UNCONVENTIONAL MONETARY POLICY AT A TIME OF COVID-19 CRISIS - IS THE INFLATION MONSTER AWAKENED?

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Abstract. With the beginning of the COVID-19 crisis, the monetary authorities recognized their responsibility to react as fast as possible and to do "whatever it takes" to keep the economic activity and business alive. Under the conditions of near-zero interest rate boundary, the only choice was to bring the unconventional monetary policy (UMP) back on stage once again. This paper systematically analyses the UMP tools employed to boost the economy and arises the question of whether these policies would trigger inflation. The monthly data of money supply (M1) and harmonised index of consumer prices (HICP) for period 2019m1 to 2021m5 for Croatia, Euro area and the US were used in econometric analysis. To determine the relationship between prices and quantity of money the Granger causality tests were employed. The main conclusion is that today non-monetary factors are the main drivers for inflation but fast recovery and inflation threats will probably evoke the tapering measures sooner than it was announced by the monetary authorities.

Keywords: Unconventional monetary policy, COVID-19 crisis, Inflation, Tapering,

JEL code: E58, E31

1. INTRODUCTION

When the first corona case appeared in China, only the most ardent pessimists could expect it to develop into a pandemic of historical proportions. Even when the first contagion appeared in Europe and other places around the world, it was unbelievable that in just a few months there would be an economic collapse that would bring the entire world economy to its knees. In the early moments of disbelief and helplessness, quick responses of almost all governments were general closure, controlling social distance, and closing borders even though they were aware that this would bring a huge recession, much deeper (but hopefully shorter) than the financial one the world experienced in period 2007-2009. The reason for this was that nobody knew to what extent the virus would be lethal, especially because of the horrific images from Italy. They could only hope that fast and rigid action (total lockdown no matter what) could eradicate the virus. Initially, it seemed that those countries that took the strictest measures on time managed to control the contagion better and reduce the number of active cases almost to zero (Croatia was one of them), but with the re-opening and international fluctuation of people, the virus returned, which brought back "the dance" (opening) and "the hammer" (closing) stages with the virus in many countries.

All this has led to major economic shocks, both on the supply and the demand side. There was a decrease in employment and production, and the lockdown has changed the structure of demand significantly in favour of high demand for basic groceries (food and personal hygiene goods, and health services and products) and electronic equipment (laptops, communication devices, etc.), to the detriment of almost all other products. Globally, an overall recession has been launched that has slowed international trade, disrupted global value chains, the flow of FDI, tourism activities, and international trade and transport (Maital & Barzani, 2020).

Central banks have powerful instruments that can be used to mitigate the effects of crises. Besides the standard instruments that are used on regular basis, in times of extreme conditions, monetary authorities also use so-called unconventional instruments. This paper aims to provide an overview of the reactions of selected central banks to the epidemic development, examine how this influenced their balance sheets and inflation. The paper is divided into the following parts. After the introduction, the second part of the paper analyzes the impact of the pandemic on the economy of the EU, Croatia, and the USA. The third section briefly reviews previous researches of the effects of the unconventional monetary policy (UMP). The fourth part of the paper is dedicated to the analysis of UMP which was used before the COVID-19 pandemic that brings us to the analysis of UMP used to boost the economy during the COVID-19 pandemic which is given in the fifth part. The sixth part of the paper deals with the effects that these measures could have on inflation. Finally, the last part makes concluding remarks.

2.   THE IMPACT OF THE COVID-19 PANDEMIC ON THE ECONOMIES OF THE EU, CROATIA, AND THE UNITED STATES

Since the outbreak of the pandemic, economic development in countries has been closely linked to the development of the epidemiological situation, and for small countries such as Croatia also to the "degree of exposures" to certain industries, international openness, and activities such as services and tourism. The data indicate that the development of the pandemic in the world had different phases and forms. Figure 1 shows the seven-day average number of daily COVID-19 deaths per million inhabitants for the EU, USA, and Croatia, which can be used as an indicator of the development of the epidemic.
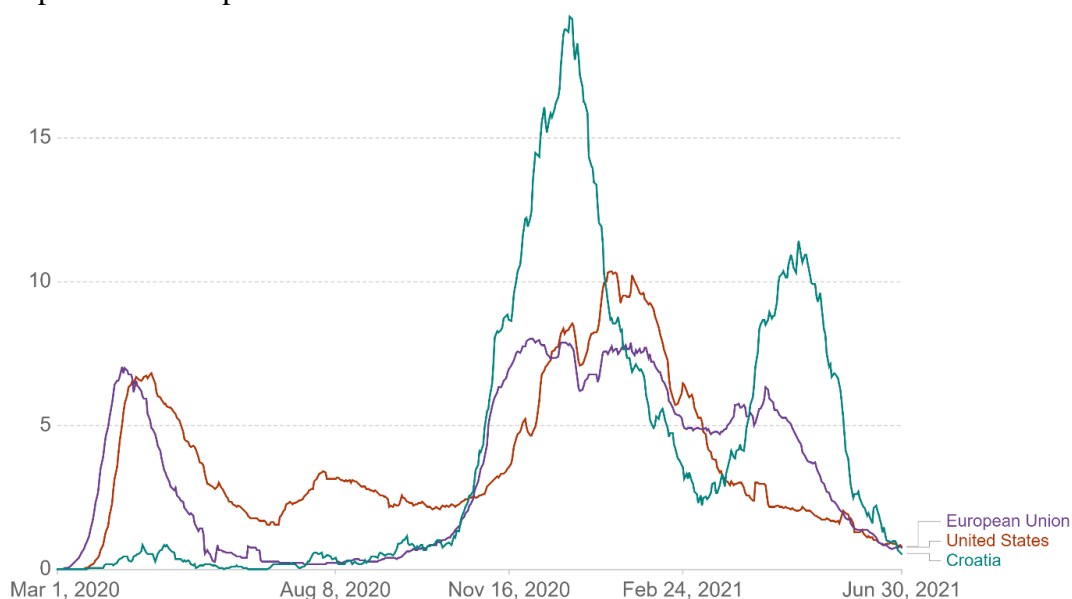

Figure 1. Daily new confirmed COVID-19 deaths per million people

Source: Our world in data

We can see that Croatia had very good figures compared to the EU and the USA until October, but after that, the number of deaths accelerated with a peak at the end of 2020. After the fast reduction of the average seven-day daily number of deaths by the end of February, unfortunately, Croatia experienced a new growth, which surpassed both the USA and the EU in terms of the seven-day average number of deaths per million inhabitants. The reason for this may be weaker closure measures compared to other European countries and too slow vaccination, due to which Croatia will surely come out of the pandemic later than others, as can be seen in Figure 2.
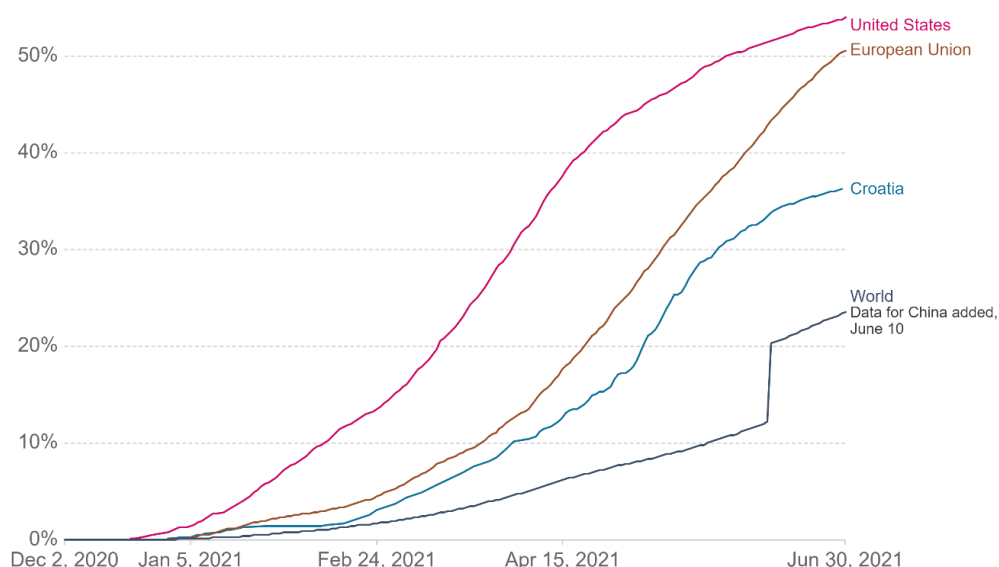
Figure 2. Share of people who received at least one dose of COVID-19 vaccine

Source: Our World in Data

Figure 2 reveals that the vaccination process was fastest in the United States, which is currently entering the vaccination phase for children aged 12 and older, and Croatia is currently significantly below the EU average. This explains the second part of the chart, after March 2021 when we have much fewer deaths in the US compared to the EU. Furthermore, we see that the total number of vaccinated in the world at present (July 2021) is about 24% which is very worrying for the general containment of the virus. Similarly, there is a drastic difference between the number of vaccinated between developed and underdeveloped countries which will prolong the duration of the pandemic and is likely to lead to a further deepening of inequalities in economic development between countries.

The graph in Figure 3 shows the movement of quarterly GDP, the percentage change compared to the same quarter of the previous year. In order to compare the depth of crises, data from 2005 Q1 to 2021 Q1 is given. The graph shows that the decline in 2020 is much deeper, but also much shorter in duration compared to the crisis of 2009, from which Croatia has been coming out for a particularly long time.
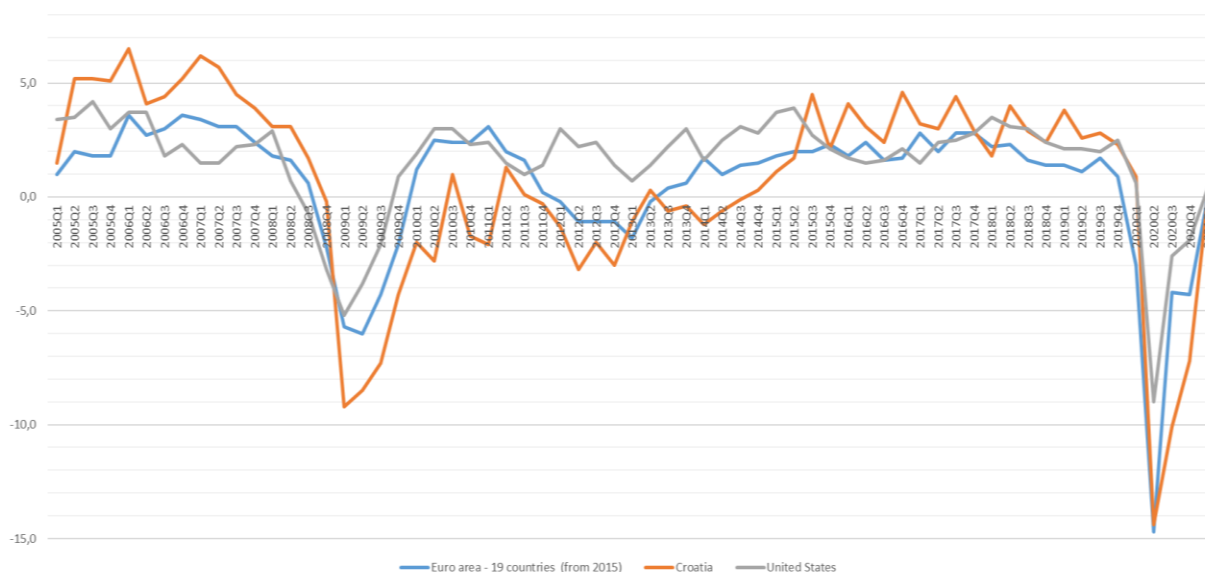

Figure 3. Real Gross Domestic Product, Percent change from Quarter one year ago in Euro area, Croatia, and the US

Source: Eurostat

After an initial shock that occurred in the first half of 2020, economies began to recover relatively quickly in the third quarter after easing rigorous closure measures. However, with the emergence of a new wave and new measures to curb the pandemic, there was a new decline in economic activity in the last quarter of 2020 and the first quarter of 2021. The Spring 2021 Economic Forecast (2021) predicts that the EU economy in 2021 will grow at a rate of 4.2%, and in 2022 at a rate of 4.4%. The forecast for the Eurozone is almost identical, while for Croatia it is somewhat more favorable (growth of 5% in 2021, and 6.1% in 2022), but this growth occurs after a much larger decline and starts from a significantly lower base. Comparing the real GDP forecasts published by the IMF (IMF, 2021, World Economic Outlook Update) and the World Bank (World Bank, 2021, Global Economic Prospects, Washington, DC: World Bank), it seems that the EU economy has experienced greater shock than the US economy from which it will also recover more slowly. It should be noticed that all forecasts must be taken with serious caution because they can change as the situation changes with the pace of vaccination, possible mutation of the virus and its sensitivity to vaccines, but also because of a different approach of fiscal policies and monetary authorities to the crisis.

What is always of particular concern in periods of recession and economic slowdown is rising unemployment. Figure 4 shows the increase of the unemployment rate in the Republic of Croatia from the beginning of 2008 until the beginning of 2014, after which we had a gradual decline. The unemployment rate in the USA has been falling from the beginning of 2010 until the beginning of the COVID-19 crisis, and in the Eurozone, we have a similar trend as in Croatia, only at much lower levels and amplitudes. One can notice a distinct seasonal character of the movement of the unemployment rate in Croatia, which is explained by the importance of tourism for the Croatian economy.
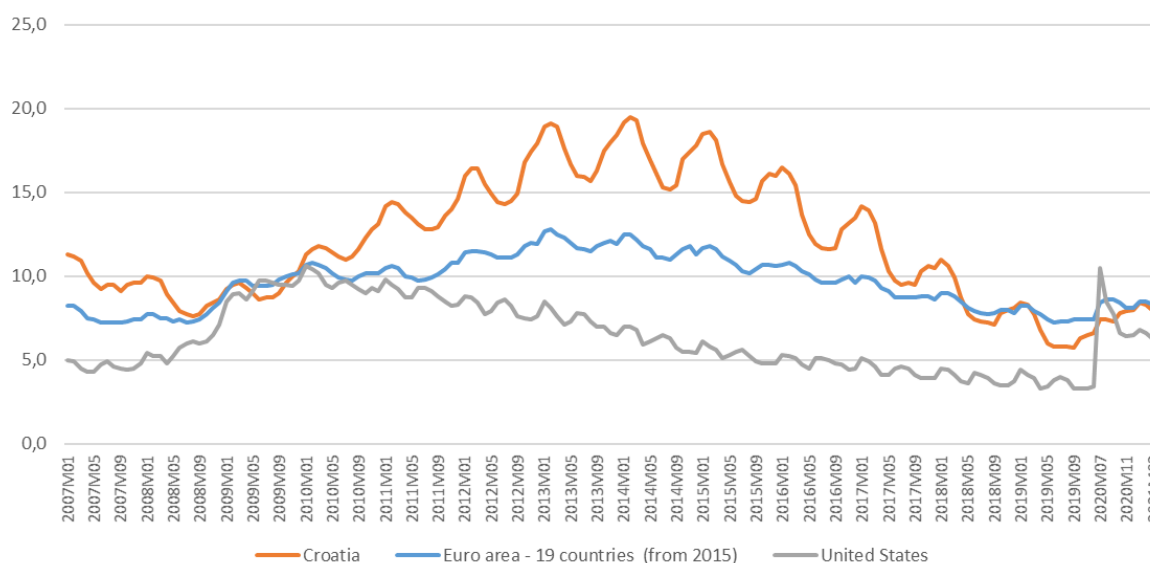

Figure 4. Unemployment rates in the Euro area, Croatia, and the US

Source: Eurostat

If we take a look at the unemployment rates for the period during the corona crisis, we could see the different movement patterns. In Croatia and the Euro area we have a relatively slight growth of unemployment and in the US a very sharp growth (up to 10.5%), but also a rapid decline which falls below the European unemployment rate, and stops at around 6.2%, which is about three percentage points more than the pre-crisis rate. It is also a higher unemployment rate compared to numbers that the US had during the time of the great financial crisis. There is a threat that unemployment rates in the EU and Croatia will rise further during 2021 and early 2022 when government measures will be ceased. The countries that are being hit hardest by the pandemic itself (Spain and Italy) are the countries more likely to suffer the worst employment implications of the

quarantines because they specialized in sectors that are more likely to be forcefully closed (Fana et.al, 2020). Data from the US suggest that entertainment, restaurants, and tourism face large supply and demand shocks (del Rio-Chanona et al. 2020).

3.   LITERATURE REVIEW

When researching unconventional monetary policy instruments (UMP), researchers paid more attention to the effects of the implementation of these policies than to the motives and various institutional preconditions that triggered their implementation. Lacalle (2019) imposes the question of whether UMP creating distortions in the financial markets in a form of increasing the prices of the financial asset beyond its fundamentals. He found some empirical evidence of "financial market inflation" and he suggests that policymakers should include this effect in their assessment of inflation expectations as well. Quantitative easing (QE) usually has a significant impact on the bond market. In the study of Breedon et.al. (2012) authors have taken several approaches to assess the financial market impact of QE in the UK, and in all cases, they have found it to have a significant and economically important impact on the bond market because of portfolio-balance effect.

The research contribution in investigating the effects of UMP on real estate gave Gabriel and Lutz (2017). They found that UMP shocks decrease key housing market interest rates, raise returns on homebuilder and returns for real estate investment trusts stocks, reduce insurance costs for subprime mortgage-backed and commercial real estate debt; and increase housing sentiment. Based on panel vector autoregressions Rahal (2016) investigates the response of OECD housing markets to UMP. He found a positive reaction of house prices one and two years following a policy shock, while residential investment responds slower but more strongly than house prices.

Monetary policy could influence the real economy in part through its effect on financial institutions however, there is no unique stance in papers that have addressed this research question about the direction of the influence. Chodorow-Reich (2014) find out that UMP in the US during the 2008-09 crisis had a strong positive impact on banks and life insurance companies measured by incensement of the value of legacy assets. Montecino and Epsein (2014) also have found that banks that sold MBS to the Fed within the QE program experienced significant increases in profitability. However, Mamatzakis and Bermei (2016) and Lambert and Ueda (2014) reported a negative relationship between UMP and bank performance in the US euro area and the UK. An event study applied on bank stock valuation did not reveal any clear effects of monetary easing on bank stock valuation. Researchers found deterioration of medium-term bank credit risk with ambiguously affected profitability.

The Macroeconomic effect of unconventional monetary policy was investigated by many researchers (Peersman, 2011; Louzis, 2017; Shibamoto and Tachibana, 2013; Baumeiseter and Benati, 2012). Louzis (2017) found out that an increase of 1% of ECB's assets could lead on average over the 2007-2016 period, to an annual rise of 0.84% in inflation and of 0.96% in GDP. Furthermore, from mid-2014 through December 2016 an exogenous nonstandard monetary policy shock that brings about a 1% increase in the ECB's assets could result, on average, in an annual increase of 1.56% in the price level and of 1.92% in GDP. The effectiveness of UMP in the Japanese economy was investigated by Shibamoto and Tachibana (2013). They argue that the current account balances held at the Bank of Japan serve as a measure of the stance of unconventional monetary policy. They propose a plausible empirical framework to examine the effects of monetary policy. Using structural VAR they found that UMP has a significant effect on the macroeconomy. The contribution of Baumeister and Benati to the research body is in the development of a structural VAR model that they used to measure the macroeconomic effects of compression in the long-term bond yield spread in 2007-2009. They detected that solidities in the long-term yield spread exert a powerful effect on both output growth and inflation. Besides that, their simulations suggest that UK and US unconventional monetary policy actions have averted significant risks both of deflation and output collapses.

4. UNCONVENTIONAL INSTRUMENTS OF MONETARY POLICY BEFORE COVID-19 CRISIS

Monetary policy is implemented by central banks through the influence on the money supply, interest rate, and exchange rate to achieve price stability, i.e. low inflation, full employment, and creating conditions for economic growth. The monetary policy instruments used by central banks depend on the level of economic development and the development of the financial markets. The main conventional instruments are reserve requirements, open market operations, and discount rates. Besides these, central banks in times of crisis began to use other, so-called unconventional instruments. Sometimes the difference between conventional and unconventional instruments is blurry. Conventional monetary policy works through positive short-term interest rates while unconventional monetary policy (UMP) influences medium and long-term rates and uses monetary policy in unusual ways to influence prices and economic activity (Karson, E., & Neely, C. J. 2021). It includes forward guidance, asset purchases, conditional bank lending programs, and negative interest rates. Sterilized and unsterilized exchange rate management sometimes are also considered as UMP (Mohanty, M. S., 2014; Cecioni et.al., 2019, Franta, et.al., 2014). A common reason why central banks begin using UMPs is that short-term interest rates become very low (approach to zero lower bound) and can no longer be decreased. Historically, this has not happened too often, but it has become more common in recent decades. Under this condition, common instruments have a limited effect (Eggertsson, G. B. 2003).

In addition to today's practice of UMP, which can be recognized in many central banks' actions and which is justified by the crisis and the huge economic contraction, the period of the global financial crisis in 2008-2012 was a time when UMP was also used by many central banks. From that period central bank officials learned a lot about how to use unconventional tools and what effects can be expected. During this period, the Fed created several facilities to boost the market such as Currency swap lines with foreign central banks, Term Auction Facility (TAF), Term Securities Lending Facility (TSLF), Primary Dealer Credit Facility (PDCF), Maiden Lane LLC 1, 2 and 3, Asset Backed-Commercial Paper Money Market Mutual Fund Lending Facility (AMLF), Commercial Paper Funding Facility (CPFF), Money Market Investor Funding Facility (MMIFF) and Term Asset-Backed Securities Loan Facility (TALF). Using these facilities Fed conducted four Quantitative easing (QE) rounds. The consequence of these activities was a tremendous increasement in the Fed's balance sheet.

Before the financial crisis (before September 2008) The Fed's liabilities consisted mainly of currency, and the amount of reserves was relatively small. The main part of assets was Treasury securities which means that the Fed was transforming the debt of the US Treasury into currency. However, the environment for conducting monetary policy during the crises was considerably different. During the crises, the excess reserves outstanding in the financial system soared under the condition of near-zero key interest rate, and the aforementioned liquidity trap appeared in which conventional open market operations could not bring sufficient monetary effects. The response of the Fed was QE that was used for transforming long-term maturity assets into short-term maturity reserves.

This US trip to QE diminished gradually. First, in December 2013 FOMC declared the conditions that would modestly reduce the pace of its asset QE purchases (unemployment rate around 7%, GDP growth between 2% and 3%, and if core inflation rate had not exceeded 2%). In October 2014 FOMC announced that it had made its last purchase, but it continued to keep the level of its holdings. Since June 2017 FOMC stopped the replacement of some matured Treasuries and MBS gradually.

The ECB engaged in QE with a substantial delay compared to the Fed. ECB injected a massive amount of liquidity into the banking system only after the collapse of Lehman Brothers (September 15, 2008). The enhanced credit support was conducted by: unlimited provision of liquidity through "fixed rate tenders with full allotment" in both the main refinancing operations (MROs) and the long-term refinancing operations (LTROs); extension of the list of collateral assets; extension of the maturity of LTRO; liquidity provision in foreign currencies through swap lines with Fed; and by

Covered Bonds Purchase Programmes (CBPP). In May 2010 ECB began the Securities Market Programme (SMP) which meant that ECB started to purchase some euro area government bonds but without explicit targets in volumes. The SMP was terminated in 2012 after €208,3 billion investment in government securities, and a new program was introduced – Outright Monetary Transactions (OMT). This program was focused on the secondary sovereign bond markets.

In the period 2008-2009, there was relatively little concern about European sovereign debt. The focus was on ECB actions to address the global financial shock. Gradually, problems first appeared in Greece and later in Ireland, Portugal, and Spain. In May and June 2010 The European Financial Stabilization Mechanism (EFSM) and European Financial Stability Facility (EFSF) were created, respectively. Between May 2010 and October 2010, about 65 billion euro of bonds were bought by the ECB; a further 125 billion euro were committed during the market turmoil between August 2011 and November 2011 such that the cumulative bond holdings grew to over 200 billion euros (about 2 percent of euro area GDP). (Lane, 2012). By the end of 2011, the ECB made a major reduction in its interest rates, while it also announced two LTROs, lending nearly €490 billion on a first phase and €530 billion on a second one, to 523 and 800 banks, respectively (Ferreira, 2015). In October 2012, the EU created an additional fund called European Stability Mechanism (ESM) that replaced EFSF and EFSM. All these unconventional monetary policy measures that have been used to mitigate the consequences of the global financial crisis, and later to respond to the European sovereign debt crisis increased the ECB balance sheet.

5. UNCONVENTIONAL INSTRUMENTS OF MONETARY POLICY DURING THE COVID-19 CRISIS

As previously elaborated, at the beginning of 2020 the whole world (including the EU and US) was faced with a huge impact on the economy triggered by the COVID-19 pandemic. Monetary authorities of the US and EU concluded that the unprecedented situation requires extraordinary measures similar to those that were used during great financial crises and sovereign debt crises, and they began to operate in parallel with the fiscal measures applied by the US government and many other governments across Europe.

There were a lot of regulatory and supervisory actions done by the Fed at the beginning and during the COVID-19 crisis. In order to encourage banks to lend, Fed reduced the rate of interest it pays on reserves (IOR), federal funds rate target range (FFR), and discount rate (DR). Besides that, Fed expanded repurchase operations, engaged in quantitative easing, and relaxed regulatory constraints. Table 1 chronologically lists the measures taken by the Fed.

Table 1. Fed responses to COVID-19 crisis

Date in 2020	Measures
3 March	The federal fund rate (FFR) was reduced to a range between 1.00% and 1.25%
4 March	Interest on reserves (IOR) decreased to 1.10%, and discount rate (DR) to 1.75%
15 March	The federal fund rate (FFR) was reduced to a range between 0.00% and 0.25%. The maturity of discount window loans was lengthened up to 90 days
16 March	Interest on reserves (IOR) decreased to 0.10% and discount rate (DR) to 0.25%
17 March	Commercial Paper Funding Facility (CPFF) was established
17 March	Primary Dealer Credit Facility (PDCF) was established
18 March	Money Market Mutual Fund Liquidity Facility (MMLF) was established
23 March	Primary Market Corporate Credit Facility (PMCCF) was established
23 March	Secondary Market Corporate Credit Facility (SMCCF) was established
23 March	Term Asset-Backed Securities Loan Facility (TALF) was established
09 April	Main Street Lending Program (MSLP) • New Loan Facility (MSNLF), • Priority Loan Facility (MSPLF), • Expanded Loan Facility (MSELF),

	• Nonprofit Organization New Loan Facility (NONLF) • Nonprofit Organization Expanded Loan Facility (NOELF)
09 April	Municipal Liquidity Facility (MLF) was established
09. April	Paycheck Protection Program Lending Facility (PPPLF) was established

Source: www.federalreserve.gov

As stated earlier, the COVID-19 crisis has affected both supply and demand sides of the economy. In order to identify which effect prevails one can look at the difference between the yield of US Treasury securities which are not indexed to inflation, and the yield on Treasury Inflation-Protected Securities (TIPS), which are indexed to inflation (so-called TIPS spread). The graph in Figure 5 suggests that the effect on demand, at least in the first months of the crisis, was much bigger than on the supply side. Namely, as the graph clearly shows, inflation expectations sank from 1.65% to 0.14% in mid-March. This means that there was a substantial increase in the demand for money on which Fed responded vigorously, as one can see from table 1.

Figure 5 also shows that demand began to recover very quickly. Now it seems that a new problem appeared, and that is the unleashed inflation. This problem will be discussed in detail in the next section of this paper.

Figure 5. Five-year TIPS spread

Source: Board of Governors of the Federal Reserve System

On the other side of the Atlantic, European Central Bank (ECB) was also forced to take several unconventional measures. Namely, ECB Governing Council first expanded the existing Asset purchase program (APP) after which the Pandemic emergency purchase program (PEPP) was launched. PEPP has undergone two major changes, in June and December 2020. The main events that present ECB's response to the corona crisis are given in Table 2.

Table 2. The ECB response to the corona crisis

Date in 2020	Measures
12 March	Existing APP was strengthened: • longer-term refinancing operations (LTROs) expanded • In TLTRO III more favorable terms applied • Additional net asset purchases of €120 billion
18 March	ECB announces €750 billion PEPP with an envelope of €750 billion
18 March	The range of eligible assets under the corporate sector purchase program (CSPP) was expanded to non-financial commercial paper
30 April	The conditions on the targeted longer-term refinancing operations (TLTRO III) have been further eased
30 April	A non-targeted pandemic emergency longer-term refinancing operations (PELTROs) was launched
4 June	The envelope of PEPP increased by €600 billion to a total of €1,350 billion, and horizon or net purchases under PEPP extended to the end of June 2021
10 December	The envelope of PEPP increased by an additional €500 billion to a total of €1,850 billion. The horizon for net purchases under the PEPP extended to the end of March 2022.

Source: www.ecb.europa.eu

The APP program included €20 billion monthly purchase of mainly government securities, and PEPP was designed to offset the negative impact of the pandemic shock on firms' liquidity and households' income by easing the fiscal constraints on national public spending and the short-term sustainability conditions of the consequent increase in national government debts (Benigno, et.al, 2021). The new program - PELTRO, was designed to provide liquidity support to the Euro area financial system and contribute to preserving the smooth functioning of money markets by providing an effective backstop after the expiry of the bridge longer-term refinancing operations (LTROs). Benigno et.al. (2021) employ the event-based analysis to evaluate the impact of these events on borrowing conditions and on inflation expectations. Measuring the borrowing conditions by the spreads in credit markets they found that monetary policy only had marginal impacts, and the most significant effect in reducing the spreads at all horizons had the strengthening of the TLTRO III on 12 March 2020. The inflation expectations were captured by the spread between nominal and real yield and by using swap rates at the same maturity. They found that these announcements did not have much impact on inflation expectations. Even more, in some cases, the responses they found were in the opposite direction of the economic intuition.

The Croatian National Bank (CNB) has also taken several measures to mitigate the economic consequences of the coronavirus pandemic. It implemented a package of monetary policy measures in order to maintain favorable financing conditions for entrepreneurs and citizens and applied numerous foreign exchange interventions to preserve the exchange rate stability. These measures are summarized in table 3.

Table 3: The measures taken by CNB

Date in 2020	Measures
13 March	Redeemed securities of the Republic of Croatia (RC) for 212,88 mln. HRK
16 March	CNB announces a direct purchase of RC bonds in kuna CNB holds foreign exchange intervention by selling foreign currency for EUR 411.05m
18 March	CNB purchases RC securities at a nominal value of HRK 4.075bn
23 March	The Reserve requirement rate was reduced from 12% to 9%
31 March	CNB holds foreign exchange intervention by selling foreign currency for EUR 618.15m
15 April	CNB established a swap line with ECB
28 April	CNB purchases RC securities in a nominal value of HRK 9.529bn
29 June	CNB purchases RC securities in the nominal amount of HRK 2.753bn
30 June	CNB purchases RC securities in the nominal amount of HRK 1.316bn

Source: www.hnb.hr

Besides these monetary measures, CNB has also adapted the approach to supervising the operations of credit institutions to make it easier for banks to provide liquidity and thus support the maintenance of economic activity and the preservation of jobs. Some recommendations were given regarding the payment operations and transactions with bank clients to facilitate the transactions for households during the crisis period.

6. THE EFFECTS OF UNCONVENTIONAL MONETARY POLICY ON INFLATION

The question that arises is whether a long period of "money printing", practiced by the world's leading central banks under the framework of unconventional monetary policy, could lead to sudden inflation and perhaps hyperinflation. This fear arises from Milton's famous thought that "inflation is always and everywhere a monetary phenomenon". However, the velocity of money and other non-monetary factors shouldn't be neglected. Numerous researches have shown that the velocity of money significantly decreases in periods of recession (Mishkin 2007, Dwyer & Hafer, 1988, Fitzgerald, 1999, Lucas, 1980) and this is also a very important factor in the equation that changes the relationship between prices and quantity of money[1]. That is why it is not always possible to recognize the strong relationship between money supply and inflation. This also partially explains the graphs in Figure 6 where we can see the growth of the M1 money supply and at the same time the swings in inflation movement measured by the harmonized index of consumer prices (HICP). The HICP chart shows that deflationary pressures were strongest in the period of the first lockdown, driven by a contraction in aggregate demand in the second quarter of 2020.

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[1] The basic equation in the quantity theory of money is: $M \times V = P \times Q$ (where M is money supply, V is velocity of money in circulation, P is average price level, and Q is real output
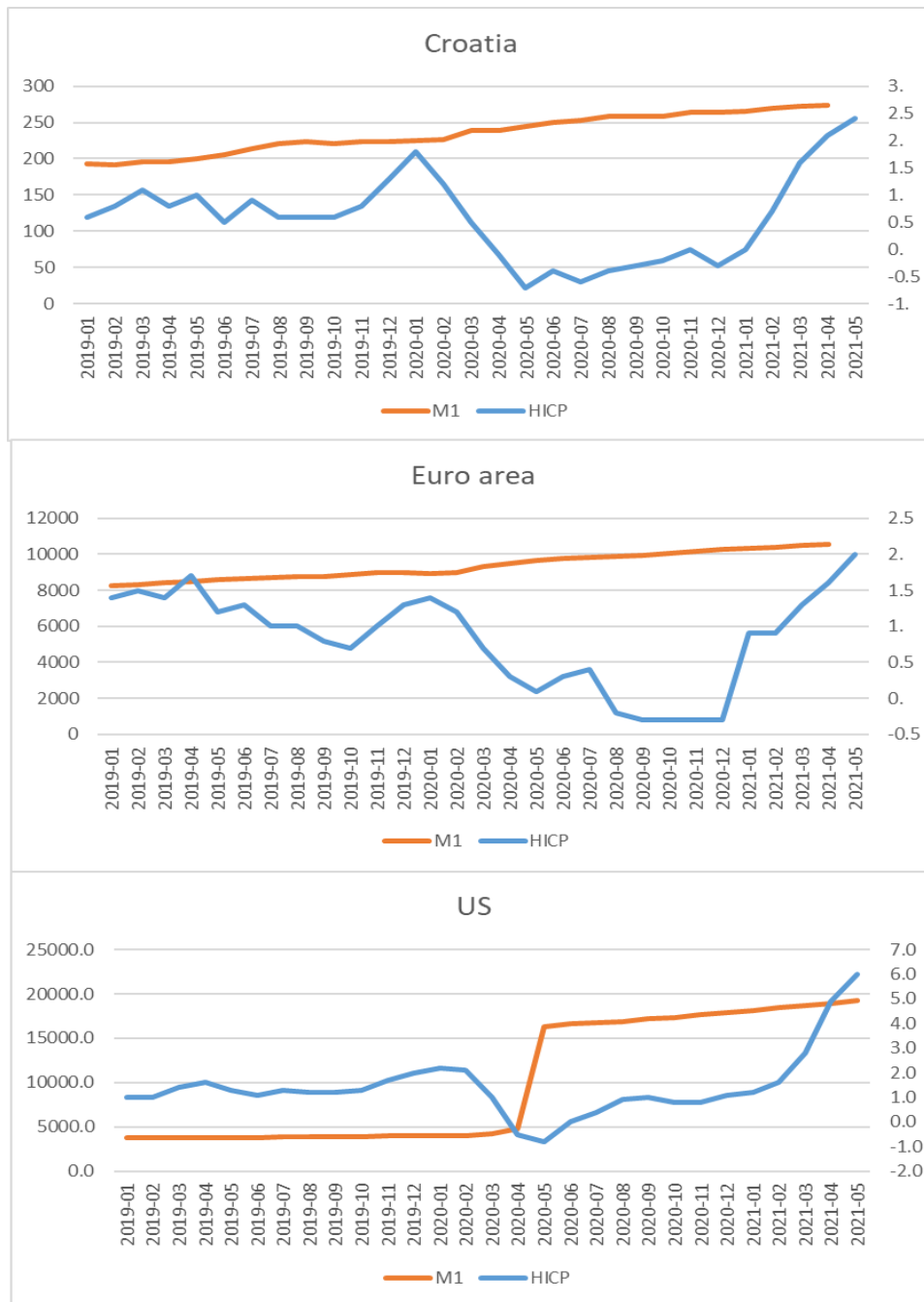
Figure 6. M1 (left axes) and HICP (right axes) in Croatia, Euro area and the US

Sources: www.hnb.hr, Eurostat, https://fred.stlouisfed.org/

Using the available data for the US, Euro area, and Croatia we can conduct simple Granger causality tests and covariance analysis between M1 and HICP. In order to avoid the stationary issues, the calculation is conducted on the differentiated log series. The results are given in Table 4.

Table 4. Granger causality test and covariance analysis

Null Hypothesis	Lags	Obs	F stat	Prob.	Covariance	Correlation
D_M1_CRO does not Granger Cause D_HICP_CRO	2	25	0.35166	0.7078	-0.001428	-0.267149
D_M1_EA does not Granger Cause D_HICP_EA	2	25	0.29731	0.7460	-0.000852	-0.338746
D_M1_US does not Granger Cause D_HICP_US	2	26	1.19920	0.3213	-0.028124	-0.192052

Source: author calculation

According to the results of Granger causality tests, we cannot reject the null hypothesis (M1 does not Granger Cause HICP) and the covariance and correlations between M1 and HICP are very low for all analysed countries. These indicative results that have shown the weak linkages between M1 and HICP for this short period, should be taken with caution given that they are based on only 25 monthly observations. Additional econometric analysis for detecting the nexus between inflation and expansionary monetary policy in the period of the COVID-19 crisis could be done after the new data would be available.

In the pre-crisis period in the Euro area, fiscal expansion was constrained by fiscal rules, and the ECB's expansionary monetary policy was not transmitted through the credit market channel at an adequate pace to reach the 2% annual inflation target[2]. This explains the slower economic growth in Eurozone in that period.

There are also some non-monetary and non-fiscal explanations for the lack of aggregate demand and thus low inflation in the long run that can be found in the contemporary scientific papers dealing with this phenomenon. That are: i) demographic change (Yoon, et.al. 2014, Liu & Westelius), ii) growing income inequalities (Monnin, 2014), iii) globalization and intensified competition (Sbordone, 2007), iv) high credibility of independent central banks that reduced inflation expectations (Bodea & Hicks, 2015), and v) high indebtedness of consumers and corporations that limits the capacity of the credit channel to transmit monetary impulses (Auel & Mendonca, 2011). For instance, the demographic changes are usually the main explanation for the low inflation in Japan that occasionally enters the deflation zone (Liu & Westelius, 2017). Due to the noticeable asymmetry in the distribution of wealth in the United States, the incomes of the vast majority of people grow much slower than the incomes of a small number of extremely wealthy individuals. This leads to a slowdown in the growth of aggregate demand and also explains a slowdown in inflation. Strong competition in a globalized world also limits price growth.

If these factors have a primary impact on inflationary trends, then the combination of monetary and fiscal policies taken by the authorities can be considered as endogenous factors - those driven by fundamental factors which are used as tools to steer the inflationary changes. In this case, it is possible to have low-interest rates and monetary and fiscal expansion at the same time, without triggering serious inflation. Non-standard monetary policy measures by which central banks responded to the pandemic crisis largely followed the quantitative easing undertaken during the great financial crisis, which indicates that monetary policy fails to transfer the momentum of expansion to the credit market. The monetary intervention has also been accompanied by strong counter-cyclical fiscal expansion, which was much stronger in the US than in the Euro area.

Today, it is certain that the economic growth curve will have a V shape, which means that a sharp decline will be followed by rapid growth. The US economy appears to be recovering much faster from the COVID-19 crisis than the Eurozone economy. Already in the first quarter of 2021, the US reached a level of activity that is higher than before the corona crisis. If we compare the

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[2] The average Euro area inflation rate in the period from January 2015 to March 2020 was only 1% on an annual basis.

graphs of the HICP index, it can be noticed that the inflation rate in the US is also significantly higher than in the Euro area, which was expected given the data of faster recovery. The cost factors such as energy prices and high demand also pull prices upwards. Now, the key issue for monetary authorities is to recognize whether this rise in prices is transitory or more persistent. The data in Figure 8 indicates that markets expect a slowdown of inflation. However, these movements also remind us that we are approaching a moment when the existing level of stimulus will no longer be needed, and monetary authorities would have to change their policies. It seems that tightening is coming sooner rather than later.

Unfortunately, these delicate policy shifts also usually bring higher market disturbances. To implement the taper (getting out of expansionary unconventional monetary policy) smoothly as it is possible, it is necessary that monetary authorities clearly and on time communicate what are they doing, why are they doing that, and their intentions what are they will do in future.

7. CONCLUSION

With the beginning of the COVID-19 crisis, the monetary authorities recognized their responsibility to react as fast as possible and to do "whatever it takes" to keep the economic activity and business alive. Under the conditions of near-zero interest rate boundary, the only choice was to bring the unconventional instruments back on stage with which, as history has shown, the great financial crisis of 2007-2009 was successfully overcome. This paper shows the tremendous impact of the corona pandemic on the economy (measured by the changes of quarterly GDP growth and by unemployment rates) in the EU, Croatia, and the US, which gives the context in which monetary policy operates. Furthermore, this paper chronologically summarizes the instruments used to control the COVID-19 pandemic crisis, drawing parallels with the choice of monetary policy instruments used during the financial crisis.

The question that arose is whether these extremely expansive monetary policies can bring countries into zones from which inflation would be very difficult to control. The main conclusion is that the major driving factors for inflation changes are non-monetary and the detected inflation is transitory. However, given the rapid pace of economic recovery and the looming rise in prices, it could be expected that monetary authorities will enter the tapering procedures earlier than initially projected.

Based on the results of this research, policy recommendations would be to proceed with expansionary monetary policy cautiously and to increase the transparency and adequate communication of the monetary authorities with the public in order to maintain credibility. For the time being, the available time series do not allow to conduct of an advanced econometric analysis that can be used to assess the impact of UMP that was used during the COVID-19 crisis on inflation, and that is what could be done for future research.

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