
Munich Personal RePEc Archive

Modeling the impact of Coronavirus uncertainty on bank system vulnerability and monetary policy conduct

Ben salem, salha and slama, ines

University of Monastir, university of Sousse, University of Monastir

April 2021

Online at https://mpra.ub.uni-muenchen.de/107391/
MPRA Paper No. 107391, posted 29 Apr 2021 14:27 UTC

Modeling the impact of Coronavirus uncertainty on bank system vulnerability and monetary policy conduct

Salha Ben Salem[1] and Ines Slama[2]

Abstract

The uncertainty of COVID-19 strongly disrupts the world through various real and financial channels. For Tunisia, the Pandemic came when the economy was confronting persevering macroeconomic imbalances, regardless of new progress with policy and reform implementation. This paper aims to analyze how the coronavirus uncertainty shock affects the monetary policy's conduct and the banking system's vulnerability in Tunisian economy. Using the structural VAR model, we find that the adaptation of an easing credit' policy by the commercial bank can attenuate the uncertainty of COVID-19 uncertainty in a short period but it causes negative consequences on the Tunisian economy in a subsequent period. The empirical results show also that uncertainty decreases the ability of the Central Bank to improve economic activity and control inflation.

Keywords: COVID-19 uncertainty, bank vulnerability, monetary policy conduct, economic implication

1. Introduction

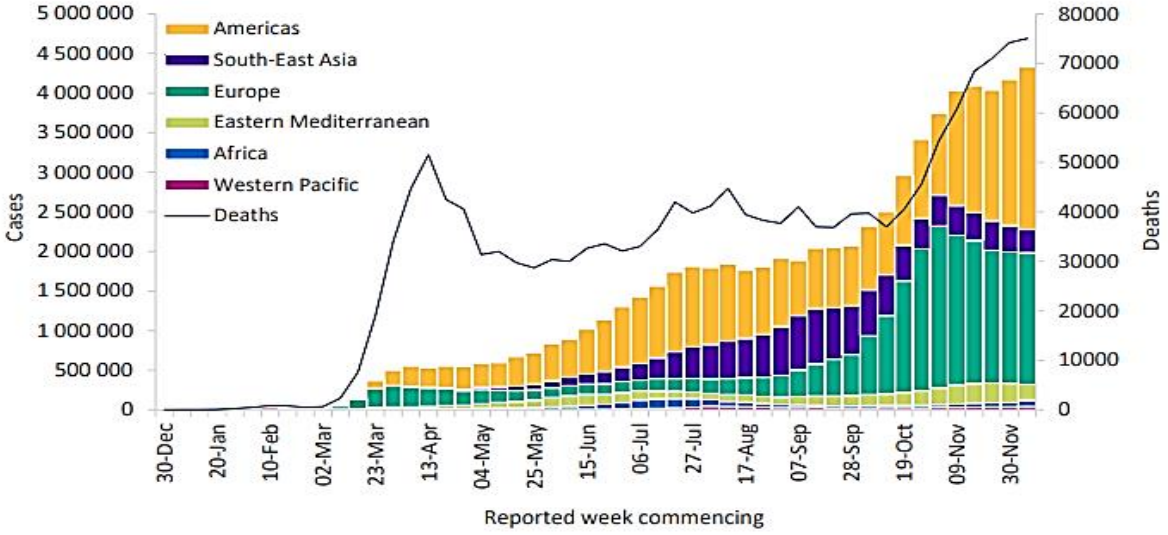
For a long time, monetary policy conduct and financial market strength have been considered the essence of the world's economic dynamic. The financial crisis of 2007-2008 unveiled this importance and showed how a temporal shock can generate a systemic and global crisis. Several theoretical and empirical models, especially VAR and DSGE models test these relationships. These models test the impact of economic crises on banking stability and monetary policy conduct. The health crisis "Coronavirus crisis" is not yet large modeled through these models.

The Coronavirus crisis started in Yohan in December 2019 and characterized as a crisis like no other. The World Health Organization classifies this crisis as a pandemic since it creates uncertainty in all facets of the economy: financial, society, employment, health, tourism, transport. There are now more than 132 million affirmed cases of the virus worldwide and more than 2.8 million have died, as indicated by the World Health Organization and Worldometer on 15 April 2021. Figure 1 shows that the death trend of the coronavirus is bullish. Americas, South-East Asia, and Europe are the most affected by this pandemic. To slow the spread rate of the virus, countries have adopted containment measures, in particular, the isolation of the infected person, the quarantine for two weeks of those who have been exposed to these patients,

[1] University of Sousse, DEFI, E-mail : Salha.bensalembannour@gmail.com
[2] University of Mahdia, DEFI, E-mail : slama.ines@hotmail.fr

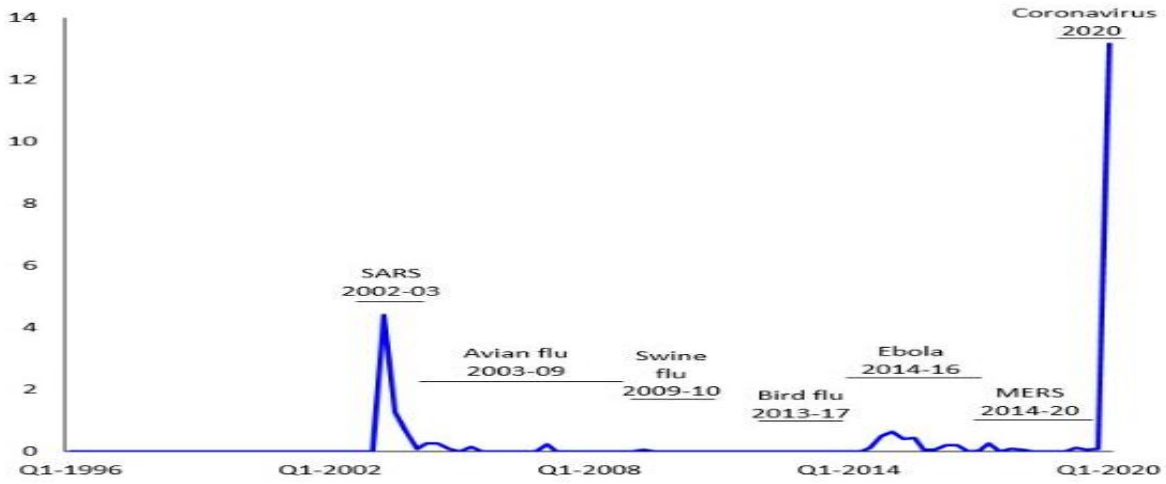
social separating (counting the closing of schools, the dropping of huge get-togethers, teleworking and travel limitations) and the all-out control of certain cities.

Figure 1: COVID-19: Affected and deaths cases



The Covid-19 pandemic has raised vulnerability, crushed economies with a tick or simply like with a wizardry wand, or more totally extended weakness in an uncertain world. Many crises throughout history have raised volatility in the worldwide economy. In the previous decade, for example, the vulnerability has raised in light of the overflow effects of the Great Recession, the European sovereign obligation crisis, the Ebola disease, the SARS pandemic, the Avian and Swine flu,... . The Coronavirus Pandemic differs from these crises because it is global and affects all economies in a short period like a magic package, that's why the world pandemic uncertainty index surge to a record high at the beginning of 2020, figure 2.

Figure 2: The average of the World pandemics Uncertainty index in the first quarter of 2020



The World Economic Outlook (WEO)) foresees that, since April, the Global growth extended at –4.9 percent in 2020, which is 1.9 percentage points underneath. In 2021 overall growth is stretched out at 5.4% which is some 6.5% lowermost than the projections in the Pre-COVID-19 of January 2020. The adverse impact on low-pay families is especially intense, risking the significant progress made in reducing extreme poverty in the world since the 1990s, IMF (2020).

For the Tunisia economy, the Covid-19 shock came when the economy was confronting persevering macroeconomic imbalances, regardless of new progress with policy and reform implementation. From January to April 2021, Tunisia announced 281.777 cases (15.520 cases per 1 million population) and 9639 deaths (492 deaths per 1 million population), as reported by WHO (2021). In the economy with just 12 Million population, these numbers is alarming. Unfortunately, these numbers have a bullish attendance, see figure 3. The new cases per day have also remained high since the end of December, with more than 2598 new daily cases reported. This context hits the Tunisian economy, especially as it has not yet exited from the negative effect of the 2011 revolution.

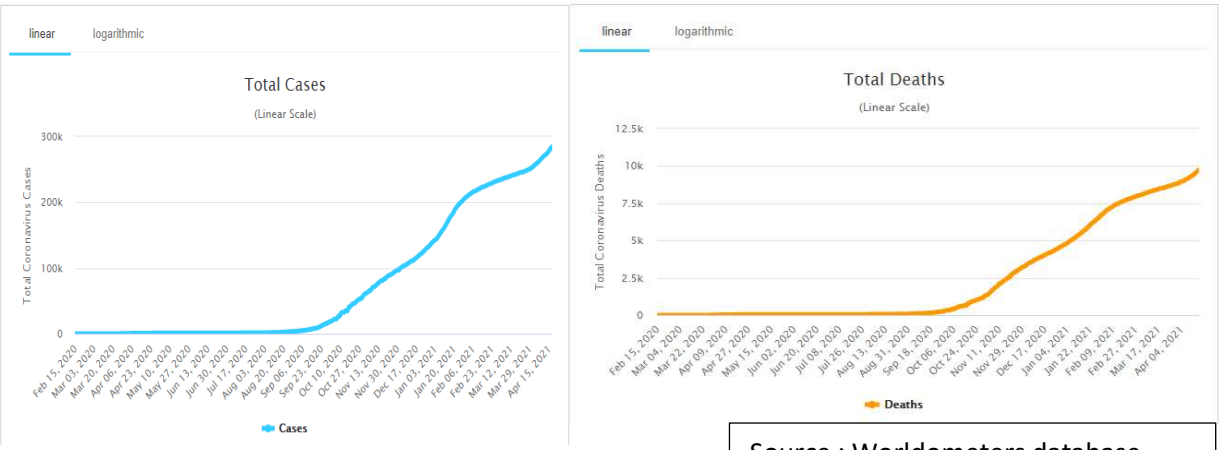
Although, there is a vast literature on economic and financial implication of financial crises, such Badarau and Popoescu (2014), Badarau (2015), Leu and Robertson 2021), Margaritta (2020), Chao et al. 2019; Wen et al. 2019; Shen et al. 2020; Wang et al. 2020), the health crisis only currently has become a subject of interest. Hence, the economic impact of the COVID-19 uncertainty on monetary policy conduct and banking system vulnerability is not generally broke down yet. To fill this gap this paper examines the SVAR model to model the effect of COVID-19 uncertainty shocks on the monetary conduct and financial sector strength.

We find that the uncertainty of COVID-19 shock decreases Tunisian production witch plunge the economy back into the recessions and depressions phase. Inflation marked by a considerable rise and confused the monetary policy interventions. For the financial side, we conclude that the adaptation of an easing credit' policy by the bank can attenuate the uncertainty of COVID-19 uncertainty in a short period but it causes negative consequences on the Tunisian economy in a subsequent period. Simulations conducted to evaluate monetary policy responses indicate that the monetary policy has no effect on aggregate demand since the uncertainty of COVID-19 is very threatening for the Tunisian economy and the growth rate was already low before the

crisis, which aggravating the uncertainty. These empirical results show that uncertainty decreases the ability of the central bank to improve economic activity and control inflation. In this context, there is a need to react to financial tensions and facilitate the downturn, in accordance with the traditional function of central banks as the ultimate supplier of funding guarantees to the banking system.

The paper is organized as follow: Section 2 presents the economic and financial implication of the coronavirus Pandemic on the Tunisian economy and the reaction of the Central Bank during this period. Sections 3 analyses our methodology. Section 4 presents the model specification adopted in this paper. Section 5 discuss the different results and section 6 the conclusion.

Figure 3 : Total of confirmed and death cases of COVID-19 in



Source : Worldometers database

2. The impact of the Coronavirus Pandemic on the Tunisian economy

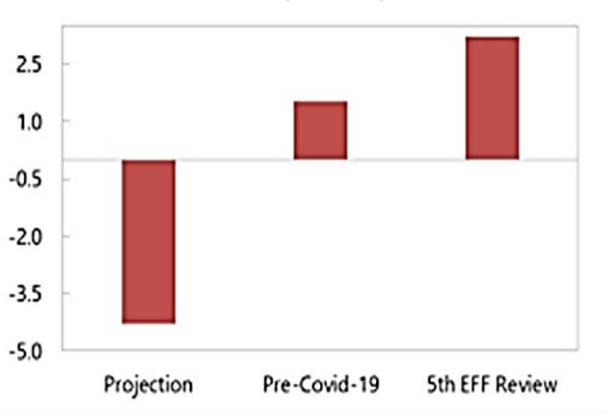
2.1 Economic impact

The health crisis eliminated the domestic demand reducing the share of the investment to GDP and the deposit to GDP ratio by around 44% and 70% in 2020 relative to 2019, which are alarming values and were not seen in the history of the Tunisian economy. Simultaneously, decreased exportation and travel restrictions, reduced tourism by around 47%, and dropped industry and textiles' export by 27% in the mid-2020, World Bank (2020). It will also lead to urgent budget and balance of payments financing needs of 2.6 and 4.7 percent of GDP in 2020, respectively, with huge drawback risks due to exceptional uncertainty.

Debt stocks declined in 2019 on the back of an appreciating dinar and lower fiscal and external deficits. The Covid-19 shock will reverse this trend and increase Tunisia's debt burden significantly through the steep fall in growth and the deterioration of the primary fiscal balance in response to lower revenues and the crisis-response measures. Debt demand declined in 2019 on the rear of an appreciating dinar and lower fiscal and external deficits. The Covid-19 stun

will switch this pattern and rise Tunisia's debt trouble significantly through the steep fall in growth and the deterioration of weakening of the essential monetary equilibrium.

Figure 4: Growth projection and key indicator dynamics (percentage of GDP)



	2019 Prel.	2020 Proj.	*Change (Percent)*
External sector			
Export of goods	38.5	32.5	*-16*
Export of tourism	4.9	1.5	*-70*
Remittances	5.0	4.4	*-12*
Domestic economy			
Investment	18.9	10.6	*-44*
Private consumption	72.7	77.5	*7*
Savings	10.1	3.1	*-70*

Sources: Tunisian authorities and IMF staff projection, 2020

Other components are influencing Tunisian' growth this year. The country suffered from further political change Elyes Fakhfakh's as of late shaped government fell, which added more vulnerability, and laborer disturbances are influencing mining yield. Taken together, these components are adding to a forecast to diminish growth to - 20.88 percent in Juliet 2020, down from the first Covid forecast of -4.3%, figure 4. In this unique circumstance, unemployment expanded from 15% to 18% in the second quarter of the year, such the level reached in the revolution of 2011.

Poverty and volatility in the Tunisian economy develop with a high pattern saw in the most recent years and particularly during 2020. According to a survey conducted by INS and the World Bank Group (by a progression of telephone interviews), there is proof that pandemic has changed eating habits (Poorer households have reduced quantities consumed) and raised the poverty rate. The survey concludes that the extreme poverty (estimated utilizing the live with 1.9 dollars/day)will keep being low than 1%; notwithstanding, poverty measured with the 3.20 dollars/ day line will increase by about 13 PB, from 2.9% to 4.2%. Moreover, the level of the probability of the population that will fall into poverty anticipated to increase in 2020. Based on the use threshold of 5.50 dollars/day, the number of poor and those who will fall into poverty anticipated to upon to 22% of the total population, after 16.6% in 2019.

Under this terrible context, the authorities have lost no time in taking measures to contain the spread of the virus and alleviate its human, social, and economic cost. This will push the Tunisian authorities to demand monetary help under the RFI for 753 million dollars (100 percent of quota) to support urgent fiscal and balance of payments needs, IMF (2020). The CBT announced to continue tightening its nominal interest rate in case of a buildup of devaluation assumptions or amplification of the inflation.

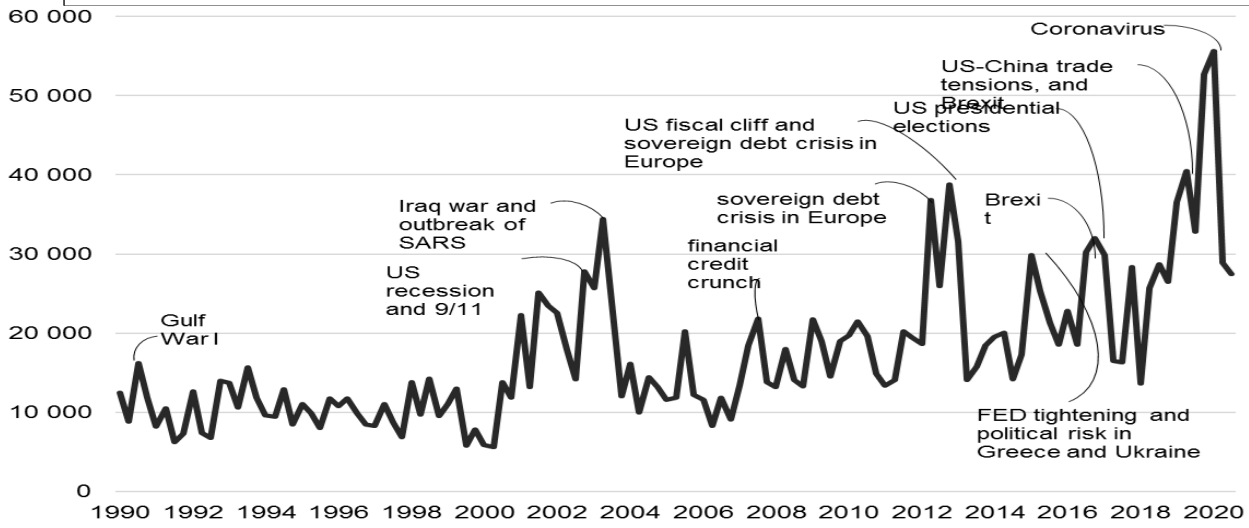
2.2 Covid-19 uncertainty and bank vulnerability

In this volatility period, it is not easy to foresee the economic impact of the virus, given the vulnerability about the spread of the infection and the scarcity of comparable events that could give helpful experimental proof.

The proof recommends an away from in which periods of expanded vulnerability are trailed by a persistent expansion in the unemployment rate, price fluidity (inflation and/or deflation), lack of confidence, an interruption in the exchange market, and interruption in economic activity (Leduc and Liu, 2020). Despite monetary policy action, the spillover impacts are significantly harder, which requires a procedure during and after the Pandemic. Notwithstanding, the best system to receive in the future would be that of the conspirator, that is, to plan adequately for crisis scenarios, regardless of whether it is hard to foresee crises precisely.

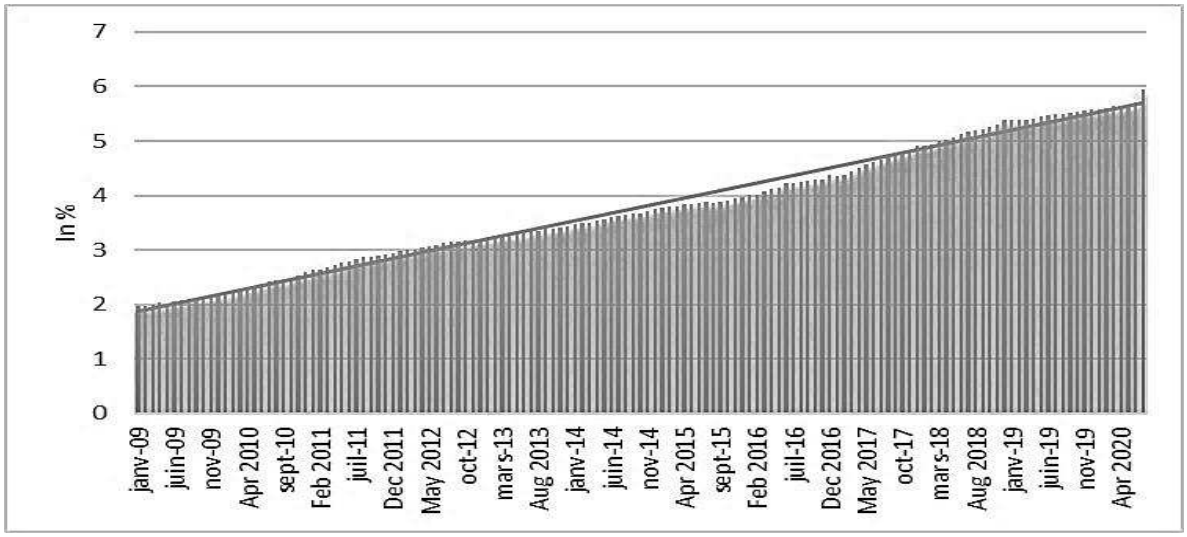
The feedback on previous warning indicators could be useful in this period. Figures 5 and 6 measure the economic uncertainty and bank uncertainty by a frequently used indicator, the WUI (World uncertainty index) and the credit to GDP ratio.

Figure 5: the economic impact of previous crises according to World uncertainty index



These indicators have climbed during this pandemic, reaching levels higher than those recorded during the financial crisis. The COVID-19 epidemic has strongly disrupted economic activity through various real and financial channels. In a short period (1 year) the pandemic has highly increased macroeconomic uncertainty and reduced purchasing power and therefore global demanded.

Figure 6 : Domestic credit to GDP ratio in the Tunisian economy



Central Bank of Tunisia database(2020)

The second indicator of uncertainty is the domestic credit to GDP ratio. This indicator used by several researchers like Borio and Lowe (2004), Borio and Drehmann (2009), and Aikman and al (2016).

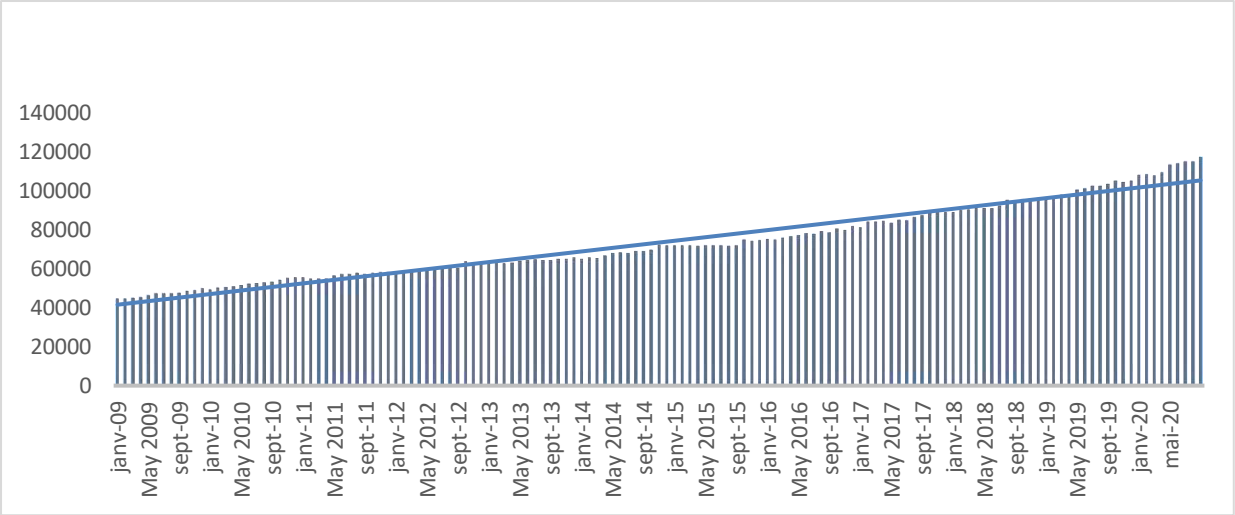
The uncertainty of COVID-19 has highly exceeded that of the subprime crisis of 2007-2008 and goes beyond all the crises we have lived in since 1970 (Figure 5), it is a completely different crisis. Monetary authorities should respond rapidly because every minute counts and the spread continues to devastate. The FMI estimation proves the pace of this speed. Hence, the CBT reaction's pace is essential to temporarily relax regulatory constraints and to be ready to provide sufficient liquidity to financial institutions, especially those that lend to small and medium-sized enterprises, (Berger et al., 2020).

2.3 The reaction of the Central Bank of Tunisia during the Coronavirus crisis

In this terrible period, many central banks are established different measures that considerably increase the size and change the composition of their balance sheets. For the central bank of Tunisia, these measures include, in particular, increased the amount of CBT' refinancing to banks by 5 billion dinars per year and lower the collateral eligibility standards applied to banks, KPMG (2020). In addition, the central banks of Tunisia have also devised new mechanisms, extending the credit repayments' period for employees and for companies affected by the crisis over 6 months, facilitating credit supply conditions for private companies and the tourist sector.

The central bank's balance sheet has a important role in injecting liquidity and regulating global demand (Zorn and Garcia, 2011; Bagus and Howden, 2016).

Figure 7 : Monetary Base (Million TND)



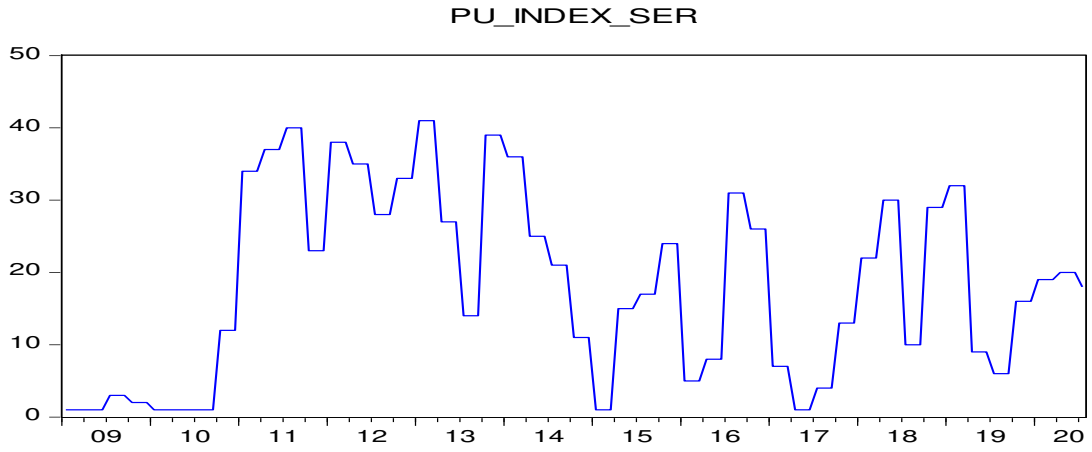
The Tunisian's balance sheet has increased dramatically (figure 7), since the shock of commodity prices in 2015, the size of the balance sheet has increased following the influence of monetary policy on financial and macroeconomic conditions, in order to raise the degree of monetary accommodation and support aggregate demand.

3. Methodology

A survey made by the European investment bank in 2020 analyzes the impact of COVID-19 on the resilience of a country's economic system and the quality of its healthcare. This survey shows that the covid-19, economic vulnerability index is very important in Tunisia. Furthermore, it shows that the tourist and banking sector are the most affected by this Pandemic, EIB (2020). Our objective is to analyze how the coronavirus uncertainty shock affects the monetary policy' conduct and the banking system's vulnerability in Tunisia. We use monthly data covering the period from 2009 m1 to 2020 m7.

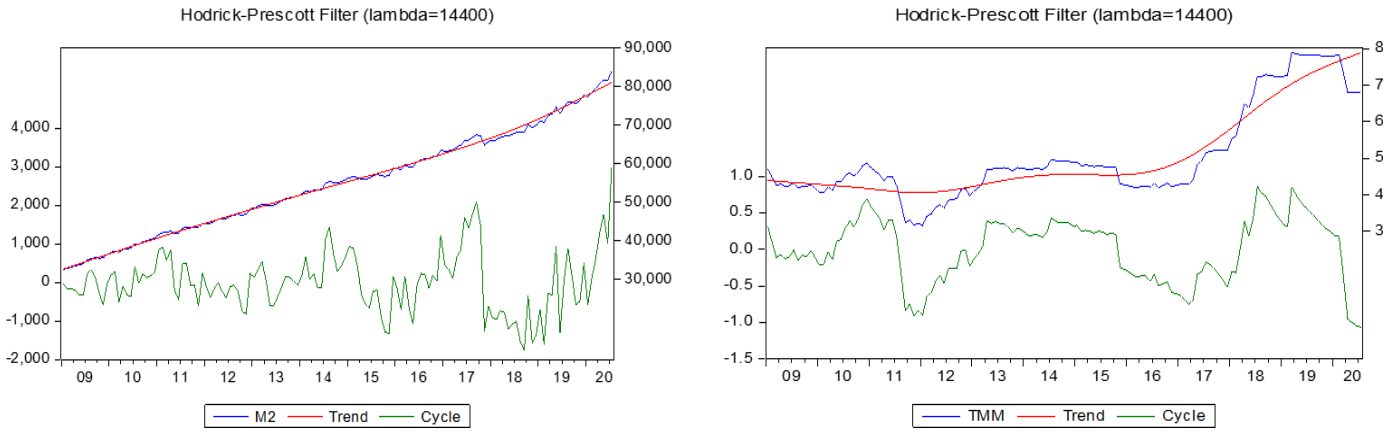
3.1. Measuring COVID uncertainty

We follow the paper of Ahir and al. (2018), and Pinshi (2020) by using the Pandemic Uncertainty Index (PU Index) of Tunisia as the main measure of uncertainty. This index is broader and takes into account the different crises, epidemics (SARS, Ebola, COVID-19,…). These data are extracted from the world uncertainty index.com database. This link database calculates the time series of the world uncertainty index for 143 countries, including Tunisia. The special feature of the PU index is that its formula was updated in April 2020 and measures the vulnerability of the COVID-19 crisis at world and national levels.



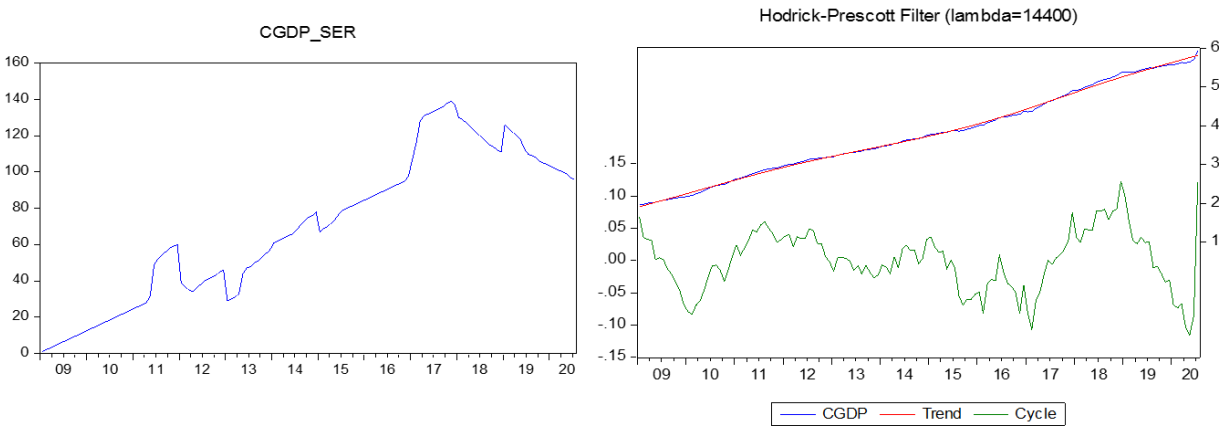
3.2 Measuring economic activity, monetary policy and Bank vulnerability

To measure the economy dynamic, we use real GDP (LGDP) ,as a proxy of economic activity, and the consumer price index (LIPC) as a proxy of inflation. We use the liquid monetary base (M2) and the policy rate (TMM) as a proxy for the monetary policy conduct. The figure below shows the evolution of the policy rate and M2 monetary base between January 2009 to July 2020. We note that the central bank did not change its monetary policy during the COVID-19



crisis, it remains at applying a restrictive monetary policy. The M2 monetary base trend is bullish which means that the Tunisian central bank is constantly injecting liquidity to refinance the banking sector and stimulate economic activity.

For the bank intermediation imbalances, we follow Aikman and al (2016) by integrating the domestic privet Credit to GDP ratio (CGDP). The literature defined the private credit-to-GDP ratio as the difference between the ratio of private non-financial sector loan to GDP and its long-term trend (Borio and Lowe (2002, 2004); Borio and Drehmann (2009)). For Tunisia, this ratio is very important since the capital market is not very developed and therefore the composition of the bank balance sheet is mainly based on credit.



4. Model specification

In order to assess the impact of Covid-19 uncertainty shock on bank strength and monetary policy conduct, we use the Structrual VAR model (SVAR) as presented by Bordo and Murshid 2002. This model shows its excellent ability to represent macroeconomic fluctuations associated with good identification properties. It should be noted that in our exercise, we will also quantify to what extent the response of endogenous variables to monetary policy actions changes with the level of uncertainty.

In the context of dynamic analysis, the structural VAR model is commonly used. This is based on the estimation of the reduced form of the type:

$A(L)\ \Delta X_t = U_t \qquad (1)$

$A(L) = In - A1L - \ldots - A_p L_p$ is the lag operator.

where ,p is the number of lags to be determined by the usual information criteria, X_t is the vector of observable variables of the dimension (nx1), with n the number of variables in the model and U_t is white noise.

The vector Ut have the variance-covariance matrix $E(ut,utT) = \Omega$ and $E(ut) = 0$

To study the dynamic characteristics of the model, the econometric theory advocated both the examination of reaction functions to a definite shock called impulse response functions and variance decomposition of the forecast error (Hamilton 1994). In order to get the shock response functions and variance decomposition of forecast error, it is necessary to write this process as the infinite structural moving average. To do this, an intermediate step is to "invert" the canonical VAR model to the Wold theorem to obtain the canonical VAR in the form of moving average:

$\Delta X_t = C(L)\ U_t \qquad (2)$

Where, $C(L) = A(L)^{-1} = \sum_{j=0}^{\infty} C_j L^j$ et $C(0) = I_n$ and U_t the vector of canonical innovations.

We postulate the vector of canonical innovations U_t is a linear combination of contemporaneous structural impulse ε_t, therefore

$U_t = P\ \varepsilon_t$ (3)

Where, P is an invertible passage matrix (nxn) that has to be estimated in order to identify the structural shocks. The short-term constraints result in the nullity of certain coefficients of the matrix P. The matrix Φ_j represents the response functions to shocks ε_t and elements of ΔX_t. we suppose that the various structural shocks are not correlated with each other and have unit variance:

$E(\varepsilon_t, \varepsilon_t^T) = I_n$ (4)

Σ is the variance covariance matrix of canonical innovations U_t, we have:

$E(U_t, U_t^T) = P\ E(\varepsilon_t, \varepsilon_t^T)\ P^T = PP^T = \Sigma$ (5)

The lack of response in the long- run of a certain number of variables ΔX_t to shocks ε leads to the nullity of the corresponding dynamic long-term multiplier.

Hence, we get to the structural form of the VAR moving average as follow:

$$\Delta X_t = \Phi(L)\ \varepsilon_t \quad (6)$$

Where $\Phi(L) = PC(L) = \sum_{j=0}^{\infty} \Phi_j L^j$

Now we identify the structural shocks, which their magnitude equivalent to one standard deviation. Next, the dynamics of endogenous variables will be calculate and graphically presented by the Impulse Response Functions.

Due to the structural moving average presentation, we can know the proportion of movements of a variable caused by its own shocks compared to shocks from other variables (Enders 1995). The variance decomposition of the forecast error intended to calculate for each shock contribution to the variance of the error.

The variance of the forecast error at horizon h can be written as follows:

$$VAR\ (X_{t+h} - E_t\ X_{t+h}) = \sum_{i=0}^{h-1} \phi_{jk}^2\ (i)\ \sigma_j^2 \quad (7)$$

Where σ_j^2 is the variance of j.

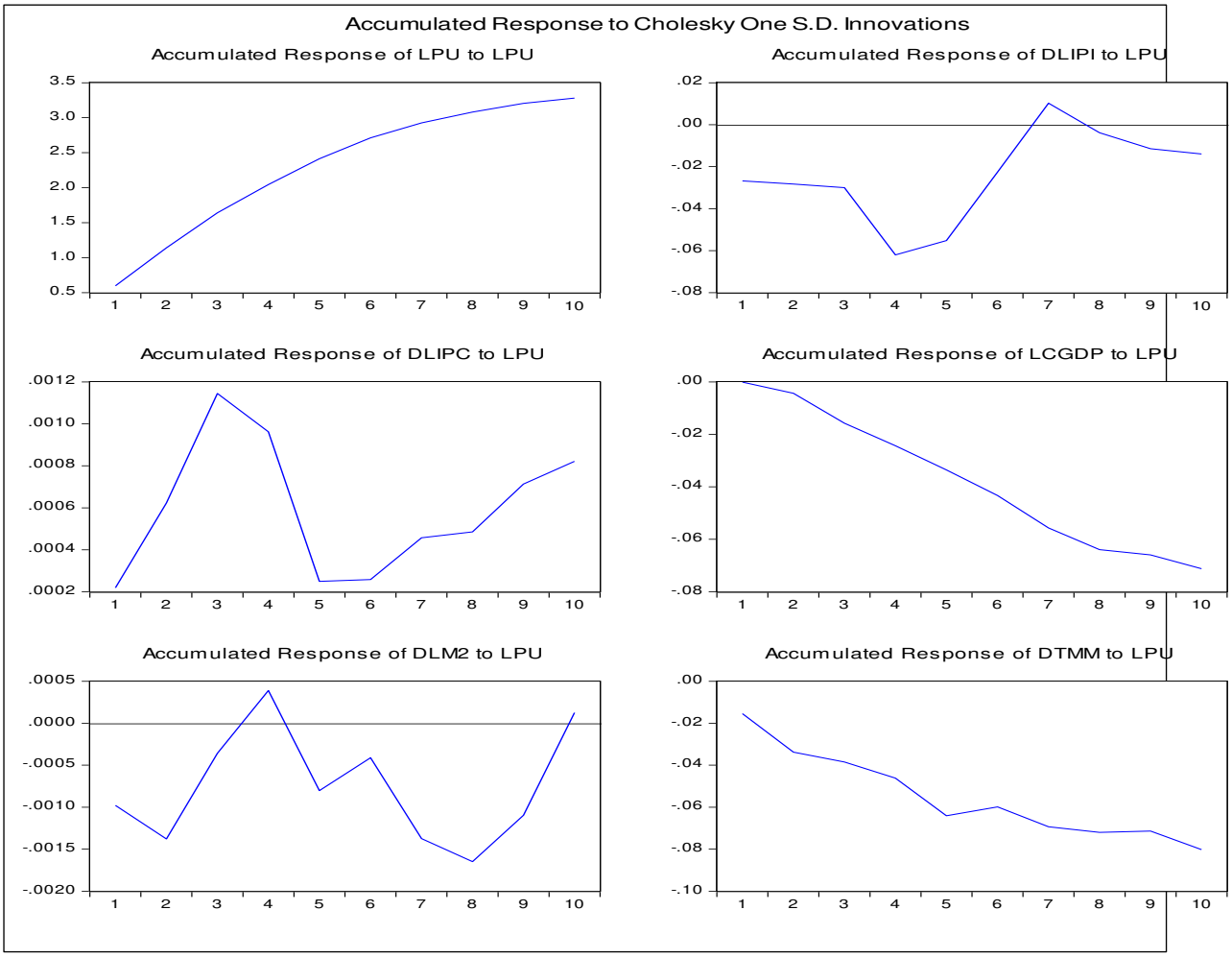
5. Results and discussion

5.1 Coronavirus uncertainty shock

This Figure plots the estimated dynamic responses of the macroeconomic and financial variables to a COVID-19 uncertainty shock. As it is evident, the uncertainty of COVID-19 decrease the Tunisian production witch plunge the economy back into recessions and depressions phase. This shock from COVID-19 would germinate macroeconomic instability. Inflation marked by a considerable rise that lasted until 10 periods following the increase of household goods' demand and services during the period of containment and the easing of consumer credit conditions, Pinshi (2020). Forth more, this increase explain by the fact that

public expenditure would not cease to increase in order to deal with the crisis and above all to meet the needs for health and payment compensation sectors, etc.

Figure8 : Coronavirus uncertainty shock



Even the financial market was not immune to the negative effects of this global crisis, as it marked by the decline in the level of credit granted to investments. Producer price index drops drastically; this effect would paralyze the economy towards its path of emergence and hamper economic development. Likewise, the nominal interest rate increased in the first period due to the lack of confidence and uncertainty that prevailed in the world and it drops slightly afterward to encourage investment.

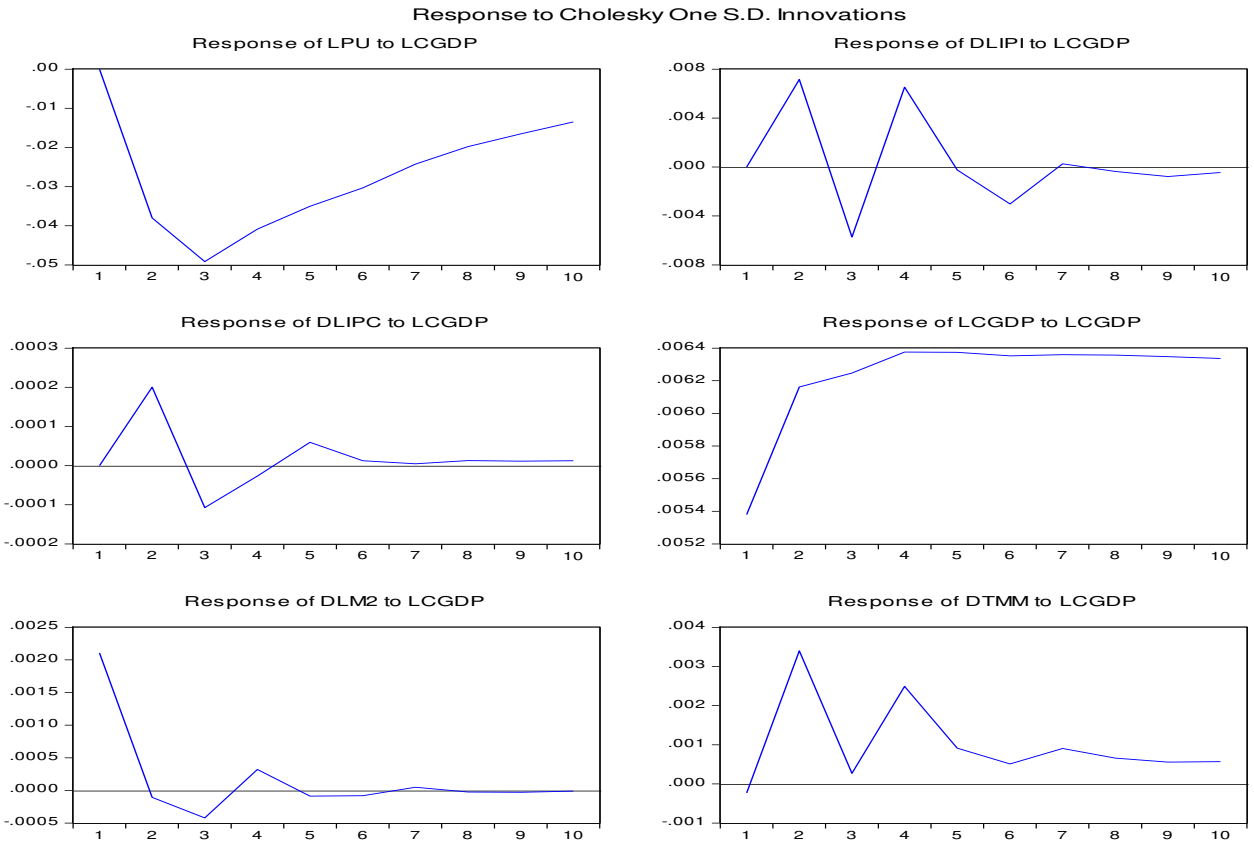
The combined reaction of all these macroeconomic variables suggests that the uncertainty affects the Tunisian economy in a similar way to an economic brake and a systemic disturbance. Thus, due to uncertainty, the COVID-19 pandemic has important effects on demand such as confidence, in addition to effects on supply such as the closing of certain businesses, the disruption of supply chains, labor shortage, and reduced service provision. The reaction of the monetary authority here could perhaps in certain cases play a role in the economic recovery.

5.2 COVID-19 uncertainty and banking sector vulnerability

Over the past four decades, uncertainty and financial shocks have been analyzed by several modelers, who have discovered that these exogenous shocks have assumed an important role in business cycle fluctuations (Caldara et al. 2016; Ludvigson et al. 2018; Chao et al. 2019; Wen et al. 2019; Shen et al. 2020; Wang et al. 2020). This sub-section aims to access the impact of bank vulnerability in the context of COVI-19 uncertainty.

The graph shows the effect of credit to GDP increase on macroeconomic variables in the context of the Coronavirus disaster uncertainty (PU). We conclude that the adaptation of an easing credit' policy by the bank can attenuate the uncertainty of COVID-19 uncertainty in a short period but it causes negative consequences on the Tunisian economy in a subsequent period. This is explained by the fact that in a period of uncertainty, the consumer's purchasing power drops sharply following the closure of businesses and the loss of his jobs, so easing their access to credit can improve their financial situation. However, this policy causes enormous negative effects on the economy if the borrower is unable to repay these debts. At the central bank level, any increase in the credit-to-GDP ratio pushes the monetary authority to raise its interest rate (TMM) and lower liquidity in the market (M2).

Figure10 : COVID-19 uncertainty and banking sector vulnerability shock



5.3Variance decomposition

The variance decomposition of the forecast error is intended to calculate for each shock contribution to the variance of the error. Thus, we can know the proportion of movements of a variable caused by its own shocks compared to shocks from other variables (Enders 1995). The following table recapitulates the effects of the decisions taken by the Tunisian monetary authorities to try to revive the economy and lower inflation.

Table 1: Variance decomposition of key

Variance decomposition of PU

Period	LPU	DLIPI	DLIPC	LCGDP	DLM2	DTMM
1	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
5	95.82824	0.695214	0.697116	2.017942	0.081971	0.679521
10	91.47301	3.794188	0.681112	3.206774	0.093574	0.751346

Variance decomposition of IPI

Period	LPU	DLIPI	DLIPC	LCGDP	DLM2	DTMM
1	0.508618	99.49138	0.000000	0.000000	0.000000	0.000000
5	0.672257	82.37284	3.609526	0.556727	2.605879	10.18277
10	1.291793	79.00324	5.195520	0.798502	3.440714	10.27023

Variance decomposition of IPC

Period	LPU	DLIPI	DLIPC	LCGDP	DLM2	DTMM
1	0.602373	0.308284	99.08934	0.000000	0.000000	0.000000
5	8.656635	5.549346	76.34343	3.586531	2.645469	3.218587
10	8.212045	9.248899	70.69119	4.566515	2.533586	4.747762

Variance decomposition of CGDP

Period	LPU	DLIPI	DLIPC	LCGDP	DLM2	DTMM
1	0.000128	0.584216	1.184528	98.23113	0.000000	0.000000
5	0.929396	1.071920	5.274991	90.85256	1.165926	0.705212
10	0.786540	30.39123	11.14616	53.67653	2.790466	1.209068

Variance decomposition of M2

Period	LPU	DLIPI	DLIPC	LCGDP	DLM2	DTMM
1	1.046598	3.259932	1.292062	0.541624	93.85978	0.000000
5	2.228534	33.33857	5.308149	1.965195	53.44117	3.718375
10	2.272095	43.33788	9.831698	2.153804	32.79407	9.610456

Variance decomposition of TMM

Period	LPU	DLIPI	DLIPC	LCGDP	DLM2	DTMM
1	0.883359	6.168507	0.474071	0.132426	0.369108	91.97253
5	2.622649	12.86123	3.954878	5.852708	2.715073	71.99346
10	2.286483	30.57682	4.136255	4.834951	2.418019	55.74747

The uncertainty shock of COVID-19 had an undesirable impact on aggregate demand and inflation around 8%. Production responds unfavorably to the drop in the policy rate (3%). There followed an unprecedented recession. The situation turns out to be of an extreme dimension since of monetary policy, adopted by the Tunisian central bank, has no effect on aggregate demand, since the uncertainty of COVID-19 is very threatening for the Tunisian economy.

The BCT has implemented measures to ease liquidity conditions. However, these measures do not appear to affect aggregate demand and the economy.

Admittedly, this pandemic will hit the economy hard in a recession and even monetary policy could not stem this recession with certainty, but it can ease the peak of economic uncertainty. Hence, we can notice that the situation of the economy (IPI) has a considerable role in the variability of the monetary sphere. It contributes to around 43% of the variability of the money supply (M2) and 30.5% of the variability of the money market rate (TMM). In addition, a

positive variation in the level of inflation contributed to a negative variability around 30% of the credit to the economy (CGDP). This strongly affected the level of investment because on the one hand the uncertainty reigns over the world economy following the pandemic and on the other hand the very sharp rise in prices.

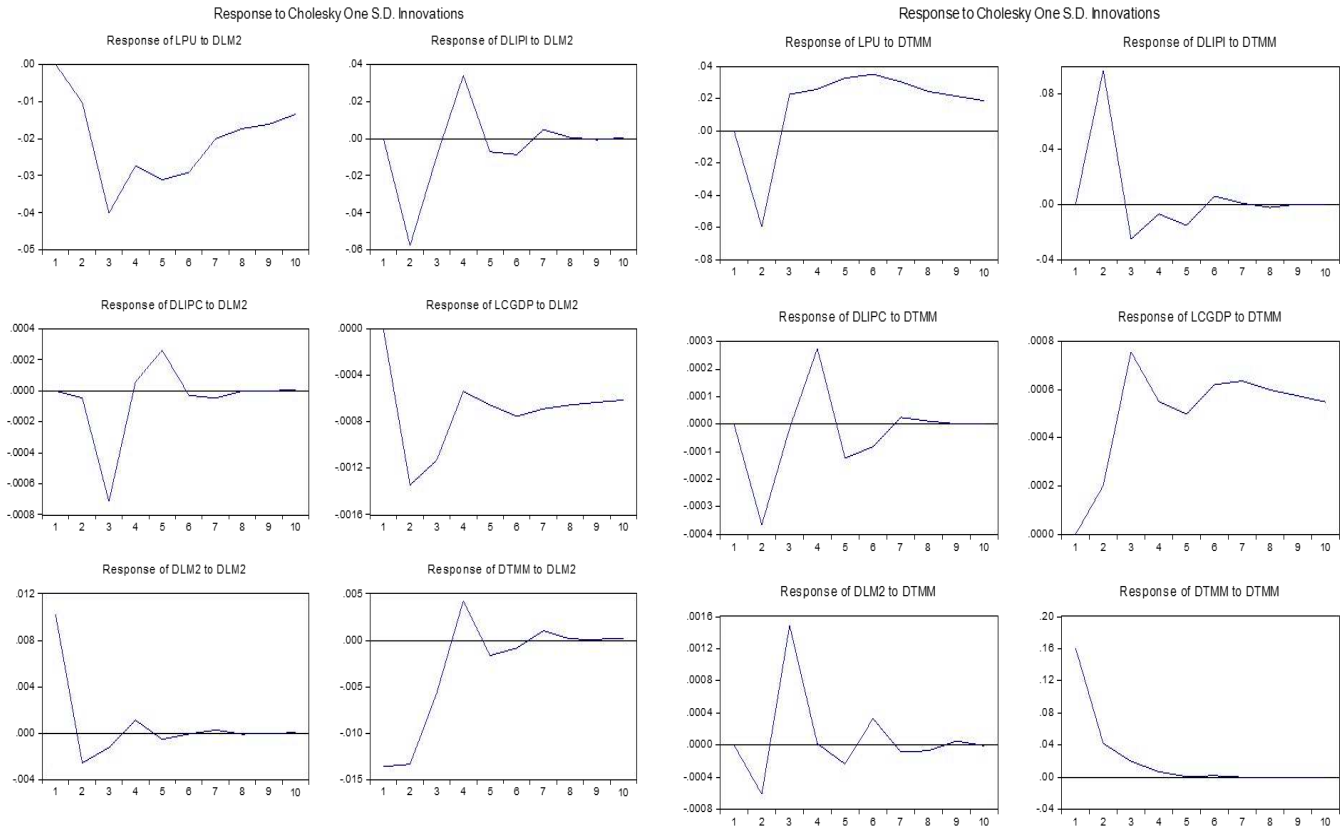
5.4 Monetary policy response

In light of this pandemic, there is a need to react to financial tensions and facilitate the downturn, in accordance with the traditional function of central banks as the ultimate supplier of funding guarantees to the banking system. The Central Bank of Tunisia is called upon to stimulate the transmission of the envisaged direction of monetary policy in the presence of COVID-19 uncertainty and to soften its balance sheet by applying downward pressure on its policy rate and increased its liquidity injection. Admittedly, this pandemic will hit the economy hard in a downturn and even monetary policy couldn't stem this downturn with conviction, but yet it can facilitate the peak of economic uncertainty and contribute to a progressively recuperate of the economy. The graph below shows that the both strategies (liquidity inject and policy rate variation) positively affect the pressure of uncertainty in the short term but they do not have the same effect on the macroeconomic and financial variables.

Vulnerability over the term of COVID-19 could permit monetary policy to broaden the maturity of its securities in the longer term. The Central Bank of Tunisia, as the ultimate insurer of liquidity, could create money, which will then refinance the banks' liquidity and encourage them more to pass on this contribution to small and medium-sized enterprises (SMEs). This measure could broaden and reach the companies most affected by the crisis by augmenting the extent of refinancing through microfinance and other financial institutions that don't have the offices for a direct refinancing at the central bank (Goodfriend, 2014; Gopinath, 2020, Pinshi (2020)). These reactions infer a decreasing the collateral to do these activities and permit the economy to change in accordance with the recuperation. However, it could also further worsen inflation and therefore reduce the purchasing power of consumers and lower aggregate demand.

Since the increase in aggregate demand would be determined by the imbalance in aggregate supply (Kovanen, 2020), the objective of the monetary authority include supporting, as much as possible, productive firms and jobs until getting back to typical conditions.

Figure11 : Monetary policy response



6. Conclusion

This paper estimates the impacts of the COVID-19 uncertainty shock on the economic activity and banking sector strength and examines the role of the monetary authorities in overcoming the Coronavirus uncertainty. Using the SVAR model, we show that the uncertainty of COVID-19 decreases Tunisian production witch plunge the economy back into the recessions and depressions phase. Inflation marked by a considerable rise and confused the monetary policy interventions. For the financial side, we conclude that the adaptation of an easing credit' policy by the bank can attenuate the uncertainty of COVID-19 uncertainty in a short period but it causes negative consequences on the Tunisian economy in a subsequent period. At the central bank level, any increase in the bank volatility ratio pushes the monetary authority to raise its interest rate (TMM) and lower liquidity in the market (M2). Therefore, the central bank regulate global demand, curb inflation, and mitigate the vulnerability in the banking sector.

Simulations conducted to evaluate monetary policy responses indicate that the monetary policy has no effect on aggregate demand since the uncertainty of COVID-19 is very threatening for the Tunisian economy and the growth rate was already low before the crisis, which aggravating the uncertainty. These empirical results show that uncertainty decreases the ability of the central bank to improve economic activity and control inflation.

In this context, there is a need to react to financial tensions and facilitate the downturn, in accordance with the traditional function of central banks as the ultimate supplier of funding guarantees to the banking system. The Central Bank of Tunisia is called upon to stimulate the

transmission of the envisaged direction of monetary policy in the presence of COVID-19 uncertainty and to soften its balance sheet by applying downward pressure on its policy rate and increased its liquidity injection. Admittedly, this pandemic will hit the economy hard in a downturn and even monetary policy couldn't stem this downturn with conviction, but yet it can facilitate the peak of economic uncertainty and contribute to a progressively recuperate of the economy.

Vulnerability over the term of COVID-19 could permit monetary policy to broaden the maturity of its securities in the longer term. The Central Bank of Tunisia, as the ultimate insurer of liquidity, could create money, which will then refinance the banks' liquidity and encourage them more to pass on this contribution to small and medium-sized enterprises (SMEs).

References

James D. Hamilton (1994): « Time series Analysis», Princeton University press.

Kim, S. and Roubini, N., 2000, «Exchange Rate Anomalies in the Industrial Countries: A Solution with a Structural VAR Approach». Journal of Monetary Economics, no.45, p.561-586.

Mackowiak, B. (2007): « External shocks, U.S. monetary policy and macroeconomic fluctuations in emerging markets », Journal of Monetary Economics, vol. 54, pp. 2512-2520.

Ahir, H., Bloom, N., and Furceri, D. 2018. "The world uncertainty index".

Ahir, H., Bloom, N., and Furceri, D. 2020. Global uncertainty related to Coronavirus at Record High. IMF Blog

Bagus, P., and Howden, D. 2016. Central bank balance sheet Analysis. MPRA Paper no. 79801

Bordo, M.D., Murshid, A.P., 2002. Globalization and changing patterns in the international transmission of shocks in financial markets, NBER Working Paper 9019.

Gita Gopinath (2020), "The Great Lockdown: Worst Economic Downturn Since the Great Depression"

Goldberg, Jonathan, Elizabeth Klee, Edward Simpson Prescott, and Paul Wood (2020). “Monetary Policy Strategies and Tools: Financial Stability Considerations,” Finance and Economics Discussion Series 2020-074. Washington: Board of Governors of the Federal Reserve System

International Monetary Fund report, June 2020, A Crisis Like No Other, An Uncertain Recovery

Leu, Shawn C. -Y., and Mari L. Robertson. 2021. “Mortgage Credit Volumes and Monetary Policy after the Great Recession.” *Economic Modelling* 94: 483–500.

Margarita Rubio(2020), "Monetary policy, credit markets, and banks: A DSGE perspective"Economics Letters, Volume 195, October 2020, 109481

Marvin Goodfriend, 2014. "Monetary Policy as a Carry Trade," IMES Discussion Paper Series 14-E-08, Institute for Monetary and Economic Studies

Pinshi (2020)Christian COVID-19 uncertainty and monetary policy. 2020. ffhal-02566796ff

Remarks by Paul Beaudry (2020),Bank of Canada available at (Rubio 2020) https://www.bis.org/review/r200130j.pd

Y.LeuaMari L.Robertson(2020), "Mortgage credit volumes and monetary policy after the Great Recession", Economic Modelling , Volume 94, January 2021, Pages 483-500

Zens Gregor ,Maximilian Böck and Thomas O.Zörner (2020), "The heterogeneous impact of monetary policy on the US labor market"Journal of Economic Dynamics and Control, Volume 119, October 2020, 103989

Zorn, L., and García, A. 2011. Financial Markets Department Central Bank Collateral Policy: Insights from Recent Experience. Bank of Canada review spring

WHO (2021), https://covid19.who.int/region/emro/country/tn