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EDITORIAL

The Liquidity Trap, History, and Research Trends: A Bibliometric Analysis

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Abstract

In a liquidity trap, the conventional expansionary monetary policy is not an effective way to stimulate economic activity. The orthodox Keynesian model poses a situation of this sort as an extreme case, which has been used to justify the importance of fiscal policy. This paper aims to conduct a qualitative and quantitative analysis (using bibliometric techniques) to explore the recent literature about the liquidity trap. The way in which the number of publications in the period 1973-2015 evolved points to the economic events (Japanese depression in the nineteen-nineties and the 2007-2008 global financial crisis) that revived economic interest in studying this topic. We believe that these results offer a very accurate schematic overview of the current research agenda.

Keywords: Liquidity trap, nominal interest rate, monetary policy, fiscal policy, bibliometrics, Keynesian theory.

1. INTRODUCTION

Prolonged economic stagnation in Japan since the nineteen-nineties and the onset of the 2007-2008 global financial crisis originating in the United States revived interest in economic quarters in analyzing an old concept: *the liquidity trap*.[2] The origin of the term dates back to the theoretical debate sparked by the publication of J.M. Keynes' (1936) seminal work against the backdrop of the Great Depression.[3]

The Great Depression of the nineteen-thirties is by and large considered the worst economic catastrophe of the twentieth century. The New York Stock Exchange collapse in October 1929 ushered in an age in which aggregate production would be severely curtailed and unemployment would skyrocket in the United States, primarily between 1931 and 1933. The American Great Depression was defined by extremely low short-term nominal interest rates. For example, the three-month Treasury bill secondary market rate declined to 0.15% in April 1934, rebounded slightly to 0.56% in April 1937, and fell to a low of 0.05% in June 1938.[4]

In the economic jargon, there is said to be a liquidity trap when conventional expansionary monetary policy is no longer able to stimulate aggregate demand and/or impact price levels. A situation of this nature arises when the nominal interest rate has fallen to its lower bound or is near it. This threshold can be conceived of as a very small but positive value or may be equal to zero.[5] As we will see later on, in addition to an extremely low or zero nominal interest rate, in recent literature, the liquidity trap has also been associated with very low or even negative interest rates,[6] such that the Central Bank is no longer able to cut the nominal interest rate in response to deflationary shocks.

"The lessons from the history of economic thought teach us that one of the main driving forces behind the evolution of new ideas is the march of events" (Snowdon & Vane, 2005, p. 9). In effect, the liquidity trap concept described here is the product of input from notable economists and a reflection of how economic thought has evolved from macroeconomics, personified initially by the IS/LM model (including contributions made by J.R. Hicks, F. Modigliani, D. Patinkin, J. Tobin, and more), to the " New Keynesian" (Clarida *et al.,* 1999) dynamic stochastic general equilibrium models of our day.[7]

The liquidity trap plays an important role in the IS/LM model because it stresses fiscal policy as the primary instrument to stimulate economic activity, as there is no crowding out effect in this scenario. This is no triviality, if we consider that one of the main tenets separating the Keynesian economists from the neoclassical is that the latter advocate for governmental intervention via fiscal policy to influence the march of economic activity.

Nevertheless, economic events at the end of the nineteen-sixties and beginning of the seventies (stagflation and the collapse of the Bretton Woods monetary system) cast doubt on Keynesian ideas. Consequently, starting at the end of the sixties and throughout the entire decade of the seventies, two currents of economic thought dominated the scene: Monetarism and the New Classical School, both of which deemphasize the concept of the liquidity trap, albeit for very different reasons. According to the Monetarists, monetary policy runs through various transmission channels in addition to the interest rate. As such, even if this channel is restricted (namely, if monetary influence cannot be exerted through the interest rate because it is already too low), it is very unlikely that the effect of monetary policy on the prices of different assets in the economy would go away altogether (real and financial assets). Thus, the Monetarists reject the possibility that monetary policy is rendered ineffective in the short term due to low interest rates.

From the viewpoint of the New Classical thinkers, the liquidity trap is a nonsensical problem. According to this theory, all fluctuations in economic activity (including declines) are competitive equilibria; in other words, they are considered

optimal situations and therefore not a problem to be solved. Moreover, because markets always become vacant (even the labor market), all unemployment is voluntary. In said scenario, the economy can never be constrained by an effective demand deficit, as Keynes (1936) argued. Fiscal policy is unnecessary, and the argument favors minimal government intervention, trusting in the market's ability to self-adjust.

Looking at the economic scenario over the past three decades, interest rates in developed countries have remained high. For example, since July 1963, the United States three-month Treasury bond interest rate has never fallen below 3%. In January 1970, it reached 7.87%, hit 8.67% in August 1973, and ballooned to 12% in January 1980. All of which to say, it is clear why since the end of the nineteen-seventies, practically all references to the liquidity trap have been relegated from the economic literature.

Even so, diverse circumstances (including the Japanese financial sector reform and the appreciation of the nominal exchange rate between the yen and the American dollar) swayed Japan's economic performance in the nineteen-nineties, giving rise to a phase of stagnation that has persisted to this day. According to figures published by the Bank of Japan (BJ), in the time period 1992-2003, the average annual growth rate of the Japanese gross domestic product (GDP) was 0.9%, which led to the implementation of lax monetary policy. Furthermore, one particular feature of the Japanese crisis in those years was deflation. These events revived academic interest in studying the liquidity trap problem (the most notable example is Krugman, 1998).

On the other hand, the global economic policy shift towards financial market deregulation has prompted profound transformations. The 2007-2008 crisis is in large part one of the outcomes of this process. The roots of the crisis date back to the early aughts and the speculative boom in the real estate sector, fueled in part by excessive monetary liquidity (due to low interest rate policies) and poor oversight in loan-granting (the subprime mortgage market).[8] The Federal Reserve's (Fed) choice in the second half of 2004 to raise interest rates, which continued into 2005 and 2006,[9] was soon reflected in a rising mortgage loan default rate.

The real estate bubble broke in the United States in July 2007 as Bear Stearns declared bankruptcy for its mortgage funds, spreading uncertainty among investors. By September 2008, the financial markets had completely collapsed. The aftermath of the crisis quickly seeped into the real economy: in 2009, the unemployment rate spiked to 9.6% and the real GDP growth rate fell to -3.0%. With the recession pounding at the door, the Fed, at the end of 2008, was compelled to cut the federal funds rate. Since then, it has kept rates unusually low, breathing new life into academic research on the liquidity trap.

Given the recent notoriety surrounding the concept, this paper analyzes the liquidity trap using bibliometric techniques. At the moment, other papers have already validated this methodology as a way to identify the main trends involved in and study the structure of several fields of economic research (for example, Prado *et al.*, 2016; Hsu & Chiang, 2015; Chun-Hao & Jian-Min, 2012).

This paper is structured as follows: Section 2 describes the information sources and method used to process this information through specialized software tools; Section 3 contains an analysis of how ideas tied to the concept of the liquidity trap in the time period under study (1973-2015) have evolved and the key economic events associated with this evolution. It provides a map of the main key words extracted from the documents in the database, supplemented by an explanation of the relationship between these terms and the liquidity trap. Finally, the analysis arrives to its conclusions in Section 4, identifying the main implications derived from the role of monetary and fiscal policy in a liquidity trap in New Keynesian models.

2. SOURCES AND METHODOLOGY

The papers examined in this research were mined from the Elsevier Scopus database, which contains a good deal of abstracts and works cited from the peer-reviewed scientific literature. Scopus is home to over 18,000 titles from over 5,000 international publishers.[10] The scientific texts can be downloaded and processed in specialized software tools used to analyze the structure of a given scientific field.[11]

In order to identify articles dealing with the liquidity trap, we searched the following terms: *liquidity trap*, *zero lower bound*, or *zero interest rate*. Papers that contained at least one of these terms in the title, abstract, or key words list were chosen. Then, only those papers and reviews belonging to the thematic area of *Economics, Econometrics,* and *Finance* were selected. The period of analysis was set for 1973, with the first records, to 2015. After applying all of these filters, we obtained 383 papers.

After identifying the documents, they were downloaded and analyzed using the software program VOSviewer (Van Eck & Waltman, 2010 and 2011). Only those key words noted by the authors and appearing in at least five publications were selected. Of the 383 papers, only 265 had key words noted by the authors. It was based on this information that the two-dimensional mapping was done (see Figure 1).[12]

VOSviewer makes it possible to calculate a score for each word based on the years in which the papers where the words appear are published. To calculate these values, the years were added up and divided by the number of papers.[13] For purposes of analysis, lower-scored terms are those that appear in older articles. On the contrary, higher-scored terms pertain to themes guiding more recent research activity.

3. RESULTS

Interest in studying the liquidity trap has taken off in recent decades. Figure 1 shows that prior to the year 2000, publications related to this topic were merely sporadic, but starting in that year, we see the first spike in quantity of publications per year. This can be explained by the bursting of the financial bubble in Japan in 1991 and the advent of a period of prolonged economic stagnation, which has persisted into the present day in the country. As stated before, weak Japanese GDP growth in the nineteen-nineties obliged the Bank of Japan to relax monetary policy. In July 1995, the short-term nominal interest rate (measured by the monthly average of the uncollateralized overnight call rate, or UOCR), fell to 0.95%, reaching as low as 0.04% in March 1999.[14] With the interest rate at a low, the Central Bank was forced to resort to quantitative easing between 2001 and 2006 for the sake of boosting prices and stimulating aggregate demand.

Even so, the inflation rate was barely positive in the years 2006, 2007, and 2008 (0.243, 0.061, and 1.378%, respectively), and sunk to negative values again between 2009 and 2012.[15]

Subsequently, there was a sustained increase in the number of publications between 2002 and 2005, associated primarily with the economic situation in the United States and the Fed's choice to cut the benchmark interest rate to 1% in June 2003. However, the number of publications really began to take off in 2009, in the wake of the 2007-2008 global financial crisis.

It is pertinent to note that the dearth of publications on the liquidity trap in the nineteen-seventies, eighties, and nineties is consistent with the two factors underscored in the Introduction: the rise of currents of economic thought to rival the traditional Keynesian vision and an economic scenario characterized by high interest rates in developed countries. These aspects explain why the liquidity trap is practically irrelevant in the economic literature between the end of the nineteen-sixties and the dawn of the new millennium.

Graph 1. Evolution of the Number of Publications on the Liquidity Trap
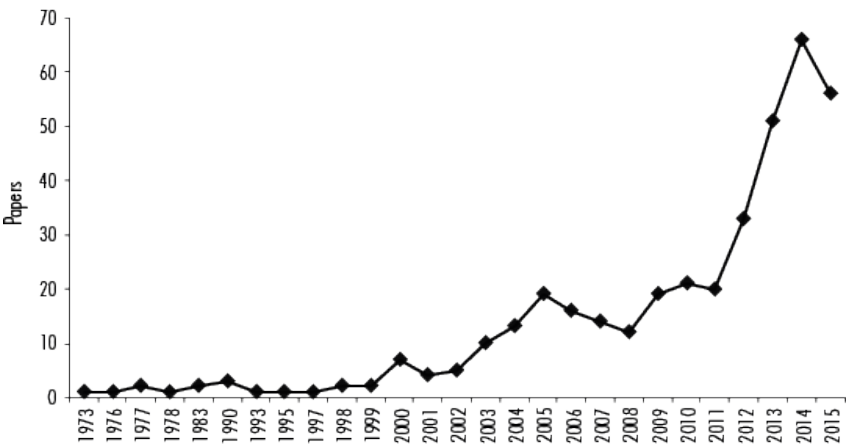
Source: Created by the authors using data from Scopus.

3.1 Frequency and average years when key words appear

The scores in Table 1 help explain Figure 1 and complement our analysis of key words in the next section. Looking at current themes, the fiscal multiplier takes the top spot, although it still appears in only a few articles. We also see that most of the terms scored an average year sometime after 2008, indicating that they are tied, principally, to the financial crisis (*financial crisis* itself is also a term on the map in Figure 1) in recent years and the monetary policy implemented by the Federal Reserve.

It is known that as a result of the financial market collapse in September 2008 and with the recession knocking on the door, the FED undertook a series of measures to incentivize economic recovery and job creation, one of which was to cut the federal funds rate in December 2008 to historically low levels of between 0 and 0.25%, where it was held for years to come. It was not until December 17, 2015 that it was finally raised one-quarter percentage point from 0.25 to 0.5%. The shortcomings of using monetary policy in a scenario with such low interest rates forced the Fed to resort to unconventional monetary expansion measures, such as its quantitative easing program, also known as the large-scale asset purchase program (LSAPS),[16] which kicked off in November 2008. To date, the United States has completed three rounds of quantitative easing. The third was suspended in October 2014.[17]

Table 1. Relevant Data on the Key Terms Obtained from VOSviewer

Term	Frequency	Average
Fiscal multiplier	5	2014.4
New Keynesian Model	5	2014.2
Unconventional monetary policy	9	2013.6
Zero lower bound	65	2013.0
Federal Reserve	5	2012.8
Quantitative easing	24	2012.5
Fiscal policy	23	2012.0
Zero interest rate	6	2012.0
Monetary policy	71	2011.8
Interest rate	6	2011.5
Financial crisis	7	2011.4
Inflation targeting	9	2011.3
Taylor rule	9	2011.3
Interest rates	8	2010.8
Zero interest rate policy	9	2010.7
Inflation	10	2010.2
Optimal monetary policy	6	2009.7
Money	7	2009.6
Liquidity trap	66	2008.8
China	7	2007.6
Money demand	6	2007.2
Japan	10	2007.1
Zero bound	12	2007.1
Deflation	21	2006.8
Monetary policy rules	5	2006.2

Note: Frequency refers to the number of papers in which each term appears. Average is the average year of the articles where each term appears.

Source: Created by the authors.

Japan appears towards the bottom of the table, which is also consistent with the economic problems the country has been facing since the nineteen-nineties. Moreover, it is important to recall that even though the current literature is more focused on the United States, Japan is still very much on the scene, because even though the so-called Abenomics has had some effect, the Japanese economy has been unable to get back on a path to economic growth.

Some of the monetary policy measures that Abe Shinzo began to implement when he became Prime Minister of Japan in December 2012 include adopting an inflation target of 2% and commencing the third round of quantitative easing in April 2013. It bears remembering that the Bank of Japan was the first in the world to implement quantitative easing, back in March 2001, after the short-term loan interest rate in the Japanese interbank market[18] fell to zero in same month the year prior. Likewise, *deflation* is another key word that has curried interest in the context of the Japanese recession. Japan's annual inflation rate in 1995 was -0.125%. Negative numbers were also seen between 1999 and 2005 (-0.328, -0.651, -0.804, -0.9, -0.25, -0.01, and -0.274%, respectively).[19] A detailed analysis of the causes and consequences underlying this aspect can be found in Svensson (2003).

Against that backdrop, it is worth noting that the monetary policy applied in the United States and in other developed countries beginning with the global financial crisis and into the present day is limited in its ability to drive economic growth and create jobs, in a context in which uncertainty continues to prevail in international financial markets and where the liquidity trap is associated with the problem of deflation in the goods and services market. By contrast, financial asset (like bond and stock) prices have swelled in the speculative markets, which the Monetarists like to point out when they assert that monetary policy does have an effect on the prices of different assets, both real and financial.

Likewise, nowadays, monetary policy across the globe lacks coordination. Namely, while Japan is pressing ahead with its extremely lax monetary policy, and the situation is similar in the Eurozone countries and England, the United States has raised the interest rate slightly and is suspending its quantitative easing program.

Other recent themes that stand out on the map due to their frequency include monetary and fiscal policy, which we will look at in greater detail in the next section, delving into the works cited.

3.2 Word Map

The key words map in Figure 1 reveals the important concepts associated with the current academic debate surrounding the liquidity trap, as well as the strength of the relationships between them. The size of the words on the map reflects the frequency with which the term was found, and the thickness of the links between them reflects the number of times the words appeared together. Below is an analysis of the terms that appear on the map, which was created based on the 12 most-cited papers in Scopus, which are listed in the Appendix to this document. Number of citations is considered to be an indicator of the impact and reach of the ideas contained in a publication across the scientific community.

Figure 1. Key Words Map
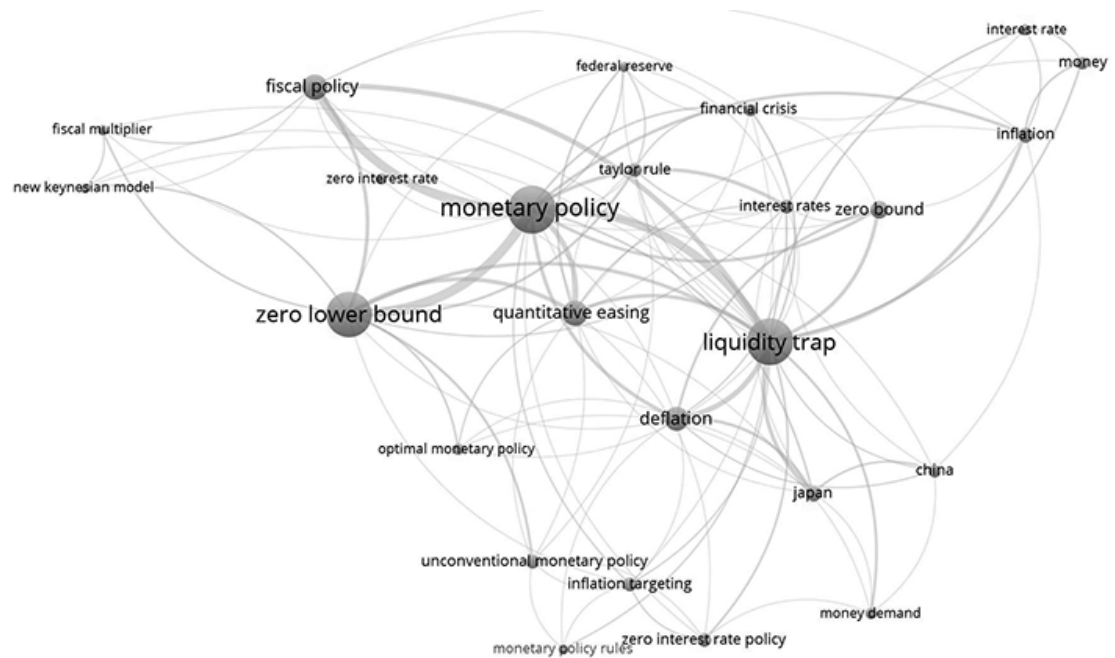
Source: Created by the authors using VOSviewer.

The modern version of the liquidity trap in the context of New Keynesian models differs from the traditional Keynesian models in fundamental ways. For explanatory purposes, we have divided our analysis of the key words into two major themes: monetary policy and fiscal policy.

3.2.1 Monetary policy

One of the most striking aspects in the recent literature is this idea that monetary policy can still be effective even when the short-term nominal interest rate has fallen to a zero lower bound (*zero lower bound, zero bound,* or *zero interest rate*).

At the moment, many central banks around the world conduct policy by setting an objective for the nominal overnight interest rate in the interbank market and adjusting the money supply to this objective through open-market transactions. In steering the interest rates, the monetary authority manages liquidity in the money market and tries to attain price stability. But when the nominal interest rate falls to zero or very close to zero, the Central Bank loses power to drive aggregate demand. This is because generally speaking, lenders do not accept negative nominal interest rates when it is possible instead to keep their money in cash. In such a scenario, conventional monetary policy is said to be ineffective and additional economic stimulus must be provided by way of unconventional monetary policy measures, which can be defined as "those policies that directly target the cost and availability of external finance to banks, households, and non-financial companies" (Smaghi, 2009, p. 4). In practice, one way in which the Central Bank can influence the cost of credit is to adjust the long-term real interest rate, spurring expectations of inflation. If expected inflation rises, the real interest rate falls even when the nominal interest rate is at zero.

3.2.1.1 Inflationary expectations

Krugman (1998) argued that the Japanese recession of the nineteen-nineties can be viewed as a case of the liquidity trap. In essence, beginning with an intertemporal non-stochastic general equilibrium model, the author posits that the way out of this problem is dependent on the credibility of agents with respect to the policy implemented by the Central Bank. The persistence of the liquidity trap is explained by the monetary authority's inability to generate the inflationary expectations that the system needs in order to induce agents to spend in the current time period. Eggertsson & Krugman (2012) also argued in favor of spawning inflationary expectations as one of the principal ways out of the liquidity trap problem.

The implications for the aggregate instability of the economic system derived from considering the presence of the lower bound of the nominal interest rate are discussed by Benhabib, Schmitt-Grohe & Uribe (2001) using a model in which monetary policy is conducted pursuant to a Taylor rule. The logic behind this type of monetary policy rule states that if the monetary authority's priority is price stability, when deflationary pressures ease and inflation starts to rise above the target, the Central Bank will respond by raising the nominal interest rate and reversing any previous increase in the monetary base. As a result, under this model, the exit from the liquidity trap may be hindered. Once again, an economy is said to be cornered in a true liquidity trap only if the monetary authority fails in its attempt to change the public's expectations.

However, although diverse authors have posited the theoretical potential for monetary policy to play a role in a liquidity trap, Svensson (2003) acknowledged that in practice, it is tricky for a Central Bank to enforce a solution to the problem. This author analyzed various proposals found in the literature and posed what is referred to as the "foolproof way" to overcome the liquidity trap. This proposal (principally focused on Japan) is a combination of three elements: *1)* commitment from the Central Bank to reach higher price levels in the future, preferably by setting a new target trajectory for price levels; *2)* concrete actions that demonstrate the Central Bank's commitment to achieving higher future price levels, inducing inflationary expectations in the private sector and reducing the real interest rate. These actions entail initially depreciating the exchange rate (measured in national currency units per foreign currency unit) and controlled floating. And, *3)* an exit strategy that specifies when and how to return to normalcy. Pursuant to Svensson, this strategy involves renouncing exchange rate control in favor of an inflation targeting policy or price level targeting when the price level target has been reached.

3.2.1.2 Deflation

Deflation is a complication that arises when an economy falls into a liquidity trap and remains in a recession for a certain period of time. When agents have deflationary expectations, the real interest rate (nominal interest rate less expected inflation) rises and hits private investment hard by raising the cost of indebtedness, which in turn exacerbates the depression. Benhabib *et al.* (2002) shows that if a Central Bank acts pursuant to a Taylor rule reaction function, deflationary expectations and the zero lower bound could push an economy down into a deflationary spiral that monetary policy cannot avoid. In this case, the central objective of the paper was to design fiscal and monetary policy measures that preserve the Taylor rule (and with it, its properties as a mechanism to stabilize the product and prices), but at the same time does away with the dynamics that push an economy over the brink into a stationary liquidity trap.

For their part, Adam & Billi (2007, 2006) discussed the implications of taking into account the presence of the lower bound for the nominal interest rate in a New Keynesian model, in the presence of monetary policy commitment and when it is run discretionally. According to these authors, a calibration for the United States economy suggests that low natural interest rate values[20] prompt considerable product loss and deflation when monetary policy is handled discretionally. The declining product and deflation is even worse when there is monetary policy commitment, but do not appear in the model if an abstraction is done of the existence of the lower bound for the interest rate.

3.2.1.3 Other unconventional measures

In keeping with the analysis of unconventional policy measures, Cúrdia and Woodford (2011) analyzed two alternatives that are not found in the basic New Keynesian model: variations in the size and makeup of the Central Bank's balance sheet, which are tied to the implementation of a reserve supply policy, and a Central Bank credit policy. Generally speaking, these extensions to the model make it possible to assign a role to financial intermediation. One of the main results is that explicitly incorporating the Central Bank's balance sheet does not necessarily imply that there is space for a quantitative easing policy as an additional stabilization tool, even when the economy has already fallen into a liquidity trap. The authors invoke the experience of the Bank of Japan between 2001 and 2006 (when quantitative easing failed to reactivate the economy), arguing that their theoretical result could hit very close to reality. By contrast, the model signals that there may be a role for the Central Bank's credit policy (or for the purchase of specific assets) when financial markets are damaged.

Direct intervention by the monetary authority as an intermediary in the credit market has also been analyzed by Gertler and Karadi (2011). These authors developed a quantitative macroeconomic model to analyze, in a simulated financial crisis scenario, the effects of implementing unconventional policy. The Central Bank captures funds from households and channels them to companies to offset a break in the flow of credit granted by private financial intermediaries. One key finding from this model is that when the presence of a lower bound for the nominal interest rate is taken into account and the Central Bank implements its credit policy in a crisis, the product contracts less than when this lower bound is not considered.

Another interesting exercise in Gertler & Karadi's model is their evaluation of the net gains, in terms of welfare, of wielding unconventional monetary policy. The model suggests that while the costs in terms of efficiency are low, the gains are

rather significant. This outcome leads to a normative analysis of the Central Bank's credit policy, which underscores the virtues of direct intervention in the credit market, versus an alternative policy to inject capital into private financial intermediaries.

On the other hand, Hamilton & Wu (2012) examined alternative monetary policy options in the presence of a liquidity trap. Likewise, they made empirical estimates of the effects of the maturity structure for the United States treasury debt in the hands of the public on the temporal structure of interest rates. This review led them to focus on a particular strategy, which consists of trying to influence the temporal interest rate structure through the maturity structure of the bonds purchased by the Fed, via open-market transactions considered to be "non-standard."

3.2.2 Fiscal policy

Fiscal policy is still considered to be an important instrument to emerge from the liquidity trap, but the reason is different from what the traditional Keynesian vision would say: fiscal measures work because they buttress monitory policy by creating greater confidence among agents that the Central Bank will stick to its announced policy to create inflation and keep the nominal interest rate low until the economy overcomes depression. Namely, fiscal policy supports monetary policy in having an influence on the expectations held by agents.

For example, Benhabib *et al.* (2002) postulated a stabilization policy consisting of a fiscal stimulus that is automatically activated when inflation is falling and the economy is heading towards a steady state liquidity trap. Specifically, the fiscal rule consists of a budget surplus sensitive to inflation that requires cutting taxes when inflation falls. Accordingly, to the extent that the economy approaches the liquidity trap, fiscal deficits will grow so big that the steady state with low inflation will end up fiscally unsustainable, such that it no longer is in equilibrium compatible with the assumption of rational expectations. It is worth noting that although the authors appeal to fiscal policy as a measure to overcome the liquidity trap, their rationale is very different from what the traditional Keynesian model argues. In other words, the mechanism through which fiscal expansion acts is not the Keynesian multiplier, but rather its effects on the government's intertemporal budgetary restrictions. The latter approach involves changing an interest rate rule to a monetary supply growth rule, which must also be accompanied by the right fiscal policy, in other words, a policy that as the interest rate reaches zero makes the government intertemporally insolvent.

3.2.1.1 Fiscal multiplier

New Keynesian models also leave room for analyzing the impact of government spending through the fiscal multiplier. Woodford (2011) examined the factors that drive the size of the government spending multiplier in different monetary policy scenarios. Although the author conducted policy experiments in the context of different models (basic neoclassical, New Keynesian but without a particular specification about price and wage adjustments, and New Keynesian with flexible wages and price-scaled adjustments), and formulations for the Taylor rule, the case that is most interesting to us is the case that takes into account the lower bound of the short-term nominal interest rate. The issue the author evaluates in this model is the effect of opting for high government spending in times of crisis (manifest in a rising differential in the interest rate spurred by a disturbance in the financial sector), taking as a given the value of government spending in normal times (meaning when there is no crisis) and a monetary policy as described by a Taylor rule. In this model, the multiplier is greater than 1 and, in fact, can even be significantly higher than 1. As such, the author concluded that when the interest rate is constrained by its lower bound, government spending can inject additional important momentum to raise the product and economic welfare.

Woodford emphasized that although the effect of fiscal stimulus is very beneficial when monetary policy is constrained by the lower bound of the nominal interest rate, expansive fiscal policy should be rolled back once the liquidity trap has been overcome, because the tax hikes that could be required to pay off public debt once the crisis has been overcome could significantly undermine the favorable effects of fiscal expansion during the crisis, both in terms of the product and welfare.

The magnitude of the spending multiplier was also evaluated by Christiano, Eichenbaum & Rebelo (2011) in a New Keynesian framework under different scenarios. The case addressed is derived from the version of the model without capital and where the nominal interest rate is constant because it has already hits its lower bound. The multiplier that results is approximately three times as higher as the multiplier that would be obtained if the nominal interest rate were above zero. Intuition as to why the multiplier could be so big when the interest rate remains constant tells us the following: rising government spending prompts the product, marginal costs, and expected inflation to rise. With a zero nominal interest rate, rising expected inflation drives down the real interest rate, which pushes up private spending (reduction in desired savings). Expanding spending also leads to an additional bump in the product, marginal costs, and expected inflation, which additional diminishes the real interest rate. The net result is a significant increase in inflation and the product.

Another interesting conclusion regarding the role of fiscal policy in a liquidity trap is found in Eggertsson and Krugman (2012). The model these authors developed shows that contrary to what is generally believed, a depression caused by an overindebted private sector can be solved by taking on more debt, but it should be public sector debt. Namely, deficit-funded government spending can help the economy stay out of unemployment and deflation to the extent that the indebted private agents managed to clean up their balance sheets.

4. CONCLUSIONS

The Japanese depression of the nineteen-nineties and the 2007-2008 global financial crisis were undoubtedly both key events that revived academic interest in analyzing the role of monetary policy in low interest rate scenarios. Likewise, the New Keynesian school on which the majority of these studies are based has led to new conclusions not seen in the old approach. For example, the finding that monetary policy is not entirely ineffective in a liquidity trap scenario. Unconventional measures appear to be an alternative tool that the Central Bank can use to influence aggregate demand and price levels, even when cutting the interest rate to zero has proved to be insufficient in reactivating activity and could lead to the risk of deflation in various wealthy countries. "Even as policymakers remain committed to fiscal consolidation, plenty of economists now argue that insufficient fiscal stimulus has been among the biggest failures of the post-crisis era."[21]

As such, fiscal policy is still considered relevant, because in addition to the multiplier mechanism, it can help bolster the strength of monetary policy in generating inflationary expectations. Consequently, a coordinated economic strategy policy ought to be designed to drive sustainable economic growth and bring down the debt and deficit levels. In order to do so, structural reforms to restore fiscal sustainability will be necessary, such as a fiscal reform that truly contributes to cleaning up public finance and allocating spending efficiently.

Finally, the information gleaned from this bibliometric analysis has been extremely useful in elucidating current research trends related to the liquidity trap.

APPENDIX

Appendix 1. The Top 12 Most Cited Papers About the Liquidity Trap

Author(s)	Title	Year	Citations
Krugman, P.R.	It's baaack: Japan's Slump and The Return of the Liquidity Trap.	1998	354
Christiano, L., Eichenbaum, M. & Rebelo, S.	When is The Government spending Multiplier Large?	2011	208
Gertler, M. & Karadi, P.	A Model of Unconventional Monetary Policy.	2011	205
Benhabib, J., Schmitt-Grohé, S. & Uribe, M.	The Perils of Taylor Rules.	2001	168
Eggertsson, G.B. & Krugman, P.	Debt, deleveraging, and The Liquidity Trap: A Fisher-Minsky-Koo Approach.	2012	138
Woodford, M.	Simple Analytics of The Government Expenditure Multiplier.	2011	134
Svensson, L.E.O.	Escaping from A Liquidity Trap and Deflation: The Foolproof Way and Others.	2003	109
Benhabib J., Schmitt-Grohé S. & Uribe M.	Avoiding Liquidity Traps.	2002	94
Hamilton, J.D. & Wu, J.C.	The Effectiveness of Alternative Monetary Policy Tools in a Zero Lower Bound Environment.	2012	74
Adam, K. & Billi, R.M.	Optimal Monetary Policy under Commitment with A Zero Bound on Nominal Interest Rates.	2006	68
Orphanides, A. & Wieland, V.	Efficient Monetary Policy Design near Price Stability.	2000	65
Cúrdia, V. & Woodford, M.	The Central-bank Balance Sheet As An Instrument of Monetary Policy.	2011	57

Source: Created by the authors using information from Scopus (date updated: October 19, 2016).

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[2] Although the term as such was coined by Robertson (1940), a harsh critic of Keynes' interest rate determination theory, the meaning this author devised differs from that with which we are generally familiar. In reality, the liquidity trap concept is associated with an interpretation of Keynes' preference for liquidity theory depicted in Hicks (1937) in his paper "Mr. Keynes and the 'Classics': A Suggested Interpretation," where he called it the "depression economy."

[3] It bears noting that in the *General Theory of Employment, Interest, and Money,* Keynes does not explicitly mention the Great Depression, but it is understood that the purpose of this work was to furnish a theoretical response to the difficulties facing the principal capitalist economies in the wake of the "1929 crash."

[4] https://research.stlouisfed.org/fred2/series/TB3MS#

[5] For example, Hicks (1937) referenced a small but positive interest rate, while the current literature points to a zero lower bound for the nominal interest rate. Boianovsky (2003) attributes this difference to the interest rate considered in each model; accordingly, while the Hicks IS/LL model emphasizes the long-term nominal interest rate, the Krugman (1998) model uses a short-term nominal interest rate (for a period) as the relevant rate.

[6] Although the connection between deflation and the liquidity trap is mainly found in recent monetary policy research, Hicks (1939) also pointed out this relationship.

[7] Models of this sort are also known in the economic literature as New Wicksellian (Woodford, 2003) or the New Neoclassical Synthesis (Goodfriend & King, 1997). The analytical model is basically composed of an inter-temporal IS equation, a monetary policy rule, and an aggregate supply equation represented by the New Keynesian Phillips curve.

[8] Carlos Obregón (2011) offers a detailed analysis of the global financial crisis and prospects for Mexico and Latin America.

[9] In December 2000, the federal funds rate was 6.4%. That same month the following year, it had fallen to 1.82%. The rate hit a low in December 2003 at 0.98%, and although it rose slightly in subsequent months, it remained below 2%. However, it finally rose to 2.16% in December 2004. From that date forward, it continued to rise until reaching 5.25% in August 2006 (data published by the St. Louis Federal Reserve Bank, https://research.stlouisfed.org/fred2/series/FEDFUNDS#).

[10] http://www.americalatina.elsevier.com/corporate/es/scopus.php

[11] Among these tools, we find Gephi, Pajek, VOSviewer, or CiteSpace (Van Eck & Waltman, 2014).

[12] The layout of the words on the map was determined using the visualization of similarities (VOS) technique, which, according to its authors, is a better method than multidimensional scaling (Van Eck *et al.,* 2010).

[13] For example, if a key word appears in a paper published in 2015 and also in two papers published in 2013, then the value for that word would be 2013.66.

[14] Data from Bank of Japan. The time series for these data can be found with the code ST'STRACLUCON on the website:

[15] Figures from the International Monetary Fund's (IMF) *World Economic Outlook Database*.

[16] Although this monetary expansion program is generally alluded to as a quantitative easing effort, according to Bernanke (2009), it was actually more of a credit easing method, because the program's goal was not only to increase the monetary base (as happened in Japan between 2001 and 2006), but also to improve the functioning of the long-term bond market and decrease long-term interest rates. In this sense, it has been said that around 80% of the assets purchased by the Fed in its first quantitative easing program were directly tied to the housing market.

[17] But it was not only the Fed dipping into the pool of unconventional monetary expansion measures. The Bank of Japan, the European Central Bank, and the Bank of England also opted for quantitative easing policies between the end of 2008 and early 2009 (Fawley & Neely, 2013).

[18] The interest rate that the Bank of Japan was using as its instrument to run monetary policy was the uncollateralized overnight call rate (UOCR), but with the onset of the first quantitative easing program, the tool was replaced by the absolute level of the current account balances commercial banks have in the Central Bank (composed of bank reserves plus deposits by non-bank financial institutions) (Ashworth, 2013). Nevertheless, in March 2006, when quantitative easing drew to a close, the UOCR was reinstated as the main monetary policy instrument.

[19] Data from the IMF's *World Economic Outlook Database*.

[20] In New Keynesian models, the natural interest rate is defined as "the real equilibrium interest rate in an economy free of monetary friction" (Amato, 2005, p. 730). In other words, an economy with flexible prices and salaries. The presence of a negative natural interest rate

is an important factor, pursuant to the current literature, that can lead to a liquidity trap (for example, in Krugman, 1998, and Adam & Billi, 2006).

[21] Fiscal Multipliers: Where Does the Buck Stop? Six Big Ideas, *The Economist,* August 13, 2016.