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HELICOPTER MONEY AS AN ALTERNATIVE MEASURE OF UNCONVENTIONAL MONETARY POLICY: AN ENFORCEABILITY STUDY

Chair: International Financial Economics

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TABLE OF CONTENTS

INTRODUCTION

The economic scenario that characterized the last decade saw many changes of paradigms and approaches finalized at the stabilization of the system. The greatest transformations regarded the measures that central banks from all over the world had to fulfil in order to face the downturns of the Great Recession, which compromised the global economic solidity. The monetary institutions, indeed, in different times and manners shifted from conventional approaches – price stability through the setting of the short term interest rate, thus via open market operations – to unconventional measures, that can be broadly summarized in two procedures: quantitative easing and forward guidance.

A decade past by since the burst of the crisis, central banks undertook many measures to contrast the negative conditions of the state of the economy, but still there is not a unanimous opinion on the effectiveness of the policies implemented so far.

In the last few years the academic and institutional debates saw an increase of suggestions that proposed helicopter money as an alternative unconventional monetary policy. Originally theorized by Friedman as an academic example of how the process of money creation works, nowadays it can be defined as a hybrid measure: a money-financed fiscal stimulus. Hence it would need a close collaboration between the Central Bank and the Treasury who would respectively inject liquidity in the system and directly distribute it to the households.

The thesis is divided into three areas, that gradually explore the evolution of monetary policies with the help of data, theoretical and empirical studies of literature.

The first chapter presents the standard tasks of central banks, and how they used to manage the conditions of the system (i.e. expansionary or restrictive monetary policies). Through the application of IS-LM and AS-AD model was presented the case of the reaching of the zero lower bound, a crucial condition that is at the core of the necessity of the fulfilment of unconventional measures. The latter are indeed broadly portrayed at the end of the chapter, presenting their transmission channels, the strong features and the flaws.

The second chapter displays a deeper focus of both quantitative easing and forward guidance. The analysis comprehends the historical origin, and a detailed description of what and when measures were taken by the four main central banks: the European Central Bank, the Federal Reserve, the Bank of England and the Bank of Japan. The approach used was the same for both quantitative easing and

forward guidance, thus the chapter presents both theoretical and empirical results, and the contribution of the literature that explored the positive and negative results.

Last but not least, the third chapter explores helicopter money, starting from the theoretical proposals that are now used as a reference point to suggest it as a policy measure. The analysis regards practical examples of how helicopter money could be implemented advised by its advocates, the analytical models that study the macroeconomic effects that it could potentially generate, and ultimately the literature against it.

Finally, the scope of the thesis is to offer a depiction of the change in approaches operated by the central banks in the last decade, and an examination of the recently most talked-about alternative policy and why it would be extremely difficult, if not impossible to implement it in the Eurozone.

CHAPTER 1

UNCONVENTIONAL MONETARY POLICIES

1.1 Conventional scenario of short-term rate setting

The role of central banks has historically been fundamental in implementing all the necessary monetary policies finalized at influencing and adjusting the monetary transmission mechanism, in a systematic and foreseeable manner, aimed at pursuing a specific target. In the last twelve years their importance in setting rules to stabilize the macroeconomic and financial sector has been more evident as recessions and intricate scenarios forced central banks to step forward and intervene to restore equilibrium.

Macroeconomic literature has vastly discussed to what extent central banks can have an impact on macroeconomic aggregates. For example, monetarists such as Friedman believed in the "neutrality of money": monetary policy only affects nominal variables and not real variables such as unemployment, GDP, investments etc. A similar view belonged to the neo-classical thread that believed that prices are determined solely by the level of money, and as the latter fluctuates, prices are the only elements of the market that are affected.

Neo-Keynesian theory, instead, used Keynes' idea regarding the "reserve of value" function referred to money, to conclude that there is a domino effect from the monetary market that affects the interest rates, and in turn has an influence on aggregate demand. This strand of literature, though, is not to be considered alternative to the neo-classical one, as the two can be considered as complementary.

The mandate of central banks is nowadays oriented not only towards price stability (i.e. inflation target), but also in setting requirements in terms of reserves[1], monitoring, supervising[2] and rules that can directly affect the market.

[1] As an example, after the economic crisis that busted in 2007, the European Commission and the European Parliament published the n. 575/2013 o "CRR - Capital Requirement Regulation" and the2013/36/UE o "CRD 4 - Capital Requirements Directive" aimed at setting two requirements in terms of reserves. The first one is the Liquidity Coverage Ratio, that forces banks at having an adequate level of unencumbered high-quality liquid assets (HQLA) that can potentially be converted in cash to face a 30 days period of stress scenario. The second is the Net Stable Funding Ratio (NSFR), used to reduce a potential long-term funding risk. To fulfill this requirement, banks need to hold on to a specific amount of stable funds.

[2] In the Euro system, national central banks are, amongst other things, the supervising authorities responsible for the pursuing of the "sound and prudent management of the financial intermediaries" (Banca d'Italia, Our Role).

Price stability is the main objective pursued, even if in different manners, by the four major central banks, namely the Federal Reserve, the European Central Bank (ECB), the Bank of England and the Bank of Japan. When the economy faces periods of trouble, so when the inflation is distant to the target - both in cases of high inflation or deflation -, central banks act in order to keep the price level anchored to the predetermined target, in order to fulfill price stability.

Taking into account the definition given by the ECB's Governing Council, price stability is realized "when the twelve-month increase in the harmonized index of consumer prices for the euro area is lower than two percent"[3]. The monetary policy actions implemented are thus focused on trying to maintain the latter value lower or close to the target over a medium-term horizon. The fine-tuning processes consist of the adjustments implemented in order to prevent the negative effects of inflation on the equilibrium of an economy, such as the loss of value of savings, increase in taxation and an increase in interest rates, subsequent to an increase of risk of inflation (Banca d'Italia).

In a conventional scenario of monetary policy, the targeting of inflation is accompanied by the control of the short-term interest rate. Central banks own the monopoly on the supply of reserves in the banking system since the issuance of fiat money is one of their main roles, therefore they are able to set the quantity and the terms in which they can be provided. Trivially, when the central bank wants to lower the interest rate, it will increase the amount of reserves in the system, and vice versa.

The fulfilment of a generic monetary policy can be summed up in three steps (Disyatat, 2008). The first is the identification of a so-called "policy signal", the formal convey of what the object of the policy is going to be. Usually, it is the overnight interest rate, but it could also be the minimum rate at which the central bank carries on transactions with the market. Secondly, an "operational target" is chosen and it is employed as an indicator of the concrete execution of the policy. Lastly, instruments such as reserve requirements, the rate of remuneration on reserves and open market operations are all examples of the whole set of "various instruments" that are intended at reaching the operational target.

1.1.1 How central banks manage short-term interest rates

In the conventional setting, open market operations are implemented in order to satisfy the daily need of reserves demanded by the banking system. It is important to underline, though, that these operations are not aimed at setting the short-term interest rate target directly. As a matter of fact, central banks'

[3] In the conduction of the monetary policy, the Federal Reserve's main objective is keeping price stability finalized at reaching the maximum level of employment.
As for the Bank of England, the 2% inflation target is the "main monetary policy aim".
Lastly, according to the Bank of Japan price stability is finalized at contributing to the development of the economy, representing its foundation.

influence on short term interest rate materializes in a less immediate way. Owning the monopoly of the reserves, central banks can generate and remove them from the system at whatever price, which is portrayed by the overnight rate, becoming the market makers (Bank of International Settlements, 2009).

Each central bank defines its influence on the short-term rate in its own fashion. Disyatat (2009) uses the expression "policy implementation reaction function" (PIRF) to describe the manner in which "the central bank will react to deviations of the reference market rate from its policy rate". Considering the specific circumstance, PIRF will vary to reach the operational target. For this reason, the reaction functions are different for each central bank, given that each one of them takes into account the peculiarity of the market, the state of the economy in which it operates, and also the particular scenario of the moment.

What so far has been referred to as "interest rate" follows an elaborate structure. The decision regarding the amount of reserves that are to be exchanged in the market, reflected in the overnight rate, has to "deal" with other rates used in the system. In general, the overnight rate is able to affect the rates exchanged in the interbank market, which consequently influence rates on loans offered by commercial banks. In the euro area, there is an interest rate corridor; by setting as a floor the rate on deposits destined to banks on their reserves, and as a cap the marginal rate (i.e. the maximum amount charged by the ECB on loans requested by banks) the central bank is able to keep the overnight rate "in the middle" of this corridor, therefore is able to "control" it (Figure 1).

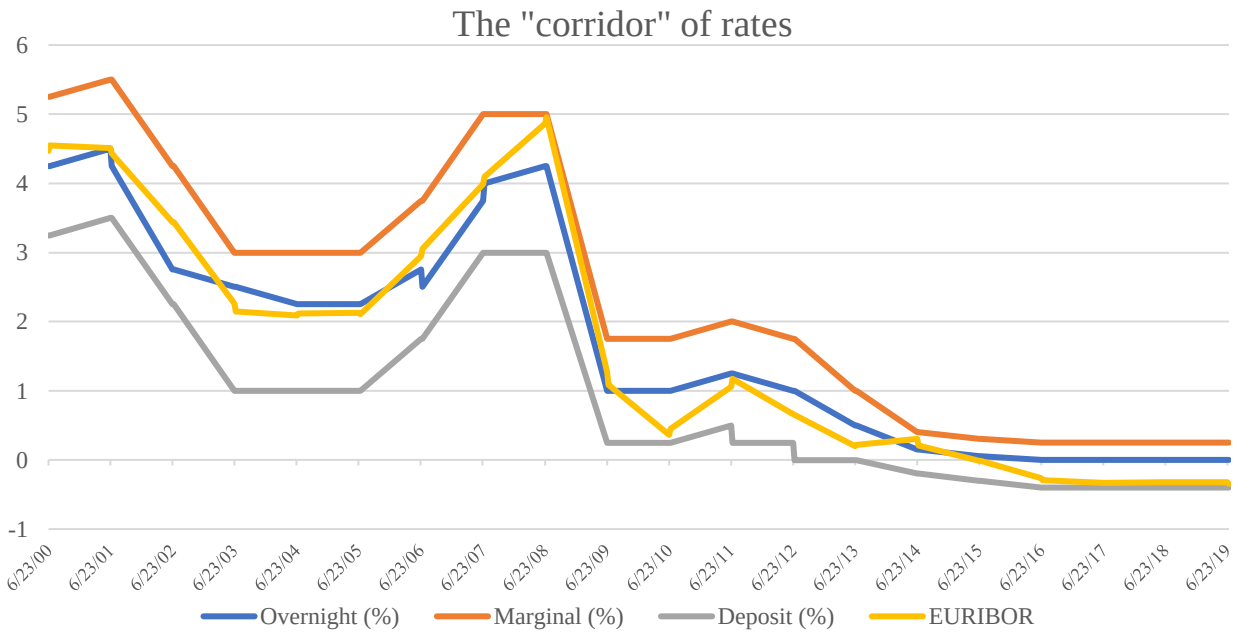

Figure 1: Data collected from the ECB statistical warehouse. Own elaboration.

One interesting feature of this control mechanism of interest rates – that is also possible to notice by checking the graph –, is that Euribor[4] moves around the overnight rate. This happens because of the arbitrage condition that rules the market: private banks will, in fact, seek funding at the most convenient rate, therefore the two rates will tend to stay close to each other, adjusting their values accordingly. In quiet and "conventional" periods, both the Euribor and overnight rate keep a certain distance from the floor and the cap of the corridor; in 2008 Euribor "touched" the cap, meaning that the thirst for reserves was so high that the ECB could not satisfy it[5].

Moreover, as theoretically explained by authors Whitsell (2006) and Bindsell (2004), rates can be moved without requiring the central bank to actively undertake open market transactions. An example of how the operational targets are not necessarily dependent on active open market operations is "forward guidance". As will be later analyzed in chapter 2, markets tend to move and adjust on a new rate as a reaction of a new declaration of new policy objectives delivered by the central banks, when these intentions are considered to be credible.

1.2 When interest rate falls: the "Zero Lower Bound"

Monetary policies, both conventional and unconventional, can be distinguished in two other broader classifications: restrictive or expansionary.

In the first case, central banks act by reducing the money supply, in order to slow down economic growth, by decreasing the amount of liquidity flowing in the economy. As clarified in the previous paragraph, central banks can affect the short-term rate by setting a price on the reserves required by the banking sector. In a restrictive monetary policy environment, the price (i.e. the overnight rate) will be set up higher. Dealing with this increase in price becomes one of the main objectives of the central bank, as it forces it to act in order to avoid high inflation, or even hyperinflation (when prices see an increase of more than fifty percent per month). The importance of working towards this goal lies in the damaging effects that inflation potentially could deliver on different levels. The first element is the contraction of purchasing power, which leads to a decreased capacity of spending because goods become too expensive, making consumers poorer. A vicious circle appears when the agents believe that prices will keep on increasing, and "animal spirits" start to kick in. This belief leads to a behavior that consists of buying as much as possible now to avoid potential higher prices later. Not only it affects the timing of the purchase, but the nature of the goods purchased too. In fact, in this context not only durable goods are stocked, but it is possible to see also an increase in investments, from both

[4] The Euribor represents the rate at which commercial banks trade reserves with each other.
[5] A focus on the economic crisis and the so-called credit crunch is presented in paragraph 1.2.

families and companies. Empirical evidence shows how one of the preferred instruments to invest in case of high inflation is stocks (Figure 2).

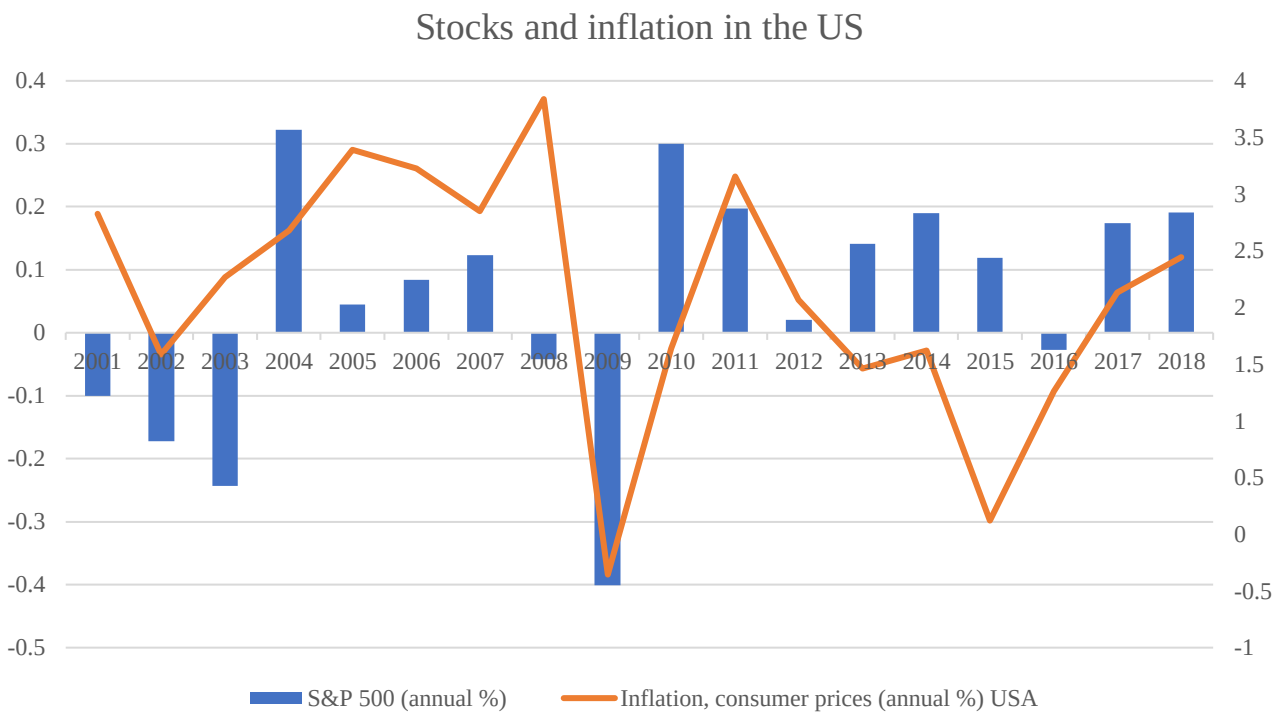

Figure 2: Data collected from the World Data Bank and Yahoo finance. Own elaboration.

Instead of saving a wad of cash under the mattress, it is more profitable to invest the same amount of money in equities. Heuristically, assuming that consumers are rational, they take into account – in this phase – that fiat money is a store of value that can transfer through time the purchasing power. A fifty euros bill will always maintain its nominal value; while it does not produce any interest, it does not see its intrinsic value changed over time. What might change is the level of inflation, thus the real value, and the purchase power (i.e. in case of deflation with the same amount of money it is possible to purchase more of the same good, vice versa in case of inflation). A similar reasoning is valid for companies too, as a situation when prices are increasing leads to capital investments that might be anticipated.

The above-mentioned vicious circle starts taking a more definite form after this second step, in which the run for purchases leads to an even higher level of inflation, as firms will tend to increase prices, exploiting the race for the stocking of goods. To avert the scenario of hyperinflation that could be caused by the still increasing price level, central banks put in act the famous fine-tuning processes, thus tend to raise the cost of borrowing in order to slow down the purchase bustle, and to make more appealing investments in sovereign bonds. If everyone decides to invest in bonds, cash holding might

become scarce, and for this reason the increase of cost of borrowing can be followed by policies of managing of reserves (setting of the overnight interest rate).

Also, in case of high inflation, the contribute of Philips curve must not be forgotten. In fact, if inflation is induced by economic growth, there will be more jobs, thus less unemployment. This is not the case when the economy experiences a period of stagflation: a stagnant growing economy, as experienced by the United States in the 1970s may see high inflation and a high level of unemployment at the same time.

An expansionary monetary policy, on the other hand, consists of undertaking a series of actions aimed at helping the economy recovering from a context of low growth, or could be implemented after a restrictive monetary policy in order to carry out the fine-tuning actions required in pursuing the price stability target. In this case the measures used are the very same as the ones stated above, but are implemented in the opposite way, in order to obtain the opposite results, as the policy signals consist in the increase of reserves pumped in the system, an increase in aggregate demand and a contraction of interest rates. As history showed, it is extremely difficult to catch on time the downside of the business cycle, and for this reason what has been seen in practice is the fulfillment of these kinds of policies once the recession has already initiated. The "conventional" way to deal with low growth is the injection of liquidity into the system by operations in the open market. The central bank does not change the size of its balance sheet but only its composition, by purchasing bonds from banks, and thus creating credit. The creation of credit allows banks to have more liquidity available to be lent, and subsequently cause the fall of interest rates. However, a well administered monetary policy has to take into account that a boost of the economy led in this manner might bring inflation at a level that is beyond the one targeted. Once again, it is fundamental handling with care all the monetary policies implemented with the much-stressed concept of fine tuning.

The fall in interest rate can lead the latter to a level that is equal or below zero; this circumstance represents the so-called "Zero Lower Bound".

The Japanese case is probably the most interesting one, as it has historically experienced a high level of debt, and subsequent low interest rates. Since October 1995 the overnight rate lied around 50 basis points, leaving little (if none at all) room for maneuver to the central bank. In the last five years of the 90s Japan did not see the hoped-for growth, not surprisingly it was the first country ever adopting quantitative easing measures in 1999[6].

[6] A deepening of this topic and a focus on the Japanese case is presented in chapter 2

Fawley and Neely (2013) provided a detailed analysis of the transmission mechanisms at the zero lower bound. The starting point is underlining that two main channels are asset price and credit. In the first one, thanks to the purchase of short term securities aimed at moving the short term rate the central bank is able to affect several types of asset prices, exchange rates included. As a consequence, if prices rise (e.g. stock prices) the economy is affected, recording for example greater demand both in consumption and investments. On the other hand, the credit channel works not only thanks to a change in prices (and subsequently yields) but takes advantage of other consequences of an expansionary monetary policy, such as the reduction in moral hazard and adverse selection that might hamper the process of credit allocation. A crucial factor that impacts the economy is expectations. For example, in case of a deflationary trend potential borrowers might be dissuaded from asking for credit, leaving the spot to individuals that are not creditworthy. Assuming that private banks and firms are aware of this moral hazard issue, they will tend to "close the credit sinks". Thus, with an expansionary monetary policy, through a decrease in interest rates lenders see their balance sheets enhanced. However, as explained before, when the interest rates are close to zero the central bank cannot use the standard market operations as a stimulus for the economy with complete efficacy.

Control of short-term rates is thus critical as they act as signals for expectations. In practice the control of the interest rate follows a rule, that was theorized by John Taylor in 1993, and that was empirically derived by the behavior of the Federal Reserve. Taylor's rule represents an example of the mentioned above "policy implementation reaction function" (PIRF) and implies that the natural interest rate i_t depends linearly on three components: the nominal value of the natural interest rate, output gap and inflation gap[7].

$$i_t = r^* + \hat{p}^* + i_Y(y_t - y_t^*) + i_p(p_t - \hat{p}^*)$$

When the economy is in normal condition, the natural interest rate must be equal to the nominal value of the natural interest rate (i.e. $i_t = r^* + \hat{p}^*$). The inflation target $\hat{p}$ is explicitly set by the central bank in order to reach the desired level of interest rate, and it changes the latter only in presence of an output or inflation gap, taking into account the respective coefficients i_Y and i_p that signal the weight that the central bank attributes to the two types of shock. This PIRF belongs to the set of tools used by the central banks when implementing conventional monetary policies, but its effectiveness seems to be at risk in case of a recession, given that one of its biggest weaknesses is that it tends on emphasizing a deflationary spiral (Benhabib *et al.*, 2001).

[7] Inflation or output gap measure the difference between the realized level of output or inflation compared to the equilibrium level.

Potentially, a central bank could pursue the zero lower bound for a longer period (considering as a benchmark what a PIRF would suggest in normal scenarios), and this approach is described by Eggertsson (2006) as a commitment "to be irresponsible" and carries with itself a time inconsistency issue.

In the Great Recession that hit the globe in the last decade, the first response to low inflation was on a hand the decrease of the interest rate, as would be suggested by Taylor's rule, but the formula would have led to negative interest rates. As it is possible to see graphically, when the rule theoretically required negative nominal interest rates, the Federal Reserve and ECB chose to stop at zero (Figures 3 and 4). This decision finds its explanation in the fact that - when nominal interest rates are negative – rational agents would hold onto cash in order not to lose money as a consequence of negative interest rates[8].

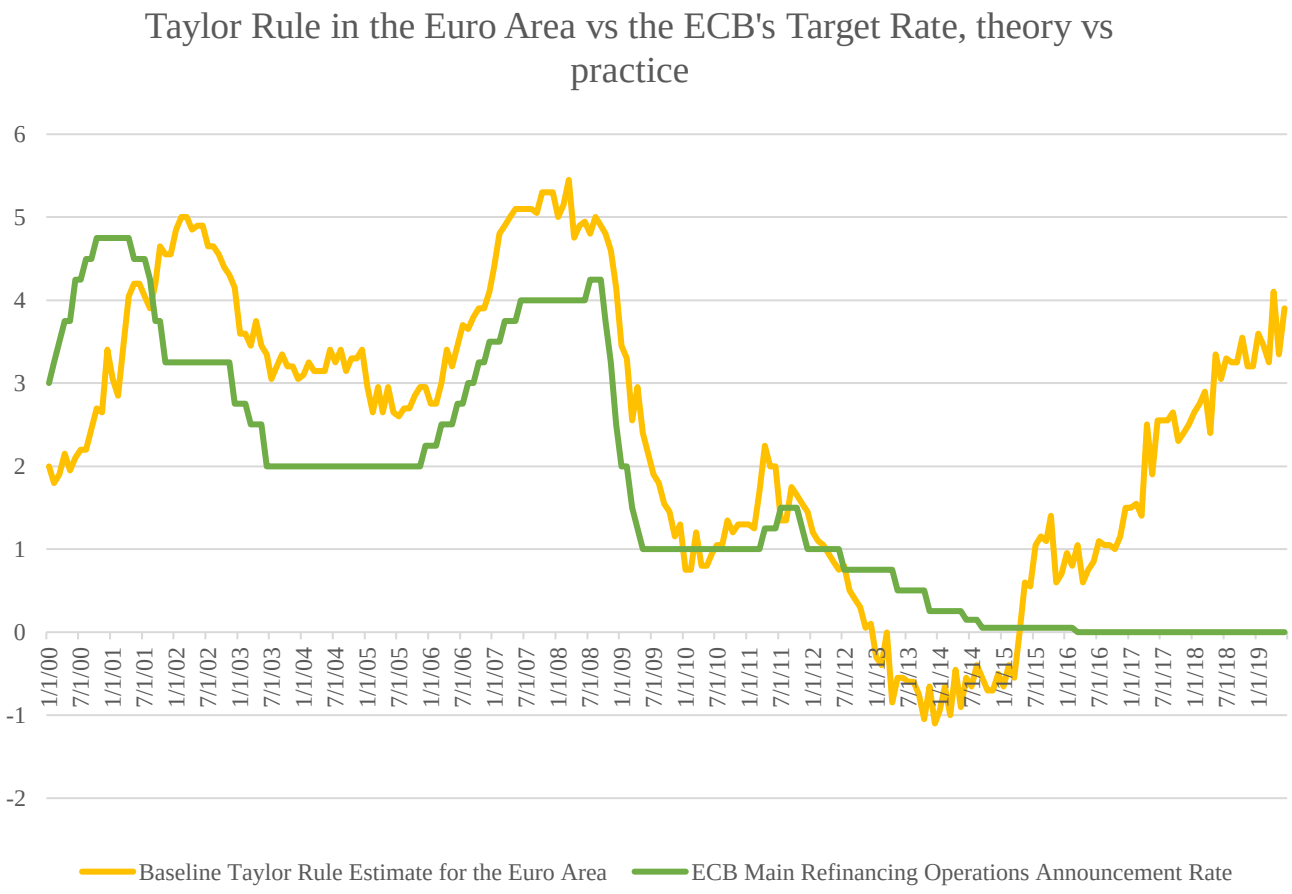

Figure 3: Data collected from Bloomberg. Own elaboration.

[8] This preference for cash is a consequence of the substitution effect, and is analyzed in depth in the following paragraph, with a technical study of Keynes's postulate of the liquidity trap.

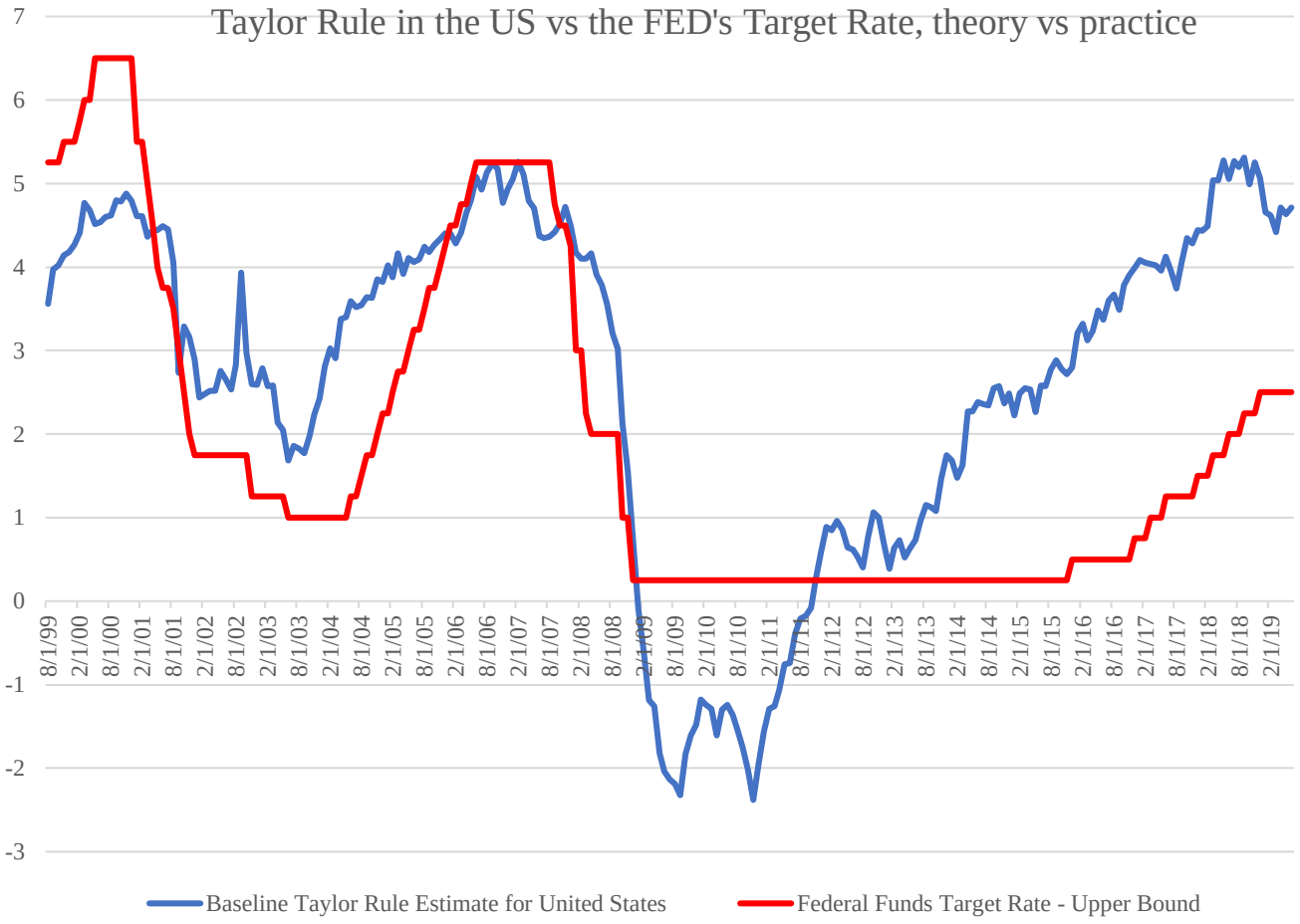

Figure 4: Data collected from Bloomberg. Own elaboration.

Literature tried to answer to the question of whether a zero lower bound scenario could be effective even before the crisis, and one of the biggest contributions to the literature regarding this effectiveness is to be found in the work of Woodford and Eggertsson (2003). The authors believe that the setting of interest rates to the level of zero represents a "genuine constraint". Practice seems to prove them right on this argument, and the first historical example is the one of Japan, where interest rates have historically been low. As it is possible to see from Figure 5, since 1995 the overnight rate has been less than 100 basis points, from then on it reached the zero lower bound, without any concrete effect on the GDP growth that, instead, kept on moving cyclically and did not respond to the monetary stimulus.

Central banks could try to decrease the long term interest rates even when the overnight rate is already at zero, through the purchase of long-term securities financed by the sale of short term securities or could implement a whole set of asset purchases or other unconventional operations to grant an effective stimulus. According to the studies of the two authors, the most important feature of any kind of policy

in a context of interest rates at the zero bound is the credibility of the policy itself, which must change the expectations of the public and convince them of its effectiveness.

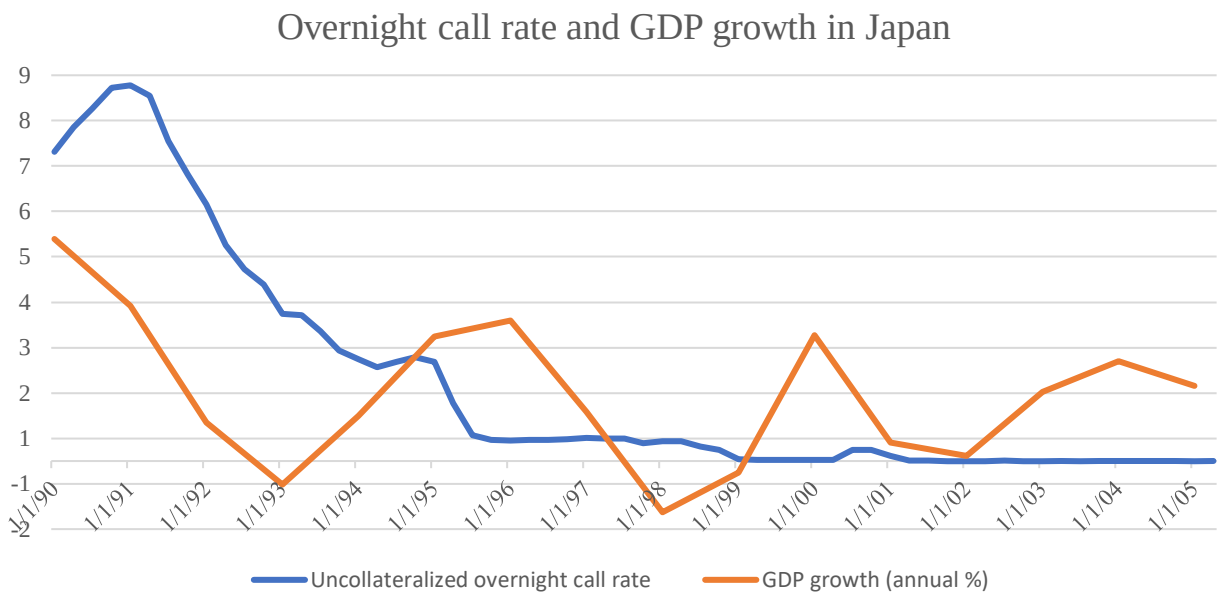

Figure 5: Data collected from the World Data Bank and FRED's Database. Own elaboration.

Hence, in order to lower long-term interest rates finalized at an increase in aggregate demand it is crucial changing expectations on the future path of the short-term rates. Inflation and output, indeed, do not depend uniquely on the current level of the short term interest rates, but also on its evolution. In order for this convincement to work, the policy measures must not be "purely forward looking"[9] but need to take into account the effects on the present time. This is true especially for the private sector's beliefs regarding the future path of short-term rates, because it subsequently defines equilibriums both for long term rates and exchange rates (as well as asset prices). Monetary policies can lose their effectiveness when the zero bound is reached and when at the same time the central bank runs after the inflation target (as in the Taylor rule), because expectations do not hold anymore. The solution found by the authors is the implementation of a policy that considers an inflation target historically coherent, and that would be optimal even in case of normal conditions. The policy rule does not need to be tailored for the specific scenario of the zero lower bound but should be a generalized product that could be used regardless of the economic condition, depending on historical values.

[9] A purely forward looking policy takes into account exclusively the possible paths of interest rates depending on the two main variables, output and inflation gap, and that does not consider the past states of the art.

The central bank thus needs to implement credible actions to fulfil the commitment; as stated by Clouse *et al.* (2003) operations such as the ones realized in open-market, when are interpreted as able to "demonstrate resolve", can be effective even in a case in which the zero lower bound has already been reached.

To sum up, there are scenarios in which the decrease of interest rates until the level of zero does not create any stimulus, making the traditional manner of sticking to an inflation target following a policy rule like the one of Taylor is not useful anymore. Central banks at this point can implement also unconventional policies, but their effectiveness when the zero lower bound has been reached depends on how credible the actions are interpreted by the private sector, and how the interpretations change the expectations on the future path of interest rates.

In the following paragraphs it is explained in detail what happens theoretically when the bank is not able anymore to create stimulus (the liquidity trap), and what are the alternatives in terms of unconventional monetary policies, their strengths and flaws.

1.2.1 When interest rate falls: the liquidity trap

According to what Keynes theorized in "The General Theory of Employment, Interest and money" (1936), there exists a case in which, when interest rates reach a particularly low level, the preference of the majority is oriented towards holding cash instead of holding debt.

The idea that lies behind this intuition is to be found in the concept of "perfect substitute goods". In theory when two goods are perfect substitute agents will be indifferent between purchasing one alternatively to the other. Keynes theorized the scenario in which - when interest rates approach the level of zero - agents will not be indifferent anymore between holding cash or investing in financial instruments but will tend on accumulating liquidity in a manner that annihilates any kind of expansionary measure.

A year later, in 1937, Hicks tried to put into a mathematical form Keynes' intuitions implementing them in its famous IS-LM model. The latter considers a setting where the gross product is equal to the aggregate supply, nominal prices and salaries are constant, and nominal and real variables are the same. In the economic system there is a central bank that directly controls the amount of money. The model considers three functions:

1. a function of aggregate consumption that increases as the gross product increases;
2. a function of aggregate investment that decreases when the real interest rate increases;

3. a function of demand for money (liquidity) that is increasing with respect to the gross product and decreasing with respect to the interest rate. The latter expresses the substitution effect between currency and financial instruments (i.e. if in order to invest in financial instruments and give up on cash interest rates must go up).

Given the three prerequisites, the result is an equilibrium condition on two markets at the same time, the one of products (IS) and the one of money (LM), as shown in figure 7.

The IS curve represents the set of points of gross product "Y" and interest rate "i" such that aggregate supply is equal to aggregate demand. When interest varies, the variation on gross product is manifested by movements along the curve. The latter moves only in cases of exogenous shocks that can affect aggregate demand, causing eventual downward or upward shifts. For what concerns the monetary component, Keynes' implementation of the notion of "liquidity preference" mentioned above causes a decreasing relationship between money demand and interest rate (Figure 6).

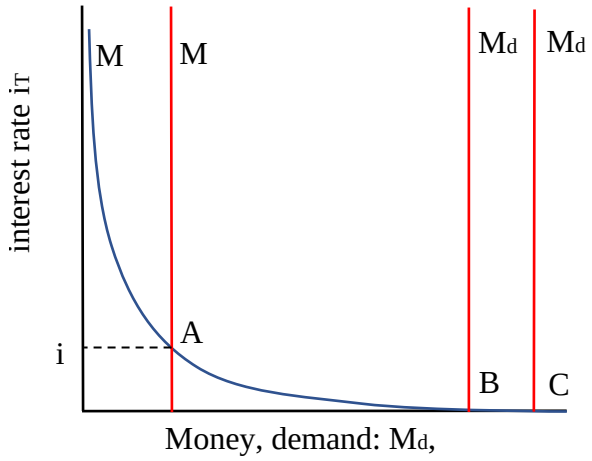

Figure 6: Relationship between money (demand and supply) and interest rate. Own elaboration

As stated before, money supply is set as a given component by central bank, thus it is possible to analyze its relationship with the movements of the gross product.

If the latter increases, money demand increases too in order to meet the increase in the transaction on the goods market. Keeping in mind that money supply is fixed, because of the substitutability between cash and financial instruments a contraction of the latter is requires to cause an increase in the interest rate.

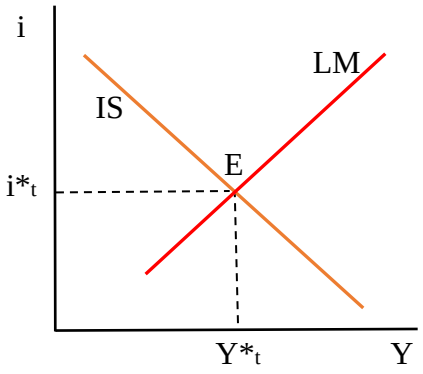

Figure 7: Generic IS-LM equilibrium. Own elaboration

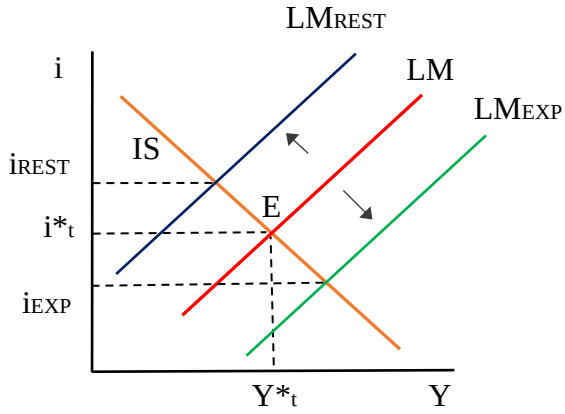

Figure 8: LM movements. Own elaboration

Point E identifies the *locus* of general equilibrium of the economic system. Summing up, the LM curve represents an increasing function, because taking the money supply as fixed, an increase in gross product leads to an increase in interest rate. In this case too any change in Y consists of movements on the LM curve, while exogenous components - such as a change in money supply - would lead to movements of the whole curve. The concept presented in the previous paragraph has a graphical representation thanks to the IS-LM model (Figure 8). Effectively, when the money supply increases, the LM curve shifts down lowering the interest rate (i_{EXP}), and vice versa when the central bank implements a restrictive monetary policy by reducing the money supply the curve shifts up, thus increasing the interest rate (i_{REST}).

In case of a decrease in aggregate demand, the graphical effect would be represented by a shift down of both the IS and the LM curve. Consider a macroeconomic shock that causes a downward shift of the IS curve. The equilibrium would move from point E to point F, seeing a decrease in both interest rate and gross product (Figure 9).

Only an intervention of the central bank (i.e. an exogenous shock in money supply) could move the LM curve in order to remain on the same level of gross product Y_t^*. This would on a hand, through an expansionary monetary policy lower again the interest rate, but at the same time could lead to a new equilibrium E^*, where Y' would be restored at its initial level Y^*.

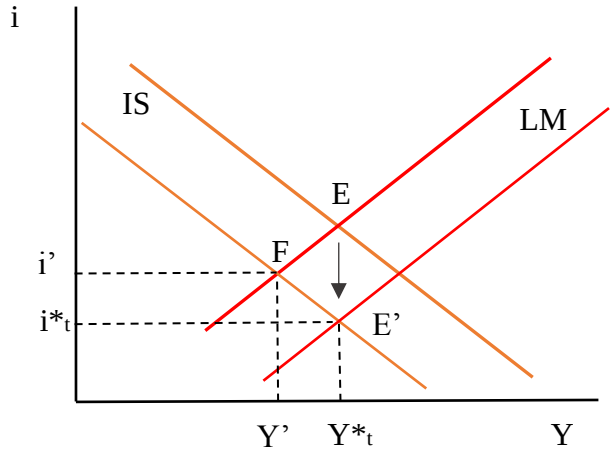

Figure 9: Central bank's response to a decrease in aggregate demand. Own elaboration

As asserted before, one of the main features of Keynes' perspective was the substitutability between cash and financial instruments. In peculiar cases of the downside of the business cycle, the liquidity preference has an increasing trend. Agents tend on stockpiling cash, holding on to the nominal value of banknotes, and use them mainly as a store of value. This behavior leads to an under-investment of financial instruments that prevents the interest rate to further decrease and blocks the demand from being restored at its previous equilibrium level (Figure 10). From a graphical point of view, the liquidity trap is represented at point T. At this state of the art the equilibrium *locus* E' cannot be reached. At the level of interest rate i_T that was originally reached due to a downward shift of the IS curve, any increase in the money supply is absorbed by an increase in demand. Money demand and supply of financial instruments are "infinite", so that the market only wants to sell all the financial instruments and drains any amount of money supply given by the central bank.

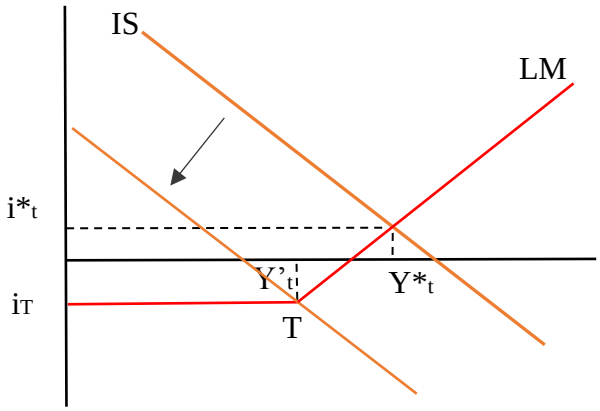

Figure 10: Liquidity trap in the IS-LM model. Own elaboration

Analyzing the same scenario from the point of view of the AS-AD model, the horizontal component of the LM curve caused by the liquidity trap corresponds to a vertical AD curve because, as stated before, the demand of financial instruments is infinite, thus the curve does not respond to any monetary stimulus. The output will remain at the same level for any level of price (Figure 11).

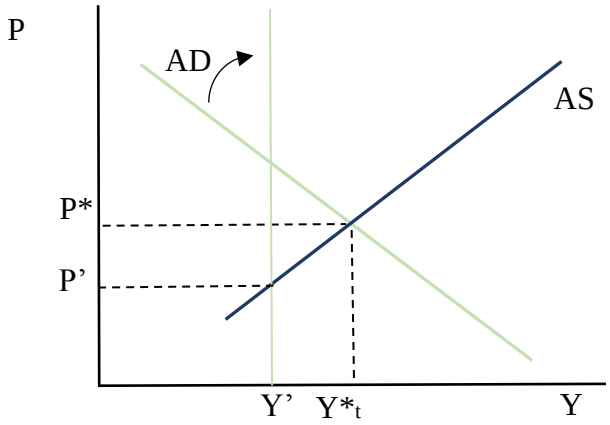

Figure 11: Liquidity trap in the AS-AD model. Own elaboration

Considering that the AD curve is now vertical and fixed (any kind of stimulus is not effective), it is possible to notice how a positive shift of the AS curve would result in an even more dangerous condition for the economy. As a matter of fact, an improvement in the aggregate supply that causes a movement of the whole curve on the down-right of the graph entails to the same level of output but causes an additional decrease in price (Figure 12).

In this scenario the economy could experience a cascade effect caused by the expectations of low

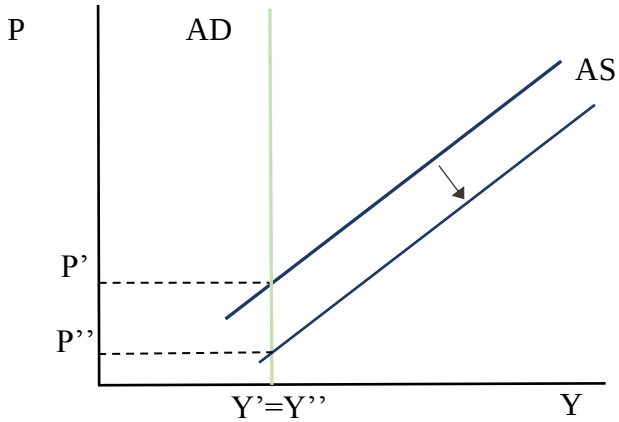

Figure 12: Vertical AD and a downwards shift of the AS curve. Own elaboration

inflation from the public, and the output decreases also in the IS-LM model. As a consequence, the real interest rate increases, shifting upwards the LM curve and further on the left the AD curve.

To sum up, Figure 13 shows how expectations of low inflation when the nominal interest rates are already low tend to increase the real interest rate to unsustainable levels. In order to get out of this scenario the intervention of the central bank is once again crucial. As will later be explained in detail, the central bank must be able to convince, both with credible words and actions, the public and change their expectations towards the idea of a higher level of prices (for instance). The following paragraph presents the state of the economy during the Great Recession, and the manners in which central banks responded with the aim of restoring the equilibrium.

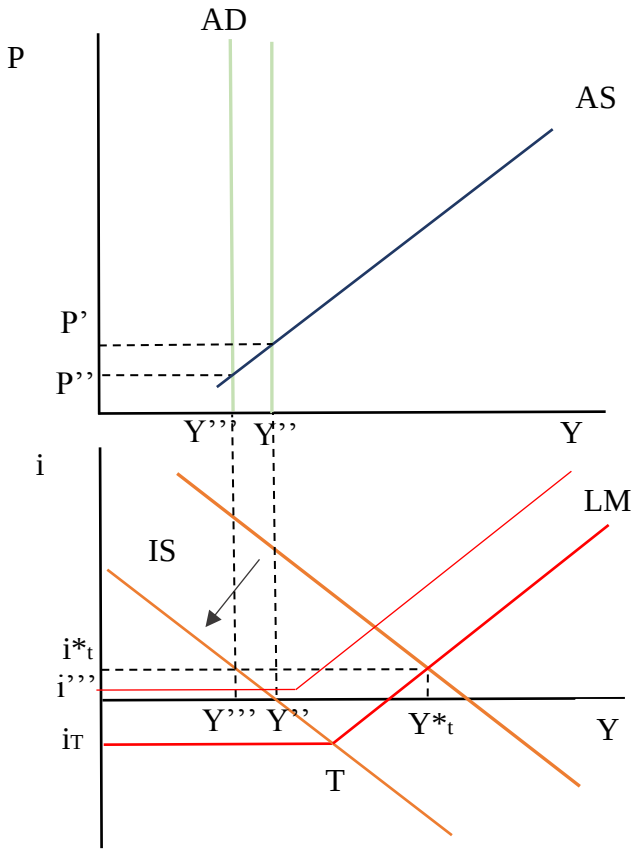

Figure 13: Liquidity trap in the IS-LM and AD-AS models. Own elaboration

1.3 Peculiar recessions: Unconventional Monetary Policies

In the previous paragraphs, it has been made clear how in the "conventional" approach central banks operate by changing the composition – but not the size – of their balance sheet in order to set the target for the short-term interest rate through open market operations. Being the sole owners of the reserves, they are able to decide the quantity and the way in which the latter can be moved, and at which price. In this manner the price of reserves is set, leading to a definition of the interest rates.

Next, the thorough explanation of the liquidity trap helps to present a starting point of exposition in which an innovative strategy must be taken by the central bank in order to overcome the deadlock whereby the ordinary monetary policies are nor effective anymore. The greatness of the genius of Keynes lies not only in the ability to predict the scenario that causes the liquidity trap, but especially in having been capable to foresee two of the three forms of today's unconventional monetary policies, "quantitative easing" and "forward guidance"[10]. A first input regarding what today is called quantitative easing was written by Keynes in "An Open Letter to President Roosevelt" (1933), where the economist referred to the idea of augmenting salaries and output by increasing the quantity of money as "like trying to get fat by buying a larger belt". He then defined the amount of money as the "only a limiting factor, rather than the volume of expenditure, which is the operative factor.".

The second one was presented in "The General Theory of Employment, Interest and money" (1936); when describing the issue of time inconsistency of some policies, Keynes added that "the same policy might prove easily successful (…) if (…) rooted in strong conviction, and promoted by an authority unlikely to be superseded".

Clearly, the contribution to the economic literature has evolved since Keynes, in order to present various analyses of all the unconventional monetary policies that have been implemented so far, the strong features and the flaws, and the ones that potentially could be implemented. Moreover, the contribution that the effects of the Great Recession gave to the state of the art of the time is impressive.

The financial crisis that kicked in in 2007 in the United States, and that later spread all over the world, showed unprecedented traits. Private banks were recording losses due to the consistent presence of bad loans in their balance sheets. As a consequence, equities decreased, driving the lending market to a "credit crunch". Banks closed the so-called "credit sinks", institutions were forced to change the previously existing set of regulations, and at the same time had to directly intervene to save the market players that were considered to be "too big to fail". The macroeconomic context that led to this scenario was characterized by two main critical points (Resti *et al*. 2008):

1. an increase in debt (high leverage) caused by a sustained injection of liquidity that lowered interest rates;
2. the quality of the credit injected in the system. A large part of the operations was conducted through the use of loan sales, securizations and re-securitizations. Moreover, the credit risk

[10] The third one would be Negative Interest Rate Policy (NIRP).

profile of such instruments was defined not always in the correct manner by rating agencies, thus altering the functioning of the financial market and creating a vicious circle of creative finance.

As a consequence, market players were willing to provide liquidity at a higher cost, laying the foundation for a significant increase in credit spreads (i.e. the difference between central bank's policy rate and the one effectively faced by consumers). As a result, central banks were forced to act promptly, implementing unconventional monetary policies.

The first move was trying to furtherly reduce interest rates by an expansion of the role of "lenders of last resort" (LOLR) (i.e. the provision of injection of liquid by the central bank due to the circumstance in which the interbank market has stopped working). As interest rates got closer and closer to the zero lower bound, the four major central banks undertook – in different timings and manners – unconventional monetary policies.

There is not a unique definition of unconventional monetary policy. It can be constituted by a shock in monetary supply carried out by the central bank, a strategy whose consequence causes a change in central bank's balance sheet, or lastly by a communication scheme regarding future monetary policies that if believed to be credible by investors can change the level of the operational target chosen by the central bank without needing the latter to actively manipulate the market.

Borio *et al.* (2009) distinguish monetary policies in two categories: the first, defined as "interest rate policy" is the one described in paragraph 1.1.1, while the second is the so-called "balance sheet policy". What differences the two is that balance sheet policies entail not only on a change of the composition of the balance sheet, but also involve its size and risk profile; these elements are what make balance sheet policies unconventional.

The authors suggest four forms of balance sheet policies:

1. Exchange rate policy, in which the central bank's actions are aimed at modifying the net exposure of the private sector by changing the exchange rate and its volatility.
2. Quasi-debt management policy, through which the central bank is able to modify the market of government's securities owned by the privates, aiming at altering the return on securities of the private sector, and consequently the cost of assets;
3. Credit policy, that consists of the purchase of a given amount of private debt and equities that alter not only the privates' balance sheet, but also the central bank's risk exposure;

4. Bank reserves policy, in which the central bank changes the amounts of reserves notwithstanding any counter-balance change on the asset side.

By intervening directly in the market, the central bank exchanges assets on which it does not have the monopoly. This monopoly role therefore represents one of the main features only of the "interest rate policies".

Following the interesting analysis carried out by Bowdler and Radia (2012), unconventional monetary policies can be discerned in two classes: "conventional unconventional" monetary policies (such as quantitative easing) and "unconventional unconventional" monetary policies, for instance forward guidance. Bean (2009) stated how the purchase of assets carried out by the central banks is not unconventional by itself. What is determinant is the scenario, the amount and the nature of the assets.

1.3.1 The transmission channels of "balance sheet policies"

The previous paragraph presented a display of unconventional monetary policies along with the historical and macroeconomic framework that led to their implementation. In addition, it is crucial the understanding of how these policies concretely have an effect: trivially, the high level of globalization can potentially "contaminate" also other countries. This happens also in the case of conventional monetary policies, so clearly a scenario of a recession may have a domino effect if spillovers are created. In other words, it is crucial that every jurisdiction internalizes the effects of its own monetary policy, in order to achieve the maximum level of economic stabilization after a shock (Dedola, Karadi and Lombardo, 2013).

According to Borio (2009) the two main channels of transmission of unconventional monetary policies are "signalling" and "broad portfolio balance". The first one is the clear communication of future operations, in order to shape the expectations of the public, thus finally impacting also the price of assets.

The second channel asserts to the change in the composition of portfolios of the private sector that arises when the concept of substitutability of assets (and liabilities) does not hold anymore.

Each one of the four different types of balance sheet policies presented in the previous paragraph operates through distinct transmission channels.

In case of exchange rate policy, the influence is exerted on the exchange rate channel, modifying the prices of domestic goods relative to the foreign ones. Quasi-debt management policy transmits in a

more subtle way, as it interferes between the public (government) and private segment of the market. Credit policies are able to effectively alter the market also through interfering, but in a direct way; in the previous case lenders and borrowers belonged to different categories by nature (public vs private), while in this scenario the central bank intermediates between actors of the same sector, the private one. Moreover, considering that in this context the central bank is including the burden of the credit risk in its balance sheet, lenders could be more willing to price the risk at a lower level because of the guarantee role embodied by the central bank itself. Lastly, in the case of bank reserves policy the bank directly affects one sector of the market (depending on the type of the asset acquired). The change in size and composition of the balance sheet has an impact on the yields. Clearly this form of policy can be devoted to the public (government), banking and non-banking sector of the economy.

An additional point of view on the transmission channels is provided by the Monetary Policy Committee of Bank of England. According to Dale (2010), the acquisition of bonds pursued by the central banks alters the portfolio of the sellers (i.e. private agents' balance sheet is now constituted of deposits rather than bonds (Figure 14).

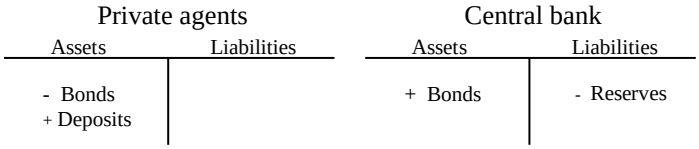

Figure 14: Portfolio rebalancing assuming that the central bank acquires assets from non-bank privates. Own elaboration

A purchase of bonds would decrease yields simply because their return is higher than the one on cash (which is zero), therefore an injection of liquidity would reduce the interest rates gained on average by investors.

Bowler and Radia (2012) added that, in the context of the rebalancing of portfolios, a component that must be considered is duration. As explained before, the purchase of assets conducted by the central bank

causes the movement of interest rates, and as a consequence alters the price of fixed income securities. If investors believe that the current level of interest rates does not fully compensate for the risk, they might ask for an additional premium. In the specific case in which the central bank buys bonds with a long duration, relieving the market with the correspondent duration risk, it is possible to observe how the interest rates for longer maturities are affected by consequence. This happens mainly because at this point the return required by investors to bear the risk of the remaining securities in the market

decreases. The "duration effect" is believed to be able to leave a footprint in the transmission mechanism not only in theory, as it found application in FED's implementation of the so-called "Operation Twist"[11].

Moreover, the authors add one more transmission mechanism to the already mentioned "signalling" and "portfolio rebalancing", "liquidity". As specified in paragraph 1.2, the response of investors to the macroeconomic context of the Great Recession was asking for higher returns that could compensate for the higher risk caused by interest rates close to the zero lower bound. By the purchase of assets on large scale, central banks were able to lower the risk premia asked for by the market players. It is important to underline that this is true when central banks buy assets that are less liquid compared to treasury notes. Government bonds' volume of transaction is normally high, and therefore their market would not be affected as largely as other markets. Moreover, it is worth noticing that each country is characterized by financial frictions that permit the transmission mechanism to work on specific channels. Christensen and Rudebush (2012) found that in the United States the main transmission channel is signaling, while the UK is mostly affected by portfolio balance.

One concept that is important to add in the analysis of the transmission mechanisms is the one presented by Eggertson and Woodford (2003) regarding the "irrelevance proposition". It implies that when the central bank buys securities from investors it does not eliminate credit risk, it just shifts from the private's sector balance sheet to the government's balance sheet, which could ultimately repay this risk by potentially increasing taxes. An alternative to assets purchases in order to avoid this impasse caused by the interaction of the monetary and financial world is given by Krugman (1998), who proposed the "overshooting of inflation target" in the future to prevent it to undershoot in the present.

Amongst the effects on securities, it is important to consider the fact that with the increase in prices the return on corporate bonds increases too, reducing the corporate default and finally increasing dividend payments. The presented mechanism is the consequence of the so-called "search for yield", in which investors tend on switching their investment preferences onto securities with higher yields.

In order to affect the market, asset purchases do not necessarily need the bond interest rates to fall, because by affecting the private sector of the economy it is possible to realize gains in wealth without seeing a reduction in bond yields. As a matter of fact, what matters is the spread between government bonds and risky assets.

[11] A focus on "Operation Twist" is presented in chapter 2.

If the return on bonds does not change, the spread can still see its value decrease if the return on risky assets is successfully affected by asset purchases (that reduce the cost of funding, thus the risk).

As it is possible to see from Figure 15, via an intervention directly oriented towards commercial banks asset purchases are able to ease the credit condition, finally stimulating domestic demand.

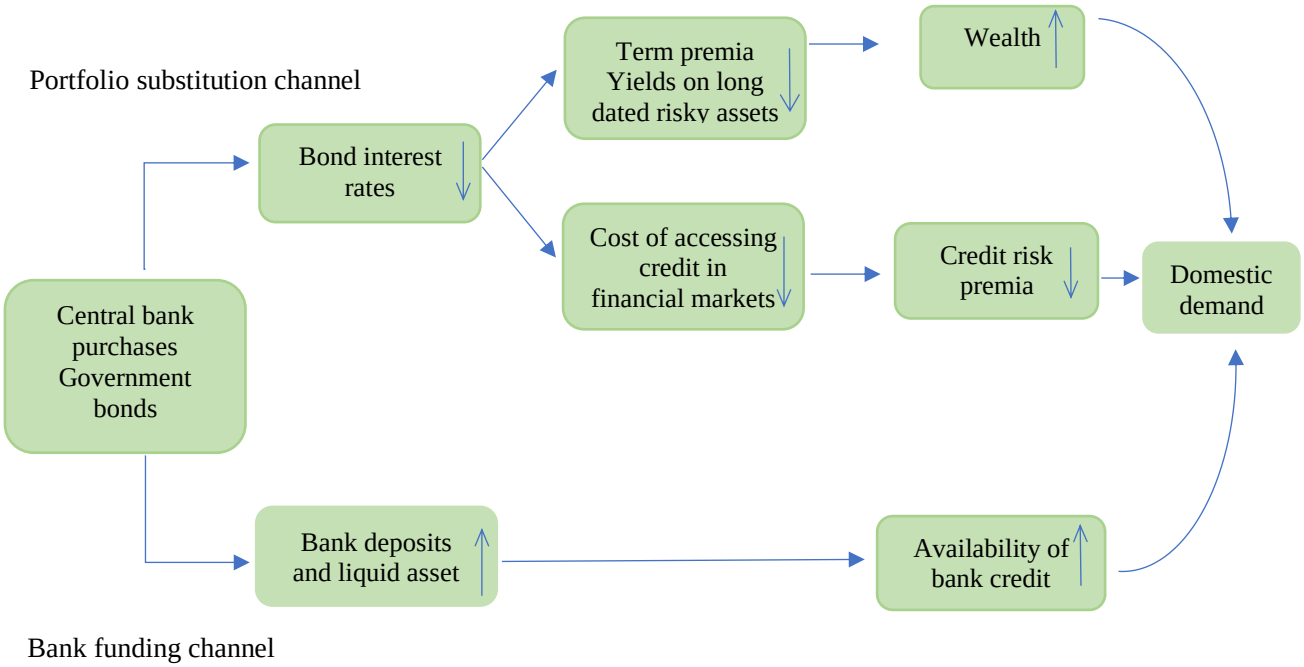

Figure 15: Transmission channels of bond purchases. Source Bank of England, Own elaboration

1.4 Implications and flaws of unconventional monetary policies

The previous paragraphs presented a definition of unconventional monetary policies, the economic setting that required their implementation and descriptions from different authors regarding the transmission mechanism. The literature does not present only analytical descriptions and strong features but also flaws and perils.

McMahon *et al.* (2018) assert to the fact that the central bank is able to adjust the stochastic path of inflation by the rebalancing of its balance sheet as a response to expectations of the market. Through portfolio allocation the distribution of the stochastic path of inflation becomes more certain. In fact, while in conventional monetary policies the portfolio allocation is restricted[12], in unconventional contexts the more freedom in managing portfolio weights and composition (i.e. unrestricted) distorts the path of inflation, price of assets and the state of the art in the foreign exchange market, making it

[12] According to the authors, it is the complete knowledge of the economic scenario that allows the central bank to set the weights accordingly to the definite distribution of inflation in a "normal" state of the art (therefore in the case of conventional monetary policy).

indeterminate. Balance sheet policies can be distinguished into two categories, restricted and unrestricted.

The restricted process is present in case of credit easing, where the central bank sets a specific inflation target, and therefore sets a target also on the composition of the weights and composition of the portfolio. Quantitative easing can be instead considered as an unrestricted monetary policy as it does not lead to a constriction of the asset composition of the balance sheet but enlarges the liabilities.

The flaw of policies in which the portfolio composition is a function of an inflation target, whether they are restricted or unrestricted, is that they are not able to prevail on the indeterminacy problem that affects nominal inflation. Thus, the indeterminacy issue regarding the path of inflation affects both policies, but in different manners.

In a context of credit easing, the authors find that indeterminacy is present but can be overcome if the assets present on the balance sheet are set to be as exogenous variables. In the case of quantitative easing, the model implemented by the authors seems to be always affected by indeterminacy of nominal inflation.

The main objective of the injection of liquidity in the system operated by the central banks was, as stated in the previous paragraphs, finalized at increasing interest rates, enhancing the portfolio of banks to try and reboot the economy.

Hoffman and Schnabl (2016) disputed on how this is not completely true, and added other elements for which unconventional monetary policies can have adverse effects. The dissertation starts with an analysis of how boom-and-burst crisis work. The starting point is the definition of equilibrium as a condition where investments and savings are equal. The correct setting of interest rate by the central bank is crucial, as mistakes may lead to type 1 or type 2 error of monetary policies. The first one is obtained when the central bank keeps low interest rates for a long time, creating a scenario of overinvestment. On the other hand, a type 2 error is possible when interest rates are raised on a too high level. Historically, as seen also before the burst of the Great Recession, central banks were keeping lower interest rates, thus approaching type 1 errors. As the crisis exploded, interest rates started increasing because of the higher risk associated with lending, and institutions were forced to act in order to slow this potential lethal increase and avoid type 2 error. The main finding of the authors is that for as much as it is true that the implementation of unconventional monetary policies was able to stabilize the financial markets and employment, side effects were encountered for investments and growth (Figure 16). This characteristic of the unequal distribution of positive consequences makes the monetary policy “asymmetric”.

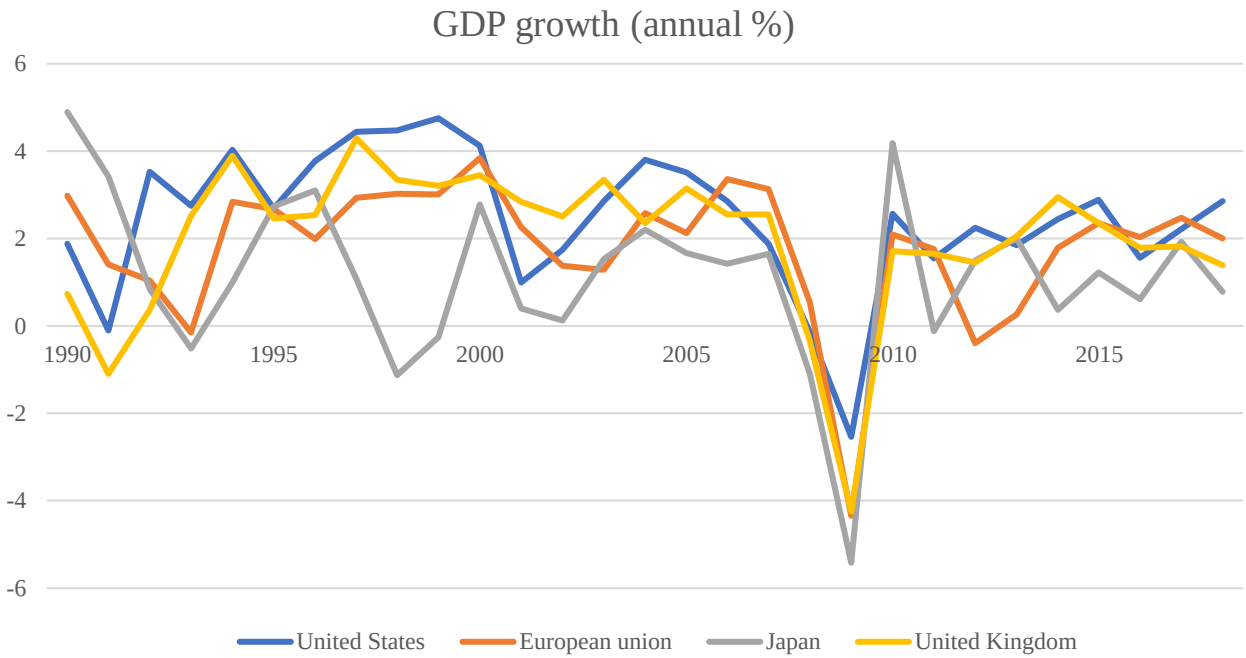

Figure 16: Data collected from the World Bank Dataset. Own Elaboration

The main point of their argument is that in the case of an economic crisis, the implementation of unconventional monetary policies "can lead to an implicit nationalization of money and credit markets". The normal functioning of the interbank sector stops, and the central bank acts as a protagonist, discouraging private banks with good levels of liquidity to provide funds as their role is "occupied" by the central bank.

Taking a closer look at the equity market, the decrease in the cost of borrowing makes shares more attractive to the eyes of investors seeking high returns; listed companies are not spared by the "charm" attributed to shares, especially their own. In fact, not only they carry higher returns compared to securities like bonds, but also share repurchases allow shareholders to collect higher dividends.

One more factor to take into consideration is the performance of investments and consumption as a response to unconventional monetary policies. One of the main roles of commercial banks, other than the collection of liquidity of the private agents consists of allocating efficiently these reserves on loans, investments or funding of projects. The latter represents the intermediary function. An injection of liquidity may push companies in moving towards the acceptance of cheap loans, and in slowing innovation. By graphically checking the total investments as a share of GDP, it is possible to see how investments have not benefitted from balance sheet policies (Figure 17).

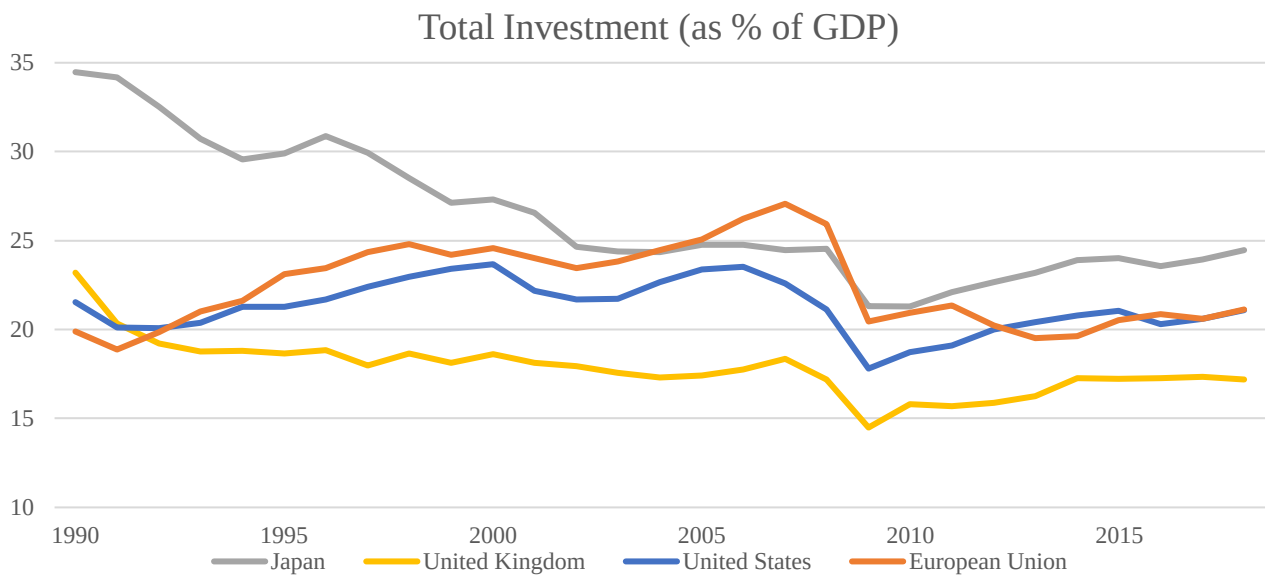

Figure 17: Data collected from World Economic Outlook Database. Own Elaboration

For what concerns consumption, in this scenario the "Cantillon effect" finds an application. According to this principle, an injection of liquidity operates in favor of the subjects that receive it first (it this case it would be banks and financial institutions). It is therefore (almost) impossible for small firms, families and individuals to benefit from balance sheet policies, mainly because the distributional mechanism does not work like a domino effect, but it is characterized by frictions that prevent from reaching fairness.

According to Borio and Zhu (2012) when asset prices increase as a result of an intervention of the central bank it is possible that credit risk increases; this eventuality is probable because assets may be present in a larger share than the one of the scenario in which they are fairly priced (Ioannidu *et al.* 2015).

Lastly, when central banks buy securities from the public sector such as treasury notes, monetary policy gets involved with fiscal policy, thinning the boundaries that should keep the two of them separated, therefore compromising the most important feature of a central bank, independence. This eventuality is represented by the enlargement of the balance sheet, which may potentially lead to more risk and losses, that in return can have fiscal consequences.

CHAPTER 2

QUANTITATIVE EASING AND FORWARD GUIDANCE: AN IN-DEPTH ANALYSIS

The previous chapter introduced the topic of unconventional monetary policies, starting from the presentation of the role of the central bank. As stated before, the operations of the central bank are in any case oriented at creating a stable economic environment, whether by reaching price stability or other targets. The normal set of tools that the central bank uses consist in adjusting the short term rate finalized at the maintenance of a specific target (i.e. level of prices) through the use of open market operations, so the injection in case of an expansionary policy or the extraction in case of a restrictive monetary policy of liquidity in the market. In practical terms, the central bank trades short term debt to modify the short term rate, causing a shift in the monetary base (i.e. the amount of liquidity that circulates in the market). This allocation scheme derives from the feature of monopoly of supply of reserves that the central bank has. In normal times its control on the interest rate works through the fulfilment of specific rules (i.e. Taylor rule) or paths (i.e. corridor).

The conventional schemes demonstrated not to always work. During the crisis caused by a real estate bubble and deflationary pressure of the 90s in Japan, and during the Great Recession that hit the globe starting from 2008 a first response was to lower interest rates to create stimulus in the economy, acting in the conventional manner. In these scenarios the Taylor rule would have suggested the setting of the nominal interest rate to negative values, but the market was bounded to a minimum level of zero[13].

As shown in the first chapter, after hitting the zero lower bound the interest rate policy becomes ineffective (as theorized by Keynes with the concept of the liquidity trap) because the lowering of interest rate is not able to "shake up" the market. Central banks then needed to respond by implementing some sort of greater effort, that takes shape in the so-called unconventional monetary policies. The necessity of their intervention came also from the poor conditions in which the financial markets were: solvency of market players was at risk, as well as the amounts of credit of the banks. The aftermath of the Great Recession forced central banks of different countries, especially in the Euro area, United States, United Kingdom and Japan to give a strong response to financial markets, in order to pamper the consequences of the Great Recession.

[13] Cash is non-interest bearing, so the market cannot push the rates below the level of the latter.

As interest rates were reaching really low levels, the assets side of the central banks' balance sheets have never been so large. In the first four years, between 2008 and 2012, in the Euro area the asset side got twice bigger, while it tripled for both the Federal Reserve and for the Bank of England[14].

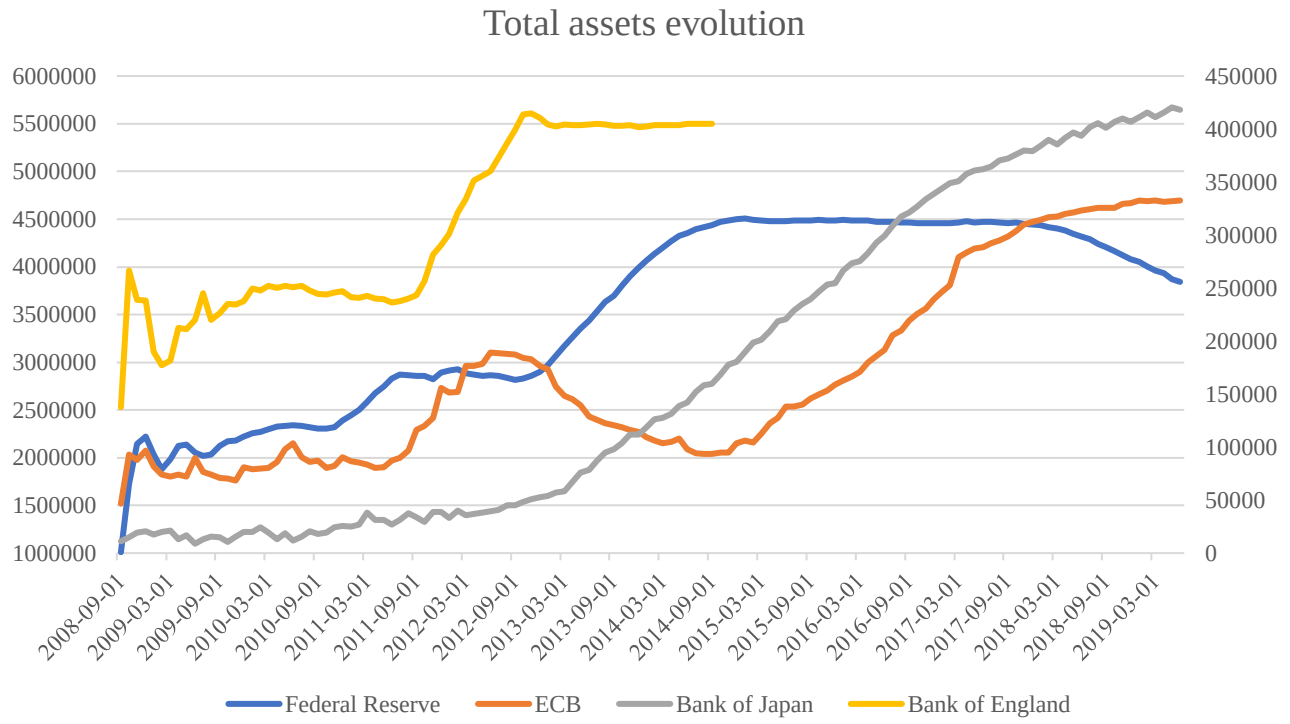

Figure 18: Data collected from FRED; data of Bank of England are plotted on the right axis. Own elaboration.

The policies implemented by the four main central banks share some traits in common, like the implementation of asset purchases, but they differ for other aspects. ECB's starting point was providing credit to financial institutions such as private banks and pension funds. The Federal Reserve and the Bank of England, instead, purchased securities from both the public and private sector.

There is no precise definition for unconventional monetary policies, but they can be considered as the set of tools that operate as a variant for the short term interest rate setting to stabilize the economy.

The two unconventional instruments par excellence are quantitative easing and forward guidance. Bowler and Radia (2012) consider the first one to be a "conventional unconventional" monetary policy, because asset purchases are not uncommon for the central bank per se, but the amount and the type of assets purchased make the policy unconventional; the second one is instead considered as an "unconventional unconventional" monetary policy, a true novelty of the set of instruments used by central banks.

[14] After 2014 the Bank of England discontinued the monthly publishing of total assets.

The following paragraphs contain a focus on quantitative easing and forward guidance of the four major central banks, with a focus on the evidence found so far.

2.1 Quantitative easing

Quantitative easing is the oldest unconventional monetary policy to ever be implemented. As the name suggests, it implies a focus on the quantity of the targets, and it consists of a monetary supply shock through the purchase of assets by the central bank that in turn expands its balance sheet. As stated previously, with open market operations the central bank acts as an intermediary in order to fulfil the targeted goal. The unconventional feature of quantitative easing consists of the bank actively purchasing securities and assets of various kinds directly into the market. The policy was experimented by the Bank of Japan in the 90s for the very first time and was aimed at exploiting the positive spillover effects on the economy caused by the purchase of government bonds from commercial banks, thus the injection of liquidity to increase asset prices and to stop the deflationary trend. The purchases were aimed at the awakening of the level of inflation, but also to lower the long term yields. Thus, one more differentiation from the conventional policies is that the purchases of long term assets are aimed at modifying the long term rates (that are not a target of the conventional policies).

Fawley and Neely (2013) presented an analytical explanation of how long term rates can be affected. By decomposing the bond yield in the following form

$$y_{t,t+n} = \bar{y}_{t,t+n} + TP_{t,n} - E_t\pi_n \text{y}$$

Where:

- $y_{t,t+n}$ is the expected real yield at time t for an n-year bond;
- $\bar{y}_{t,t+n}$ is the average expected overnight rate for the next n-years;
- $TP_{t,n}$ is the term premium at time t for a n-years bond;
- $E_t\pi_n$y is the expected level of inflation at time t for the next n-years;

the long term yield can decrease in three different manners:

1. a fall in term premium;
2. a fall in policy rate path;
3. an increase in expected inflation.

In the last decades central banks undertook several unconventional operations. The Federal Reserve attempted to an "Operation Twist", and bought governments bonds and agency-backed mortgage securities; the ECB fulfilled LTROs, credit easing and repo operations; the Bank of England opted for the purchase of gilts from the non-bank market; lastly the Bank of Japan adopted "pure QE" and also a peculiar form of qualitative and quantitative easing (QQE). The acquisitions targeted specific quantities of assets owned by the private sector, or government bonds, and by the enlargement of the balance sheet of the central bank, it was possible to impact the balance sheet of the private sector, interfering on the economy through transmission mechanisms.

Before explaining in detail the policies that were implemented, it is important to distinguish credit easing from quantitative easing. The first policy targets specific parts of the economy, sectors of the markets and rates, the second one consists of an expansion of the balance sheet of the central bank caused by purchases of any kind. The difference between "pure QE" and credit easing was explained in a speech by Bernanke (2009), where he described how "in a pure QE regime, the focus of policy is the quantity of bank reserves, which are liabilities of the central bank; the composition of loans and securities on the asset side of the central bank's balance sheet is incidental". In the same year a board member of the ECB, Lorenzo Bini Smaghi, defined the asset purchase process as "when the central bank decides to expand the size of its balance sheet, it has to choose which assets to buy. In theory, it could purchase any asset from anybody", confirming Bernanke's view.

The first burst was caused by the collapse of the financial market of the United States triggered by the housing price bubble that started in 2006, and that left its disruptive mark starting from 2008. The four major central banks responded in different manners, also reflecting the different financial structures of the four economies and can be divided into two groups. The Federal Reserve and the Bank of England focused their efforts towards bond purchases, while the ECB and the Bank of Japan provided credit directly to banks. These first sets of policy reactions were implemented to try and react to and pamper the consequences of the bankruptcy of Lehman Brothers.

2.1.1 QE in the Eurozone

For what concerns the Euro area, it is possible to divide the implementation of the policies in three different steps.

In the very first years the ECB acted mainly as a lender of last resort in order to restart the functioning system of the financial market, and to let financial institutions regain their normal functioning. The first actions of the ECB were aimed at reducing the spread between the 3-month Euribor and the

overnight indexed swap, which in October 2008 hit the record level of 198 basis points. The central bank implemented the Fixed-rate tender full-allotment programs (FRFA), that consisted of lending a fixed amount to banks, at the condition that these had the appropriate collateral[15]. Moreover, the main refinancing rate[16] was cut from 425 to 100 basis points.

This first response was not enough to calm the markets, and the ECB was forced to intervene in the interbank sector by finally implementing asset purchases. In 2008-2009 it introduced the 12-month Longer-Term Refining Operations (LTROs) with the aim to push banks to borrow at longer maturities[17], and the Covered Bond Purchase Program (CBPP)[18], that helped its specific sector of the market to grow. The president at that time was Jean-Claude Trichet, and he presented these programs as destined to "revive the market"; these operations were "conducted as fixed rate tender procedures with full allotment, and the rate in the first of these operations was the rate in the main refinancing operations at that time" with a maturity of one year (ECB, 2009). One last round was launched in 2011. Unfortunately, LTROs and CBPP were not entirely successful, as these programs were not able to record a big effect on the market.

The second step is represented by the crisis of sovereign debt recorded in countries like Portugal, Ireland and Greece, that forced the central bank to actively intervene by purchasing government bonds of fragile member States, implementing the so-called "Security Markets Program". Hence, in 2010 the focus of the ECB was forced towards directly trading in the secondary market to ensure "depth and liquidity", in order to "address the malfunctioning of securities markets and restore an appropriate monetary policy transmission mechanism" (ECB, 2010). The main aim of this program was to avoid the debt default of these countries, and to decrease yields (the government bonds were more costly because riskier, so they recorded high spreads). The peculiarity of this program is that it did not announce publicly the "when" and the "how much", but it worked with a mechanism of request and the markets were left in the dark. According to Minder (2011) the SMP was effective, as it was able to reduce the yields on sovereign debt. In 2011, when SMP was still running, the ECB decided to run a second time LTROs and CBPP, providing direct help and funding to banks. According to Buiter and Rahbari (2012) the real intention of the ECB behind the choice of implementing a second round of

[15] The FRFA program is not conventional because its conventional version consists of a bidding process. It was defined by Lorenzo Bini Smaghi (2009) as "endogenous credit easing".
[16] The main refinancing rate is determined by the Main refinancing Operations (MRO), a conventional policy used by ECB to target the short term policy.
[17] This program was run several times.
[18] Covered bonds are considered to be "safe" securities because in case of default the lender can retaliate on the collateral, that functions as a warranty.

LSAP and CBPP was to finance the SMP in a costless manner, and at the same time comply to the rules.

At the end of 2012 the ECB had bought in the secondary market €218 billion of government bonds of the GIIPS countries (Greece, Italy, Ireland Portugal and Spain). A study conducted by Krishnamurthy *et al.* (2018) demonstrates that the Security Markets Program was able to cause a decrease in the two-years bond yields of Italy and Spain by 200 basis points, by 500 basis points in Ireland and Portugal, and by 1000 basis points in Greece, proving to be extremely successful.

In the same year Mario Draghi gave the famous speech in London in which he stated that "within our mandate the ECB is ready to do whatever it takes to preserve the Euro, and believe it will be enough". This statement can be considered one first embryonal example of how credible communication can influence the markets without actively intervening.

However, the "true" forward guidance, along with other measures like asset purchases on large scale and credit supply was implemented in the third step, when the sovereign crisis was over, but inflation was not growing enough. Along with forward guidance, that was first implemented on the 4th of July 2013, credit easing policies were fulfilled through the so-called "Targeted Longer-Term Refinancing Operations". Using ECB's words, these are "financing to credit institutions for periods of up to four years. They offer long-term funding at attractive conditions to banks in order to further ease private sector credit conditions and stimulate bank lending to the real economy".

In 2014 the European Central Bank drastically changed its way to conduct unconventional monetary policy. The first element that stands out is definitely the adoption of negative interest rates, fulfilled in August 2014, and that at the moment has not been abandoned. This policy was implemented altogether with the launch of a large-scale asset purchase, by buying asset backed securities, covered bonds and government bonds that consisted of an Asset Purchase Programme (APP) and TLTRO in order to support forward guidance.

The APP amounted to a total of €2,6 trillion, was operative until December 2018, and contained three schemes:

1. a third round of CBPP, that accounted to the 10%;
2. an asset-backed securities programme (ABSPP), only 1% of the total amount;
3. the public sector purchase programme (PSPP), that received the largest share of contribution, 82%;
4. the corporate sector purchase programme (CSPP), which constituted 7% of the whole program.

After the end of the implementation of the APP, the ECB shifted its efforts toward the reinvestment phase. The principal payments of the securities purchased with this program that reached maturity are now in fact being reinvested (Figure 19).

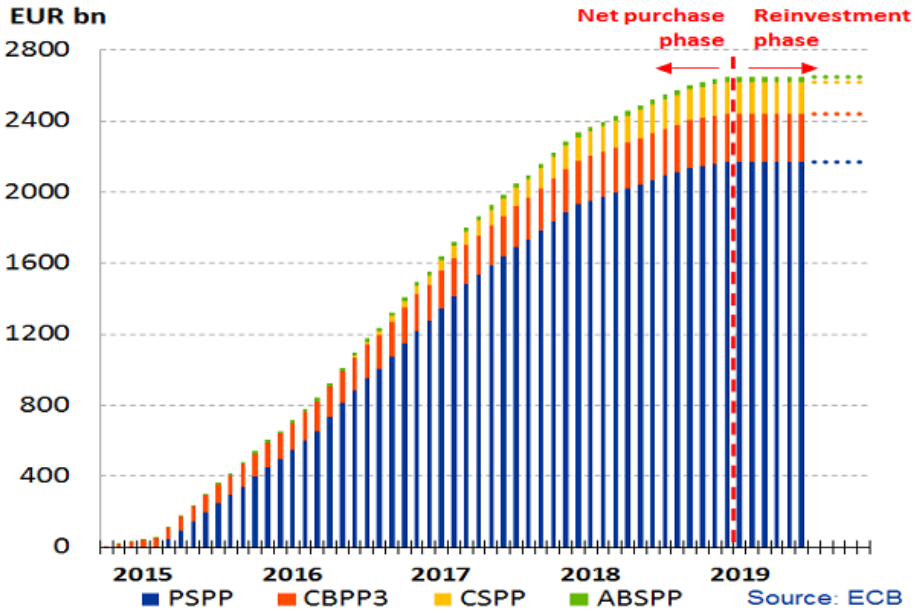

Figure 19: Composition and evolution of APP program. Source: ECB

As of June 2019, the ECB has bought €2,8 trillion of securities.

2.1.1.1 Negative interest rates

What has been said so far, and what was seen in the first five years following the Great Recession and the implementation on the first unconventional monetary policies measures is that in case of a deflationary trend, when the rates are close or on the zero lower bound, central banks cannot opt anymore on the decrease of the interest rate to create stimulus because the rational agent will tend on stockpiling cash (which is non-interest bearing), making the conventional monetary policy useless, as the economy falls in the liquidity trap. Any kind of conventional expansionary policy would not be effective, thus on the zero lower bound Taylor's rule cannot be used anymore.

Initially, evidence proved this view right, and as explained in the previous paragraphs, only credible commitments from the central banks in pursuing asset purchases were able to enhance the conditions of the markets.

In 2014 something peculiar happened in the Eurozone. Negative interest rates were adopted for the first time by one of the four major central banks. This type of policy was not new in continental Europe, as Denmark was the first to adopt it. Negative interest rate policy was implemented in June

2014, hitting a level of -0,1%, (Figure 20) and the initial intention was to use it for a short period of time, in order to fight the deflationary trend that started in that year, and to enhance growth and investments. In a normal scenario, when commercial banks deposit their reserves in the central bank, they realize a gain (represented by the interest rate). With negative interest rates the opposite happens: commercial banks pay the central banks a "fee" to store the reserves. Originally, the primary objective of the policy was to create a system that could incentivize lending (thus spending) and discourage saving. So far, the results are not satisfactory. What was born to be a policy rate to be kept for a short period of time seems to have "tied the hands" of the ECB, who is now not able to increase the interest rate. As of July 2019, the interest rate has kept on decreasing since its first implementation, to a level of -0,4%. In a recent statement (March 2019) Mario Draghi defined it as "a powerful instrument in enhancing, fostering the recovery and converging to price stability and achieving our objective".

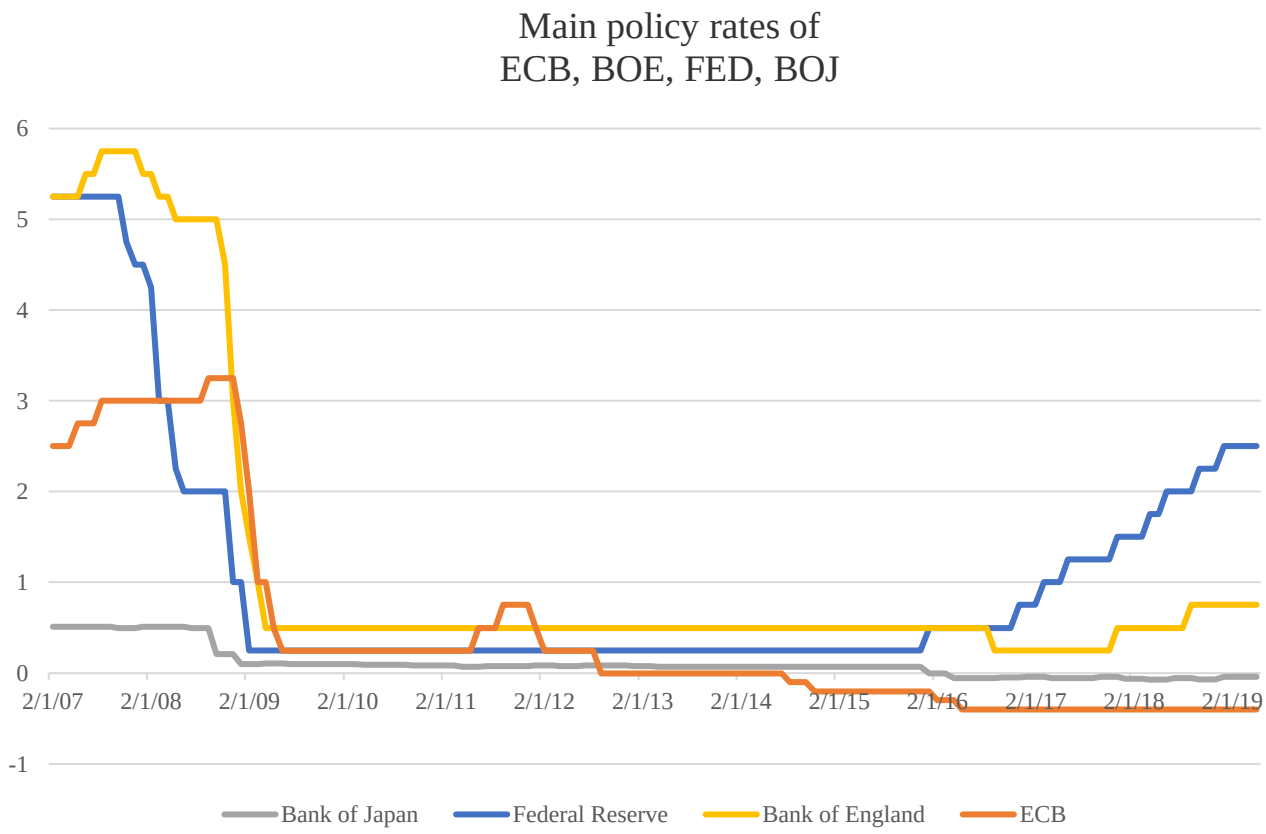

Figure 20: Data collected from FRED, ECB Statistical warehouse, Bank of Japan Statistics, Bank of England Statistics. Own elaboration

This type of policy seems to carry with itself several issues. First of all, it has not helped the recovery of the economy, but – on the contrary – has created a serious constraint for the central bank.

With negative interest rates there is the concrete possibility of keeping alive "zombie firms"[19] that do not give any contribution to growth and accumulate resources. To be more thorough, a study conducted by the open banking platform Deposit Solutions[20] stated how European banks paid €7,5 billion on their surplus deposits in 2018. German banks contribute with the largest share (33%) of all Eurozone deposit charges from 2016 to 2018, while countries like Italy, Portugal and Spain account for 10% of the total amount. Moreover, a negative interest rate regime represents a cost for banks, that have seen their profitability decrease[21], and lastly it might create a spillover effect on the households' deposits.

A different view is given by the ECB, which considers the loss on profitability of lenders to be regained on volume given that low rates create stimulus for demand for credit. Benoit Coeure, an Executive Board member, said that the €7,5 billion euros of loss on profitability are "peanuts" and addressed the non-performing loans and technological change to be the major issues.

2.1.1.2 The effects of unconventional monetary policies on bank stability in Europe

A study conducted by Avalos and Mamatzakis (2018) analyzed the impact that unconventional monetary policies have on the loss-absorbing buffers of the European banks. The results seem to be heterogeneous, as there is a consistent difference between the two groups of countries chosen for the dissertation: "core" countries (Austria, Belgium, Finland, France, Germany, Luxembourg and Netherlands) and the "periphery", constituted by the countries that suffered the most from the recessions (Greece, Ireland, Italy, Portugal and Spain, GIIPS to abbreviate). The discrimination component derives from the idea that the ECB applies the same figure in terms of target on a territory with numerous countries that were affected by the crisis to different extents in the first place.

The first group seems to have been strengthened by these policies, while it damaged the more fragile banks of the second group.

Two critical issues might have contributed:

1. the assets purchase program has not taken into account fully the difference in size of the bond markets of the countries, delivering an asymmetrical result;
2. it is possible that – if predicted by the fragile countries – a sustained assistance by the central bank could have led to a looser respect of the buffers.

[19] As happened in Japan, zombie firms are borrowers with low profitability or those that are already heavily indebted.
[20] The sources of the data of the report Data are from the ECB, Deutsche Bundesbank, Swiss National Bank and the Swiss Federal Tax Administration.
[21] The same press release from Deposit Solutions found a 4% decrease in profits in 2018. German banks bore the heaviest share, with a loss of 9% of profits.

Even if the empirical results are not able to point directly and with certainty to specific causes, the outcome of the implementation of unconventional monetary policies on banks' robustness is clear: the policies implemented so far (quantitative easing or interest policies) for GIIPS have not beneficial, if possible deleterious. The opposite happened for the "core" countries, where quantitative easing especially has reinforced the loss-absorbing buffers.

2.1.2 QE in the United States

The Federal Reserve implemented several runs of quantitative easing. The first can be referred to as QE1 (or alternatively as LSAP1) and was run between 2008 and 2009 with the goal of facilitating the restoration of the economy, with an emphasis on real estate market. The first asset purchase program announcement was made by the FED in November 2008, with the target of a $100 billion purchase of debt of government sponsored enterprises (GSE) and $500 billion mortgage-backed securities emitted by the GSEs. In 2009 the Federal Reserve increased the amounts for both bonds and MBSs ($100 and $750 respectively), and the acquisition of $300 billion of long term government bonds. According to Gagnon *et al.* (2011) QE1 was able to lower the long term real interest rates influencing the term premia ($TP_{t,n}$). The authors state how the first round of LSAP (LSAP1) implemented through 2008 until 2010 was able to influence long term interest rates of several financial instruments, including not

Figure 21: Data collected from FRED. Own elaboration

only government but also corporate bonds. To be more thorough, this specific policy was able to decrease the 10-years yield by a range that varies between 30 and 100 basis points.

Ben Bernkanke defined LSAPs as credit easing measures because the intention of the Federal Reserve was not uniquely the expansion of the monetary base but was targeted at the decrease of the long term interest rates.

In 2010 the United States experienced a troublesome deflationary trend, with the price level that got down 1 percent. In order to respond to deflation and try to regain price stability, the FED announced an extra purchase of government bond that amounted to $600 billion, implementing in this manner QE2. As opposed to QE1, QE2 was largely anticipated by the market, that already adjusted according to the expectation of an additional purchase program, thus the effects of the announcement were strongly cushioned.

In 2011 the Federal Reserve implemented a peculiar type of policy that was first fulfilled in the 60s with scarce success, "Operation Twist". The official name is "Maturity extension program and reinvestment policy", and consists of purchasing $400 billion of long term securities, financed with the sale of short term assets for the same amount. The main aim was to lower the long term interest rates. This type of policy does not imply any increase in the monetary base.

In 2012 the United States faced a stagnation of the labor market that was considered by Bernanke as a "grave concern". To contrast it, the Federal Reserve extended Operation Twist, but it implemented it in a different manner. In this phase the purchases were not sterilized through the sale of short term securities but implied an expansion of the monetary basis; in the same year a QE3 was carried on. In this phase a major difference characterized the policies: no specific total amount was specified for the purchases, but the FED announced a rhythm of a monthly quantity ($40 billion for MBS and $45 billion for Operation Twist) until "the outlook for the labor market does not improve substantially (…) in a context of price stability.". As it is possible to see from Figure 18, asset purchases started decreasing in 2017 after 9 years of constant increase.

2.1.3 QE in England

In the United Kingdom the impact of the Great Recession was large because of the strong dependency the economy had (and still has) on financial markets, with the GDP that saw a decrease of more than 4% (Figure 16). The Bank of England implemented the first policy measures a little later compared to the other three central banks. In order to respond to the crisis, the Bank of England firstly acted by launching a large-scale asset purchase in three phases. In a second phase forward guidance was

implemented, and lastly one more round of quantitative easing was fulfilled in order to contrast the negative effects of the Brexit vote.

As happened in many countries, the Bank of England first responded to the crisis by cutting interest rates, but in order to provide a bigger stimulus it implemented three rounds of asset purchases, that were destined to government bonds, respectively in 2010, 2011 and 2012.

The first round consisted of the announcement of the Asset Purchase Facility (APF) and was made in January 2009 by Her Majesty's Treasury. At the same time the interest rate decreased to the at a level of 50 basis points (March 2009). The purchases were set to be conducted in January and March and were aimed at fulfilling a traditional pure QE and private asset purchases in order to enhance specific sectors of the economy. Initially, the amount of private assets targeted only "high quality private sector assets", it accounted for £50 billion and was funded through the sale of short term gilts (government bonds). In this case the monetary base was not affected, thus it does not represent a proper unconventional policy. The acquisition of medium and long term gilts was, instead, conducted in March, and consisted of a pure QE, as it was funded with the expansion of the monetary base (i.e. issue of money), and accounted for a total amount of £200 billion. According to the Bank of England, the first round of purchases carried on between 2009 and 2010, which accounted for £200 billion "is likely" to have caused an increase in inflation of 75%. The increase in price level reduced the amount of goods that could be purchased by agents. Joyce *et al.* (2011) suggest that the first round of purchases lowered the yield on government bonds by 100 basis points, with an increase of net financial wealth of 16%.

Between 2011 and 2012 the Bank of England increased the APF target three times. The first in October 2011, when deflationary trends led to a target of £275 billion; the second in February 2012 when the amount was increased up to £325 billion; lastly in July 2012, when a reduction of the GDP forced the central bank to push the target up to £375 billion.

By the end of 2012, the total amount of purchases amounted to £375 billion. The effect on yields was not as expected because investors predicted and foresaw that the Bank of England would have carried on with other asset purchase programs.

Forward guidance was implemented for the first time in August 2013, when the Bank of England declared that it had "agreed its intention not to raise Bank Rate from its current level of 0.5% at least until the (…) unemployment rate had fallen to a 'threshold' of 7%". Unfortunately, literature does not provide a sufficient focus on the effects of forward guidance implemented by the UK.

In August 2016 one last round of asset purchase of both government and corporate bonds was fulfilled in order to contrast the increase in yields, caused by the augmented risk perceived by investors after the Brexit vote.

2.1.3.1 Effects of QE on savers and pensioners: a tiny focus on the British case

According to the Bank of England, the distributional effects of the policies helped to recover savings and growth. Kamath *et al.* (2011) showed how in England the 80% of the assets held for investment purposes are held by people aged above 45 years. For this reason, it is important to understand what has been the effect of quantitative easing of pensioners, which constitute approximately 20% of the UK population.

Getting back to the basics of microeconomics, income effect can be the result of an expansionary monetary policy, considering that it reduces the interest that debtors pay on their loan (at the same time in reduces the interest collected by creditors). A substitution effect manifests itself when the lowered interest rates cause the "search for yield" and creates an increase of investments at the expense of savings. Lastly, a reduction of interest rates that causes an increase in the price of the assets creates a "wealth effect", as owners at this point find themselves with more valuable holdings.

Income and wealth channels are the ones that give origin to great impacts on the distribution channel for savers. For the most part single agents' balance sheets are constituted of deposits, and for this reason savers have been affected more by the lowering of the bank rates instead of the lowering of the long term rates[22]. The effect of QE on pensioners for some aspects is the same as the one recorded by savers. One difference is to be found on the liquidity of the assets, as pension funds are less liquid than assets held by savers, and as a consequence are affected in larger part by the long term rates. Pensions can be broadly divided in defined benefit scheme - when the former worker receives his last salary and the risk is borne by the employer - and defined contributions, when while working individuals pay a contribution, and the final income depends on the amount put aside (in this case the risk is borne by the worker).

The impact of quantitative easing for pensioners clearly depends on the composition of the pension fund. In case of investment in government bonds only, no net change would be recorded. In the case of a defined benefit scheme, an eventual deficit would be enlarged by quantitative easing measures, mainly because asset purchases cause an increase in size of both assets and liabilities, and if liabilities

[22] It is worth considering that the first effects of the change in interest rates might be felt by savers that opted for investments with a floating rate.

are greater than assets as a consequence the deficit would be even greater because of proportion effects. For what concerns defined contribution schemes, given that the worker is the provider and the user of funds, it is important to understand how quantitative easing affects these two phases. During the collection phase, asset purchases measures have an impact on the value of the portfolio, thus an important factor is the composition of the latter. Once the working (and accumulation) period is over, the individual will receive an amount of money for life (i.e. life annuity) in exchange for the pension fund. The amount received clearly depends on the rate present on the market, which of course in turn depends on the long term interest rate. To conclude, quantitative easing in this case has a double faced effect, the one on the portfolio, and the one on the annuity.

2.1.4 QE in Japan

Japan represents maybe the most peculiar case, mainly because it is the forerunner of balance sheet monetary policies. The first ever quantitative easing measure was indeed implemented by the Bank of Japan in 1999, with the purchase of assets that amounted to ¥35 trillion. In that context Japan was experiencing a steep decrease in stock prices and a collapse of the real estate market.

As it is possible to see from Figure 16, Japan suffered the greatest decrease in GDP during the Great Recession.

The first efforts of the Bank of Japan started at the end of 2008 and were aimed at helping the banking sector, though a policy called "Special funds supplying operations" (SFSOs), that consisted of lending a potentially infinite[23] amount of credit at the policy rate (which in that time was close to 30 basis points as Figure 20 shows). Just like the FRFA implemented by the European Central Banks, also this liquidity provision in the market is to be considered as a quantitative easing policy because it enlarged the monetary base. Moreover, in the same month (December) the Bank of Japan started increasing the monthly purchase of government bonds, and a declared an interest in the acquisition of corporate securities. As expected, the presence of a regular buyer on the market caused an increase in price and a reduction of liquidity risk.

After one year, in December 2009 the Japanese central bank decided to substitute SFSOs with fixed rate operations (FROs); the difference between the two regarded not only the quantity but also the quality of the assets purchased. With the new program, in fact, the bank wanted to have access to a wider set of securities, in order to carry on the ¥20 trillion acquisition of securities with a 3-month maturity. The program was extended in 2010 with ¥10 more trillion of securities, this time with a 6-

[23] Banks still needed to present a valid amount and quality of collateral in order to receive funding from the central banks.

month maturity, accompanied by the implementation of forward guidance. The balance sheet program was not successful because the market did not interpret the acquisition carried on by the central banks as credible (Shirai 2017). Forward guidance did not obtain the hoped-for results because, as explained by Katagiri (2016), in case of a long period of deflation – both realized and expected – the promise to maintain interest rates low until in an unspecified time in the future when inflation will start to increase again does not create any stimulus in the economy.

Following the footsteps of the ECB, in 2011 the Bank of Japan increased steeply the amount of government bond purchased. An extra ¥60 trillion of public debt was purchased until December 2012, altogether with ¥1 trillion of private assets.

The turning point in the Japanese monetary policy was represented by the election of the prime minister Shinzo Abe in 2012, who operated in order to enhance the economic stimulus to respond to the reduction of GDP in 2012 with a set of policies that are part of a stream called "Abeconomics". The Bank of Japan announced a 2% inflation target and carried out large scale asset purchases in 2013 and 2014. Indeed, the Bank of Japan decided to reintroduce the unlimited funding for an amount of ¥11 trillion, and the debts were structured with maturities from 1 up to 3 years, which could be renewed for a fourth year. In this case too the only limitation was represented by the amount of collateral.

Also in this scenario Japan can be considered as a forerunner, as the policy was not only quantitative, but qualitative too (it included the purchase of ETFs other than government bonds), representing the so-called quantitative and qualitative easing (QQE). A third step was conducted in 2016, when Japan was suffering an economic slowdown due to a decrease in the growth of the Chinese economy.

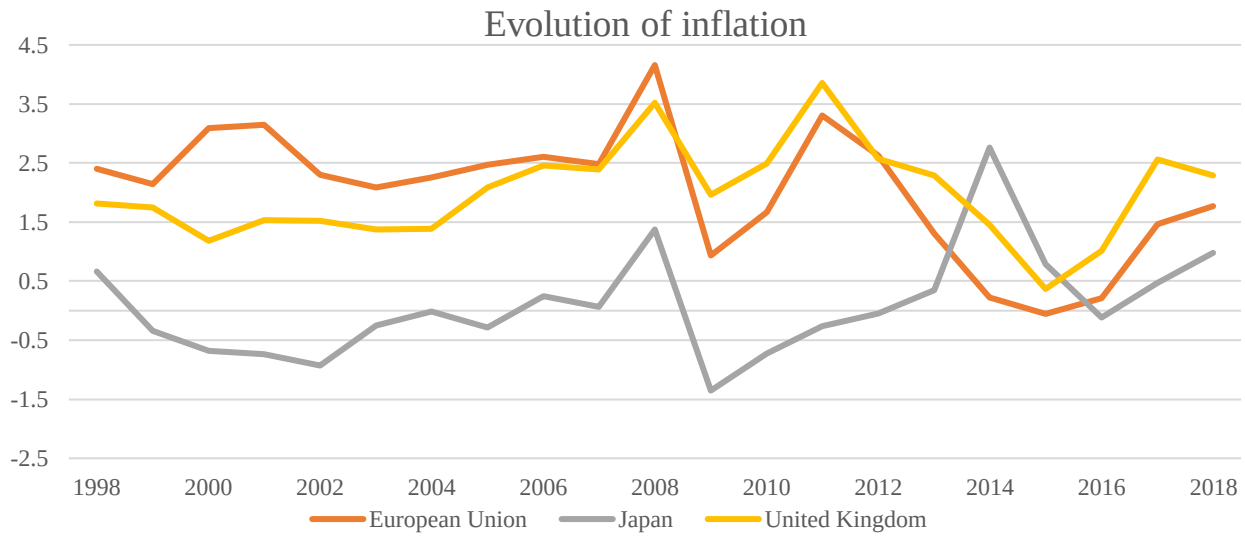

Figure 22: Data collected from the World Bank Dataset. Own Elaboration

This last phase saw the Bank of Japan implementing the so-called "yield curve control" and committing to an "inflation overshooting" target, as theoretically suggested by Krugman (Figure 22).

2.2 The macroeconomic effects of asset purchases

In terms of practical evidence of quantitative easing implemented for the recovery of the market, the analysis is not straightforward because central banks started operating when at the same time governments were trying to stimulate the demand through fiscal policy. The first analysis use a methodology of event studies. When setting up these type of approach it is crucial selecting the right window length; in case the period of time selected is too short it can miss out important factors that might have had an impact, and vice versa, if the window length is too wide it might contain some biased factors that influence the event studied.

One first study regarding the effectiveness of unconventional monetary policies was carried on by Gagnon *et al.* (2011) using both an event study and a time series analysis to understand the effects of QE1 implemented by the Federal Reserve. In the event study the main input was the change in interest rates that followed the communication by the FED regarding the future asset purchase. From the simplicity of this approach some implications follow: the expectations are influenced only by the official announcements, markets are efficient because they are able to elaborate immediately the communication of the central bank and move accordingly[24]. The authors suggest that the changes might have been assimilated slowly because of the newness of the policy LSAP1. Results of their study record a decline in yields of 10-year agency debt, 10-year treasury yield and current-coupon agency MBS. For what concerns the 10-year Treasury yield, the decline is to be attributed to a reduction in term premium.

The time series analysis was structured in order to understand the variation in term premium using macroeconomic factors such as variables regarding the business cycle[25], the debt securities of the public and the incertitude about the basics of the economy. According to their results the LSAPs were able to reduce the term premium by a range between 38 and 82 basis points.

Gambacorta *et al.* (2013) studied the impact of unconventional monetary policies in eight different countries[26]. Through the implementation of a VAR model, the authors were able to demonstrate how these strategies have truly helped the economy on a macro level, causing an increase

[24] The change in yields happens when the communication is held, not when the purchase effectively is implemented.
[25] Specifically, for what concerns the business cycle the authors considered the unemployment gap, the core inflation, the long run inflation disagreement and six months realized volatility of the 10 years treasury yield.
[26] The eight countries analyzed by Gambacorta *et al.* were the United States, Euro Area, United Kingdom, Japan, Canada, Switzerland, Sweden and Norway.

in both prices and output. To be more thorough, the result of the simulation manifested a bigger effect on output than on prices, with the first being three times larger. Moreover, the effect on prices seems to have been more robust on only half of the eight countries taken in analysis.

Weale and Wieladek (2016) studied the macroeconomic effect of asset purchases and their approach consists of a VAR model on monthly data regarding the asset purchases programs of England and of the United States, comprising a focus on three different channels[27] that might influence the GDP and prices. The data were treated differently for the two countries. Asset purchases conducted by the Bank of England were simply accumulated; the ones implemented by the Federal Reserve in Operation Twist were considered to be additional asset purchases and carried the same weight as purchases of Treasure bonds financed with the central bank's reserves. The results of the study show that asset purchases are in any case able to increase real GDP[28] and price level and are able to decrease the uncertainty.

Mouabbi and Sahuc (2016) studied the macroeconomic effects of unconventional monetary policies in the Eurozone by using a medium scale DGSE, where an EONIA shadow rate[29] substituted the policy rate from which followed theoretical model that was then compared to the observed outcome. Their results show that without the implementation of these operations the Euro area would have suffered a 19% restriction of output compared to the pre-crisis levels, deflation on two occasions, 2009 and 2016, and a slower growth in inflation in 2015 and 2016. The first result would mainly be a consequence of the reduction of investments that would have been recorded in the absence of unconventional monetary policies.

Dell'Ariccia, Rabanal and Sandri (2018) focused - in particular - on the effects of unconventional monetary policies in the Euro area, United Kingdom and Japan. According to their findings, there is evidence that these approaches have contributed to an enhancing of the economic scenario after the hit of the zero lower bound; furthermore, they found proof that these policies caused a decrease in corporate yields, an increase of stock prices and a depreciation of the exchange rate. More in detail, three circumstances in particular seem to be able to foster the effects of unconventional monetary policies:

[27] The three channels are portfolio balance, signaling and expectations, that are presented in paragraph 1.2.1

[28] In the United States, an unexpected asset purchase that lowers the long rate raises both the GDP and the price level by about 1,06%. In the UK the main transmission channel seems not to be the one of long term yields.

[29] The shadow rate is backwards computed as the short term rate that would generate the observed yield curve. It is equal to the policy rate when the economy is in conventional periods, but it can reach negative values when the policy rate is at its zero lower bound, as shown by Claus, Claus and Krippner (2014). It represents a useful tool to signal the response caused by conventional or unconventional monetary policies (Krippner, 2013; Wu and Xia, 2016).

1. In cases of serious financial distress; an example would be the effectiveness of Mario Draghi's affirmation of the famous "whatever it takes", after which spreads on Government bonds decreased consistently without needing the ECB to actively operate in the market.
2. Central banks' actions and intentions need to be considered credible; at the very beginning of the aftermath of the financial crisis the ECB undertook the so-called Longer-Term Refinancing operations, which did not have much effect on the market because of the skepticism regarding this new approach.
3. The Japanese experience shows that in case of deflationary forces, unconventional monetary policies fail to be effective.

2.3 Forward guidance

The setting of the short term interest rate is one of the main tools used by the central bank to provide equilibrium in the market and price stability. The first chapter presented the way in which, during normal case scenarios of the economy, the short term rates are set in the conventional manner (i.e. open market operations). But as was stressed in the previous paragraphs, the reference rate for households and firms finalized at savings or investments is the long term one. During the financial crisis, long term interest rates have been compromised, seeing their value skyrocketing. Amongst the countermeasures that were implemented to lower these yields there is "Operation Twist", through which the Federal Reserve started purchasing securities with a long duration in order to decrease their return. The previous paragraphs also described a decomposition of the structure of the long term yield, in order to understand in which way central banks can influence its level, and term premium seems to be the component most affected by the unconventional monetary policies implemented so far.

One more important move used by central banks regarding the setting of interest rates is their communication. As stated in the previous paragraphs, the credibility of actions and announcements is decisive in changing the expectations of the market. For this very reason, central banks started implementing communication schemes that could guide and influence the market.

Forward guidance is in fact defined as the ability (or intention) of the central bank to orient short term rates to a specific target by clear manners of announcement of statements. Committees of central banks gather several times a year[30] to decide the level of interest rates that has to be set, and after their

[30] The FED and the ECB committees usually meet up for a minimum of 8 times a year.

decision follows the communication to the public. The intention of forward guidance is thus to bridge the gap of uncertainty[31] of the future conduction of monetary policy.

According to Campbell *et al.* (2012) forward guidance can be expressed in two ways. The "Delphic" one, in which the central bank describes the evolution of its monetary policy according to its own expectations about the future state of the economy. The most powerful communication scheme is the "Odyssean" one, in which the central bank commits to keep a low level of interest rates and declares a monetary tightening even in case of an enhancement in the condition of the markets. The first method is called "Delphic" recalling the oracle of Delphi, that was able to predict the future but did not guarantee anything. The second one is called "Odyssean" because of its binding feature. The central bank decides to commit to a target, "tying itself" in the same way Odysseus constrained himself to the ship's pole in order not to give in to temptation that sprang from the Sirens' melody.

In their statements central banks can communicate several details (qualitative, quantitative or time dependent). For example, they can declare what type of policy they want to implement, the operational target chosen to fulfil stability, its level, and (or) for how much time the policy is expected to last. In this last case the temporal specification can be linked with the achieving of objectives that regard macroeconomic measures such as "keeping a specific level of interest rates until the unemployment rate reaches a certain level".

The effectiveness of forward guidance can be put at risk by several factors. First of all, it might not be able to change expectations (in the proper way, or even at all) if the market interprets it wrongly, if it anticipates it, or if it does not find the policy to be credible.

The Federal Reserve started using forward guidance content in the its official reports in May 1999. In the aftermath of the dot com bubble, the FED stated that it would keep low interest rates for a "considerable period". As time went by more transparency was required, thus the pool of forward-guidance disclosure started to grow. In 2009 the committee stated that it would keep low interest for "an extended period". Only in 2011 the temporal specific component was added, saying that funds rate would remain at low levels "at least through mid-2013". The following year, in 2013, the Federal Open Market Committee (FOMC) changed its style of communication, from a generic to a more specific one. It adopted the so-called Evans rule, that consisted of specifying the commitment linking it to an inflation rule. It stated that the FOMC would keep "rates near zero at least until unemployment falls below 6.5% or inflation rises above 2.5%". Evans rule (and its specificity) was abandoned in March

[31] The interest rate set during a meeting is in fact only valid until the next one. The discrete feature of this crucial decision represents the main source of uncertainty for the market.

2014, when the Federal Reserve declared "it likely will be appropriate to maintain the current target range for the federal funds rate for a considerable time after the asset purchase program ends".

The ECB started using forward guidance in July 2013, when the Governing council declared it "expected interest rates to remain low for an extended period of time". Moreover, the ECB's official definition for forward guidance is "providing information about (..) future monetary policy intentions, based on its assessment of the outlook for price stability". It is also crucial for forward guidance to be consistent with the "Governing Council's assessment of the current economic situation and the outlook for the future, in particular for inflation" in order to maintain credibility.

The Bank of England adopted forward guidance in 2013, declaring explicit quantitative targets. In particular, both interest rates level and amount of assets purchased would not change until the unemployment rate declined below 7 percent, and the guidance would be dropped if the expected medium-term inflation could increase by 50 basis points above the target.

The Bank of Japan used forward guidance in its statements since October 2010 altogether with quantitative easing. The statement declared that the rates would have not been increased until "price stability is in sight". In 2012, with the election of the Prime Minister Abe the content of the communications got more intense, with the announcement of keeping interest rates low to reach the explicit 2 percent inflation target "at the earliest possible time".

In recent times literature started producing studies that analyzed the efficacy of forward guidance at influencing interest rate expectations. Woodford (2012) showed that forward guidance was able to have an impact on the beliefs of the market, even if it was not able to fully and correctly price the changes declared by the central bank[32]. According to the author the efficacy of the communication schemes implemented by the Federal Reserve is to find in the forecast of the possible evolution of interest rates. Generally, Woodford found forward guidance able to affect "under certain circumstances (…) financial markets (…) in ways that reflect a shift in beliefs about the future path of interest rates.".

Campbell *et al.* (2012) conducted a groundbreaking study that differs from the previous work because it analyzed the interpretation of macroeconomic variables changed in accordance to forward guidance in the period before the Great Recession. The result of their study demonstrates how an

[32] An example of this case is represented by the Bank of Canada in 2009. The commitment to low interest rates was not able to reach the announced 25 basis points.

unexpected reduction of future rates was able to decrease the expectations about the unemployment rate, and that inflation expectations were marginally augmented.

Del Negro *et al.* (2012) showed how when the study of forward guidance is analyzed through the use of new Keynesian models, an interest rate peg that is maintained for additional periods causes responses of demand and inflation that increase rapidly, becoming almost explosive. This represents the so-called "forward guidance puzzle". In their analysis the explosive results seem to be empirically significant. In particular, when the interest rate target is maintained for an additional quarter the output growth response increases steeply in a first moment, to then decrease progressively.

A study conducted by Campbell *et al.* (2017) tried to measure the impact of Odyssean forward guidance of the Federal Reserve and its macroeconomic effects in order to understand whether it was able to enhance the economic scenario using the term structure of overnight interest futures rates. In the setting of the research, the authors allowed forward guidance to be misinterpreted by the public, the model is linear and, in order to study the variations of the business cycle, amongst its variables there is GDP, consumption and investment, wages and price inflation and the expectations for the long run inflation from 2008 until 2014. Considering that both theory and practice consider expectations of the public to be crucial in determining the levels of the macroeconomic components, in this study forward guidance is treated as additional measure to the modification of the policy rate. Results of the study show that changes in the business cycle are due uniquely to technology and liquidity preference shocks. For what concerns the reaction to liquidity preference, it shows that in case of shock in demand of government bonds follows a reduction in real activity. Inflation and funds rates respond to the four main shocks too.

Nakata *et al.* (2019) studied the implementation of forward guidance linked to the reaching of an optimal result monetary policy, through the use of a sticky price model with an effective lower bound on interest rates, an Euler equation and a Phillips curve. For a central bank, committing for a longer period to an interest rate peg entails costs and benefits. The costs are represented by a temporary "overheating" of the economic scenario. The benefit consists of an easing of the decrease of output and inflation because of the overheating itself. The model develops in three periods, and there is no uncertainty. In the first period the central bank picks the output gap, the nominal interest rate and inflation in order to maximize the discounted sum of all utility flows of the households. The results of the model depend on the discount factor of the Euler equation. If in period one inflation and output see a smaller increase than what would be their level in normal scenarios welfare can record an increase. Lastly, when the central bank keeps the interest rate at the effective lower bound for a longer period

of time the expectations of the market regarding the future levels of output and inflation tend on increasing. To sum up, according to the authors maintaining the policy rate at the effective lower bound for an extended period of time ("low-for-longer strategy") represents an optimal choice for the central bank.

CHAPTER 3

HELICOPTER MONEY: A STUDY REVIEW ON ITS ENFORCEABILITY

The two previous chapters presented an in-depth analysis of the reasoning behind the existence of unconventional monetary policies. To briefly sum up, what followed after the Great Recession represented an unprecedented change in the setting of the economic world, with augmented banking regulation, and especially the (forced) choices that central banks needed to undertake that resulted, indeed, in unconventional monetary policies. As stated in earlier paragraphs, the change in the paradigm that guides all the actions oriented towards price stability was significant and saw the introduction of two main new forms of "way of conducting business": quantitative easing and forward guidance. Through the purchase of specific assets (thus oriented at intervening in specific sectors of the economy) and through the clear communication of their intentions (mainly regarding the level of interest rates) central banks tried (and in some cases succeeded) to stabilize compromised market conditions that were the result of the financial crisis. Since their implementation, the economic literature has – as one would expect – tried to study the effective macroeconomic consequences of these groundbreaking policies, their strong features and their flaws. As of 2019 there are at least two strands of literature that still debate whether unconventional monetary policies have created benefits or not.

In the last years, many researchers that did not see great results after the implementation of unconventional monetary policies started hanging on an example that Milton Friedman proposed in 1969 in order to propose it as an alternative solution to the policies implemented so far. It is crucial to underline that the example made by Friedman was solely a vehicle to explain to his students how the monetary expansion mechanism works.

> *"Let us suppose now that one day a helicopter flies over this community and drops an additional $1,000 in bills from the sky, which is, of course, hastily collected by members of the community. Let us suppose further that everyone is convinced that this is a unique event which will never be repeated." (Friedman, "The Optimum Quantity of Money")*

Friedman's intention originally was to explain how inflation is linked with the process of money creation, and why the latter is costly. Abstracting this concept from its original context, the idea that has been recently revived by researchers is quite simple: potentially, the Central Bank might distribute directly to the households (thus avoiding the intermediation with financial institutions) an unexpected amount of money, having as a constraint its intertemporal budget. It is important to point out the criticality of the expectations factor that, as shown in the previous chapters, is the core of the good outcome of any type of monetary policy. In this popular assumption Friedman kept a vague and general approach when describing the event of a helicopter drop of money (consistently with the original intention of not proposing it as an alternative tool of monetary policy). Today helicopter money proposals generally interpret it as fiscal policy financed with a monetary policy, that is oriented towards a direct addressee: the households or - as an alternative - the Government itself[33].

Something similar was formulated by Keynes in 1936, as a metaphor used to present a theoretical way in which deflation might be fought off.

> *"If the Treasury were to fill old bottles with banknotes, bury them at suitable depths in disused coalmines which are then filled up to the surface with town rubbish, and leave it to private enterprise on well-tried principles of laissez-faire to dig the notes up again (the right to do so being obtained, of course, by tendering for leases of the note-bearing territory), there need be no more unemployment and, with the help of the repercussions, the real income of the community, and its capital wealth also, would probably become a good deal greater than it actually is." (Keynes, "General Theory of Employment, Interest, and Money")*

The heart of Keynes' idea, instead, was to represent (in this case too with a vivid imagery example) how unemployment might be attenuated (if not totally eliminated) by nothing more than an incentive offered by the Government. Through organization and coordination between privates, the dig up would keep individuals active and occupied, and at the same time – through this ploy – the total wealth of the community would be increased. Once again Keynes was ahead of its time: with this simple analogy

[33] In this latter case the idea is to boost demand and economy thanks to the implementation of big public investments such as infrastructures etc. The later paragraphs will focus on this aspect.

he presented the concept of a direct stimulus of the economy immediately oriented towards individuals, bypassing the standard procedure aimed at an economic boost.

Helicopter money seems to cross in between the differentiation between monetary and fiscal policies. The first one handles the monetary base and the setting of the interest rate with the objective of pursuing price stability, while the second tampers taxation in order to set the expenditures of the Government to provide for economic equilibrium. There is no specific definition of helicopter money, but the modern literature's concept evolves around the imagery created by Friedman. Nowadays it can be considered as money transfers operated by the central bank with the help of the Government that will never be asked back; it thus consists of a permanent increase of the monetary base.

Furthermore, it falls within the realm of unconventional monetary policies, so its implementation could potentially be expected in the case of the reaching of the zero lower bound, as a final-recourse measure. As a matter of fact, when it comes to fulfill policies whose aim is to increase the amount of liquidity in the system, it is essential trying to tamper the effects of moral hazard that otherwise could jeopardize the independence and the credibility of the Central Bank.

The final intention of the thesis is to try and clear as many aspects as possible of this type of policy, present its strong features through proposals and with the analysis of some analytical models, the arguments against it and finally why the implementation of a direct intervention of this type is nowadays almost impossible in the Eurozone.

3.1 The reasons behind the newly obtained fame

As anticipated before, the last decade has seen a sharp rise of interest towards the idea of a helicopter drop–type of policy. One of the biggest contributors to the great media coverage on helicopter money is undoubtedly Ben Bernanke (2002, 2016), who on several occasions pointed out how the policy would be particularly effective in contexts in which the level of debt is high. During the Japanese crisis at the beginning of the millennium he stated that:

> *"(...) a money-financed tax cut is essentially equivalent to Milton Friedman's famous 'helicopter drop' of money."*

Historically speaking, the necessity to fulfil new types of interventions such as quantitative easing and forward guidance was the economic scenario after the Great Recession: low level of inflation and interest rates at their historical minimums. Since their first implementation almost a decade has passed

by. The researches presented previously showed how and to what extent these policies have been beneficial, with a focus on the United States, Eurozone, Japan and the United Kingdom. The "fuse" that started this recent stream of thoughts for which a new type of unconventional monetary policy like helicopter money should be implemented lies in the interpretation that what has been done so far is *not enough*. It is also true that in recent years the economy has been affected by advances in technology that are making it harder for firms to create jobs; the increase in productivity is perpetuated at the expense of employment. This leaves the state of the economy with large quantities of products whose demand is not stimulated enough because of the creation of a vicious circle. Employment levels that remain low cause consequentially low aggregate demand, violating Say's law. Say's law asserts to the fact that the supply side of the economy is able to generate a demand for products. According to this view the labor market is able to compensate the workers perfectly enough to let them purchase every item produced. Empirical results show that the latter view is not applicable nowadays, especially because owners of capital are keener towards saving rather than consuming.

According to Mencinger (2017) one of the main reasons for the missed results of quantitative easing in Europe is due to the austerity fiscal policies that prevented the member countries from the generation of demand. Equilibrium, though, is always in the middle, and for this reason several authors have tried to understand whether the cogs are broken only in the demand side, or also in the supply side of the economy. Meltzer (2016) attributes the cause to the supply side, asserting that the increase in savings has not only slowed consumption, but also kept interest rates at really low levels. An interesting point of view is presented by Walker (2016) who believes that the low interest rates are due to a decreasing amount of population in developed countries, that as a consequence blocks the mechanisms through which households trade with each other. His view sees the population as divided into savers, lenders and sellers that balance each other's needs by trading and making supply and demand meet. Unfortunately, this mechanism works only when there is proportion between individuals' preferences (consumption vs. savings) and population growth.

Helicopter money – according to its advocates – seems to be able to overcome the shortage of a satisfactory level of aggregate demand through the simple distribution of money, similarly to what was theorized by Keynes. Normally the Central Bank makes direct payments to the Government in case of debt monetization, and to the public in case of specific fiscal policies. In the past years central banks, as explained in the previous chapter, started acquiring assets directly in the secondary market in order to fulfil unconventional monetary policies. Ideally, central banks are not supposed to hand out cash to the households in order not to step away from their independent and *apolitical* status. With helicopter

money the Central Bank would have two options to stimulate aggregate demand, bypassing the latter technical obstacle:

1. it could hand the funds to the Government, that in turn will use them to fund public works such as infrastructures;
2. it could use the Government as an intermediary: it will hand in the money directly to the household and will follow the criteria specified by the central bank.

In addition, helicopter money is believed to stimulate banks not to hang on the money injected in the system in the form of reserves (Kyriazis and Economou, 2017).

Considering that there is no official and precise definition, many types of interventions might represent a helicopter money policy. The Central Bank might print money and distribute it to people, concretely by delivering cash or "virtually" by a bank account transfer or a check. But the reality is a bit more complicated. Our economic system is built on the assumption that everything has its countervalue, that is the reason why – for example – balance sheets need the assets and the liabilities side to show the same figure. The most important feature of money today is that it is fiat money. This means that it does not have intrinsic value, as it is not concretely made by precious metals – for example – but because its value is a legal tender type. It is the institution that issues the banknotes the one that needs to maintain and guarantee for its value. Fiat money thus represents a substitute for commodity money (the case in which coins are made of gold or silver and can be materially used because of their physical composition). In recent times, thus, the money creation process consists of the purchase of financial assets or alternatively the lending of reserves to financial institutions[34]. For this very reason money cannot be simply created and then distributed; there needs to be a passage in between the two processes.

Getting back to Friedman's original statement, the simple idea was that through the distribution of money directly to individuals inflation could be created only at one condition: money needs to irredeemable in order for this mechanism to work, so it cannot be removed from the system in any way (e.g. future increase in taxes). Two assumptions lie behind this analysis: the Central Bank is able to monitor the quantity of money that is used in trade through the manipulation of the monetary base, and the reserves it holds have an interest rate of zero (they are not remunerated).

[34] This is consistent with what was presented so far in the first chapter when explaining the process of conventional monetary policies with the trade of reserves. Money creation (or "destructions") is strictly related to the setting of interest rates.

In order to be effective, helicopter money is supposed to follow three transmission channels (Kyriazis and Economou, 2017). The first one entails an increase in wages and employment levels, as a consequence of the increased public spending. The injection of liquidity[35] allows, on a household level, an increase in aggregate demand and consumption. Lastly, the additional money provided by the Central Bank must not be asked for back[36]. To these first three assumptions, the authors add three more "pillars" that are fundamental for the effectiveness of the policy:

1. In order to truly boost consumption, the helicopter drop should be viewed by the public as unexpected.
2. The liquidity cannot be redeemed by the authorities, resulting in a permanent increase in the monetary base.
3. The liquidity injected in the form of fiat money must result in an economic advantage for the holder.

An eventual implementation of helicopter money should take into consideration several factors, such as the state of the economy and the type of market in which the policy would be integrated and the level of independence and credibility of the Central Bank. In the case of the Eurozone, the system is predominantly bank-centric, and the risk tolerance is low[37], especially when compared to countries such as the United States. This has led so far to conservative policies that prevented the reaching of the targeted level of inflation, while trying at the same time to keep balance in the variegated and complex European market. This makes the context "efficient but not highly profitable". It is for the latter reason that liquidity[38] is much required in such a framework, where large injections would – ideally – boost demand, productivity and the level of employment.

When analyzing the stance of central banks, as stated before it is crucial not to lose sight of one of their most important characteristics, independence. According to Eijffinger (2007) the European Central bank is the most independent one because it does not have to account for its actions to any of

[35] It can consist of a bank transfer in a bank deposit – for example – or a cut in taxes.
[36] An example would be represented by an increase in taxes for the next generation.
[37] The risk tolerance is considered to be low because the reasoning asserts to the fact that an overload on commercial banks, in case of helicopter money implemented through bank transfer, would make them more vulnerable. Moreover, in a bank-centric system like the European one, the investment choices would still be oriented towards banks (unlike the American market, where eventual additional investments would be oriented towards stocks.
[38] It could be argued that large quantities of liquidity have already been injected in the European market. The supporters of the helicopter money theory – though – see the previous unconventional monetary policies as not effective, or not effective enough, hence pushing for a policy that would (in theory) concretely stimulate the economy because the funds will be handed directly in the hands of the households. A greater focus on the differences between quantitative easing and helicopter money is present in paragraph 3.2.

the institutions, both of the European Union or of the Governments of the single member States. According to the author, the latter peculiar trait could allow the ECB to successfully decrease the "inflation bias" of the implementation of such a procedure.

The direct involvement of the consumers seems to be crucial when stimulating the economy. According to a publication provided by the Federal Reserve 81,3% in 2012 of the economic growth is created by consumers. It is legitimate to wonder why central banks do not provide liquidity directly to households but do hand it into the banking system. White (2018) provides an impactful example by stating that the abovementioned mechanism "is the metaphorical equivalent of pumping (…) fuel into the driver's seat instead of into the engine under the assumption that the driver is smarter than the engine". The author provides in his article an analysis of helicopter money that seems to be more philosophical than economic, and presents his own scheme of policy that follows four assumptions:

1. Every adult owns a debit card that is connected to the Treasury;
2. The distribution of money is – in amount – inversely proportionate to the money supply movements;
3. In case of potential economic distress, the central bank can distribute additional amounts of liquidity as a precautionary action;
4. The use of the liquidity is unbounded (consumption, investments, or repayment of debts are all allowed).

The distribution of money would be fulfilled through what the author calls "printing money", thus by correctly attributing the first action to the central bank, while the eventual injection of additional funds would be funded by the sale of Government bonds, hence it would exclude any other increase of the monetary base or an increased level of taxation. The paper does not specify the criteria of the distribution of the direct payment, but it underlines how in peculiar times (e.g. zero lower bound) it would be reasonable to provide funds with the aim of assisting the economy, thereby (temporarily) neglecting the personal contribution feature that represents the foundation of modern society.

In his analysis, White presents also three possible objections that could be moved against his "Direct Citizen payment proposal", and why they are unsupported.

1. Competencies. It could be stated that individuals, on average, do not have the necessary financial education that can lead to an optimal choice of consumption. On the other hand, conventionally the Central Bank has always dealt directly with the banking system and

financial institutions. Despite the knowledge and the specialization, the financial sector was not always able to reach efficient results.

2. Inflationary effect. The idea that usually is associated with more money handed directly to the households is high inflation[39]. It is also true that the Central Bank does inject liquidity in the system in "normal" times, and most importantly, a solid policy on prices should include several other factors such as the variation of debt and the amounts of investments.
3. Worsening of the crisis. The author fights back the concept that sees the highest risk in case of exclusion of private investments, by stating that it is the aggregate demand the true core of the economy, thus with its push (that would be fine-tuned by the helicopter policy) it is possible to move towards stability.

Mencinger (2017) states how helicopter money is doable, but realistically it will always face "political and ideological opposition". The feasibility of the policy is explained by some intuitive computation. The study takes into account the results of a survey conducted by ING, that shows the preferences of the respondents towards the implementation of helicopter money, and what they would do with the received amounts. By simulating the results obtained in the survey altogether with the amounts injected in the system via quantitative easing (*de facto* it implies a substitution of quantitative easing with helicopter money) there would emerge a rise in GDP by 180 basis points in the Eurozone.

3.1.1 Helicopter money in practice: QE for the people

As time went by literature provided with a more specific and generally accepted definition of helicopter money: it consists of an increase of the nominal base of money initiated by the Central Bank, that is distributed to the people and financed with a fiscal policy intervention. What differentiates the views of the authors might regard the criteria of the distribution, who is worthy of receiving the additional amount of money, the quantity and the practical way of implementation (i.e. checks in the mail, bank transfers, tax rebate, etc.). Its direct feature is what characterizes it with the other types of policies, both conventional and unconventional. As a matter of fact, the core essence of helicopter money is represented by the absence of the intermediation of financial institutions in the process of the transmission mechanism. The receivers of the helicopter drop can be distinguished in two macro groups: the people and the government. From this distinction will follow the analysis of the following paragraphs.

[39] Again, the examples of Weimar Republic, or the recent cases of Venezuela and Zimbabwe come to mind.

One first example that has gained success over time is the one presented by Muellbauer (2014) and it is called "QE for the people". The idea is simple, and it consists of distributing cash for €500 to each adult citizen of the Eurozone.

As mentioned in the previous paragraph, the fuse that started this stream of literature was the idea that the results of the unconventional monetary policies implemented in the years after the crisis have not been effective enough. Muellbauer considers quantitative easing to have been less effective in Europe than it has been in the United Stated blaming the differences on the different nature of the two markets. To be more specific, quantitative easing carries with itself several effectiveness issues:

i. In the Eurozone, the banking sector is far more prominent than the financial market. For this reason, the lowering of yields of assets such as Treasury of corporate bonds has a lower and less impactful effect than the one operated in the United States.
ii. The lowering of bond yields drives the European companies towards an increase in contribution rates[40] and not towards spending.
iii. Lastly, the bullish effect of the equities market in the Eurozone has been way lower than in the United States, because the equities market is far less relevant in Europe[41].

Moreover, QE needs to be eventually reversed[42] and works in asymmetric distributional channels (the wealthy sector of the society is more likely to receive benefits from quantitative easing than the poor). The heterogeneity of all the twenty-eight countries that are part of the European Union does not allow for these policies to record the same benefit, as every country has its own internal market with its own characteristics and own politics. According to Muellbauer the solution to this lack of efficacy and to the asymmetric distributional effects is helicopter money. The distribution would be oriented towards adults by checking for their social security number. The author considers the legitimacy of this operation because of the independent nature of the European Central Bank, which would prescind from political objectives of any kind. The Governments' budget constraints would be lessened, and nominal demand would see a boost. The increase in spending would finally generate an increase in future tax revenues for the Government. This policy would have its negative aspects too. Like any other policy, it would be costly, and it could generate moral hazard. The behavioral component of the public is critical, because it might relax the search for jobs, compensate "unworthy" individuals; the same

[40] This is true when the bond purchases were conducted with an increase of deficit in the pension funds sector.
[41] As mentioned before, the most relevant market in the Eurozone is represented by the banking sector.
[42] Contrary to helicopter money, where the central bank will never pull back the money that was distributed.

applies to local Governments that in case of a situation of high leverage might avoid the idea of implementing harsh but necessary fiscal reforms.

3.1.2 Helicopter money in practice: Tax Credit Certificates

The previous paragraphs cleared how helicopter money consists of an increase of money in the system and sees the Central Bank as the first protagonist of the implementation of the policy. Considering that an intervention from the Treasury seems to be necessary, it is possible to obtain a helicopter money type of policy also thanks to a rebate of taxes[43]. After all, what matters is the increase of money in the system, that can be pursued with an injection of liquidity – like in the case of QE for the people presented by Muellbauer – or by a decrease in taxes payable for the households. In fact, in both cases the result would be an increase in the nominal wealth.

Bossone and Cattaneo (2016) are amongst the biggest supporters of helicopter money, and together they presented an alternative to the unconventional monetary policies seen so far, with an analysis that focuses on the Italian case, but that is applicable to all the countries of the Eurozone. The two authors propose the implementation of the so-called Tax Credit Certificates (TCC), instruments issued by the Government that do not need the guarantee of the European Central Bank[44]. This particular type of certificate is not to be considered as debt, because the Government will not pay any coupon, and it is not legal tender. When a TCC is redeemed, the Government can accept its use starting from two years after its issuance, and it will entail a rebate on taxes[45] for an amount that is equal to its face value.

TCCs can be traded on the market and will be priced similarly to a two years zero-coupon bond. The allocation scheme provides for a distribution of TCC that is inversely proportionate to income. The proposal of the authors is motivated by some eventual positive effects. TCC would:

a) increase demand, and subsequently output and employment;
b) be associated with a store of value because two years after its issuance, if exercised, it creates an increase of value for the holder;
c) be tradable, so it would be used to satisfy a need for immediate liquidity for the seller, and the desire of investing aimed at saving on taxes for the buyer.

[43] A logical consequence would be wondering whether helicopter money is a monetary or a fiscal policy. In the later paragraphs there will be a focus on this topic.
[44] Even if the authors refer to it as "Helicopter tax credits", it cannot be fully comparable to a helicopter drop of money because in this scheme the ECB seems not to be involved.
[45] A TCC can be used to repay any kind of obligation with respect to the public sector.

A study conducted by Mediobanca on a TCC scheme[46] found that it could increase the GDP growth for 300 basis points and would lead the fiscal multiplier to a level of 1,2 in Italy. According to their study, the use of TCC would allow for an increase in demand and employment without recording a change in the deficit to GDP ratio. The study proposes also several conditions that are intended to prevent results that are far away from the ones expected, and that would be implemented by the Government once the targets are not fully met. Amongst them there are incentives and compensation for the holders of the TCCs and a communication scheme that can be considered similar to forward guidance[47]. By diversifying the portfolio of the households, TCC might be able also to reduce the credit risk associated with the large share of ownership of Government bonds held by the financial institutions present in the Eurozone.

The study presented by the authors is intriguing but shows some flaws. The first thing that jumps out is the absence of a collaboration between the Government and the Central Bank. In order to define TCC as a "helicopter" policy the main element would be the involvement of the ECB – in this case – in the first steps of the process. In the case proposed it is not clear how the Government would fund the first issue of TCC, the authors only care to say that as time goes by, the boost of demand would increase the tax revenues, that in turn would cover the implementation of the policy as soon as the fiscal multiplier becomes greater than 1. One last, but crucial element that was not specified concerns the distribution. The authors stated that it would be free, and it would be destined "across the economy". The latter seems to be a shallow definition. It is not clear if it regards adults only, or only people that are actively working (*de facto* excluding pensioners from the picture). Consider the case of an individual that is at the same time the owner of a company. The paper does not make clear if the individual would receive two different TCCs, one for itself and one for the company, or if only one certificate would be distributed, leaving to the individual the choice on which taxes or obligations it is to be used.

3.1.2.1 The outcomes of a post-Recession fiscal stimulus: the Australian case

In the aftermath of the Great Recession some countries (such as the United States and Australia) decided to act not only with the implementation of monetary policies but tried to stimulate directly demand through fiscal policies. The example presented below clearly does not represent a type of

[46] The proposed scheme consists of a simulation that asserts for a first round of emission of TCC for €20 billion in 2016, and others of €40 billion every year after 2017.
[47] It would imply the announcement of financing a fraction of the expenses.

helicopter money policy since it was purely fiscal, but it is helpful in understanding what kinds of effects a hand-in of cash can generate.

A study conducted by Leigh (2012) tried to understand the impacts of the massive fiscal policy measure that Australia undertook in a six months period, from December 2008 to May 2009. According to the OECD, the amounts used to fund the policy amounted to a figure close to 500 basis points, 460 to be precise, of the 2008 GDP. It is not always easy to predict the effects of a fiscal policy, and since they are Government funded by an increases in debt it would be reasonable to expect from the households to save the amounts destined to the tax rebate to meet the expectation of an increase of the very same taxes in the following years[48]. The analysis was conducted on a survey destined to households, who answered whether they received the money, and if so, how they spent it.

According to the author there might have been an incidence on the spending results due to the technicality used by the Government to describe the measure. The policy was indeed identified as a "bonus", while a fiscal measure implemented in the United States[49] in the same years – according to the responses collected in surveys – was lower maybe because it was named as a "rebate".

The fiscal policy was fulfilled in two different moments, and because of this temporal mismatch it is possible that the collected answers were not completely reliable. The first package, implemented at the end of 2008 was addressed to pensioners, carers and children[50] and amounted to a total of $8,8 billion. The second round of fiscal policy was implemented in the early months of 2009 and amounted to a total of $12 billion. One important detail is represented by the fact that it was unanticipated. Also in this case the policy was divided in three branches. The first was destined for individuals who had a taxable income, with the bonus being proportionate to the latter. The second was designed for children of low or middle class families, while the third was for single parent-families. In both tranches the amounts received by the Government were not subject to taxation and were cumulable with already-existing support measures.

For what concerns the survey, it was conducted from the Australian National University and had a reply rate of 32 percent[51]. The ones that received the fiscal bonuses used them for expenditures for the largest share (40,5%). The rest was used to repay debt (35,5%) and for saving purposes (24%). These

[48] The subsequent increase in taxes would be justified by the Government as a measure to cover the expenses of the fiscal policy.
[49] In this case the author refers to a survey conducted on the fiscal stimulus of 2008.
[50] Pensions include not only end-of-work contributions, but also disability and service pensions. For carers the Australia Government considers the ones who take care of people with disabilities, and lastly the child measure was addressed to families that were already eligible to support schemes.
[51] The people interviewed were 120, so the respondents amounted to 384.

results show that not all the amounts were used for consumption (or repayment of debt) but still a discrete share is destined to investment.

The use of a survey as a measure of the impact of a fiscal stimulus is immediate and shows clear results, even if it has some limitations. The first one would be that it records only the short-term results, so it does not provide for a clear picture of the effects of such a policy in the future. The second one regards the fact that the survey was based on just one question, which might miss some aspects that were not included in it.

3.1.3 Helicopter money in practice: debt monetization

Helicopter money sees the interaction of monetary and fiscal authorities. The same mechanism is applied in debt monetization, which is defined as an expansion of the fiscal deficit, funded by emission of Government bonds that the Central Bank promises to pay, thus procuring the Treasury newly issued money that then can be used to pursue the fiscal policies that were intended. At first glance, debt monetization and helicopter money might seem similar, but there are three main differences (Dowd, 2018).

1. in case of debt monetization, the Government issues a bond that promises an interest payment and that has a market value that is greater than zero. In the hypothetical setting of helicopter money, the Government would instead issue a zero-coupon infinite bond;
2. when it comes to deciding who would be the receivers of the policy, in helicopter money the decision is in the hands of the Central Bank, while in debt monetization the choice belongs to the Government[52];
3. the nature of the two policies is different, and as a consequence they both respond to different political and legal constraints.

According to the new strand of literature (i.e. Sgambati, 2016), it is impossible to imagine the presence of money in our society without the occurrence of debt that will never be removed from the system. As stated previously, the very existence of fiat money consists of not being linked to a physical countervalue[53]. Having to deal with money creation, or injection of liquidity, has historically been critical, both from a political and empirical point of view. A vivid image would be the one of the

[52] This is consistent with the idea that debt monetization is implemented with the aim of pursuing a fiscal policy.
[53] As of today, it would be hard to implement a link between money issuance and commodities, considering that they get scarcer as time goes by.

Weimar Republic and the economic crisis in Germany between 1921 and 1923, when the injection of banknotes did nothing more but creating hyperinflation (Figure 23).

Figure 23: An iconic representation of the hyperinflation effect in the Weimar Republic in 1923.
Source: Rare Historical Photos

Briefly summing up, what happened in the two years of the huge crisis that hit Germany in the twenties was a substantial necessity of liquidity needed by the Teutonic economy. It all was caused by the increased costs of World War I, and the issue was faced by disconnecting the number of banknotes circulating in the system with reserves of gold. Negative effects started escalating as the Reich started printing money to cover all the expenses caused by the World conflict and the situation got even worse when the War was over. Germany was defeated and considered responsible and accountable for all the costs that the winners had incurred. In order to meet their obligations, Germany continued printing and thereby using as a repayment instrument for the conflict debts the so-called "Papiermark". Clearly, the effects on the domestic economy were devastating. As time went by the deutsche mark started progressively losing value. At some point in 1923 wheelbarrows were needed in order to complete simple trades (e.g. buying bread), people were forced to get back to the use of bartering, as the highest banknote[54] denomination ever reached in those years was one hundred million billions. Germany was

[54] Clearly, in such a context the nominal value of banknotes is not backed by real goods.

able to get back on track only in 1924, when it left behind the use of the deutsche mark in favor of the new currency, Rentenmark.

Nowadays examples might be represented by the cases of Zimbabwe[55] and Venezuela[56], both countries being severely impacted by the disastrous outcomes of hyperinflation. Thus, the creation process of fiat money is uniquely a financial event, in the hands of the Central Bank. For this very reason in the past debt monetization was considered to be unethical, but luckily times have changed, and now the manner of keeping still the purchasing power by swapping maturities is not only widely accepted but is one of the main features of the modern economy.

Furthermore, during financial crises the state of the economy (and its components) is not the only element facing risks. As seen in the case of the Great Recession, the tight relationships that tie the banking system become more of a weakness than a strength, obliging the bank to resist selling off the reserves thus not meeting the demand of the clients. Helicopter drops, and their effects, might represent an escape route from this apparent blind alley[57].

A detailed analysis of why the creation of money is what it is today, and whether debt monetization and helicopter money interact was presented by Kyriazis (2017). The importance of having liquidity circulating in the economy lies in the fact that it can be practically and immediately used for exchanges of goods. The old – but always useful – example of a house gives a clearer idea of the difference in liquidity (and thus immediateness) between assets. Every house has its intrinsic value, but it is (almost) never used in exchange for another good other than liquid money; as a consequence, liquid and "fast" assets are the core of the majority of everyday trade. For this very reason, there is a substantial difference between quantitative easing and helicopter money. The essence of the latter is in its direct, immediate and liquid feature that is able to quickly increase investments or consumption. In the case of quantitative easing, on the other hand, there is a cushion effect caused by the intermediation of the market that is not able to directly influence the households' preferences.

Considering Bowler and Radia's definition of policies such as forward guidance as "unconventional unconventional", helicopter money could be considered the most unconventional of all (maybe "unconventional to the power of three"). It was stated before how quantitative easing has consistent side effects that regard the hurdle of having to eventually reabsorb all the liquidity injected, the loss of credibility of the central bank and financial institutions, the loss of efficacy of the subsequent rounds

[55] Probably the most critical case is the African one, which was forced to drop its official currency, after having reached in 2008 a level of inflation of 231.000.000%.
[56] After the drop in oil prices inflation started rising. As of 2019, the inflation rate in Venezuela reached 130.060%.
[57] The success of this policy depends on how sustainable the debt is.

of liquidity injection. The credibility feature of the Central Bank, and how it might be lost with the continuate and ineffective use of unconventional monetary policies was a concept highly stressed in the previous paragraphs because it is *critical.* It is the Central Bank that grants for the validity of the fiat money it creates, giving it the legal tender status. Getting back to the concept that sees no modern money circulation without the presence of constant debt is tightly linked with the independence feature of the Central Bank: simply put, at the end of the day there must be an institution that grants for the instruments used to trade in the system, and that allows for debts to exist. An interesting view sees the modern exchanges not as a standard interaction between creditor and debtor, but between debtor and debtor (Kim, 2011). It is almost as money is not really owned by anyone because of its frenetic shifts. In this context of "hustle and bustle", according to the author debt monetization via helicopter drops might represents a solution.

Buiter (2003) states[58] that a helicopter drop of money is able to increase the net wealth of the household, thereby increasing consumption. According to the author, implementing a helicopter money policy through debt monetization is able to prevail over both debt neutrality and Ricardian equivalence. One more positive effect would be represented by the consequence that avoids deflationary spirals and liquidity traps. In order to achieve these positive effects, it is crucial for the Government to create the expectation that even in the long run the money injected will not be withdrawn. This is true especially in the Eurozone, where the prevalent sector is the banking one. Lastly, the importance of having a bank-centric system allows for the interaction between helicopter money and debt monetization to work in harmony. This happens because the money creation process is not initiated by the concrete banknotes printing, but by the creation of bank deposits whose value coincides with the one of the instruments exchanged. To sum up, helicopter money and debt monetization can be implemented by a collaboration between the Central Bank and the Treasury. The first decides the amount and how to destine the funds by buying – ideally – Government bonds that are zero-coupon and infinite maturity. In this way, not only money creation is fulfilled, but with the help of credible actions of the Government it would be possible to avoid liquidity traps and deflationary spirals by the use of the most unconventional of policies.

It is crucial to consider the negative effects of the implementation of such a policy. By keeping a strong relationship of necessity with unconventional monetary policies, the economy becomes weaker and more sensitive to eventual negative shocks. One important assumption to be taken into consideration is that the primary idea behind the implementation of unconventional monetary policies was their

[58] A wider analysis of Buiter's studies will be presented in the next paragraphs with a focus on analytical models.

temporary feature. As experience shows, it is with great difficulty that central banks are nowadays trying to get back to the original and conventional manner to maintain price stability. The most impactful example is probably the one of negative interest rates in the Eurozone. Considered at first as a short-term and temporary measure, in time the rate was lowered, creating a strong dependency with the monetary policy in which the upper hand is gained by the latter and incredibly not by the ECB. Thus, it is reasonable to believe that the same thing might happen when implementing a helicopter money policy through debt monetization. The system would not also be strictly conditioned by the continuous creation of debt, but also to an escalation of need of an even more unconventional policy. It would be unsustainable.

3.2 The differences between helicopter money and quantitative easing

At first glance helicopter money and quantitative easing seem to share some traits in common. Both policies entail an increase in liquidity aimed at stimulating the demand and are thought to be implemented – because most effective – when the interest rate is at the zero lower bound.

The are several differences that distinguish helicopter money from quantitative easing that regard the addressees, the effects, and the manner in which the two policies affect the monetary base.

As stated previously, both policies imply the injection of liquidity in the economy but it is possible to notice the first difference when looking at the receivers. Helicopter money is direct as it is addressed to the non-financial actors of the economy, in fact the funds can either be distributed directly to the households, or to the Government (which will use it to fund large investments of public use). The opposite happens with quantitative easing as asset purchases, in all their forms, are aimed at stimulating the long term interest rates of the securities acquired, hence the money transfer is oriented towards financial institutions and, subsequently, the financial market.

The second distinction considers the consequences of the effects of the two policies. By handing money (in forms of bank deposits, tax cuts or as funds for Government investments) helicopter money causes a rise in net wealth. The reason for the latter increase is due to the fact that the whole public either has more money because of a liquidity transfer, because of a decreased amount of expenses that can be addressed towards consumption, or finally because public spending (when sustainable) is one of the ways in which the wealth of a society can increase. On the other hand, quantitative easing generates positive effects in the system, such as the increases in the interest rate, that in a cascade effect can affect positively the GDP, level of prices, and reduce the total risk in the market.

Moreover, from a technical point of view, when fulfilling quantitative easing the central bank always has to record an increase on the asset side to compensate for the liquidity injected in the system. In case of helicopter money, instead, the increase in the asset side of the central bank's balance sheet is a bit more subtle as there can be no claims on the money created. In this scenario the Central Bank increases its liabilities, so in order to counterbalance its assets it should record an increase in a "fictitious" balance sheet line item[59], since it should have a market value of zero (Dowd, 2018).

Lastly, both policies imply an increase in the monetary base. When the Central Bank intervenes augmenting the amount of liquidity, in fact, as a consequence the monetary base increases. The difference between the two policies in this case refers to the fact that while quantitative easing is temporary - eventually the central bank will take back all the liquidity injected in the system -, helicopter money consists of a permanent increase of the monetary base since the additional funds provided are not redeemable.

3.3 Helicopter money under the lenses of analytical models

The arguments presented so far were solely theoretical and described several ways in which – according to the advocates of helicopter money – the policy can be implemented. The literature produced is clearly not restricted to the theoretical area, and several analytical models were studied and presented in order to add even more points of view and reasons in favor of helicopter money. To be more thorough, this paragraph will focus on two models proposed by Buiter (2003, 2014) that in the first version deeply investigates the interaction between the policy and the liquidity trap, maintaining as core element the feature of non-redeemability of fiat money, while in the most recent paper presents equilibria solutions starting from different points of view that lead to the same strong statement: there always exists an equilibrium in which the combination of financial and monetary policy is able to lead to an increase of aggregate demand. Moreover, the following paragraph studies in detail the model portrayed by Di Giorgio and Traficante (2018) and analyses the impact of helicopter money implemented as a money financed policy in an open economy with the interaction of two countries. The results show the large expansionary effects of a monetary-financed fiscal policy compared to the standard debt-financed scheme; finally, also in this case helicopter money is able to boost aggregate demand, by exploiting the positive effects of depreciation. A final presentation of the effects of money-financed fiscal stimulus is displayed through the analysis of Galì (2019) and of Punzo and Rossi (2019), with the latter who focused on the importance of the redistributive effects.

[59] Since the money injected in the system should be non-redeemable, a good candidate could be a perpetual zero-coupon bond.

3.3.1 Helicopter money and its effectiveness in liquidity trap. A first by Buiter (2003)

The author examines the stimulation of demand, and whether it can be obtained with a drop of fiat money, Treasury bonds or both, implementing several steps. In the model the "actors" are the households and the government[60]. The "items" are two also in this case and consider base money and debt with both interest rate and risk free rate equal to zero that has maturity of one year. These two items – when summed – represent the net financial wealth, and its present value needs to be non-negative, as a first intertemporal budget constraint. The solvency constraint for the Government can be considered as specular given that in this case the present value of the non-monetary financial debt has to be non-positive. The analysis shows that in a representative agent model a drop of money is able to cause a "pure fiscal effect", thus an increase in base money is able to affect net wealth and consequently consumption.

It was stressed how one of the core features of helicopter money is that the money injected in the system must be irredeemable, creating an asymmetry that consists of resulting as an asset for the households but *not* a liability for the government. Altogether with the assumption that households interpret base money as an asset and any additional quantity can be produced by the Government in a costless manner, these three are the foundation of the model.

The market is supply dominated, and households receive y_t, consume c_t , pay taxes τ_t, maximize the utility function v_t, presented in a "Chinese box" manner, and that behaves like a Cobb-Douglas

$$\forall \sigma > 0 \vee \sigma \neq 0 \rightarrow v_t = \sum_{j=1}^{\infty} (1+\rho)^{-(j-t)} (\sigma - 1)^{-1} {z_j}^{(\sigma-1)^{-1}}$$

$$\forall \sigma = 1 \rightarrow v_t = \sum_{j=1}^{\infty} (1+\rho)^{-(j-t)} ln z_j \qquad 1.$$

$$\forall\, 0 < \alpha < 1, \varphi > 0, \varphi \neq 1 \rightarrow\ z_j \left[\alpha^{\frac{1}{\varphi}} c_j^{\ \frac{\varphi-1}{\varphi}} + (1-\alpha)^{\frac{1}{\varphi}} \frac{M_j}{P_j}^{\frac{\varphi-1}{\varphi}} \right]^{\frac{\varphi-1}{\varphi}}$$

$$\forall \varphi = 1 \rightarrow\ z_j = c_j^{\alpha} \left(\frac{M_j}{P_J}\right)^{1-\alpha}$$

[60] The government considers the consolidation between fiscal and monetary institutions, thus the consolidated balance constraint.

The function is double iso-elastic, with parameters σ and φ that represent substitution elasticity: the first one is constant and intertemporal, while the second refers to elasticity between consumption and money.

Taking into consideration that the net financial wealth function (that is also the only state variable in the model), at $t+1$, is

$$F_{t+1}^{h} = (1 + i_{t+1}^{M})M_t + (1 + i_{t+1})B_t \qquad 2.$$

Where M and B represent respectively the two stores of value available to the households, base money and nominal bonds, thus in $t+1$ the financial wealth is trivially the sum of the capitalized two components.

The one-period budget considers financial wealth and the impact of consumption and taxes.

$$f_{t+1}^{h} = (1 + r_{t+1})\left(f_t^{h} + y_t - \tau_c - c_t\right) + (i_{t+1}^{M} - i_{t+1})(1 + \pi_{t+1})^{-1}m_t \qquad 3.$$

Thus, it is possible to see how net financial wealth depends on the capitalized amount left of the previous period (i.e. net wealth plus the endowment minus the amounts spent for taxes and consumption) plus the impact in difference of interest rates between money and bond.

The solvency constraint, as stated before, needs to be non-negative as time t goes towards infinity, and this characteristic is presented by the following expression

$$\lim_{N\to\infty} R_{t+1,N} = \lim_{N\to\infty} R_{t+1,N}\left[(1 + i_N^{M})(1 + \pi_N)^{-1}m_{N-1} + (1 + r_N)b_{N-1}\right]^{h} \geq 0 \qquad 4.$$

where R_t is the real market discount factor used to obtain the present value, and r_N is the risk-free rate.

Putting together the single period budget constraint and the solvency constraint it is possible to solve the following identity

$$f_t^{h} = \sum_{j=1}^{\infty} R_{t+1,j}\left[c_j + \tau_j - y_t + \left(i_{j+1} - i_{j+1}^{M}\right)\left(1 + i_{j+1}\right)^{-1}m_j\right] + \lim_{N\to\infty} R_{t+1,N}f_N^{h} \qquad 5.$$

The latter expression is thus an extension in time of what presented in expression 3, all terms discounted according to the real discount rate.

The optimum is finally reached in $(j \geq t)$, when the household maximizes the utility function subject to the constraints in 4 and 5, and knowing that at time t_0 the initial stocks of both money and bonds are fixed

$$u_c(c_j, m_j) = (1 + r_{j+1})(1 + \rho)^{-1}u_c(c_{j+1}, m_{j+1}) \qquad 6.$$

$$u_c(c_j, m_j) = (1 + i_{j+1})\left(i_{j+1} - i_{j+1}^M\right)^{-1} u_m(c_j, m_j) \quad 7.$$

$$\lim_{N \to \infty} (1 + \rho)^{-(N-t)} (c_N, m_N) f_N^h = 0 \quad 8.$$

Equations 6. and 8. represent respectively the Euler equation and the transversality condition.

If the present value of debt is zero, the intertemporal budget constraint becomes

$$f_t^h = (1 + i_t^M)(1 + \pi_N)^{-1} m_{t-1}(1 + r_N) b_{t-1} = \sum_{j=t}^{\infty} R_{t+1,j} \left[c_j + \tau_j - y_t + \left(i_{j+1} - i_{j+1}^M\right)\left(1 + i_{j+1}\right)^{-1} m_j\right] \quad 9.$$

It is possible to obtain a "pure fiscal effect" if and only if the government is able – through the implementation of the policy – to influence the present value of all taxes, present and future, as it is possible to see from the following consumption functions

$$c_t = \mu_t w_t \quad 10.$$

$$w_t = f_t^h + h_t \quad 11.$$

$$f_t^h = (1 + r_t)[(1 + i_t^M)(1 + i_t)^{-1} m_{t-1} + b_{t-1}] \quad 12.$$

$$h_t = \sum_{j=t}^{\infty} R_{t+1,j} \left(y_j - \tau_j\right) \quad 13.$$

$$\mu_t = \left\{ \sum_{j=t}^{\infty} \left[1 + \left(\frac{1-\alpha}{\alpha}\right)\left(\frac{1 + i_{j+1}}{i_{j+1} - i_{j+1}^M}\right)^{\varphi - 1} \right] \prod_{s=t+1}^{j} \frac{(1 + r_s)^{\sigma - 1}}{(1 + \rho)^{\sigma}} \left(\frac{1 + \left(\frac{1-\alpha}{\alpha}\right)\left(\frac{1 + i_{s+1}}{i_{s+1} - i_{s+1}^M}\right)^{\varphi - 1}}{1 + \left(\frac{1-\alpha}{\alpha}\right)\left(\frac{1 + i_s}{i_s - i_s^M}\right)^{\varphi - 1}} \right)^{\frac{\sigma - \varphi}{\varphi - 1}} \right\}^{-1} \quad 14.$$

With w_t is indicated the total real household wealth, and it comprises the net financial wealth and the human wealth h_t, both in real terms. This component is crucial because it is the one that shows the impact of taxes on the household consumption.

For what concerns the government, the liabilities of its consolidated balance sheet match the net financial wealth of the households, while its one-period budget is

$$b_t \equiv (1 + r_t) b_{t-1} + g_t - \tau_t - [M_t - (1 + i_t^M) M_{t-1}] P_t^{-1} \quad 15.$$

and is subject to the non-positive constraint of the future value of its non-monetary debt

$$\lim_{N \to \infty} R_{t+1,N} b_N \leq 0 \quad 16.$$

The two, combined together, give the intertemporal budget constraint

$$(1 + r_t)b_{t-1} = \sum_{j=t}^{\infty} R_{t+1,j}(\tau_t - g_t + [M_t - \left(1 + i_j^M\right)M_{j-1}]P_j^{-1} \qquad 17.$$

The final consideration regards the consolidation of the accounts of households and the government. As stated before, the net financial wealth of the households must be equal to the financial liabilities of the Government and their present values – as time goes to infinity – must be equal to zero only for the first ones. This condition is not needed for the Government in order to allow for an equilibrium in case of liquidity trap, thus when $i_t = i_t^M$, as long as the initial amount of monetary base is positive and the growth rate of money is not smaller than its nominal interest.

The intertemporal budget constraint of the government (17) allows to rule out from the consumption of the households the non-monetary government debt, and finally to obtain a consolidated real total wealth

$$w_t \equiv (1 + i_t^M)M_{t-1}P_t^{-1} + \sum_{j=t}^{\infty} R_{t+1,j}(y_t - g_t + [M_t - \left(1 + i_j^M\right)M_{j-1}]P_j^{-1} \qquad 18.$$

At this point, consumption becomes

$$c_t = \hat{\mu}_t \widehat{w}_t \qquad 19.$$

$$\widehat{w}_t = \sum_{j=t}^{\infty} R_{t+1,j}(y_t - g_t) + \lim_{N\to\infty} R_{t+1,N}\,(1 + i_N^M)\,(1 + \pi_N)^{-1} m_{N-1} \qquad 20.$$

$$\hat{\mu}_t \equiv \left\{ \sum_{j=t}^{\infty} \prod_{s=t+1}^{j} \frac{(1 + r_s)^{\sigma-1}}{(1 + \rho)^{\sigma}} \left(\frac{1 + \left(\frac{1-\alpha}{\alpha}\right)\left(\frac{1 + i_{s+1}}{i_{s+1} - i_{s+1}^M}\right)^{\varphi-1}}{1 + \left(\frac{1-\alpha}{\alpha}\right)\left(\frac{1 + i_s}{i_s - i_s^M}\right)^{\varphi-1}} \right)^{\frac{\sigma-\varphi}{\varphi-1}} \right\}^{-1} \qquad 21.$$

To sum up, the analysis presented by Buiter (2003) shows that the government – through the implementation of helicopter money – is able to affect the consumption subsequently the aggregate demand of the public through two mechanisms: the first one regards the credibility of the policy that influences the present value of present and future taxes, and that is present in the real human wealth; the seconds asserts to the idea that the present value of the limit of the summation of irredeemable fiat money constitutes an element of net financial wealth. The two summed find the total real wealth, and subsequently their increase is able to boost the aggregate demand. The latter mechanism is possible

exclusively thanks to the non-redeemability feature of fiat base money, that allows for the Government – following the view of the author – not to increase its liabilities, as on this type of instrument there can be no further claims, hence it represents solely an asset for the agent that receives it. The same reasoning cannot be applied, for the same cause, to a helicopter drop of bonds since – by definition – bonds need to be redeemed.

Finally, the analysis showed how helicopter money can be effective at any level of interest rates, and this is true even for cases in which the economy is at a state of liquidity trap.

3.3.2 An extension of the previous work, Buiter (2014) and the broader effectiveness of helicopter money

The work presented in the previous paragraph was produced right after the Japanese recession of the second half of the 90s, thus the world had not already experienced the Great Recession and all the consequences in terms of unconventional monetary policies.

In 2014 Buiter published a new article whose title is "The simple analytics of helicopter money: why it works – always". For as "strong" as it sounds in declaring the absolute validity of the policy it is also true that the author widely explored the topic analyzed eleven years before, covering several new aspects.

The two main starting points are, as usually, the non-redeemability of money and the three assumptions stated in the paper before[61], with the objective to demonstrate how it is possible to always find a combination of monetary and fiscal policy that leads to an equilibrium in which aggregate demand increases in case of a helicopter drop, and that Ricardian equivalence[62] is not relevant. Also in this case the two representative agents are households and the Government, and they operate in a closed economy.

The households that were born at a time $s \leq t$ need to maximize the following utility function that is expressed as a Cobb-Douglas with parameter $0 \leq \alpha \leq 1$

$$max \int_t^{\infty} e^{-(\theta+\lambda)(v-t)} \ln \left[\bar{c}(s,v)^{1-\alpha} \left(\frac{\overline{m}(s,v)}{P(v)} \right)^{\alpha} \right] dv \qquad 22.$$

[61] For convenience, here they are reported: fiat money is perceived as an asset by the households, price of money is positive, and it is not redeemable.
[62] Ricardian equivalence states that aggregate demand doesn't increase if the taxpayers believe that there will be an increase in taxes in the future

Where λ is the life expectancy, P is the price level, $\bar{c}(s,v)$ represent consumption, and $\bar{m}(s,v)$ is base money. As stated previously, the economy is closed, and the competitiveness of the market allows for the rates of return of both money and bonds to be equal.

The real value of financial wealth is the sum of the capital budget available to the household plus the combination of money and bonds

$$\bar{a}(s,v) \equiv \bar{k}(s,v) + \frac{\bar{m}(s,v) + \bar{b}(s,v)}{P(v)} \qquad 23.$$

In this case the budget constraint takes the following form

$$\dot{\bar{a}}(s,v) \equiv (r(v)+\lambda)\bar{a}(s,v) - i(v)\frac{\bar{m}(s,v)}{P(v)} + \bar{w}(s,v) - \bar{\tau}(s,v) + \frac{\bar{d}(s,v)}{P(v)} - \bar{c}(s,v) \qquad 24.$$

Here $\bar{w}(s,v)$ is the real wage, $\bar{\tau}(s,v)$ is the lump sum tax, and finally $\bar{d}(s,v)$ is the nominal value of helicopter money[63]. It is possible to notice how it varies depending on variations of financial assets and on any changes that regard net human wealth (last four terms of the equation).

Moreover, the households are subject to the solvency constraint

$$\lim_{v\to\infty} \bar{a}(s,v)e^{-\int_t^v (r(v)+\lambda)du} = 0 \qquad 25.$$

Differently to the scenario presented in Buiter (2003), in this case the solvency constraint does not need to be non-negative but can be constricted to being in the limit equal to zero because consumption and money are increasing components of the utility function.

The optimality problem takes into consideration consumption and its structure, which also in this case is a "Chinese box". Human wealth $\bar{h}(s,t)$ is the combination of the present value of net income and helicopter money, and it moves accordingly to the life expectancy (trivially, someone that is about to die will tend on squandering his possessions, thus will consume more). Human wealth altogether with financial wealth $\bar{a}(s,v)$ summed up results in total wealth, and finally consumption is a weighted function of net total wealth.

$$\bar{c}(s,t) = (1-\alpha)(\theta+\lambda)\bar{J}(s,t) \qquad 26.$$

$$\bar{J}(s,t) \equiv \bar{a}(s,t) + \bar{h}(s,t) \qquad 27.$$

[63] The explication of the component of the helicopter drop d is one of the greatest differences between the model investigated in Buiter (2003).

$$\bar{h}(s,t) = \int_t^{\infty} \left(\bar{w}(s,t) - \bar{\tau}(s,t) + \frac{\bar{d}(s,v)}{P(v)} \right) e^{-\int_t^v (r(u)+\lambda)du} dv \qquad 28.$$

$$\frac{\bar{m}(s,t)}{P(t)} = \left(\frac{\alpha}{1-\alpha}\right) \frac{1}{i(t)} \bar{c}(s,t) \qquad 29.$$

Function 8 represents the money demand, increasing in consumption and decreasing in the nominal interest rate.

Differently from the model presented in the previous paragraph, in this case the birth rate β is considered, altogether with the population of newborns $\beta e^{(\beta-\lambda)t}$ and of people still alive $\beta e^{(\beta-\lambda)s} e^{-\lambda(t-s)}$. Consequently, the total population is expressed as $\beta e^{-\lambda} \int_{-\infty}^{t} e^{\beta s} ds = e^{(\beta-\lambda)t}$. In the generational aggregation of the public one more strong assumption is added: all the individuals, newborns and adults, earn the same wage, obtain the same amount of helicopter money and pay the same amount of taxes, thus resulting in all the households obtaining an identical amount of human wealth. Consumption and money demand result in

$$C(t) = (1-\alpha)(\theta+\lambda) J(t) \qquad 30.$$

$$\frac{M(t)}{P(t)} = \left(\frac{\alpha}{1-\alpha}\right) \frac{1}{i(t)} C(s,t) \qquad 31.$$

$$\dot{A}(t) \equiv r(t)A(t) - i(t)\frac{M(t)}{P(t)} + W(t) - T(t) + \frac{D(t)}{P(t)} - C(t) \qquad 32.$$

$$H(s,t) = \int_t^{\infty} \left(W(s,t) - T(s,t) + \frac{D(s,v)}{P(v)} \right) e^{-\int_t^v (r(u)+\beta)du} dv \qquad 33.$$

$$A(s,v) \equiv K(s,v) + \frac{M(s,v) + B(s,v)}{P(v)} \qquad 34.$$

$$J(t) = A(t) + H(t) \qquad 35.$$

With a new solvency constraint

$$\lim_{v \to \infty} A(s,v) e^{-\int_t^v r(u)du} = 0 \qquad 36.$$

The Government is also in this model considered to be the consolidation of fiscal and monetary authorities, and it trades uniquely with the household (demanding taxes and distributing payments).

The budget is expressed in the following formula

$$\frac{\dot{M}(t) + \dot{B}(t)}{P(t)} \equiv i(t)\frac{B(t)}{P(t)} + G(t) - T(t) + \frac{D(t)}{P(t)} \qquad 37.$$

And shows that the government realizes its gains on both the issue of money and debt (RH) thus explicitly allowing for debt monetization, but subject to the constraint of interest payments on the debt issued, fiscal expenditures and helicopter money drops. It is specifically in this expression that Buiter's reasoning founds its applicability, because the emission of money as irredeemable does not represent a liability, and thus finally does not the restrict the Government.

It is also subject to the non-positive solvency constraint

$$\lim_{v\to\infty}\left(\frac{B(v)}{P(v)}\right)e^{-\int_t^v r(u)du}\leq 0 \qquad 38.$$

The intertemporal budget is the following

$$\frac{\dot{M}(t)+\dot{B}(t)}{P(t)}\equiv\int_t^\infty\left(T(v)-\frac{D(v)}{P(v)}-G(v)+i(v)\frac{M(v)}{P(v)}\right)e^{-\int_t^v r(u)du}dv+\lim_{v\to\infty}\frac{M(v)}{P(v)}e^{-\int_t^v r(u)du} \qquad 39.$$

Thus, the government needs to be able to even the present value from its income sources (i.e. net public spending, saving from the emission of money rather than debt checking on their respective interest rates) and the present value of the money present in the system with both money and debt.

The last step is represented by the consolidation of the intertemporal budget constraint of the government with the aggregated consumption, that leads to

$$C(t)=(1-\alpha)(\theta+\lambda)\begin{bmatrix}K(t)+\int_t^\infty(W(v)-G(v)e^{\beta(v-t)})e^{-\int_t^v(r(u)+\beta)du}dv\\-\int_t^\infty\left(T(v)-\frac{D(v)}{P(v)}\right)e^{-\int_t^v(r(u)+\beta)du}\left[1-e^{\beta(v-t)}\right]dv\\+\frac{1}{P(t)}\left(M(t)+\int_t^\infty\dot{M}(v)e^{-\int_t^v i(u)du}dv\right)\end{bmatrix} \qquad 40.$$

Consumption is proportionate to the presence – in real terms – of both current money in circulation and the present value of future money, wholly respecting the initial assumption inserted in the expression for consumption – for which – it is directly proportionate to net financial wealth (and thus ultimately, money).

The level of birth rates is crucial in understanding whether helicopter money could be effective even in presence of Ricardian equivalence. In fact, if β is greater than zero and the Government announces an increase in taxes, net human wealth will still increase because part of the taxes will burden the future cohort. In the scenario in which the birth rate is equal to zero, the formula for consumption is

the one expressed from 5 to 8, and Ricardian equivalence would succeed, delivering an expression for aggregate consumption that is the following

$$C(t) = (1-\alpha)(\theta+\lambda)\left[\begin{matrix} K(t) + \int_t^{\infty} ((W(v) - G(v))\, e^{-\int_t^v r(u)du} dv \\ + \frac{1}{P(t)}\left(M(t) + \int_t^{\infty} \dot{M}(v) e^{-\int_t^v i(u)du} dv\right)\end{matrix}\right] \quad 41.$$

It is in this context that the need for the positivity of price becomes central, because thanks to this assumption even in a context of Ricardian equivalence helicopter money would be able to boost aggregate demand, unlike the case of a fiscal policy, in which a positive birth rate – and thus a future generation - is needed to lessen the burden for the present population.

Last but not least, the model is flexible and able to be effective even in cases of liquidity trap. In the latter context the utility function to use is not a Cobb-Douglas, but one in which – in some conditions (i.e. after crossing some thresholds) – the utility from receiving helicopter money is not increasing.

$$max \int_t^{\infty} e^{-(\theta+\lambda)(v-t)} \ln\left[\bar{c}(s,v)\left(\frac{\overline{m}(s,v)}{P(v)}\right)\right]$$

$$u\left(\frac{\overline{m}(s,v)}{P(v)}\right) = \eta\frac{\overline{m}(s,v)}{P(v)} - \frac{1}{2}\gamma\left(\frac{\overline{m}(s,v)}{P(v)}\right)^2 \; when\; 0 \le \frac{\overline{m}(s,v)}{P(v)} \le \frac{\eta}{\gamma} \; and\; \eta,\gamma > 0 \quad 42.$$

$$= \frac{1}{2}\frac{\eta^2}{\gamma} \; when\; \frac{\overline{m}(s,v)}{P(v)} > \frac{\eta}{\gamma}$$

Here the threshold is represented by interest rates at a level of zero, and in this context the utility will be equal (and from there on fixed) at a level of $\frac{1}{2}\frac{\eta^2}{\gamma}$.

The aggregate consumption and money demand function are both needed to study the effects of a zero lower bound, and are the following

$$C(t) = (\theta+\lambda)J(t) \quad 43.$$

$$\frac{M(t)}{P(t)} \ge \frac{\eta}{\gamma} e^{(\beta-\lambda)t} \quad 44.$$

The solvency constraints the for households and government are respectively

$$\int_t^{\infty} i(v)M(v)e^{-\int_t^v i(u)du} dv = 0 \; if\; i(v) = 0, v \ge t \quad 45.$$

$$\lim_{v\to\infty} M(v) if\; i(v) = 0, v \ge t \quad 46.$$

And aggregate consumption would then be

$$C(t) = (1-\alpha)(\theta+\lambda)\begin{bmatrix} K(t) + \int_t^{\infty} (W(v) - G(v)e^{\beta(v-t)})e^{-\int_t^v (r(u)+\beta)du}dv \\ -\int_t^{\infty} \left(T(v) - \frac{D(v)}{P(v)}\right) e^{-\int_t^v (r(u)+\beta)du}\left[1 - e^{\beta(v-t)}\right]dv \end{bmatrix} \quad 47.$$

3.3.3 Helicopter money and fiscal stimulus in open economy. A study by Di Giorgio and Traficante (2018)

In the previous paragraphs the analytical analysis built by Buiter (2003, 2014) showed a comprehensive approach in which helicopter money can be justified, asserting especially on its characteristic of always being able to boost aggregate demand, even in non-ideal conditions, such as liquidity trap and prevalence of Ricardian equivalence. The first work also refers to the possibility for the households to benefit from a "pure fiscal effect" when the influence on current value of present and future taxes is the primary component that boosts demand. In the second paper the effect of taxes is still important, but also mitigated by the impact of the helicopter drop, this time made explicit in the model.

As stressed before, helicopter money can be implemented in several ways: a direct distribution of money to the public, alternatively to the government – finalized at the realization of project such as infrastructures –, and finally with a tax cut. The two models presented so far were characterized by the presence of two representative agents (households and the government) that traded in a closed economy and focused on the distribution of money directly to the households.

Di Giorgio and Traficante (2018) explore a two country model in an open economy to investigate the macroeconomic effects of a money financed fiscal policy in comparison to the standard debt financed fiscal policy. In the model there are four agents, households and government both domestic and foreign. The households have a basket of goods, both domestic and foreign, financed with the labor that they supply to their local firms. The Ricardian equivalence issue is dodged with the setting of demand as driven only by a perpetual-youth mechanism. The two countries, H and F, are the same in terms of size, and they conduct different fiscal and monetary policies. Country H can conduct fiscal policy in two manners:

1. if debt financed, the monetary policy is determined by the Central Bank that will follow a Taylor-style rule in the setting of the interest rate;
2. if money financed, the short term rate will move consequently to reach an equilibrium in the money market.

Country F - on the other hand - has a balanced budget and follows a Taylor rule, bearing the spillover effects of the monetary and fiscal policies implemented in country H.

The households maximize the following utility function (written for a generic household j)

$$E_0 \sum_{t=0}^{\infty} \beta^t (1-\gamma)^t \left[\log C_t(j) + \delta \log(1 - L_t(j)) + \chi \log\left(\frac{M_t(j)}{P_t}\right)\right] \quad 48.$$

where γ represents the probability of replacement for traders in the market, C_t is consumption, $\frac{M_t}{P_t}$ represents – as usual – real money balances, L_t is labor ($1 - L_t$ is thus leisure) and β is the discount factor. Utility thus maximizes consumption, labor and real money balances.

The budget constraint is represented by the expression

$$\begin{aligned} P_t C_t(j) + E_t\{\mathcal{F}_{t,t+1} Q_{H,t}(j)\} + B_{H,t}(j) + \mathcal{E}_t B_{F,t}(j) + M_t(j) \quad 49. \\ \leq \frac{1}{1-\gamma}\left[(1 + i_{t-1}) B_{H,t-1}(j) + \mathcal{E}_t (1 + i^*_{t-1}) B_{F,t-1}(j) + Q_{H,t-1}(j) + M_{t-1}(j)\right] + W_t L_t(j) \\ + P_t D_t(j) - P_t T_t(j) \end{aligned}$$

Each cohort j thus has a wealth that derives from the wage W_t, interest gains from both domestic and foreign bonds, holdings of money and state contingent assets Q, claims on real profit D_t net of tax expenses T_t. The whole expression is discounted to the probability of replacement factor γ.

The demands for the respective domestic good are

$$home \rightarrow Y_h(h) \equiv C_H(h) + C^*_H(h) + G_H(h) = \left(\frac{P_H(h)}{P_H}\right)^{-\varepsilon} \left[\kappa \left(\frac{P_H}{P}\right)^{-\theta} C + (1-\kappa)\left(\frac{P^*_H}{P^*}\right)^{-\theta} C^* + G\right]$$

and 50.

$$foreign \rightarrow Y^*_F(f) \equiv C_F(f) + C^*_F(f) + G^*_F(f) = \left(\frac{P^*_F(f)}{P^*_F}\right)^{-\varepsilon} \left[(1-\kappa)\left(\frac{P_F}{P}\right)^{-\theta} C + \kappa \left(\frac{P^*_F}{P^*}\right)^{-\theta} C^* + G^*\right]$$

where $C(h)[C(f)]$ is the consumption index for the domestic[foreign] basket of both foreign and domestic goods, $P[P^*]$ is the domestic[foreign] consumption-based price index for both foreign and domestic goods, G represents the quantity of consumption of the national good, θ is the substitution elasticity between domestic and foreign goods and finally κ represents the home bias in the choices of consumption of the government.

Aggregation is implemented across cohorts, and is finalized at reaching the optimum conditions for consumption expressed in

$$\delta P_t C_t = W_t(1 - L_t) \tag{51.}$$

$$\frac{M_t}{P_t} = \frac{\chi(1 + i_t)}{i_t} C_t \tag{52.}$$

$$P_t C_t = \frac{1 - \beta(1 - \gamma)}{(1 - \gamma)(1 + \chi)} \Omega_{t-1} + \frac{1 - \beta(1 - \gamma)}{(1 + \chi)} \mathcal{H}_t \tag{53.}$$

$$C_t = \sigma E_t \left\{ \mathcal{F}_{t,t+1} \frac{P_{t+1}}{P_t} \Omega_{t+1} \right\} + \frac{1}{\beta} E_t \left\{ \mathcal{F}_{t,t+1} \frac{P_{t+1}}{P_t} C_{t+1} \right\} \tag{54.}$$

Demand now follows the expression

$$\begin{aligned} Home \rightarrow\ & Y_H = \kappa \left(\frac{P_H}{P} \right)^{-\theta} C + (1 - \kappa) \left(\frac{P_H^*}{P^*} \right)^{-\theta} C^* + G \\ Foreign \rightarrow\ & Y_F^* = (1 - \kappa) \left(\frac{P_F}{P} \right)^{-\theta} C + \kappa \left(\frac{P_F^*}{P^*} \right)^{-\theta} C^* + G^* \end{aligned} \tag{55.}$$

For what concerns the Government side, its consumption is fully home biased and exogenous, and it can be funded by taxes, seigniorage on issuance of money or by issuing debt with one period maturity that has no risk.

The budget for country H is then

$$B_t + M_t - M_{t-1} = (1 + i_{t-1}) B_{t-1} + P_t Z_t \tag{56.}$$

The supply side of the market has production functions, respectively for domestic and foreign countries

$$\begin{aligned} home \rightarrow\ & Y_{H,t} \Xi_t = L_t \\ foreign \rightarrow\ & Y_{H,t} {\Xi_t}^* = {L_t}^* \end{aligned} \tag{57.}$$

from which follows equilibrium in the labor market, that implies the following expression for marginal costs

$$\begin{aligned} home \rightarrow\ & MC_t = \frac{\delta C_t}{1 - Y_{H,t} \Xi_t} \frac{P_t}{P_{H,t}} \\ foreign \rightarrow\ & MC_t^* = \frac{\delta C_t^*}{1 - Y_{F,t}^* \Xi_t^*} \frac{P_t^*}{P_{F,t}^*} \end{aligned} \tag{58.}$$

The model operates in a steady state scenario, where inflation debt and seigniorage are all at zero, it is expressed in linear form and considers money demand, net foreign assets (NFA), aggregate consumption, public debt, primary deficits, equilibrium in real marginal costs.

As stated previously, country H can choose whether to conduct a debt or money financed scheme for its fiscal policy. In the first case money supply moves to respect the Taylor-type rule and does not depend on primary deficit. In the second scenario the monetary base has to be larger in order to keep the debt constant, and the interest rates move to reach the equilibrium, thus without following any specific rule. By keeping the debt constant taxes are not increased, causing important implications that are better analyzed through the parametrization of the linear model.

With the parametrization of the variables, the authors were able to analyze in detail their findings. To be more thorough, the two methods seem to affect inflation and output gap with different intensity. With money financing the shocks are wider and constant compared to debt financing, where the initial shock is not sustained but tends to decline. The tampering on the increase of output gap is due to the appreciation of the real exchange rate. Another component that affects the shocks is the real interest rate, which decreases in case of money financing, thus allowing for a boost in consumption. Always in money financing the growth in real activity and the stability of debt allow for the debt to GDP to decrease. The increase in consumption, output and constant debt level creates an enhancement of the NFA position.

The greatest difference on impact of the two policies is recorded in the spillover effects on the foreign country F. In case of money-financing the depreciation affects the foreign country causing a negative output gap. On the other hand, the appreciation caused by the debt-financing scheme allows the foreign country to have an increase in output.

To sum up, Di Giorgio and Traficante (2018) created a model that investigates the effects of helicopter money implemented as a money financed stimulus in an open economy, and successfully demonstrated how the policy can increase output gap and meliorate the position of the home country H exploiting the advantages subsequent to the real depreciation of the exchange rate. In a cascade effect the increase in output gap boosts demand and consumption. Contrarily to a standard debt-financed fiscal policy, the money financed one generates greater effect and allows for the home country to impose itself on the foreign one.

3.3.4. Galì (2019) and Punzo and Rossi (2019) analysis on the effectiveness of a money-financed fiscal stimulus

The area of studies that regards helicopter money as a money-financed fiscal stimulus finds in Galì one of the points of reference in current literature. The following paragraph presents the most recent version of his paper “The effects of a money financed fiscal stimulus”, also in order to prepare for the

theoretical basis proposed by Punzo and Rossi (2019), who – with a more specific approach – studied the impact of redistributive effects and their importance in such an environment.

Galì's analysis considers the difference in effectiveness between two types of fiscal policies, a tax cut against an increase in Government spending, the differences between a money financed versus a debt financed scheme, and finally the contrast between a normal scenario and a liquidity trap.

The model is set as New Keynesian in a closed economy with a monopolistic market and sticky prices. It considers a fiscal shock, that is unique, unanticipated and endogenous, thus depicting the scenario as a deterministic one. The actors are the Government, households and firms. For what concerns the Government, its consolidated budget constraint is

$$G_t + B_{t-1}R_{t-1} = T_t + B_t + \frac{\Delta M_t}{P_t} \qquad 59.$$

The latter expression is hence a function of lump sum taxes, one period zero interest bonds and money. Moreover, the Government applies a tax rule, where the first component is endogenous and changes in response to changes in the debt ratio, while the second it's independent

$$\hat{t}_t = \psi_b \hat{b}_{t-1} + \hat{t^*}_t \qquad 60.$$

The tax rule yields the evolution of public debt in the following formula

$$\hat{b}_t = (1 + \rho - \psi_b)\hat{b}_{t-1} + b(1+\rho)(\hat{\imath}_{t-1} - \pi_t) + \hat{g}_t - \hat{t^*}_t - \varkappa \Delta m_t \qquad 61.$$

Where the variation of debt depends on the previous year's debt, the long run debt target b and the deviations from their steady state variables for Government debt, endogenous tax and variation (in log terms) of money that considers its inverse velocity income $\varkappa$. In the long run the debt ratio has to converge to its target.

The goods market is in equilibrium when

$$Y_t = C_t + G_t \qquad 62.$$

Real balances follow the formula

$$\hat{l}_t = \hat{c}_t - \eta \hat{\imath}_t \qquad 63.$$

The monetary policy expression considers the financing scheme

$$\Delta m_t = \left(\frac{1}{\varkappa}\right)\left(\delta^t + b(1+\rho)(\hat{\imath}_{t-1} - \pi_t)\right) \qquad 64.$$

The author finds that the relevance of the financing scheme is due to the presence of sticky prices, because the latter produce aggregate demand and output as depending on the real interest rates. The real interest rates clearly depend on how money supply is provided and on nominal interest rates, hence on the financing method.

When seigniorage changes in order to maintain still the value of real debt $\mathcal{B}$, the effects are different whether a money or debt financing scheme is considered. In the first case, when the Government increases its purchases taxes do not ever move, while in case of a tax cut they decrease but only temporarily. The effect on the economic variable in the case of a tax cut is great thanks to the constant increase in output caused by an increase in consumption triggered by the decrease in real interest rates. As debt remains still, the debt to output ratio decreases thanks to the increase in output. When the Government carries on a fiscal policy through the increase of purchases the effects also result in an increase of output and consumption. To sum up, under a money financed scheme taxes and debt do not change as a response to the new fiscal policy at the expense of the management of the monetary policy.

In the case of a debt financing method, the issue of debt changes the taxes according to rule 60 to realize the long run level of debt. In this case the monetary policy is detached from the fiscal one, thus seigniorage changes considering the demand for money in order to accomplish price stability. The macroeconomic variables are not affected, both in nominal and real terms, due to Ricardian equivalence, and the same stillness manifests itself also in case of Government purchases.

Lastly, Galì explores the case of a liquidity trap, expressed as the consequence of a momentaneous negative shock of demand that blocks the central bank from fulfilling its stabilizing duties due to the zero lower bound of the nominal rate. In the period after the shock the interest rate reaches again the previous positive value.

In this case the expression for real money balances becomes

$$\hat{l}_t \geq \hat{c}_t - \eta \hat{\imath}_t \qquad 65.$$

If the Government does not act in response to the zero lower bound, the decrease in demand causes as a consequence a decrease in output and inflation, contrarily to debt that increases thanks to the rise in real interest rates. Also in this scenario the Ricardian equivalence prevents a debt financed scheme of a tax cut from its effectiveness. On the contrary, a money financed approach seems to be extremely effective for a tax cut, where output and inflation decrease less both in cases of presence or absence of a fiscal response to the zero lower bound thanks to the continuous decrease in real interest rates. The

latter is caused by the persistent injection of liquidity that lowers the nominal rate even when the shock disappears. The case of Government purchases in this scenario records the same effects, but to a smaller extent.

To sum up, Galì's model was able to show the effectiveness of helicopter money approached in different scenarios and with different manners. The policy seems to be more effective compared to a normal debt financed scheme, producing benefits and almost no damages. Galì was able to show how in normal times a money financed fiscal stimulus has a great impact on consumption and output, while the same cannot be found with a debt financed approach, where there is no change in the macroeconomic variables, mainly due to the Ricardian equivalence. In the context of a zero lower bound the difference between the two procedures is still present, but on a smaller scale.

Punzo and Rossi (2019) used the abovementioned model as a starting point for their analysis, which studies in detail how the redistributive effects impact the overall effectiveness of a money financed fiscal stimulus. The starting point is a New Keynesian model, analyzed both in the two-agents model – borrower and saver – and in the representative agent scheme, both studying the impact of a money financed scheme against the standard debt financed scheme. Following Galì's steps, Punzo and Rossi apply their model to the alternatives of tax cut versus Government purchases, in order to assess the differences caused by the manner in which helicopter money is implemented. For what concerns the two-agents model, the difference between borrowers and savers lies in their "degree of impatience". Also this model considers a closed economy, with households, firms, fiscal and monetary authority. The Government is able to fund the fiscal policies by collecting lump sum taxes or issuing one period riskless bonds. The main findings of the study can be summarized in five points.

1. The redistributive effect is always present in normal times, with any type of policy. Specifically, in case of a money financed scheme borrowers' benefits are larger since they tend on consuming more than in case of the standard debt financing, with larger aggregate demand recorded in the first case. The importance of the redistributive effect is studied by considering a model with one representative agent, where the difference between money and debt approaches are smaller.
2. The consumption and output fiscal multipliers are larger in the case of money financed program implemented during normal times, while in the alternative case of public spending the results are close to the ones of debt financing. In both scenarios of money financing, the values of the multipliers are an increasing function of borrowers, as the latter tend to consume more than savers, and thus increase also the aggregate demand.

3. The money financed scheme, compared to the debt one, favors borrowers and penalizes savers, and vice versa in terms of welfare.
4. The normal case scenario of money financing is generally preferable, because it generates bigger multipliers and welfare conditions. This concept seems to hold up only in the case of a two-agents model, where the spillover throughout preferences is able to shift the changes in inflation. With the injection in liquidity, the real value of debt decreases, favoring borrowers and worsening the position of savers. As a consequence, borrowers consume more, resulting in a larger aggregate demand compared to the case of a representative agent.
5. Lastly, in the case of liquidity trap the alternative money financing scheme seems to be more effective. In this case the seigniorage changes in order to keep the value of real debt still, and at the same time sustains higher level of inflation compared to the normal case scenario. The higher level of inflation is able to activate the redistributive channel from savers to borrowers, in order to boost the consumption of the latter, and finally increase aggregate demand, avoiding a recession. Also in this case seems evident the importance of a two-agents model, where the redistributive channel is present.

In conclusion, all five models – even in different ways - were able to demonstrate that helicopter money shows to be effective primarily in boosting aggregate demand consequently consumption.

3.4 The arguments against helicopter money

The previous paragraphs presented all the reasonings in favor of helicopter money, investigating both theoretical and analytical possible implementations. What emerged so far from the contribution of the advocates of this peculiar policy is that it represents the sole alternative to quantitative easing - as the latter was not able to reach the established objectives -, and it is effectively able to boost aggregate demand in any cases (e.g. zero lower bound, presence/absence of Ricardian equivalence, open economy). As literature started producing more and more material backing up helicopter money, the same happened for the contribution added by authors who do not agree with all the positive features claimed by its supporters.

Cecchetti and Schoenholtz (2016) found a first set of issues in Friedman's original draft, stating that it contains three issues:

1. Central banks remunerate the reserves with the final aim of the setting of the interest rate.

2. The effective control of the reserves is not in the hands of the central bank, but it is uniquely determined by the demand of the public; the actual setting regards the interest rate, thus promising an everlasting expansion of the monetary base is *not* credible.
3. The distribution of funds lies in the spectrum of action of the fiscal policies, while central banks can only pursue monetary policies.

The last point is crucial. Defined as it is right now, helicopter money represents a hybrid. To be coherent with the current notion it needs to be initiated by the Central Bank, but the intervention of the Treasury is necessary. To see more clearly how it could be implemented nowadays it is worth analyzing the balance sheet of both the Treasury and the Central Bank to see how the two change the consolidated balance sheet of the Government.

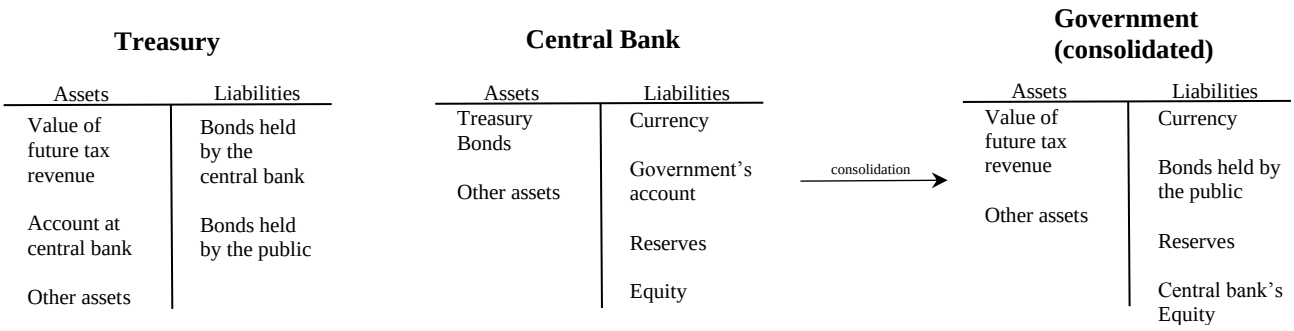

Figure 24: The effect of consolidation

Analyzing Figure 24, it is possible to understand that in case of a purchase of a Treasury Bond operated by the Central Bank in exchange for reserves changes - as a direct consequence - the maturity of the elements of the consolidated balance sheet of the Government. In fact, a long term liability is acquired in return for a very liquid and short-term liability[64]. According to the authors, helicopter money nowadays cannot be considered exactly as what Friedman proposed, nor close to quantitative easing (as in this case the expansion of the balance sheet of the central bank is not necessarily related to fiscal policy). It has to be interpreted as a "multi-stage process" that is initiated with a transfer of money from the Central Bank's to the Treasury's balance sheet. As stressed before, in case of a change in either assets or liabilities the latter must be counterbalanced. For example, if the central bank is to expand one liability item it must – as a response – decrease one other liability item or alternatively

[64] This type of operation sees an increase in assets for the Central Bank, represented with the purchase of a Bond, that is counterbalanced by an injection of reserves (short term) that is recorded on the asset side of the Treasury as "Account at Central bank". In consolidation, this operations cancel out "Treasury Bonds" (Assets, Central Bank) with "Bonds held by the Central Bank" (Liabilities, Treasury) and "Governments account" (Liabilities, Central Bank) with "Account at Central bank" (Assets, Treasury). This double counterbalance does not change the size of the Government's Balance Sheet, but only varieties the maturity structure of the liabilities side.

increase one (or more) element in the asset side. A common example in literature is the emission by the Treasury of a perpetual zero-coupon bond acquired by the Central Bank. This would technically represent an example of helicopter money as it would be funded by the monetary policy institution, being perpetual and zero-coupon it would have characteristics of fiat money, and finally the total amount of the emission would be then transferred to the public by the Government.

Before the distribution, there would be no change in the consolidated balance sheet. This is true because in the structure presented above "Account at central bank", in consolidation, cancels out with "Government's account"[65]. After the distribution (consider the case of a bank transfer) there would be an increase in "Accounts of the commercial bank" that would need to be counterbalanced in the asset side[66].

Reserves must not be forgotten. Assuming that reserves are not intentionally manipulated by the Central Bank and only altered by demand, there would not be any unconventional aspect in the whole helicopter money process. This is true because in case the interest rate target was not to be changed, the operation described above represents a very conventional case of "debt financed fiscal policy", and thus there is no helicopter money.

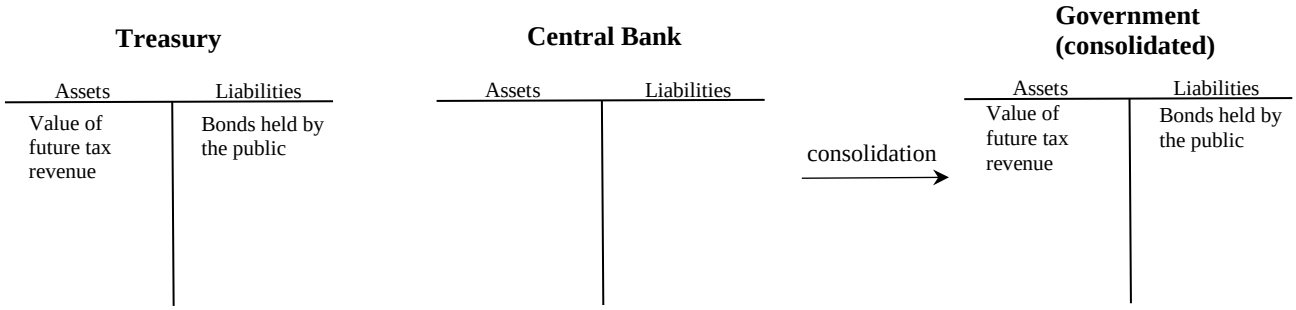

Figure 25: The disappearance of the helicopter drop in the case before the Recession

The figure above shows only the item that sees a change in their value. In this step there is no change in the Central Bank's balance sheet because the assumption is that the interest rate target is remaining constant. This implies that when the Treasury issues debt, it will spend the total amount in the Central Bank deposit. The reserve is (in this case) counterbalanced with an increase in "Value of future tax

65 The Treasury would record an increase in "Account at central bank" on the asset side counterbalanced by an increase of "Bonds held by the central bank" in the liabilities. The central bank instead would see "Treasury bonds" on the asset side and "Government's Account" in the liabilities.

66 The reasoning works as explained in note 65. Moreover, the asset item that could change, in this stylized example, could be other assets; working on a long term vision, it is plausible for the Government to consider the future value of tax revenues as a consequence of the enhanced market conditions after the cash handout.

revenues". The assumption implies that equilibrium is to be maintained in the market in order to keep the same level of interest rate. For this reason, commercial banks would use this excess of liquidity to buy Government bonds[67].

What makes this whole procedure not-unconventional is the assumption that reserves are demand determined, a condition that was held true before the Great Recession. Not surprisingly the regained fame of helicopter money appeared only after the crisis, and after the implementation of quantitative easing measures. It was made clear how only after reaching the zero lower bound and after falling in the liquidity trap central banks started implementing unconventional monetary policies. Helicopter money would be effective as a policy only after the implementation of other measures, when levels are supply and not demand dictated.

One other crucial point is the required collaboration between the Central Bank and the Government in order to distribute money that causes a permanent increase in the monetary base. This collaboration, that on the surface might seem harmless, could cause one important issue. Indeed, the implementation of such a hybrid policy could result in the loss of independence for central banks, that would be forced to give way to the so-called "fiscal dominance". Fiscal dominance is a phenomenon that sees the Central Bank "busy" rescuing the Government when the latter reaches unsustainable levels of public debt. There can be cases in which public debt is so large that even fiscal policy proceeds cannot cover it, thus forcing the Central Bank to manage and to control it in spite of the conventional objectives of monetary policies (i.e. price stability).

Both the analytical models and the theory presented by the advocates of helicopter money seem to push on the idea that money drops would boost aggregate demand. Such a statement has to be viewed in its temporal evolution. Apart from exceptional cases, in the short-term this type of effect can be taken for granted. It is not so trivial to say so for what concerns the effects of the policy in the long-term. In order to stabilize the aggregate demand, it is crucial not only to establish credibility and trust towards the work of the Central Bank, but also to create found expectations that in future there will be no decrease in wealth (e.g. increase in taxes). Such a belief seems to be particularly hard to carry on forever, especially considering that – at least in normal cases – fiscal policy is led by the Government, thus the political influence on the decision making process is consistent. The latter sort of belief cannot be assured by the Central Bank due to the fact that – as mentioned before – a deep intervention of the latter in the public's matter would result in fiscal dominance.

[67] There would be a decrease in assets for what concerns "Treasury Bonds" and in liabilities for what concerns "reserves".

Specifically in the case of the Eurozone, further complications could arise. The institutional bodies of the ECB are composed of representatives of the national central banks of the Member States that adopt the Euro as a currency. There is not something similar on the fiscal point of view, "little" technical detail that severely compromises the implementation of helicopter money in the Eurozone. It would hardly be possible coordinating all the members and deciding a criterion of worthiness. Moreover, if the ECB were to increase its liabilities in favor of some countries, the others would have to burden a fiscal policy that does not belong to their "till".

It may be argued that considering that helicopter money would be a temporary measure, and that the new liabilities would be written off against assets with a market value of zero, it would be closer to the area of debt monetization, a scenario in which banks and governments have already shown their capability of collaboration. On the other hand, underestimating that monetary and fiscal policies are result of a precise separation of powers that are at the core of the "checks and balances" of the democracy of the current times could result in a fatal error. The two operate towards different goals that are in the hands of different institutions for a reason. A Government is elected, and represents the voice of a country, while the bodies of the Central Bank do not reflect the public's preferences. It is true that the interaction of these two worlds is fundamental when seeking the equilibrium of the whole, and a "little" interference of monetary policies when it comes to the rescue of public debt is not necessarily harmful. However, the case of helicopter money not only would see the Central Bank fulfilling fiscal policy actions, but there is a high risk that could lead the system in a vicious circle of need and addiction to money drops that would gobble up the Central Bank, not to mention monetary policy objectives.

Lastly, no author has proposed a clear exit strategy. Being an unconventional policy helicopter money could only be temporary, but as seen with the policies implemented so far, letting them go and getting back to the conventional way of conducting business is not so trivial. It would be lethal to implement money drops without clearly stating how to get back on the tracks of "normality".

3.4.1 The effects of helicopter money on the European Central Bank's balance sheet and the legal implications

In practical terms, the effects that helicopter money would have in the balance sheet of the European Central Bank would be consistent, and thus must be considered – and for as much as it is possible – computed.

The following reasoning follows an analysis that Dowd (2018) conducted on the FED, but in the case presented below explores the implication of such a policy in Europe.

By checking the data published in December 2018, ECB's equity capital amounted to a total of €104,9 billion, total liabilities were €4.702,7 billion with a consequential leverage ratio of 44,8[68]. If the ECB were to distribute €5 billion, its liabilities would see an increase of the latter value, but the same effect would not be recorded on the market value of the assets[69]. It would be more complicated for the ECB if it were to implement a policy that amounts to a level close to the one of capital (i.e. close to 104 billion). The results of such a choice are not immediate. Theoretically, the capital would become negative, the leverage ratio could potentially lead to infinity as equity is smaller than assets, and the ECB could collapse. In the previous chapters it was explained how all the unconventional monetary policy operations were in the number of trillions, thus the latter element leads to the consideration that the leverage ratio for a Central Bank is not as crucial as for commercial banks or firms. It could be stated that as long as a Central Bank is able to produce irredeemable fiat money it could burden negative capital and extremely high levels of leverage ratio. The crucial factor lies in the beliefs and trust of the public, and how credible they are in the eyes of their claimants.

Exploring the legal point of view of the implementation of helicopter money seems appropriate. It was stressed many times that in order to have a correct form of a helicopter money type of policy it is the Central Bank the one institution that must fulfil it, decide the amounts, the criteria for the receivers and the timing. The Government would only act as a bridge between the Central Bank and households, in the same way as it would operate in case of a fiscal policy. The case of the European Central Bank seems to be especially complicated. Not only in the EU there is no fiscal union, but according to article 123 of the Treaty on the functioning of the European Union (TFEU) the Central Bank cannot distribute money. Literally,

> *"Overdraft facilities or any other type of credit facility with the European Central Bank or with the central banks of the Member States (hereinafter referred to as "national central banks") in favour of Union institutions, bodies, offices or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States shall be prohibited, as shall*

[68] The leverage ratio is considerably low, especially is compared to the American one, which in 2018 recorded a level of 96,6.

[69] The latter phenomenon implies that the difference between the liabilities and the market value of the assets would be equal to the amount used for the policy.

the purchase directly from them by the European Central Bank or national central banks of debt instruments."

Helicopter money is thus at the moment prohibited as a policy instrument, and for as much as it is true that the involvement of the Government would imply that it is the latter the institution distributing and crediting, it is also crucial the importance of the willingness of the Central Bank in the multi-stage process. One other critical factor regards the independence of Central Banks, and article 123 of the TFEU is a point of reference in order not to lose sight of the main objective to pursue: price stability is to be reached from a standpoint that is as nonpartisan as possible in the political decision process. Let us not forget that the bodies of central banks are not elected, thus they do not represent the ideas of the population.

3.4.2 Why it would be wrong to consider a helicopter money policy as a "free lunch"

From the point of view of a potential receiver of helicopter money, the idea of obtaining money without the need of contribution of any kind might – at first glance – look like as receiving it for free. For the same reasoning that lies behind how money creation is implemented today, something similar must be applied also when it comes to analyzing the assumptions of receiving financial compensation. The balance of our society is granted by a mechanism by which in order to receive compensation, in the majority of cases an effort must be put on the table to fulfil a "mutual trade". To be more thorough, the modern welfare society works in a way that grants help (also in the form of financial aid) to compensate for any possible difficulty (i.e. health issues, poverty). The above-mentioned setting does not leave much room to the existence of a policy, whether it is to be considered fiscal or monetary, that can be costless, thus representing a "free lunch".

Borio, Disyatat and Zabai (2016) present an interesting insight. Their vision of helicopter money is similar to the one of Cecchetti and Schoenholtz, and in more macroeconomic terms it can be considered as a permanent expansion of the money balances of the public that increases the nominal purchasing power implemented with the fulfilment of a permanent increase in Central Bank liabilities that have an interest rate of zero. Again, the permanent factor is crucial at allowing no fear of future increase in taxes and a greater propension at spending. The balance sheet presented before (Figure 23) can be used as a reference to understand that in the consolidated Government's balance sheet – after the implementation and distribution of helicopter money - there would be a smaller amount of interest

debt to be paid. Assuming that the amount injected will never be removed, demand[70] would increase. According to the three authors, a big factor that is missed by the ones that believe that helicopter money is free is what they call a "crucial trade-off" that is represented by the opportunity cost of lost seigniorage.

This type of policy might result in two different scenarios, that are not so tempting:

1. interest rates stay forever at a zero level;
2. the measure would be equal to a debt or tax financed government deficit, with the flaw that it would not obtain new stimulative effects on the economy.

The core of their analysis regards reserves and how the ones that are in excess are remunerated. Their presence is essential in the banks' balance sheets, not only for the minimum legal requirements, but also because they can be used as buffer against the uncertainty of cash flows to receive. For what concerns remuneration of excess reserves there are two possibilities:

1. remuneration below the policy rate, most common approach in which the central banks moves the reserves in order to reach the interest rate goal, trying to let supply and demand meet;
2. remuneration at the policy rate, that consists of placing on the market more reserves than the ones needed for the equilibrium[71].

If a Central Bank wants to adopt a helicopter money type of policy keeping on the liabilities side reserves that are not interest bearing, with respect to one of the two remuneration schemes, it will fall in the two critical scenarios mentioned above. In fact, by remunerating excess reserves below the policy rate the Central Bank would be forced to "give up monetary policy" undertaking the big drawback of keeping interest rates at a zero lower bound permanently. The alternative of financing excess reserves at the policy rate can – on the other hand – result in a debt financing scheme by considering the consolidated Government's balance sheet. The case of tax financing would instead be created if the Central Bank was to levy a mandatory requirement of non-interest bearing reserves[72]. To conclude, according to the authors a purely fiscal policy could be more effective, and the results of helicopter money would not add more stimulus.

[70] The macroeconomic values are to be considered in their nominal nature.
[71] After the Great Recession both the FED and the Bank of England started adopting this approach.
[72] In this case the compulsory part of reserves would be of the same amount of the "helicopter drop".

3.5 Concluding remarks on helicopter money

In summary, helicopter money has positive and negative features, but what is incontrovertible is the fact that its eventual implementation would be technically difficult, especially in the Euro Area. The state of the economy at the moment sees unprecedented low levels of interest rates, if not negative rates, that act as a signal on how critical the context is. Quantitative easing and forward guidance have been – in absolute terms – effective, but fear and risk aversion spread in the market keep on tampering the effects of the efforts that central banks took in the past years.

It is also true that fiscal policies, on the other hand, tend to be more expansionary because they approach directly the public, and maybe are more understood by the public[73]. For this reason, it is reasonably argued that the austerity measures did not help, but on the contrary are amongst the reasons that caused a rise of Nationalist political proposals.

Monetary institutions were brave enough to face the Great Recession with asset purchases of various kinds (credit easing, large asset scale purchases etc.), but the heritage of the economic system nowadays sees the policies prevailing on the institutions, who have lost control of "their own creatures".

According to Bartsch *et. al* (2019) a solution could be found on a compromise consisting of a "soft collaboration" between fiscal and monetary authorities, in which the two would work together only in special and severe cases.

However, is hard to believe that it could work for three reasons:

1. Central banks are not still able to regain control of conventional monetary policies, but on the contrary are giving way to the latter (negative interest rates are the most impactful example).
2. The distance in competences, will and length of mandate between the Central Bank and the Government would hardly keep the latter stick to a predetermined plan of "soft collaboration". Moreover, the distribution of "free money" is a dangerous tool to use in electoral campaigns or even political debates.
3. Last but not least, at the moment there is no clear exit plan even for the policies implemented 10 years ago, thus it is complex imagining a way out from helicopter money.

[73] If approached directly the public is able to change more drastically its expectations.

CONCLUSIONS

The thesis explored the world of unconventional monetary policies, their application and the recorded results. Starting from an analysis that considered the standard approach used in the past by central banks with the so-called conventional monetary policies, the study considered the special case of a liquidity trap, as it is the crucial reason behind the implementation of the unconventional monetary policies. In fact, the scenario of the Great Recession forced central banks in changing their approach towards the stabilization of the market.

Following the example of the approaches implemented by the Bank of Japan in the aftermath of the economic crisis of the late '90s, central banks started to inject liquidity directly into the system in order to revive the low level of interest rates.

The study considered the policies implemented by the four major central banks, the ECB, the FED, BoE and BoJ. All of them used asset purchases, even if in different manners (e.g. "Operation Twist" in the USA, "APP" in the Eurozone just to cite some examples); probably the true peculiar intervention is nowadays represented by the use of negative interest rates, firstly implemented as a temporary measure, but that as June of 2019 are still used in Europe and in Japan.

Modern literature has seen a great contribution to empirical analysis that studied the macroeconomic variations that followed as a response to the new policies, with the use of examinations like event studies and VAR models. According to the analyses, most programs were able to enhance macroeconomic variables such as output and level of prices and reduce uncertainty. On the other hand, the large increase of assets in the balance sheet of the central banks increased the risk of loss of independence and credibility, mainly because with unconventional monetary policies the monetary authorities are gradually losing control of the very same measures implemented.

Forward guidance is still used in conjunction with quantitative easing and consists of the ability of central banks to change the expectations of the public by communication in terms of manners and (or) timing regarding the operational target. There is no unanimous belief regarding the effectiveness of forward guidance, but according to authors such as Woodford (2012) the policy is able to influence to some extent the public.

As time goes by, helicopter money is gaining increasing fame, as its advocates state that the unconventional monetary policies implemented so far have not been effective enough. It would consist of a money-financed fiscal policy, thus the public would receive from the Government money created by the Central Bank. Currently many practical options have been theoretically presented, such as QE

for the people and tax credit certificates. Moreover, the analytical models are able to prove the effectiveness of this hybrid policy, stating that it would boost aggregate demand by increasing consumption, even in complex contexts (e.g. zero lower bound). Unfortunately, the implementation of a measure that requires a strict collaboration between the monetary and the fiscal authority is not that straightforward. In general terms it would erase the boundaries between the two institutions, weakening the role of the Central Bank that would lose control of the monetary policy. As of today, the liquidity already injected in the system with asset purchases has not been reabsorbed, thus it is highly improbable that a complex policy such as helicopter money could be handled with care, in a time in which the policies themselves control the authorities and not vice versa.

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SUMMARY

CHAPTER 1

UNCONVENTIONAL MONETARY POLICIES

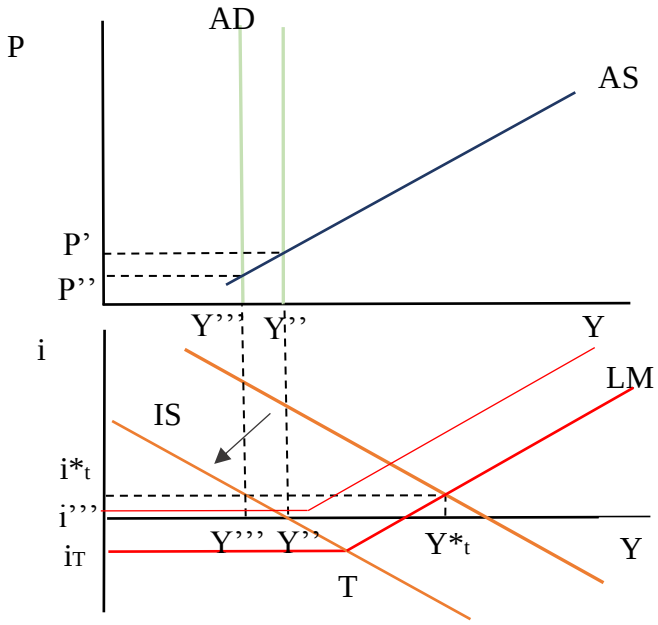
The main role of central banks traditionally consisted of fulfilling price stability (thus a specific target) in a systematic and foreseeable manner. Usually, the target is symbolized by a specific figure that leads all the actions of the monetary institutions towards price stability (e.g. according to the ECB's definition it is realized "when the twelve-month increase in the harmonized index of consumer prices for the euro area is lower than two percent"). Amongst the set of tools finalized at the reaching of the inflation target, the short term interest rate is probably the most important, as via operations in the open market (i.e. exchange of reserves in order to fulfill the demand of the interbank market) central banks are able to control it by setting a specific price on reserves. The influence on inflation materializes in a cascade effect, given that the short term rate influences the rates on loans set by commercial banks. Considering the European case, the overnight rate moves within the so-called "corridor" of rates. The ECB sets a floor (rate on deposits) and a cap (marginal rate), creating an equilibrium between the overnight rate and the EURIBOR (i.e. rate at which commercial banks trade reserves with each other) by letting arbitrage work.

In general, monetary policies can be distinguished into two categories, restrictive or expansionary. In the first case, the central bank would set up the overnight rate at a higher level, to avoid scenarios of high inflation. On the other hand, in case of an expansionary policy the central bank would decrease the short term rate (e.g. the price of reserves would be lower, thus their quantity would increase). The setting of the overnight rate is part of the so-called "fine-tuning process", through which it is possible to guide the economy away from scenarios of low growth. In case of the necessity of a boost of the economy, it is possible to reach unexpected levels of inflation that annihilate the effects of further decreases in the interest rates. This scenario represents the "zero lower bound". Historically, Japan was the first country ever to experience quantitative easing measures in 1999 as an alternative response to extremely low levels of the overnight rate. A central bank can than decide whether to stick to a policy implementation function (PIRF) such as the Taylor Rule, that in cases of zero lower bound would indeed imply committing to extremely low levels of the interest rates as suggested by the function (what Eggertsson (2006) considers to be "a commitment to be irresponsible"), or whether to undertake alternative and unconventional measures.

The Great Recession that hit the globe twelve years ago forced the central banks to abandon the Taylor rule (used so far) and to choose unconventional measures. Considering the macroeconomic variables

recorded in the time windows 2009-2011 for the United States, and 2013-2015 for the Eurozone the rule would have suggested the use of negative interest rates. Both the ECB and the FED opted instead for rates that were close (or even equal) to zero in order not to disrupt the expectations of the public. In fact, when nominal interests are below zero rational agents would hold onto cash that is non-interest bearing, thus the latter would not be affected by negative interest rates and it would not lose value. According to Woodford and Eggertsson (2003), the maintenance of the zero lower bound would represent a "genuine constraint", and practice seems to prove the two authors right, as in Japan the use of very low interest rates in the 90s did not record any positive effect on the GDP growth. At the core of the effectiveness of the setting of the short term interest rate, there is the ability of the central bank to be credible in the eyes of the public, to change their expectations regarding its future level. This is true also when considering measures that imply the managing of the long term interest rates. Considering the main macroeconomic variables such as inflation and output, it would be a mistake considering the both of them with an approach that is "purely forward-looking", as their current level depends also on the past values. According to the authors in case of the reaching of the zero lower bound central banks should not use an *ad hoc* measure but should apply a universal policy rule interpreted to be credible by the public, that could be implemented considering past data and thus used regardless of the economic context.

The zero lower bound is strictly linked to the concept of the liquidity trap. Initially theorized by Keynes, it implies the existence of a case in which – at a certain low level of the interest rate – the majority opts for the holding of cash instead of debt, neutralizing the consequences of any possible monetary measure of the setting of the interest rate. In analytical and mathematical terms, the liquidity trap can be analyzed with both an IS-LM or an AS-AD model.



Considering the IS-LM model, the liquidity trap is represented at point T, and at the level of interest rate i_T any amount of increase is money supply is absorbed by an increase in money demand; the policy is ineffective. In the AS-AD model it is evident how expectations regarding the level of inflation are crucial when interest rates are low, as they tend to increase the real interest rate to unsustainable levels.

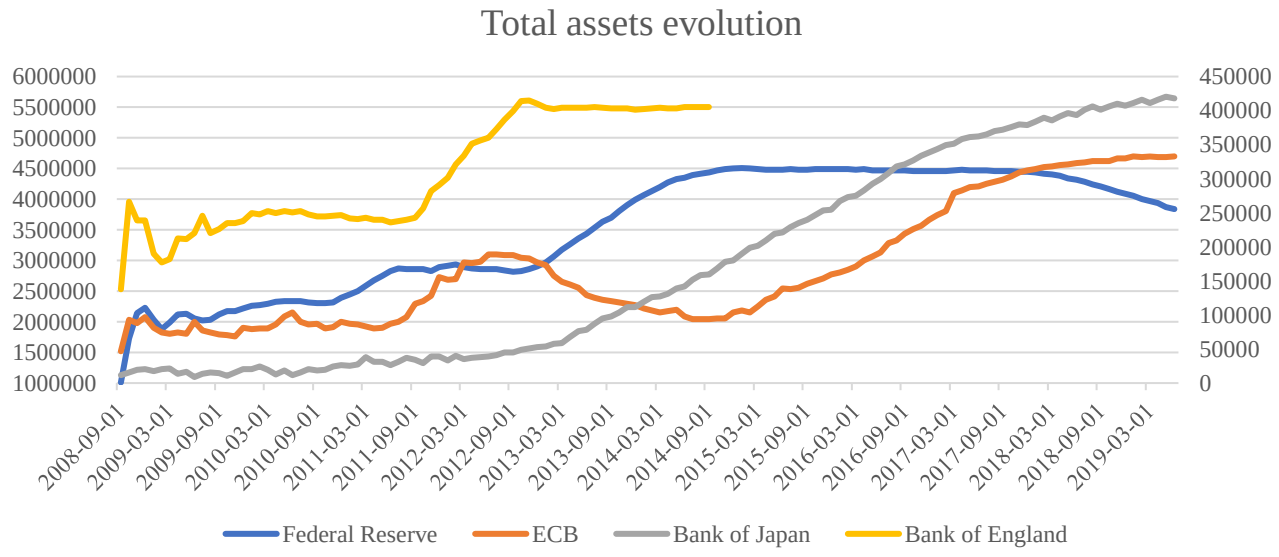
The ineffectiveness of the use of conventional tools to face the side effects of the Great Recession, as stated previously, forced banks to act on the market in a different manner. Unconventional monetary policies do not have a unique definition: they could be represented by a sudden increase in monetary supply, the enlargement in size of the balance sheet of the central bank, and finally, it could be a precise type of communication scheme finalized at convincing and orienting the beliefs of the market. During the years of the crisis, literature regarding these "new creatures" flourished, trying to shed light on the policies novelty. According to Borio *et al.* (2009), unconventional monetary policies can be summarized in four categories: exchange rate policy, quasi-debt management policy, credit policy, and bank reserves policy. The inclusion of assets on which the central bank does not own the monopoly (unlike the case of reserves) makes asset purchases "balance sheet policies". Moreover, the author also considers the manners in which these policies affect the market, thus analyzing their transmission channels: "signalling" and "broad portfolio balance". The first refers to the ability of communicating clearly the description of future operations in order to influence the market, while the second represents the change of the composition of the balance sheet of the private sector. According to Bowler and Radia (2012), one more transmission channel must be considered, the one of liquidity; in fact, the large acquisitions carried on by central banks reduce the risk premia present in the market. The same opinion is not shared by Eggertsson and Woodford (2003), that with the "irrelevance proposition" stated that when central banks purchase a large amount of securities in the market they do not decrease or eliminate credit risk, they just shift it in their balance sheet.

Not all authors showed enthusiasm towards unconventional monetary policies. McMahon *et al.* (2018) stated that when the composition of the assets is directly linked to an inflation target, there still prevails on the market the so-called indeterminacy problem of the nominal inflation. According to Hoffman and Schanbl (2016), side effects of unconventional monetary policies affected investments and growth, mainly because these types of measures entail to uneven distribution, making them "asymmetric". During recessions the normal functioning of the interbank market stops, discouraging private banks to keep on maintain good levels of liquidity as their role is filled by the central bank. The asymmetry is most clearly represented by the so-called "Cantillon effects", that states that in case of a large injection of liquidity the main beneficiary is the first agent receiving it (in this case it would

be banks and financial intermediaries), leaving no room for firms and individuals to exploit from these policies. One last concept that will be furtherly stressed in the following chapters is the loss of independence of the central bank when the enlargement of its balance sheet increases consequentially the risk and the potential losses, with probable consequences of the fiscal level.

CHAPTER 2
QUANTITATIVE EASING AND FORWARD GUIDANCE: AN IN-DEPTH ANALYSIS

As stated in the previous chapter, the greater effort that the recession brought with itself consisted of an impressive increase of the total assets in the balance sheet of the central banks. Analyzing the evolution of assets, it can be noticed how in the Eurozone it got twice as big between 2008 and 2012, while in tripled in the USA and the UK during the same time window. In general terms, asset purchases do not represent an unconventional measure for the central banks *per se*. To be more thorough, according to Bowler and Radia (2012) the two measures, quantitative easing and forward guidance can be considered respectively "conventional unconventional" and "unconventional unconventional". Hence, what makes these policies so peculiar is the amount and the type of assets acquired by central banks.



Quantitative easing consists of the expansion of the balance sheet of the central bank caused by an expansionary supply shock of money; as mentioned before, it is the oldest unconventional monetary policy ever implemented, when it was tested for the first time in Japan at the end of the twentieth century. In that case, the objective of the Bank of Japan was to stimulate inflation and to

lower long term yields. The latter represents another novelty of the unconventional setting, as the trading of long term assets finalized at the modification of long term rates is not provided for in conventional times. Quantitative easing must be clearly distinguished from one of its sub-categories, credit easing. The first one refers to a generic expansion of the balance sheet of the central bank irrespective of the type of asset purchased, and for this reason, it is also referred to as "pure QE". Credit easing, on the other hand, refers to the implementation of a policy that targets specific sectors (thus assets) of the economy. The following paragraphs present the evolution of quantitative easing in the four major central banks: the ECB, the FED, Bank of England and Bank of Japan.

In the Eurozone, the implementation of unconventional policies can be divided into three different moments. During the first phase the efforts of the ECB were aimed at reducing the spread between the 3-month Euribor and the overnight rate, the main refinancing rate saw a large decrease (from 425 to 100 basis points) and it was launched the so-called Fixed-rate tender full allotment program, a fixed lending scheme destined to banks at the condition that these had the necessary collateral. Asset purchases were launched between 2008 and 2009, with Longer-Term Refining Operations (LTROs) and Covered Bond Purchase Program (CBPP). The first was aimed at stimulating banks to borrow at longer maturities while the second consisted of the purchase of covered bonds. Launched again in 2012, the programs were not successful. The second step (2010) was consequential to the sovereign debt crisis in countries like Portugal, Ireland, and Greece. The ECB launched the successful Security Markets Program (SMP), by trading directly in the secondary market sovereign bonds in order to increase liquidity and depth in the market, finally decreasing their yields. At the end of 2012, the ECB had bought in the secondary market €218 billion of government bonds of the GIIPS countries (Greece, Italy, Ireland Portugal, and Spain). The third step was characterized as a response to low levels of growth of inflation, with the implementation of the Targeted Longer-Term Refinancing Operations, Asset Purchase Programme (APP) and negative interest rates. As of June 2019, the ECB has bought €2,8 trillion of securities. An analysis conducted by Avalos and Mamatzakis (2018) on the effects on bank stability found that the policies implemented so far (quantitative easing or interest policies) for GIIPS have not beneficial if possible deleterious. The opposite happened for the "core" countries, where quantitative easing especially has reinforced the loss-absorbing buffers.

In the United States, the Federal Reserve ran several times quantitative easing measures. The first one was fulfilled between 2008 and 2010, with the purchase of debt and mortgage-backed securities of the government-sponsored enterprises and long term real government bonds. According to Gagnon *et al.* (2011), QE1 was extremely effective, as it decreased both government and corporate bond yields. In 2010 the FED launched QE2 because of a deflationary trend, with the purchase of $600 billion of government bond. Largely anticipated by the market, this measure did not record wide positive effects.

One year later "Operation Twist" was implemented, consisting of the purchase of $400 billion of long term securities financed with the sale of short term assets for the same amount, with the aim of reducing the long term interest rates. The third and last round of quantitative easing, QE3, was launched altogether with a new round of Operation Twist (in this case with the money creation); no total specific amount was announced to the market. Asset purchases started decreasing only in 2017, after 9 years of constant increase.

In the United Kingdom, unconventional monetary policies were fulfilled in three steps. The first one was a pure QE altogether with the purchase of private asset purchases, launched in 2009 for a total amount of £200 billion. According to Joyce *et al.* (2011), the first round of purchases lowered the yield on government bonds by 100 basis points, with an increase of net financial wealth of 16%. The quantitative easing program was re-launched several times until 2012 when the total assets acquired amounted to a total of £375 billion. The second step implied the implementation of forward guidance for the first time in 2013 when the Bank of England agreed not to raise the level of interest rate until reaching a lower level of the unemployment rate. In August 2016 one last round of asset purchases of both government and corporate bonds was implemented to contrast the market's reaction towards Brexit.

For what concerns the Japanese case, as stated previously the unconventional measures undertaken in the last decade were not the first ones. At the end of 2008 the Bank of Japan launched a "Special funds supplying operations", a lending scheme for Banks that did not have a maximum amount, it increased the monthly purchase of government bonds and started acquiring corporate securities, reducing liquidity risk and increasing the prices. At the end of 2009 began the so-called fixed-rate operations, extended until 2010 and that amounted to a total of ¥30 trillion and was accompanied by the use of forward guidance. According to Shirai (2017), the balance sheet measures were not considered credible, and for this reason were not successful. With the election of Shinzo Abe in 2012, the Bank of Japan announced an inflation target of 2% and reintroduced SFSOs for ¥11 trillion; one more innovative measure was conducted in 2016, with the so-called quantitative and qualitative easing, that included also the purchase of ETFs.

Many studies were conducted in order to analyze the macroeconomic effects of asset purchases. Gambacorta *et al.*, with the use of a VAR model, were able to demonstrate how the policies increased prices and output in the eight countries considered. Weale and Wieladek (2016) focused on the purchases of the United States and of the United Kingdom, showing that the policies were, in any case, able to increase real GDP and the price level and to decrease uncertainty.

Forward guidance implies the ability or intention of the central bank to orient short term rates to a specific target by clear manners of the announcement of statements. The importance of the

communication schemes lies in the necessity for central banks to be considered credible, in order to successfully orientate the expectations of the market. It is thus fundamental removing the uncertainty that regards the future conduction of the monetary policy. According to Campbell *et al.* (2012) forward guidance can be "Delphic" or "Odyssean"; in the first case, the central bank describes the future monetary policy according to its own expectations, while in the second case the declaration is more binding and specific. The details that can be communicated regard the quality, the quantity or the time length of the policy measure. It is difficult to guarantee the effectiveness of forward guidance mainly because it strictly depends on the correct interpretation of the policy by the public. Moreover, its powers can be vanished also in the case of an anticipation by the market, or – as mentioned above – if the policy is not considered to be credible. The four major central banks started using forward guidance in different timings. The FED implemented it for the first time in 1999, and in 2013 opted for the adoption of the more specific Evans rule, which consists of the clear declaration of the commitment linked to the inflation rule, that was later abandoned in 2014. The Bank of Japan adopted forward guidance in 2010 with quantitative easing, and two years later, during "Abeconomics" the communication style got more intense. The ECB and the Bank of England both adopted forward guidance in 2013.

Some studies were published in order to assess the effectiveness of forward guidance. Woodford (2012) showed that it worked in influencing to some extent the expectations of the market, even in cases in which the policy was not correctly interpreted. According to Campbell *et al.* (2017), the Odyssean forward guidance used by the Federal Reserve was able to point as main causes of inversion of the business cycle to technology and liquidity preference, with the latter being able to reduce the real activity.

CHAPTER 3

HELICOPTER MONEY: A STUDY REVIEW ON ITS ENFORCEABILITY

The two previous chapters made clear how unconventional monetary policies were required as a response to the Great Recession; through asset purchases (quantitative easing) and communication schemes (forward guidance) the aim of central banks was to stabilize the compromised conditions of the market. The literature on unconventional monetary policies can be broadly distinguished in authors who found and believe in the effectiveness of these policies, and the ones that declare that what has been done so far is not enough. For this reason, the latter hang on a theorized example proposed by Milton Friedman in 1969 and that is now called "helicopter money". The famous quote, contained in "The Optimum Quantity of Money" stated: << *Let us suppose now that one day a helicopter flies over*

this community and drops an additional $1,000 in bills from the sky, which is, of course, hastily collected by members of the community. Let us suppose further that everyone is convinced that this is a unique event which will never be repeated.>>. It is important to underline that this proposal was presented only as an imagery example in order to explain the money creation process and its link with inflation. The idea is straightforward: potentially, the central bank could create money and distribute it directly to the public in an unanticipated manner. The current re-elaboration and interpretation of the policy consists of a money financed fiscal stimulus that will never be asked back (i.e. a permanent increase of the monetary base), hence the policy seems to cross in between the duties of the Government and of the Central Bank, that are different and should be kept separated and independent from each other. Helicopter money clearly is to be considered as an unconventional measure. Following the definition delivered by Bowler and Radia (2012) concerning quantitative easing and forward guidance, helicopter money is so peculiar that it could be described as "unconventional to the power of three".

The increasing fame that this policy is gaining is to be attributable to the fact that the economic scenario has not experienced the expected recovery. It is crucial underlining that the technologic advances that were made in the last decade are gradually removing the necessity of jobs, hence leaving the market with large quantities of products whose demand is not satisfied, violating Say's law. Therefore, the past unconventional measures that were implemented cannot be considered as the sole cause of the missed recovery. Several authors tried to find alternative causes of the failure; Mencinger (2017) addressed it to the austerity fiscal policies in the Euro area that lowered aggregate demand.

The helicopter money enthusiasts are sure that the policy would be able to overcome the unsatisfactory level of aggregate demand, simply by the use of a cash handout. The latter could be implemented in two ways. The Central bank could:

3. hand the funds to the Government, that in turn will use them to fund public works such as infrastructures;
4. use the Government as an intermediary, who in turn would hand in the money directly to the household and follow the criteria specified by the central bank.

Kyriazis and Economou (2017) presented in a clear manner the three fundamental conditions for the effectiveness of helicopter money:

4. In order to truly boost consumption, the helicopter drop should be viewed by the public as unexpected.

5. The liquidity cannot be redeemed by the authorities, resulting in a permanent increase in the monetary base.
6. The liquidity injected in the form of fiat money must result in an economic advantage for the holder.

In general, the true engine of the economy is represented by consumers (the FED published a report in 2012 stating that 81,3% of the economic growth is generated from consumption). Thus, wondering why central banks do not provide liquidity directly to the households seems to be legitimate. With a powerful example, White (2018) depicted this choice as "the metaphorical equivalent of pumping (…) fuel into the driver's seat instead of into the engine under the assumption that the driver is smarter than the engine".

Literature provides several examples of how the policy could be implemented. Distinguishing for the addressee, QE for the people, tax credit certificates and debt monetization represent interesting examples. The first one was presented by Muellbauer (2014) and consists of the simple idea of the distribution of €500 to each European adult citizen. According to the author, it would be able to overcome the asymmetric issue of unconventional policies, and it would increase aggregate demand by lessening the budget constraints of the government. Bossone and Cattaneo (2016) theorized the use of the so-called Tax Credit Certificates (TCC), issued by the government that do not need a guarantee from the ECB. It is not a debt instrument nor a legal tender. It allows, two years after its issuance, a tax rebate equal to its face value, and it can be traded on the market. According to the authors, it would increase demand (and as a consequence output), and it would increase the value for the holder after the two years. The use of TCC would increase demand and employment. The comparison of helicopter money to debt monetization seems to be immediate, as the latter consists of an expansion of the fiscal debt funded by the emission of government bonds that the central bank promises to pay (thus with the emission of liquidity). In reality there are three main differences (Dowd 2018): in debt monetization, the bond issued by the government has a positive market value, while in helicopter money it would be a zero-coupon infinite bond. Central bank is the authority that chooses who is worthy of receiving the liquidity, while in debt monetization the choice belongs to the government. Lastly, their nature is different as they respond to different political and legal constraints. Historically, the concept of debt monetization was considered to be immoral (the crisis of the Weimar Republic comes to mind), because in the past there was no strict separation between the monetary and the fiscal policy, and the injection of banknotes caused unbearable levels of inflation, completely stopping the functioning of the economy. Nowadays, debt monetization is widely accepted because of the guarantee status of central banks; according to Kim (2011) the current economy sees the interaction of only debtors rather than creditors and debtors, and for this very reason debt monetization via helicopter drops would

represent a solution to the crisis. As will later be widely explained, Buiter (2003) believes that helicopter money via debt monetization would be able to prevail on debt neutrality and on Ricardian equivalence, and would boost consumption and aggregate demand, also avoiding the liquidity trap.
Helicopter money shares some traits in common with quantitative easing, such as the stimulation of demand through injection of liquidity, and the implementation is critical conditions (i.e. zero lower bound). On the other hand, the two policies have many differences. Helicopter money is directly addressed to individuals, causes a rise in net wealth, there are no claims on the money created as the policy is irredeemable. Quantitative easing, on the contrary, is directed towards financial institutions, it has a less direct impact on the economy (it works through a cascade effect), it increases the assets side of the balance sheet of the central bank and, finally, it is a temporary measure. Sooner or later the liquidity injected must be withdrawn.

The large production of literature is not exclusively oriented to theoretical approaches but delivers also interesting analytical studies. Buiter presented two analysis, one in 2003 and one in 2014, exploring the effectiveness and the strength of helicopter money in several conditions. Di Giorgio and Traficante (2018) considered the effects of the policy in an open economy with the interaction of two countries. Galì (2019) analyzed a money-financed fiscal stimulus through the use of a New-Keynesian model, while Punzo and Rossi (2019) used Galì's work as a foundation to study the redistributive effects of helicopter money.
The first model presented by Buiter (2003) studies the eventual stimulation of demands via helicopter money, and whether it can be obtained with a drop of money, government bonds or both. The actors in the market are households and the government (considered in its consolidation between Treasury and Central Bank). Both of them need to comply to a solvency constraint (for households it has to be non-negative, while the opposite is required for the Government). The model shows how the policy is able to obtain a pure fiscal effect only if it is able to influence the present value of all taxes. For households, total wealth is the sum of human and financial wealth. The second component is the crucial one, as it comprises the impact of taxes on consumption (and as a consequence the effectiveness of the policy). This winning mechanism only works because of the irredeemable feature of money (in fact the reasoning does not work with bonds, as they are redeemable). In this model, helicopter money is able to overcome also a liquidity trap because it works at any level of the interest rate. The second model displayed by Buiter (2014) presents new features and demonstrates the possibility of *always* finding a fiscal and monetary combination that leads to an equilibrium in which the policy boosts aggregate demand and overcomes Ricardian equivalence. Differently to the first paper, the household solvency constraint now needs to be in the limit equal to zero, because consumption and money are increasing in the utility function. Moreover, the model considers life expectancy, in order to address

the consumption preferences and the birth rate β. For what concerns the government, it is able to realize its gains on both the issue of money and debt; the non-redeemability of money is again crucial, as it is the feature that lets the model work because money is not a liability, thus does not restrict the government. By consolidating aggregate consumption with the intertemporal budget of the government it is possible to see how it depends on the presence (present and future) of money circulating in the economy and on net financial wealth.

$$C(t) = (1-\alpha)(\theta+\lambda)\begin{bmatrix} K(t) + \int_t^{\infty} (W(v) - G(v)e^{\beta(v-t)})e^{-\int_t^v (r(u)+\beta)du}dv \\ -\int_t^{\infty}\left(T(v) - \frac{D(v)}{P(v)}\right)e^{-\int_t^v (r(u)+\beta)du}\left[1-e^{\beta(v-t)}\right]dv \\ +\frac{1}{P(t)}\left(M(t) + \int_t^{\infty}\dot{M}(v)e^{-\int_t^v i(u)du}dv\right) \end{bmatrix}$$

If $\beta > 0$, any increase in taxes would still increase human health because part of the burden will be shared by future generations. If $\beta = 0$ Ricardian equivalence would prevail, but with positive prices helicopter money would still be able to boost demand. Also in this case the model is able to prevail on liquidity traps.

Di Giorgio and Traficante (2018) considered, instead, a two-country model in an open economy, to analyze the spillover effects of a money financed fiscal stimulus and offered a comparison with a standard debt financed measure. The two countries, H and F have the same size but follow different monetary policies. The difference between the two is that H, in the case of money financing, lets the short term rates move to reach an equilibrium in the money market, while in the debt financing scheme the central bank follows a Taylor-style rule in setting the interest rate. Country F only follows an interest rate rule and bears the spillover effects of the monetary and fiscal policies implemented by country H. The households gain wealth that derives from interest gain on both foreign and domestic bonds, money and state-contingent assets, and net real profit. The wealth is also discounted for a factor that considers the probability of being substituted in the market. The demand functions are expressed for both the home and the foreign cohort. The consumption of the government is fully home biased and exogenous, and derives from the collection of taxes, seignorage or by the issue of riskless one period debt. The model is studied at the steady state, so inflation and seignorage are equal to zero. Through parametrization, the authors found significant differences between a money-financed and debt-financed policy. To be more thorough, in the first case the positive shocks are wider and sustained, the real interest rate decreases boosting consumption, the GDP ratio decreases, and the depreciation affects country F, causing a negative output gap. In the second case the positive shocks decline as time goes by, the real exchange rate appreciates allowing for the increase in output of country F.

Galì (2019) considers the effectiveness differences between a money financing versus a debt financing scheme, tax cut against Government spending and lastly the difference between a normal scenario and a liquidity trap. The model is New Keynesian in a closed economy, the market is monopolistic, and prices are sticky. The government's consolidated budget constraint is a function of taxes, money and one period bond that is non-interest bearing. The tax rule applied is exogenous and moves accordingly to the changes in the debt ratio plus an independent component. The evolution of debt is a function of long run debt target, deviations from the steady state of debt, taxes and money. The importance of the financing scheme depends on the presence of sticky prices, because their creation of demand and output depends on the interest rate (that consequently depends on the financing method). The difference between money financing and debt financing seems clear in the case in which seignorage adjusts to maintain the same level of real debt. In the first case, when Government purchases are implemented taxes do not change, while they do only temporarily in case of a tax cut. In this manner the policy is able to boost consumption, and then output. In the second case taxes change according to a tax rule, and the macroeconomic variables do not change because of the predominance of Ricardian equivalence. Lastly, in case of a liquidity trap the money financing scheme is still able to be effective because of the lowering of the interest rate caused by the injection of liquidity, while – again – the debt financing method is not effective.

Punzo and Rossi (2019) used a similar method to the one proposed by Galì (closed economy with households, firms, fiscal and monetary authorities where the governement funds its policies via the collection of lump sum taxes or the emission of riskless one period bond) to show the importance of the redistributive effects in case of a helicopter drop between savers and borrowers (via a comparison between a two-agents versus a representative agent model). The difference in the two agents is expressed via a "degree of impatience", and also in this model the analysis considers the difference between a money financed policy versus a debt financed policy. The main findings prove that the redistributive effects are always present in normal times, with any policy. In money financing borrowers consume more, thus receive larger benefits, and produce greater aggregate demand, consumption and output multipliers. For these reasons it is the preferable scheme.

The rising contribution of literature that analyzed helicopter money is to only oriented towards the presentation of the positive features, but also the explanation of the negative aspects. According to Cecchetti and Schoenholtz (2016) the permanent expansion of the monetary base required by helicopter money is not credible because the amounts of reserves are mainly demand driven. For this reason, the policy would be effective only after the implementation of other measures, when reserves are supply and not demand dictated. One more feature to consider is the probable loss of independence of the central bank, that would undergo the so-called "fiscal dominance", a condition in which the

central bank is busy rescuing the government (i.e. in cases of large levels of government debt) that lead to the giving up of the management of the monetary policy. Moreover, the positive effects (such as a demand boost) cannot be granted in the long term scenario, mainly because this type of guarantee cannot be delivered by the central bank. Especially in the Euro area, the collaboration between the ECB and the treasury would not be so straightforward as the models would suggest. In fact, there is no fiscal union that could coordinate such a complex policy; thus, it would be hardly possible coordinating all the members and deciding a criterion of worthiness, also considering that the burden of the fiscal policy would burden every member in a non-proportional way. According to article 123 of the Treaty on the functioning of the European Union (TFEU) clearly prohibits "*Overdraft facilities (...)") in favour of Union institutions (...) or other public authorities*".

The interaction would also result in the violation of the "checks and balances" mechanism that represents the core of the democracy of the current time. The central bank does not have a body elected by the public, thus it would not be able to represent their voices. The case of helicopter money not only would see the Central Bank fulfilling fiscal policy actions, but there is a high risk that could lead the system in a vicious circle of need and addiction to money drops that would gobble up the Central Bank, not to mention monetary policy objectives. Borio, Disyatat and Zabai (2016) presented the argument on why helicopter money is not a "free lunch". According to the three authors, a big factor that is missed by the ones that believe that helicopter money is free is what they call a "crucial trade-off" that is represented by the opportunity cost of lost seigniorage, and a purely fiscal policy could be more effective, and the results of helicopter money would not add more stimulus.

To sum up, the implementation of helicopter money has three main issues:

4. Central banks are not still able to regain control of conventional monetary policies, but on the contrary are giving way to the latter (negative interest rates are the most impactful example).
5. The distance in competences, will and length of mandate between the Central Bank and the Government would hardly keep the latter stick to a predetermined plan of "soft collaboration". Moreover, the distribution of "free money" is a dangerous tool to use in electoral campaigns or even political debates.
6. Last but not least, at the moment there is no clear exit plan even for the policies implemented 10 years ago, thus it is complex imagining a way out from helicopter money.