

**Comparing the Monetary Policy Responses of Major Central Banks to the
Great Financial Crisis and the COVID-19 Pandemic**

Stanley Fischer

November 2021

Abstract

There have been two major global economic crises over the last two decades, the Great Financial Crisis (2007-2009) and the COVID-19 pandemic (2020-present). These two events presented fundamental challenges to central banks as they attempted to pursue effective monetary policies that would guide their economies on the path to recovery. Despite the unprecedented circumstances faced during these periods, policymakers were able to find success by embracing unconventional monetary policy methods like quantitative easing and emergency lending programs in a world with extremely low interest rates. This research reviews the monetary policies of major central banks during these crises in order to gain a better understanding of their evolution over time and the effectiveness of their policy responses to both the Great Financial Crisis and COVID-19.

The first section of this research will recap the key monetary policy actions of three major central banks – the Federal Reserve, the European Central Bank, and the Bank of England – during the Great Financial Crisis, as well as examine the different impacts that their policy decisions had on the recoveries experienced in each of those regions. Next, the second section will briefly summarize some of the key reforms that were enacted in the aftermath of the Great Financial Crisis to prevent similar catastrophic financial meltdowns from occurring again in the future. The third section of the research reviews the monetary policies of the influential central banks during the COVID-19 pandemic and examines how their responses compare to the previous crisis. This section will also review the fiscal policy responses to the pandemic and importance of public health and vaccinations to economic recoveries. Finally, the fourth section reviews how the world of monetary policy has changed over the last two decades and offers some concluding thoughts.

Thank you to my research assistant Adam Feifel for all his hard work and contributions to this research project over the last few months.

Section I – Monetary Policy and the Great Financial Crisis

Introduction

In order to properly evaluate the recent actions taken by major central banks in response to the COVID-19 pandemic and to assess the effectiveness of their monetary policy decisions, it is important to first have a comprehensive understanding of the history of the Great Financial Crisis (“GFC”) in 2008. There were many lessons learned from the monetary policy responses to the GFC and its aftermath, and over the last decade central bankers revised their policy playbook accordingly in preparation for the next serious economic downturn. The financial meltdown and economic collapse of the GFC tested central banks in a way that had not been seen since the Great Depression, forcing policymakers to take on an expanded role with their monetary policy decisions as they attempted to contain and then recover from the economic crisis. Overall, there were four main categories of monetary policy that shaped the responses of central banks to the GFC: interest rate changes, liquidity and credit programs, quantitative easing with the expansion of central bank balance sheets, and forward guidance.

Monetary Policy Prior to the GFC

Historically, the missions of central banks revolve around their ability to independently ensure price stability, sustainable growth, and maximum employment. Prior to the GFC, the US economy went through a 25-year period known as “the Great Moderation” where, in contrast with the volatility and high inflation of previous decades, there was consistent economic growth and relatively low, stable inflation levels. During this period, the Federal Reserve focused its efforts on tightening monetary policy when inflation was high or output exceeded potential and easing monetary policy when the circumstances were reversed. This newfound systemic approach helped the Fed reduce economic volatility and price instability in the US by always staying one step ahead of the risks posed by inflation and potential recessions.¹

A similar phenomenon was occurring in many other advanced economies worldwide during this same time period, as in Europe where there was a sharp decline in the volatility of GDP growth and inflation that also began in 1980s. The improved efficiency of monetary policy in Europe played a leading role in the reduction of the continent’s economic volatility, where monetary policy became more credible, the counter-cyclicality of its interest rate decisions were more effective, and inflation was combated with a forward-looking (and not backward-looking) perspective. By increasing stability in terms of inflation and growth, monetary authorities in Europe were able to avoid facing the challenging trade-off between extreme changes in prices and output.²

The Great Financial Crisis

¹ “The Great Moderation,” *Federal Reserve History*, November 2013, <https://www.federalreservehistory.org/essays/great-moderation>

² “The Great Moderation in the Euro Area: What Role Have Macroeconomic Policies Played?” *European Commission*, June 2008, https://ec.europa.eu/economy_finance/publications/pages/publication12753_en.pdf

One of the primary causes for the GFC was the bursting of the US housing bubble, where home prices fell by more than one fifth on average between 2007 to 2011. This decline in housing prices (in conjunction with insufficient financial regulation as well as other economic factors) helped spark the GFC, as losses on mortgage-related financial assets caused significant strains throughout global financial markets. Starting in 2008, the GFC had a devastating impact on the US economy – GDP fell by 4.3%, the unemployment rate doubled from less than 5% to 10%, and at 18 months it was the longest (and deepest) recession since World War II.³ Additionally, the stock market lost \$8 trillion in value from 2007 to 2009, and Americans lost \$9.8 trillion in wealth as their home values and retirement account balances plummeted.⁴

The challenging economic situation was not unique to the US, for the effects of the GFC spread as it caused recessions in economies worldwide. It led to a loss of more than \$2 trillion in global economic growth, equivalent to a nearly 4% drop in global GDP growth from Q2 2008 to Q1 2009.⁵ Although European officials had initially hoped the economic crisis would remain a problem only for the American economy, Europe entered into a recession in Q1 2009, only a few months after the US.⁶ In the Eurozone, GDP shrunk by 4.4% in 2009, and the unemployment rate peaked at 12.1% in 2013.^{7,8} In the UK, GDP decreased by more than 6% from Q1 2008 to Q2 2009, and the unemployment rate peaked at 8.4% in 2011.⁹ An increasingly globalized world had allowed the GFC to become a fully-fledged global economic crisis.

Interest Rate Changes

Traditionally, central banks lower interest rates to stimulate economic growth by encouraging borrowing and investing. In times of economic crises, cutting interest rates has historically been the first tool used by central banks to quickly combat serious economic downturns and recessions. This was certainly the case as well during the GFC between the years of 2007 to 2009, where interest rates were slashed by central banks worldwide in response to the ongoing crisis. Unbeknownst at the time, the interest rate cuts to ultra-low levels during the GFC ended up persisting over the course of the following decade, and this resulted in central banks utilizing this traditional tool of monetary policy much less frequently in the period thereafter.

³ “The Great Recession and Its Aftermath,” *Federal Reserve History*, November 2013, <https://www.federalreservehistory.org/essays/great-recession-and-its-aftermath>

⁴ “A guide to the financial crisis – 10 years later,” *The Washington Post*, September 2018, https://www.washingtonpost.com/business/economy/a-guide-to-the-financial-crisis--10-years-later/2018/09/10/114b76ba-af10-11e8-a20b-5f4f84429666_story.html

⁵ *Ibid*

⁶ “What Has the Eurozone Learned from the Financial Crisis?,” *Harvard Business Review*, September 2018, <https://hbr.org/2018/09/what-has-the-eurozone-learned-from-the-financial-crisis>

⁷ “Real GDP growth rate – volume,” *Eurostat Data Browser*, <https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en>

⁸ “December 2013 Euro area unemployment rate at 12.0% EU28 at 10.7%” *European Commission*, January 2014, https://ec.europa.eu/commission/presscorner/detail/en/STAT_14_17

⁹ “The 2008 recession 10 years on,” *Office for National Statistics*, April 2018, <https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/the2008recession10yearson/2018-04-30>

In the United States, as economic conditions began to deteriorate starting in late 2007, the Federal Reserve steadily reduced interest rates over the course of the following year, from 5.25% in August 2007 to 2.00% in April 2008.¹⁰ Then, following the bankruptcy of Lehman Brothers in September 2008 and the subsequent financial meltdown, the Federal Reserve responded by cutting rates the maximum amount that was possible. In December 2008, the upper limit of the Fed Funds Target Rate was reduced to 0.25% and the lower limit was reduced to 0.00%.^{11,12} After taking this unprecedented action, the Fed's rates continued to stay low at these minimum levels, and they were not raised at any point during the seven years after the GFC.

In contrast with the Federal Reserve, the European Central Bank ("ECB") continued to raise interest rates at the start of the financial crisis in 2007, with their Deposit Facility Rate reaching a high mark of 3.25% in July 2008. The ECB only began to seriously cut rates in November 2008, and they ended 2008 with their deposit rate still at 2.00%. The deposit rate was eventually lowered to 0.25% in April 2009, several months after the Federal Reserve's equivalent rate cuts. However, in 2011 the ECB actually raised interest rates twice, before quickly reversing course and then lowering their rates again later that year. In 2012, the ECB deposit rate was reduced to 0.00%.¹³ The ECB then became the first major central bank to introduce negative interest rates in 2014, and they have stayed negative ever since.¹⁴ Like the other major central banks, the Bank of England ("BoE") also significantly reduced their Bank Rate at the end of 2008 in response to the GFC. The BoE decreased rates from 5.00% in April 2008 to 0.50% in March 2009 through a series of six rate cuts over the course of one year. Unlike the ECB though, the BoE never introduced negative interest rates to the UK. Instead, the BoE's Bank Rate stayed at 0.50% from March 2009 to August 2016, a period of over seven years.¹⁵

Overall, in response to the GFC the ECB was slower and more hesitant than the Federal Reserve (and the BoE, to a certain extent) to reduce interest rates and keep them at lower levels. However, the ECB was later forced to make up lost ground and even take the drastic step of introducing negative interest rates to the Eurozone. This eventually led to a situation where the ECB continued reducing their interest rates deeper into negative territory during the second half of the 2010s, while the Fed had the ability to repeatedly raise rates during those years thanks to the US having consistently stronger economic performance than Europe.

Liquidity and Credit Programs

Another well-known role played by central banks is acting as a "lender of last resort" in periods of financial turmoil. During challenging economic situations, central banks traditionally have been the lender of last resort because they have the responsibility to ensure continued stability in markets and

¹⁰ "Federal Funds Target Rate," *FRED*, <https://fred.stlouisfed.org/series/DFEDTAR>

¹¹ "Federal Funds Target Rate – Upper Limit," *FRED*, <https://fred.stlouisfed.org/series/DFEDTARU>

¹² "Federal Funds Target Rate – Lower Limit," *FRED*, <https://fred.stlouisfed.org/series/DFEDTARL>

¹³ "ECB Deposit Facility Rate for Euro Area," *FRED*, <https://fred.stlouisfed.org/series/ECBDFR>

¹⁴ "Going negative: the ECB's experience," *European Central Bank*, August 2020, <https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200826~77ce66626c.en.html>

¹⁵ "Official Bank Rate history," *Bank of England*, <https://www.bankofengland.co.uk/boeapps/database/Bank-Rate.asp>

financial systems.¹⁶ During the GFC, the Federal Reserve stepped fully into this role and utilized several emergency lending programs in order to ensure there would continue to be sufficient liquidity in credit markets. The Fed's "alphabet soup" of liquidity programs focused on quickly providing lending to depository institutions (e.g., TAF), primary dealers (e.g., TSLF), in support of commercial paper and money markets (e.g., CPFF), and market participants more broadly (e.g., TALF) as the global financial system began to falter.¹⁷ The Federal Reserve's emergency lending to financial institutions peaked at a value of \$1.6 trillion in December 2008.¹⁸

The ECB acted in a similar manner to the Fed when it came to their liquidity programs during this challenging time period. The ECB's primary response to the GFC was to offer enhanced credit support to the economy and ensure that there would continue to be sufficient liquidity in the banking system as funding sources became frozen. Liquidity was allocated to financial institutions through main refinancing operations ("MRO") and long-term refinancing operations ("LTRO"), with maturities ranging from 1 week to 3 years. At their peak in 2012, the balance of these operations exceeded €1 trillion. The favorable conditions of these credit programs allowed banks to have unlimited access to central bank liquidity (with sufficient collateral), thus stabilizing the banking system during both the GFC and the subsequent European sovereign debt crisis.¹⁹ The Bank of England also created a large liquidity program in response to the GFC called the Specialty Liquidity Scheme, which at its peak had lent £185 billion to the British banking system.²⁰

As the lender of last resort for the US, UK, and Eurozone, the Fed, BoE, and ECB all took swift action to inject liquidity into credit markets as the financial world was facing a meltdown in 2008. The willingness of these central banks to commit fully to their emergency lending programs reflected the importance of maintaining sufficient liquidity in markets during an economic crisis. By providing cheap credit to financial institutions, these central banks were able to prevent additional bankruptcies and an even worse financial panic from taking place. Also, it should be mentioned that liquidity swap arrangements (where currencies are effectively exchanged risk-free between central banks over a specified period of time) were also used extensively by central banks during the GFC, for this was another method to prevent funding markets from drying up by ensuring that there was sufficient liquidity across borders.²¹

Quantitative Easing

¹⁶ "What is a lender of last resort?" *European Central Bank*, August 2019, <https://www.ecb.europa.eu/explainers/tell-me-more/html/what-is-a-lender-of-last-resort.en.html>

¹⁷ "Federal Reserve Liquidity Programs: An Update," *Federal Reserve Bank of Minneapolis*, June 2010, <https://www.minneapolisfed.org/article/2010/federal-reserve-liquidity-programs-an-update>

¹⁸ "Separating Fact From Fiction on the Fed's Loans," *The Wall Street Journal*, December 2011, <https://www.wsj.com/articles/SB10001424052970204083204577082331689233426>

¹⁹ "The (not so) Unconventional Monetary Policy of the European Central Bank since 2008," *Bruegel*, July 2014, <https://www.bruegel.org/2014/07/the-not-so-unconventional-monetary-policy-of-the-european-central-bank-since-2008/>

²⁰ "The Bank of England's Special Liquidity Scheme," *Bank of England*, March 2012, <https://www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2012/the-boes-special-liquidity-scheme.pdf>

²¹ "What Are Fed Swap Lines and What Do They Do?" *The Wall Street Journal*, November 2011, <https://www.wsj.com/articles/BL-REB-15272>

As the economic effects of the GFC continued to linger and it became clear how long the road to recovery would be, central bankers began relying on unconventional monetary policies in their responses to the crisis. One of the most prominent forms of unconventional monetary policy is quantitative easing (“QE”) and the significant expansion of central bank balance sheets. Essentially, QE occurs when central banks transition away from targeting interest rates to instead target the excess reserves held by banks (i.e., the quantity of currency in the banking system), where the central bank buys financial assets in exchange for reserves. Doing so expands the money supply in the market, and in the process helps increase investment and economic activity.²²

By the end of 2008, because inflation was less than the Federal Reserve’s 2% target and output was still below potential, the Federal Reserve began utilizing quantitative easing as a monetary policy tool since their interest rates could not be lowered any further. In the aftermath of the GFC, there were three rounds of QE in the US (November 2008 - March 2010, November 2010 - June 2011, and September 2012 - October 2014) where the Fed purchased long-term treasuries and agency mortgage-backed securities.²³ As a result of their QE programs, the Fed’s balance sheet expanded significantly – total assets rose from \$882 billion in December 2007 (6.0% of US annual GDP) to \$4.47 trillion in May 2017 (23.5% of US annual GDP).²⁴

Unlike the Fed, the ECB only launched its formal quantitative easing program, the Asset Purchase Programme (“APP”) in March 2015, seven years after the GFC.²⁵ The ECB hoped QE would support economic growth across the Eurozone and help return lagging inflation levels to their 2% target. By finally adopting QE as one of their monetary policies, the ECB expected that their extensive bond purchases would act as a stimulus that would weaken the Euro, boost stocks, and lower financing costs. By the end of 2018, the ECB had spent a total of €2.6 trillion in their QE program, buying up mostly government debt, as well as some corporate debt, asset-backed securities, and covered bonds.²⁶ However, not all of Europe shied away from quantitative easing in the immediate aftermath of the GFC. In the United Kingdom, there were also several rounds of QE from the BoE: QE1 (£200 billion; 2009-2010), QE2 (£125 billion; 2011-2012), QE3 (£50 billion; 2012), and QE4 (£70 billion; 2016). The majority of QE purchases by the BoE were of UK government bonds, also known as gilts.²⁷

After central banks became unable to lower their interest rates any further during the GFC, they turned to unconventional monetary policies and began using QE to stimulate economic growth. In other words, central banks started expanding their balance sheets – not only with lending to financial

²² “Quantitative Easing: Lessons We’ve Learned,” *Federal Reserve Bank of St. Louis*, July 2012,

<https://www.stlouisfed.org/publications/regional-economist/july-2012/quantitative-easing-lessons-weve-learned>

²³ “Large-Scale Asset Purchases,” *Federal Reserve Bank of New York*, 2018, <https://www.newyorkfed.org/markets/programs-archive/large-scale-asset-purchases>

²⁴ “What Is Quantitative Easing, and How Has It Been Used?” *Federal Reserve Bank of St. Louis*, November 2017, <https://www.stlouisfed.org/on-the-economy/2017/november/quantitative-easing-how-used>

²⁵ “How quantitative easing works,” *European Central Bank*, August 2021, https://www.ecb.europa.eu/explainers/show-me/html/app_infographic.en.html

²⁶ “What ECB Stimulus Has Done,” *The Wall Street Journal*, August 2021, <https://www.wsj.com/graphics/what-ecb-qe-stimulus-has-done/>

²⁷ “The central bank balance sheet as a policy tool: past, present and future,” *Bank of England*, August 2020,

<https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/the-central-bank-balance-sheet-as-a-policy-tool-past-present-and-future.pdf>

institutions, but also by engaging in large-scale asset purchases, better known as quantitative easing. As with other areas of monetary policy following the GFC, the ECB was slower to respond than the Fed and BoE, for it only started its Eurozone QE program in 2015 after the Fed and BoE had each already finished three rounds of QE. To illustrate the disparity in their adoption of QE after the GFC, from 2007 to 2014 the BoE balance sheet increased by 416% and the Federal Reserve balance sheet increased by 381%, but the ECB's balance sheet only increased by 103% over that same period of time.²⁸

Forward Guidance

Forward guidance has become another tool frequently used by central banks, where they communicate to the public about the likely future course of monetary policy. The Federal Reserve began utilizing forward guidance more prominently as a part of their response to the GFC.²⁹ For example, when the Fed Funds Target Rate was reduced to the zero bound in December 2008, the Federal Open Market Committee put out a statement that “weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time.”³⁰ Although the Fed’s forward guidance tended to be more qualitative in nature at the start of the GFC, in 2011 the Fed transitioned to having more explicit guarantees tied to economic data (i.e., unemployment, inflation). In turn, as the Fed’s statements became increasingly explicit, their forward guidance was more effective at persuading markets that policy interest rates would continue to stay low.³¹

Similar to other monetary policies, the ECB did not act as quickly as the Federal Reserve when it came to using forward guidance at the start of the GFC. The ECB only formally introduced forward guidance as a monetary policy tool in July 2013, when the ECB Governing Council stated that it expected interest rates to remain low for an extended period of time.³² One year earlier, in July 2012, ECB President Mario Draghi famously said, “Within our mandate, the ECB is ready to do whatever it takes to preserve the Euro. And believe me, it will be enough.” Bond yields in the Eurozone declined thereafter, and his “whatever it takes” statements are now widely viewed as having been an inflection point of the European sovereign debt crisis after the GFC.³³ In terms of the UK, the BoE formally started to use explicit forward guidance in August 2013, where their Monetary Policy Committee began providing guidance about the levels of future interest rates, rather than just announcing the Bank Rate for the month ahead, as had previously been the case.³⁴

²⁸ “European Central Bank Picked Tough Time to Diet,” *The Wall Street Journal*, August 2014, <https://www.wsj.com/articles/european-central-bank-picked-tough-time-to-diet-1407098213>

²⁹ “What is forward guidance, and how is it used in the Federal Reserve's monetary policy?” *Board of Governors of the Federal Reserve Bank System*, December 2015, <https://www.federalreserve.gov/faqs/what-is-forward-guidance-how-is-it-used-in-the-federal-reserve-monetary-policy.htm>

³⁰ “Review of Monetary Policy Strategy, Tools, and Communications,” *Board of Governors of the Federal Reserve Bank System*, February 2019, <https://www.federalreserve.gov/monetarypolicy/timeline-forward-guidance-about-the-federal-funds-rate.htm>

³¹ “The new tools of monetary policy,” *Brookings*, January 2020, <https://www.brookings.edu/blog/ben-bernanke/2020/01/04/the-new-tools-of-monetary-policy/>

³² “What is forward guidance?” *European Central Bank*, July 2021, https://www.ecb.europa.eu/explainers/tell-me/html/what-is-forward_guidance.en.html

³³ “The Speech That Transformed European Markets – Five Years Later,” *The Wall Street Journal*, July 2017, <https://www.wsj.com/articles/the-speech-that-changed-european-markets-five-years-later-1501061404>

³⁴ “Monetary policy trade-offs and forward guidance,” *Bank of England*, August 2013, <https://www.bankofengland.co.uk/-/media/boe/files/inflation-report/2013/monetary-policy-trade-offs-and-forward-guidance>

The GFC and its aftermath illustrated how forward guidance is another useful option in the central banker toolkit, especially when combating a serious economic crisis. In the decade following the GFC, the Fed, ECB, BoE, and other central banks improved significantly in their abilities of effectively using forward guidance to influence financial markets. Although there are some limitations about what forward guidance can accomplish on its own (especially if circumstances change, the central bank seeks a different course in policy, etc.), it has become a popular tool for central bankers that now plays a critical role in the world of monetary policy.

Summary

Overall, the US and UK economies recovered significantly faster from the GFC than the Eurozone. US GDP levels regained their pre-crisis levels by 2011 and the UK did so by 2013, but that wasn't true for the Eurozone until 2015.^{35,36} Similarly, unemployment rates recovered in the US and the UK on very similar trajectories after the GFC, returning in 2015 to their pre-crisis levels of around 5% for both countries.^{37,38} In contrast, the Eurozone had consistently high unemployment in the years following the GFC (hitting a record high above 12.1% in 2013), so much so that the unemployment rate of 7.9% at the end of 2018 was still higher than the pre-crisis unemployment rate of 7.1% over a decade earlier at the start of 2008.^{39,40} While there are many factors that led to differences in their economic recoveries, one of the main reasons for this divergence was the Fed and the BoE taking a more aggressive approach than the ECB when it came to monetary policy. During the GFC and in the immediate years that followed, the Fed and BoE were more proactive than the ECB about quickly cutting interest rates, pursuing quantitative easing, and issuing forward guidance. In turn, the UK and US economies were able to experience faster economic recoveries compared to the Eurozone, which struggled economically in comparison to those countries in the decade after the GFC.

³⁵ "The ECB and the Fed: a comparative narrative," *Bruegel*, January 2016, <https://www.bruegel.org/2016/01/the-ecb-and-the-fed-a-comparative-narrative/>

³⁶ "The 2008 recession 10 years on," *Office for National Statistics*, April 2018, <https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/the2008recession10yearson/2018-04-30>

³⁷ *Ibid*

³⁸ "U.S., European Economies and the Great Recession," *Federal Reserve Bank of St. Louis*, February 2017, <https://www.stlouisfed.org/on-the-economy/2017/february/unemployment-rate-dynamics-us-europe>

³⁹ "Euro area unemployment at 7.9%," *Eurostat*, January 2019, <https://ec.europa.eu/eurostat/documents/2995521/9539652/3-31012019-BP-EN.pdf/bd847e5d-0694-4f90-b21f-f87a57ac4277>

⁴⁰ "Euro area unemployment stable at 7.1%," *European Commission*, April 2008, https://ec.europa.eu/commission/presscorner/detail/en/STAT_08_44

Section II – Financial Reforms During the Interim Period

Introduction

After the GFC, the monetary policy decisions and economic outcomes from the time period were carefully studied and analyzed by central bankers and economists in preparation for the next major financial crisis. At the same time, during the interim period between the GFC and the COVID-19 pandemic, policymakers enacted a number of much-needed reforms and revised standards in order to strengthen global financial systems and prevent a similar economic meltdown like the GFC from occurring again in the future. The regulatory overhaul that took place following the GFC was primarily focused on different ways to reform and stabilize the financial system, particularly the banking sector which had repeatedly proven its vulnerability throughout the crisis.

Key Financial Reforms

Some of the most prominent examples of financial reforms during the interim period include the establishment of the Financial Stability Board (2009), the Dodd-Frank Wall Street Reform and Consumer Protection Act (2010), the Basel III Standards (2011) and the subsequent Basel IV Standards (2017), and the European Market Infrastructure Regulation (2012). By and large, the reforms enacted during the interim period were crucial for reducing the susceptibility of banks to further economic crises, as well as enabling regulators to deal with bank failures without imperiling financial systems in their entirety. These reforms were instituted via government legislation and central bank regulations, and they have since been credited with significantly lowering the risk of another worldwide economic downturn like the GFC being caused by breakdowns in the financial system.

Hosted by the Bank for International Settlements (“BIS”), the Financial Stability Board was established shortly after the GFC in April 2009, and it proceeded to take on a central role in promoting the reforms of international financial regulation and supervision.⁴¹ Following the GFC, the BIS also updated their “Basel Framework” standards of banking regulation in 2011 to strengthen the regulation, supervision, and risk management of banks.⁴² The Basel III regulations were a response to the core issues that caused the GFC, where banks were too highly leveraged, held insufficient quality capital, and had inadequate liquidity buffers. Basel III therefore implemented new capital enhancements and liquidity ratios, as well as introduced the leverage ratio and countercyclical ratio to better monitor systemic risk.⁴³ These reforms were further revised and tightened in 2017, and subsequently became known as Basel IV. Although many of the key reforms from the updated Basel standards have been implemented in the financial and banking systems of developed economies, the full global implementation schedule has been repeatedly delayed, with the most recent delay coming after the COVID-19 pandemic pushing the revised implementation date to January 2023.⁴⁴

⁴¹ “History of the FSB,” *Financial Stability Board*, <https://www.fsb.org/about/history-of-the-fsb/>

⁴² “Basel III: international regulatory framework for banks,” *BIS*, <https://www.bis.org/bcbs/basel3.htm>

⁴³ “Banking regulations: an introductory framework,” *Moody’s Analytics*, January 2011, <https://www.moodyanalytics.com/-/media/whitepaper/2011/11-01-03-regulation-guide-introduction.pdf>

⁴⁴ “Governors and Heads of Supervision announce deferral of Basel III implementation to increase operational capacity of banks and supervisors to respond to Covid-19,” *BIS*, March 2020, <https://www.bis.org/press/p200327.htm>

Excess reserves, the cash funds held by banks over and above their central bank's requirements, were a key area of reform after the GFC. Because of this, there have been significant increases in the excess reserves of banks since the GFC. In the US, excess reserves grew from \$1.9 billion in August 2008 to \$2.6 trillion in January 2015. The primary reason for this increase was the Federal Reserve began paying interest on excess reserves in late 2008, giving banks a financial incentive to increase their excess reserves with the Fed and receive interest at a risk-free rate. The Fed's QE programs then caused even further increases in the excess reserves of the banks.⁴⁵ Although their mechanism is different, the BoE also shifted towards paying interest on the reserves of commercial banks (matching their Bank Rate) after the GFC.⁴⁶ Excess reserves grew exponentially in Europe as well, from €4.2 billion in June 2012 to €1.3 trillion in June 2019 seven years later. This increase largely came about thanks to the ECB's QE program in the latter half of the decade.⁴⁷

Another major reform that grew in importance in the aftermath of the GFC was frequent stress testing of banks and key financial institutions to see how they would be able to react to a future severe economic shock. Combined with the other financial reforms of the interim period, the results of the stress tests illustrated that banks all over the world were much more capitalized and less leveraged compared to their vulnerable financial situation prior to the GFC.^{48,49,50} Overall, the banking system was stabilized and then significantly strengthened throughout the interim period. Regulators and policymakers wanted to ensure that there would not be another historic recession caused by failures and weaknesses in the global financial system, so they enacted reforms accordingly in an attempt to bring about lasting financial stability and prevent another GFC from taking place. However, these accomplishments have unfortunately been somewhat overshadowed since then by the subsequent and severe worldwide economic crisis in 2020 that came from the public health sphere, with origins completely unrelated to financial markets.

⁴⁵ "Excess Reserves: Oceans of Cash," *Federal Reserve Bank of Cleveland*, February 2015, <https://www.clevelandfed.org/newsroom-and-events/publications/economic-commentary/2015-economic-commentaries/cc-201502-excess-reserves-oceans-of-cash.aspx>

⁴⁶ "Fiscal danger of interest on reserves overblown," *Official Monetary and Financial Institutions Forum*, December 2020, <https://www.omfif.org/2020/12/raising-bank-of-england-rates-risks/>

⁴⁷ "Excess reserves at the ECB soar," *Reuters*, July 2019, <https://fingfx.thomsonreuters.com/gfx/editorcharts/EUROPE-MARKETS-ECB/0H001PBWT6DJ/index.html>

⁴⁸ "Dodd-Frank Act Stress Test Publications," *Board of Governors of the Federal Reserve Bank System*, August 2021, <https://www.federalreserve.gov/publications/dodd-frank-act-stress-test-publications.htm>

⁴⁹ "Stress tests," *European Central Bank*, <https://www.bankingsupervision.europa.eu/banking/tasks/stresstests/html/index.en.html>

⁵⁰ "Stress testing," *Bank of England*, October 2021, <https://www.bankofengland.co.uk/stress-testing>

Section III – Monetary Policy and the COVID-19 Pandemic

Introduction

By 2020, global financial and banking systems had been strengthened thanks to the financial reforms and updated standards that had been instituted over the course of the previous decade. During this interim period between the GFC and COVID-19, economists, central bankers, and policymakers did their best to prepare for the next potential downturn. However, the long period of economic expansion ended abruptly and unexpectedly in early 2020 with the outbreak of the COVID-19 pandemic. The uncontrolled spread of COVID-19 and its ability to continuously wreak havoc on a global scale have caused tragic levels of morbidity, extremely costly lockdowns, and economic recessions that have been unprecedented in modern history.

Unlike the GFC in 2008 where the global recession was caused by endogenous problems within financial systems and markets, COVID-19 has been an exogenous shock that is at its core a public health crisis. Nevertheless, despite the differences in the core nature of these crises, the monetary policy responses of the influential central banks to the COVID-19 pandemic were largely built upon the foundations of their actions a decade earlier during the GFC. The Fed, BoE, and ECB all significantly expanded their emergency liquidity and quantitative easing programs in the face of economic downturns caused by COVID-19, and their actions have thus far been credited with helping prevent even worse recessionary meltdowns from taking place.

The COVID-19 Pandemic

The COVID-19 pandemic began with the detection of several mysterious pneumonia cases in Wuhan, China in December 2019. This was identified as a novel coronavirus that was eventually called “COVID-19” by the World Health Organization, and it quickly spread throughout China in January 2020. By February 2020, COVID-19 cases were beginning to spread rapidly in other countries outside of China, and the WHO declared it to be a pandemic in early March 2020. As cases of the pandemic began to surge in March and April 2020 all over the world, countries started implementing widespread lockdowns and other restrictions in an effort to contain the spread of the virus, prevent healthcare systems from being overrun, and lessen the number of COVID-19 cases and deaths.⁵¹ As of the time of this writing, almost two years after COVID-19 first appeared, the world is still struggling mightily to get the pandemic fully under control. By October 2021, there have been 240 million confirmed cases of COVID-19, as well as 5 million deaths confirmed to have been caused by the virus.⁵²

COVID-19 plunged the world into its worst recession since the World War II.⁵³ The lockdowns, disease, and death of the virus have been extremely costly for the global economy, and global GDP fell by

⁵¹ “Key milestones in the spread of the coronavirus pandemic,” *World Economic Forum*, April 2020, <https://www.weforum.org/agenda/2020/04/coronavirus-spread-covid19-pandemic-timeline-milestones/>

⁵² “Coronavirus Resource Center,” *Johns Hopkins University*, October 2021, <https://coronavirus.jhu.edu/map.html>

⁵³ “COVID-19 to Plunge Global Economy into Worst Recession since World War II,” *The World Bank*, June 2020, <https://www.worldbank.org/en/news/press-release/2020/06/08/covid-19-to-plunge-global-economy-into-worst-recession-since-world-war-ii>

3.6% in 2020 (equivalent to a loss of \$2.9 trillion in output) according to the World Bank.⁵⁴ As is often the case in these types of crises, the economic downturn caused by the pandemic has been more severe in the poorer nations of the world. The impact of the economic shock is expected to be quite long-lasting, and the International Monetary Fund is forecasting that by 2024 global GDP will still be 3% lower compared to where it would have been according to the pre-virus baseline trend.⁵⁵

The United States has been particularly hard hit by COVID-19, where the country has had the most cases and deaths of any nation worldwide.⁵⁶ The US entered a recession from February to April 2020, and the pandemic caused the economy to shrink by 3.4% in 2020, which was the largest drop in GDP since 1946.⁵⁷ The US unemployment rate jumped from a full-employment figure of 3.5% in February 2020 to 14.8% in April 2020 just two months later, the highest unemployment rate ever recorded in the country.⁵⁸ The Eurozone and the United Kingdom have also been harmed greatly by COVID-19, both epidemiologically (with high levels of cases and deaths) and economically (with severe recessions caused by the pandemic). In the Eurozone, GDP fell by 6.8% in 2020, and the monetary union had a “double-dip” recession in both Q1 2020 - Q2 2020 and Q4 2020 - Q1 2021.^{59,60} In the UK, GDP decreased by 9.8% in 2020, the country’s largest annual fall of economic growth on record.⁶¹ There were also historic crashes in stock markets, oil markets, and bond markets worldwide in March and April 2020 as a direct result of the unfolding economic crisis and chaos caused by COVID-19.

Federal Reserve

In response to the COVID-19 recession, the Federal Reserve’s monetary policy actions attempted to contain the economic fallout of the historic crisis. The Fed’s monetary policy decisions were heavily influenced by their experiences during the GFC, but they also differed in several significant ways. As was the case with the GFC, the Federal Reserve cut interest rates due to the COVID-19 economic crisis. In March 2020, the Fed reduced the upper limit of the Fed Funds Target Rate from 1.75% to 0.25%.⁶² Unlike the Fed, other major central banks did not have the ability to lower their interest rates, because they still had zero or negative interest rates at the start of the crisis. Another area of monetary policy for the Fed during COVID-19 that was similar to the GFC response was forward guidance. The Fed continued to use forward guidance on their future interest rate decisions, saying that their rates would

⁵⁴ “World Bank Open Data,” *The World Bank*, <https://data.worldbank.org/>

⁵⁵ “Social and economic impact of COVID-19,” *Brookings*, June 2021, <https://www.brookings.edu/research/social-and-economic-impact-of-covid-19/>

⁵⁶ “WHO Coronavirus (COVID-19) Dashboard,” *World Health Organization*, October 2021, <https://covid19.who.int/>

⁵⁷ “U.S. economy contracted 19.2% during COVID-19 pandemic recession,” *Reuters*, July 2021, <https://www.reuters.com/business/us-economy-contracted-192-during-covid-19-pandemic-recession-2021-07-29/>

⁵⁸ “Unemployment Rates During the COVID-19 Pandemic,” *Congressional Research Service*, August 2021, <https://fas.org/sgp/crs/misc/R46554.pdf>

⁵⁹ “GDP down by 0.7% in the euro area and by 0.5% in the EU,” *Eurostat*, February 2021, https://ec.europa.eu/eurostat/documents/portlet_file_entry/2995521/2-02022021-AP-EN.pdf/0e84de9c-0462-6868-df3e-dbaaad9f49f

⁶⁰ “GDP up by 2.0% in the euro area and by 1.9% in the EU,” *Eurostat*, July 2021, <https://ec.europa.eu/eurostat/documents/2995521/11563211/2-30072021-BP-EN.pdf/0567c280-b56c-2734-2a4b-e4af85a55bf5?t=1627630313030>

⁶¹ “GDP first quarterly estimate, UK: April to June 2021,” *Office for National Statistics*, August 2021, <https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/gdpfirstquarterlyestimateuk/apriltojune2021>

⁶² “Federal Funds Target Rate – Upper Limit,” *FRED*, <https://fred.stlouisfed.org/series/DFEDTARU>

remain low until the unemployment and inflation levels in the US would return to the target levels sought by the central bank.⁶³

Another key element of the Fed's response to the COVID-19 pandemic was a revival of their GFC liquidity and credit programs offering emergency lending to securities firms, money market funds, and the banking system. However, the Fed also took the historic step of providing liquidity outside of the financial system for the first time ever in response to an economic crisis. They launched programs offering emergency lending to large corporations, small and medium-sized businesses, state and municipal governments, and more. An additional tool used by the Fed to ensure there would be sufficient liquidity in international markets was reducing the rates on their international swap lines, and, as was the case during the GFC, there was a significant increase in activity for these short-term currency exchanges between central banks.⁶⁴

Similar to the GFC, quantitative easing again played a crucial role in the Federal Reserve's response to COVID-19. The Fed ended its QE3 program in 2014 with its balance sheet at its (previous) peak value of \$4.5 trillion. The Fed then began modestly unwinding its large-scale asset holdings through a balance sheet normalization program starting in 2017, and by 2019 total assets had declined to under \$3.8 trillion thanks to this quantitative tightening.⁶⁵ After the outbreak of COVID-19, the Fed launched "QE4" – a new round of quantitative easing – and again began large-scale purchases of treasury securities and agency mortgage-backed securities.⁶⁶ From March 2020 to October 2021, the Fed's portfolio of securities increased from \$3.9 trillion to \$8.0 trillion.⁶⁷ In 2020, the Fed's balance sheet grew to be equivalent to 33% of US annual GDP.⁶⁸ As of October 2021, the Federal Reserve is still continuing to purchase \$120 billion worth of securities every month.⁶⁹

While testifying about the Federal Reserve's response to the COVID-19 pandemic before Congress, former Chair Ben Bernanke made the following two observations about how the Fed's role had changed in comparison to previous economic crises:

1. First, the Fed became a "market maker of last resort" by acting to stabilize financial markets that play a critical role in the financial system (e.g., the repo market, treasury securities market, etc.) when they experienced substantial volatility.
2. Second, although the Fed has always served as the lender of last resort to banks in previous financial crises, COVID-19 was the first time where the Fed also became the lender of last resort to the non-financial sector, creating new facilities for lending to corporations, state and local governments, and to buy corporate bonds. Even though these programs did not extend as much

⁶³ "What's the Fed doing in response to the COVID-19 crisis? What more could it do?" *Brookings*, March 2021, <https://www.brookings.edu/research/fed-response-to-covid19/>

⁶⁴ *Ibid*

⁶⁵ "Credit and Liquidity Programs and the Balance Sheet – Recent balance sheet trends," *Board of Governors of the Federal Reserve Bank System*, October 2021, https://www.federalreserve.gov/monetarypolicy/bst_recenttrends.htm

⁶⁶ "What's the Fed doing in response to the COVID-19 crisis? What more could it do?" *Brookings*, March 2021, <https://www.brookings.edu/research/fed-response-to-covid19/>

⁶⁷ "Credit and Liquidity Programs and the Balance Sheet – Recent balance sheet trends," *Board of Governors of the Federal Reserve Bank System*, October 2021, https://www.federalreserve.gov/monetarypolicy/bst_recenttrends.htm

⁶⁸ "Global QE Tracker" *Atlantic Council*, 2021, <https://www.atlanticcouncil.org/global-qe-tracker/>

⁶⁹ <https://www.federalreserve.gov/monetarypolicy/files/monetary20210728a1.pdf>

credit as initially expected, they succeeded in convincing investors that the Fed would not allow these critical debt markets to become dysfunctional and break down.⁷⁰

The Federal Reserve's support of non-financial corporations during the early stages of COVID-19 was unprecedented, but the policymakers at the central bank felt that it was necessary to take such actions to ensure that companies would be able to continue their business operations in spite of the many challenges presented by the pandemic. The Fed created two new facilities to provide financing for corporations – the Primary Market Corporate Credit Facility (“PMCCF”) and the Secondary Market Corporate Credit Facility (“SMCCF”). The PMCCF allowed the Fed to lend directly to corporations by providing loans and buying new bond issuances, with favorable conditions for deferring interest and principal payments in the first few months, as long as there would be no dividends nor stock buybacks. With the SMCCF, the Fed gained the power to buy existing corporate bonds and exchange-traded funds of investment-grade corporate bonds. The Fed stated that these facilities could purchase up to \$750 billion of corporate debt, and any potential losses would be backstopped by \$75 billion from the U.S. Treasury's Exchange Stabilization Fund.⁷¹

However, the Fed's corporate bond holdings ended up totaling only a small fraction of what was set aside for these facilities, with SMCCF peaking at around \$14.2 billion in value. Around one year after these initiatives were launched, the Fed announced in June 2021 that it would begin selling its SMCCF purchases, with the central bank at that point holding \$5.2 billion in corporate bonds and \$8.6 billion in corporate bond ETFs.⁷² Comparing this to the Fed's current balance sheet size of around \$8.5 trillion, the central bank only needed to devote a small percentage of its resources in order to accomplish their mission of stabilizing debt markets.⁷³ In fact, the Fed's actions caused a major rebound for this financial sector, where the market value of debt funds increased significantly to be worth \$1.1 trillion after the Fed's relatively minor \$8.6 billion of bond ETF purchases. Ultimately, most experts now credit the turnaround in debt markets to the Fed sending signals to investors that the central bank would not let them fail. This commitment on its own was successful in smoothing the corporate bond market and incentivizing record inflows to purchase bond ETFs, even if the Fed only owned a small percentage of the total debt ETF universe.⁷⁴ By the end of 2020, the SMCCF stopped purchasing eligible assets, and by August 2021 all the Fed's holdings of corporate bonds and ETFs had either matured or been sold. The PMCCF also ended at the conclusion of 2020, and there were ultimately no bond purchases made through this facility during the time that it was operational.⁷⁵

⁷⁰ “Former Fed Chairs Bernanke and Yellen testified on COVID-19 and response to economic crisis” *Brookings*, July 2020, <https://www.brookings.edu/blog/up-front/2020/07/17/former-fed-chairs-bernanke-and-yellen-testified-on-covid-19-and-response-to-economic-crisis/>

⁷¹ “What's the Fed doing in response to the COVID-19 crisis? What more could it do?” *Brookings*, March 2021, <https://www.brookings.edu/research/fed-response-to-covid19/>

⁷² “Fed to Sell Corporate Bonds and ETFs Acquired During Covid-19 Crisis,” *The Wall Street Journal*, June 2021, <https://www.wsj.com/articles/fed-plans-to-sell-13-7-billion-of-corporate-bonds-etfs-by-year-end-11622666400>

⁷³ “Assets: Total Assets (Less Eliminations from Consolidation),” *FRED*, <https://fred.stlouisfed.org/series/WALCL>

⁷⁴ “Bond ETFs With \$1 Trillion Shrug as Fed Starts to Withdraw,” *Bloomberg*, June 2021,

<https://www.bloomberg.com/news/articles/2021-06-07/no-fed-no-problem-for-credit-etfs-with-more-than-1-trillion>

⁷⁵ “Periodic Report: Update on Outstanding Lending Facilities,” *Board of Governors of the Federal Reserve Bank System*, September 2021, <https://www.federalreserve.gov/publications/files/pdcf-mmlf-cpff-pmccf-smccf-talf-mlf-ppplf-msnlf-mself-msplf-nonlf-noelf-09-13-21.pdf>

Bank of England

Similar to the Federal Reserve, the Bank of England looked to expand upon their monetary policy actions from the GFC when they were faced with the economic challenges of COVID-19. Like the Fed, the first policy action taken by the BoE was reducing interest rates. The BoE was more limited than the Fed in their abilities to rely on interest rate changes because their Bank Rate was already relatively low at 0.75% when the pandemic started. In March 2020, the BoE proceeded to cut the Bank Rate to 0.1%, its all-time low value, in response to the outbreak of COVID-19.⁷⁶ Also, like the other central banks during the pandemic, the BoE continued using forward guidance to relay to investors that interest rates would remain extremely low in the immediate future. As the BoE wrote multiple times in their monetary policy reports in 2020, the bank “does not intend” to tighten monetary policy until there would be “significant progress...in eliminating spare capacity and achieving the 2% inflation target sustainably.”^{77,78}

Like other central banks, the BoE acted quickly to increase its lending operations in response to COVID-19. In April 2020, the BoE launched the Term Funding Scheme with incentives for SMEs (“TFSME”), a program that reduces bank funding costs with additional incentives for small and medium enterprises.⁷⁹ The program was expected to provide over £100 billion in funding to banks.⁸⁰ Similar to the Fed’s corporate lending efforts, the BoE also launched the COVID Corporate Financing Facility to purchase the commercial paper of larger companies that were fundamentally strong but experienced disruptions to cashflows during the pandemic. By buying their short-term debt, the BoE was able to help these firms continue paying wages and suppliers despite the challenges faced by their businesses.⁸¹ The BoE also worked in conjunction with the other major central banks to ensure there would be an increase in frequency and value of swap lines so that there would continue to be sufficient liquidity (particularly of US dollars) throughout the international banking system and global funding markets.⁸²

Finally, as was the case after the GFC, quantitative easing was again a key aspect of the BoE’s response to the COVID-19 pandemic. Between March and November 2020, the BoE announced that it would buy £450 billion of government bonds and £10 billion of corporate bonds through the BoE’s QE program, with the asset purchases to be finished by the end of 2021. By the completion of this round of QE, the BoE will have £875 billion of government bonds and £20 billion of corporate bonds on its balance sheet. Overall, the BoE’s quantitative easing in response to COVID-19 was much larger and

⁷⁶ “Official Bank Rate history,” *Bank of England*, <https://www.bankofengland.co.uk/boeapps/database/Bank-Rate.asp>

⁷⁷ “Monetary Policy Report,” *Bank of England*, August 2020, <https://www.bankofengland.co.uk/-/media/boe/files/monetary-policy-report/2020/august/monetary-policy-report-august-2020>

⁷⁸ “Monetary Policy Summary and minutes of the Monetary Policy Committee meeting ending on 16 December 2020,” *Bank of England*, December 2020, <https://www.bankofengland.co.uk/-/media/boe/files/monetary-policy-summary-and-minutes/2020/december-2020.pdf>

⁷⁹ “The central bank balance sheet as a policy tool: past, present and future,” *Bank of England*, August 2020, <https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/the-central-bank-balance-sheet-as-a-policy-tool-past-present-and-future.pdf>

⁸⁰ “Bank of England measures to respond to the economic shock from Covid-19,” *Bank of England*, March 2020, <https://www.bankofengland.co.uk/news/2020/march/boe-measures-to-respond-to-the-economic-shock-from-covid-19>

⁸¹ “Coronavirus - Business support to launch from today,” *GOV.UK*, March 2020, <https://www.gov.uk/government/news/coronavirus-business-support-to-launch-from-today>

⁸² “Coordinated central bank action to enhance the provision of global U.S dollar liquidity,” *Bank of England*, March 2020, <https://www.bankofengland.co.uk/news/2020/march/coordinated-central-bank-action-to-enhance-the-provision-of-global-us-dollar-liquidity>

faster than their previous rounds of QE after the GFC and Brexit referendum.⁸³ In 2020, the BoE's expanded balance sheet grew to be equivalent to 43% of the UK's annual GDP.⁸⁴

Comparing the BoE's responses to the economic crises faced by the UK in 2008 and 2020, interest rate cuts were not as effective of a monetary policy tool during COVID-19 because rates were already quite low and could not be reduced much further. As was the case with the GFC, the BoE ramped up its emergency lending programs to ensure there would be sufficient liquidity available to market participants and consumers. The UK banking and financial systems were in a much stronger position during COVID-19 compared to the GFC, due to the strong reforms of the interim period and the crisis being caused by public health (and not financial) issues. However, the UK was already dealing with economic headwinds from Brexit and the challenges of leaving the EU somewhat smoothly without causing excessive damage to the UK economy. The BoE therefore relied heavily on QE from the start of COVID-19 as the main way to support the British economy during this crisis, and it has become evident that QE has now become their primary monetary policy strategy for responding to a wide range of economic problems.

European Central Bank

In terms of the European Central Bank, the ECB significantly changed their approach to monetary policy during COVID-19 compared to previous crises, in large part thanks to the lessons learned from the Eurozone's struggles to recover economically after the GFC. At the outset of the COVID-19 pandemic, the ECB deposit rate had been negative since June 2014, and in September 2019 it was reduced again to -0.50%.⁸⁵ Because of this, slashing interest rates further into negative territory clearly would not have been a sufficient option for responding to the scale of the economic crisis, and the ECB therefore did not make any rate changes in 2020 or thus far in 2021. The ECB has also continued to offer forward guidance that their interest rates will stay at the same (or potentially even lower) levels until there would be realistic projections of sustained inflation levels at the 2% target on the horizon.⁸⁶

As was the case during the GFC, the ECB expanded its targeted long-term refinancing operations ("TLTRO") in response to COVID-19, where they have been offering banks cheap, long-term loans with additional incentives for how the money should be used. The ECB is essentially paying banks to borrow money from them in the hope that they will be incentivized to then lend those funds to Eurozone consumers and small businesses.⁸⁷ By June 2021, take-up of the TLTROs had increased to €2.2 trillion, a sizeable increase from their pre-pandemic €600 billion level in January 2020.⁸⁸ Also, like all other major central banks, the ECB re-established their international swap lines in order to ensure there would be

⁸³ "Quantitative easing: a dangerous addiction?" *House of Lords Economic Affairs Committee*, July 2021, <https://committees.parliament.uk/publications/6725/documents/71894/default/>

⁸⁴ "Global QE Tracker" *Atlantic Council*, 2021, <https://www.atlanticcouncil.org/global-qe-tracker/>

⁸⁵ "Key ECB interest rates," *European Central Bank*,

https://www.ecb.europa.eu/stats/policy_and_exchange_rates/key_ecb_interest_rates/html/index.en.html

⁸⁶ "What's the ECB doing in response to the COVID-19 crisis?" *Brookings*, June 2020,

<https://www.brookings.edu/research/whats-the-ecb-doing-in-response-to-the-covid-19-crisis/>

⁸⁷ *Ibid*

⁸⁸ "The ECB's policy response to the COVID-19 pandemic," *European Central Bank*, June 2021,

<https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210624~ff1db45d52.en.pdf>

sufficient liquidity in markets, particularly to deal with the shortage of US dollars in funding markets that occurred at the start of the crisis.⁸⁹

Even before COVID-19 came to Europe, at the start of 2020 the ECB's previous quantitative easing programs that began in the mid-2010s were still ongoing. With the APP, the ECB was already purchasing €20 billion each month in government bonds, regional and local bonds, corporate bonds, and asset-backed securities.⁹⁰ It should be noted that while the Fed purchased corporate bonds in their QE programs only under the extraordinary circumstances of COVID-19, the ECB had been conducting purchases of non-bank corporate bonds since 2016 and already had holdings of €200 billion in corporate bonds at the start of the pandemic.⁹¹ In response to the COVID-19 outbreak, in March 2020 the ECB announced it would purchase an additional €120 billion under the APP. The ECB also launched a supplementary €750 billion Pandemic Emergency Purchase Programme ("PEPP") to buy even more of these asset types, as well as the commercial paper of non-financial corporations, until the end of the COVID-19 crisis.⁹² The PEPP maximum amount of net purchases was later increased to €1,350 billion in June 2020 and then to €1,850 billion in December 2020.⁹³ Overall, these QE programs greatly increased the size of the ECB's balance sheet – it grew to €7 trillion in 2020, which is equivalent to 60% of Eurozone GDP.^{94,95}

Since the ECB entered COVID-19 in a situation where their interest rates were already negative, to combat the economic fallout of the pandemic the central bank increased their reliance on the unconventional monetary policies they had adopted several years after the GFC. The ECB quickly expanded their post-GFC emergency lending and quantitative easing programs that were still ongoing in 2020 due to persistent economic stagnation faced by the Eurozone, with high unemployment, low inflation, and lagging growth. Unlike their response to the GFC, the ECB reacted quickly and at a much larger scale to the economic crisis posed by COVID-19. Even before the pandemic, there were already fears about the "Japanification" of the European economy with another challenging decade looming, and the ECB therefore took decisive monetary policy actions to prevent an even worse economic crisis from taking place. Overall, the shift in the ECB's monetary policy strategy offers a strong contrast to their more hesitant response to the GFC, and on a macro level this reflects how conventional wisdom among central bankers has changed over the course of the last two decades regarding what are the best monetary policy responses to economic downturns.

Loosening of Regulatory Requirements

⁸⁹ "What's the ECB doing in response to the COVID-19 crisis?" *Brookings*, June 2020, <https://www.brookings.edu/research/whats-the-ecb-doing-in-response-to-the-covid-19-crisis/>

⁹⁰ *Ibid*

⁹¹ "Asset purchase programmes," *European Central Bank*, October 2021, <https://www.ecb.europa.eu/mopo/implement/app/html/index.en.html>

⁹² "What's the ECB doing in response to the COVID-19 crisis?" *Brookings*, June 2020, <https://www.brookings.edu/research/whats-the-ecb-doing-in-response-to-the-covid-19-crisis/>

⁹³ "The ECB's policy response to the COVID-19 pandemic," *European Central Bank*, June 2021, <https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210624~ff1db45d52.en.pdf>

⁹⁴ "Annual consolidated balance sheet of the Eurosystem," *European Central Bank*, February 2021, <https://www.ecb.europa.eu/pub/annual/balance/html/index.en.html>

⁹⁵ "Global QE Tracker" *Atlantic Council*, 2021, <https://www.atlanticcouncil.org/global-qe-tracker/>

Thanks to the significant reforms that were adopted after the GFC (e.g., Dodd-Frank, Basel III & IV, etc.), the financial system was in a much stronger position at the start of the COVID-19 pandemic. Because of this, a new monetary policy action that was used by all the major central banks in 2020 was the temporary loosening of regulatory restrictions on banks to increase their lending during the economic downturn. Loosening these restrictions centered on freeing up the excess reserves of banks so that more of their capital would flow back into the economy, but with enforceable conditions that would prevent these funds from being used for share buybacks, increasing dividends, or bank bonuses. For example, the ECB allowed banks to fully use their capital and liquidity buffers due to the strong capital position that they had built up in the years leading up to the pandemic.⁹⁶ The Fed also eliminated banks' reserve requirements (although this was considered somewhat irrelevant due to banks holding far more on deposit than what was required of them). Additionally, the Fed also changed its capital buffer requirements, both for capital and long-term debt.⁹⁷ Finally, the BoE also reduced their capital buffer requirements on UK banks, which they expected to increase lending capacity by up to £190 billion.⁹⁸ The BoE also cancelled the stress tests of the major financial institutions in 2020.⁹⁹

Other Differences in the Responses to the GFC and COVID-19 Crises

Reviewing the actions of influential central banks during COVID-19, one of the main items that stands out is the size and speed of these monetary policy decisions. The monetary policies of these central banks were initiated and rolled out over the course of a few short weeks in March and April 2020. This reaction was much faster than what occurred during the GFC. In the previous crisis, the actions of central banks were usually spread out over the duration of 2008 and 2009, and there was typically more of a delay before their monetary policy programs actually came into effect. The scale of monetary policy in 2020 also usually matched or exceeded what was done in response to the GFC. Generally, this was because: 1) The immediate, practically overnight, nature of the pandemic and lockdowns necessitated a sizeable and rapid response from central banks; 2) Because central banks were typically relaunching the same or similar monetary policy programs from the GFC era, they were able to act more swiftly activating them in the immediate aftermath of COVID-19; and 3) Policymakers learned a lesson from their experiences in the GFC that “bigger is better” for their monetary policy decisions in times of economic crisis, and that it is crucial to respond quickly in order to prevent even worse economic meltdowns from taking place.

While there are multiple noteworthy differences in the monetary policy responses of central banks to the GFC and COVID-19, two additional ones that stand out are central banks doing more non-monetary policy measures and providing assistance directly to small businesses and consumers. Both of these trends can be seen with the examples of the Fed's Main Street Lending Program (“MSLP”), Paycheck Protection Program Liquidity Facility (“PPPLF”), and the Municipal Liquidity Facility (“MLF”). The PPLF facilitated loans for the Treasury Department's Paycheck Protection Program for small businesses, the

⁹⁶ “What's the ECB doing in response to the COVID-19 crisis?” *Brookings*, June 2020, <https://www.brookings.edu/research/whats-the-ecb-doing-in-response-to-the-covid-19-crisis/>

⁹⁷ “What's the Fed doing in response to the COVID-19 crisis? What more could it do?” *Brookings*, March 2021, <https://www.brookings.edu/research/fed-response-to-covid19/>

⁹⁸ “Bank of England measures to respond to the economic shock from Covid-19,” *Bank of England*, March 2020, <https://www.bankofengland.co.uk/news/2020/march/boe-measures-to-respond-to-the-economic-shock-from-covid-19>

⁹⁹ “Bank of England cancels stress test of banks over coronavirus,” *Reuters*, March 2020, <https://www.reuters.com/article/us-health-coronavirus-britain-regulation-idUKKBN2170QI>

MSLP provided loans to medium-sized businesses and non-profit organizations, and the MLF allowed the Fed to lend directly to state and municipal governments.¹⁰⁰ All these are activities that are significantly distant from traditional monetary policy actions, and the recipients of this support were not provided comparable aid whatsoever during the GFC. As mentioned earlier, the BoE and ECB also geared many of their COVID-19 policy responses to help increase lending to small and medium sized businesses (e.g., the BoE & TFSME and the ECB & TLTROs).^{101,102}

Governments and central banks were often criticized in the aftermath of the GFC for offering much more substantial assistance during their rescue of Wall Street compared to the support they provided to Main Street. Therefore, given that the COVID-19 crisis necessitated bolder policy decisions during an extremely challenging economic period, it makes sense that central banks (especially the Fed) stepped up to provide support to businesses and individuals with less resources that were not helped directly during the GFC. By giving small businesses generous assistance, even if it was in a manner that somewhat blurred the lines between fiscal and monetary policy, the central banks demonstrated that one of the lessons from the GFC that had been taken to heart is the need to cast a wide net when offering support during times of true economic crisis.

Fiscal Policy Review

While this research focuses primarily on the monetary policy responses to the COVID-19 crisis, the fiscal policy responses have been arguably just as, if not more, critical in guiding the economic recoveries from the pandemic. Globally, the worldwide fiscal policy response to COVID-19 in 2020 totaled \$7.8 trillion, equivalent to around 7.4% of global GDP, with the vast majority of this fiscal stimulus spending coming from the governments of advanced economies.¹⁰³ The fiscal policy in response to COVID-19 is already estimated to be more than double the amount that was provided during the GFC, and this has helped alleviate the pandemic's effect on consumption and output, while also causing a significant rise in the debt levels of countries.¹⁰⁴

In the United States, the country's initial pandemic fiscal response was equal to almost 12% of annual GDP, a percentage number that was the highest among all OECD countries.¹⁰⁵ After multiple rounds of stimulus across two different presidential administrations, as of October 2021 the US has now spent \$4.7 trillion in COVID relief (out of the \$5.9 trillion set aside for fiscal policy in this area).¹⁰⁶ This has been significantly larger than US fiscal stimulus spending during the GFC, which totaled only \$1.8 trillion

¹⁰⁰ "What's the Fed doing in response to the COVID-19 crisis? What more could it do?" *Brookings*, March 2021, <https://www.brookings.edu/research/fed-response-to-covid19/>

¹⁰¹ "Term Funding Scheme with additional incentives for SMEs (TFSME) – Market Notice," *Bank of England*, March 2020, <https://www.bankofengland.co.uk/markets/market-notice/2020/term-funding-scheme-market-notice-mar-2020>

¹⁰² "Our response to the coronavirus pandemic," *European Central Bank*, October 2021, <https://www.ecb.europa.eu/home/search/coronavirus/html/index.en.html>

¹⁰³ "Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic," *International Monetary Fund*, July 2021, <https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19>

¹⁰⁴ "One year since the outbreak of COVID-19: fiscal policy response," *European Commission*, March 2021, https://ec.europa.eu/info/sites/default/files/economy-finance/1_en_act_part1_v9.pdf

¹⁰⁵ "The Fiscal Policy Response to the Pandemic," *Brookings*, March 2021, https://www.brookings.edu/wp-content/uploads/2021/03/BPEASP21_Romer_conf-draft_updated.pdf

¹⁰⁶ "COVID Money Tracker," *CRFB*, October 2021, <https://www.covidmoneytracker.org/>

between 2008 to 2012.¹⁰⁷ The US's total fiscal response to the pandemic has been the equivalent of 27.1% of its annual GDP, a figure that is significantly higher than the responses of almost all other developed nations and nearly four times greater than the share implemented in response to the GFC.¹⁰⁸

The governments of EU countries and the UK also had very generous fiscal policy responses to the COVID-19 crisis. Fiscal support in the EU (including both automatic stabilizers and discretionary measures) in 2020 was estimated to be around 8% of annual GDP, which is considerably more than the fiscal support that was provided during the GFC.¹⁰⁹ The EU member states also came to an agreement on a historic €2 trillion stimulus plan that will help the continent's recovery from the pandemic over the coming years.¹¹⁰ In the UK, the government's fiscal policy response to the pandemic has totaled almost £344 billion, roughly equivalent to 16% of the country's annual GDP.¹¹¹ Overall, while the fiscal policies of the EU and the UK in response to COVID-19 may not be as sizeable as what has been implemented in the US, they still are extremely large by historical standards and have been crucial in helping support their economies and recovering from the crisis.

Public Health Policy and Vaccinations

As in the aftermath of any economic crisis, it is necessary to review and assess the effectiveness of the monetary and fiscal responses of policymakers to the global recession caused by the COVID-19 pandemic. However, in this instance, only focusing on these areas provides an incomplete picture of the economic recovery if sufficient focus is not also placed on analyzing public health and vaccine policies. Ultimately, because COVID-19 is first and foremost an epidemiological crisis, there never was a path forward for recovering economically without getting the pandemic under control, with both reduced morbidity and widespread immunization.

Unfortunately, public health systems have long been notoriously underfunded, and this had costly implications when the world faced the COVID-19 pandemic. For example, in the US funding for state and local public health departments has fallen by 17% since 2010, and less than 3% of the \$3.6 trillion in annual government health spending is directed towards public health. This has led to an estimated \$4.5 billion gap in the amount of annual funding that would be needed to have a fully adequate public health system in the country.¹¹² COVID-19 exposed the dangers of neglecting public health systems to such an extreme degree, for the pandemic could have certainly been far less devastating in terms of lives and economic losses had sufficient investments been made in the ability to detect, prevent, and mitigate serious diseases. The G20 recently published a report arguing that governments need to collectively commit \$75 billion over the next five years in increased international financing for pandemic prevention

¹⁰⁷ "The Fiscal Response to COVID-19 Will be Larger than the Great Recession Response," *CRFB*, December 2020, <https://www.crfb.org/blogs/fiscal-response-covid-19-will-be-larger-great-recession-response>

¹⁰⁸ "How the \$1.9 trillion U.S. stimulus package compares with other countries' coronavirus spending," *The Washington Post*, April 2021, <https://www.washingtonpost.com/world/2021/03/10/coronavirus-stimulus-international-comparison/>

¹⁰⁹ "One year since the outbreak of COVID-19: fiscal policy response," *European Commission*, March 2021, https://ec.europa.eu/info/sites/default/files/economy-finance/1_en_act_part1_v9.pdf

¹¹⁰ "Recovery plan for Europe," *European Commission*, June 2021, https://ec.europa.eu/info/strategy/recovery-plan-europe_en

¹¹¹ "Economic and fiscal outlook – March 2021," *Office for Budget Responsibility*, March 2021, <https://obr.uk/efo/economic-and-fiscal-outlook-march-2021/>

¹¹² "Confronting a Legacy of Scarcity: A Plan for America's Reinvestment in Public Health," *Yale University*, June 2021, https://law.yale.edu/sites/default/files/area/center/ghjp/documents/publichealthfunding_final_6.7.21.pdf

and preparedness. The only way to avoid more devastating pandemics in the future is to invest substantially more in public health resources and vaccine manufacturing capacity. This is why spending this “minimum” amount of \$75 billion is therefore a fiscally responsible course of policy to pursue, especially when considering that cumulative losses from COVID-19 are projected to total \$22 trillion over the next few years.¹¹³

COVID-19 vaccines were developed and approved in record time, and they remain the only true solution for eventually ending the pandemic and returning to normalcy. The Pfizer-BioNTech and Moderna vaccines were approved in the US and many other countries for emergency use authorization starting in December 2020, and this was followed by the approval of other vaccines like Oxford-AstraZeneca, Janssen, and more.¹¹⁴ As of October 2021, 46% of the world has received at least one dose of a COVID-19 vaccine and 6.4 billion doses have been administered worldwide.¹¹⁵ The extremely positive economic impact of vaccination has been clear in countries that have had successful vaccination campaigns. With more people vaccinated, there is less infection and death, health care systems are not in danger of being overrun, businesses throughout the economy can reopen without the threat of another lockdown, and unemployment levels drop as employees return to work. A recent analysis from the UN suggests that countries with higher vaccination rates are poised to continue having much faster economic recoveries from the pandemic, with GDP increasing around \$8 billion for every one million people that are vaccinated.¹¹⁶

In the first year of the pandemic, governments invested around \$100 billion in vaccine development, and much of the innovation of these successful drugs were built upon the groundwork of previous decades of public support for vaccine research and development.¹¹⁷ For example, over \$15 billion was spent on the research and development of HIV vaccines in the first two decades of this century, and over 80% of those funds came from the public sector. Although the repeated attempts to develop an effective HIV vaccine have been unsuccessful, much of the scientific knowledge learned along the way turned into the critical foundations used for the lifesaving COVID-19 vaccines.¹¹⁸ At the present moment, with the fraught dangers of pandemics at the forefront of all policymaking, there are already billions of additional dollars that have been committed to develop new vaccines against future coronaviruses and epidemic diseases.¹¹⁹ Overall, investments in vaccines research, development, and manufacturing have been repeatedly proven to be a wholly necessary investment for governments, and it is therefore prudent to devote more resources in this area in preparation for future pandemics.

¹¹³ “Stopping the next pandemic,” *Harvard Kennedy School*, July 2021, <https://www.hks.harvard.edu/faculty-research/policy-topics/health/stopping-next-pandemic>

¹¹⁴ “Covid-19 Vaccines: What’s Coming and When?” *The Wall Street Journal*, December 2020, <https://www.wsj.com/articles/covid-19-vaccines-whats-coming-and-when-11598882964>

¹¹⁵ “Coronavirus (COVID-19) Vaccinations,” *Our World in Data*, October 2021, <https://ourworldindata.org/covid-vaccinations>

¹¹⁶ “Impact of vaccine inequity on economic recovery,” *United Nations Development Programme*, April 2021, <https://data.undp.org/vaccine-equity/impact-of-vaccine-inequity-on-economic-recovery/>

¹¹⁷ “Vaccinating the World Waiving Intellectual Property Rules on COVID-19 Products,” *Boston University Global Development Policy Center*, March 2021, https://www.bu.edu/gdp/files/2021/03/GEGI_PB_013_TRIPS.pdf

¹¹⁸ “The Repeated Setbacks of HIV Vaccine Development Laid the Groundwork for SARS-CoV-2 Vaccines,” *NBER*, March 2021, <https://www.nber.org/papers/w28587>

¹¹⁹ “To Prevent the Next Pandemic, Scientists Seek One Vaccine for Many Coronaviruses,” *The Wall Street Journal*, October 2021, <https://www.wsj.com/articles/to-prevent-the-next-pandemic-scientists-seek-one-vaccine-for-many-coronaviruses-11633339802>

Although it is possible to evaluate the post-COVID economic recoveries of different countries strictly through the lens of their monetary and fiscal policies, it is difficult to draw any conclusions without also taking into account their public health capabilities and vaccination campaigns. Because they are highly developed economies, the US, Eurozone, and UK all have been fortunate enough that they can afford expansive monetary policy and generous fiscal policy, while also having the resources to purchase and administer hundreds of millions of vaccines for their large populations. These actions in conjunction with each other have allowed these countries to return to having strong economic growth in 2021 following the gradual easing of pandemic restrictions. In Q2 2021, GDP in the US grew by 6.5%, in the Eurozone by 2.0%, and in the UK by 4.8%.^{120,121,122} However, had vaccines still not been available in these countries (thus allowing the pandemic to continue spreading uncontrollably), it would have been impossible to see such quick turnarounds in their economies. As such, this serves as an important reminder that while monetary policy is a powerful tool for policymakers in response to financial turmoil and downturns, it nonetheless cannot be viewed as a panacea that is able to fully solve every type of economic problem completely on its own.

¹²⁰ “Gross Domestic Product, Second Quarter 2021 (Advance Estimate) and Annual Update,” *Bureau of Economic Analysis*, July 2021, <https://www.bea.gov/news/2021/gross-domestic-product-second-quarter-2021-advance-estimate-and-annual-update>

¹²¹ “GDP up by 2.0% in the euro area and by 1.9% in the EU,” *Eurostat*, July 2021, <https://ec.europa.eu/eurostat/documents/2995521/11563211/2-30072021-BP-EN.pdf/0567c280-b56c-2734-2a4b-e4af85a55bf5>

¹²² “GDP first quarterly estimate, UK: April to June 2021,” *Office for National Statistics*, August 2021, <https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/gdpfirstquarterlyestimateuk/apriltojune2021>

Section IV – Conclusion

The last two decades have been transformative for the world of monetary policy. The Great Financial Crisis caused central banks to adopt unconventional monetary policies at a large scale once their traditional toolkit (e.g., cutting interest rates) was proven to be insufficient for dealing with the severe economic recession of 2008-2009. These new policies, like quantitative easing, emergency lending, and forward guidance continued in the decade that followed and helped shape the lengthy economic recovery with steady growth, low inflation, and minimal interest rates. When the COVID-19 pandemic emerged in 2020 and caused economies to crash worldwide, central banks were again quick to utilize and expand upon their GFC-era unconventional monetary policies, particularly with record levels of quantitative easing and providing lending to non-financial borrowers. COVID-19 is unfortunately still with us, but it is already clear that the monetary policy response to the pandemic helped prevent an even worse economic disaster from taking place. Thanks to aggressive monetary policy, as well as generous fiscal stimulus and highly effective vaccines, there has been a fast and robust economic recovery from COVID-19, and as a result the major central banks have generally been praised for how they reacted to this historic and sudden economic downturn.

One of the main challenges that central banks faced at the outset of the COVID-19 pandemic was that the space for global monetary policy was much more constrained compared to the situation before the GFC due to record-low interest rates, where one third of developed-market government bonds and the investment grade universe had negative yields in 2019. As such, leading economies could no longer rely on the support of interest rate cuts as had historically been the case, and the capabilities of monetary policy were therefore feared to be limited in the event of a new serious downturn.¹²³ However, when this downturn arrived in the spring of 2020 with the severe recession caused by the COVID-19 pandemic, central banks did an admirable job utilizing the monetary policy tools at their disposal and preventing a worse economic collapse from taking place. The central banks reacted in a manner that was unprecedented in terms of the speed, scope, and size of their asset purchases and emergency lending programs. This demonstrated that the “unconventional” monetary policies introduced during and after the GFC have today become quite conventional, given the heavy reliance on them by central banks and the market reaction accepting and approving of the new policies.¹²⁴

Therefore, rather being “out of tools” when facing economic recessions, central banks have instead adapted to the current low interest rate world and revised their monetary policy playbook for responding to serious crises. The new COVID-19 monetary policies (e.g., purchasing corporate and municipal bonds, lending to the nonfinancial private sector, easing capital regulatory requirements, etc.) all illustrated that central banks have seemingly adopted a “whatever it takes” approach for stabilizing markets and supporting economic recovery.¹²⁵ During the most volatile, uncertain period at the beginning of the pandemic, worldwide lockdowns curtailed most economic activity, unemployment levels spiked to previously unimaginable levels, and stock, bond, and oil markets were rapidly crashing in March-April

¹²³ “Dealing with the next downturn: From unconventional monetary policy to unprecedented policy coordination,” *BlackRock*, August 2019, <https://www.blackrock.com/corporate/literature/whitepaper/bii-macro-perspectives-august-2019.pdf>

¹²⁴ “Monetary Policy and Central Banking in the Covid Era,” *Centre for Economic Policy Research*, June 2021, <https://voxeu.org/content/monetary-policy-and-central-banking-covid-era>

¹²⁵ *Ibid*

2020. At that moment in time, there were widespread fears that a bottom had not yet been reached, and the COVID-19 recession would continue to worsen dramatically. However, even though the death and disease caused by the pandemic continued in the months thereafter, economic conditions improved much more quickly than had been anticipated by most experts. While the forceful fiscal policy responses of governments deserve much of the credit for the economic turnaround, it is also clearly the case that the unprecedented actions of central banks to stabilize markets and offer generous support to their economies played a crucial role in halting the downward spiral of markets, lessening the pandemic-driven losses of businesses, and jump-starting the economic recovery.

The GFC and COVID-19 pandemic are two historic events that caused the greatest international economic crises since World War II. They also occurred only twelve years apart, potentially indicating how events of such seismic economic magnitude are taking place more frequently in today's highly globalized (and increasingly volatile) world. Therefore, if nothing else, policymakers should be prepared to continue frequently using unconventional monetary policy in a myriad of ways to combat future economic crises. The past two decades have shown how important speed, size, and adaptability are to the monetary policy of the twenty-first century, and they will all continue to be critical for central banks as they contend with future economic downturns and fulfilling their mandates for price stability and maximum employment. Ultimately, policymakers appear likely to continue the "whatever it takes" approach to supporting their economies in the face of financial meltdowns, pandemics, and more, thereby continuing to build upon the expansive monetary policies that have characterized their responses and the recoveries to recent economic crises.