



A Study on the Impact of Money Supply Growth and Government Debt Increase on the Economic Performance in the Euro-Area

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Abstract

The severe economic and financial challenges of the COVID-19 pandemic have become increasingly noticeable since March 2020. The European Central Bank has attempted to intervene swiftly and effectively in response to these challenges and has carried out some facilities, including providing additional bank liquidity measures, promoting collateral easing initiatives, and large supplementary acquisitions of government and private sector assets. As a result, we witness an expansion in the balance sheet of the European Central Bank. The objective of this paper is to analyze the impact of money supply (M3) growth and government debt to GDP ratio on the real economy between 2000:Q1 and 2020:Q3. In the analysis, we employ Autoregressive Distributed Lag (ARDL) bounds test is developed by Pesaran et al. (2001). The findings from the ARDL bounds test support the evidence of the impact of money supply (M3) growth and government debt increase on inflation.

Keywords: Economic Growth, COVID-19, Money Supply, Inflation

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Para Arzı ve Kamu Borcundaki Artışın Euro Bölgesi Ekonomik Performansına Etkisinin Analizi

Özet

COVID-19 salgını Mart 2020'den bu yana tüm dünyada yıkıcı ekonomik ve finansal sonuçları beraberinde getirmiştir. Diğer merkez bankaları gibi, Avrupa Merkez Bankası da, bu sonuçların etkisini hafifletebilmek adına, likiditenin artırılması, teminatların gevşetilmesi, kamu ve özel sektör tahvillerinin alınması gibi önlemleri içeren bir dizi aksiyon almıştır. Sonuç olarak, Avrupa Merkez Bankası'nın bilançosunda belirgin bir genişleme yaşanmıştır. Bu çalışmanın amacı, 2000:Ç1 ve 2020:Ç3 döneminde, para arzındaki (M3) ve kamu borcundaki artışın reel ekonomi üzerindeki etkisini araştırmaktır. Analizde, Pesaran ve diğ. (2001) tarafından geliştirilen ARDL Sınır Testi Yaklaşımı kullanılmıştır. Analiz sonuçları, para arzındaki (M3) ve kamu borcundaki artışın enflasyon üzerinde etkiye sahip olduğunu göstermiştir.

Anahtar kelimeler: Ekonomik Büyüme, COVID-19, Para Arzı, Enflasyon

Introduction

The European Central Bank (ECB) has responded to the COVID-19 recession by rapidly supporting banks and injecting the Euro-Area with liquidity contrary to its poor reaction to the 2008-09 global financial crisis. However, the recession has made the fiscal imbalances worse, particularly in the countries like Italy and Spain. In the second quarter of 2020, the GDP declined by 12.1 percent. The recovery is expected to rely on effective management of the COVID-19 crisis, while the economic policy, in particular, the degree of monetary and fiscal stimulus, is of critical importance (International Institute for Strategic Studies, 2020). We see that the outbreak of the COVID-19 pandemic and subsequent steps during the first half of 2020 not only led to the closure of several activities in economies but also adversely impacted the banking sector in these countries. Even though banks entered the crisis at higher capital and liquidity levels compared to the 2008-09 global financial crisis period, their resilience has been tested by the sharp tightening observed in financial markets, the increasing funding burdens, and substantial re-pricing of risky assets. Such developments and the growing risk for more detrimental scenarios contributed to extraordinary policy actions. A variety of new monetary and prudential facilities have been established with the policy reaction to the COVID-19 crisis in several countries. In the Euro-Area, the ECB's response involved the readjustment of the targeted longer-term refinancing operations (TLTROs) and the easing of capital requirements by the national macroprudential authorities and centralized micro prudential authority (Baldwin and Weder di Mauro 2020; Acharya and Steffen 2020; Altavilla et al., 2020).

In this study, we attempt to give brief information about the monetary policy response of the European Central Bank since the beginning of the COVID-19 pandemic. We also try to test the impact of the policy response of ECB on the real economy by using the variables as money supply (M3) growth, government debt to GDP ratio, industrial production index, economic growth, inflation, and unemployment level. Our research contributes to academic literature in several ways. First, there are very few studies focusing on the impact of the ECB's response against adverse impacts of the COVID-19 pandemic on the real economy. Secondly, in the empirical analysis, we employ the bootstrap ARDL bounds test to examine the existence of level-relationship using the quarterly data from 2000:Q1 through 2020:Q3. Since the bootstrap ARDL bounds test is powerful even in small samples and allows to investigate the relationship between the variables when the regressors mixed of I(0) and I(1), we prefer to use this test in this research.

The study has the following structure: After mentioning the central bank policy instruments such as quantitative easing since the start of the COVID-19 in Section 1, we will proceed with reviewing the policy response of the ECB in Section 2. Section 3 briefly addresses the academic literature, and Section 4 outlines the empirical methodology. Finally, the last section concludes by giving some policy implications.

The Central Bank Instrument Combination Against COVID-19

Although the COVID-19 shock is mainly a real shock, its impact on financial markets also was significant. When the COVID-19 extends from a Chinese economic epidemic to a global pandemic, equities have plummeted, and financial uncertainty has increased worldwide. At the beginning of February, the major stock markets worldwide have reacted, as it is clear that the outbreak has been spilled over. With cases reported particularly in Italy, Iran, South Korea, and Latin America, the local benchmark indices responded more strongly. The shifts of the stock market represent the most badly hit industries such as travel and leisure or food and catering (CEIC, 2020). In the United States, for instance, recent levels of volatility rival or exceed the levels seen in October 1987 and December 2008 and, before, at the end of 1929 and the early 1930s (Baker et al., 2020). In the U.S, the stock market index has fallen by 30 percent in a few weeks. Figure 1 shows that the CBOE volatility index (VIX) has risen to levels comparable with those during the 2008-2009 Global Financial Crisis. Other indicators signaling financial volatility, such as high yield spreads and investment grades, have shown similar adverse trends. The Federal Reserve had to allocate nearly 20 percent of U.S GDP in financing a wide variety of lending and market supporting facilities in order to avoid the free fall (Federal Reserve, 2020).

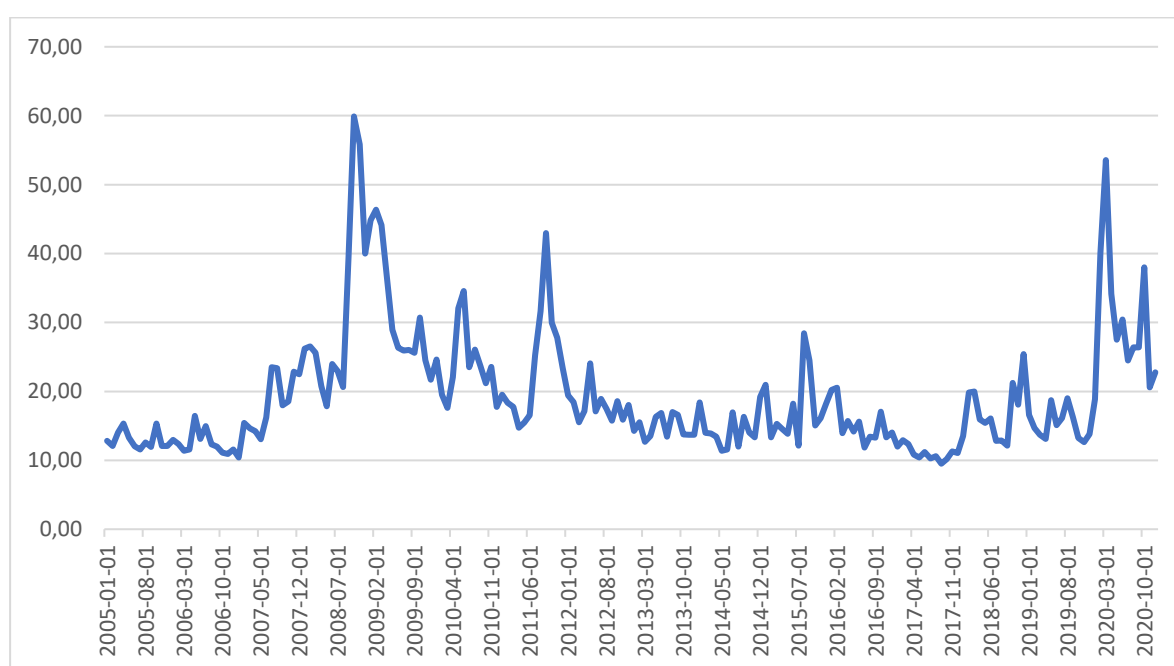


Fig.1: CBOE Volatility Index (VIX)

Source: Federal Reserve Bank of St. Louis (2020).

Until now, many central banks implemented expansionary monetary policies to boost the slowing economies as a result of the pandemic. Policy rate cuts, in other words, interest rate reductions, have been a commonly used tool by central banks. The idea behind interest rate cuts is quite simple; that is, if a central bank pushes downward on short-term interest rates, which reduces the overall borrowing costs, it stimulates corporate spending and consumer expenditure preferably. When short-term rates are almost close to zero, further reductions might have little to no effect. This is why central banks have relied on asset purchase schemes, which is called quantitative easing, to pressure downward on long-term interest rates. That strategy has been a pillar of the Federal Reserve's response against COVID-19, in which newly generated currency purchases hundreds of billions of dollars of assets such as government bonds (Lu, 2020).

Caballero and Simsek (2020) emphasize that conventional monetary policy might reduce the downward pressure if the interest rate is unconstrained. If so, massive asset purchases by government facilities in the context of quantitative easing (QE) are necessary to avoid a downward spiral. The QE, which is used as a last resort by central banks when there are no other tools to restore the economy, was used by FED as a monetary tool during the 2008-09 Global Financial Crisis and by ECB 2010-2014 Euro-Area Debt Crisis. Firstly, QE promotes economic growth, supports businesses in recession, enhances consumer confidence, and makes imports more costly as a re-

sult of the decrease in the currency value owing to the increased money supply (Reddy, 2020). Central banks typically use the QE when other monetary policy tools, including interest rate decreases, are not efficient or sufficient, as mentioned above. In response to the severe economic downturn arising from the COVID-19 pandemic, several central banks, including the FED, the ECB, the BOJ, and other major central banks, are engaged in unprecedented programs for quantitative easing. These programs include major acquisitions of assets, namely central banks purchasing financial instruments like government and corporate bonds. The aim is to supply liquidity on money and capital markets and to promote economic activity. As of April, the U.S Federal Reserve and the other central banks in G7 purchased assets massively. Large-scale acquisitions are expected to extend to the following period depending on the severity of the economic crisis. In view of the current financial crisis, monetary authorities are planning to purchase more and more assets than ever. The Federal Reserve acquires corporate bonds of certain companies for the first time, including bonds that have recently fallen below investment grade (Martinez-Diaz and Christianson, 2020).

How European Central Bank React to the COVID-19 Pandemic?

With the emergence and growing spread of the COVID-19 pandemic, the Euro-Area has been placed under a health emergency that poses serious challenges to the economy and the financial system of the eurozone as well as to the transmission of single monetary policy in addition to the humanitarian crisis (ECB, 2020). The significant economic and financial consequences of the COVID-19 pandemic have become increasingly evident since March 2020. As the pandemic grew, investors readjusted their portfolios, pushing liquidity to crowd out and rising demand for more stable assets in many financial markets. In conjunction with a rise in market-based borrowing costs for companies, the sharp downturn in stock and bond market indices led to a substantial tightening of financial terms in the period from February to April 2020. In this atmosphere, financial markets witnessed a significant risk of adverse liquidity spirals, and excessive asset price changes in several markets could jeopardize financial stability and prevent monetary policy transmission. The monetary policy response of the ECB has centered on main issues as market stabilization, monetary policy safeguarding, providing sufficient central bank liquidity to promote credit provision to the real economy, and assuring that the general stance is effectively accommodative (ECB, 2020b). ECB implemented asset purchases, lending programs, swap-repo lines and taken supervisory measures (ECB, 2020c). Figure 2 shows the extensive package of crisis measures taken by the ECB over the March-August period.

	Asset Purchases	Lending Programs	Swap/Repo Lines	Supervisory Measures
March 2020	Asset Purchase Program (APP) was extended by 120 bn EUR in 2020. Pandemic emergency Purchase Program (PEPP) was launched.	Conditions for Targeted Lending Program (TLTRO-III) was eased. Additional longer-term refinancing operations (LTROs) were launched-facilitating switch into TLTRO-III	EUR Swap Lines were activated with additional central banks. USD Dolar Swap Lines were reactivated with Federal Reserve and other major central banks.	Temporary capital, liquidity and operational assistance: easing use of capital and liquidity buffers, proactive prudential treatment of loans backed by government support measures and prevention of procyclicality in accounting, recommendation against dividend payments.
April 2020		Further easing of TLTRO-III conditions, depending on lending performance. Pandemic Emergency Longer-Term Operations (PELTROs) were introduced. Temporary easing of collateral requirements.	EUR Swap Lines were set up with additional central banks.	Temporary reduction in capital requirements for market risk.
June 2020	PEPP was extended by 600 bn EUR to 1,350 bn EUR.		EUREP Repo Facility to supply Euro liquidity to non-Area central banks and EUR Repo Line was set up with additional central banks. Frequency of 7 day USD operations was reduced.	
July and August 2020			EUR repo lines were set up with additional central banks. Frequency of 7 day USD operations was reduced again.	Clarification of capital/liquidity buffers restructuring and supervisory requirements on addressing debtor stress.

Fig. 2: The Crisis Measures of the European Central Bank: March-August Period

Source: ECB (2020b, 2020c).

When reviewed the interest rate policy implemented by the ECB, we see the key interest rates have been left unchanged in March, April, June, July, and September 2020. Accordingly, the main refinancing operation rate, the marginal lending facility, and the deposit facility are 0 percent (since March 2016), 0,25 percent (since March 2016), and -0,50 percent (since September 2019), respectively. Although the ECB has not adjusted the key short-term interest rates like the Federal Reserve and the Bank of England, by adapting its longer-term refinancing operations, it has greatly reduced the long-term funding costs. In this context, in March 2020, the ECB has launched a significant monetary stimulus through asset acquisition schemes. The approved additional net purchases under the new pandemic emergency purchase program (PEPP) and the increased asset purchase program (APP) amount to 7.3 percent of Euro-Area GDP (European Parliament, 2020). Figure 3 shows net purchases of the Euro system.

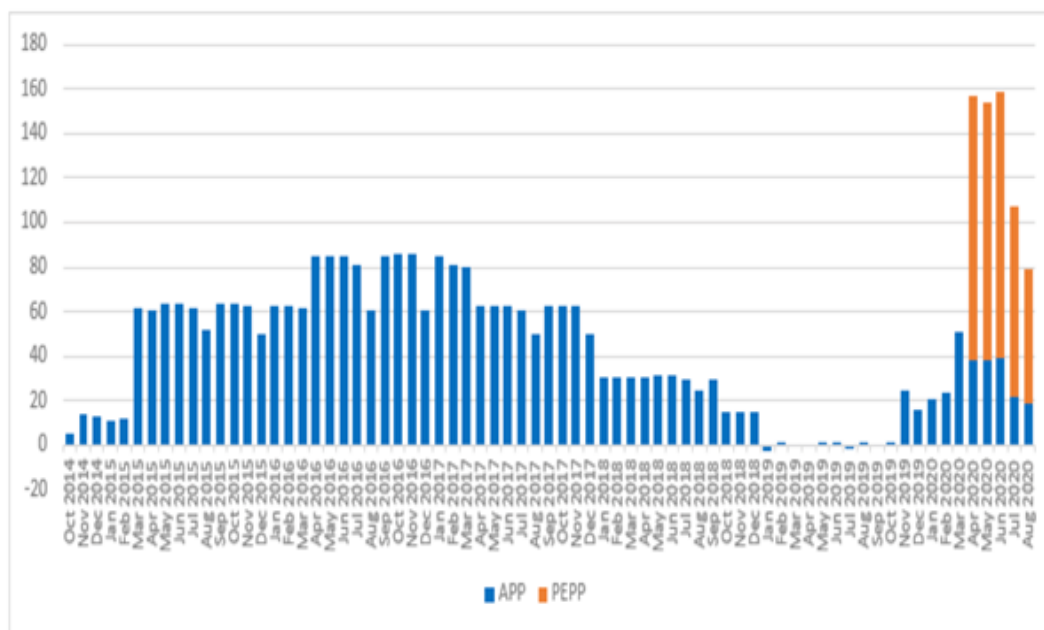


Fig. 3: Euro-system Net Asset Purchases by Month (EUR billion)

Source: EU (2020). Available from:

[https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/648787/IPOL_BRI\(2020\)648787_EN.pdf?cv=1](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/648787/IPOL_BRI(2020)648787_EN.pdf?cv=1)

Access date: 19.10.2020.

The European Central Bank, which has agreed to act quickly and decisively in response to these challenges, has carried out some activities, including providing additional bank liquidity measures (targeted or non-targeted), promoting collateral easing initiatives, and large supplementary acquisitions of government and private sector assets under the APP and the PEPP (ECB, 2020a). In order to address the serious risks to the monetary policy transmission process and outlook for the Eurozone posed by the growing spread of the COVID-19, the ECB has agreed to introduce a new temporary APP of the private and public sector securities. Under the PEPP, purchases have been planned to be implemented until the end of 2020 and to include all the asset categories eligible under the APP (ECB, 2020d). The acquisition of private assets has been a major and focused part of the ECB's policy response to the economic uncertainty caused by the health crisis of COVID-19 (ECB, 2020e).

There are three reasons for extending the coverage of non-financial commercial paper under the CSPP. First of all, by easing funding conditions, it increases the transmission of the ECB monetary policy measures to the real economy. Secondly, it promotes liquidity provision through capital markets, which helps firms handle their needs for short-term financing. Thirdly, commercial paper purchases offer further opportunities for companies to provide access to capital markets (ECB, 2020a). The initiatives of the European Central Bank have led to stabilization of specific conditions of funding in the Euro-Area, improvement of market liquidity, and a decline in uncertainty, thus safeguarding the financial conditions required to achieve the price stability objective. In the second quarter of 2020, financial conditions indicate an unprecedentedly sharp and abrupt tightening in prices of equities, bond markets, foreign exchange, and money markets. Therefore, quick and decisive action was required to assure that what began as a health and economic crisis did not become a full-scale financial crisis with self-fulfilling price spirals and fire sales. In this context, the ECB has tried to stabilize the financial markets that was subject to an extraordinary uncertainty and low levels of liquidity (ECB, 2020e).

Literature Review

In just eight months, we see that primary databases have been filled with research papers, reports, reviews, notes, and editorials focusing on the COVID-19 pandemic. On the other hand, there are a few studies focusing on the macroeconomic implications of the pandemic in countries, particularly in the Euro-Area. There is limited data as the macroeconomic variables are published with a lag. Of these studies on the COVID-19 crisis and economic fundamentals, Jinjark et al. (2020), Bonatti et al. (2020), Delatte and Guillaume (2020), Aguilar et al. (2020), Masciandaro (2020), Andries et al. (2020), Ortman and Tripier (2020) analyze the developments in Euro-Area. In attempting to compare the significance of the dominating market conditions and the policy responses to the

COVID-19 in addressing the growth of Eurozone (EZ) sovereign spreads throughout the first half of 2020, Jinjara et al. (2020) concentrate on CDS premiums in Eurozone by employing a multi-stage econometric approach. In this regard, they aim to generalize model-implied changes in the CDS premiums for the period of 2019:07-2020:06 following estimating a multi-factor model for changes in CDS premiums in the pre-pandemic period of 2014:01-2019:07. They conclude that their model is doing well to measure the realization of the sovereign spreads over the remainder of 2019 but falls throughout the pandemic period, which varies dramatically in 2020:03. In the second phase, with an emphasis particular to the 2020 period, they see that the COVID-19 specific threats and related policies are well represented in the deviation experienced in 2020:03.

The COVID-19 pandemic deeply transformed the economic systems, economic procedures, and policymaking frameworks of the Eurozone. Owing to its deteriorating impact on the supply and demand side, much of the conventional thinking in economic policymaking tends to be inadequate. The COVID-19 pandemic has taken the ECB into a trilemma in maintaining the integrity of Euro-Area against major flight into safety phenomenon and self-fulfilling predictions, on the one-part, monetary orthodoxy and fiscal orthodoxy on the others. By illustrating the fundamental effect of COVID-19 on the economic system and by emphasizing the discrepancies between the new policy framework and past ECB programs, Bonatti et al. (2020) introduce the package that the ECB has taken to deal with the pandemic crisis. Furthermore, they address the medium to long-term challenges facing the ECB, which depend on the various post-COVID scenarios relating to economic growth and inflation, given its specific multinational competence.

Although the pandemic has represented the exogenous shock that contributed to the overall increase in the sovereign debt, the sovereign risk premiums in the Euro-Area have been heterogeneous. From this perspective, Delatte and Guillaume (2020) attempt to estimate the causal factors of sovereign bond spread in the Euro-Area in the period of 2020:01-2020:05. Their findings indicate that the resiliency to COVID-19 relies on the initial fiscal condition, the robustness of banks, and the potential for medical care. They also conclude that the ECB statements have become a game-changer during the recession and have a much greater contribution than the asset purchases programs. Moreover, the European Council's cooperation has also led to a reduction in the spread, but the consequence was largely compensated for by financial funding, focused on loans, which tended to increase spreads. Aguilar et al. (2020) intend to study the steps taken by the ECB and evaluate the economic and financial consequences of the major activities in both the Euro-Area and Spain. In this context, after they clearly define the monetary policy situation of the pre-virus Euro-Area, which is represented by low inflation and low-interest rates, they address the numerous steps taken by the ECB after the outbreak of pandemic in March 2020. Eventually, they examine using a range of mathematical methods how the major initiatives introduced during the present pandemic could theoretically influence economically and financially. These instruments imply that these will have positive first-order impacts on the GDP and inflation of the Euro-Area and Spain, considering the complexity of quantifying the resulting magnitude of the financial and economic downturn in the absence of this initiative. Masciandaro (2020) addresses the implementation of linkages between a fiscal backstop of currency transfers and a helicopter monetary strategy which creates losses in the central bank's balance sheet without substantial adjustment in the money base. Firstly, he finds that an optimal helicopter monetary policy could be developed when a central bank operates as a long-sighted policymaker. The characteristics of this strategy can be determined by taking into consideration fiscal risk, public debt costs, and macroeconomic characteristics overall. The policy composition might create distributional consequences if the responsible government consists of career-concerned officials and people are heterogeneous.

Globally, policymakers struggle with the COVID-19 pandemic by a combination of public health, fiscal, macroprudential, monetary, or market-oriented policies. In an event analysis approach, Andries et al. (2020) evaluate the impacts of the pandemic on sovereign CDS spreads throughout Euro-Area. They conclude that larger numbers of cases and deaths dramatically raise market volatility in European government bonds. From a different point of view, Ortmans and Tripier (2020) attempt to assess the response to the release of the COVID-19 case numbers and investigate the development it has taken around the ECB's facilities. They use national capital markets and country and time-specific impacts to assess the impartial influence of COVID-19 on sovereign risk in the Euro-Area. They examine how the ECB's monetary policy announcements have halted the spread of the COVID-19 pandemic in the European sovereign debt markets. Their findings demonstrate that new cases in Euro-Area have a major and enduring impact upon the sovereign bonds, and then this impact disappears with the ECB's press conference, implying that this change is a positive consequence of ECB's announcement.

Data and Econometric Methodology

Data

In our analysis, we use money supply (M3), employment rate (ER), inflation rate (INF), government debt (GD), and economic growth (EG). We try to analyze how the European Central Bank affects the real economy so we use money supply and government debt. Secondly, since we aim to see how money supply has impact on the real economy we utilize some macroeconomic variables as inflation, employment and economic growth.

To investigate the effects of money supply(M3) and government debt (GD) on the real economy (RE), we use the following model:

$$RE_t = \alpha_1 + \alpha_2 M3_t + \alpha_3 GD_t + e_t \quad (1)$$

Where RE_t shows an indicator of real economy. We employ employment rate (ER), inflation rate (INF), and economic growth (EG) as the proxy of the real economy. $M3_t$ is the broad money supply change while GD_t indicates of Government Debt (as a % of GDP). The data for these variables are obtained from the European Central Bank Statistical Data Warehouse, covering the period between 2000:Q1 and 2020:Q3.

ARDL Bootstrap Test

In this study, we employ an augmented version of one of the most popular cointegration tests. ARDL bounds test is developed by Pesaran et al. (2001), and due to its advantages over the existing cointegration tests, numerous practitioners have implemented the method. The ARDL bounds test is found as efficient in even small sample sizes (Narayan, 2005); the pre-condition that all of the regressors must be stationary at the first differences has been relaxed in the ARDL bounds test; to remedy autocorrelation and endogeneity problems, one can augment the test equation with appropriate lag orders (Nkoro and Uko, 2016), lastly, to reflect the specific effects of regressors, different lag orders of regressors are allowed unlike some other cointegration tests, such as Johansen cointegration test (Thao and Hua, 2016).

We employ Eq.1 in the unrestricted error correction form to implement the ARDL bounds test as follows:

$$\begin{aligned} \Delta RE_t = & \beta_1 + \beta_2 RE_{t-1} + \beta_3 M3_{t-1} + \beta_4 GD_{t-1} \\ & + \sum_{i=1}^k \gamma_i \Delta RE_{t-i} + \sum_{i=0}^l \phi_i \Delta M3_{t-i} + \sum_{i=0}^m \theta_i \Delta GD_{t-i} + u_t \end{aligned} \quad (2)$$

where Δ is the first difference operator. We use Akaike information criteria to determine the optimal lag length. To test the existence of a long-run relationship among the variables, the validity of the following hypotheses is investigated:

$$H_{0A} : \beta_2 = 0$$

$$H_{0B} : \beta_2 = \beta_3 = \beta_4 = 0$$

One can test the first hypothesis using t-test statistic (t) while the second using F-test statistic (F_I). However, the decision process of the ARDL bounds test is different from the traditional test. There are mainly two different sets of critical values. First is classified as lower bound (I(0)), second is defined as upper bound (I(1)). If the test statistics are found as higher than the upper critical values, then it is concluded that there is a cointegration relationship among the variables. Else, if the test statistics are lower than the lower bound, one can conclude that there is not any long-run relationship among the variables. The region between two bounds is called the zone of indifference, and if the test statistics are in the zone of indifference, one cannot decide whether there is a long-run relationship or not.

McNown et al. (2018) have improved the ARDL bounds test in two ways. First, they suggest complementing H_{0A} and H_{0B} hypotheses by testing the following hypothesis to reveal the degenerate case:

$$H_{0C} : \beta_3 = \beta_4 = 0$$

This hypothesis can be tested by the F-test (F_2). McNown et al. (2018) also suggest obtaining the critical values via bootstrap simulations to remedy the inconclusive results. To conclude that there is a cointegration among the variables, all of three statistics (t , F_1 , and F_2) must be statistically significant.

Empirical Results

As a first step of the analysis, we test the unit root properties of the variables using augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Table 1 presents the results:

Table 1: The Results of Unit Root Tests

Series	ADF Unit Root Test	PP Unit Root Test
EG	-0.864 (0.794)	-1.361 (0.597)
ER	-2.389 (0.149)	-1.283 (0.634)
GD	-0.062 (0.949)	-0.427 (0.899)
M3	-1.374 (0.591)	-1.822 (0.368)
INF	-1.471 (0.543)	-2.506 (0.118)

Note: The numbers in the parentheses show the p-values.

The results in Table 1 provide evidence that all variables are not stationary at level¹. So, we can apply the bootstrap ARDL bounds test to examine the long-run relationship between the real economic variables and M3, GDEBT. Table 2 contains the results of the bounds test:

Table 2: Results of the Bounds Test

Selected Model: ARDL(4, 1, 3)		Critical Values		
Dependent Variable: EG	Test Statistics	0.9	0.95	0.99
F_1	1.343	3.156	4.040	6.314
T	1.783	-1.576	-1.947	-2.790
F_2	0.237	3.591	4.850	7.839
Selected Model: ARDL(2, 1, 0)		Critical Values		
Dependent Variable: ER	Test Statistics	0.9	0.95	0.99
F_1	1.162	4.251	5.091	6.904
T	-1.238	-2.818	-3.281	-3.865
F_2	0.251	3.300	4.302	6.000
Selected Model: ARDL(3, 1, 0)		Critical Values		
Dependent Variable: INF	Test Statistics	0.9	0.95	0.99
F_1	4.386***	4.191	5.098	6.980
T	-3.356***	-3.067	-3.411	-4.142
F_2	4.604***	4.524	5.598	8.957

Note: *** shows the significance at the 10% level. We run 2000 simulations to obtain bootstrap critical values.

¹ Results of the tests for the difference data confirm that all variables become stationary at the first difference.

The findings from the ARDL bounds test, support the evidence of the existence of a long-run relationship for the $INF = f(M3, GD)$ equation since all test statistics are higher than the bootstrap critical values, so we estimate the long-run and short-run coefficients and tabulate the results in Table 3:

Table 3: Short-run and Long-run Coefficients

Variables	Coefficients	p-values
Short-run coefficients		
D(INF _{t-1})	0.290*	0.006
D(INF _{t-1})	0.181	0.101
D(GD)	-0.101*	0.001
ECT	-0.252*	0.000
Long-run coefficients		
M3	-0.120	0.151
GDEBT	-0.073*	0.002
Constant	8.228*	0.000

Note: * shows the significance at the 1% level.

The error correction term (ECT) is found as negative and significant, which indicates that deviations will be corrected in the long-run. Besides, the GD find as significant and has a decreasing effect on the INF in both the short and long-run. Furthermore, the findings from the ARDL bounds test indicate that money supply growth and government debt increase have a long-term impact on inflation, indeed, it is an expected effect theoretically.

Conclusion

In the first half of 2020, the COVID-19 outbreak and subsequent steps resulted in the closure of a number of economic activities and also adverse repercussions on the financial sector in those countries. The fiscal authorities and the central banks have responded quickly in order to mitigate the adverse impacts of the COVID-19 pandemic. There is growing evidence that the swift and decisive policy implementations of the central banks have already contributed to the improvement of the macroeconomic outlook, although it seems early to evaluate the full effect of these measures since the effects of the COVID-19 pandemic still continues. In this paper, we attempt to analyze the impact of the policy response of the European Central Bank on the economic activity between 2000:Q1 and 2020:Q3 following giving brief information about how the ECB has reacted to the economic and financial crisis resulting from the COVID-19 pandemic. In the empirical analysis, we employ the ARDL bounds test developed by Pesaran et al. (2001) to test the impact of money supply (M3) growth and government debt to GDP ratio on inflation, economic growth, industrial production index, and employment rate. We find that there are long-run relationships between money supply (M3) growth and inflation as well as government debt to GDP ratio and inflation. These results are in line with the other studies including Reddy (2020), Bonatti et al. (2020) and Aguilar et al. (2020) that confirms the expansionary monetary policy practices do have impacts on some macro-economic variables like inflation. On the other hand, we could not find a long-term impact of money supply growth and government debt increase on economic growth and employment rate. According to several researches, the power of the monetary policy implemented by the ECB in the pandemic period has seemed limited. For instance, as indicated by Lepetit and Fuentes-Albero (2022) flexible monetary measures, such as forward guidance, cause huge rises in inflation but have relatively modest effects on real economic activity as long as the risk of infection remains high. In the analysis which they examine the role of monetary policy in the COVID-19 pandemic, their conclusions concern the efficiency of monetary policy, implying that monetary policy is less successful in a pandemic than in normal times.

Our study that tries to analyze the key actions taken by the European Central Bank in 2020 against the COVID-19 pandemic yields the conclusion that these responses had a positive impact on the Euro-Area macroeconomic performance by increasing money supply, enhancing bank lending activity, easing collateral requirements and by indirectly paving the way for expansionary fiscal policies in the Euro-Area. The research on the impact of the policies of the ECB since the pandemic has increased in the last period. In this context, Benigno et al. (2022) emphasize that it is still unclear how this new European “policy mix” will develop. It is important to note that

the centralized fiscal policy, which was introduced in the EU and EA in 2020 and primarily implemented in 2021, is exceptional and transient. Furthermore, the projects, or a mix of reforms, public investments, and private investments, should be focused on three pillars: the “green” transition, digital innovation, and social inclusion. Finally, in terms of financial inclusion, the ECB implemented several programs including purchasing financial assets, supporting the balance sheets of financial institutions, decreasing the pressure in the financial markets since the onset of the pandemic to stabilize the financial system and these programs are expected to continue in the future by focusing particularly on the green transition and digital innovation.

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