

The future of money and the money supply

Constantin ANGHELACHE

Bucharest University of Economic Studies, Romania

"Artifex" University of Bucharest, Romania

actincon@yahoo.com

Mădălina-Gabriela ANGHEL

"Artifex" University of Bucharest, Romania

madalinagabriela_angel@yahoo.com

Ștefan Virgil IACOB

Petroleum-Gas University of Ploiesti, Romania

Artifex University of Bucharest

stefaniacob79@yahoo.com

Dana Luiza GRIGORESCU

Bucharest University of Economic Studies, Romania

danaluiza2004@yahoo.com

Abstract. *In this article, the authors sought to determine what the future of money will be compared to the money supply currently in circulation, but also to the digital system that will be introduced in the economy. The preference for money, especially for fiat money, starting in 2000 and accentuated from 2002, reaching by the end of 2021 a market capitalization of cryptocurrencies that is, from known data, 1.4 trillion euros. Total market capitalization slowed in the latter peak of 2018, with activity outstripping the euro position in the traditional foreign exchange market.*

Volatility is an important driver of price. Given the absence of a sovereign guarantee, the bank is willing to engage in more speculative activity. This implies that the introduction of backup generation would reduce volatility. Furthermore, a regulatory system aimed at protecting the currency and preventing speculative attacks would increase the reliability and efficiency of this alternative money.

Given the cross-border nature and use of cryptocurrency, the regulatory architecture would require international coordination, both in terms of compliance and oversight duties as advocated by the International Monetary Fund.

In international specialized studies, a number of benefits that Block-chain technology brings are considered. Most prominent is its decentralized nature which makes it less prone to corruption and more sustainable. Another important benefit is that Block-chain transactions are less expensive and faster than those normally transacted in fiat currencies (current currencies).

There are recent developments in Block-chain that indicate that it can play a very important role in future payment systems. One of the last major benefits of blockchain is that payments are validated.

Bitcoin and other digital currencies may change the function of money, however. From a macroeconomic point of view cryptocurrencies represent a risk for monetary and financial stability. From a microeconomic perspective, they involve a risk for investors who could risk all their money, namely, due to extremely fast exchanges from day to day, digital instruments devalue or become less valuable. Stablecoins can be seen as an intermediate solution between privately issued cryptocurrencies and central bank digital currency.

Given the volatility of cryptocurrencies, as well as the rest of CPTC, stablecoins have come to the fore as a potential third title that aspires to bring stability to the volatile cryptocurrency market.

Money plays a fundamental role in the money supply. Before discussing the evolution of money and the role of digitization of cash and cryptocurrencies, we must first go back to the basics and define money in terms of its role and functions in an economy.

The very large literature offers a number of aspects but nevertheless there is common ground that economic schools would agree on and that is the function of money in modern economies. In this sense, it is understood that money can change its form and transactional nature without fundamentally changing its function or role in the economy.

There is broad agreement that the functions of money can be divided into three layers, primary, secondary and tertiary, where each layer reflects the descending degree of direct functionality, but also the increasing degree of generality and transactionality of the role it plays. Primary functions refer to them as a medium of exchange and measure of value. Secondary functions reflect their role in the standard store of value for payments. The tertiary layer reflects its contingent functions such as credit base, liquidity of national wealth, distribution of income and measure or maximization of utility. The most common function attributed to money is that of money as a medium of exchange because it facilitates the trading of goods and services between various people.

Based on the study of a wide bibliography, the authors concluded that money also serves as a common measure of value. The values of various commodities are expressed in terms of money. This is, as a number of economists call it, the accepted and standardized universe.

Keynesian economists have established that the function of money as a store of value is one of the most important. In this sense, money becomes an asset and thus currency, or cash, becomes the most liquid form of asset, i.e. money can be very cheap and immediately exchanged for goods and services, and their value is established at least for at least a short period of time. The money can be viewed and considered, by standardization, a deferred payment. This is the basis of credit trading. Money is the basis of the distribution of production in consumption among the various factors, but primarily the basis of the distribution of production for investment and consumption.

The role of money does not seem to be changed with the introduction of virtual money, it still performs the same fundamental functions and remains closely linked to the market for goods and services. The forces that determine the equilibrium level of money and employment continue if the bringing together of these forces in a single or virtual market does not fundamentally alter their functions.

Macroeconomic aggregates in the euro area play an essential role. Since 1970, these aggregates have also referred to nominal money in the usual way, but also to the possibility of narrowing the sphere of liquid money, simultaneously with the appearance of other forms of money.

According to the official statistics of the Central European Bank, monetary aggregates are M1, i.e. the sum of currencies in circulation plus demand deposits; M2, which is equal to M1 plus term deposits with a maturity of up to 2 years, plus repayable deposits of up to 3 years; and M3, which is equal to M2 plus repurchase agreements, plus shares of money market funds, plus debt securities with maturities of up to 2 years. While the share of M2 in M3 has decreased over time, in parallel the share of M1 has increased since the beginning of 2000, aspects presented graphically for easier understanding.

In the study carried out, the authors used a series of existing data at the World Bank, the International Monetary Fund, a series of other sources as well as the materials of some specialists in the field, which were mentioned in the Literature Review.

The growth rates of the structure of monetary aggregates represent a precise trend of the perpetuation of cryptocurrencies, the emergence of digital currencies and the system of macroeconomic monetary aggregates.

Internationally, it can be seen that in 2020-2021 the cryptocurrency market followed the same course as the euro currency. At the same time, as the total market capitalization increases it has slowed down somewhat, and after 2018 the course has resumed further.

In the study carried out we used existing data at the European Union, data published by specialists and we used the logic, interpretation, association and interpretation of macroeconomic monetary aggregates, to achieve our proposed objective regarding the future of money and the money supply.

Keywords: money supply, digital system, cryptocurrencies, economy, financial market.

JEL Classification: E20, E30.

Introduction

The study by the authors was based on a series of papers that used a number of technologies and methods to analyse the perspective of today's money, financial digitization and the evolution of cryptocurrencies. In this regard, it began by suggesting that the preference for money, especially for fiat currency that has increased since 2000 worldwide, has not decreased as we might have expected with the advent of cryptocurrency. This coincides with the launch of the euro in January 2002, suggesting that the issuance of the new currency increased demand, as did its share of money as a whole.

Several benefits of Block-chain technology are analysed in the literature, the most important being its decentralized nature, which makes it less prone to corruption and manipulation. At the same time, an important element is that Block-chain transactions are less expensive and faster than transactions made in fiat currency (normal currencies, dollar, euro, Swiss franc, pound sterling, etc.). There are recent developments on Block-chain that indicate that it can play a very important role in future payment systems.

Another aspect would be that the major documented benefits of blockchain are validated payments. Bitcoin and other digital currencies can take over the function of money, but they cannot remove it. From a microeconomic perspective, this implies a risk for investors who could, in the context of not studying the algorithms and the problems raised by the use of Bitcoin and digital currencies, face large losses.

Central banks can take advantage of digital currency technology and still conduct monetary policy as usual. Digital currencies could be converted directly into cash and notes. However, this aspect can raise some problems, questioning the role of banks in financing economic activity.

In the future, the fundamental role of money and the money supply will be maintained. Before discussing money and its evolution and the digitization of cash into cryptocurrencies we must first go back to the basics and look at money in terms of its role and functions in the economy.

Probably because money was at the centre of the main battles, economic debates between different currents of thought, they have an important role, as an ingredient as the basic atom in the economic system. This has prevented economists from arriving at a unified view of money. However, there is common ground that economic schools try to agree on, namely the function of money in the system of the modern economy.

There is broad agreement that the functions of money can be divided into three layers, primary, secondary and tertiary where each layer reflects the descending degree of direct functionality, but the increasing degree of generality and transcendence that this money can play. Currency or cash is the most liquid form of assets, which can be used immediately for transactions in goods and services.

There is also the situation where money is considered a credit-based standard of payment. Money also facilitates the distribution of production into investment and consumption, as well as between the various factors.

Monetary theory is a branch of economics that deals with explaining how the use of money in various forms affects the production, consumption, and distribution of goods and services. To support the theory of money, we specify that it is not just a means to facilitate exchanges with some goods, but something more vital that affects the general level of economic activity. At first glance, the role of money cannot be changed with the introduction of virtual money. They perform the same fundamental functions and remain closely linked to the market for goods and services.

The forces that determine the level of the equilibrium forces of money and employment continue if the confluence of those forces in a physical or virtual market does not fundamentally change.

Monetary aggregates in the euro area are established in three components: M1 (sum of currency in circulation and demand deposits); M2 (M1 plus time deposits with a maturity of up to 2 years, plus deposits repayable up to 3 years); M3 (M2 plus repurchase agreements plus money market fund shares plus debt securities with maturities up to 2 years). The share of M2 and M3 has decreased over time, in parallel with the growth of M1. Bearing in mind that the euro was officially launched in January 2002, this means that the importance of the currency has only increased since its launch, reaching over 60% at the end of 2014 and a particularly high percentage in the 2020s in the euro area. While liquid money M1 follows the business cycle very well and actually leads, less liquid money, especially M3 is countercyclical and actually changes during recessions. It appears that preferences for wider and less liquid money are driving low growth averages and contraction. The analyses to date perform a comparative study comparing the business cycle of M3, from 1990 to 2021, compared to GDP, and the economic component of M2 from 1980 compared to GDP, but also the cycle component of M1 from 1980 compared to GDP.

These three aggregates are very important and must be taken into account when studying the system of cryptocurrencies, digital currency and other forms of improvement of the financial-monetary system.

A cryptocurrency is a type of unregulated digital currency that is issued and usually controlled, developed and accepted by members of virtual communities. A bitcoin is essentially an entry in a public ledger shared across all participants in a network.

The total cryptocurrency market cap has grown since 2014. It has practically grown 1000 times in less than 6 years. By the end of 2019 they were below 1 trillion euros, and in 2020-2021 it reached 1.4 trillion euros. Here, then, is that because of this apparent coordination and permanence position for the foreseeable future, it is reasonable to focus to better understand the dynamics of the respective market.

Next, we studied the composition of the cryptocurrency market, also making a graphic representation, where capitalization peaks appear at certain times. Given the cross-border nature and use of cryptocurrency, the regulatory architecture would require international coordination in compliance as well as oversight tasks, as supported by the International Monetary Fund.

In specialized literature, Block-chain technology is considered to have a number of benefits and, therefore, many researchers recommend it for use. This is very different from the foreign exchange market where only a few players such as central banks and large commercial banks dominate the market. The system is therefore more dependent on trust in central authorities and is vulnerable to a single point of failure, or a single point of attack.

We recall here the example of the failure, or Forex scandal, of 2015, when a few large banks and financial institutions joined together to fix foreign exchange rates, to the detriment of consumers and businesses, and to their own benefit.

One reason for the increased power held by these institutions, and therefore their ability to undertake manipulative schemes, is that they are the intermediaries for the centralization of funds and deposits. They control money and financial assets and, in this way, can determine developments, influence market changes.

There are recent developments in Block-chain which indicate that it can play a very important role in the future payment system. Thus, is the issuance of Basic, a cryptocurrency whose tokens can be firmly attached to a basket of arbitrary goods or assets. This coin has a more stable price than its predecessors such as Bitcoin, although it has not reached the same market capitalization.

To make Basic similar to the standard central bank currency, one could, for example, update Basic to a CPI consumer price index. This is done to algorithmically adjust the supply of Basic tokens in response to changes in the Basic exchange rate of the dollar, euro or other currencies.

A good example is that this aspect is still being researched in depth and some countries have already introduced instant payment services for multiple sovereign currencies, which are faster than Block-chain technology in processing transactions.

There is currently a 24/7 market for institutions that can access central bank money. The only requirement is that the institution meets the same eligibility criteria as for the Target model and makes payments directly with money in the central bank. This exercise has been carried out since 2019 in the European Central Bank. Here, then, is that currently the future of money and the money supply will go hand in hand, the functions will be maintained, but they will transform and, in this way, everything is aimed at the process of financial digitalization, the digitalization of the economy and the digitalization of activity in general.

Literature review

According to Blau (2017) the value of bitcoin depends on the self-fulfilment of the expectations of private agents regarding its trading. This implies that the introduction of a back-up guarantee would also reduce volatility. Moreover, a regulatory system designed to protect the currency and prevent it from speculative attacks and Ponzi games would increase its reliability and effectiveness as an alternative currency. Ciaian et al. (2016) find that technological advances and increased computing power have been an important factor for investors, resulting in an increased demand and price for bitcoin. Franco (2015)

highlights that in cryptocurrency, cryptography is used to secure and verify transactions, as well as to control the creation of new units of cryptocurrency. In a paper Gerba et al. (2018a) analysed the historical evolution of different aggregates. In another extensive empirical work, Gerba (2015) examined the evolution of money supply and monetary aggregates in quarterly frequency. Gerlach et al. (2018) traced the history of bitcoin peaks from 2012 to 2018. They used a robust automatic peak detection method that classifies the time series of prices into unbroken periods, growth on the one hand, and unbroken market contractions on the other. Moreover, they used the Lagrange regularization method to detect the beginning and end of a bubble episode. Under this approach, the draw-up is defined as the sequence of positive returns interrupted by negative returns no greater in amplitude than a previously defined tolerance level. Similarly, a draw-down is the sequence of negative returns that can be interrupted by positive returns no higher than previously established as a tolerance level according to the analysis done by Harras and Sornette (2011). The authors conclude that over a period of 6 years (2012-2018) there were three such larger developments (in 2013, 2014 and 2018) and ten smaller peaks. Volatility is another important price driver. Lahmiri et al. (2018) argue that the underlying nature of Bitcoin as a digital currency (and not fiat) means that it is vulnerable to higher volatility. Given the absence of the underlying sovereign guarantee (which in the case of fiat currency comes through the central bank), it is prone to greater speculative activity. Pieters and Vivanco (2017) argue that blockchain technology is perfect to facilitate efficient payment in systems in developing countries where the existing payment system is less credible and less developed.

Data, results and discussion

The preference for money, especially fiat currency, which has grown since the 2000s in both the Eurozone and the US, has not decreased as one might expect with the advent of cryptocurrency. This coincides with the launch of the euro in January 2002, suggesting that the issuance of the new currency increased the demand for it and its share of money as a whole.

By the end of 2021, the market capitalization of cryptocurrencies is just over EUR 1 trillion and is similar to the total size of currency in circulation in the third quarter of 2021 (at EUR 1.4 trillion). While the growth in total market capitalization has slowed somewhat since the last peak in 2018, in the not-so-distant future, activity in this market will exceed the size of the euro in the traditional foreign exchange market, which is showing its rapidly growing importance. In 2018, Bitcoin accounted for nearly 46% of the market.

Volatility is an important driver of price. Given the absence of a sovereign guarantee base (which in the case of fiat currency comes through the central bank), it is prone to greater speculative activity. This implies that the introduction of a reserve guarantee would reduce volatility. Moreover, a regulatory system aimed at protecting the currency and preventing it from speculative attacks would increase its reliability and effectiveness as an alternative money. Given the cross-border nature and use of cryptocurrency, the regulatory

architecture would require international coordination of both compliance and supervisory tasks, as argued by the International Monetary Fund and the Bank of England.

Several benefits of blockchain technology are considered in the specialized literature. Most prominent is its decentralized nature which makes it less prone to corruption and manipulation. Another important benefit is that blockchain transactions are less expensive and faster than normal fiat currency transactions. There are recent developments in blockchain that indicate that it may play a very important role in future payment systems. One of the last major documented benefits of blockchain is that payments are validated.

Bitcoin and other digital currencies can change the function of money. The limited new evidence collected so far may suggest that digital currencies are viewed primarily as stores of value and are not typically used as a medium of exchange. Currently, there is little evidence of digital currencies being used as units of account. Thus, digital currencies do not really function as money in the economy and involve some risks if they were to be used in the long term. Therefore, digital currencies in their current form are not likely to replace traditional money in any economy.

From a macroeconomic point of view, cryptocurrencies pose a risk to monetary and financial stability. From a microeconomic perspective, they involve a risk for investors, who could risk all their money. However, at present, the small size of digital currency schemes makes them unlikely to pose any real risks to financial stability. Risks to monetary stability could theoretically arise in the case of a digital currency that should achieve widespread use, but this is highly unlikely.

Private digital instruments have the following two advantages: firstly, they introduce fintech as a technology to reduce transaction costs in various fiat currencies, and secondly, in countries with underdeveloped financial systems where many consumers are excluded from the financial system, private digital currencies can contribute to financial inclusion.

The demand for a stable asset using DLT has opened the debate about the possibility of issuing a central bank digital currency. Central banks can take advantage of digital currency technology and still use monetary policy in its usual way. Digital currencies could be converted directly into cash and notes. However, this can also raise problems, questioning the role of banks in financing economic activity.

Stablecoins can be seen as an intermediate solution between privately issued cryptocurrencies and central bank digital currency. Given the volatility of cryptoassets and given the rest of the questions surrounding CBDCs, stablecoins have come to the fore as a potential third asset type that aspires to bring stability to the volatile cryptoasset market. However, stablecoins are still in their infancy and are therefore not a safe enough investment vehicle. Perhaps, with time and the refinement of various models in the future, they could end up replacing traditional digital currencies like Bitcoin or Ripple.

The fundamental role of money and the money supply

Before discussing the evolution of money and the role of digitization of cash and cryptocurrencies, we must first go back to the basics and define money in terms of its role and functions in an economy.

Despite a very large literature on money and much heated debate about its fundamental role for the overall economy, there is no single, unified definition. Probably because money has been at the centre of most of the battles in economic debates between different schools of thought, from having no role (the neutrality of money theorem) to being the basic ingredient, like the atom of an economic system (Minsky-Keynes, Marxism), this prevented economists from arriving at a unified view of money.

However, there is common ground that (most) schools of economics would agree on, namely the function of money in modern economic systems. We should spend some time pointing these out, and they will be crucial to understanding why money can change its form and nature of transaction without fundamentally altering its economic function or role.

There is broad agreement that the functions of money can be divided into three layers (primary, secondary, and tertiary), where each layer reflects the descending degree of direct functionality, but the increasing degree of generality and transcendence that money plays.

Primary functions refer to them as a medium of exchange and measure of economic value. Secondary functions reflect their role as a store of value and standard for payments. The tertiary layer reflects its contingent functions, such as the credit base, liquidity to wealth, income distribution, and utility measurement or maximization.

The most common function attributed to money is that of a medium of exchange, it facilitates the buying and selling of goods and services, thus eliminating the need for the double coincidence of desires as in the case of barter. A trading company that wants to sell wheat in exchange for rice can sell it for money and then buy rice, also for money.

Money also serves as a common measure of value. The values of various commodities are expressed in terms of money. This measure is universally accepted and standardized. Money as a measure of value made transactions simple and quick. As such, money serves as a unit of account.

Keynesian economists also emphasized the function of money as a store of value. Agents stockpile cash to meet contingencies. According to Keynes, people store money to take advantage of interest rate changes. Thus, money retains value over time and space. Money as a store of value implies the postponement of consumption into the future, and thus the connection between present and future times becomes essential.

In this sense, money becomes an asset because it is a claim. It is the most convenient way to claim such goods and services. Therefore, instead of keeping their wealth in the form of illiquid assets (houses, stocks, etc.), people prefer to keep their wealth in the form of money.

Currency (or cash) is the most liquid form of assets, meaning money can be very cheap and immediately exchanged for goods and services, and its value is stable at least for a short period of time. In fact, all assets such as bonds, savings accounts, treasury bills, government securities, stocks and real estate. They serve as stores of value, but differ in the degree of liquidity. In advanced economies, currency is stored in the form of bank deposits.

Money can also be viewed through a deferred payment standard. This function grew over time with the growth of credit-based trade. Therefore, a person who buys on credit agrees

to pay in the future when his invoices are due. As a result of this function, it also became possible to express future payments in terms of money. A borrower who borrows a certain amount now agrees to pay the same in the future.

Money facilitates the distribution of production in common among various factors. Moreover, a consumer as well as a producer measure the utilities of various goods and factors of production with the help of money.

In the financial system, money is the basis of credit. Banks create credit using cash/foreign reserves. These reserves are not only important for regulatory compliance, but also as means of counter-payment or offsetting balances during difficult or distressed times.

Monetary theory is a branch of economics that deals with explaining how the use of money, in various forms, affects the production, consumption, and distribution of goods.

For supporters of the theory of money, money is not just a means to facilitate the exchange of goods, but something more vital, affecting the general level of economic activity. According to them, the existence of a monetary sphere separated from activity is a fact of profound significance: what takes place in the monetary sphere can suddenly and dramatically influence the level and nature of employment, the return on capital and production. Money market activity affects the commodity market.

At first glance, the role of money does not seem to have changed with the introduction of virtual money. They still perform the same fundamental functions and remain closely linked to the commodity market.

The forces that determine the equilibrium level of money and employment continue unless the confluence of those forces in a physical or virtual market fundamentally alters them. The experience of a stock trader, moving from the physical to the virtual market, but without fundamentally changing the process of determining stock prices, proves this. On the other hand, unusual or atypical gathering such as negative deposit rates and persistently low market rates can fundamentally alter the forces in money markets and the role of money as a measure of value, store of value, standard of payments, or its functions contingent if it permanently modifies the request for it.

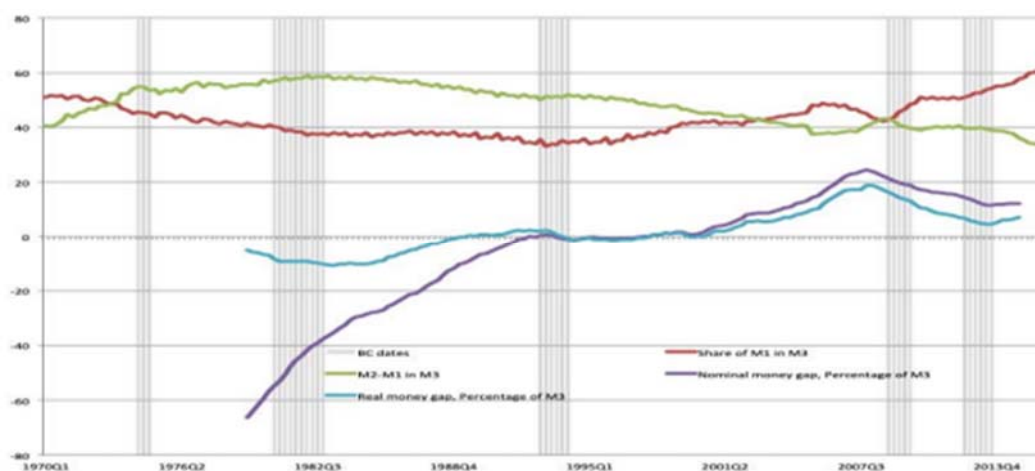
Monetary aggregates in the euro area

The ECB has put a lot of effort into understanding the historical development of money in the euro area, including extrapolating data on monetary aggregates back to 1970. The information included in monetary aggregates refers to money commonly denominated in a more aggregated economy representing narrow and most liquid money, while the smaller aggregates are broader but also include less liquid money. According to the official statistics of the ECB, the aggregates are:

- $M1 = \text{amount of currency in circulation} + \text{overnight deposits (at sight)}$.
- $M2 = M1 + \text{term deposits with a maturity of up to 2 years} + \text{repayable deposits of up to 3 months}$.
- $M3 = M2 + \text{repurchase agreement} + \text{money market fund shares} + \text{debt securities with a maturity of up to 2 years}$.

While the share of M2 in M3 has declined over time, in parallel the share of M1 has increased since the early 2000s. Bearing in mind that the euro was officially launched in January 2002, this means that the currency's importance has only increased since its launch, reaching over 60% at the end of 2014. Not only is it historically the highest share since 1970, but it is also in line with international standards. Moreover, the money gap was positive during the same period, implying an excess of liquidity above the equilibrium level. Taken together, this means that the preference for money, especially fiat currency, has increased since the 2000s in the euro area.

Figure 1. Aggregate monetary ratios – time evolution since 1970



Source: Gerba et al. (2018a).

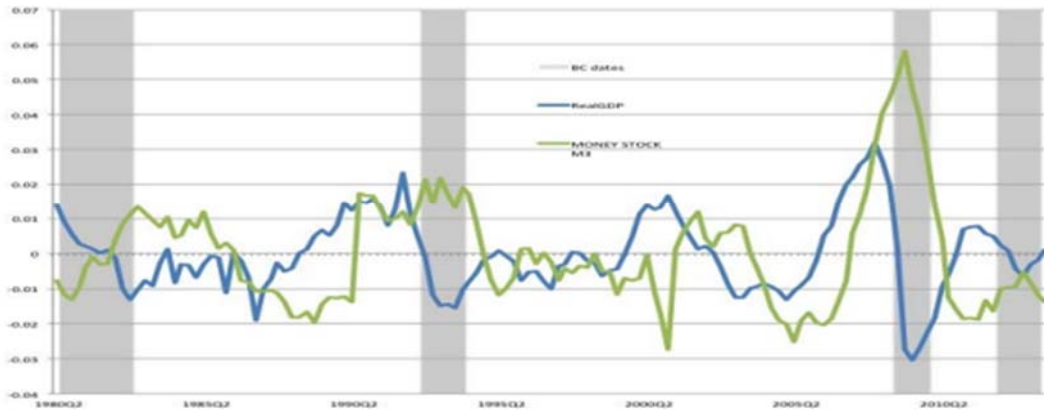
If we then turn to the evolution of money through the 1980 business cycle in Figures 2-4, we see some very interesting patterns. While liquid money (M1) follows the business cycle very well and actually leads, less liquid money, especially M3 is countercyclical and actually rises (falls) during recessions (expansions).

It appears that preferences for wider, less liquid money dominate in low-growth, contractionary environments. However, in expansions, the desire to spend increases and therefore money is more liquid. If we imagine for a moment that that preference for liquid money disappeared or the circulation of money decreased, then monetary aggregates would be a cyclical.

Both analyses point to the same conclusion: the amount of money and the preference for cash only increased over time, especially during expansions. In contractions, on the other hand, the preference for less liquid (but higher yielding) money dominates.

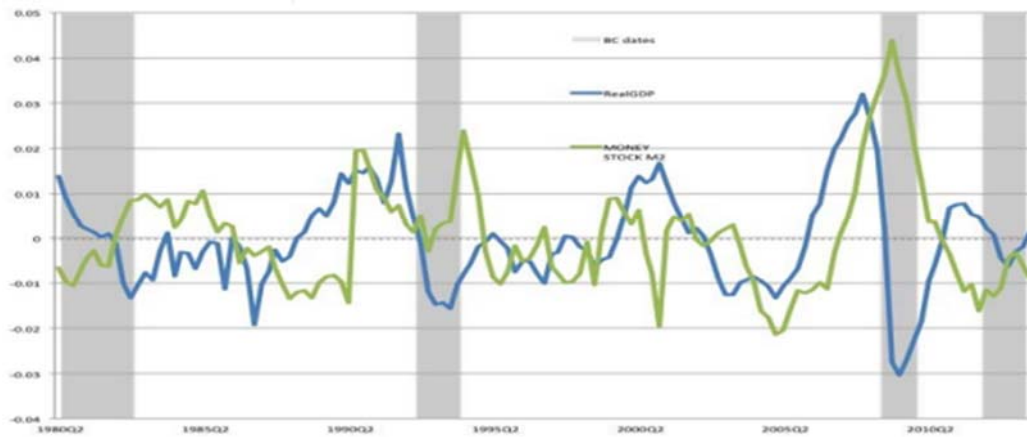
There may be some links between the current environment of low growth with negative interest rates and the demand for virtual (alternative) money, just as the relationships between economic activity and liquidity preferences may undergo fundamental changes.

Figure 2. The business cycle component of M3 since 1980 – compared to GDP



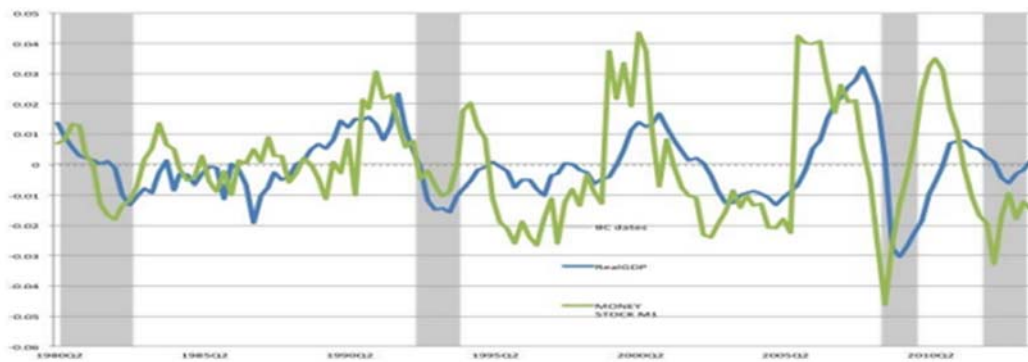
Source: Gerba et al. (2018a).

Figure 3. The business cycle component of M2 since 1980 – compared to GDP



Source: Gerba et al. (2018a).

Figure 4. The business cycle component of M1 since 1980 – compared to GDP



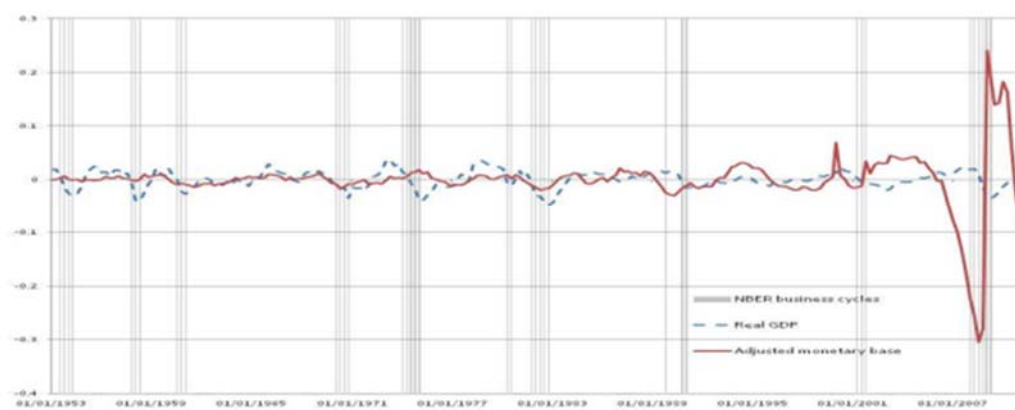
Source: Gerba et al. (2018a).

Monetary aggregates in the US

The availability of longer time series for the US allows us to examine money developments from a much broader perspective.

Figure 5 shows that for most of post-war history, the money supply closely followed the business cycle. Unlike the Eurozone, it lags slightly behind the cycle, but has a high correlation with it. However, since the beginning of 2000 it has intensified and become up to ten times more responsive, in particular the contraction of the money supply just before the 2007-2008 crisis and the subsequent readjustment are notably the largest in terms of historical view. Thus, there is evidence, even for the US, that the importance of currency and liquid (physical) money has just increased over the past two decades.

Figure 5. Money supply in the US – the business cycle component compared to GDP



Source: Gerba et al. (2018a).

We turn our attention to money in circulation. Similar to the Eurozone, we will find that M1 closely follows the business cycle, while M2 is generally countercyclical. Also, the cyclical fluctuations of M1 have intensified since the 1990s, becoming much more responsive to changes in the general economic environment. However, the same evolution is not observed in M2, implying that it is the currency, through the money supply, that is most responsive to business cycle conditions.

On the demand for money, the evidence is even stronger. The demand for currency became twice as large as before 2000. However, for the demand for less liquid money (M2), this change did not occur.

Summarizing the evidence, we observe the same pattern in the US money market as in the euro area.

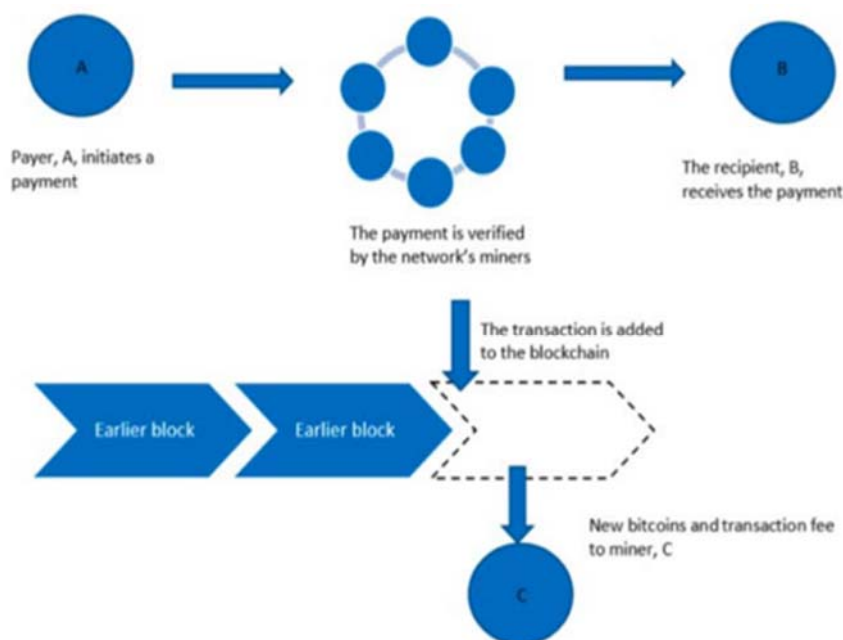
The demand and supply of M1 (currency) has increased in the last two decades and is very much, following the evolution of the economic cycle. Considering that at the same time the money supply is greatly intensified, it means that the preference and use of the currency simply increased.

Cryptocurrency: Risks and opportunities

A cryptocurrency is a type of unregulated digital currency that is issued and usually controlled by developers and used and accepted by members of a particular virtual community.

A bitcoin is essentially an entry in a public ledger shared by all participants in a network. Once an owner wants to transfer their bitcoin (or part of it) to a third party, to avoid double spending, the message is sent to all nodes in the network. It must be confirmed by a certain number of nodes against which the bitcoin is registered with the owner's name before the transaction is executed and then ownership is transferred to the new entry via an entry in the same public ledger. It is added as a block in the chain. Hence the name blockchain. Figure 6 explains the blockchain process.

Figure 6. Overview of the blockchain process

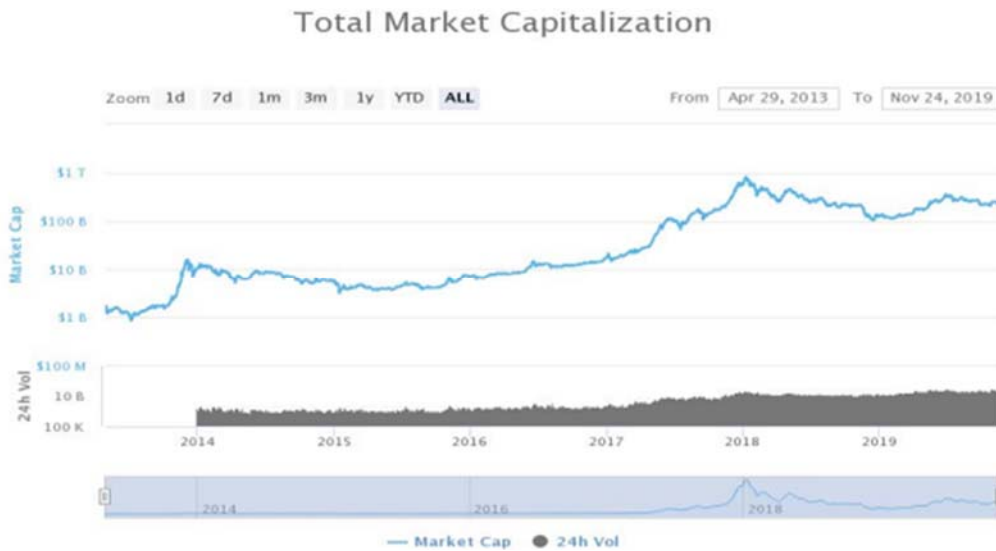


Source: Soderberg (2018).

The total cryptocurrency market capitalization has grown seriously since 2014 as depicted in Figure 7. It has practically increased 1000 times in less than 6 years. By the end of 2019, it is just under €1 trillion and similar in size to the total currency in circulation in the third quarter of 2019 (at €1.2 trillion). In 2020-2021, the cryptocurrency market followed the same course as the euro currency.

While the growth in total market capitalization has slowed somewhat since the last peak in 2018, in the not-so-distant future, activity in this market will exceed the size of the traditional Euro forex market, which is showing its rapidly growing importance.

Figure 7. Total cryptocurrency market capitalization (in EUR)



Source: Coinmarketcap.com

In 2018, Bitcoin accounted for nearly 46% of the market, or \$133 billion. Although its dominant position has been somewhat weakened since the early days of cryptocurrency in 2012, it is still the largest and most traded virtual currency on the market, as shown in Figure 8.

Because of this apparent leadership position, and its permanence for the foreseeable future, it is reasonable to focus to better understand the dynamics of that market.

Figure 8. Cryptocurrency market composition



Source: Coinmarketcap.com

According to studies, the spikes in the bitcoin market are the result of the search for safe assets, especially in the period of great uncertainty, which also explains the positive correlation between the VIX Index and the price of gold. In particular, given the low returns offered by safe alternative assets (e.g. Treasury bonds), investors were encouraged to diversify and invest in other assets, which also contributed to the increase in demand for bitcoin.

Given the cross-border nature and use of cryptocurrency, the regulatory architecture would require international coordination in compliance as well as oversight duties, as advocated by the International Monetary Fund and the Bank of England.

Blockchain technology

Several benefits of blockchain technology have been proposed in the literature. Prominent among most is its decentralized nature, which makes it less prone to corruption and manipulation. This is very different from the foreign exchange market, where only a few players such as central banks and large commercial banks dominate the market.

The system is therefore dependent on trust in central authorities and is vulnerable to a single point of failure or susceptible to a single point of attack. Examples of such failures is the Forex scandal of 2015, when several large banks and financial institutions conspired to fix foreign exchange rates to the detriment of consumers and businesses and to their own benefit.

One reason for the increased power held by these institutions, and therefore their ability to undertake manipulative schemes, is that they are the intermediaries for channelling their funds and deposits. They control money and financial assets. However, when the system is decentralized, there is less chance that such manipulation is possible, which clearly indicates a major benefit of blockchains in terms of reducing the monopoly power of financial institutions.

Another important benefit is that blockchain transactions are less expensive and faster than normal fiat currency transactions. For example, PayPal charges up to 3% for currency transactions and transfers. In the case of cryptocurrency, these fees are only a fraction of PayPal's and range from 0.1% to 0.25% (Underwood, 2016).

However, it should be noted that the existing lower costs are largely the result of a relative lack of regulatory requirements for blockchain transactions. If regulations are imposed in the future, these costs could also increase. This benefit of blockchain technology is also supported by other researchers, who concluded that the more frequent use of blockchain technology can help reduce infrastructure costs, as it requires relatively less human and technological resources, resulting in lower initial and maintenance costs.

There are recent developments in blockchain that indicate that it may play a very important role in future payment systems. A good example is the issuance of Basic, a cryptocurrency whose tokens can be firmly attached to a basket of arbitrary goods or assets. This coin has a more stable price than its predecessors (such as Bitcoin), although it has not yet reached the same market capitalization.

To make Basic similar to the standard central bank currency, one could, for example, peg it to the USD and update the peg to a Consumer Price Index (CPI). This is done through an algorithmic adjustment of the Basis token supply in response to, for example, changes in the Basic-USD exchange rate.

This allows authorities to implement monetary policy using cryptocurrencies similar to that executed by central banks around the world, but through a decentralized protocol applied to the algorithm.

A good example is that of Ripple, a system based on remittance services. TenX, a Singapore-based start-up is working with MasterCard and Visa to offer a system where payments are made to suppliers through the company's verification cards. The seller receives the bid in dollars. In addition, it appears that even the Federal Reserve has considered the possibility of introducing blockchain as a way to process the interbank payment system. However, at the back end, the virtual currency is converted into dollars by the company. The issue of whether authorities allow cryptocurrency transactions or sellers accept that cryptocurrency is bypassed.

One of the last big benefits documented with blockchain is that payments are validated 24/7. This is in stark contrast to the traditional payment system which normally issues only a few times a day and excludes weekends and public holidays.

Some countries have already introduced instant payment services for multiple sovereign currencies, which are faster than blockchain technology in processing transactions. One example is the TARGET Settlement Instant Payment, launched in the euro area at the end of 2018. It allows companies and individuals to transfer funds in seconds and regardless of their banks' opening hours. It functions as a 24/7 market for institutions that can access central bank money. Thus, the only requirement is that the institution meets the same eligibility criteria as for TARGET and makes payments directly with money in the central bank (ECB, 2019).

Conclusions

From the study of this article, "The future of money and the money supply", a series of conclusions emerge, mostly theoretical. First of all, the improvement of the economic system through digitization also refers to the financial system. In the financial system, the system of cryptocurrencies will be introduced, on an increasingly large scale, which will become a means of payment that is faster and more difficult to expose to the intervention of individuals concerned with breaking cards.

This system gives an additional guarantee that it will be much harder for the phenomenon of corruption and the use of the black market because the system is based on computer algorithms and does not leave the possibility for people to intervene, ensuring financial and monetary stability. Bitcoin and other digital currencies can, in principle, change some functions, but they cannot remove them.

On the other hand, this system using Block-chain technology provides a number of advantages to those who use it. First, its decentralized nature makes it less prone to evasion. Block-chain transactions are little expensive and quick to use compared to normal currency transactions. Block-chain can also play an important role in the future payment system. One of the last major documented benefits of Block-chain is that payments are validated and there is very little risk of being manipulated or subject to subversive, corrupt activities.

From a macroeconomic point of view, cryptocurrencies represent a risk for monetary and financial stability, and therefore from a macroeconomic and financial aggregates perspective, it is necessary to study the possibility of risks, identify them and take measures to avoid major risks.

References

- Blau, B.M., 2017. Price dynamics and speculative trading in bitcoin. *Research in International Business and Finance*, 41, pp. 493-499.
- Ciaian, P., Rajcaniova, M. and Kancs, D.A., 2016. The economics of BitCoin price formation. *Applied Economics*, 48(19), pp. 1799-1815.
- Franco, P., 2015. *Understanding Bitcoin: Cryptography, Engineering and Economics*. Chichester, West Sussex: Wiley.
- Gerba, E., 2015. *Have the US Macro-Financial linkages Changed? The Balance Sheet Dimension, in Financial Cycles and Macroeconomic Stability*, LAP Lambert Academic Publishing, Saarbruecken, Germany.
- Gerba, E., Jerome, H. and Zochowski, D., 2018a. *Structural Changes in the Euro Area: Evidence from a New Dataset*, Forthcoming in ECB Working Paper Series.
- Gerba, E., Jerome, H. and Zochowski, D., 2018b. How Profound are Euro Area Macro-Financial Linkages? Stylized Facts from a Novel Dataset, Forthcoming in ECB Working Paper Series.
- Harras, G. and Sornette, D., 2011. How to grow a bubble: A model of myopic adapting agents. *Journal of Economic Behavior and Organization*, 80(1), pp. 137-152.
- Lahmiri, S., Bekiros, S. and Salvi, A., 2018. Long-range memory, distributional variation and randomness of bitcoin volatility. *Chaos, Solitons & Fractals*, 107, pp. 43-48.
- Pieters, G. and Vivanco, S., 2017. Financial regulations and price inconsistencies across Bitcoin markets. *Information Economics and Policy*, 39, pp. 1-14.