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Central bank policy formulation under COVID-19 in Ghana: A fit-for-purpose?

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ABSTRACT

This paper evaluates the fit-for-purpose of the monetary policy measures implemented by the Bank of Ghana in response to the COVID-19 pandemic. We examine the effectiveness of the BoG's policy interventions in the context of vector autoregressions augmented with macroeconomic and financial indicators. We demonstrate that the BoG's monetary policy measures have had nominal, real, and financial effects. The monetary interventions have been successful, as evidenced by the gradual reduction in the sovereign spread, improved financial stability, and increased real economic activity. Our findings suggest that balance sheet actions are less effective and should be moderated in the conduct of monetary policy in jurisdictions without zero lower bound constraints. However, the analysis indicates that in times of crisis, central banks should deploy both standard and non-standard tools to stabilize dysfunctional financial markets and avoid a deflationary spiral. The historical and variance decomposition of the data reveal that monetary policy shocks have historically made the largest contributions to the targeted macro-financial aggregates during the pandemic episodes.

KEYWORDS

Central bank; Monetary policy; Financial stability; COVID-19; Emerging market

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1. Introduction

The COVID-19 pandemic[1] led to an unprecedented and sudden halt of global economic activities, triggering what the IMF referred to as the "great lockdown". The pandemic presented multiple and overlapping challenges across various sectors amidst extraordinary uncertainty about its impacts. The COVID shock created an immediate challenge for policy fronts worldwide. Amidst the uncertainties, the global economy sharply and abruptly deteriorated, and market volatility heightened as financial markets reacted swiftly. The health systems were perhaps the first to feel the impact of the COVID-19 outbreak. The lockdown measures were implemented to contain the virus's spread and ease the mounting pressure on the health systems. However, as the lockdown measures persisted, the economic impacts of the crisis intensified[2]. In Ghana, the Bank of Ghana (BoG) implemented monetary policy measures to alleviate the pandemic's economic consequences, including cutting interest rates, reserve requirements, and decreasing banks' conservation buffers. These measures require an assessment of their fit-for-purpose and their potential to elicit specific lessons for the future conduct of monetary policy. This paper examines the macroeconomic and financial effects of the accommodative stance of monetary policy and documents the respective impacts of conventional monetary measures, macroprudential policy, and central bank balance sheet actions.

The rapid economic deterioration and surge of sovereign risk prompted central banks to take unprecedented action in terms of magnitude and speed. Central banks faced the challenge of stabilizing financial markets and supporting the real economy, deploying a range of tools in a multidimensional strategy to address overlapping challenges[3]. These tools included rate cuts and forward guidance to support aggregate demand and ease market strains, asset purchases, liquidity provision, and credit support to provide additional support for aggregate demand, support business survival, employment, and address dysfunction in key financial markets. Finally, regulatory easing and macroprudential measures, such as reductions in capital buffers, were implemented to de-escalate potential credit and liquidity contraction. According to Benmelech and Tzur-Ilan (2020), globally, during the initial COVID-19 era, the policy rate moderated by 0.63 percent (0.43 percent in high-income countries and 0.84 percent in low-income countries). Central bank guarantees amount to an average of 1.42 percent of GDP, while asset purchases due to the COVID-19 crisis represent an average of 2.11 percent of GDP. Benmelech and Tzur-Ilan (2020) also show that out of 85 countries, 31 percent implemented repo operations, 22 percent lowered their reserve requirements ratio, 39 percent imposed restrictions on dividend payouts, bonus payments, or share buybacks by commercial banks, 73 percent implemented at least one macroprudential policy tool, and 86 percent eased lending restrictions for financial intermediaries in response to the COVID-19 crisis.

Our contribution adds value to the theoretical and empirical literature on the macroeconomic and financial effects of monetary policy design during the COVID-19 crisis. Benmelech and Tzur-Ilan (2020) noted that countries with lower interest rates before the crisis were more likely to implement non-conventional monetary policies in response to the crisis. Demirguc-Kunt, Pedraza, and Ruiz-Ortega (2020) observed that monetary easing, borrower assistance, and liquidity support measures helped mitigate the adverse impact of the crisis on the banking sector. Rebucci, Hartley, and Jiménez (2020) evaluated the effects of quantitative easing (QE) decisions taken by advanced and emerging central banks in March and April 2020 and found that QE remained effective, associated with exchange rate depreciation, and led to a reduction in sovereign bond yields. However, Bernoth, Dany-Knedlik, and Gibert (2020) revealed that the announcement of the Pandemic Emergency Purchase Programme (PEPP) in the

[1] The novel coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome SARS-CoV-2 was declared a global pandemic by World Health Organisation (WHO) on March 11, 2020

[2] See the 2020 United Nations Framework Report for detailed elaboration on the socio-economic impacts of the Covid 19 pandemic.

[3] Refer to English, Forbes and Ubide (2021), for an overview of monetary policy measures during the COVID era.

Euro Area did not trigger a significant decrease in sovereign yields. Ortmans and Tripier (2020) suggested that the ECB's asset purchases helped mitigate the financial stress arising from the COVID-19 crisis. Blot, Bozou, and Creel (2021) showed that Asset Purchase Programme (APP) announcements steered inflation expectations upward, while the PEPP had heterogeneous effects, impacting the sovereign spreads of the most fragile economies (e.g., Italy) and having no impact on the least fragile economies (e.g., the Netherlands) during the pandemic.

Overall, ECB monetary policy measures had financial effects on banking stability, nominal effects on inflation rates, and real effects on Euro Area unemployment rates. In the US, Feldkircher, Huber, and Pfarrhofer (2021) indicated that compared to a no-policy scenario, monetary expansion during the pandemic depreciated the currency, caused more favorable long-term financing conditions, and led to higher output growth and stock market returns.

Despite several common threads in central bank actions in response to the pandemic, the idiosyncrasies of each economy and institution determined the specific actions of each central bank. Against this backdrop, a country-focused analysis would draw out specific implications for the future conduct of monetary policy. This paper evaluates the magnitudes of monetary policy tools deployed in Ghana and assesses the impacts of the central bank's actions. The paper contributes to the emerging literature on the "recession playbook" (as discussed, for example, in Bernanke 2020) since the Great Financial Crisis (GFC). The study focuses on a frontier economy characterized by relatively low financial development and potentially restricted monetary transmissions, comparing the results with observations from advanced economies. Thus, this study helps to determine whether the stylized facts about the "recession playbook"[4] are portable across countries. Furthermore, the study contributes to determining monetary policy options and policy mix available to central banks in times of adverse external shocks as they attempt to contain and recover from economic crises. The paper also sheds light on the use of the central bank toolkit in response to overlapping challenges and rapid economic deterioration in an environment without the zero lower bound (ZLB) constraint but with mounting debt challenges.

Data from the Bank of Ghana shows that in Ghana, the COVID-19 pandemic and resulting restrictions led to sharp and sudden declines in aggregate demand, worsening financial conditions, and unprecedented declines in output. As the pandemic shock drove a section of economic activities to a near-complete halt, the BoG responded extraordinarily and timely to ensure appropriate market liquidity conditions, improve consumer sentiments, and contribute to economic recovery. The BoG deployed conventional monetary policy, as well as transitory adjustments to the regulatory framework and liquidity provision.

We estimate a vector autoregressive (VAR) model, and the impulse response analysis shows that the rapid, sizeable, and concerted reaction of the BoG effectively stabilized the financial market and minimized the negative implications for the real economy. In this paper, we have established that the BoG acted decisively and utilized the tools in its kit to support the flow of credit to households and businesses. These policy measures, taken together and perhaps in tandem with the gargantuan fiscal policy response, improved financial conditions and provided crucial support to the real economy. However, inflation risks remained high, largely reflecting the sizeable fiscal stimulus and negative supply-side effects.

Building on this section, the remainder of this paper is organized as follows: The next section reviews some related literature, while section three explores the pandemic shocks and macroeconomic conditions in Ghana. The fourth section discusses the BoG's response to the pandemic. The fifth section discusses the empirical model and methods, as well as data issues and the empirical results. Finally, the sixth section concludes.

2. Related literature

The New Keynesian models reject the dichotomy between real and nominal variables and promote the non-

[4] Application of monetary policy tools aimed at ending a crisis or recession and restoring normal growth.

neutrality of monetary policy, particularly in the short run, by anchoring the economy to a nominal target. This theoretically reinforces the general ability of central banks to control inflation and potentially affect output and employment in the short run. As a result, monetary policy measures have been implemented across multiple economies to boost economic growth, stabilize prices, and drive economic momentum. The management of short-term policy interest rates has evolved as the main traditional approach to designing monetary policy.

However, since the turn of the century, it has become apparent that low inflation (actual and expected) combined with historically low real interest rates resulting from technological, demographic, and other factors that have increased global savings relative to desired investment, have led to persistently low nominal interest rates at both short and long ends of the yield curve. The chronic low interest rates have challenged the traditional approach to monetary policy-making (Bernanke, 2020). The global financial crisis of 2007-2009 represented a critical turning point in the application of monetary policy tools. In response to the crisis, all major central banks aggressively lowered their policy rate to zero (or nearly so), reaching the effective zero lower bound on the short-term nominal interest rate, according to Baumeister and Benati (2013).

Kiley and Roberts (2017) emphasize that following pre-financial crisis policy rules, short-term rates would be constrained by zero as much as one-third of the time, with significant consequences for economic performance. Therefore, Bernanke (2020) cautions that policymakers will have to adopt new tools, tactics, and frameworks if monetary policy is to remain effective. Consequently, major central banks have turned to alternative policy tools, such as forward guidance, large-scale purchases of financial assets (quantitative easing), funding-for-lending programs, yield curve control, negative interest rates, and other evolving tools, to provide stimulus[5]. It is important to note that in most emerging economies and other jurisdictions without zero lower bound constraints, the management of short-term policy interest rates remains the key approach to monetary policy operations.

Baumeister and Benati (2013) explain that, like standard monetary policy actions, the primary objective of unconventional monetary policy operations is to put downward pressure on long-term interest rates to spur aggregate demand and real economic activity by supporting private borrowing of households and businesses. Bernanke (2020) argues that these new tools have proven effective, providing substantial additional scope for monetary policy despite the lower bound on short-term interest rates. Even when financial markets are not overly strained, central bank asset purchases have a significant impact on financial conditions. Forward guidance has grown in importance over time, both in terms of assisting the public in understanding how policy will respond to changing economic conditions and in facilitating monetary policymakers' commitments to the so-called lower-for-longer rate policies, which can add stimulus even when short rates are at the lower bound. Empirical studies, notably Krishnamurthy and Vissing-Jorgensen (2011), Joyce et al. (2011), and D'Amico and King (2013), have shown that asset purchase programs were successful at flattening the yield curve as balance sheet policies substantially reduced longer-term yields. Additionally, Bhattarai and Neely (2022) reveal that unconventional monetary policies have influenced international asset prices and tail risk in the desired manner.

In a separate vein of research on the effects of monetary policy, Bhattarai and Neely (2022) find that the impact of policies also depends on the economic state and recommend that unconventional monetary policy be reserved for times of crisis or when the zero bound limits conventional monetary policy. Baumeister and Benati (2013) explore the macroeconomic effects of compressions in the long-term bond yield spread during the Great Recession of 2007-09 and find that such compressions have a strong impact on both output growth and inflation. Kuttner (2018) also studies the applications of monetary policy during the financial crisis and finds evidence that forward guidance and quantitative easing were successful in reducing long-term interest rates. Bernanke (2020) argues that policies aimed primarily at stabilizing dysfunctional financial markets (such as the Federal Reserve's emergency credit facilities and currency swaps, and the European Central Bank's Securities Markets Programme) can improve

[5] See Fawley and Neely (2013) and Karson and Neely (2021) for detailed chronologies of actions by major central banks.

economic outcomes by stabilizing financial markets but are not useful outside of a crisis. This paper sheds light on the use of the central bank toolkit in response to overlapping challenges in an environment without the ZLB constraint but mounting debt challenges.

3. The Pandemic Shock and Macroeconomic Conditions

The World Health Organization declared COVID-19 a global pandemic on March 11, 2020. Ghana officially confirmed its first cases on March 12, 2020. Heading into the pandemic, the Ghanaian economy already faced heightened debt levels. The debt-to-GDP ratio had reached approximately 64 percent before the onset of the pandemic (as reported in Figure 1).

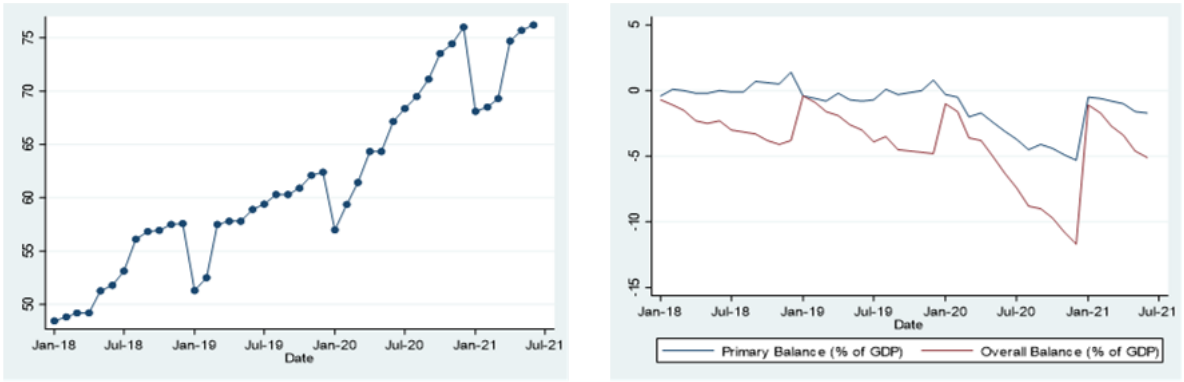
The forceful fiscal response to the pandemic heightened sovereign risk and escalated the debt-to-GDP ratio to around 76 percent by December 2020, while the overall fiscal deficit jumped to approximately 15 percent by December 2020. The fiscal deterioration spurred by the pandemic will remain a key challenge for Ghana in the coming years, perhaps even in the post-pandemic era. The increased gross public debt will restrict policy impacts and further limit fiscal space to maneuver and provide relief as the pandemic continues and, potentially, in future crises. The rise in indebtedness raises questions about debt sustainability, with associated sovereign risk, reduced access to capital, and declining investment. Thus, quickly de-escalating uncertainty regarding debt sustainability is fundamental to the continued recovery process.

Capital markets and financial conditions also exhibited acute stress from the COVID-19 shock (Figure 2). The sovereign spread spiked in response to the pandemic shock as funding costs and credit risk increased. Compared to the Great Financial Crisis, financial markets regained stability earlier, mainly due to large-scale policy responses by the Bank of Ghana (BoG) and the government. The COVID shock produced a heightened demand for liquid assets, also known as a "dash for cash." The rebalancing of portfolios from higher-risk instruments to lower-risk instruments increased the yield on higher-risk instruments. The yield for long-term instruments rose most of all, as the higher the risk the instruments had, the more the yields rose. Thus, at the initial phase of the COVID crisis, the premiums for higher-risk fixed-income instruments rose, as did the interest rates on long-term loans. It is worth noting, however, that Ghana had already faced deteriorating financing conditions in the run-up to the crisis, as higher fiscal borrowing needs had generated a pre-existing steepening in the yield curve and a rise in public debt.

The financial turmoil caused by the pandemic shock affected both market rates and access to private sector credit (Figure 3). The poor financial conditions impacted capital formation and the financial intermediation process. Capital markets have not developed as a relevant credit channel in Ghana; notwithstanding, the sharp increase in liquidity demand significantly impacted the stock market. The COVID crisis heightened credit risks, as many businesses had their earnings negatively affected by the pandemic and the associated restrictions on economic activities. As conditions in Ghana's gilt market deteriorated, financial conditions tightened, leading to severe credit tightening for both households and companies. This ignited liquidity problems in the Ghanaian economy. The pandemic exerted devastating impacts on credit to the private sector and the equity market. The COVID shock impaired market functionality and increased various risk premiums, presenting a strong case for various interventions to restore financial stability and market functionality.

Economic and price developments demonstrated the impact of the pandemic shock on macroeconomic stability (Figure 4). Conditional on the pandemic shock, real economic activity and inflation exhibited a negative co-movement. Inflationary pressures heightened while real economic activities plummeted. The COVID shock elevated inflation expectations and lowered real interest rates, as nominal interest rates were muted due to monetary policy accommodation. The low real interest rates created favorable conditions in the financial markets, reduced funding costs, and rapidly improved financial conditions. These developments have quickly aided the recovery of the economy from the slump caused by the pandemic shock. The inflation problems appear to be transitory, declining

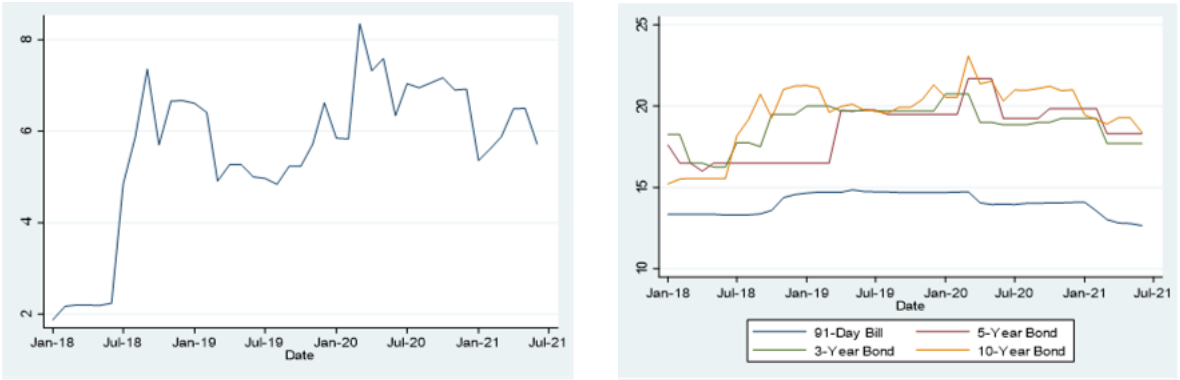
after the initial hike as the pandemic-induced food price shock eased. The pandemic induced a more significant food price shock than non-food inflation. The pandemic-related idiosyncrasies, particularly the containment measures, might have emboldened the underlying food price pressures and strengthened the influence of food inflation on the formation of inflation perceptions and expectations. Deflating food prices helped to subdue headline inflation. The severe downturn in economic activities resulted in the sharpest decline in Ghana's GDP during the second and third quarters of 2020.



a. Debt-to-GDP ratio b. Fiscal balances

Figure 1. Evolution of sovereign debt and fiscal balances.

Data source: Bank of Ghana.



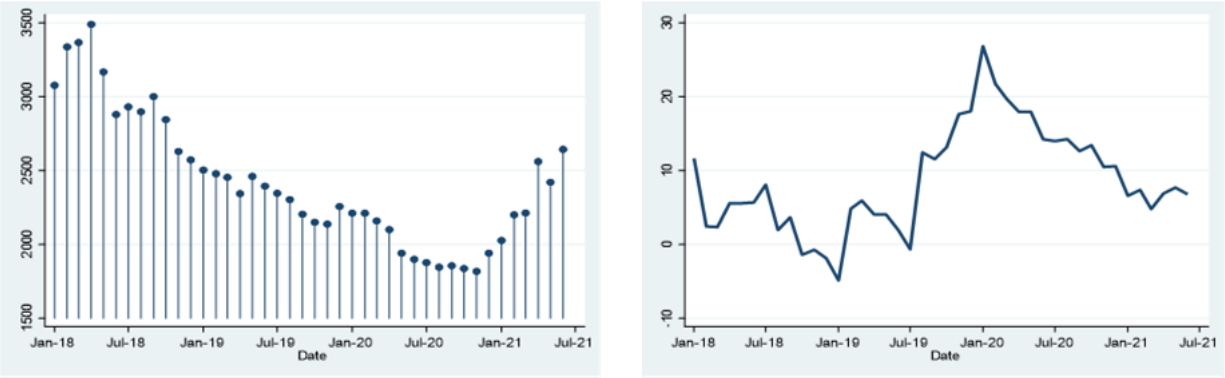
a. Sovereign spread b. Sovereign yields

Figure 2. Government of Ghana sovereign yields and spread.

Data source: Bank of Ghana.

The uncertainty caused by the global spread of COVID-19 also led to increased depreciation pressure on the local currency (Figure 5). The heightened economic uncertainty and financial stress prompted capital flight towards safe-haven assets, depreciating the Ghanaian cedi. In addition to the direct effects of the COVID-19 pandemic on the Ghanaian economy, the depreciation of the currency posed an additional drag on economic activity in import-oriented sectors and fueled further inflationary pressures. The COVID-19 pandemic exacerbated the long-standing issue of the depreciation of the Ghanaian cedi. The task for the monetary authority was to limit the depreciation of the currency and prevent it from becoming a major drag on inflation and the economy. The Bank of Ghana (BoG) intensified its interventions in the foreign exchange market during the crisis, reducing the depreciation pressure on the currency but also depleting the net international reserves. Foreign exchange market interventions can help

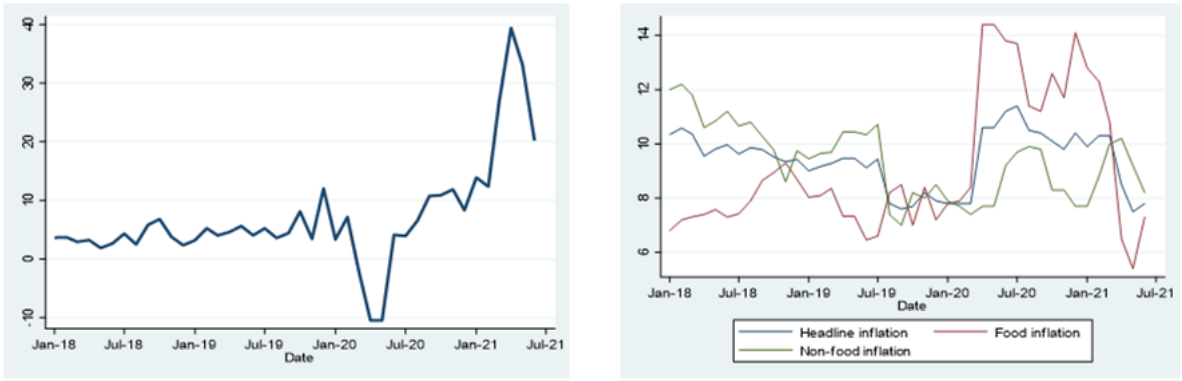
prevent excessive depreciation of the local currency and contribute to stabilizing price and economic developments, but they may also pose challenges. An intervention involving the sale of foreign assets for domestic assets will decrease the net creditor position of the country and lead to a depletion of the debt service account in the balance of payments.



a. Stock index b. Private sector credit (annual growth)

Figure 3. Financial markets and financial conditions.

Data source: Bank of Ghana and Ghana Stock Exchange.



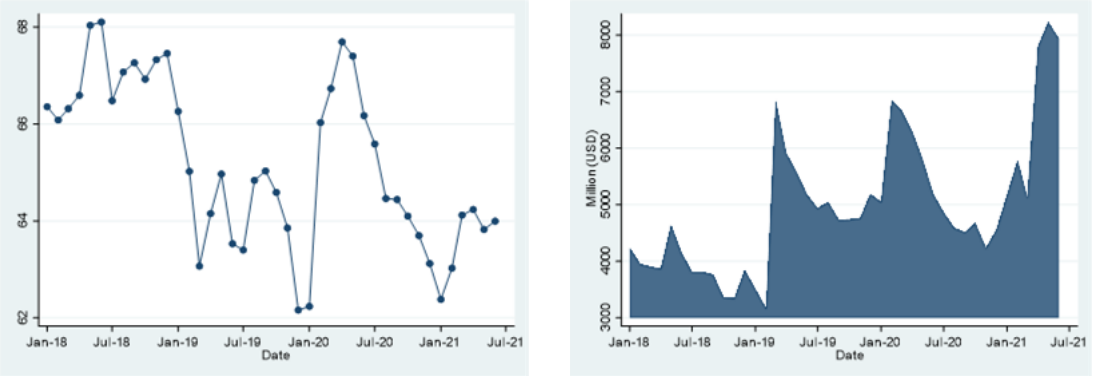
a. Real economic activity (annual growth) b. Inflation

Figure 4. Real economic activities and inflation.

Data source: Bank of Ghana.

The Bank of Ghana (BoG) acted swiftly and implemented programs designed to support the liquidity of core markets that had rapidly become severely impaired. These actions caused the Bank's balance sheet to balloon from around GH¢102 billion in March 2020 to approximately GH¢137 billion by the end of January 2021. By the end of January 2021, the Bank's assets had recorded an annual growth of 59 percent, the highest in the past five years (Figure 6). The most active element of the BoG's balance sheet was its claims on the central government. At the end of January 2021, the Bank's claims on the central government amounted to GH¢42 billion, representing an annual growth of 159 percent, the highest in the last one and a half decades. The significant increase in the asset size of the Bank's balance sheet resulted primarily from large-scale purchases of government bonds. This occurred despite the fact that the BoG had long refrained from extensive purchases of government bonds for effective monetary policy purposes. As anticipated, the rapid growth in the Bank's balance sheet was expected to taper off in the latter half of 2021, as the assets held on the balance sheet—originating from programs directed at market functioning—would

continue to roll off from the levels posted in January 2021.



a. Real Effective Exchange Rate b. Net International Reserves

Figure 5. Exchange rates and international reserves.

Data Source: Bank of Ghana.

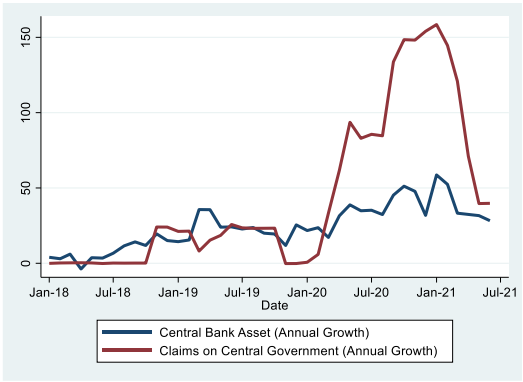


Figure 6. Bank of Ghana's assets and claims on central government.

Data source: International Financial Statistics, IMF.

4. The Bank of Ghana crises response

Two main challenges confronted central banks during the pandemic: first, to stabilize markets and protect credit supply and second, to counter the adverse impact of the pandemic on the projected growth path. In the initial response to the pandemic crisis, the BoG adopted a comprehensive package of complementary measures. Essential elements included cutting interest rates, lowering reserve requirements to support more directly the flow of credit to households and businesses, and regulatory reliefs to encourage and incentivize commercial banks and other financial institutions to support the flow of credit to households and businesses.

The BoG lowered its policy rate to an 8-year low from 16% to 14.5%. The reductions in the interest rate were designed to reduce the cost of funds and improve the availability of finance. This action would ultimately support the recovery from the economic slack by bolstering the cash flows of businesses and households and improving consumer and business confidence. In addition, the BoG eased reserve requirements to respond to liquidity and credit needs. The BoG reduced reserve requirements for lenders from 10% to 8%. This remedy sought to provide additional funding to banks to support the supply of credit to businesses and households and provide liquidity support to critical sectors.

Finally, the BoG eased regulatory capital requirements to release balance sheet buffers of financial institutions

to tackle the liquidity squeeze in the financial markets. The cut in the conservation buffer of commercial banks from 3% to 1.5% supported the ability of banks to supply the credit needed to counter the liquidity stress enforced by the pandemic. As was the case in most jurisdictions, this measure reinforced the expectation that ensuring banking sector soundness provides the room for all elements of the liquidity and capital buffers that had been built up by banks to be drawn down as may be required. The BoG activated other macroprudential policy actions to enhance the capacity of banks to offer the needed support to the real economy through the crises. The BoG provided dividend payment guidance and directed that banks and Specialized Deposit-Taking Institutions (SDIs) suspended dividends or other distributions in response to the capital and liquidity reliefs. This was intended to provide additional liquidity and capital headroom for the financial institutions to continue to offer support to the real economy through the shock.

5. The Effects of the BoG's Monetary Policy on Ghana's Economy and Financial Markets

When the pandemic hit around the globe, the IMF in its April 2020 World Economic Outlook Report indicates that emerging market economies would not only see their real economic activities collapse but also face wider spreads due to heightened risk aversion and substantial portfolio outflows. Thus, in the context of exceptionally difficult circumstances, the utility of the BoG's approach to policy can be measured in outcomes – by the evolution of sovereign spread, maintaining banking sector soundness, stability in the capital markets, and key macroeconomic variables like real economic activities and inflation.

5.1. Empirical methods

The literature on monetary policy effects has often employed impulse response analysis to investigate the effects of monetary policy. We followed this approach and estimated a VAR model with the following proxies for macroeconomic and financial indicators, in the spirit of Blot, Bozou and Creel (2021), the Bank of Ghana Composite Index of Economic Activity[6] (real, yearly change), inflation (yearly change in the consumer price index), the capital adequacy ratio (banking sector soundness indicator), the Ghana Stock Exchange Composite Index (annual change), the spread between ten-year public bonds and the 3-month treasury bill. The first indicator is to estimate the real effect of monetary policy and the latter three variables to estimate the impact of monetary policy on financial stability. The monetary policy stance is proxied by the policy rate, reserve requirement ratio, central bank asset (annual growth) and easing of capital buffers.

Our model proceeds with a VAR(p) in its structural form as follows:

$$\mathbb{G}_0 Y_t = \sum_{i=1}^{q} \mathbb{G}_i Y_{t-1} + \varepsilon_t \quad (1)$$

where $\mathbb{G}_0$ captures the instantaneous relationships, Y is a vector of endogenous variables, the coefficient matrix, $\mathbb{G}_i$ captures the lagged relationship between the endogenous variables and ε is a vector of structural shocks. The foregoing VAR(p) in its reduced form is represented as follows:

[6] The Composite Index of Economic Activity (CIEA) tracks short term dynamics in economic activity and signals the status of the real economy. The CIEA is a composite of 10 indices which assesses the developments in the productive sectors of the economy.

$$Y_t = \sum_{i=1}^{q} \mathbb{H}_i Y_{t-1} + \mu_t \quad (2)$$

where $\mathbb{H}_i = \mathbb{G}_0^{-1}\mathbb{G}_i$, $\mu_t = \mathbb{G}_0^{-1}\varepsilon_t$, and μ is a vector of reduced form innovations.

The goal is to identify the structural shocks and evaluate the related dynamic effects. We follow the Cholesky decomposition to identify monetary policy shocks. Cholesky decomposition imposes a recursive structure in the VAR to identify structural shocks. We rely on the standard assumption in the literature and impose a recursive structure on the instantaneous relations between the variables as per the following ordering: y = real economic activity, inflation, monetary policy, sovereign spread, capital adequacy ratio, and equity index[7]. The monetary policy indicators were included in turn. We implement the analysis for p = 2 lags (by the Akaike's information criterion [AIC], the Hannan–Quinn Criterion [HQ] and the final prediction error [FPE]) in the VAR[8]. The VAR(2) satisfies the stability conditions, as no root lies outside the unit circle. But for inflation and real economic activity, the trending properties of the variables (Table A1) reveal the absence of unit roots in the series. Thus, inflation and real economic activity are included in the first difference while the remaining variables are included in levels.

5.2. Data description

The data for the analysis was sourced from the Bank of Ghana and the Ghana Stock Exchange. Data are monthly and go from January 2010 to December 2021. The study variables include the Bank of Ghana Composite Index of Economic Activity (real, yearly change), inflation (yearly change in the consumer price index), the capital adequacy ratio (banking sector soundness indicator), the Ghana Stock Exchange Composite Index (annual change), the spread between ten-year public bonds and the 3-month treasury bill, the monetary policy rate, reserve requirement ratio, central bank asset (annual growth) and easing of capital buffers.

Table 1. Descriptive statistics of study variables.

Variable	Mean	Maximum	Minimum	Std. dev.
Inflation	11.76	19.20	7.50	3.29
Capital Adequacy ratio	18.45	23.89	14.75	1.68
Real Economic Activity (Growth)	7.98	39.40	-10.47	7.19
Reserve Requirement Ratio	9.41	11.00	8.00	0.79
Spread	3.12	8.72	-5.02	2.89
Equity Returns	3.46	93.93	-86.85	42.13
Capital Buffers	2.79	3.00	1.50	0.51
Monetary Policy Rate	17.56	26.00	12.50	4.13
Central Bank Assets (Growth)	30.79	82.32	-10.46	19.12

The data (Table 1) shows that inflation averaged 11.76 percent over the study period while real activity expanded on average by about 8 percent. Capital adequacy ratio averaged 18.45 percent over the period 2010 to 2021. Generally, Ghanaian banks have maintained more capital than prudentially required. This may suggest that the banks have mostly leaned towards risk aversion. On the average, reserve ratio was about 9 percent, the monetary policy rate was pegged at about 18 percent and central bank assets expanded by about 31 percent over the study period. Unsurprisingly, equity returns have been the most volatile with a standard deviation of 42.13.

[7] The ordering imposes the typical recursive identifying assumption that changes in monetary policy do not affect macroeconomic variables in the same month (Walsh, 2010).

[8] Implementing the analysis for p=6 lags and p=4 lags, leaves the results unchanged.

5.3. Empirical results

The results of the impulse responses are reported in Figures 7 – 10: Figure 7 presents the responses of macro-financial indicators to policy rate cuts; Figure 8 shows the effects of lowering the reserve requirements on the macroeconomic and the financial environment; Figure 9 presents the impacts of lowering capital buffers and Figure 10 the impacts of balance sheet actions. The estimates confirm that accommodative monetary policy produces a real effect (real economic activity increases), a nominal effect (inflation increases) and a financial stability effect (the spread tends to decrease, banking sector soundness tend to improve, and the equity market upturns). Both inflation and capital adequacy ratio respond rapidly to changes in the monetary stance; however, it takes time for the real economic effects to unfold. Aside from the sovereign spread, all the macroeconomic and financial indicators responded fully to the changes in the monetary stance in under a year. The impact on sovereign spreads takes almost a year to spread out. For the Euro Area, Blot, Bozou and Creel (2021) find that the impact of the ECB's monetary actions on sovereign spread takes almost 2 years to spread out. On the financial side, while monetary policy has a rapid impact on banking sector instability, it fully modifies the indicators of capital markets after 10 months.

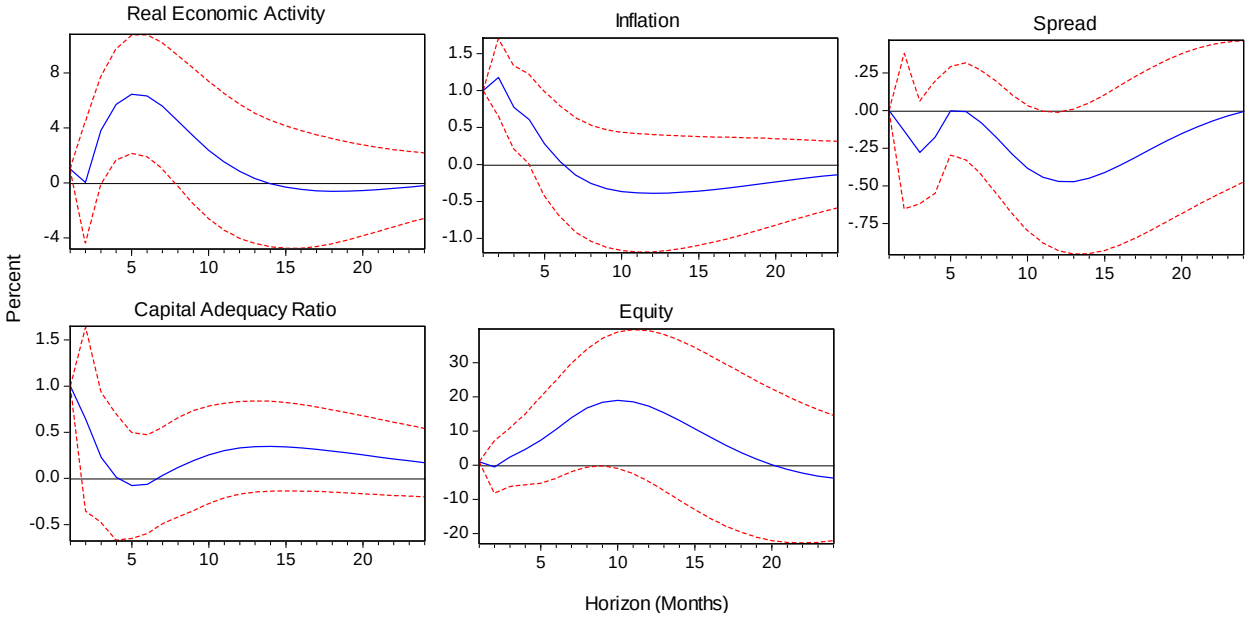


Figure 7. Effects of policy rate cuts.

Notes: Responses to one standard deviation negative shock. These results show the impact of an accommodative monetary policy.

The results suggest that the approach of monetary authorities during crises was not necessarily to rein in price but to reduce dysfunctionality in the financial market. Thus, these actions may cause upward price movements. The sudden jump in the capital adequacy ratio may also reflect the impact of the pandemic on risk-taking in the banking sector. It may suggest that Ghanaian banks tend to hold more capital than is required by regulation and the financial institutions in the country lean toward risk aversion generally.

The measures meant that monetary policy was kept expansionary, improved the financial conditions, and provided support for the real economy. In other words, there was no conflict of interest between safeguarding macroeconomic stability on the one hand and maintaining financial stability on the other. All measures undertaken by the Bank of Ghana have addressed the challenge of financial conditions and economic downturns at the same time, in a complicated interaction. The results confirm preliminary evidence from other countries[9] which suggests

[9] See, for example English, Forbes and Ubide, 2021

that improved financial conditions helped to mitigate the negative impact of the shock on firms' investment and employment decisions and has been relevant in softening the real impact of the crisis.

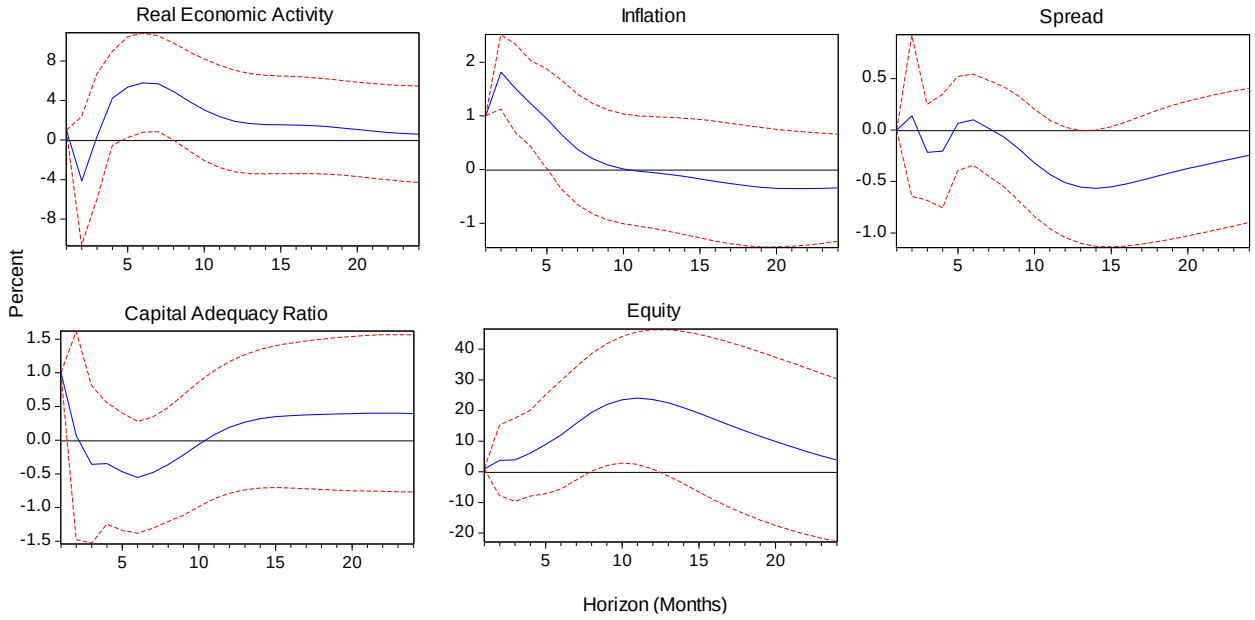


Figure 8. Effects of reduction in the reserve requirement.

Notes: Responses to one standard deviation negative shock. These results show the impact of an accommodative monetary policy.

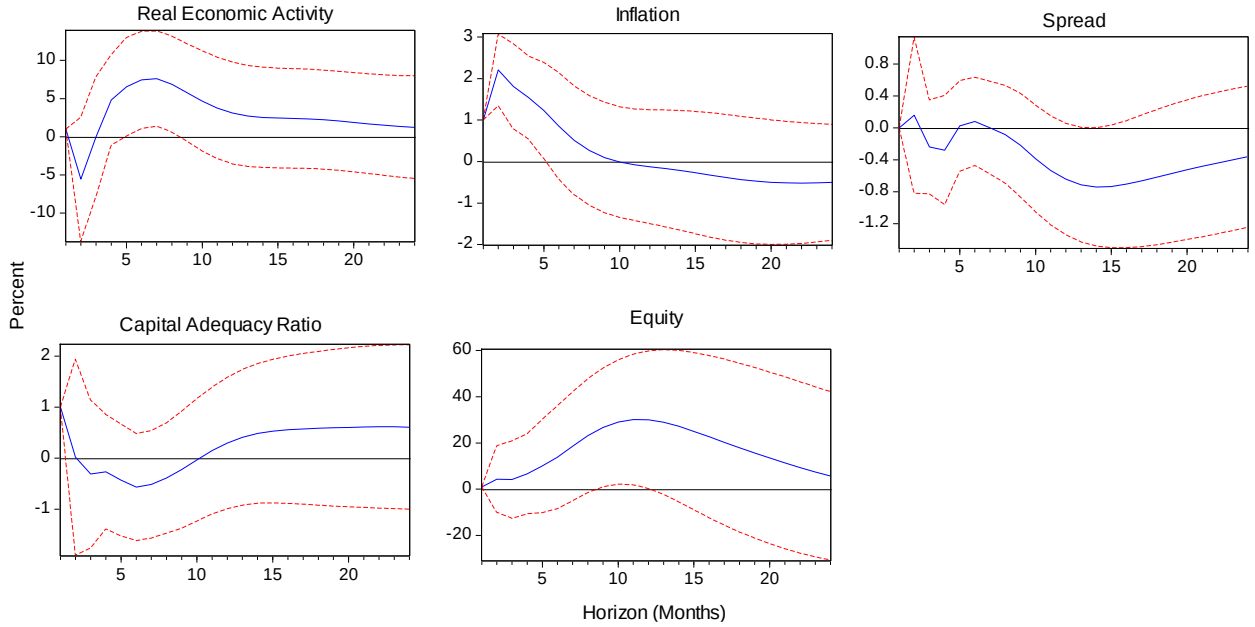


Figure 9. Effects of easing capital buffers.

Notes: Responses to one standard deviation negative shock. These results show the impact of an accommodative monetary policy.

The balance sheet-related measures appeared less effective. There are several reasons for this. First, the capital market in Ghana is relatively small, which naturally limits the size of the balance sheet programme. Second, the risk of fiscal dominance of monetary policy and the associated fiscal challenges may have restricted the smooth

functioning of balance sheet measures. Third, compared with the relevance of the banking sector, only comparatively few large companies use the capital market to finance themselves, rendering the capital market in Ghana to a subordinate role in the transmission of monetary policy. Indeed, Benigno et al. (2020) caution that in emerging markets, the effectiveness of quantitative easing depends on the degree of policy credibility. Quantitative easing under low policy credibility may lead to an undesirable tightening in financial conditions by raising risk premia and inflation expectations.

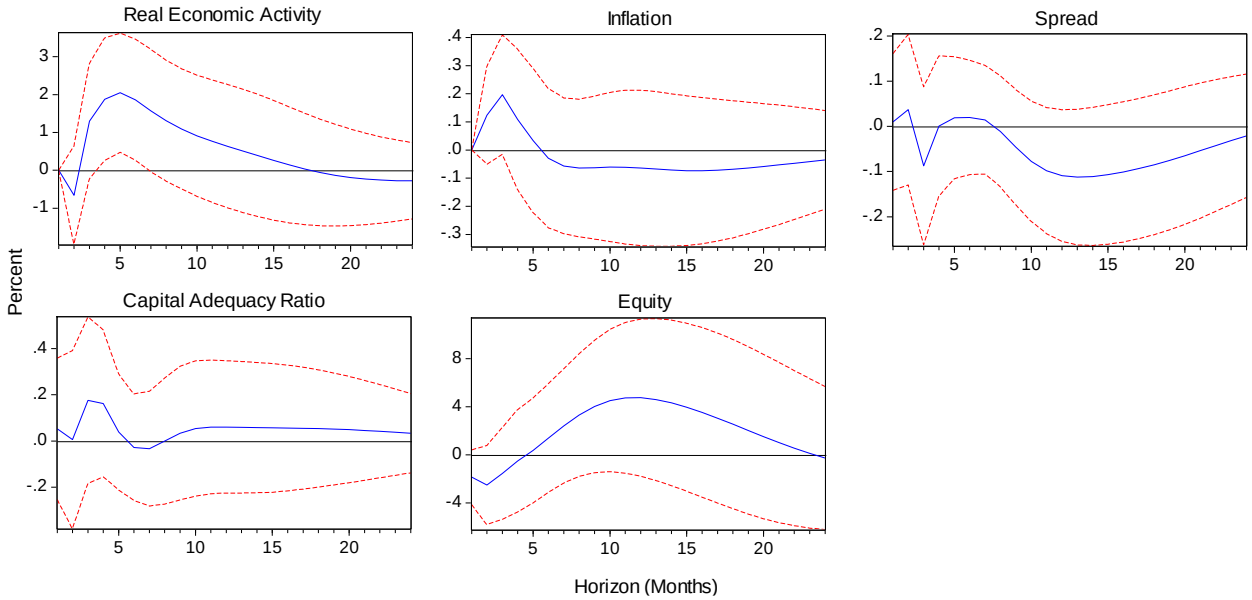


Figure 10. Effects of balance sheet action.

Notes: Responses to one standard deviation positive shock. These results show the impact of an accommodative monetary policy.

The evidence from Ghana suggests that for countries without the zero lower bound restraints, central banks' balance sheet expansions should be kept moderate in the conduct of monetary policy. Thus, while balance sheet expansion can also be effective means of providing monetary accommodation and accommodating additional expansionary fiscal policy, it poses risks to financial stability and can wreak havoc on the economy.

5.4. Generalized impulse responses

We apply the generalized impulse response analysis to test the robustness of the impulse responses under the Cholesky decomposition identification scheme. Pesaran and Shin (1998) indicate that, unlike the traditional impulse response analysis, the generalized impulse response analysis for unrestricted VAR does not require shock orthogonalization and is invariant to the ordering of the variables in the VAR. Figures 11 – 14 (Appendix) show the results of the generalized impulse response analysis.

These identifying assumptions have little impact on the estimated reactions and, therefore, the impulse responses of the economic and financial variables parallel qualitatively the findings from the baseline analysis. The impulse responses confirm that accommodative monetary policy produces a financial stability effect as well as increases in real economic activity and prices.

5.5. The historical significance of monetary policy shocks

Are there significant time variations in the economy's response to monetary policy actions? We explore the

historical perspectives of the foregoing results and examine the role of monetary policy in economic and financial fluctuations over the pandemic periods. Figures 15 -18 plot the time path of the structural shocks implied by the model. The historical decompositions support the results from the impulse responses, highlighting that, structural shocks to monetary policy considerably explain the historical fluctuations in the macroeconomic and financial data of Ghana. This suggests that central bank's balance sheet expansion, changes in monetary policy rates and reserve requirements and macro-prudential policies have significant roles in chartering the path of the macro-financial indicators.

It appears the historically observed relationship between monetary policy rates and macro-financial variables has not been affected by the pandemic. However, we detect significant time variation in the structural relationship between macro-financial indicators and monetary policy that is applied via changes in the reserve requirement, macroprudential policies and balance sheet actions. The key structural macroeconomic relationships have not remained unchanged in the face of the dramatic economic contraction associated with the pandemic. The joint behaviour of the macro-financial environment and the central bank's balance sheet actions, changes in reserve requirements and macro prudential policies have become more pronounced during the pandemic era. Thus, it cannot be ruled out that the pandemic might have led to structural changes in the economy due to its severity.

The historical decompositions suggest that the propagation of the monetary policy shocks is extremely relevant during the pandemic episodes. The historical decomposition of the data shows that monetary policy shocks historically have made comparatively the biggest contributions to the targeted macro-financial aggregates during the pandemic. Thus, the signs show that the expansion of the BoG's balance sheet and the easing of reserve requirements and capital buffers have maintained financial stability and kept the economic activities from plummeting to levels that would probably have prevailed in the absence of such monetary policy actions and have likely averted a deflationary spiral for the Ghanaian economy. These signs indicate the effectiveness of policy intervention in warding off disastrous macroeconomic consequences in times of crisis. Arguably, the post-pandemic economic revival may have been driven mainly by the sustained accommodative monetary policy stance.

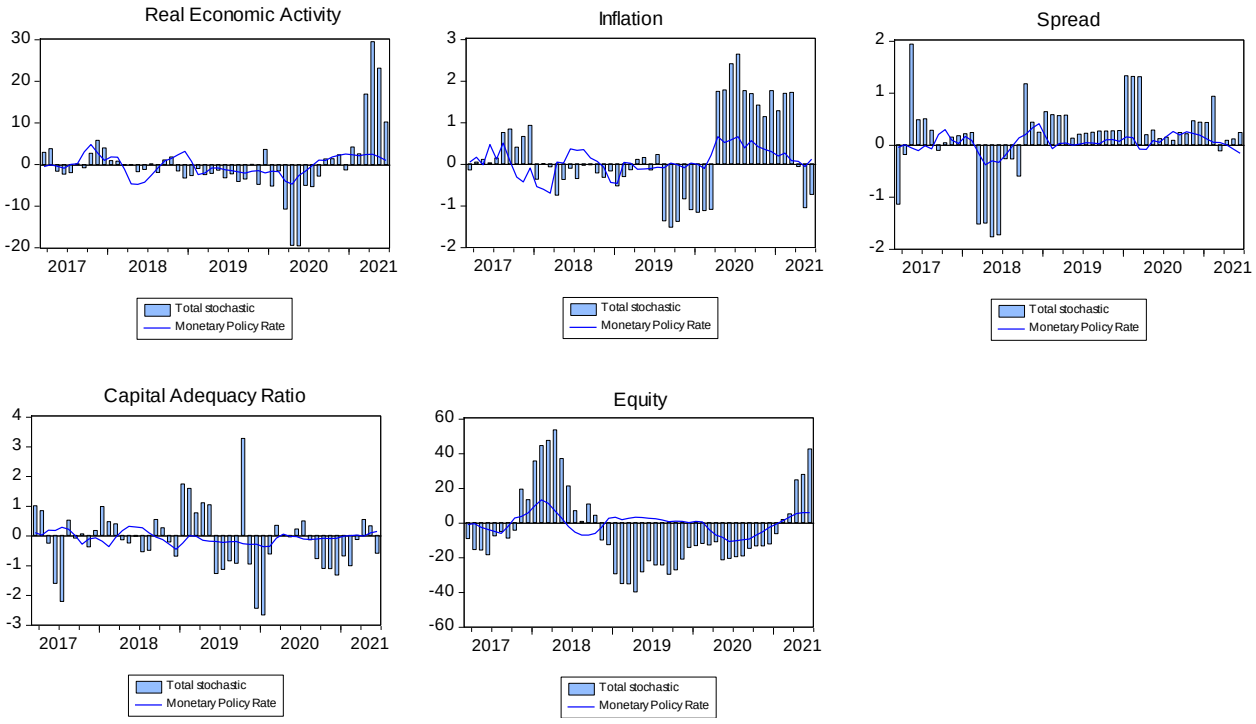


Figure 15. Historical decomposition: Macro-financial indicators and monetary policy rate.

Figure 16. Historical decompositions: Macro-financial indicators and reserve requirements.

5.6. Variance decompositions

To assess the relative importance of the identified monetary policy shocks, we list for different horizons, *h*, the forecast error variance decomposition of real economic activity, inflation, spread, capital adequacy ratio, and equity returns in Table 2. According to our estimates, evidently, changes in the monetary policy rates are the dominant source for real economic activity in Ghana. After one year, about 25% of the variation in real activities can be attributed to the surprised changes to the monetary policy rate. Changes in central bank assets explain 12% of the variation in the real activity variable after one year and about 10% after 3 years. Surprise changes in the reserve requirement ratio and capital buffers explain about 10% of the variance in real activity after 3 years.

Among the gamut of monetary policy tools, monetary policy rate contributes the least to the variance in inflation. Thus, monetary expansion implemented via monetary policy rates would most likely stimulate the economy the most but generate the least inflation. This evidence may suggest that signals of policy intentions have been better projected through monetary policy rate. After 3 years, macroprudential policies explain about 31% of the variation in inflation while changes in the Central Bank assets explain about 24% of the inflation variance. Although monetary policy shocks are not important to spread, capital adequacy and equity at short horizons, they become more important as *h* increases. After 3 years, monetary policy shocks explain a fraction of 16% (monetary policy rates), 3% (macroprudential policies) and 1% (central bank assets) of the variance in spread. After 3 years, about 3% and 7% of the variations in capital adequacy are contributed by changes in macroprudential policies and central bank assets respectively. In contrast, changes in monetary policy rates are not an important source for the determination of capital adequacy. Monetary aggregates are the most important for the variation in the stock market. Central bank assets' contributions to the equity variance reached 20% after 1 year and 19% after 3 years. This may reflect the importance of the portfolio channel to the transmission of unconventional monetary policy.

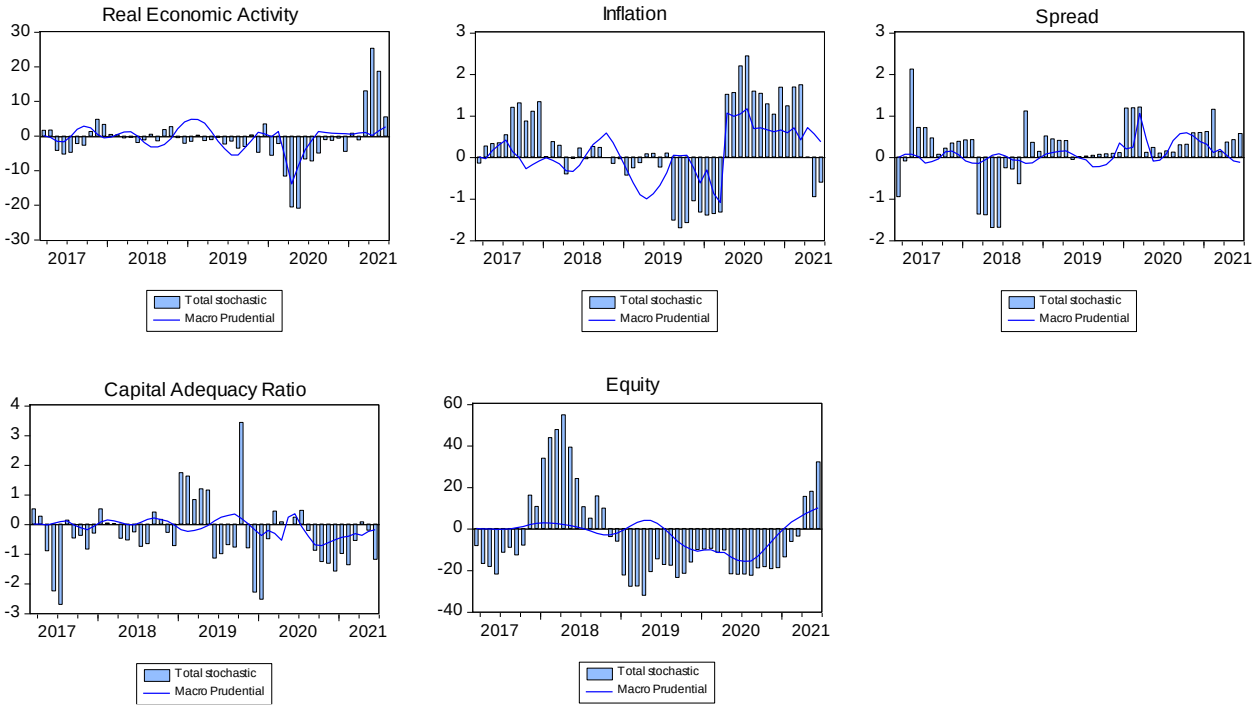


Figure 17. Historical decompositions: Macro-financial indicators and macroprudential policy.

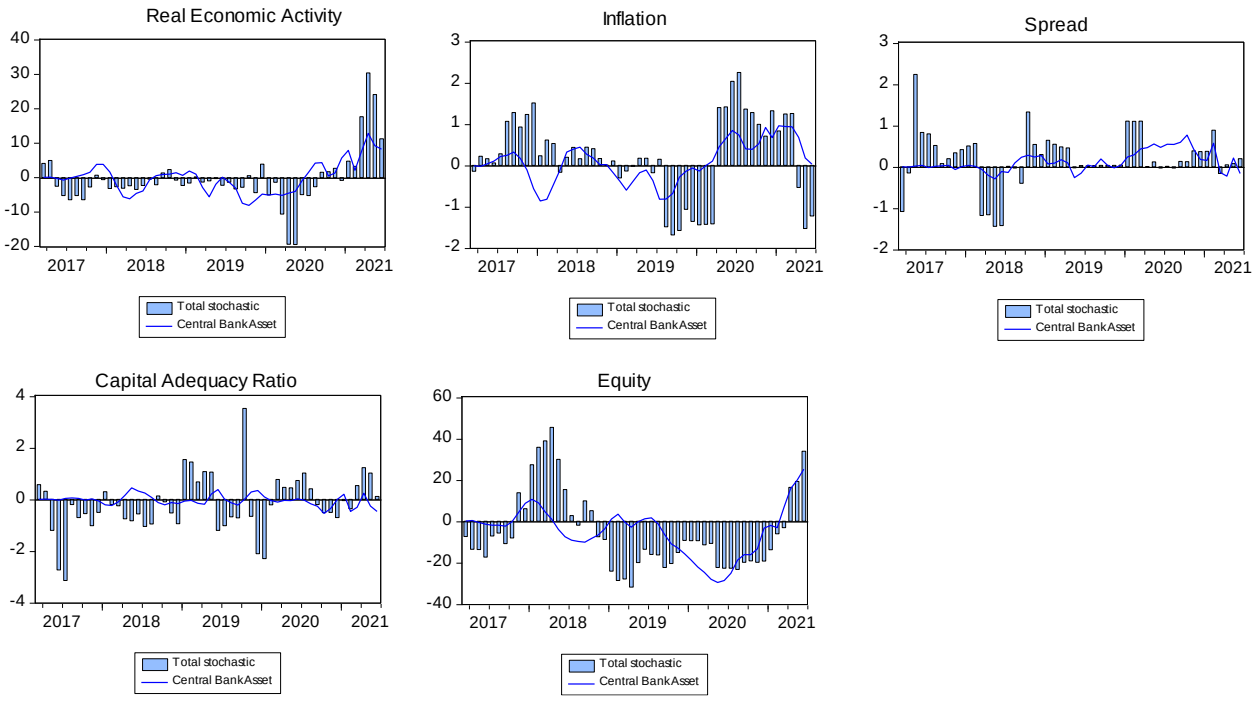


Figure 18. Historical decompositions: Macro-financial indicators and balance sheet actions.

The analysis proves that monetary policy tools, other than the management of short-term policy interest rates, can achieve the same desired policy outcomes. It becomes clear that, in times of crisis, central banks should deploy both standard and non-standard tools to surmount the multiplicity of challenges even if there is no zero lower bound constraint.

Specifically, the findings of this paper provide a compelling case for BoG to act as a market stabiliser in the specific circumstances of crisis. It was clear that conventional policy measures and macroprudential policies

achieved a considerable level of success as flight-to-safety measures. It is obvious that to reduce the mounting stress in core funding markets in times of crisis, adjustments in the policy rate will need to be supported by other monetary designs. The central banks' efforts to stabilise the financial markets underscore the realisation that monetary policy objectives would be more difficult to achieve without properly functioning markets.

It is worth noting that, in the conduct of monetary policy during crises, an important challenge for monetary authorities is to provide the right magnitude of support. Too little support might not address the liquidity and credit stress and offer little or no impetus to the recovery of the economy. Too much support, on the other hand, could pose a further risk of debt unsustainability, excessive risk-taking, and future financial vulnerabilities.

Table 2. Forecast error variance decomposition in terms of monetary policy shocks (%).

Horizon (Months)	Monetary Policy Rate	Reserve Requirement	Macro prudential	Central Bank Assets
Real economic activity				
1	1.86	5.11	5.11	1.35
6	13.92	2.24	2.25	7.31
12	24.77	3.82	3.82	11.54
24	18.59	6.43	6.42	9.84
36	17.91	10.20	10.20	10.43
Inflation				
1	0.28	1.08	1.08	7.66
6	1.58	11.39	11.39	21.74
12	3.15	16.40	16.40	18.82
24	8.34	25.85	25.86	24.20
36	8.33	30.51	30.50	24.00
Spread				
1	0.00	0.00	0.00	0.00
6	12.18	6.10	6.10	0.44
12	12.80	5.04	5.05	1.06
24	16.04	3.52	3.52	1.34
36	16.44	2.74	2.74	1.33
Capital adequacy ratio				
1	0.00	0.00	0.00	0.00
6	0.78	6.96	6.96	7.41
12	0.62	6.89	6.88	6.54
24	0.60	4.64	4.64	6.69
36	0.59	3.47	3.47	6.66
Equity				
1	0.00	0.00	0.00	0.00
6	5.22	0.27	0.27	9.61
12	7.00	1.73	1.74	20.05
24	8.18	4.13	4.12	19.13
36	8.00	4.53	4.53	19.43

6. Conclusion

As in many other countries, the COVID-19 pandemic and its related containment measures led to a significant economic downturn and worsened financial conditions in Ghana. The pandemic shock presented a unique challenge to monetary authorities in ensuring market functionality and supporting real economic growth. To address these challenges, the Bank of Ghana (BoG) implemented several measures, including cutting policy rates, reducing reserve requirements, providing central bank liquidity, and offering regulatory relief, to foster favorable financing conditions for firms and the public sector. This paper assesses the macroeconomic conditions during the pandemic

and evaluates the effectiveness of the policy measures implemented by the BoG in response to the pandemic.

The results of our analysis demonstrate that the coordinated policy response was successful. The monetary policy measures implemented had both nominal and real economic effects, with the overall macroeconomic and financial impact being in line with expected outcomes. Following the monetary easing, financial markets stabilized quickly, with credit spreads narrowing, the banking sector's soundness improving, equity prices rebounding, and financial market tensions easing. These findings suggest that the robust policy response provided crucial support for the survival and recovery of the real economy. Interestingly, our research suggests that balance sheet-related measures may be less effective and should be kept moderate for countries with similar macroeconomic characteristics and structures as Ghana, particularly those not facing the zero lower bound constraints. Nonetheless, the findings of our study highlight the critical role of monetary policy in improving financial conditions and supporting effective demand.

While significant uncertainties persist, the economic outlook has improved, albeit marginally. Economic activity is expected to recover sharply in the coming years as the impact of the pandemic subsides, thanks in part to the continued policy support of the Bank of Ghana. However, there remain significant risks, including increased fiscal deterioration, heightened uncertainty surrounding debt sustainability and macro-financial risk, and persistent inflation pressures due to negative supply-side effects and strong demand supported by large fiscal stimulus. These challenges may hinder the recovery process and pose a threat to the effectiveness of monetary policy. Additionally, the substantial loss in central bank international reserves may lead to heightened risk aversion and the possibility of a balance of payments problem. As is the case with many peripheral countries, the pressure of depreciating currency and its potential drag on the economy and the credibility of the monetary and inflation targeting frameworks is an obvious limit to continuous policy accommodation.

Our analysis yields important policy implications and critical lessons for the conduct of monetary policy. The findings indicate that policy rates explain the most variability in real activity while generating the least inflation, suggesting that policymakers should maintain moderate monetary aggregates and strengthen cross-cyclical measures. Furthermore, central banks should adopt a more market-friendly design with enhanced transparency and predictability to improve policy transmission through the portfolio channel. A well-functioning market mechanism is also crucial for increasing policy transmission efficiency. Proper monetary and fiscal coordination is needed during crises, with policies loosened where there is policy space and consolidated where required, to provide clarity and support the recovery process. It is also crucial to establish a clear demarcation between fiscal and monetary policy to preserve central bank credibility and independence. Finally, pursuing a credible public finances trajectory is essential to ensure that monetary policy remains accommodative throughout the recovery process and facilitates growth normalization.

The empirical results presented in this study suggest several avenues for future research. In response to the Covid-19 pandemic, monetary authorities utilized a range of tools in a multidimensional strategy to address overlapping challenges. As such, it is essential to investigate whether an optimal mix of policy tools exists and whether any policy trade-offs between long-term dynamism and short-term stability exist, conditioned on the pandemic shock. Evaluating these issues could enhance our understanding of the effectiveness of monetary policy during crises and contribute to the development of a more comprehensive policy framework.

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Declaration of Competing Interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Appendix

Table A1. Unit root tests.

Variables	Augmented Dickey-Fuller (ADF)		Phillips-Perron (PP)	
	Level	First difference	Level	First difference
Real economic activity	-1.38	-5.23***	-1.26	-6.95***
Inflation	-1.32	-3.10**	-1.45	-7.15***
Sovereign spread	-4.14***	-8.72***	4.09**	-9.13***
Equity	-1.94*	-2.88**	-1.22	-5.15***
Capital adequacy ratio	-3.87**	-8.13***	-3.80**	-19.56***
Policy rate	-4.20***	-3.98***	-4.04***	-7.22***
Reserve requirement	-1.05*	-7.21***	-1.06	-7.14***
Capital buffer	-1.14*	-7.14***	-1.13*	-7.14***
Central bank asset	-0.97*	-6.59***	-0.95	8.49***

*Note: *, ** and *** indicate significance at the 10%, 5%, 1% level respectively.*

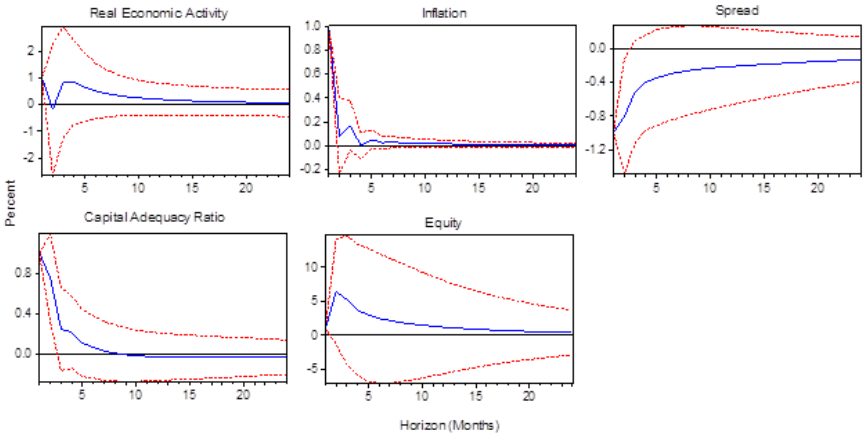

Figure A1. Effects of policy rate cuts (Generalized impulse responses).

Notes: Responses to one standard deviation negative shock. These results show the impact of an accommodative monetary policy.

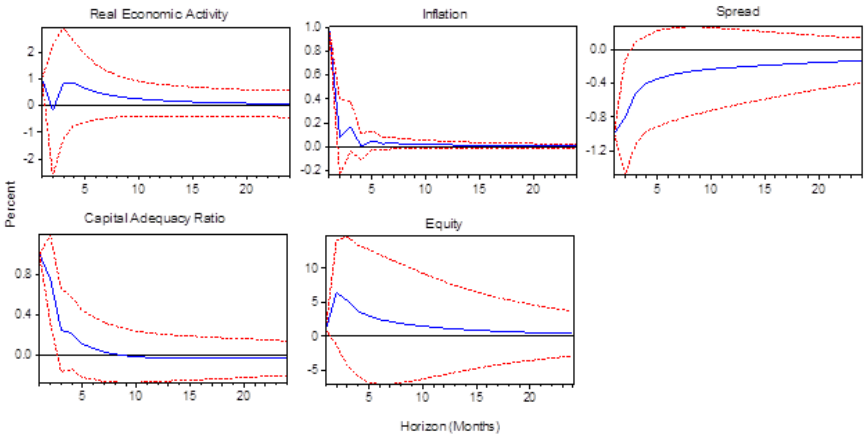

Figure A2. Effects of reduction in reserve requirement (Generalized impulse responses).

Notes: Responses to one standard deviation negative shock. These results show the impact of an accommodative monetary policy.

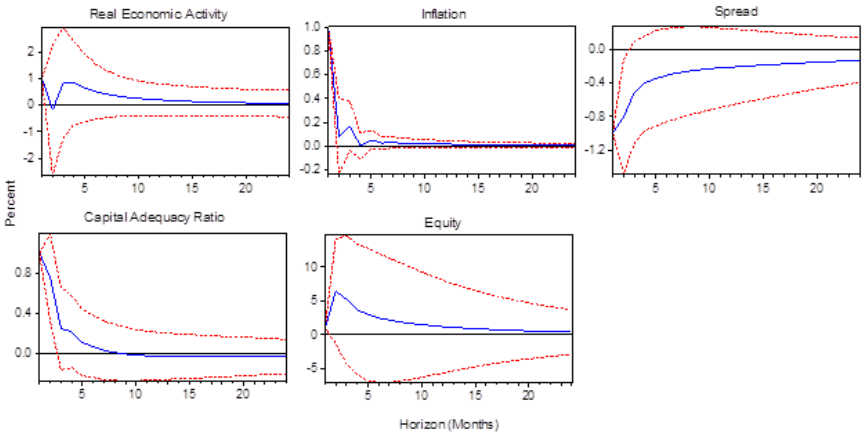

Figure A3. Effects of easing capital buffers (Generalized impulse responses).

Notes: Responses to one standard deviation negative shock. These results show the impact of an accommodative monetary policy.

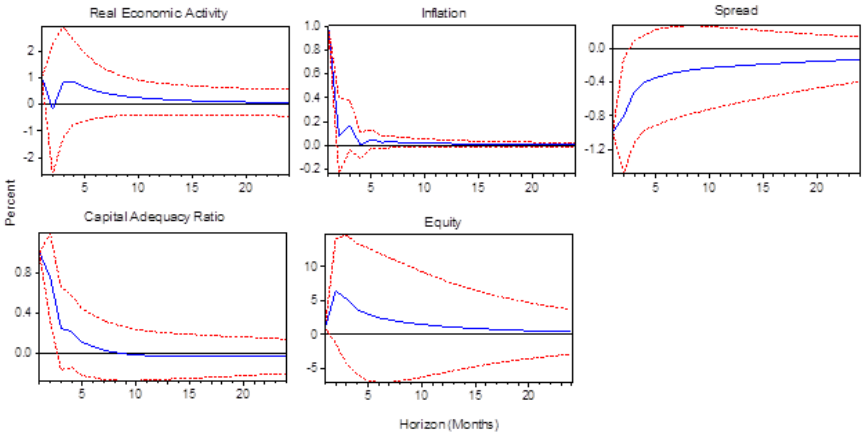

Figure A4. Effects of balance sheet action (Generalized impulse responses).

Notes: Responses to one standard deviation positive shock. These results show the impact of an accommodative monetary

policy.

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