Unraveling the 2021 United Kingdom's Flash Crash: A Consequential Financial Event

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Abstract:

Central banks around the world took unprecedented policies to aid the economy in 2020 due to the COVID-19 shock. This paper zones in on the United Kingdom during another financial crisis, where a new variant of COVID-19 was discovered in mid-November 2021. Starting by introducing the economic scene before and after the crisis, a recommendation of financial market liquidity operations will follow where the viability of long-term asset purchases, reduction of capital needed for lending, and commercial papers are discussed. Next, monetary policy options to stimulate aggregate demand are analyzed, followed by the implementation process of each policy. Lastly, the effectiveness and risks of each policy and tool are examined, finishing off with a policy recommendation for the Bank of England to combat the slowing growth rates, shortages in goods, and failing equity and financial markets.

1 - Macroeconomic Environment and Financial Market Conditions

The United Kingdom, a major force in international diplomacy and the 6th largest economy is considered a small-open economy due to its inability to alter world prices when compared to its larger trading partners. With GDP contributions primarily made by the service sector, providing 81% of output in 2020,[1] the United Kingdom's ability to affect the world economy is limited due to its exports in highly competitive markets such as machinery, automobiles, electrical and electronic equipment, and financial services. With CPI up 4.2% in October[2], whilst core inflation was shown to be 3.4% (3.8% in Exhibit 1.A), the acceleration in inflation combined with a modest increase in corporate debt vulnerabilities[3] provides slight concerns for the financial health of leveraged companies; and based on historic-data, high-inflation paired with large amounts of economic uncertainty/volatility (measured using VIX) provides potential for economic downturns. However, The Bank of England's Financial Policy Committee has increased cash capacity in order to provide support in the occurrence of significant economic uncertainty modeled using the interim results from their 2021 solvency stress test. With the UK's recent departure from the EU paired with global supply chain issues, food shortages across the UK[4], a decrease in the labour force[5], and inflation causing prices to increase across the board, the UK faces many problems to deal with prior to the new crisis.

Equity Analysts are currently predicting a second year of Bull Market post-2020 recession throughout 2022, modeled using assumptions generated by the 2007-2008 recession[6]. Despite historically high valuations, the prediction of overall returns for a second year of a bull market are said to be "historically positive," similar to that of 2010, in spite of the

[1] House of Commons Library – Components of GDP: Key Economic Indicators
[2] Deloitte – Weekly Global Economic Update
[3] Bank of England – Financial Stability Report
[4] Approximately 26% of Food is imported into the UK from the EU
[5] Results in transportation of necessary resources to be limited
[6] Morgan Stanley – Stock Market Outlook 2021: Bull Market: But Buckle Up

increased stock volatility when viewing CBOE's VIX ETF/ETN[7]. With increased risk taking prior to the new crisis, global financial markets saw the increase in the proportion of high-yield bonds issued, and the loosening of underwriting standards, this could amplify a downturn in the economy similar to that of 2007-2009. Through the alleviation of temporary supply chain bottlenecks, the market has been able to approach pre-covid efficiency, despite the bottlenecks causing high inflation during previous periods due to scarcity of products available for consumers affecting fair value price through Willingness to pay of consumers and firms. The bottlenecks were prevalent in the UK with nationwide gas and food shortages triggering a sharp rise in underlying inflation which brought cause to concern for the Bank of England who may be raising interest rates in the beginning of the first half of 2022. Finally, with the high-priced U.S. equities and the focus on foreign equities, i.e. Chinese, and Australian, provide growth opportunities due to the return to life of the Australian economy due to the easing of lockdown restrictions, and a post-lockdown jump in consumer spending as well as easing of incremental fiscal and monetary easing in China[8]. However, with major bottlenecks in consumer electronics and the technology market as a whole, marked by supply chain issues with the limited supply of semiconductors and significant demand across many industries, inflation and consumers willingness to pay forced the prices to increase dramatically.

Scenario:

With the introduction of a new wave of COVID-19, beginning with the Omicron variant, we see the fragile economic landscape laid out above, crumbling. Equities are down by more than 50%, growth rates in advanced economies are falling due to the slowing down of international trade in goods, and key domestic financial markets and exchange rates are now increasingly volatile. More trouble lies ahead, as with the already high inflation environment surrounding the EU, U.S., China, and the UK, combined with the major risks investors have taken in investing in high-risk stocks and high-yield bonds.

With respect to the UK economy, the impact caused by a significant decrease in international trade due to the resurgence of the pandemic causes major disruption on the already tainted supply chain, which would further exacerbate domestic panic due to the inability to access certain fresh food products and oil/gas imports. Other than the effect on the supply chain, a mandatory quarantine order due to the introduction of the new variant would cause overall economic output to decrease significantly despite output approaching pre-Covid levels prior to the shock. With a decrease in overall output and mandatory quarantine in place until a new vaccine is created, consumer consumption would decrease due to a decrease in consumer income, requiring Government stimulus to be passed around.

[7] Exchange traded note
[8] Russell Investments – Growing Pains: 2021 Global Markets Outlook – Q4 Update

With levered positions across World Equity markets, expected equity returns will be negative. There are expectations of some investment/asset managers to become bankrupt due to their highly levered positions. With the now illiquid nature of key domestic financial markets, demand for high-yield bonds would decrease, in-turn causing an increase in bond spreads between government and foreign bonds. However, with the introduction of new asset classes, in particular cryptocurrency, modeling consumer behaviour through the use of past recessions would be difficult due to recently lowered adoption of rare metals in favour of newer asset classes.

China, which faced headwinds prior to the economic shock, saw economic growth driven by strong retail performance whilst industrial production, despite being led by an increase in the production of high-tech products and electric vehicles, saw a decline in output. However, prior to the shock, slow decreases in the average price of new homes paired with both the default on debt by Evergrande[9] and a slowdown in rapid Export Growth due to a decline in the demand for Chinese products and supply chain issues, places China in a very tough spot.

The United States also faces a very tough situation, as the Federal Reserve has put in a plan to Taper bonds; but with the recent resurgence with Omicron, the Fed is forced to continue or increase its bond purchasing program as unemployment would increase, requiring the government to reissue stimulus. This decrease in employment paired with high inflation, caused by the continued increase in money supply, would cause output to fall; with the decreased output plausibly caused by decrease in consumption, investments, requiring an increase in government spending .

With the overall economic effect dependent on the monetary and fiscal policies introduced by the Central Banks, we can estimate a decrease in labour force participation, an unknown change in employment[10], and estimate a decrease in consumers consumption on non-essential products. The reduced consumption on non-essential products can also be viewed as an increase in consumption of “inferior-goods” whilst a decrease in the consumption of “normal-goods”.

2 - Financial Market Liquidity Operations

The main issues arising from the crisis include shortages in goods, slowing growth rates, plummeting equity markets, and exchange rate volatility. Due to the effects of the original pandemic, the Bank Rate was lowered to 0.1%.[11] While maintaining this interest rate, the central bank must 1) increase long-term security purchases, 2) reduce capital needed for bank lending, and 3) provide government-backed loans to businesses.

[9] Second Largest Property Developer by Sales in China
[10] Dependant on consumer behaviour
[11] The Bank of England explains the measures they took when addressing the first wave of COVID-19.

Long-Term Asset Purchases:

The first operation that is available to the Bank of England is purchasing long-term assets. Quantitative easing is when central banks engage in large-scale asset purchases when short-term interest rates are nearing zero. These asset purchases are typically government-backed or government securities, such as long-term Treasury Bills or bonds. As seen from the actions of the Canadian central bank, by purchasing these securities, the Bank of England's balance sheet will expand. In turn, liquidity will increase and returns to these assets will decrease.[12] Indirectly, longer-term interest rates will also decrease, thus encouraging borrowing and spending to stimulate the economy. With lower returns on fixed-income assets, such as government bonds and Treasury Bills, investors will be more inclined to invest in higher return securities. This will counteract the widening bond spreads and decrease the flight-to-safety taking place in the financial markets. As well, this will help promote growth rates as individuals and companies are able to more easily borrow.

Rebucci et al. (2021) analyzed 30 quantitative easing announcements across over 21 countries to debunk the rumour that quantitative easing is less effective in developed countries, such as the UK. Although effects on bond yields are 2-4 times stronger in developing countries, it is evident that this liquidity operation still helps stabilize the foreign exchange rate markets in developed countries. Benford et al. (2009) from the Bank of England's Monetary Analysis Division explain how multiple rounds of quantitative easing may be needed to fully assist the economy to recover in the face of a crisis. The UK started with a 200 billion GBP announcement in 2020, due to COVID-19. In total, they spent 895 billion GDP to avert that crisis (Figure 1). In this crisis, a similar approach is recommended. The Bank of England should start off with a lower amount, such as 200 billion GBP and then purchase additional assets as the crisis progresses. This is to prevent the negative impacts of quantitative easing, which Steely (2015) explains are high amounts of inflation and asset bubbles.[13] Though this action will counteract the current slowdown in growth and financial market dips, the Bank of England must take due action to taper these asset purchases once the economy recovers.

Reduce Capital Needed for Lending:

Credit institutions, such as commercial banks, have requirements regarding their capital and liquidity requirements. These requirements are in place to decrease risk, ensuring banks have a minimum capital ratio to sustain losses and honour withdrawals in periods of crises. The Bank of England mandates a total capital ratio of 8%.[14] Banks are the pillars of the financial system, therefore ensuring their solvency is of utmost importance during this time.

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[12] Deputy Government Paul Beaudry explains the logistics of quantitative easing on helping the Canadian economy recover.
[13] James M. Steely examines the UK bond market to explain the adverse effects of quantitative easing on the economy.
[14] The Bank of England details capital requirements for commercial banks.

The Bank of England could possibly decrease the commercial bank capital requirements needed during this crisis. As well, they could postpone the need for bank stress tests until after the economy recovers. Natalya Martynova (2015) describes how there is little research to prove a direct relationship between capital requirements and economic growth. Instead, she uses empirical studies to map out the indirect impacts. She concludes that higher capital requirements reduce capital supply and slows down economic growth. Therefore, temporarily decreasing the capital requirements for commercial banks in England will allow them to better support the economy through this shock. In particular, this will directly aid those that are impacted by the 50% decline in equity markets and slowing growth rates.

During the initial shock of COVID-19 in March of 2020, the Bank of England was one of the central banks around the globe to cancel their annual stress test, also known as the annual cyclical scenario.[15] This can be implemented at the start of the crisis. However, the effects of decreasing the commercial bank capital requirements may take a bit more work. In a Bank of England working paper, Bridges et al. (2014) uses a series of panel regressions to determine the effects of capital ratios on lending, including metrics over time. Therefore, to implement this policy, the Bank of England must gradually decrease this ratio to prevent excessive risk.

Government-Backed Loans:

The crisis is placing high pressures on businesses in the UK. This is taking the form of increased prices due to global supply chain disruptions, challenges borrowing due to financial market illiquidity, and company value impacts due to failing equity markets. To prevent unemployment and to alleviate pressure on the cash flows of UK companies, the Bank of England can purchase unsecured, short-term debt issued by a corporation, also known as commercial papers.

Dadush et al. (2000) discover that short-term capital flows is procyclical, stating that its elasticity to GDP is 0.9 when a positive shock occurs yet 1.8 when a negative shock takes place. They explain that risk factors and volatility affects these numbers greater than the actual shock itself. This poses a great concern to corporations and investors alike as it poses a large risk to credit markets and the overall economy, especially in the case if a firm fails. Following the failure of Lehman Brothers in 2008, Duygan-Bump et al. (2010) uses cross-sectional and time-series evaluation to analyze the actions of the United States Feds, and how they use asset-backed commercial papers, along with other methods, to stabilize asset outflows from this negative shock. Calomiris et al. (1995) discover that commercial papers act as a substitute for bank lending, and issuing commercial papers positively correlates with an increase in the accounts receivable in the balance

[15] The Bank of England lists and elaborates on policies they are implementing in light of COVID-19.

sheet. Therefore, the Bank of England will ensure liquidity and help support companies through this economic shock by purchasing commercial papers.

During the shock in March 2020, many central banks around the world took similar actions to provide liquidity to support jobs, families, and the economy. For Canadian and U.S. central banks, they purchased unsecured commercial papers with a three-month or less term from eligible companies. The Bank of Canada stated they would purchase commercial papers with a minimum credit rating of R-1 over a 12 month period.[16] The Bank of England should take similar measures, namely rolling out this program over the span of a year and using increasing amounts that fit within the original 200 billion GBP mentioned in the quantitative easing recommendation.

3 - Monetary Policy Options

We recommend six monetary policy options, unconventional and few conventional, that the Bank of England (BoE) can undertake to stimulate the country's aggregate demand or achieve their monetary policy objectives during this Omicron downturn; while being mindful that the interest rates are near the effective lower bound. We will also take a look at when these policy options were used in the past.

Policy 1: Quantitative easing

Quantitative easing was first performed by the Bank of Japan in the early 2000s to combat deflation. It was argued to be ineffective by Spiegel (2006), as Japan's GDP continued to fall in the subsequent years, along with a host of other poor indicators. Although the effectiveness of this unconventional policy option continues to be questioned by economists, there are few options the BoE can take as interest rates were conventionally lowered near their effective lower bound in 2020.

Quantitative easing (QE) is when the central bank increases the money supply by buying bonds and other assets[17] from both the public and private markets. This causes two things: one, this injects liquidity into the targeted markets[18], and two, it bids up the price for those bonds, which lowers the cost of funding for businesses, increasing aggregate demand.

[16] The Bank of Canada details their commercial paper purchase program, due to COVID-19.
[17] Other assets may include Mortgage Backed Securities, equities from the public markets, among others.
[18] Businesses will receive more liquidity, thus allowing them to take on more projects, hiring more workers, boosting the aggregate demand in the economy.

The U.S. Fed launched QE during the Great Recession because they have exhausted their other expansionary monetary options. A study by Gagnon et al. (2010) found that it lowered the U.S. 10-year treasuries by 90 basis points from the $300B, or 2% of their GDP, in bond purchases, demonstrating effectiveness.

Policy 2: Forward guidance

Forward guidance is another unconventional option, which is when the bank makes a public commitment to maintain interest rates at a certain level. This would boost aggregate demand if there is reduced uncertainty; take this intuitive example: there would be greater home buying activity if interest rates are said to continue to be low in the future based on speculation; and seemingly win-win, if rates are expected to increase consumers would take the opportunity now to buy ahead of a rate increase.

During August 2020, to combat the COVID crisis, the BoE announced that they "do not intend to tighten monetary policy until there is clear evidence in… achieving the 2% inflation target," which reinforced market expectations of interest rates staying low. This unconventional monetary option yielded results for the BoE during the Financial Crisis. Based on the findings of Weale (2013), forward guidance achieved its objective of reducing uncertainty 6 months after the announcement, evidenced by the Libor futures which gauges volatility after monetary policy announcements.

Policy 3: Negative interest rate policy

The BoE could consider implementing the monetary option of making depositors of commercial banks pay to keep their deposits by turning interest rates negative. Depositors are more likely to withdraw their money, making them more likely to spend it. Furthermore, consumers are also paid interest to take out loans, thus boosting aggregate demand.

This policy option is expected to yield positive results for BoE; based on empirical findings of Campos (2019), negative interest rates seem to be the most efficient in the European and Japanese regions (Figure 2). Campos (2019) analyzed this data throughout the past, with most data taken from the aftermath of the Financial Crisis.

The negative interest rate policy option was utilized by the European Central Bank in 2014, to combat the sovereign debt crisis. Based on empirical evidence, Casiraghi et al. (2020) discovered that negative interest rates effectively and swiftly boosted aggregate demand. Their findings suggest that it improved the trade balance, as well as increased investments and credit growth.

Policy 4: Reserve requirements

The BoE can lower the reserve requirements (RR), as the BoE had raised the deposit rates months following the initial COVID downturn in March as the economy started to recover. Reserve requirements is the minimum amount of cash that a financial institution must hold on their balance sheet to ensure they are able to meet customer withdrawals. This policy option will stimulate aggregate demand, as banks become more liquid and are able to loan out a greater portion of their cash to businesses and households. This also creates a virtuous cycle, as with a greater money supply, lending could become cheaper, further increasing aggregate demand.

The U.S. Fed not only lowered the reserve requirements, but removed it completely for banks during the 2020 crisis to encourage banks to lend out all of their cash. This decision may have been inspired by its effectiveness in the past, when Latin American central banks modified RR during 2008. As discussed by Martin (2012), the central banks of Peru, Columbia, and Brazil dealt with unsustainable credit expansion[19] by using RR countercyclically, which affected credit and liquidity levels.

Policy 5: Term auction facility/ Term securities lending facility

This policy is enforced to help banks with relatively healthy balance sheets avoid credit crunches by allowing them to borrow from the central bank at a rate that is below the current market rates. This policy option works to stimulate aggregate demand by allowing banks to more easily access funds, allowing them to meet short term liabilities such as payroll[20] or paying coupons[21]. This is different from the discount window, as financial institutions can borrow anonymously, which reduces the potential for bank liquidity concerns from depositors; therefore reducing the risks of bank runs which could cause defaults.

The U.S. undertook this monetary policy option for the first time in August 2008. At the time, there was a lot of uncertainty regarding which banks were going to go bankrupt. If a bank were to be exposed by taking government loans, it would be likely that the bank would not survive following a bank run, as McAndrews et al. (2017) explains by citing examples in the past. Armantier et al. (2008) discovered that the policy option was beneficial as there was high demand for the first 10 auctions, that totalled $360 billion of term funding.

Policy 6: Term securities lending facility

[19] This trend caused the deterioration of the balance sheets of the banks due to the over-leveraging, thus forcing the central banks to increase the RR to contain the risks, as explained by Martin (2012).
[20] Fewer layoffs will be necessary if the firm can continue paying employee wages.
[21] Coupons are paid semi-annually to bondholders on the issued bonds that banks use for financing.

This policy option allows financial institutions to exchange their assets for government bonds. The term securities lending facility (TSLF) increases aggregate demand by allowing banks to trade their risky assets for safer assets, thereby allowing the bank to provide businesses with loans with increased confidence in their financial position.

Fleming et al. (2009) explains that the objective of the TSLF launched in 2008 by the U.S. Fed was for financial institutions to easily obtain funds; as treasuries served as collateral. Hoyos (2020) further supports the general thesis of the TSLF suggested, as he discusses that during 2008 there were 20 primary dealers who were relying on the repo market[22], which frightened the Fed, as 5 of them were the country's largest investment banks. The TSLF was well received, as the Fed received nearly $1B[23] in fees from the participation of 18 of those dealers as Hoyos (2020) mentioned.

4 - Monetary Policy Implementation

Policy 1: Quantitative Easing

Quantitative easing (QE) is implemented through the central bank increasing the money supply by buying bonds and other assets from both the public and private markets. This injects money into the market and subsequently increases bond prices (decreasing yields) due to increased demand— flattening/steepening the yield curve based on maturity of the bonds bought.[24] As high-yield bonds have fallen out of favor and interest rates are extremely low, long maturity bonds would be favored— flattening the yield curve to reflect economic downturn and contribute to resumption of previous growth.

Looking back at the Great Recession of the U.S, we see similar characteristics as our crisis, with increasing unemployment, declining consumption, and tight credit conditions.[25] In March 2009, with a GDP of 14.45 trillion[26], the Fed issued a statement with intent to purchase a total of $1.25 trillion of mortgage-backed securities (MBS) and $200 billion of agency debt by the end of the year combined with 300 billion in long term treasury securities over the next 6 months. Using this as reference, with a GDP of $2.708 trillion in 2020, our central bank will purchase $234 billion in agency debt throughout the span of a year, and 56 billion in treasury securities over 6 months; giving additional support for agencies that can aid in food and oil shortages and reducing their leverage while also giving time for financial markets to adjust.[27]

[22] The repo market, also known as the repurchase agreement market, was a major short term funding market that was valued at roughly $10 trillion in 2008.
[23] $781 million was collected from a total of $236 billion in usage of TSLF.
[24] Benford (2009) analysts detail lowering bank rates in QE to stimulate spending in an inflationary environment
[25] Federal reserve (2009) FOMC issuing a statement declaring the intent of initiating QE
[26] Numbers mentioned in this section are in USD.
[27] Initial calculation= capital used on asset/US GDP* UK GDP 2020 and readjusted to fit our crisis

Policy 2: Forward Guidance

Forward guidance is implemented in financial markets through releasing information into the market regarding long-term monetary policy centered around how the central bank (CB) intends to set interest rates in the future as changes in the Fed Funds rate are largely predictable.[28] This policy can be open-ended, meaning that there may or may not be concrete dates and/or targets, resulting in the possibility of both qualitative and quantitative assessments.[29]

Based on record high inflation of 4.2% and an already lower bound interest rate policy, the forward guidance provided by the CB should be immediate and provide concrete details in terms of economic developments while also not providing a specific date. Specifically, the CB will make an announcement stating that the current policy will be expected to continue until inflation is at the target 2% level. As our economy is just beginning the recovery process and inflation is expected to stay above-target for an extended amount of time, this statement signals a strong policy intention that gives the CB increased control over a market that will be less sensitive to economic developments (Moessner, 2019). Historically, the BoE and other CBs have made similar statements to stick to the lower bound interest rate and our CB will follow this example as the market needs to be less sensitive to the heightened downside risk.

Policy 3: Negative interest rate policy (NIRP)

NIRP is a forceful and unconventional monetary policy that is considered when an economy attempts to regain growth in an environment of decreasing interest rates and low growth to stimulate the economy.[30] This policy is implemented initially though a CB announcement followed by effects mentioned in section 3 that encourage both spending and lending in the economy to boost investment. As shown through Exhibit 3, a plethora of countries have already adopted this policy to display commitment to policy objectives, despite lower bound interest rates restricting additional policy easing.[31] Moreover, our NIRP will be similar to that of the European CB in 2014 as we plan to begin with an interest rate of -0.1% and adjust accordingly based on observed results (Claeys, 2021). However, due to the severe stress our economy is under, we will announce the readjustment of the rate by 20 basis points at the start of the next fiscal year, of up to -1.0%, with an annual review to determine future policy.

Policy 4: Reserve Requirements (RR)

CBs implement this policy by lowering or increasing the restriction on the amount of cash and liquid assets that banks must have on hand. This policy will be implemented after our CB determines if our economy requires additional stimulus

[28] (Moessner 2019) on how markets react to zero bound interest rate news from the central bank
[29] (Mkay, 2016) details forward guidance and its effect on the market
[30] (World Economic forum 2016) conditions for NIRP and graph of countries adopting the policy
[31] (Arteta, 2016) detail sources and implications for NIRP

through lowering the RR, or raising the cost of credit by increasing the RR. Historically, China's CB decreased RRs during the 2008 crisis and the Fed removed RRs entirely in 2020 due to COVID— both instances occurred during an economic downturn with heavy GDP decreases.[32] As such, our CB will announce the removal of RRs entirely beginning next quarter in order to encourage lending and give the economy time to react. Moreover, when our GDP begins to show an upward trend, we will reevaluate changing RRs again.

Policy 5: Term Auction Facility (TAF)

During the 2007 Financial Crisis the Fed introduced the TAF that was to be implemented for select institutions to receive long-term funding through competitive auctions; these auctions were held periodically and distributed lending on a collateralized basis.[33] In a declining market with immense uncertainty, long-term securities fell out of favor as investors would only lend on the shortest of terms.[34] Historically, the Fed lent out a total of $3.8 trillion to 416 banks under the TAF from 2007 to March 2010, accounting for 25% of the USA's GDP in 2010 (Wiggins, 2015). As our crisis stems from a sudden pandemic, our CB will lend a total of 686 billion (25% of UK GDP in 2020) over a period of two years with the first of many periodic auctions a month after the announcement to prioritize having an immediate effect on increasing the ability of banks to receive funding and stabilizing the economy.

Policy 6: Term Securities Lending Facility (TSLF)

Once again looking towards the successes of the Fed, another liquidity facility they set up in 2008 is the TSLF that was designed to increase the ability of dealers to finance positions by allowing them to use securities as collateral when bidding in exchange for liquid treasuries (Fleming et al, 2009). Overall, 1.194 trillion was lent through the TSLF over the subprime mortgage crisis from 2007-2010.[35] As our equity markets are rapidly declining and investors are pulling their investments in panic, our banks are put into a position where they must consider selling their less liquid assets to maintain financing costs; in this situation, our CB will promptly introduce the TSLF as a temporary measure not meant to last past 2023. Comparing the size of the U.K economy to the U.S, our CB will issue a total of $215.7 billion through the TSLF with the first auction being two weeks after preparations and announcements have been made.

[32] (Afanasyeva, 2020) details reserve requirement changes and impacts on China and 2020 federal reserve report detailing why RRs were eliminated
[33] (Armantier et al, 2008) Analysis and explanation of TAFs
[34] (Banton,2020) why the taf emerged
[35] (Felkerson, 2011) Details all funding facilities created by the Fed during the 2007-2009 crisis

5 - Potential Effectiveness and Risks

Policy 1: Potential Effectiveness and Risks of Quantitative Easing

Quantitative easing (QE) has shown significant promise as a form of expansionary monetary policy during economic recessions, which boosts economic recovery (Joyce et al., 2012). Its effectiveness has been demonstrated in past recessions in countries such as the United States and the United Kingdom. In a paper published by Kapetanios, Mumtaz, Stevens, and Theodoridis in 2012, they used three separate time-series models to analyze the Bank of England's QE recovery program, with data from March 2009 to January 2010.[36] The data obtained by the authors show that without quantitative easing, the real GDP of the U.K. would've fallen even lower in 2009, and conclude that QE is an effective policy for financial crises (Kapetanios et al., 2012).

Joyce et al. (2012) states that there are risks and unintended consequences affiliated with QE. Firstly, a risk is due to lack of historical data, policymakers are unsure about the specific effects of QE, such as diminishing returns if imposed on a larger scale (Joyce et al., 2012). Secondly, the authors propose consequences such as the increased use of unconventional monetary policies such as QE, can cause high levels of bank reserves and reduce interbank lending, which may lead to malfunctioning of the market (Joyce et al., 2012). Also, Joyce et al. (2012) discusses that post recovery, central banks need to reduce the level of reserves, whilst also avoiding high levels of inflation. They conclude that the most concerning risk is increased unsustainable levels of government debt from bond purchases by central banks (Joyce et al., 2012). The risks are currently overlooked due to the effectiveness of QE, but are predicted to become a larger issue as it becomes more commonly used.

Policy 2: Potential Effectiveness and Risks of Forward Guidance

Forward guidance (FG) has been used in the past by countries such as Canada, Germany, Italy, Japan, and more (Ehrmann et al., 2019). FG in general as a form of unconventional monetary policy has shown to be successful under the standard New Keynesian model, as a commitment by the government to promise a certain interest rate has been found to be effective in avoiding a liquidity trap (Carlstrom et al., 2015). This sentiment is also confirmed by Bassetto (2019). There is further evidence that demonstrates FG as an effective monetary policy tool, but uncertainty exists on impacts of FG on different complete and incomplete market models (Hagedorn et al., 2019).

In general, due to differences in market models assumptions, academic literature investigating FG has arrived at different conclusions (Hagedorn et al., 2019). By combining past data, Hagedorn et al. (2019) attempt to reanalyze the effectiveness

[36] The authors used a BVAR, MS-SVAR, and TVP-SVAR model.

of FG and find that it is not an effective monetary instrument, and has nearly no effect on output and employment. Further, due to FG being dependent on credibility, a risk central banks encounter is unresponsiveness of the private sector due to low credibility or patience (Bassetto, 2019). As mentioned previously, because there are multiple types of FG, each type implies different consequences (Ehrmann et al., 2019). A consequence of FG as detailed by Ehrmann et al. (2019) is increased uncertainty. This is because though FG is meant to provide more information and decrease uncertainty for the private sector, public information from banks can interfere and negatively affect private information in prices from markets, and thus amplify uncertainty (Ehrmann et al., 2019).

Policy 3: Potential Effectiveness and Risks of Negative Interest Rate Policy

The use of Negative Interest Rate Policy (NIRP) has demonstrated mixed results. Though, using NIRP with other expansionary monetary policies has shown promise (Fukuda, 2017; Demiralp et al., 2021). In the case of Japan, NIRP combined with QE has shown positive effects on the Japanese economy, while NIRP alone had limited positive effects (Fukuda, 2017). This is contrasted by a paper published in 2020 by Czudaj, where NIRP showed a positive effect on inflation and GDP growth expectations; the author concludes that NIRP may be effective in increasing economic growth. In addition, based on a working paper by the ECB, NIRP has shown promise when combined with other expansionary programs such as the asset purchase program (Demiralp et al., 2021).

A risk or consequence of NIRP is financial instability, as demonstrated in the case of Japan (Fukuda, 2017). Due to NIRP, both short and long-term interest rates were negative, causing Japanese financial institutions to lose profits in the domestic market (Fukuda, 2017). Long-run consequences of NIRP are uncertain; and some economists even argue that it is ineffective to fight stagnation and that central bank officials are better off pursuing fiscal policy (Czudaj, 2020; Bucchianico 2020).

Policy 4: Potential Effectiveness and Risks of Reserve Requirements

By lowering the reserve requirement (RR), central banks are able to allocate more credit to firms (Wei, 2020). China has demonstrated use of this policy, by lowering the RR ratio, which is argued by Wei to also achieve stability of inflation and unemployment, and reduce social welfare loss due to greater credit availability.

This is contrasted by Nautz and Schmidt (2009), who argue that lowered RR can have consequences. The authors propose that lowering the RR may cause concerns such as inability to deal with liquidity shocks, and higher volatility of the federal funds rate (Nautz and Schmidt, 2009).

Policy 5: Potential Effectiveness and Risks of Term Auction Facility

The Term Auction Facility (TAF) effectiveness in literature shows mixed results, due to the use of different economic assumptions (McAndrews et al., 2017). A working paper by the staff of the Fed of New York shows that the TAF is effective, particularly in helping interbank markets on liquidity strains (McAndrews et al., 2017).

A consequence of the TAF, as demonstrated in the Financial Crisis, is increased uncertainty (Thornton, 2011). Thornton (2011) argues that the TAF, though originally a helpful monetary policy tool, actually increased the risk premium on financial bond rates. He attributes this to the introduction of the TAF as a sign to the market that the recession was worse than expected.

Policy 6: Potential Effectiveness and Risks of Term Securities Lending Facility

Term securities lending facility (TSLF) has demonstrated effectiveness in improving market liquidity (Fleming et al., 2009). It is important to note that because the TSLF was only introduced in 2008, and therefore historical data on the policy is limited (Fleming et al., 2009). Another point of effectiveness for TSLF as an unconventional monetary policy is that it does not impact implementation of interest rate policy, due to the policy using collateral instead of cash (Fleming et al., 2009).

A risk associated with TSLF is lack of transparency due to anonymity associated with those who borrow collateral (Hoyos, 2020). Though the courts ruled that the Fed had to release some information, public outcry and past lawsuits on transparency raise concerns of the future of the TSLF (Hoyos, 2020).

6 - Policy Recommendations

Taking into consideration the recent rise of the Omicron variant, as well as current domestic conditions of the UK, policy recommendation options are scarce. As demonstrated with evaluation of both conventional and unconventional monetary policy options, perhaps a mixture policy may be the best option. As referenced in section 2, a mixture of long-term asset purchases, greater availability for lending, and increased government-backed loans must all be accomplished.

Firstly, the domestic situation of the country must be addressed. Due to the rise of the Omicron variant, as well as equity markets down by more than 50% there are serious domestic issues that we should focus on. New quarantine measures that

arise from the new COVID-19 variant , as well as reduced labor force participation are bound to hurt supply chains more than they are now. Public confidence is also diminishing due to lockdown measures imposed to combat this new variant.

In terms of the international situation, other countries are all suffering from this new Omicron variant, and therefore we cannot depend on other nations for essential goods and should be focused on strengthening our own economy. Due to the new variant, we also expect decreased travel from abroad, translating into reduced capital inflow from tourism and other streams of income.

To address each issue, an individual monetary policy should be used. A mixture of policy, as mentioned previously, may prove most useful.[37] For example, we propose to use forward guidance to calm the rising consumer confidence associated with the Omicron variant. Though forward guidance has demonstrated mixed results, it is thought that combined with other policies discussed below and adequate credibility of the Bank of England, forward guidance should provide a positive impact on recovery. To impose forward guidance, we should announce immediately, an interest rate and future economic conditions we plan to maintain throughout recovery to increase consumer confidence again. Another issue is the decline of the equity market, which we believe by imposing quantitative easing, we can improve. Quantitative easing has been analyzed to have positive effects on economic recovery in literature, and though there are concerns and risks, we should worry about economic recovery first. Therefore, we should immediately begin buying up stocks from key industries that support the U.K. economy, such as manufacturing and construction. Another policy we should use is negative interest rate policy, though there are concerns on timing with this specific policy. NIRP has demonstrated effectiveness when combined with other policies in Japan and the European Union (Fukuda, 2017; Demiralp et al., 2021). Therefore, we should wait three or four quarters post implementation of other mentioned policies before implementing NIRP. By immediately implementing NIRP, we risk further deterioration of equity markets due to loss of bank revenue. Also, consumer confidence may decline further if NIRP were implemented immediately. Finally, to further support businesses, we should also implement term securities lending facility. This, along with QE, will further provide support for firms, contributing to recovery.

[37] As demonstrated in the case of the Japanese Central Bank and ECB (Fukuda, 2017; Demiralp et al., 2021).

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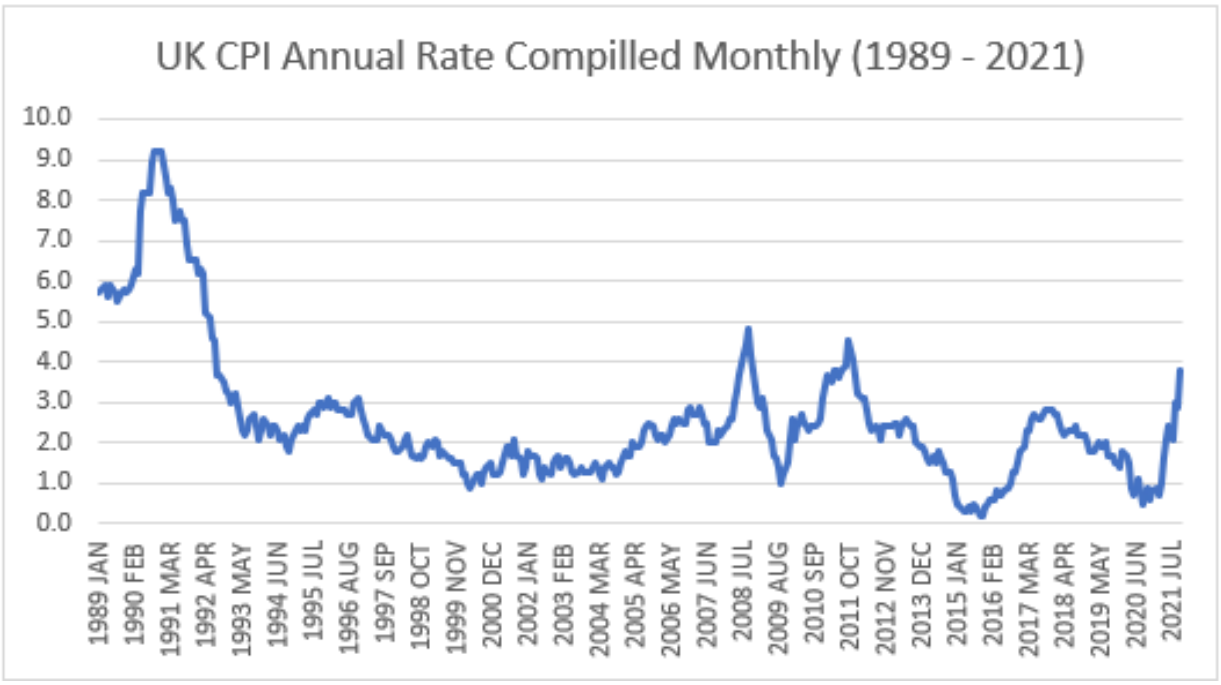
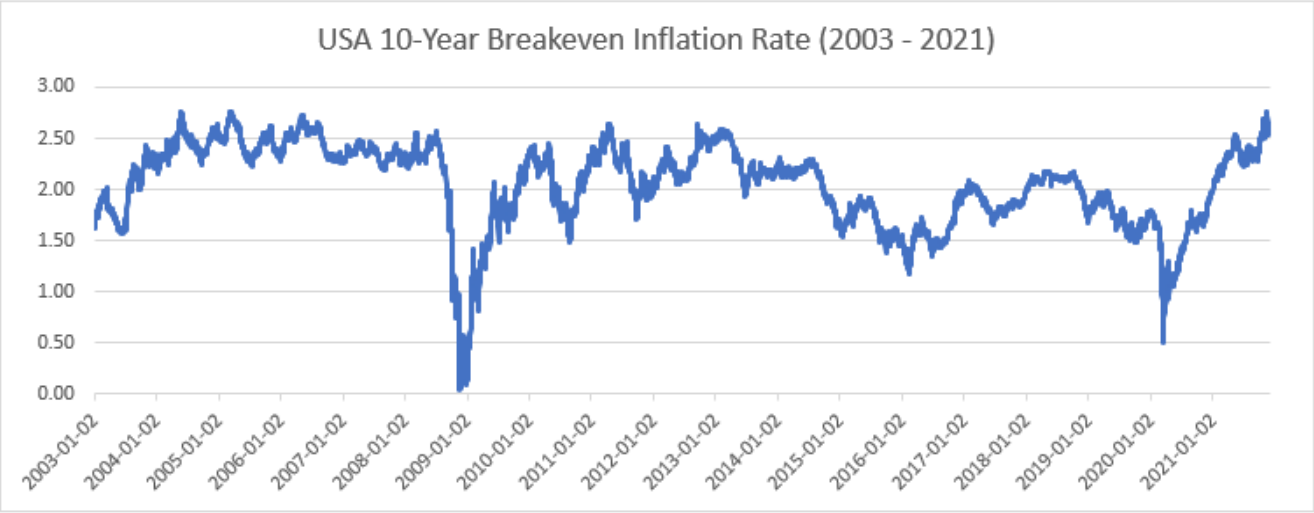
Appendix

Exhibit 1.A - UK Consumer Price Index Annual Rate Compiled Monthly



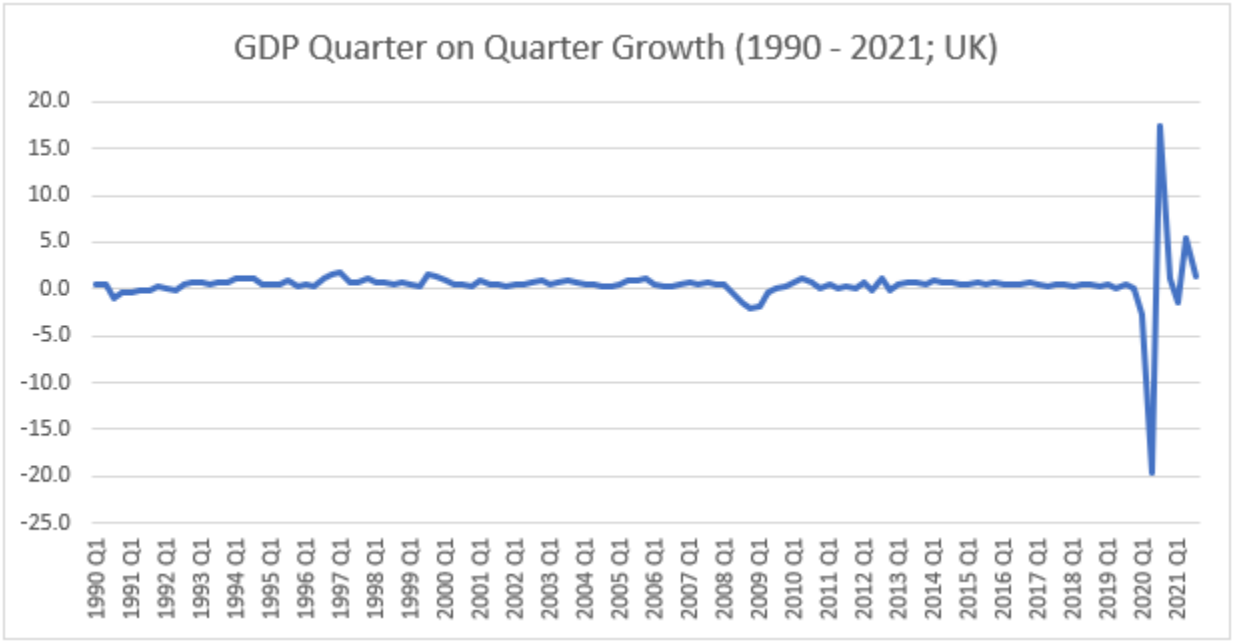
Source: U.K. Office for National Statistics, Consumer Price Inflation UK: October 2021

Exhibit 1.B - USA 10-Year Breakeven Inflation Rate



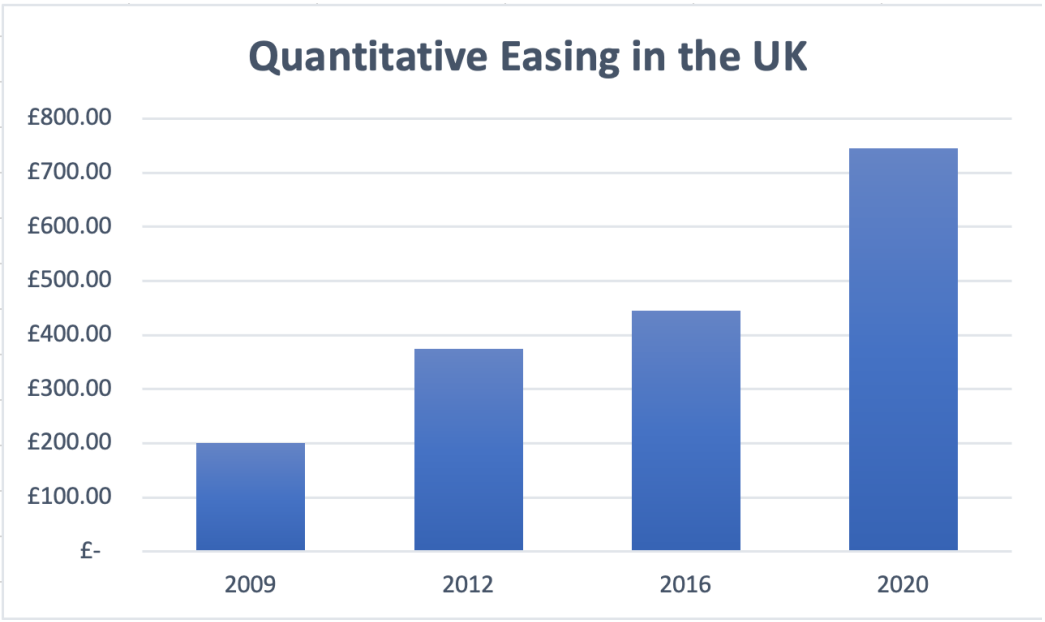
Source: Federal Reserve St. Louis

Exhibit 2.A - UK GDP Quarter on Quarter Growth



Source: U.K. Office for National Statistics, GDP Quarter on Quarter Growth

Figure 1 - Cumulative Bond Purchases by Bank of England



This graph shows the cumulative bonds purchased by the Bank of England over four crises; 2009 (financial crisis), 2012 (Eurozone debt crisis), 2016 (Brexit referendum result), 2020 (Coronavirus pandemic)

Source: Bank of England

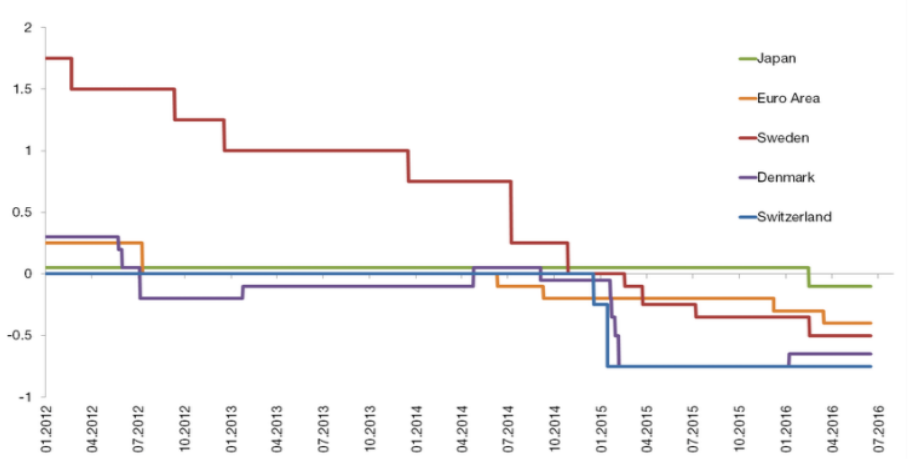
Figure 2 - Effects of Quantitative Easing for Each Country

Country/Pi	0.4	0.5	0.6	0.7	0.8
United States	30.29%	40.23%	50.35%	60.70%	74.70%
Switzerland	42.52%	48.39%	60.62%	68.24%	80.43%
United Kingdom	56.36%	60.63%	71.81%	77.37%	86.40%
Europe	65.21%	68.77%	78.32%	82.66%	89.60%
Japan	69.20%	72.42%	81.08%	84.88%	90.89%

$\rho_i$represents the smoothing parameter, using the Taylor rule in the columns, showing the relative efficiency of the negative interest rate policy for each country.

Source: Federal Reserve Bank of San Francisco

Exhibit 3: Countries with negative interest rates



Source: National Central Banks, provided by Haver Analytics