COLEGIO UNIVERSITARIO DE ESTUDIOS FINANCIEROS

GRADO EN
ADMINISTRACIÓN Y DIRECCIÓN DE EMPRESAS

Trabajo de Fin de GRADO

The effects of negative interest rates and Japanization of the economy. Business problems for the Banking Sector

Author: Olivié Redondo, María
Tutor: Carbó Valverde, Santiago

Madrid, April 2020

Table of contents

Figures

1 Introduction

The boom of the negative interest rates arose after the crash of Lehman Brothers, which triggered the great financial crisis of 2008. The reaction of the central banks was the implementation of an unconventional expansionary monetary policy, NIRP (Negative interest rate policy), which was promoted with other actions such as Quantitative Easing (QE)[1], which consists of generating money and putting it into circulation. This is used by some central banks to increase the money supply, increasing the excess reserves of the banking system, and generally by buying bonds from the central government itself to stabilize or increase their prices and with them reduce long-term interest rates.

However, the first economy to implement zero bound interest rates was Japan, around the 1990s. The reduction of interest rates was driven by the "Japan Lost decade", where they experimented an asset price bubble and tried to combat deflation by decreasing interests. At that time the rest of the economies did not had in mind a reduction as severe as Japan's. As aforementioned, it was during the crisis of 2008 that the idea of reducing interest rates was raised and finally in 2014 the ECB reduced rates to negative levels. Following the lead of the ECB, Japan in 2016 further reduced its rates leaving them also at negative levels.

In terms of the way the economy has been managed under these circumstances, Japan has been one of the most admired economies. As a result, Europe is attempting to follow in its path and adopt similar measures - this process is known as Japanization. Furthermore, it was not until the end of 2019 that growth expectations and the end of the recession were put on the table at the central banks. But at the beginning of the year (2020) the outbreak of a health crisis, the COVID-19, has triggered a 360º turn of the economy, making economies leave aside the objectives that were expected to be achieved during this year.

The main objective is to develop a deep analysis regarding interest rates and their impact on the banking sector, as well as a comparison between Japan and European economies, and finally mention some of the recent problems that have emerged due to COVID-19.

[1] It has two main objectives. Lower interest rates and create liquidity to facilitate credit for clients.

2 The global overview of the economy

2.1 Reaction of the economy to the 2008 Global Financial Crisis

It has been more than ten years since the subprime mortgage crisis broke out. Subprime mortgages were given at high-interest rates to those with low creditworthiness. The crash of the economy was so dramatic that it prompted the Federal Reserve (Fed) - and the European Central Bank (ECB) - to pump hundreds of billions of dollars and reduce interest rates. Through monetary and fiscal policy, the central banks went into uncharted waters. Those were shock steps that did not fix the source of the problem: the banks were contaminated by products designed with weak creditworthiness.

All of the recessions have common features. Because of their high returns, banks invest in high-risk assets that operate until someone says they are toxic and lose their value and liquidity. The cause comes as people are demanding to reclaim the money in masses in the face of a lack of confidence, and the acceleration of the contagion effect. The 2007 one was no different. It started with subprime mortgages, spread to other products and banks ran out of the capital to absorb the losses.

Europe's biggest bank, HSBC, one of the most competitive on the US real estate market, issued the first notice about the coming recession. In February 2007, it reported that there would be higher than planned defaults on mortgage portfolios. Evictions were skyrocketing, and the bank was unable to foresee how many borrowers would not be able to repay their loans. The first subprime mortgage Structured Funds burst. The concerns extended to major banking institutions like Merrill Lynch, JPMorgan Chase, Citigroup, Goldman Sachs, and others. Soon afterward it was the French bank BNP Paribas that declared the suspension of investments in three mortgage debt-specialized funds because they were insolvent (Pozzi, 2017).

The response to the financial crisis was made in two ways. First, an intervention was made to help systemic institutions. Then, mechanisms were put in place to provide the liquidity needed by financial operators to sustain their activities so that the money would flow into the economy. The Fed injected $87.5 billion in two days, plus $156 billion more from the ECB. The interest rate was cut by half a point within a week and it was understood for the first time that the risk had become genuine. This unexpected pessimism

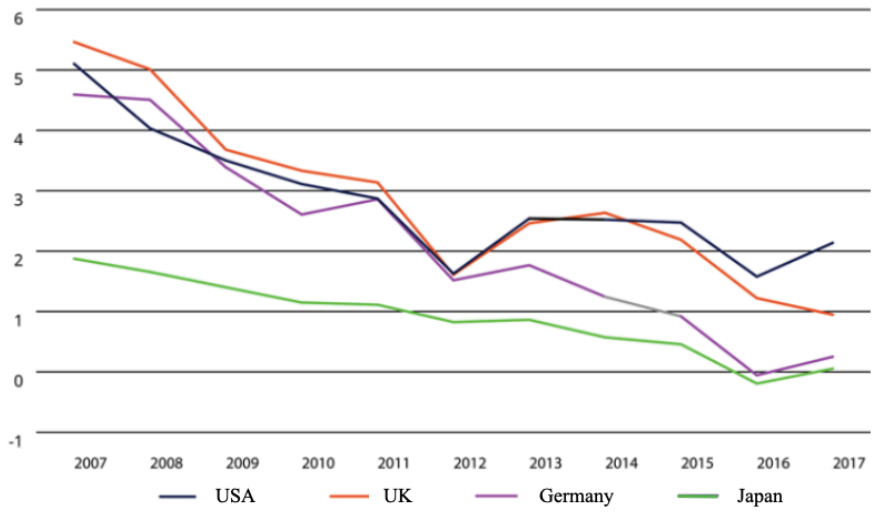
led the central bank to reduce the money price to 4.75 percent by another half percentage point.

Moreover, the rapid and relentless decline in bond yields has been one of the most troubling consequences of the crisis (Bret, 2017). Central banks felt the need to cut borrowing costs and therefore lower interest rates with certain quantitative easing initiatives that had been introduced, generating liquidity electronically and using it to purchase bonds. This had the desired effect of reducing bond yields when bond prices rose. Bond prices have a significant impact on the overall borrowing costs of the economy, thus the need to cut them down.

Yields, however, continued to decline years after central banks lowered rates. New rounds of quantitative easing were one explanation for this, but on the other hand, nervous buyers still decided to purchase bonds for their capital as a refuge. This was becoming serious. The yields on Japanese and German bonds reached negative territory in 2016 (see Figure 1). This suggests investors were paying money to keep it, instead of collecting dividends on a loan.

Figure 1

The decrease in bond yields as a consequence of the international financial crisis
Bond yield



Source: Schroders. Data retrieved in June 2017.

Japanese, German and British bond yields held below 1 percent, reflecting market expectations on interest rate outlook in these countries. US debt prices jumped by more

than 2 percent as the Fed began to lift interest rates. It was during this financial crisis that the theoretical idea of negative interest rates as an instrument of an expansionary monetary policy was put into practice.

2.2 Current economic situation

During and after the last financial crisis, the monetary policy has taken the lead role. Expansionary measures have been applied at a global level trying to recover all the damages, but it seems financial institutions are just focused on keep reducing interest rates and provide a huge amount of liquidity.

Despite all the measures adopted, the world economy still carries the imbalances left by the international Financial Crisis. One of the most visible and troubling consequences of the crisis was the downturn in world trade, which had risen by around 7 percent per year (in volume) before 2008 and was a key driver of economic and wealth growth. However, foreign trade has risen three times less since 2011 and the downturn does not seem to be reversed within a fair timeframe (Aranda, 2018).

As for Europe, the external market bottomed out in 2009 and has been on an upward course with modest trade surpluses ever since. The austerity budgetary policies implemented in the region could, according to some economists, be behind the still poor performance of the European foreign sector. Philippe Waechter[2], attributes the low trading results to factors such as the lack of continuity in global economic development, the sluggish underlying pattern in foreign trade and the adjustments taking place within. He argues that developing countries have a lower commitment - to global trade - as they have less industrial capacity, which suggests that alternative ways need to be sought to improve their economic development once again, and discusses the advent of entrepreneurship as an indicator of a healthy effort to reinvent the market structure and generate new players to improve competition and open up new business opportunities.
Furthermore, notwithstanding all the initiatives followed, the emergence of a global health crisis, known as the coronavirus (COVID-19), has meant a turnaround in the development and recovery of the world economy. At the beginning of 2020, the economy,

[2] Philippe Waechter is the chief economist of asset management firm Natixis AM of the French financial and insurance corporation BPCE. https://pressroom-en.natixis.com/news/outlook-2020-finding-equilibrium-in-a-non-cooperative-world-6aa8-8e037.html

in general, had an expectation of both, economic and market growth (specifically interest rates) which have been impaired by the coronavirus, so as a consequence they will not be able to be reached. The economy was expected to recover in connection with a rise in interest rates, and after the outbreak of the virus, the first response of the central banks was to lower interest rates even further. The consequences that COVID-19 is going to generate in the economy are of notorious character, also it is going to be the impact that it is going to have in the businesses.

3 Zero-bound and negative interest rates

3.1 Brief explanation of what zero-bound and negative interest rates are

Interest rates are one of the most effective instruments used by central banks to stimulate the economy and are applied to the main refinancing rate, the marginal lending rate, and the deposit facility rate. But what are they? and what is the difference between zero-bound rates and negative interest rates?

Zero bound interest rate is an expansionary monetary policy technique known as ZIRP, where a central bank reduces short-term interest rates close to zero to boost the economy, if appropriate (Nath, 2020). It is used to combat deflation and promote economic recovery. The first one to use this policy was the Bank of Japan around the 1990s, just after the Japanese asset price bubble collapse. Zero-interest rate policy has both, benefits and risks.

Regarding the benefits, ZIRP has the potential to boost economic growth and, given weak yields, reduces borrowing rates, which can help stimulate spending on business resources, employment, and households. Enabling job growth and the development of new business opportunities. Banks are also strengthening the bank balance sheets and lending power. Low-interest rates will increase the prices of the assets. And, higher asset prices combined with quantitative easing will expand the monetary base, leading to an increase in household discretionary income[3].

[3] Discretionary income refers to the portion of the income left for an individual to spend, invest or save after paying taxes and personal necessities. Discretionary income is different from disposable income. In other words, discretionary income is what is left from disposable income after paying taxes (Kagan, 2018).

Despite the benefits attributed to the zero bound interest rate policy, risk has to be taken into consideration too. Low-interest rates were correlated to the emergence of liquidity traps, which happens when saving rates get big and monetary policy becomes ineffective. ZIRP adoption came largely, usually, after an economic crisis when deflation, unemployment, and sluggish growth prevailed. Declining investor trust or increasing worries about deflation might also lead to liquidity traps. In addition, given zero interest rates and monetary growth, borrowing will stagnate as companies pay off earnings debt rather than choosing to reinvest in the sector.

A negative interest rate policy (NIRP) is an unconventional monetary policy instrument employed by a central bank where nominal target interest rates are fixed at a negative value below the theoretical lower bound of zero percent (Hayes, 2020). A NIRP is a fairly recent monetary policy framework, intended to alleviate a financial crisis. A negative interest rate means that zero interest would be paid to the central bank (and also to private banks). Instead of earning interest on withdrawals, depositors have to pay annually for the bank to hold their funds. It is intended to allow banks to lend money more openly, and companies and people to borrow, lend, and raise money instead of charging a premium to keep it safe. This occurs in an environment of low-interest rates.

Individuals and companies save capital through deflationary times, instead of saving and investing. The consequence is a drop-in consumer demand, contributing to an even greater decline of costs, a stagnation or pause of industrial growth and productivity, and a rise in unemployment. In cope with such economic deflation, typically a flexible or expansionary monetary policy is employed. If deflationary pressures are powerful enough, however, merely lowering the interest rate of the central bank to zero might not be enough to promote borrowing and lending.

3.2 The decision of central banks to adopt these measures and the impact on the economy

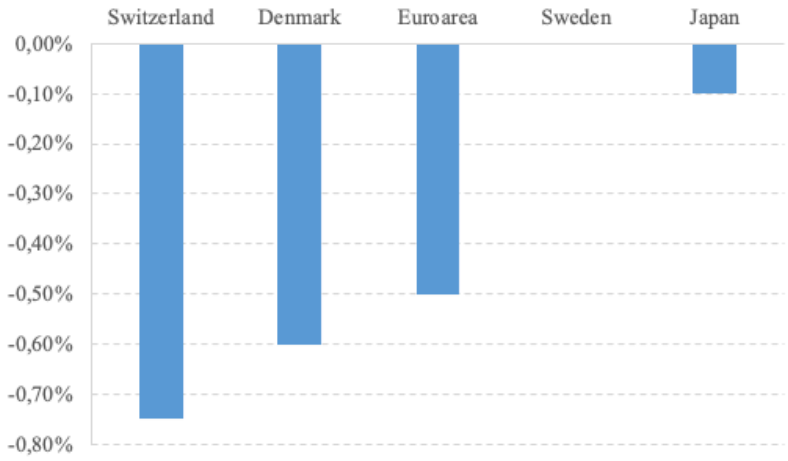
To battle the global financial crisis caused by Lehman Brothers ' failure in 2008, several central banks are slashing interest rates down to zero. A decade on, interest rates in most

countries remain small owing to weak economic development. Many global central banks have turned to unconventional monetary interventions, including a negative rate strategy, leaving no space for more lowering rates. The Eurozone, Switzerland, Denmark, Sweden and Japan have enabled it possible for rates to drop marginally below zero (see Figure 2). However. it was Sweden the first to break the trend of negative rates and raise them to 0% in December 2020. It was a simple 25 bp raise but a crucial shift back to monetary-policy normality.

Figure 2

The interest rates of the central banks that applied a negative rate strategy

Interest rate



Source: Swiss National bank, Danmarks Nationalbank, European Central Bank, Sveriges RiksBank, and Bank of Japan. Data retrieved in March 2020.

Personal Production

The consequences of negative policy levels in Sweden, Denmark, Japan, Switzerland and the Euro Area are studied by Eggertsson, Juelsrud and Wold (2017). They show a breakdown in the pass-through to deposit and lending levels, utilizing aggregate and bank-level statistics, once the policy rate turns negative. However, the analysis indicates that not only are negative interest rates inefficient, but it is also that they can be contractionary to efficiency.

As aforementioned, under de negative interest rate policy, financial firms are expected to pay an interest on storing surplus assets with the central bank, under a negative rate scheme. This is, any extra cash that goes above what the regulators claim banks must

keep on hand. Therefore, central banks penalize financial institutions for keeping on to cash in the expectation of encouraging firms and customers to raise lending.
The ECB implemented negative rates to boost the economy in June 2014, reducing the deposit rate to -0.1 per cent. Describing the eurozone economy as mired in a time of "prolonged" stagnation, ECB leader Mario Draghi reported on September 2019 a 10-point fall in the deposit rate to -0.5% from its previous -0.4%. Despite Bank of Japan (BOJ) was the pioneer in implementing zero-bound interest rates, in January 2016, it introduced negative rates, largely to stop damaging an export-reliant economy through unexpected yen appreciation. It pays 0.1 percent interest with the BOJ on a fraction of the financial institutions' surplus reserves property.

Blanchard, Dell'Ariccia and Mauro (2010) comment on the lessons learned from the macro-politics since the crisis (and not). They conclude that a significant exception in theoretical models of central banks is the consideration of the so-called "credit axis" (reductions of interest rates driving up lending). They often say that the last financial crisis has highlighted the traditional dual position of central banks as facilitators of such a credit system and, at the same time, as last resort borrowers who are still in charge of supervising the banks. The first conclusion they draw points explicitly to the interest rate as the core target of monetary policy which, nevertheless, largely avoids the nuances of financial intermediation.

Moreover, central banks find some pros and cons when implementing negative interest rates (Kihara and Koranyi, 2019). In addition to reducing borrowing costs, supporters of negative rates argue they are helping to undermine a country's currency by helping to make it less competitive than other currencies. A weaker currency gives a competitive advantage to a country's export and boosts inflation by increasing import costs. It is one of the reasons for Trump to want the dollar's negative rates. Negative central bank rates often rising funding costs on a variety of tools, ensuring enterprises and families earn much cheaper loans. Yet negative rates often limit the gain from loans that financial firms receive. If sustained ultra-low levels do so much harm to the stability of financial firms, they might avoid lending and hurt the economy. There are also limitations on how far central banks can drive rates into negative territory - by choosing to hold real banknotes instead, depositors can stop being charged negative rates on their bank deposits.

Carbó, Cuadros and Rodríguez (2019) explain how as a part of the debate related to the reconsideration of macroeconomic policies, negative interest rates should be part of the discussion too. Even though establishing negative rates may seem to be part of a process of central bank monetary strategy, the restrictions tend to be both political and of a practical nature, having an impact on financial institutions.

4 The Japanese economy

4.1 Japan’s lost decade

After the crash of the Japanese asset price bubble in late 1991 and early 1992, the Lost Decade was a time of economic stagnation in Japan. In the 1990s, Japan became the first global economy ever to switch to a zero-interest-rate policy, when the Bank of Japan managed to avoid a fall into deflation by making liquidity available at virtually no expense. The idea was that banks, in return, would lend to worthy companies who would invest in exchange, with the resultant rise in the money supply contributing to inflation. It didn't work as expected, and the economy started to suffer from a liquidity trap in which investors faced near to zero returns deposit their funds in bank accounts where they were priced out of the economy in real terms.

One of the main causes of Japan's Lost Decade was the behavior of the banking sector. Japanese banks provided collateral-based loans back in the 1980s. Land values started to fall beginning in 1991, and banks continued to acquire bad loan assets. The number of bank defaults started to grow shortly after the financial bubble collapsed, peaking nearly a decade later. When the bubble burst, there was no bank loss and support from Japan's Deposit Insurance Corporation (DICJ), the insuring institution of the financial industry, was almost zero. As banks began collapsing after the burst of the bubble, the DICJ started raising financial aid to support the banks that collapsed. This funding also has peaked a decade after the bubble exploded. The Basel capital requirements are another challenge to the banking system. Basel I regulations required banks, regardless of economic conditions, to retain 8 percent capital. Japanese banks started reducing their lending to prevent a cash crisis that created a credit shortage and borrowing money from banks became impossible for SMEs and startups (Yoshino et al. 2015).

There was, additionally, an excessive contractionary policy and a reduction of the fiscal policy effectiveness, prejudicing the situation in Japan at the time. Japanese monetary policy became too easy in the late 1980s and led to an economic bubble developing. Since the bubble burst, Japan's monetary policy was over-strengthened, dramatically decreasing Japanese banks 'lending power. The Bank for International Settlements 'capital requirements regulation restricted Japanese banks from lending money to small and medium-sized businesses, companies and vulnerable industries. Kiichi Miyazawa, Japan's minister from 1991 to 1993, followed monetary policies as the Japanese economy struggled to rebound in the 1990s. He adopted a Keynesian approach, aiming for an era of fast growth in Japan where public spending would help improve the Japanese economy. However, there was a misallocation of the funds, resulting in a decrease in the returns from public and private investments[4].

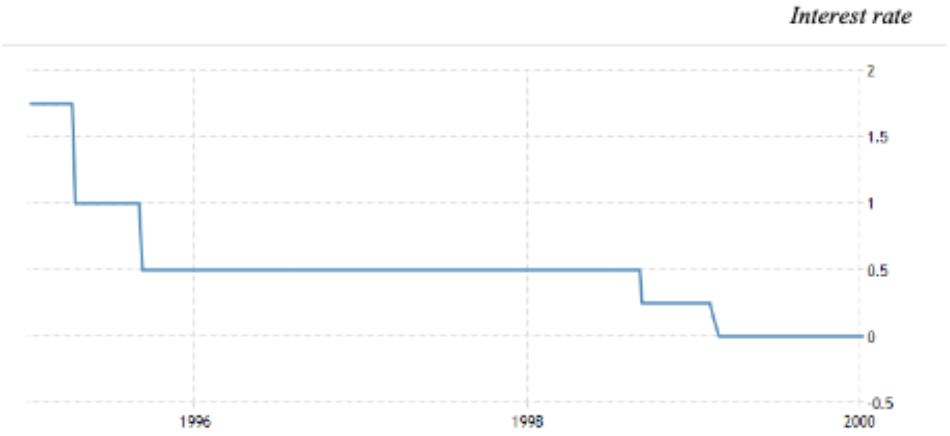
Moreover, a banking crisis emerged in 1998 in Japan. During the late 1990s, Japanese banks were in chaos. As a total, 181 banks went bankrupt entirely. Many of the failed banks were small or credit cooperatives. The main reasons were the overconcentration on lending to just particular industries, the increase of regional banks' stress since regional recessions, the fraudulent actions assumed by the banks when lending and the unsuccessful investment actions undertaken. To overpass this situation central banks, usually, inject capital into the economy. However, at that time, the injection of capital into troubled institutions was perceived as a moral hazard. Many companies opposed to this solution, but in the 2000s, capital injections were put in place.

Despite all the focus given to the monetary policy implemented, the main problem of the Japanese stagnation was in its investment-saving (IS) relationship (Christensen et al. 2019). Notwithstanding very low-interest rates, private investment did still not rise. The expected potential return rates were small. Although the short-term interest rate of the central bank was set at zero, depressed spending in Japan meant the economy could not recover. Thus, too much attention has been placed on the monetary policy rather than on structural issues, resulting in ineffective.

[4] Public investment was concentrated in the countryside. Due to the ineffective distribution of funds, it has tended to produce low stimulative effects on gross national products

Figure 3

The evolution of Japan's interest rate during the "Lost Decade"



Source: Trading economics and Bank of Japan.

4.2 Actions undertaken by the Bank of Japan regarding the Great Financial Crisis of 2008

The Japanese economy is not yet fully out of an already long period of deflation and low growth, whose roots are to be found in 1998. As aforementioned, that year, Japan experienced a financial crisis that caused a significant recession of the economy which has been dragging on for over 20 years.

Following in the steps of other economies during the global financial crisis, such as Denmark or the Euro Area, the Bank of Japan decided to implement ultralow rates below zero, in 2016. Japan's history is now long enough to show the validity of going negative as an instrument for expansionary monetary policy. This action was undertaken, mainly, to prevent an unwanted rise in the yen from damaging an export-dependent economy. On the portion of surplus reserves that financial institutions deposit with the Bank of Japan, it charges 0.1 percent interest. The purpose of this action undertaken was to encourage institutions to lend more money and make people take their money from bank accounts, so they spend rather than save. The BOJ was trying to show the rest of the economies that they were going to be proactive and that, they wanted to be ahead of the curves by lowering the rates.

Figure 4

Japan's interest rate post-2008 Financial Crisis

Source: Trading Economics and Bank of Japan.

Japan has battled with deflation for a long time and rates have stagnated in recent years, given the aggressive monetary initiatives initiated by the central bank, which include a major bond-buying program (Kawai et al. 2013). Through this initiative, the objective was to reactivate the economy's life and to increase spending in the country. At the moment, the current situation in Japan has not changed that much. It keeps interest rates and minimums and tries to read the inflation target of 2%. However, any goal or expectation set for the economy has stopped as already mentioned due to the COVID-19. This health-crisis has caused many upward expectations in the market to be held back or impaired by the influence and economic consequences triggered by the virus.

4.3 The process of Japanization

Despite the economic conditions and the long period of stagnation, Japan has managed to save its economy by keeping interest rates at minimum or even negative levels for more than 20 years – despite it does not grow at the expected level and reaches the famous inflation close to 2%. And yet, it shows that a developed country may collapse into a sustained stagnation and deflation period, and still manage to keep under control its economy.

In recent years, a new concept has emerged among the major economic powers, known as Japanization. This is a persistent condition with a deflationary, underperforming,

economy, and to stimulate demand there is no conventional monetary policy used (Ruiz, 2019). A deflationary trap can catch the economy. Japanization first emerged in japan, as described above, but its features are gradually observed in the rest of the world. Indeed, a deeper glance reveals that economies around the world began heading toward the condition of Japanization long before the 2008-09 global financial crisis. Furthermore, a trend towards the state of Japanization, namely disinflation and a decreasing interest rate, combined with lower-than-potential growth, can be said loosely to be a "turning Japanese" phase (Cho et al. 2018).

The condition of Japanization is represented in three key characteristics, which are typically used to describe the phenomenon – because the economic circumstances driving this cycle have many dimensions. A prolonged duration of decline is the first feature. That is, the real rate of growth is below the potential growth rate. The second aspect is that the policy rate is lowered to (near) zero and trapped. The central bank reduces the interest rate until inflation occurs. As the nominal interest rate cannot be (significantly) below zero, that is the central bank's ultimate easing to do with the conventional monetary policy instrument. Finally, deflation is the last characteristic of Japanization.

So, it seems like both Europe and the US are at the same crossroads as Japan has been for almost three decades: very low rates and capital injections to fuel demand and stimulate the economy. By adopting similar measures to those in Japan, both economies are "becoming Japanese" through the Japanization process.

5 The European economy

5.1 Conventional and unconventional monetary policy tools

It was during the great financial crisis of 2008 that the European Central Bank began to adopt some measures similar to those previously adopted by the Bank of Japan. Therefore, the instruments themselves were not completely modern, as some of them had been established for their usage, and others applied to the capacity of the central bank to provide liquidity by reserve issuance. What was really distinctive is the variety of monetary policy measures, the enormous size of activities and the reasons with which

certain tools were used, leading to the implementation of the so-called unconventional policy.

One of the main statutory goals, which drives the monetary policy, is to maintain inflation stable to a target level throughout the medium term – in most economies set at an annual average of approximately 2 percent. Therefore, a transition from a period that was called "Great Moderation" to "Great Recession" took place, resulting in a shift in the performance of the economy - from robust growth to moderation of inflation rates in most advanced economies. Throughout this time, the challenges presented to monetary policy were serious and forced central banks to respond to behavior that differed from their defined policy frameworks.

The European Central Bank evolved from a conventional to an unconventional policy. During the period of the conventional monetary policy, the framework of the central bank was traditionally defined by a shortage of reserves, with central banks utilizing fairly limited changes in reserve balance to drive the policy rate into its target. The key instrument of traditional monetary policy was to monitor a short- interest rate: adjustments in this target rate and the assumptions of the market regarding its potential circumstances, influencing financial markets[5] and further down the communication chain impacting the macroeconomy[6].

The diffusion of conventional policy has three key conditions. First, the policy rate should not be constrained by its lower bound, it must have space to move in the desired direction. Second, funding conditions have to move in accordance with policy rate adjustments, therefore, funding markets must work effectively with adequate arbitration between overnight rates and the rest of the interest rate term structure. Finally, the inflation expectations of the public need to be well anchored. Such requirements were mostly fulfilled throughout the time of "Great Moderation."

Then, the crisis began, and with it a new combination of measures - the unconventional monetary policy[7]. Many central banks confronted a weakened financial market and

[5] i.e. supply and borrowing costs

[6] i.e. gross expenditure, production, and inflation

[7] The UMPTs were implemented as an expansionary monetary policy, trying to increase spending, reach the inflation target, and ensure economic stability.

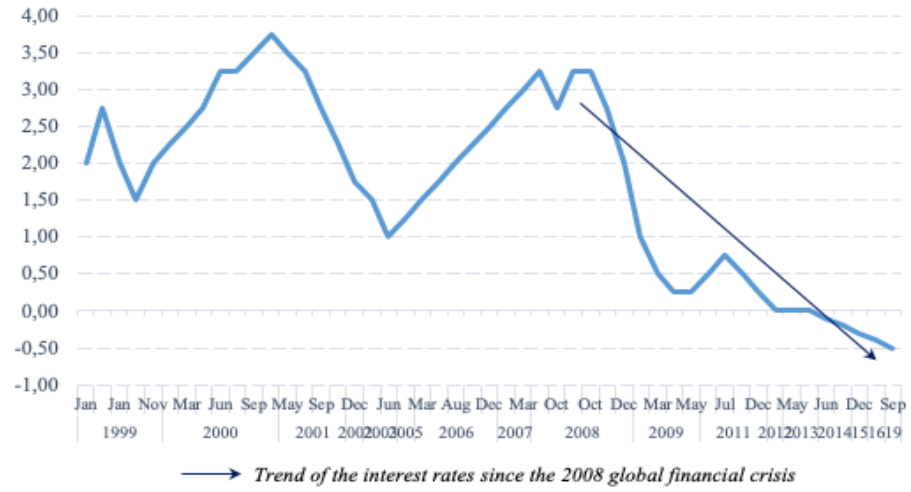
quickly came up against the boundaries of what conventional instruments could do. The central banks also slowly adopted a range of policy initiatives which have been regarded officially as unconventional monetary policy tools (UMPTs). By using these tools, the central bank was an intermediary for a broader scope of financial operations. They stepped in to fill in the gap created by the receding activity of participants from the private sector, while also impacting the opportunities of the participants. Some of the techniques have been developed to impact term spreads[8], while some have been built to control liquidity and credit spreads[9]. The unconventional monetary policy had two core goals: addressing monetary policy feedback system problems, and delivering extra monetary stimuli until the policy rates could not be more reduced.

The first tool used by the ECB was the negative interest rate policy (NIRP). Negative policy rates are unorthodox in the context that they suggest that the owner of surplus assets incurs an expense from holding them with the central bank, overturning the normal trend of interest payment flows within a monetary system. They also involved a unique extension of interpretations of the range of possible rates, thereby affecting the shaping of agents' expectations of future rates. The operational details of the regulatory framework required some adjustments. However, it was not until 2014 that the European Central Bank implemented negative interest rates (see Figure 5).

Figure 5

Evolution of the European Central Bank interest rates

Interest rate (%)



Source: European Central Bank. Data retrieved in April 2020.

Personal Production

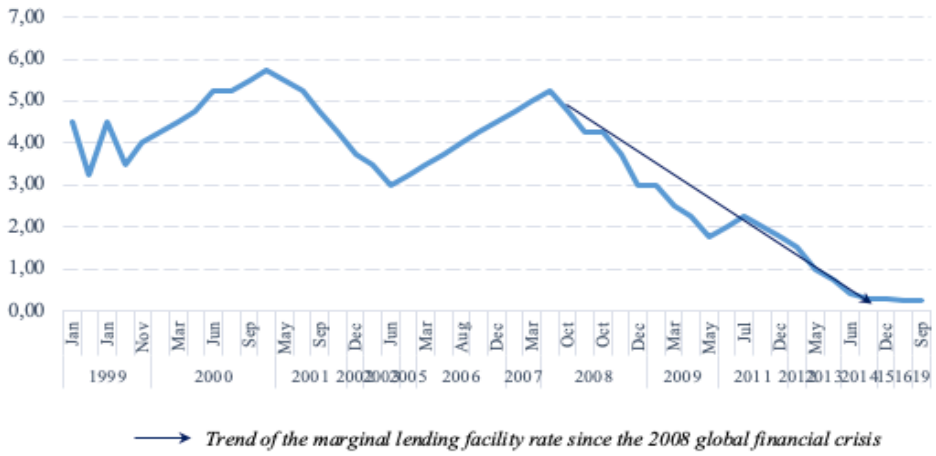
[8] i.e. long-term risk-free rates.
[9] i.e. interest rates on specific non-risk-free instruments equivalently.

The expansion of lending operations (LOs) was the second tool implemented. The ECB developed new or enlarged ongoing lending facilities to offer substantial liquidity to a broader variety of financial firms at the same time, in somewhat looser terms (mostly by requiring lower-quality collateral), for longer horizons (from weeks to years), and presumably at lower rates (see Figure 6). LOs allowed pressure financial intermediaries to lend capital to the real economy, by preventing a collapse in financing markets that would have accelerated the deleveraging cycle, overcoming the policy transmission of bottlenecks.

Figure 6

Evolution of the European Central Bank marginal lending facility rate

Marginal lending facility rate (%)



Source: European Central Bank. Data retrieved in April 2020.

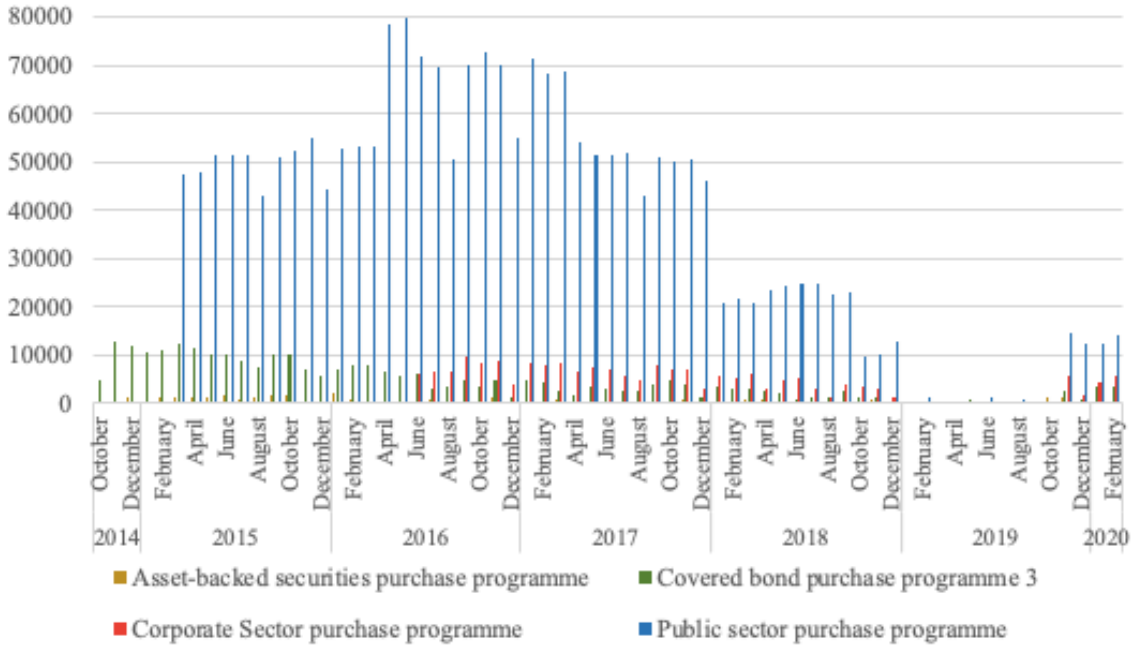
Personal Production

Furthermore, the central bank put on practice asset-purchase programs (APPs), which consisted of large-scale acquisitions, by central banks, of assets other than short-term treasury bills, usually supported by the accumulation of central bank reserves. The main reason for using large-scale acquisitions of assets by central banks has been their influence on asset prices. Relevant rates and associated risks are reduced by the purchases of the private sector and government debt, and also theoretically avoid impaired relations in the transmission chain are, resulting in a decrease of the borrowing costs. Through a substitution effect, purchases that remove safe assets from investors' portfolios can stimulate demand for riskier assets with the goal of stimulating aggregate spending.

Figure 7

Evolution of the European Central Bank asset-purchase programs

Asset-purchase programs (€ millions)



Source: European Central Bank. Data retrieved in April 2020.

Personal Production

The last tool used under the unconventional monetary policy is forward guidance (FG). This is about presenting knowledge on potential policy decisions in order to shape public perceptions. The goal of FG as a UMPT was to influence the perceptions of the private sector about potential policy in ways that differed from previous modes of communication. It was aimed at demonstrating the readiness of central banks to undertake unconventional policy measures over a prolonged time span. Forward guidance was not only applied and coordinated for the policy rate, but also for the other tools - asset-purchase programs and lending operations. The first economy applying this tool was Japan[10] and its success depended on the capability of the central bank to sustain and support the credibility of its announcements.

Overall, the adoption of the unconventional monetary policy by the European Central Bank helped the financial institutions to face and survive the conditions raised due to the global financial crisis, and ensure economic stability. On the 9th of June, 2014, one of the

[10] The Bank of Japan put on practice this tool after lowering the interest rates in 1999.

members of the executive board of the ECB, Benoît Coeuré, gave a public speech giving his opinion of negative interest rate policy:[11] *"[…] it seems fair to say that the lowering of policy rates, with the deposit rate moving into negative territory, has provided an appropriate monetary policy stimulus to the euro area economy, comforted the forward guidance of the ECB, and contributed to some reduction in market fragmentation, without having an adverse impact on the functioning of money markets".*

However, it is important to address that the effectiveness of UMPTs not only depends on the particular circumstances of its implementation but also on the public's confidence in their practicality, implementation, and scalability, and thus depends on the central bank's reputation in general. However, it seems there are two views in the economy about the efficiency of unconventional monetary policy. Some economists believe it helped central banks to overcome the challenging situation that arises due to the crisis – Smets and Potter (2019). While others consider that the stimulus set applied was not sufficient – Klass Knot[12].

5.2 Current situation of the European economy. The economic impact of COVID-19

Since the implementation of the UMPTs as a measure of an expansionary monetary policy, the European economy has recovered or, rather, has been able to move forward, ensuring its functioning and financial stability. Although the expansion has moderated in recent years, recovery in the euro area appears to be driven by the underlying momentum of domestic demand, underpinned by robust labor market trends and favorable funding conditions. Following the steady downturn in the last two years, the forecast for global economic operation beyond the euro area has lately shown some signs of change. However, foreign trade remains low and uncertainty remains high about future trade ties among major global partners. Finally, the ECB had upward expectations of the inflation rate at the beginning of 2020.

[11] See Coeuré B. (2014) Life below zero for further information of the speech

[12] President of De Nederlandsche Bank and member of the ECB's Governing. https://www.dnb.nl/en/news/news-and-archive/Persberichten2019/dnb385535.jsp

Overall, the current monetary-policy interventions[13] give significant assistance to trends in growth and inflation, effectively buffering the adverse momentum from global factors. However, the implementation of monetary policy steps by the ECB means that financial conditions stay highly conducive, protecting the economy from global uncertainties and setting the stage for building up domestic inflation pressures. Moreover, under the strategy that the European Central Bank is following, policymakers must perform a study to review the monetary policy toolkit's efficiency and possible side effects generated during the past decade. The vice-president of the ECB, Luis de Guindos, states *"the review will include an examination of directions in which the economic and monetary analyses through which the ECB assesses the risks to price stability could be enhanced, as well as an evaluation of our communication practices. Our strategy review will have a long-term perspective, with the aim to build an efficient and lasting framework"*[14].

Despite the economic recovery in recent years, the outbreak of COVID-19 has had a negative impact on the global economy. This pandemic has led to central banks' intervention to safeguard financial stability. Therefore, given the accelerated and disproportionate nature of the economic disturbances caused by the uncontrolled spread of the so-called coronavirus[15], the responses are being national, with differences between the different EU governments, in any case with adjustments as the economic impact grows.

Coronavirus outbreak (COVID-19) has become a big blow to global and euro area economies 'development potential and has raised market uncertainty. It will have a major effect on economic growth, even though it is largely transient in nature. This would, in particular, slow down output as a result of fragmented supply chains and reduce domestic and foreign demand, particularly through the adverse effects of the containment measures needed. The heightened volatility often has a detrimental effect on investment plans and their funding.

[13] Currently, the European Central Bank still uses UPMTs to guarantee financial stability.

[14] https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200220~7bf389feeb.en.html

[15] Technically SARS-CoV-2, which causes COVID-19 respiratory disease.

Although the European Union, as an entity, has not yet articulated a comprehensive plan against the economic impact of the pandemic, a number of decisions have been taken so far. Therefore, to support businesses and workers at risk, a coordinated and ambitious fiscal policy is required by the European Central Bank. The ECB has also agreed on a robust set of monetary-policy initiatives. These initiatives, in combination with the significant monetary policy support already in position, would improve liquidity and funding conditions for consumers, companies, and banks and help maintain the steady supply of credit to real economy.

The set of the main monetary policy measures are four. First, to provide immediate liquidity support to the financial system, longer-term funding operations (LTROs) are carried out. Second, net asset purchases of EUR 120 million are made, ensuring a strong contribution from the private sector procurement program. In addition, conditions are improved for all TLTRO III operations in place between June 2020 and June 2021. And finally, the ECB agrees not to change the official interest rates.

To assess the scope and limitations of this initial response, it is necessary to take into account the still unfinished union of fiscal policies, with respect to whose strengthening, Europe appears divided. It can conclude that the impact of the coronavirus is going to leave temporary marks on the economy. During the period of quarantine, the economic activity has been practically paralyzed, thus damaging many businesses and some of the great powers of the European Union, like Italy or Spain. Due to the situation, many sectors have been fully damaged. For example, the tourist activity has been completely stopped, and countries whose main activity was this, are suffering the consequences of it. Therefore, the actions taken by the EU have to be more at a national level, since the repercussions of the coronavirus are different according to the area affected.

6 The impact of negative interest rates on the banking Sector

The impact of negative interest rates and the policies developed have already been explained. However, it is important to understand the impact they have on the banking sector and how the business, overall, is affected.

The effect of the negative interest rate policies on banks differs from the business model of the corporation. Smaller banks based on domestic loans and deposits are always hit more than bigger banks, which appear to be more currency diversified and have a greater share of the fee market. Also, there is not just an impact on bank profitability, also on bank lending, and on the balance sheet structure.

Moreover, it is important to take into consideration the current situation under which banks are performing, COVID-19. This health crisis, as already mentioned, is going to have a temporal, but strong impact on the economy, therefore, the banking sector is going to be affected too. They have to adapt and be prepared for any change in the monetary policy.

6.1 Bank's profitability and interest rates

The effect of low-interest rates on the banking industry and the low slope of the yield curve has been and still is the subject of debate, with conflicting views among central banks and the banking sector. The latter emphasizes the negative effect on the intermediation margin of low-interest rates and argues that this depends on the specific level of loan and deposit reaction to changes in intermediation margins. Therefore, when intermediation margins are very small, potential declines lead asset interest rates to decline more than liability interest rates, and there is also a "floor" at zero interest rates on deposits. Consequently, the margin for intermediation is limited. In addition, when the margin is at a low level, banks may be reluctant to lend, particularly if consideration is given to the capital usage associated with the credit operation.

Loan demand and deposit supply levels for the banking industry are not independent of total returns on assets and liabilities received and charged. A rise in market interest rates may be correlated with higher yields, but it would often usually be associated with lower savings balances, resulting in financial costs for savings creditors and eventually reducing bank profits. Banks of the Eurozone have as one of their main problems the low return, which is below the cost of raised capital. This reduced profitability is explained by multiple factors: a growing and uncertain regulatory pressure, a high volume of

unproductive assets; and a scenario of very low or even negative interest rates, which burdens the intermediation margin.

It is important to address that the monetary policy works mainly by its observable impact on the interest rate for the short-term and the yield curve slope. Through the policy rate, the central bank regulates the short-term rate very closely. However, its effect on the yield curve is more indirect, through its effects on market participants' views of the potential course of policy levels and large-scale government securities operations specifically designed to have an effect on their price (Borio et al. 2015). In the lines that follow, it is going to be considered the net interest income, the non-interest income and loan provisions, as different ways where the interest rate level and yield curve slope could have an impact on some of the components of bank profitability.

First, the impact on the net interest income by the interest rates. The interest rate trend and the yield curve slope are related to the higher net interest income. This relationship is likely to be extremely powerful at very low-interest rates and diminish as interest rates increase. When mentioning the level of interest rates, there are four relevant elements – retail deposits endowment effect, capital endowment effect, quantity effect, and the dynamics of transmission effects.

Under the retail deposits endowment effect, usually, bank deposits are priced as a market rate markdown, generally indicating a sort of monopolistic control and transaction facilities. The strengthening in monetary policy raises net interest income if the markdown becomes lower when the interest rates decline. Interest levels have fallen extremely small since the recession. Provided that the deposit rate cannot go much below zero, the markdown is reduced when the policy rate is lowered to very small rates. That means the relation of net interest income and interest rates is non-linear. An extreme case of the retail deposit endowment effect is known as the capital endowment effect. Equity capital does not pay interests. Hence, the return on assets (ROA) covered by capital automatically decreases, as interest rates decrease. The impact is typically lower in quantitative terms than that for deposits, as capital is just a smaller share of total assets. This being mentioned, it works at any degree of interest rates.

Also, there is a quality effect went rates are altered, affecting the number of bank loans and deposits. The demand for loans is more sensitive to interest rates than that for deposits, to the extent that higher interest rates will undermine the profitability at some point. This point is determined by, among others, the resilience of loan and deposit demand to market levels, as some sectors will end up influenced by the same changes in the conditions of the market.

There are two types of dynamic effects in the transition of interest-rate amounts to net interest income. The first refers to the delays in rate adjustments, reflecting the idea that changes in the market are just temporary. That means that when there are changes in the monetary policy banks make profits. The second one is related to accounting practices. Each margin of interest on new loans often covers the potential losses. As a consequence, expanding existing loans briefly improves productivity, because defaults usually materialize just a few years later, when loans have become non-performing, diminishing the margin of interest.

It is also important to mention the slope of the yield curve, as it also influences net interest income. A steeper yield curve will have a favorable impact on the net interest received by banks. The impact is partly temporary. That is that if the liabilities of both banks were at current levels, the only permanent part of the profits would be the term premium (return to maturity transformation and risk associated) - over time, shocks excluded, stock prices would match up with those reflected in the yield curve, and hence in forwarding rates. Therefore, a negative term premium could be harmful for bank profitability. There are also qualitative effects derived from the changes on the slope of the yield curve, especially on the amount of fixed-rate mortgages of the bank.

Secondly, there is the impact on the non-interest income. There are three relevant elements - effects on securities valuation, hedging by derivatives, and fees and commissions. There should be losses assumed by the bank's securities portfolios under high-interest rates. On the accounting standards depends the impact on the profit and loss account. Moreover, for banks, it is essential to hedge interest rate risk. It is achieved primarily by interest rate swaps, with valuation results usually recorded as non-interest

earnings. Also, fees and commissions represent a huge proportion of total non-interest income, and they come in different shapes and varieties. Including those specifically linked to loan and deposit operations and those connected to more investment-banking practices. That said, it is believed the impact of interest rates on non-interest income is often non-linear, being higher at very low-interest levels.

Finally, the impact on loan loss provisions. The exposure of loan-loss provisions to interest levels at extremely low-interest rates can be considered to be especially strong. That is, despite the traditional response feature of central banks, these low prices are likely to continue during financial crises, as the balance sheets of banks, as well as their clients, are in bad condition. That can make banks especially unlikely to acknowledge additional losses. The relation between the yield curve slope and the loss of loans is likely to be qualitatively equivalent. A steeper slope raises the average amount of the interest rates over a specified short-term period. This will at least increase the cost of debt service on the stock which needs to be replaced at longer maturities.

Related to the impact on profitability, the European Central Bank undertook a stress test to determine the effect on the banking sector of various interest rate scenarios, explicitly on intermediation margins and the economic valuation of equity, in the latter case by evaluating the increase in the value of investment portfolios (Cruz et al. 2018). This exercise demonstrates the ECB's concern about the impact on banking margins and thus on the productivity of the current scenario of low, and even negative, interest rates and the low slope of the yield curve.

6.2 Balance sheet structure and lending

Studies have been focusing on the impact of monetary policy on bank returns, i.e. on profit measures relative to total assets. However, the balance sheet structure is also influenced by the level of interest rates, therefore, changes in the balance sheet structure can help to give a better explanation of banks' profit fluctuations. The assets - credit in relation to debt securities - and liabilities - deposits in relation to wholesale financing - composition of banks can be also altered, as a reaction to adjustments in interest rates,

resulting in further channels for interest level influencing banks' profits. There is a chance that the supply of bank loans at very low-interest rates can become less efficient. One possible explanation may be the adverse effect of extremely low levels on the performance of the lending sector of the banks.

Banks are relevant for the transmission of monetary policy to the economy, especially for financial systems based on banks such as the one in the euro area. The balance sheet components and structure can be modified through different channels (Pérez et al. 2018). First, there is the interest rate channel, which refers to the transmission of changes in the policy rate to deposits and loan rates, through the banking system. However, the effective zero lower bound[16] on retail deposits means that a large portion of the lending of banks cannot be re-priced until this level has been achieved, which may contribute to a reform in the normal transmission process. Certain complexity is transferred to the banking system by the negative interest rate policy - it restricts banks with high dependence on retail deposits from changing their funding costs entirely. The subsequent squeeze on profit margins can disrupt the interest channel, as high-deposit banks can continue increasing loan rates rather than reducing them on reaction to a strategy of relaxing their profit margins to protect them.

Second, there is the bank lending channel. First, the reserve cost could encourage banks to lend further loans in an attempt to prevent their reserve holdings. Second, from the depositors' point of view, the zero-lower bound on deposit rates contributes to a reduction in retail deposit keeping potential costs and raises competition for these deposits. As a result, banks will issue further loans, due to this increased funding of deposits. Therefore, the policy may intensify the channel of bank lending by raising the cost of keeping excess liquidity, particularly for banks with a high share of retail deposit financing on their balance sheet, although NIRP reduces the capacity of banks to pass lower rates on to their borrowers and may, therefore, reduce the effectiveness of the interest rate channel (Demiralp et al. 2017).

[16] Central banks will not be willing to increase credit and demand by reducing short-term interest rates if short-term interest levels exceeded zero. It is predicted the economy would reach a liquidity trap for this purpose.

In addition, trough the risk-taking channel, it can be seen the swap of very stable assets, like central bank reserves, for riskier assets, such as loans and bonds, which highlights the role of risk expectations and risk tolerance. Rising asset prices and collateral values triggered by lower policy rates can fuel the capacity and willingness of the banks to take on more risk. For example, banks can depend on risk factors based on market share values, such as expected default rates, and use Value-at-Risk structures to control their asset-liability frameworks, both are likely to induce greater risk to be taken in a lower rate environment. Also, high risk assumed by banks, such as risk-free excess liquidity, is usually transformed into loans. However, in the case of high retail deposit banks, during the period of negative interest rates it is seen that lending has increased.

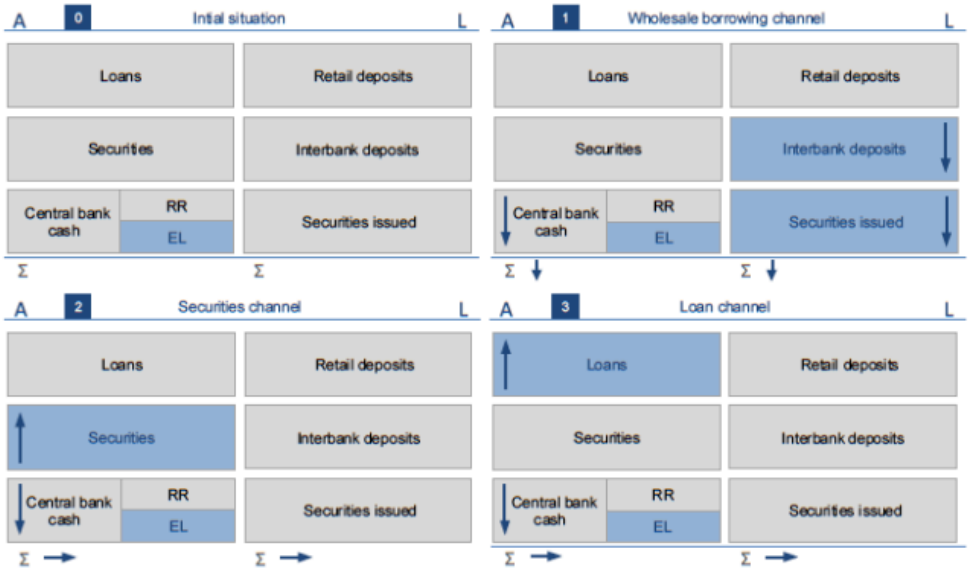
Although NIRP will the promote adjustment of bank balance sheets due to negative costs on excess liquidity and enhanced risk-taking, there could be limits below which banks cannot accept more squeezes in their earnings and follow different strategies. Under the negative interest rate policy, the banks' adjustment process of reducing the level of excess liquidity reserves in order to prevent increased costs, usually involves modifications of certain products in the balance sheet too. Aggregate excess liquidity cannot be modified, at least in the short term. It can only be reduced through the acquisition of banknotes or by repaying borrowing from the Euro-system. Banks, however, do not borrow from to keep funds on to the deposit facility and receive a negative profit. Alternatively, banks do it to meet liquidity requirements or even to fund operations (e.g. long-term activities - TLTROs).

Moreover, this means that, inside the closed framework under which central bank deposits flow, the funds lent are paid out to other banks. Therefore, in a situation where the central bank is engaged in large-scale acquisitions of assets, much of the excess liquidity in the system is not actively created by bank borrowing from the central bank but indirectly obtained when transactions of central bank assets are sold. In both situations, the banks that are holding the excess liquidity differ from the ones that borrowed from the system. This is because banks that keep excess liquidity do so mainly for purposes related to their position and role in the financial system. Generally, by repaying funds borrowed from the central bank, there is very little room for individual bank excess liquidity to be reduced.

Higher interest rates contribute to the replacement of bank loans with asset-side debt instruments and, to some degree, wholesale borrowing with liability-side term deposits. Therefore, as aforementioned, a change in the balance sheet structure is required (see Figure 8). Such changes in the balance of assets and liabilities would plausibly harm bank lenders and favor bank depositors. Additionally, bank shareholders are usually affected in a negative way by the interest rates, therefore, the relationship among bank profitability, balance sheet layout, and interest rate level are nonlinear – changes as a function of the interest rate level and, balance sheet structure.

Figure 8

Possible scenarios for banks to reduce excess liquidity on their balance sheets



Source: European Central Bank.

Finally, a banks 'adjustment policy to gradually reduce margins, which may signal a lower potential net worth of banks, is intended to counter declining rates by raising their lending operations. This policy, however, relies on the capital endowment of the banks and the expected value of their investments (Klein, 2020). The above is favorably associated with the intermediation charges, such as limitations on loan losses. Hence, a very low level of income may deter banks from raising their credit supply as they are unable to meet certain costs associated with higher lending. Thus, the effect of the performance of banks on new lending is uncertain (Arce et al. 2019). And, Borio and Gambarcorta (2017) believe that further cuts in the short-term rates could be less successful in stimulating credit at very low interest rates. This outcome ends up diminishing effectiveness affecting various

bank-specific characteristics, such as profitability, capitalization, borrowing costs, risk and profit diversification.

6.3 Banks and COVID-19

The outbreak of the coronavirus has presented major challenges for the society and risks for the economy. Post-crisis, central banks and the banking sector have been reinforcing their position, increased the quality of their assets, build up a strong liquidity reserve, etc. By the adoption of different policies and measures, they have managed to ensure the stability of their services and performance, but with this new crisis changes are going to take place and the financial sector should be prepared.

In order to cope with natural hazards, organizational crisis incidents, and bank stress situations, supervisors must take action combining the tools they have access to. The International Monetary Fund (IMF)[17] provides some guidance to the banking sector in order to face the challenges presented by the COVID-19. First, banks should maintain their operations and use their reserves (of liquidity or capital) whenever they need it. Also, they should promote loan adjustments, banks should adapt their loan portfolio for those sectors and clients who have been hard hit by the coronavirus. Moreover, banks have to encourage the communication channels, i.e. improving the reporting activities and disclosure. And, also reinforce the coordination not just at a national level, but also at an international one.

Also, the European Banking Authority (EBA) suggests some ideas to manage the situation and presents measures to support baking lending activities[18] – non-legislative and legislative moratoria on loan repayments, prudential framework regarding default, forbearance, and IFRS9; supervisory reporting and Pilar III (Basilea) disclosures, and activities that could help mitigate the impact of the coronavirus. However, what is really

[17] For further information see: https://blogs.imf.org/2020/03/31/maintaining-banking-system-safety-amid-the-covid-19-crisis/

[18] For further information see: https://eba.europa.eu/coronavirus

necessary for the banking sector, is a coordinated fiscal stimulus, central banks should join forces to help economies reach stability[19].

7 Conclusion

It can be concluded that since the Global Financial Crisis, the European Central Bank have been following an unconventional monetary policy. Implementing interest rates under zero levels, expanding their lending operations and undertaking asset purchase programs. And it has been like this for more than a decade, showing a period of stagnation and low inflation, similar to the one suffered in Japan. This is why it is said that the European economy is undertaking a process of Japanization. Nevertheless, there have been side effects, including disincentives to deleveraging the private sector and spillovers to other nations, but they are not deemed significant enough to offset the gains of UMPTs.

These unconventional monetary policy tools had an impact on banks performance. First, the impact of both, low-interest rates and low slope of yield curves, have a strong impact on profitability of banks. Furthermore, there is a non-linear relationship between profitability and these two elements. Hence, the lower the rate and the slope, the higher the impact it has on profitability. There is an impact on the net interest income, non-interest income and loan loss provision and the ECB has performed stress test proving different scenarios to see how these can affect banks.

Moreover, not just the bank profitability is altered. There is also an impact on the balance sheet structure and lending operations. When interest rates and yield curves change, it affects the assets and liabilities of a bank, therefore, a restructure is needed in order to meet the liquidity and capital minimum requirements. Additionally, lending operations are affected, therefore, central banks should encourage banks to lend and maybe increase the cost of holding excess liquidity. Through this measure, banks would prefer to provide funds to borrowers, instead of holding it. This is, instead of following the "originate and hold" model, they should follow the "originate and distribute" one.

[19] See: https://www.socialeurope.eu/covid-19-is-an-opportunity-for-europe

Finally, it can be said, that these expansionary measures have helped but they have also had a great impact on the banking sector. However, in January 2020, the European economy had some economic expectations of improvement and growth. But all has been paralyzed or reversed due to the arise of the COVID-19. The pandemic is affecting the global economy, making central banks to reinforce their tools and instruments in order to ensure financial stability.

8 References

Adrian, T. and Narain, A. (2020). *Maintaining Banking System Safety amid the COVID-19 Crisis* [Online]. Available at: https://blogs.imf.org/2020/03/31/maintaining-banking-system-safety-amid-the-covid-19-crisis/ (Accessed: 11th April, 2020).

Arce, O., García Posada, M. A. and Mayordomo, S. (2019). Adapting lending policies against a background of negative interest rates, *Analytical articles 1/2019 (March). Bank of Spain.*

Aranda, A. (2018). "Qué ha cambiado en la economía tras la crisis", *Forbes,* 19th April. Available at: https://forbes.es/empresas/41919/que-ha-cambiado-en-la-economia-tras-la-crisis/ (Accessed: 22nd February 2020).

Asset purchase programmes [Online]. Available at: https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html (Accessed: 5th March 2020).

Bank of Japan [Online]. Available at: https://www.boj.or.jp/en/index.htm/ (Accessed: 12th March 2020).

Blanchard, O., Dell'Ariccia, G. And Mauro, P. (2010). Rethinking Macro Policy. *VoxEU.org,* 16 February.

Borio, C., Gambarcorta, L. and Hofmann, B. (2015). The influence of monetary policy on bank profitability.

Borio, C., and Gambarcorta, L. (2017). Monetary policy and bank lending on a low interest rate environment: Diminishing effectiveness? *Journal of Macroeconomics*, 54, pp. 217-231.

Bret, D. (2017). *La crisis financiera mundial 10 años después: seis gráficos que cuentan la historia.* [Online]. Available at: https://www.schroders.com/es/es/inversores-

particulares/vision-de-mercado/analisis-macro/la-crisis-financiera-mundial-10-anos-despues/ (Accessed: 22nd February 2020).

Carbó, S., Cuadros, P. and Rodríguez, F. (2019). Intermediation below zero: The effects of negative interest rates on banks' performance and lending. *Dirección de Estudios Financieros de Funcas.*

Cho, D., Ito, T. and Mason, A. (2018). *Economic Stagnation in Japan. Exploring the Causes and Remedies of Japanization* [e-book reader]. Available at: https://books.google.es/books?id=PR1HDwAAQBAJ&printsec=frontcover&hl=es&source=gbs_atb#v=onepage&q&f=false (Accessed on: 19th March 2020).

Christensen, J. H. E. and Spiegel, M. M. (2019). Negative Interest Rates and Inflation Expectations in Japan. *Pacific Basin Note* – Research from the Federal Reserve Bank of San Francisco.

Coeuré, B. (2014). Life Below Zero: Learning about Negative Interest Rates. Speech at the ECB's Money Market Contact Group.

Cruz, P., J. Fernández de Guevara and J. Maudos (2018). Bajos tipos de interés en la eurozona: impacto sobre los márgenes y la rentabilidad de los bancos, *Papeles de Economía Española*, 155, abril, pp. 132-146.

Danmarks Nationalbank [Online]. Available at: http://www.nationalbanken.dk/en (Accessed: 12th March 2020).

Decisiones de política monetaria [Online]. Available at: https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.mp200312~8d3aec3ff2.es.html (Accessed: 1st April 2020).

Demiralp, S., Eisenschmidt, J. and Vlassopoulos, T. (2017). Negative interest rates, excess liquidity and bank businesses models: Banks' reaction to unconventional monetary policy in the Euro Area. *Working Paper Series*, no. 1708. Koç University – Tüsiad Economic Research Forum.

Eggertsson, G. B. Juelsrud, R. E. and Wold, E. G. (2017). Are negative nominal interest rates expansionary? National Bureau of Economic Research, *Working Paper* 24039, https://www.nber.org/papers/w24039

European Banking Authority [Online]. Available at: https://eba.europa.eu/coronavirus (Accessed: 10th April 2020).

Hayes, A. (2020). *Negative Interest Rate Policy (NIRP) Definition* [Online]. Available at: https://www.investopedia.com/terms/n/negative-interest-rate-policy-nirp.asp (Accessed: 28th February 2020).

Japan Interest rate [Online]. Available at: https://tradingeconomics.com/japan/interest-rate (Accessed: 20th March 2020).

Kagan, J. (2018). Discretionary Income Defined [Online]. Available at: https://www.investopedia.com/terms/d/discretionaryincome.asp (Accessed: 28th February 2020).

Kawai, M. and Morgan, P. (2013). Banking Crisis and "Japanization": Origins and Implications. *Working Paper Series*, no. 430 – Asian Development Bank Institute

Key ECB interest rates [Online]. Available at: https://www.ecb.europa.eu/stats/policy_and_exchange_rates/key_ecb_interest_rates/html/index.en.html (Accessed: 15th March 2020).

Kihara, L. and Koranyi, B. (2019). *Explainer: How does negative interest rates policy work?* [Online]. Available at: https://www.reuters.com/article/us-ecb-policy-rates-explainer/explainer-how-does-negative-interest-rates-policy-work-idUSKCN1VY1D2 (Accessed: 28th February 2020).

Klein, M. (2020). Implications of negative interest rates for the net interest margin and lending of euro area banks. *BIS Working Papers* No. 848.

Knot, K. (2019). Klaas Knot comments on ECB policy measures. Press release. Available at: https://www.dnb.nl/en/news/news-and-archive/Persberichten2019/dnb385535.jsp

Lagarde, C. and Guindos, L. (2020). Conferencia de prensa. Speech of the ECB's president and vice-president.

"Los analistas auguran un impacto limitado del coronavirus en la economía mundial", Expansión, 24th February. Available at: https://www.expansion.com/economia/2020/02/24/5e53c4dee5fdead45c8b45fc.html (Accessed: 2nd April 2020).

Nath, T. (2020). *What is Zero Interest-Rate Policy (ZIRP)?* [Online]. Available at: https://www.investopedia.com/articles/investing/031815/what-zero-interestrate-policy-zirp.asp (Accessed: 28th February 2020).

Pérez C. and Ferrer, A. (2018). The impact of the interest rate level on bank profitability and balance sheet structure. *Revista de Estabilidad Financiera,* 35.

Pozzi, S. (2017). "Hipotecas subprime: La crisis con la que empezó todo", *El País*, 6th August. Available at: https://elpais.com/economia/2017/08/05/actualidad/1501927439_342599.html (Accessed: 22nd February 2020).

Ruiz, J. (2019). *¿Qué es la japonización de la economía?* [Online]. Available at: https://blog.r4.com/que-es-japonizacion-economia/ (Accessed: 23rd March 2020).

Smets, F. and Potter, S. (2019). Unconventional monetary policy tools: a cross-country analysis, Committee on the Global Financial System, BIS CGFS Papers No 63. Report prepared by a Working Group chaired by Simon M Potter (Federal Reserve Bank of New York) and Frank Smets (European Central Bank).

Sveriges Riksbank [Online]. Available at: https://www.riksbank.se/en-gb/statistics/search-interest--exchange-rates/repo-rate-deposit-and-lending-rate/ (Accessed: 12th March 2020).

Swiss National Bank [Online]. Available at: https://www.snb.ch/en/ (Accessed: 12th March 2020).

Waechter, P. (2019). *Outlook 2020: finding equilibrium in a non-cooperative world* [Online]. Available at: https://pressroom-en.natixis.com/news/outlook-2020-finding-equilibrium-in-a-non-cooperative-world-6aa8-8e037.html (Accessed: 22nd February 2020).

Yoshino, N. and Taghizadeh-Hesary, F. (2015) Japan's Lost Decade: Lessons for Other Economies. *Working Paper Series*, no. 521 – Asian Development Bank Institute.