That is, the return on investment criteria approach of MMT would be front and center to the debate over these spending plans, rather than worrying too much about how they would be financed.

When traditional economists, meaning most of the profession, analyze MMT, they worry about the breakdown of the independence of central banks and the possibility of a return to serious inflation pressure. With the central bank being joined at the hip with expansionary fiscal policy under MMT were an inflationary spiral to develop, the central bank would not be able to “take the punch bowl away,” using the typical metaphor.⁶ This criticism takes as a given that the politicians in charge of fiscal policy will become addicted to spending and not worry about budget deficits, so they cannot be depended upon to rein in spending.

As economics Nobel Prize winner, Shiller (2019), observed though, MMT may well work *up to a point*. When the starting point for the rapid rise in government debt finance aided and abetted by the central bank is a low inflation environment, then

it may take years or decades for the inflation to occur. Down the road, if inflation occurs when demand for goods and services far exceeds the available supply, such as often happens with war time military spending, then MMT has the potential to lead to inflation even in peace time, eventually.

Indeed, by most measures, inflation had been extremely low in Europe and Japan for a long time. In the Eurozone, core inflation had not once exceeded the European Central Bank's 2% limit since December 2002. In Japan, expanding the Bank of Japan's balance sheet from 40% to over 100% of GDP and buying corporate bonds and equities in the process, did succeed in moving Japan from -1% inflation to barely positive inflation, averaging 0.4% or so for the 2015–2020 period. Even in the United States, where the Federal Reserve enjoyed more success than either the European Central Bank or the Bank of Japan in steering its economy clear of deflation, the Fed's preferred measure of price increases, the core PCE deflator, has exceeded a 2% year-over-year growth rate on only a few occasions since 2008. That is, central banks have tried hard to create some inflationary pressure in goods and services, and neither low rates nor government bond asset purchases achieved the stated objectives. So, the concerns of central bankers were manifesting itself in calls for less fiscal austerity and more government spending, well before the pandemic crisis hit.

For economists, the challenge is figuring out when the inflation might occur, and what to do about it when it arrives. When the starting point for MMT is in the middle of a massive economic dislocation with huge unemployment, the immediate problem is going to be lack of demand, and there is little risk of inflation pressure. A necessary yet not sufficient requirement for the inflation pressure to re-emerge is that the economy would have to get back on track and reduce unemployment back to the low and non-inflationary levels of 2019. And then, even more aggressive new spending, financed by debt bought by the central bank, would be needed to push the economy into an inflationary spiral. This whole process of “moving into spiraling inflation” could take a decade or more. When it comes, though, MMT has no exit plan—except depending on the fiscal authorities to curtail their spending.

4 | LONG-LASTING BEHAVIORAL CHANGES

Stressful periods, such as the pandemic economic shutdown of 2020, severely disrupted routines and forced individuals and companies to rethink even the most basic life habits and business processes. Companies that had to go into overdrive in the pandemic shutdown, such as online shopping, delivery services, virtual Internet meeting providers, as well as companies damaged by the shutdown, such as the food service industry, airlines, and hotels, all have learned valuable lessons. We will briefly mention just a few to illustrate our point and to invite one's imagination to extend our examples.

- **Work from Home.** Where it was possible to work from home (WFH), many companies have seen increases in productivity. Meetings are shorter. There is more focus on tasks at hand. The success of WFH is likely to lead to more flexible time schedules where possible, a reduced need for office space, a reduction in business travel compared to past practices, among other changes. As these lessons are implemented by companies, there will be efficiency gains.
- **Supply Chain Complexity.** The pandemic shutdown disrupted supply chains around the world, many of which were already suffering from the prepandemic US-China tariff tensions. Companies may choose to diversify their supply chains, seek shorter routes, locate input parts and assembly plants a little closer to the where the products will be sold, etc. The dependability of supply and transportation logistics will be more carefully balanced against just seeking the location with the lowest cost of production.
- **Just in Time Inventory.** Keeping inventories as slim as possible did not work as anticipated in the pandemic shutdown. Balancing inventory planning with a heightened expectation of potential swings in demand will get considerable attention in the postpandemic era.
- **Leaner decision structures.** The speed of economic upheaval from the pandemic shutdown was unprecedented. Many companies had to streamline decision structures so they could react faster than they ever knew they could. Less bureaucratic decision making offers a chance for improved adaptability.
- **Intense Problem-Solving Focus.** In many cases, quick solutions to unexpected challenges have led to an intense focus on solving specific types of problems. Developing a new vaccine or improving health treatment protocols are headlines in this space. As some companies, emerge from the stressful period, they will see heightened innovation and creativity.

These are just a few examples, yet as we look around, even in the early stages of the economic rebuilding, there are many cases where strategic corporate changes are being made that are based on the lessons of the pandemic shutdown and are being

rapidly deployed. There are some good news and some not so good news embedded in this reality of potentially heightened innovation during the recovery period.

The good news are that we may see a period of several years or more with strong gains in labor productivity as corporates apply the lessons learned from the pandemic shutdown. Some corporations may downsize to match reduced demand to their output, and at the same time enacting various efficiencies, including less business travel, more flexible work hours, streamlined executive decision processes. All of these things hopefully add up to more earnings growth, yet they also suggest that the process of putting people back to work may take longer than many expect. Corporate efficiencies can help profits recovery faster than the economy. And the economy may see the recovery in real GDP back to the prepandemic peak arrive more quickly than a return to prepandemic employment levels. Of course, it does not have to turn out as this hypothetical scenario suggests, since other things are never equal. Government fiscal spending, especially on infrastructure projects, could result in much faster employment gains and a more rapid return to peak employment.

5 | FINAL THOUGHTS ON ANALYZING THE US ECONOMY DURING AND AFTER THE PANDEMIC

One interesting aspect of the debate among analysts during the 2020 pandemic had to do with the expected shape of the economic rebound. Would it be a quick, V-Shaped recovery, and extended U-Shaped recovery, or possibly even a W-Shaped recovery with a setback on the way to regaining prepandemic activity levels. An article by Ponczek (2020) in Bloomberg News summarized the quandary of “expecting what ‘normally happens’ to guide the [pandemic] here-and-now is an especially fraught exercise, in the article aptly titled: “History Is a Nightmare From Which Stock Pundits Refuse to Awake.” The debate over the equity market rally was running in parallel with the debate over the shape of the economic recovery. One of the key assumptions one had to make to forecast a V-Shaped economic recovery was that consumer and business behavior would snap back to prepandemic patterns once the virus was contained with no long-lasting behavioral changes whatsoever. From our perspective, this assumption was never remotely tenable, but the Fed-supported huge rally in equities led many economists to implicitly embed the “no long-lasting behavioral changes” assumption into their recovery estimates and to continue to use traditional equilibrium analysis despite the overwhelming evidence that the pandemic-induced shutdown was a “far from equilibrium” episode.

Our key takeaways for future research into economic activity during and after the pandemic period include the following:

- In a “far from equilibrium” state involving an avalanche network collapse, the physics of phase transitions may be much more helpful for analyzing the pandemic and the subsequent economic recovery than traditional equilibrium economic models.
- Price signals were considerably less important than health fears, government-mandated shutdowns, and financial distress during the pandemic period. Again, this observation underscores that traditional equilibrium economic models based on price signals to guide supply and demand would not be useful until well into the recovery period.
- Interpreting traditional economic data during the pandemic period requires many caveats, including, among many other issues, if seasonal adjustment is appropriate, how data collection methods were impacted, and how government rules on skipped student loan and mortgages impacted the data in a misleading manner.
- Alternative data, from airline passengers, to restaurant diners, to commuter activity, and more, all provide additional insights into the pace of the economic recovery and whether certain behavioral changes were more likely to be transient or long-lasting.
- Policy response analysis comparing 2020 with 2008 and the 1930s suggests that parallels with previous serious economic downturns are not likely to be useful.
- Policy response analysis may need to be divided between policies that worked to cushion the shock of the pandemic-induced shutdown versus policies that might create new jobs and accelerate the pace of the economic recovery. Most of the initial fiscal and monetary policy responses fell into the category of “cushioning the shock” and not “accelerating the recovery.”
- Regarding the analysis of the Fed's actions, one needs to avoid focusing on the total balance sheet expansion and instead focus on the types of securities the Fed was buying or not buying. Purchases of US Treasury securities support the concept of a fusion of monetary and fiscal policy, and the pattern of these purchases diverged from the balance sheet expansion after mid-June 2020 when the balance sheet stabilized for several months.
- Given the Fed's considerable involvement in funding the US federal government budget deficit, the fusion of monetary and fiscal policy naturally leads into an examination of Modern Monetary Theory (MMT) and how to forecast inflation in the future.

- The pandemic caused many behavioral changes, some of which may be long-lasting and influence corporate business models, including more flexible work arrangements, less business travel, and smaller real estate footprints for many white-collar service businesses.

The 2020 pandemic is a clear challenge to traditional economic analysis. Our perspective requires one to challenge basic assumptions, such as the role of price signals versus other decision criteria in making economic decisions. For sure, the pandemic was a special event and create non-linear outcomes and significant, long-lasting behavioral changes, so the use of linear regression models may be quite inappropriate for pandemic analysis. Data anomalies from disrupted data gathering processes, to seasonal adjustment, to the unintended misrepresentation of credit delinquencies due to pandemic forbearance rules means that researchers will have to get more acquainted with the details of the data they use than ever before. We hope these lessons from “in the real time” analysis will help alert economists to the challenges of making sense and learning lessons from the 2020 pandemic period. Or, in the words of Riehnart and Rogoff (2009), yet again, although in not the same way, “this time is different.”

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ENDNOTES

- ¹ US Bureau of Labor Statistics, Employment Situation News Release for April 2020, released on May 8, 2020: “There was a change to the estimation method used in the establishment survey for April. Business births and deaths cannot be adequately captured by the establishment survey as they occur. Therefore, the establishment survey estimates use a model to account for the relatively stable net employment change generated by business births and deaths. Due to the impact of the COVID-19 pandemic, the relationship between the two was no longer stable in April. Therefore, the establishment survey made modifications to the birth–death model.”
- ² US Department of Labor, “News Release” for September 3, 2020 for Unemployment Insurance Weekly Claims: “Prior to September 2020, the seasonally adjusted unemployment insurance claims series used multiplicative seasonal adjustment factors. Starting in September Bureau of Labor Statistics staff, who provide the seasonal adjustment factors, specified these series as additive. In accordance with the usual practice, the seasonal adjustment models and factors will be reviewed at the beginning of each calendar year, when prior years of seasonally adjusted estimates will be subject to revision.”
- ³ Fortune Magazine, “The 20 biggest companies that have filed for bankruptcy because of the coronavirus pandemic”, June 29, 2020. The names include: Hertz, Frontier Communications, Intel Sat, McDermott International, JC Penny, Whiting Petroleum, Neiman Marcus, Diamond Offshore Drilling, among others. Retail and oil dominant the list of larger firms declaring bankruptcy in the first half of 2020.
- ⁴ Federal Reserve. Press Release, March 23, 2020. “Federal Reserve announces extensive new measures to support the economy.” The opening sentence said it all: “The Federal Reserve is committed to using its full range of tools to support households, businesses, and the U.S. economy overall in this challenging time.” Many analysts dubbed this “open-ended QE or infinite QE”. Also see: Federal Reserve Press Release, April 9, 2020. Federal Reserve takes additional actions to provide up to \$2.3 trillion in loans to support the economy.
- ⁵ From Investopedia (https://www.investopedia.com/terms/p/push_on_a_string.asp) “While the phrase pushing on a string has been attributed to British economist John Maynard Keynes, there is no evidence he used it. However, this exact metaphor was used in a House Committee on Banking and Currency in 1935, when Federal Reserve Governor Marriner Eccles told Congress that there was very little, if anything, that the Fed might do to stimulate the economy and end the Great Depression. Governor Eccles: “Under present circumstances there is very little, if anything, that can be done.” Congressman T. Alan Goldsborough: “You mean you cannot push a string.” Governor Eccles: “That is a good way to put it, one cannot push a string. We are in the depths of a depression and..., beyond creating an easy money situation through reduction of discount rates and through the creation of excess reserves, there is very little, if anything that the reserve organization can do toward bringing about recovery.”
- ⁶ William McChesney Martin, Jr. (October 19, 1955). “Address before the New York Group of the Investment Bankers Association of America”. The job of the Federal Reserve, he famously said, is “to take away the punch bowl just as the party gets going,” that is, raise interest rates just

when the economy reaches peak activity and inflation pressures are likely to emerge. [paraphrased from Wikipedia: https://en.wikipedia.org/wiki/William_McChesney_Martin]. William McChesney Martin was chairman of the Federal Reserve Board from March 1951 through January 1970, serving under five US Presidents.

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