The Effectiveness of the Monetary Policy in the Era of the Cryptocurrency and the Electronic Payments

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A R T I C L E I N F O	A B S T R A C T
	It is of common sense that the financial innovation swept the world of finance by the provision of a package of different financial products and services that have more capability to suit the needs of the customers in terms of dealing transactions (the transactions costs of the innovated financial products) and flexibility (the ease of the innovated financial products usage). The deep advancement of the information technologies has led to a new wave of clearing payments and managing the financial institutions. The emergence of the electronic payments and the digital monies coupled with the cryptocurrency and the blockchain era raises many debatable issues about the effectiveness of the monetary policy in regulating the money supply and achieving the macroeconomic goals. In this paper, we seek to analyze the effectiveness of the monetary policy in the era of the financial innovation and the digital payment system.

1. Introduction

The monetary policy is a strategy adopted by the central banks as the ultimate organization to sustain the stability of prices, the rational conduct of the inflation and achieve the macroeconomic goals (Fernando da Silva Vinhado et al, 2019; Daniel L Thornton, 2014; Friedman B.M, 1999; Woodford M, 1999; Miles Kimball, 2017; Thomas Matthys et al, 2020. To meet these goals, it adopts a package of different instruments and techniques (Open Market Operations, Standing Facilities and Reserve Requirements). These instruments are coupled and managed rationally in an attempt to achieve the macroeconomic objectives especially those related to the price stability, the stabilization of the business cycles, the fastening of the economic growth and the exchange rate stability (Michiel De Pooter et al, 2021; Nathan S. Balke et al, 2021; Ping He et al, 2008; Aleksander Berentsen et al, 2018; Vincent Sterk et al, 2018). On the other hand, the continual expansion size of the different economies in terms of transactions (the volume of the dealings treated in an economy for one year as an index for valuing the scope of the economy) and behaviors (the continual sophisticated patterns of the consumption behaviors and the relentless advancement of the economic agents literacy) coupled with the outburst of the financial crises especially the crisis of 2008 led to rethink the ways and processes of how the financial transactions are dealt between agents (Yiping Huang et al, 2021; Schularick M et al, 2012). In this regard, the financial innovation witnesses an unprecedented wave of progress and coverage. The financial innovation by this sense denotes the creation of new financial instruments, processes, technologies, institutions and markets more able to come up with the challenging demands of the customers on one hand; and to manage rationally the risks incurred from the financial transactions (Hui An et al, 2021; Farah Waheed et al, 2021). The financial innovation covers the design of new financial products and securities like the options, swaps and derivatives; and the different digital payment devices as Credit Cards, Digital Wallets, PayPal, ATM (Automated Teller Machine), ACH (Automated Clearing House). These devices and processes emanated from the deep impacts of the technology on the financial arena raises many questions about the discretionary power of the monetary authority to handle the monetary system in favor of the macroeconomic objectives especially those concern with the stabilization of prices and growth enhancement (Özlem Durgun et al, 2015; Yong Ma, 2018; Archer, D, 2006; Arnone M et al, 2004). In this paper, we discuss the effects of the financial

innovation and cryptocurrency on the transmission channels of the monetary policy and its effectiveness by identifying first the financial innovation and the cryptocurrency and second exposing the different impacts of the financial innovation on the transmission channels of the monetary policy namely the interest rate channel and the credit view channel.

2. The Financial Innovation and the Cryptocurrency

The bulk of the technological advancement in the financial arena has created an unprecedented wave of instruments and processes of dealing the financial transactions and transferring risks and giving the financial institutions a more leverage capability to raise equity capital less costly (Al-Laham et al, 2009; Jack et al, 2010; Mario D, 2007; Tatom et al, 1990; Thomas I. Palley, 2015). Three distinguished features of the institutional financial innovation process (the corporate banking and institutions) are observed: The Investment Crowdfunding, remittances and mobile banking (Yu Luo, 2017; Cristiano Boaventura Duarte, 2020; Blinder, A, 2017). The former feature designates the situation where the increase of the corporate equity is allowed to all kind of investors and not restricted only to the big ones. The financial innovation in the context of raising equity becomes more easy and democratic. The crowdfunding issue facilitates the funding of various corporate institutions and permits to raise unequivocally the entrepreneurial ventures in terms of decreasing the cost of capital, boosting reputation, marketing the institution and enlarging the audience of the institution. This fact paves the way for a rational and an efficient feedback. Remittances on the other hand are one of the outcomes of the financial innovation and it is described by the fund transfer by a foreigner or community to his own country. It is by then a process of sending back the expatriated funds through the technological devices like Western Union, World Remit and Ria Money Transfer. The last institutional trait of the financial innovation is represented by the mobile banking which means enabling the consumers to manage their banking operations by using specific offered application in smartphones or tablets. Many operations are undertaken by using the mobile baking transactions like the funds transfer and deposit checking. In this regard, the mobile banking is coupled with other financial devices like ATM (Automated Teller Machine) to allow the customer withdrawing their funds in cash. In addition to this, the technology progress and its application on finance gives rise to a new mode of digital cash and monies, and this *fashion* witnessed a great outburst especially with the advancement of the internet (Peter Bernholz et al, 2014). According to Jan Lansky, the cryptocurrency system should come up with the following conditions: (1) the absence of any discretionary authority that dictates obligations, commitments and orders, (2) The cryptocurrency system itself has the power to control the digital units and monitor their ownership processes, (3) In case when new cryptocurrency unit is created, the only system which has the power to determine the origin and the ownership of this unit, (4) the crypto graphical ownership of the cryptocurrency is only exclusive and not available to everyone, (5) The cryptocurrency system allows dealing transactions when the cryptographic ownership of the unit is changed and the transaction bill is not issued only by an entity proving the ownership of the unit, (6) The cryptocurrency system selects only one instruction in case when two or more instructions entered simultaneously for the cryptocurrency change unit (Saifedean Ammous, 2018; Léo Malherbe et al, 2019; James R. Barth et al, 2020). The following picture figures out the steps of the transaction dealt inside the cryptocurrency system:
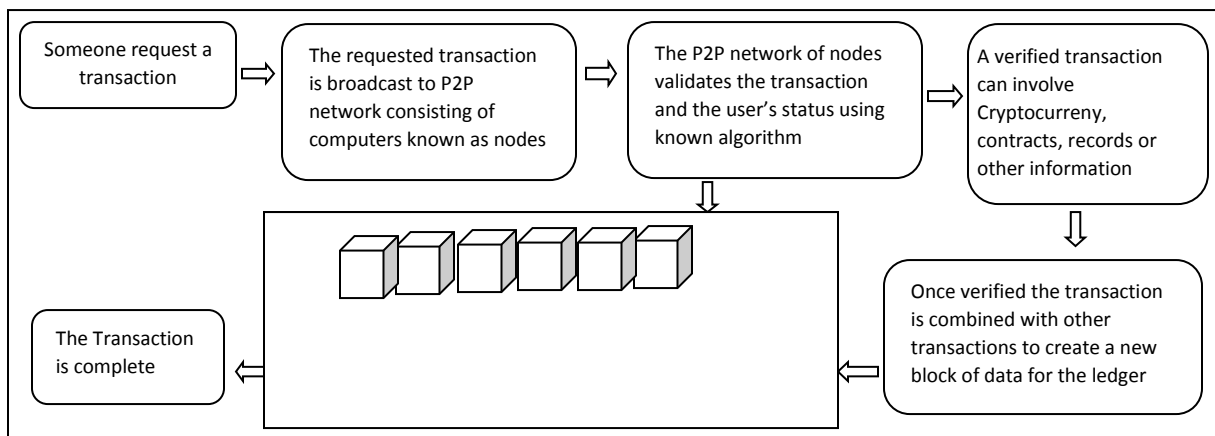

Figure 1: Transaction steps in Cryptocurrency System

It is evidently clear that the cryptocurrency system is designed in attempt to avoid the transaction third party and as a consequence, it is based on peer-to-peer transaction. This mode of this cashless and decentralized system of payment poses serious and challenging issues for the discretionary power that the monetary authority enjoys. The overwhelming presence of the cryptocurrency system and the digital monies in the financial transactions leads to change the functional mode of the financial institutions inside the financial system because the agents become freer in dealing transactions and the network permits the peer-to-peer consensus without the need to third party. However, on the other side the rules of the game are not yet clear, the fact that arises critical suspicions about the credibility and safety of this kind of operations. This issue makes the monetary authorities in a difficult situation full of unpredictability in controlling and monitoring the monetary policy mechanism such as interest rates, reserve requirements and the open market operations.

3. The cryptocurrency, digital money and the monetary policy

The monetary policy by this sense is a package of different tools, institutions, instructions and instructions applied on the monetary base in attempt to serve the development and the macroeconomic objectives. The authority of the monetary policy is the central bank that owns the discretionary power to control the interest rates and direct the money supply by using the implementation tools like the reserve requirements, the open market operations, the standing facilities and the interest rate.

3.1. The monetary policy, the reserve requirements and the digital money

The importance of the reserve requirements as a directive tool of the monetary policy stems from the fact that the central bank is the bank of the last resort or the last lender. This situation obliges the banks of the second rank to keep financial fraction reserve as deposits in their account at the central bank. The amount of these reserves is determined by a ratio fixed by the central bank to manage the money supply through the credit facilities channel (Xiaoyun Wei et al, 2020; et al, 2017; John H Cochrane, 2014; Pierre Richard Agénor et al, 2018). The increase of the digital monies and the cryptocurrency systems lead the liabilities of banks to become no more a subject of the traditional liabilities per see (cash deposits especially those of short and medium terms) but they are shrunk because of the usage of the digital monies and the cryptocurrency system that permits the peer to peer transaction without the existence of the third party. In addition to this, the increase of the technological advancement platforms and the financial innovation raise many financial alternatives eligible to accomplish the transactions such as the derivative securities. This issue decreases the intent of holding traditional liabilities and to be transformed towards holding and investing in the different derivative securities, and formulating financial portfolios. The portfolio holding decreases the amount of the banking liabilities and as a result, it curtails the effectiveness of the reserve requirement ratio as a directive tool of the money supply. The change in the volume of the banks liabilities (deposits) which is due to the crowding effect of the digital money and the financial portfolio holdings leads to destabilize the financial system and contract its stability. The decrease of the liabilities volume pushes the monetary authority to increase the level of the reserve requirement in order to maintain the stability but the pressure of this ratio is reflected much upon the lending rates. The increase of the lending rate cause by higher reserve requirement leads the banks to promote higher riskier projects and borrowers as a belief that they generate higher returns and compensate the higher rate of the reserve requirements. This issue (the shifting of the risk paradigm) conducts the banking failure and threatens the financial stability. In addition to this, the higher rate of the reserve requirement affects badly the financial leverage of the bank institutions; the fact that encourages them to be shifted into holding riskier portfolios and as a consequence, unpredictable outcomes may dominate the scene. Let us consider that the bank adopts a risk shifting process due to the increase of the reserve requirement and chooses to invest in higher portfolio returns. In the traditional from the balance sheet of the bank is represented by:

$D = L_{/D}$ denotes deposits and L represents loans. Let us consider the r_D is the deposit interest rate and r_L is the loan inerest rate. The bank compensates the depositors and the borrowers are required to pay back the loan as follow:

$(1+r_D)D = (1+r_L)L$ in zero sum game but practically it is not the case. The banks endeavors to maximize the returns of the loans and manage rationally their deposits, which means that:

$(1+r_L)L \succ (1+r_D)D$ The gap between the loans returns and the deposits cost determines the financial leverage of the bank. The bank stability means that the bank conducts rationally the financial leverage for the longest possible period. The central bank obliges the banks of the second rank to keep a reserve fraction of their deposits through the reserve requirement φ , so the reserve fraction in general form is given by:

$FR = \varphi D$ after subtracting the required fraction reserve, the bank is able just to lend the $(D - \varphi D)$ at cost r_L

then the financial reward of the bank from the credit management CR_R is :

$CR_R = (D - \varphi D)r_L$ The bank in this situation tends to maximize the returns of its loans regarding the costs of the deposits and the financial leverage FL is the gap between the bank reward and the deposits management as follow:

$FL = \dfrac{(D - \varphi D)r_L}{(1 + r_D)D}$ The bank now tends to maximize the financial leverage from $t_{=0} \to n$ in an attempt to maintain the financial stability under the condition of the reserve requirement enactment. The bank maximizes the following system:

$$\begin{cases} MAX\ FL_t = \int_0^\infty \dfrac{(D_t - \varphi D_t)r_{Lt}}{(1 + r_{Dt})D_t} d(r_{Lt}) \\ (r_{Lt}, r_{Dt}, \varphi) \in \square^+ \end{cases}$$ which means that the bank strives to improve continuously the financial

leverage regarding the rate of deposits, the rate of loans and the preset ration of the reserve requirement. The advancement of the financial innovation and the wide usage of the digital money and peer-to-peer transaction system led to shrink the deposit base used as a financial resource for lending credits and realizing profits. In addition to this, the monetary authority in an attempt to maintain its control on the monetary system tries to increase the reserve requirement, the fact that pushes the banks to invest in alternative riskier portfolios to compensate the reserve requirement and the financial innovation incurred losses. In this situation, the deposit base of the bank used as a credit platform is given by: $\left[D - \varphi D - \beta(D - \varphi D)\right]$ in which β denotes the deposit fraction addressed to be invested in the financial portfolio, which equals to $FP = \beta(D - \varphi D)$. In this case, the bank tends to maximize the above system regarding the risks of the invested financial portfolio and the increase of the reserve requirement as follow:

$$\begin{cases} MAX\ FL_t = \int_0^\infty \dfrac{(D_t - \varphi D_t - \beta(D_t - \varphi D_t))r_{Lt}}{(1 + r_{Dt})D_t} d(r_{Lt}) \\ (r_{Lt}, r_{Dt}, \varphi, \beta) \in \square^+ \end{cases}$$, the increase rate of the reserve requirement and the

higher risk of the financial portfolio investment decreases the monetary base of the bank on one hand and destabilizing its financial leverage:
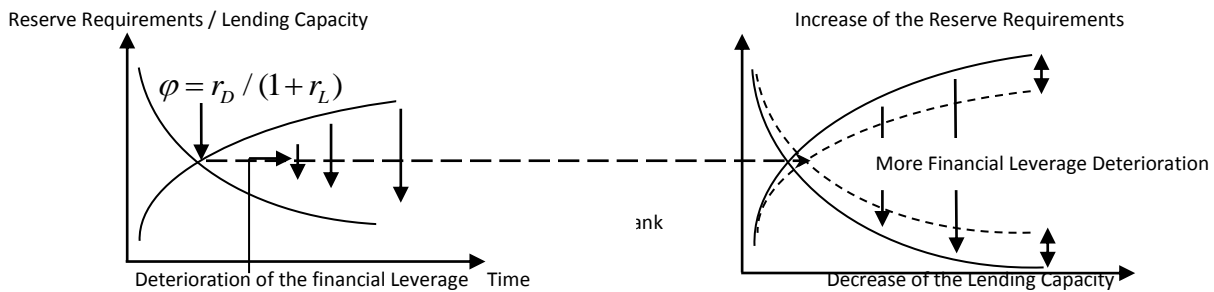

Figure 2: The Financial Leverage and the Reserve Requirements

3.2. The monetary Policy, the Open Market Operations and the Digital Money

The open market operation is the second process adopted by the authority of the monetary policy to conduct and manage the money supply. It consists of selling and buying securities at the financial market. The objective of this operation is to conduct the interest rates and the real economy consequently. In this context, two positions are undertaken: the seller position and the buyer one. The former means that the central bank sells securities and financial assets and therefore the money supply decreases by the amount of the financial assets sold (Toshihiro Ihiro, 1982; Richard A. Highfield et al, 1996; Michael Dotsey, 1986). This operation leads to shrink the volume of money in

circulation and the deposit account of banks, which decreases their lending capacity to the economy. Conversely, the central bank may take the position of an asset purchaser. This situation leads to increase the monetary base in the economy by the value of the assets bought. In addition to this, the purchasing position leads to credit the deposit accounts of the banks, the fact that increases their lending capacity. The lending and deposit interest rates of the banks change according to the positions undertaken by the central bank in open market operations. In seller position, the deposit account of banks are contracted by value of the assets sold by the central bank and as consequence, the interest rate rises in order to maintain the stability between the monetary base, the financial assets sold and the real economy. In buyer position, the deposit account of banks are expanded and credited by the value of the purchased financial assets, this situation leads to strengthen the capacity of banks to lend money and lending interest rate decreases consequently to maintain the financial and monetary stability. The financial Innovation in the context of the open market operations has twofold effects. The first is that it facilitates the buying and selling the different package of securities through the advancement of the technological platforms and the wide scope of the securities offered (derivatives, swaps, and options). The second effect, the financial technology advancement waned the discretionary power of the central bank through the intervention in the open market operations. In fact, the lending capacity of banks is not only affected by the volume of the assets sold and bought but the existence of the shifting process to invest in financial portfolios by the banks has in its own right a remarkable effect. Let us consider FA_b, FA_s the financial assets bought and sold by the central bank in open market operations. In purchasing position, the lending capacity of the banks is given by:

$LC = D - \varphi D + FA_b$ (The purchase of assets increase the crediting process of banks) and consequently the banks under the financial innovation and the digital payments system tends to maximize the following system:

$$\begin{cases} MAX\ FL_t = \int_0^\infty \dfrac{(D_t - \varphi D_t + FA_b - \beta(D_t - \varphi D_t))r_{Lt}}{(1+r_{Dt})D_t} d(r_{Lt}) \\ (r_{Lt}, r_{Dt}, \varphi, \beta) \in \square^+ \end{cases}$$ and taking into account the multiplier effect of

money creation because of the deposit account expansion. The selling position of the central bank leading the banks of the second rank to maximize the system:

$$\begin{cases} MAX\ FL_t = \int_0^\infty \dfrac{(D_t - \varphi D_t - FA_s - \beta(D_t - \varphi D_t))r_{Lt}}{(1+r_{Dt})D_t} d(r_{Lt}) \\ (r_{Lt}, r_{Dt}, \varphi, \beta) \in \square^+ \end{cases}$$ This case the multiplier effect is bigger than the

multiplier effect of the purchasing position in order to compensate the loss of lending capacity due to the selling position. The interest rate changes according to the lending capacity of the banks. The purchase position leads to decrease the borrowing interest rate in order to cumulative rates of inflation and maintain the stability of the economy. In the contrary case (the selling position), the deposit accounts of the banks are shrunk and as a consequence the interest rate rises as a strategy to stabilize the inflation rate, the offering of credit and the real economy. The effect of the financial innovation in conducting the interest rate is correlated by the response velocity of the banks to the effects of the open market operations, the uncertainty of the environment, the financial literacy and the incentives of the economic agents and the transparency of the monetary policy transmission channels. The following figure the change of banks' lending capacity according to the purchasing and the selling position of the central bank:
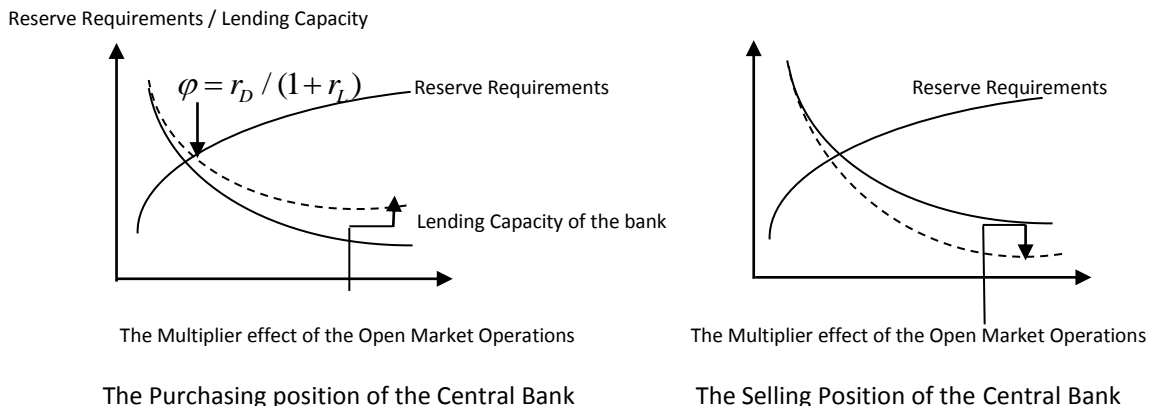

Figure 3: The Selling and Purchasing Position and the Banks' Lending Capacity

3.3. The standing Facilities and the Effectiveness of the Monetary Policy

The standing facilities is a monetary policy considered as a bank alternative to cover the short-term liquidity requirements. This operation is undertaken by the central bank counterparties in the overnight market within a corridor determined by the deposit facility rates and the lending facility rates. In this case, the width between the lending rate and the deposit rate conducts the liquidity availability and the excess reserve. These rates present a ceiling floor for the money market interest rate because there is no limit to excess this kind of alternatives (the lending facility especially). As a result, the rates (overnight lending and deposit) are used to manage the volatility of the short-term liquidity (Uwe Vollmer et al, 2016; Viral V. Acharya et al, Douglas D. Davis et *al*, 2020). The rates of the lending and the deposit facilities between the banks at short term at the overnight markets allow the central bank to envision the movement of the market credit rate to be predicted at the long terms. One attempt adopted by the central bank to manage the fluctuations of the overnight market is to allow banks to borrow from the central bank at rate higher than the policy rate market or to make deposit at the central bank at rates lower the overnight market. This corridor managed by the central bank is an *intervening widow* adopted by the central bank to curtail the unmanaged reserves and the high fluctuations of the interest rates. Henceforth, the monetary authority is faced by two uncorrelated interest rates (the policy rate and the overnight market rate) to achieve the monetary and the macroeconomic targets. In addition to this, the overnight market is characterized by a large extent of unsecured loans unless in the situation when the collateral is required and the probability of default is existed with a high magnitude. The contagion effect inside the overnight market is an evident issue as the bankruptcy of a bank or its inability to meet its commitments toward the other banks in the overnight market network may exacerbate the contagion to the whole network. This fact leads undoubtedly to destabilize the discretionary power of the monetary authority to conduct the interest rates in favor of the monetary and the real macroeconomic targets. Let us consider D_{OM}, L_{OM} the bank's deposits and the lending processed at the overnight market at r_{D^*}, r_{L^*} r_{D^*}, r_{L^*} (the overnight market deposit and lending rates respectively). Then the total deposit is:

$D = D_M + D_{OM}$ which means that it equals the deposit at the policy monetary market rate r_D and the deposit of the overnight rate and the lending is: $L = L_M + L_{OM}$, at the equilibrium state, the central bank conducts the monetary authority to maintain the interest rates corridor stability (the spread between the monetary policy rate and the overnight market rate) which means that the objective of the central bank is:

$D_M + D_{OM} = L_M + L_{OM}$ through the rational management of the interest rates. The reward of the deposit returns and the lending costs respectively is determined by:

$$\begin{cases} R_M = (1+r_M)D_M + (1+r_{D^*})D_{OM} \\ R_L = (1+r_L)L_M + (1+r_{L^*})L_{OM} \end{cases}$$ in order to maintain the stability of the monetary policy and the overnight

market interest rates for both the deposit and the lending processes, the monetary authority attempts to absorb the fluctuations of the short term interest (the overnight rates) which means that the difference between the rates should be managed carefully:

$$r_L - r_M = \frac{R_L - (1+r_{L^*})L_{OM} - L_M}{L_M} - \frac{R_M - (1+r_{D^*})D_{OM} - D_M}{D_M}$$, So the stability of the monetary policy under

the fluctuation of the short-term interest rates is ensured if:

$$\lim_{t \to \infty} f(t_\theta) = 0 / f(t_\theta) = \theta_t(r_L - r_M).t$$ where θ is the fluctuation rate and t is the time factor. In case of the

financial innovation the fluctuation of the overnight interest rate is more volatile and harder to be managed .This is due especially to the facilities offered to the banks through the financial innovation to invest in the financial portfolios to come up with the various banking commitments. These portfolios are dealt in markets with higher rates of risks:
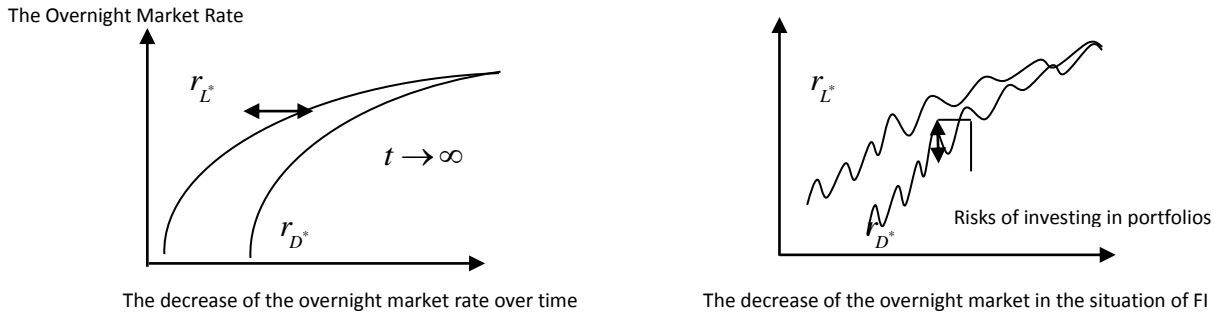
The Overnight Market Rate

The decrease of the overnight market rate over time

The decrease of the overnight market in the situation of FI

Figure 4: The standing Facilities and the Effectiveness of the Monetary Policy

4. Conclusion

This paper discusses the effectiveness of the monetary policy in an era when the financial innovation and the different technological platforms dominate the scene. It is undoubtedly to assert that the financial innovation make the payment processes and the financial transactions easier in terms of execution (the time and the effort spent in dealing transaction) and adaptability (the financial innovation devices are more able to cater the consumers' behaviors and tastes). However, the innovation in finance poses challenging issues for the monetary authorities to handle rationally the monetary aggregate in favor of the real economy. This is due to the fact that FI gives rise to other financial alternatives for the banks and agents alike to invest in financial portfolios with higher risks and unpredictable trends. This issue led the interest rate (one of the most significant tools of the monetary policy) to be more volatile and takes aberrant trend which makes the fact of steering and managing the monetary policy a serious endeavor.

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References

[1]   Aleksander Berentsen., Sébastien Kraenzlin and Benjamen Mûller, (2018), "Exit Strategies for Monetary Policy" *Journal of Monetary Economics* 99, pp20-40, Available at: https://doi.org/10.1109/TEC.2006.875468

[2]   Al-Laham, Mohamad, Haroon Al-Tarawneh, and Najwan Abdallat, (2009), "Development of Electronic Money and Its Impact on the Central Bank Role and Monetary Policy" *Issues in Informing Science and Information Technology 6*, pp339–349, Available at: https://doi.org/10.1109/TEC.2006.875468

[3]   Archer, D, (2006), "Implications of Recent Changes in Banking for the Conduct of Monetary Policy" *BIS Papers 28,* pp123-151, Available at: https://doi.org/10.1109/TEC.2006.875468

[4]   Arnone, M., and L. Bandiera, (2004), "Monetary Policy Monetary Areas and Financial Development with Electronic Money" *IMF Working Paper*, WP/04/122, Available at: https://doi.org/10.1109/TEC.2006.875468

[5]   Blinder, A., M. Ehrmann, J. de Haan, and D.-J. Jansen, (2017), "Necessity as the Mother of Invention: Monetary Policy After the Crisis" *Economic Policy* 32 (92), pp707–755, Available at: https://doi.org/10.1109/TEC.2006.875468

[6]   Cristiano Boaventura Duarte, (2020), "Alternative Monetary Targets, Instruments and Future Monetary Policy Frameworks" *Review of Political Economy* 31(4), pp582-601, Available at: https://doi.org/10.1109/TEC.2006.875468

[7]   Daniel L Thornton, (2014), "Monetary Policy: Why Money Matters (and Interest Rates don't)" *Journal of Macroeconomics 40,* pp202-213, Available at: https://doi.org/10.1109/TEC.2006.875468

[8]   Douglas D. Davis, Oleg Korenok, John P. Lightle and Edward S. Prescott, (2020), "Liquidity requirements and the interbank loan market: An Empirical Investigation" *Journal of Monetary Economics 115*, pp113-126, Available at: https://doi.org/10.1109/TEC.2006.875468

[9]   Farah Waheed and Abdul Rashidn, (2021), "Credit Frictions, Fiscal Imbalances, Monetary Policy Autonomy, and Monetary Policy Rules" *The Journal of Economic Asymmetries 23,* pp1-18, Available at: https://doi.org/10.1109/TEC.2006.875468

[10] Fernando da Silva Vinhado and Jose Angelo Divino, (2019), "Interactions between monetary and macroprudential policies in the transmission of discretionary shocks" *North American Journal of Economics and Finance 50,* pp1-16

[11] Friedman B. M, (1999), "The Future of Monetary Policy: The Central Bank as an Army with only a Signal Corps ?" *In. Finance 2(3),* pp321-338, Available at: https://doi.org/10.1109/TEC.2006.875468

[12] Hui An, Ruibo Yang, Xuejiao Ma, Siqi Zhang and Sardar M.N. Islam, (2021), "An evolutionary game theory model for the inter-relationships between financial regulation and financial innovation" *North American Journal of Economics and Finance 55,* pp1-15, Available at: https://doi.org/10.1109/TEC.2006.875468

[13] Jack, William, Tavneet Suri and Robert Townsend, (2010), "Monetary Theory and Electronic Money: Reflections on the Kenyan Experience" *Economic Quarterly 96 (1),* pp83–122, Available at: https://doi.org/10.1109/TEC.2006.875468

[14] James R. Barth, Hemantha S. B. Herath and Tejaswini C. Herath, Pei Xu, (2020), "Cryptocurrency valuation and ethics: a text analytic approach" *Journal of Management Analytics 7(3),* pp367-388, Available at: https://doi.org/10.1109/TEC.2006.875468

[15] John H Cochrane, (2014), "Monetary Policy with Interest on Reserves" *Journal of Economic Dynamics and Control 49,* pp74-108, Available at: https://doi.org/10.1109/TEC.2006.875468

[16] Léo Malherbe, Matthieu Montalban, Nicolas Bédu and Caroline Granier, (2019), "Cryptocurrencies and Blockchain: Opportunities and Limits of a New Monetary Regime" *International Journal of Political Economy 48,* pp127-152, Available at: https://doi.org/10.1109/TEC.2006.8

[17] Michael Dotsey, (1986), "Wealth Effects of Open Market Operations and Optimal Monetary Policy" *Journal of Monetary Economics 17,* pp225-238, Available at: https://doi.org/10.1109/TEC.2006.8

[18] Michiel De Pooter, Giovanna Favara, Michele Modugno and Jason Wu, (2021), "Monetary policy uncertainty and monetary policy surprises" *Journal of International Money and Finance 112,* pp1-16, Available at: https://doi.org/10.1109/TEC.2006.8

[19] Miles Kimball, (2017), "Next Generation Monetary Policy" *Journal of Macroeconomics 54,* pp100-109, Available at: https://doi.org/10.1109/TEC.

[20] Mitsuru Iwamura and Tsutomu Watanabe, (2017), "Electronic Money and Monetary Policy" *Japanese Economy 33(4),* pp65-74, Available at: https://doi.org/10.1109/TEC

[21] Nathan S. Balke, Enrique Martínez-García and Zheng Zeng, (2021), "In no uncertain terms: The effect of uncertainty on credit frictions and monetary policy" *Economic Modelling 100,* pp1-24, Available at: https://doi.org/10.1109/TEC

[22] Özlem Durgun and Mustafa Caner Timur, (2015), "The Effects of Electronic Payments on Monetary Policies and Central Banks" *Procedia - Social and Behavioral Sciences 195,* pp1-24, Available at: https://doi.org/10.1109/TEC

[23] Pierre Richard Agénor, Koray Alper and Luiz Pereira da Silva, (2018), "External Shocks, Financial Volatility, and Reserve Requirements in an Open Economy" *Journal of International Money and Finance 83,* pp23-43, Available at: https://doi.org/10.1109/TEC

[24] Ping He, Lixin Huang and Randall Wright, (2008), "Money, Banking and Monetary Policy" *Journal of Monetary Economics 55,* pp1013-1024, Available at: https://doi.org/10.1109/TEC

[25] Richard A. Highfield, Maureen O'Hara and Bruce Smith, (1996), "Do Market Operations Matter? Theory and Evidence from the Second Bank of the United States" *Journal of Economic Dynamics and Control 20,* pp479-519, Available at: https://doi.org/10.1109/TEC

[26] Saifedean Ammous, (2018),), "Can Cryptocurrencies Fulfil the Functions of Money" *The Quarterly Review of Economics and Finance 70,* pp38-51, Available at: https://doi.org/10.1109/TEC

[27] Schularick M and Taylor A M, (2012), "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870-2008" *The Am. Econ. Rev 102 (2),* pp1029-1061, Available at: https://doi.org/10.1109/TEC

[28] Tatom John A, (1990), "The Effects of Financial Innovation on Checkable Deposits, M1 and M2" *The Federal Reserve Bank of St. Louis Review 72 (4),* pp37–57, Available at: https://doi.org/10.1109/TEC

[29] Thomas I. Palley, (2015), "The E-Money Revolution: Challenges and Implications for Monetary Policy" *Journal of Post Keynesian Economics 24(2),* pp217-233, Available at: https://doi.org/10.1109/TEC

[30] Thomas Matthys, Elien Meuleman and Rudi Vender Vennet, (2020), "Unconventional Monetary Policy and Bank Risk Taking" *Journal of International Money and Finance 109,* pp1-17, Available at: https://doi.org/10.1109/TEC

[31] Toshihiro Ihiro, (1982), "The Dynamics of Open Market Operations and the Assignment Problem" *Journal of Macroeconomics 4(2),* pp179-194, Available at: https://doi.org/10.1109/TEC

[32] Vincent Sterk and Silvana Tenreyro, (2018), "The Transmission of Monetary Policy through Redistributions and Durable Purchases" *Journal of Monetary Economics 99,* pp124-137, Available at: https://doi.org/10.1109/TEC

[33] Viral V. Acharya, Michael J. Fleming, Warren B. Hrung and Asani Sarkar, (2017), "Dealer financial conditions and lender-of-last-resort facilities" *Journal of Financial Economics 123,* pp81-107, Available at: https://doi.org/10.1109/TEC

[34] Woodford M, (1999), "Optima Monetary Policy Inertia" *The Manchester School 67(1),* pp1-35, Available at: https://doi.org/10.1109/TEC

[35] Xiaoyun Wei and Liyan Han, (2020), "Targeted Reduction in Reserve Requirement Ratio and Optimal Monetary Policy in China" *International Review of Economics and Finance 69,* pp209-230, Available at: https://doi.org/10.1109/TEC

[36] Yiping Huang, Xiang Li and Chu Wang, (2021), "What does peer-to-peer lending evidence say about the Risk-Taking Channel of monetary policy?" *Journal of Corporate Finance 66,* pp1-35, Available at: https://doi.org/10.1109/TEC

[37] Yong Ma, (2018), "Financial Development, Financial Structure, and the Growth Effect of Monetary Policy: International Evidence" *Global Economic Review 47(4),* pp395-418

[38] Yu Luo, (2017), "The monetary root of financialisation" *Economic and Political Studies 5(1),* pp41-59, Available at: https://doi.org/10.1109/TEC