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The impact of unconventional monetary policy on the bank lending and the profitability of commercial banks in the Euro area

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Abstract

This paper examines the effect of unconventional monetary policy, specifically the Asset Purchase Programme (APP), on the lending behavior and profitability of commercial banks in the Euro area. In addition, the Euro area is divided into two groups, namely North and South to see if there are any differences between those European countries. A pooled OLS estimation is utilized, including a fixed effects model as a robustness check. The findings of the paper suggest that the APP does not exhibit a significant impact on the lending behavior and profitability of commercial banks, but the coefficients are positive, aligning with the existing literature. The differences noted between North and South refer to the potential asymmetries in the transmission of monetary policy, but did not show a significant effect. The results remain consistent across various robustness checks.

Keywords

Unconventional monetary policy, ECB, APP, commercial banks, Eurozone, Panel data, Finance

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1. Introduction

In an era marked by recurrent financial crises and pervasive economic uncertainties, the European Central Bank (ECB) has assumed a paramount role within the global monetary landscape. The ECB, as a powerful institution endowed with a specific mandate to conduct monetary policy, has undertaken an agenda focused on achieving macroeconomic stabilization. Central to this agenda is the utilization of conventional monetary policy tools, such as interest rate adjustments and market operations, to foster stable prices, optimize economic growth, and enhance employment rates during economic downturns. The consequences of these policies have far-reaching effects across the entire economic marketplace.

Notably, while the ECB sets monetary policy for the entire Eurozone, each contributing country maintains a national central bank responsible for managing monetary policy by domestic governmental regulations and overseeing national reserves. These national central banks collectively comprise the shareholders of the ECB, with share allocation based on population size and economic output, mitigating potential conflicts of interest. Concurrently, commercial banks, as financial intermediaries, provide essential services to the public and businesses, including loans, saving accounts, and payment solutions. Commercial banks play an instrumental role in stimulating economic activity through lending operations and the generation of interest income. The relationship between national central banks and commercial banks is underpinned by two critical facets; monetary policy and financial stability, encompassing aspects such as setting interest rates and mitigating systemic risks within the financial system. Despite their distinct responsibilities, the cooperation between these entities is indispensable for sustaining a healthy and robust economy.

Directly impacting economic activity in the market are consumers, buyers, and operating firms, collectively comprising the drivers of economic dynamics. These participants access bank loans provided by commercial banks for diverse purposes. The performance of commercial banks, in turn, is influenced by a multifaceted array of factors encompassing market conditions, resource allocations, technological innovations, and government policies. These factors, whether manifesting directly or indirectly, are subject to change over time, covering differences in exchange rates, interest rates, credit availability, demand fluctuations, and investor sentiment, thereby exerting distinct influences on the performance of commercial banks.

The post 2008 financial crisis landscape has witnessed a growing interest in unconventional monetary policy (UMP) among policymakers and researchers. UMP has been adopted by numerous central banks, including the ECB, the Bank of Japan, and the US Federal Reserve,

with the primary aim of restoring financial stability and confidence in the financial markets. This thesis primarily centers on the ECB, examining the mechanisms through which ECB policy decisions impact consumers, firms, and households within the real economy, a process known as the transmission of monetary policy. This transmission entails modifications in the money supply, credit accessibility, asset valuations, exchange rates, and the shaping of expectations. However, during periods of economic crises, this transmission mechanism can become impaired, rendering conventional policy measures less effective, particularly when confronting the zero lower bound of interest rates (Cecoioni, M. et al., 2016).

Understanding the influence of UMP on bank lending and profitability carries profound implications. The profitability of banks is fundamental for maintaining a stable financial system. UMP may exert substantial influence through various channels, including interest rate spreads, asset valuations, and shifts in risk-taking behavior, all of which ultimately impact profitability. Furthermore, investigating the effectiveness of these policies on credit expansion and investments is pivotal.

The overarching objective of this thesis is to expand upon current literature and furnish valuable insights for commercial banks, illuminating aspects related to risk assessment, profitability, policy effectiveness, and optimal decision-making in the midst of evolving ECB policies. This is particularly evident n the face of unexpected economic downturns, exemplified during the COVID-19 crisis of 2020, which exerted substantial pressure on the global economic growth. Consequently, the research question guiding this thesis is as follows:

What is the impact of unconventional monetary policy implemented by the ECB on bank lending and profitability within the Euro area concerning commercial banks?

Previous literature suggests that the implementation of unconventional monetary policies exerts a discernible influence on bank lending behavior. For instance, Jiménez et al. (2014) have observed that, in response to UMP, banks with lower liquidity and capitalization augment lending to riskier borrowers as a strategy to uphold profitability. However, this strategy may concurrently result in reduced financial stability. It is noteworthy that these findings are contingent upon sector-specific characteristics and the prevailing economic context, implying that alterations in the economic environment can yield divergent outcomes. Kenourgios and Ntaikou (2019) have recently conducted a study on the above-mentioned topics, which I will use as a guideline for this thesis research. They found that UMP has limited positive effect on the banks profitability and lending behavior in all Euro area countries. I intend to augment their

study by employing an alternative analytical approach, extending the research period, and specifically examining a particular monetary policy implemented by the ECB. Thereby will this thesis extend the existing body of literature, building upon the works of Cecoioni and Jiménez.

This study extends its analysis by investigating the differentiated impact of UMP on North and South European countries. This analytical approach contributes to a comprehensive elucidation of the intricate dynamics embedded within the Eurozone's monetary framework. North Europe, in this context, encompasses Belgium, France, Germany, Luxemburg, Sweden and the Netherlands, collectively recognized as the core economies of the Eurozone. These countries are characterized by their robust GDP, financial stability, industrial base and a pronounced presence in international trade. South European countries will consist of Greece, Ireland, Italy, Spain and Portugal. The comparison between North and South European countries within the context of this thesis lies in the profound economic disparities that define the Eurozone's constituent nations. There are divergent economic characteristics and trajectories of North and South European countries. Georgiadis (2015) found asymmetries in the transmission of monetary policy within the Euro area. Northern European countries in general have exhibited stronger economic fundamentals, while Southern European countries have often more economic challenges such as higher public debt, lower GDP per capita, and elevated unemployment rates, based on current and previous ECB data. Financial stability is a cornerstone of a prosperous Eurozone. This research enables an assessment of how one specific ECB policy influence the stability of banking systems in both regions. These insights are valuable for regulators, investors, and financial institutions seeking to safeguard against systemic risks and maintain a stable financial environment.

The remainder of the research is structured as follows, section 2 reviews the relevant literature, section 3 outlines the theoretical framework and the data that is used, section 4 will present the results, robustness checks and discussion, finally section 5 will conclude.

2. Literature Review

There is a general comprehension by policy makers on the fact that UMP, at least in the short run, could have a significant impact on the real economy. Monetary policy plays a pivotal role in shaping a nation's economic landscape to navigate economic fluctuations and crises. Although there is a lot of empirical research about the effects of monetary policies, different results appear in different settings. In this literature review I will provide the conclusions of current literature on the following questions: What are unconventional monetary policies, which types of policies are there, how does the transmission channels work, what does current literature say about the influence of UMP on the lending behaviour and the profitability of banks and summarize the main findings and research gap.

2.1. Monetary policy

For this research it is important to understand the mechanism by which conventional monetary policy is working, how unconventional monetary policy differs from the conventional monetary policy regime and the relationship between the two policies. Understanding this helps to determine the impact of monetary policy programs on the banks lending behaviour and profitability of the commercial banks.

Conventional Monetary Policy (CMP) is perceived as a systematic procedure by the central banks to achieve stable inflation rates by setting the short-term nominal interest rate. It relies on the interest rate adjustments through the interest rate channel. Clarida et al. (2002) discuss the role of expectations in the conventional monetary policy framework. They note that the transmission mechanism between short-term interest rates, inflation and economic activity is complex and central banks can use their control over the short-term interest rates to influence the household spending and investment decisions by the shareholders. So when the central banks lowers the interest rates, it reduces the costs of borrowing and stimulates spending and investing, which leads to a boost in economic activity. Mishkin (2011) noted that conventional monetary policy has some limitations especially in times of an economic crisis. They need to manage expectations when inflation is very low or interest rates reached their zero lower bound or when there is a liquidity scarcity. Central banks then need to be more flexible, transparent and willing to use unconventional monetary policy.

Unconventional Monetary Policy (UMP) is used when normal CMP by the central banks to control short-term interest rates have no impact anymore due to poor economic circumstances. These are non standard measures and occur when the conventional policy reach its limitations. After the financial crisis in 2008 several measures emerged as response by the central banks.

These measures can be divided into two groups, namely interest rate policies with the goal to influence financial conditions and balance sheet policies where the goal is that asset prices will be affected on the balance sheets to provide credit for the real economy.

2.2 Types of unconventional monetary policies

UMP can be defined as policies that specifically target the availability and cost of external financing for individuals, banks and non-financial institutions. In this part all UMP's and their influence on the goals of the ECB will be discussed. These policies are provided by the European Central Bank Eurosystem data website. Combining these types of policies with the current literature, will explain the effects on the economy and main variables of interest for this thesis.

To start with the interest rate policies. The ECB established a set of three different interest rates: foremost among them is the interest rate on the main refinancing operations, which is pre-determined and serves as the benchmark against which banks can borrow funds against collateral. They also set the interest rate for the marginal lending facility and the deposit facility. However, these interest rates become constrained when the effective lower bound is encountered; Mishkin (2011). Consequently, the ECB will employ new additional policy measures to address these limitation. In June 2014 the ECB introduced the negative interest rate policy (NIRP), where the deposit facility rate is set below 0% and the main refinancing operation as well as the marginal lending facility rate is set to less than 0.5%. Central banks have adopted the NIRP to establish their economic goals. In the figure below all interest rates by the ECB are plotted over time, where it is striking that after 2014 interest rates fell below 0 or 1%.

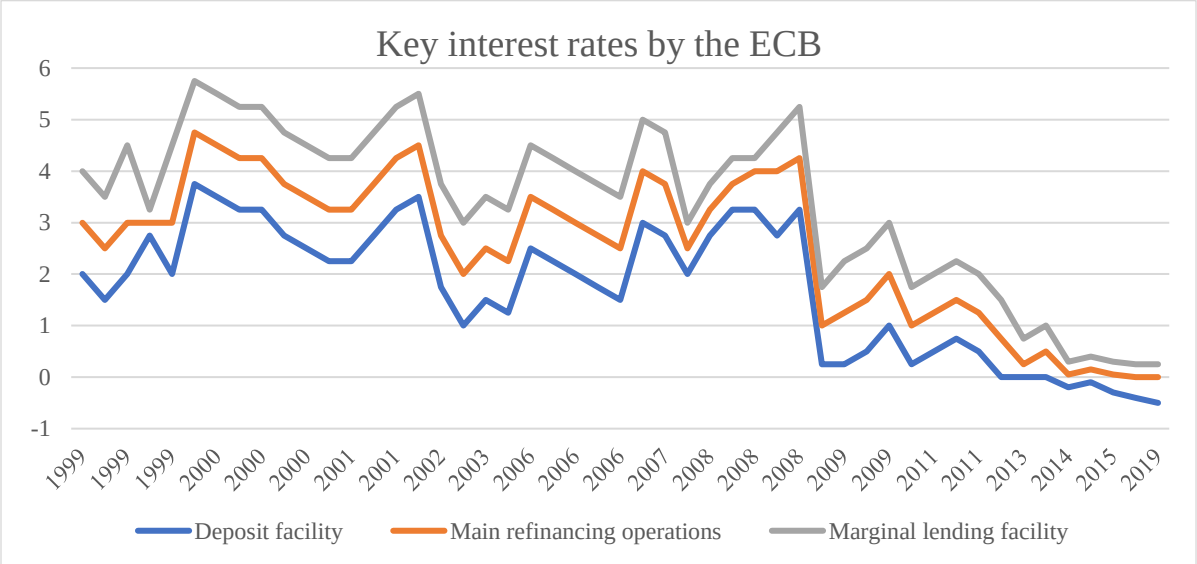

Figure 1: Key interest rates by the ECB before and during NIRP

The economic consequence of lowering the interest rates by the central bank is that it boost the credit demand for investments and consumption for firms and households. Central banks are charging commercial banks for holding large amounts of reserves. The ultimate goal is to stimulate borrowing and lending to increase economic activity. There are several effects of the NIRP. Gauti et al. (2019) found in their study that when banks and households are willing to pay for storage and liquidity services provided by reserves and deposits, the policy rates can become sufficiently negative. Policy rates and lending rates can differ. Especially, when commercial banks are strongly depending on deposits, it is more likely to have a bigger disparity. Nevertheless, the paper argues that reducing funding costs incentivizes the commercial banks to lend more to households and firms. A negative consequence of this is that is reduces the profits of the commercial banks and increases risk behaviour. However, the commercial banks have the option to maintain their profitability through various means, such as cutting expenses, increase their revenue by utilising non-interest sources and try to stop policy rates from directly influencing lending rates.

Another additional policy measures employed by the ECB is forward guidance, a strategy in which they communicate their prospective plans for monetary policy. This policy seeks to exert influence on the financial decisions made by investors, companies and households by providing a reference point for the future path of interest rates. Forwards guidance can be time-based and state-based. Time-based guidance commits to monetary policy until a specific point in time, for example fixed interest rates for the next three years. State-based guidance commits to monetary until a specific economic condition is attained, for example the 2% inflation goal. Following the pronouncement by the ECB, commercial banks are inclined to establish long-term loans at reduced interest rates. This, in turn, facilitates more favourable borrowing conditions for all participants on the economic markets. In essence, forward guidance provides more certainty about the future in uncertain times. McKay et al. (2016) investigated the impact of forward guidance on monetary policy in a New Keynesian model with uninsured income risk and borrowing constraints. They found that, in comparison to a New Keynesian model with complete markets, the effectiveness of forwards guidance decreases substantially when these additional components are taken into account.

The ECB also requires financial credit institutions in the euro area to hold a specific level of funds on their accounts with their respective national bank. This requirement policy is called minimum reserve and is one of the balance sheet policies. The goal of the minimum reserve system is to stabilise interest rates in the market. The banks must ensure that, over the course

of the maintenance period, the average amount of reserves on their current account satisfies their minimum reserve requirements, so no precise amount of reserves is needed and is depending on certain amounts of their balance sheet. As a results of taking the average of the maintenance period, banks are free to add or remove money from their reserves in response to sudden unexpected shocks on the money market. If a bank does not meet the requirements a suitable sanction will be imposed.

The final instrument used by the ECB are Open market operations (OMO), with the goal to signal the monetary policy stance, steering interest rates and managing the liquidity situation in the financial market. An open market operation is when the ECB buys and sells treasury bills to change amount of money in the economy. This is done with central banks and is depending on a particular interest rate. Changing the money supply, will affect the supply of loans and will also change interest rates. By changing the interest rates, there will be an effect on the demand of loans. When the ECB wants to increase the money supply and lower interest rates an expansionary OMO is used. By purchasing a range of assets for example government bonds, corporate bonds, securities issued by European supranational institutions, covered bonds and asset-backed securities, there will be an increase in supply of bank reserves. This allows the commercial banks to allow more loans, which stimulates the economy.

There are four different types of open market operations, each with different goals, frequency and strategy. These are outlined below. In the accompanying figure, these four OMO types are consolidated on the asset side of the ECB's balance sheet, providing a visual representation of their respective magnitudes.

Type Market operation	Goal of operation
Main refinancing operations (MRO)	On regular base (weekly) Executed by national central banks
Longer-term refinancing operations (LTRO)	Provide long term liquidity Three months (up to 48 months)
Fine-tuning operations	Ad hoc base Used in unexpected liquidity fluctuations
Structural operations	To change the structural position of the Euro system Asset purchases programme

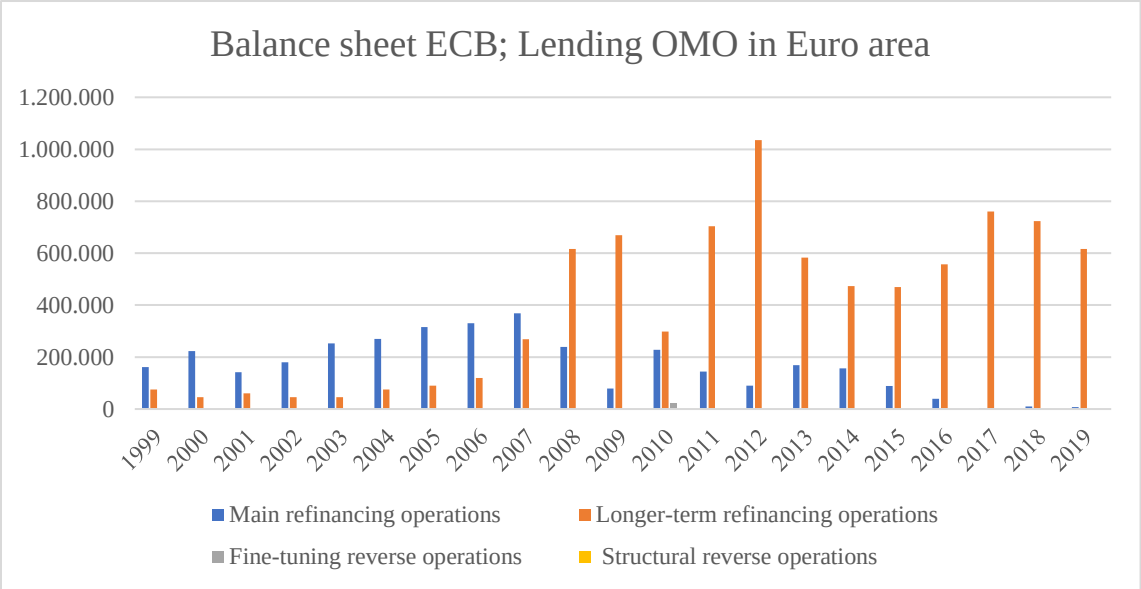

Figure 2. Lending to Euro area credit institutions related to the four monetary policy operations denominated in millions of euro, data used from ECB

What stands out in the figure is that there has been only one instance of a fine-tuning reverse operation in 2010, and there are no indications if structural reverse operations reflected on the balance sheet of the ECB.

The last type of structural operations, asset purchases programme (APP), is where the focus lies on this thesis. But since these purchases are non standard, they where included in the longer term refinancing operations in the figure above. APP and quantitative easing (QE) are related concepts, but not exactly the same. The goal of quantitative easing is to boost the money supply and encouraging lending and investment by requiring the central bank purchase a sizable amount of financial assets. The APP is a subset of QE. When using QE the ECB is varying in the types of purchases within a broader framework. The APP can be seen as a targeted implementation of QE tailored to specific market needs.

The asset purchases program helps to overcome the low interest rates and help the economy by boosting money supply. The APP consist of corporate sector purchase programme (CSPP), public sector purchase programme (PSPP), asset-backed securities purchase programme (ABSPP) and the third covered bond purchase programme (CBPP3). The list of the used APP for this thesis will be listed in the data section (3). In the figure below, all net purchases under the APP per programme are listed in million of euros. In the appendix.. the reinvestment phase of APP is represented. Since 2019 there are no new net purchases, only reinvestments of redemptions.

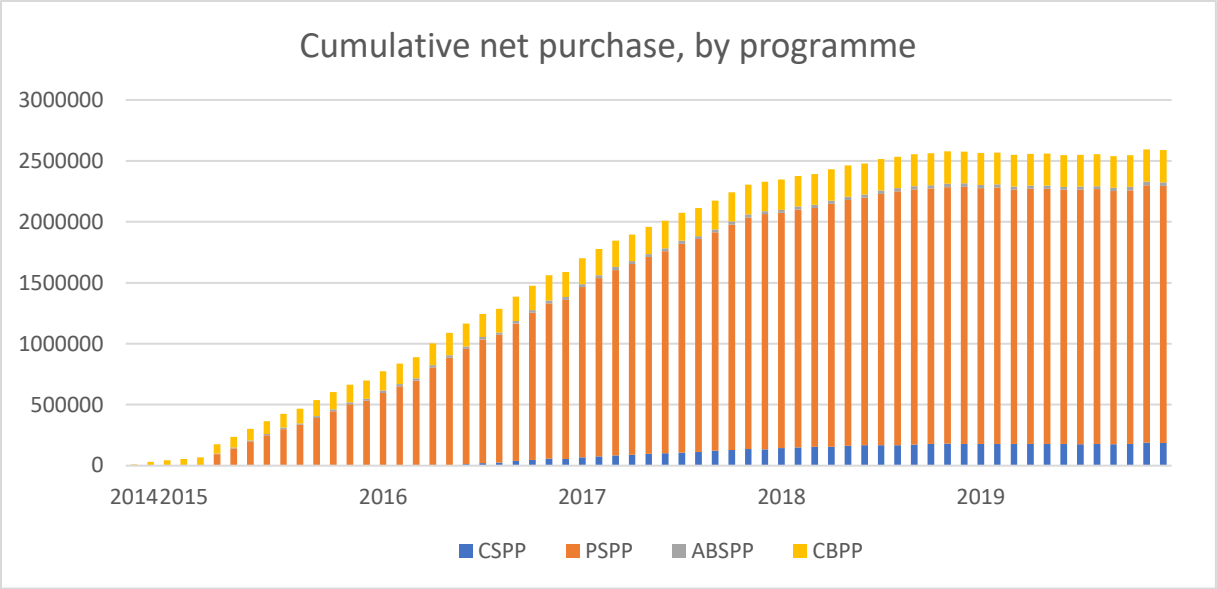

Figure 3. APP per programme in million of euros, data used from ECB.

M. Mandler et al. (2020) assesses the macroeconomic effects of the ECB asset purchases by using a simulation approach. They found that QE a limited effect on inflation and substantial positive effects of the APP on bank lending to non-financial corporations. Thereby Albertazzi et al. (2018) noted that QE has a small positive effect on bank lending, especially corporations with higher capitalization levels in the Euro area. They also found that the impact of QE is significant on potentially increasing bank's net profitability, but under strict economic constraints. In addition, Boeckx (2017) found that by buying assets the markets with capital losses have increasing liquidity. The ECB can influence the real economy by an exogenous expansion in total assets can lead to a significant but temporary rise in prices and output, it improves the bank lending conditions and the volume of the bank lending and it depreciates the exchange rate so they are effective to counter risk into financial stability.

Combining these literature results with data provided by the ECB, the following two graphs can be made. Noticeable on the left figure, there was a big fall in the leverage ratio, which could possibly mean that there is less risky assets on the balance sheet or different capital composition. The APP also puts pressure on the profitability of the banks, but the relationship between those is depending on the economic environment and will be dived deeper later on.

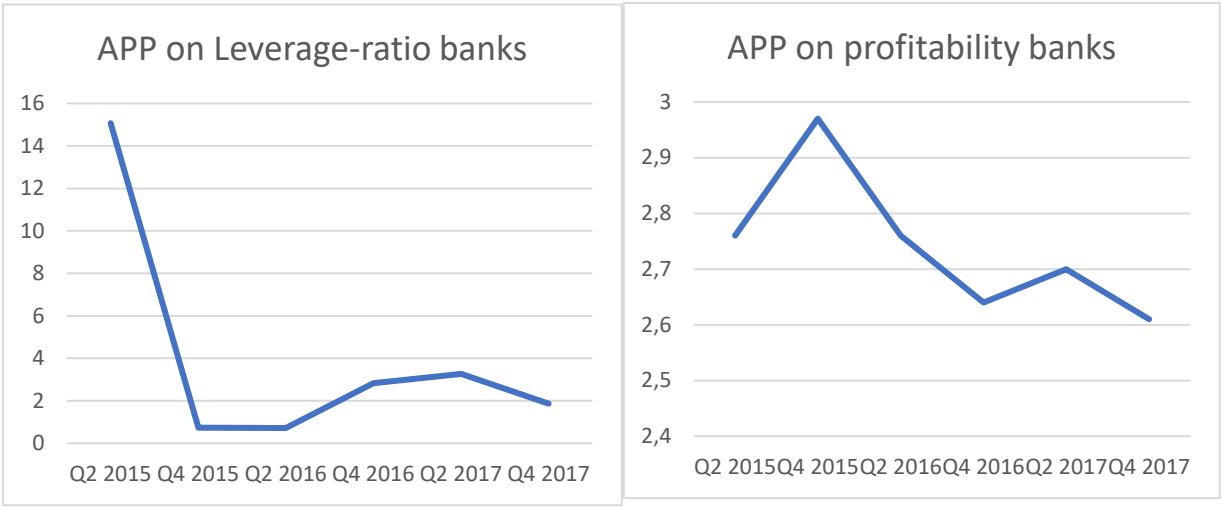

Figure 4. The effect of APP on leverage ratio and profitability of banks

In conclusion, it can be asserted that there are four main types of UMP, each differing in execution but sharing common economic goals.

2.3 Transmission channels

Monetary policy operates through various channels to influence economic activities. These channels play a significant role in the transmission of central bank actions to financial markets, which in turn impact asset prices, interest rates and eventually influence the behaviour of the participants on the economic market. The two crucial transmission mechanisms are portfolio rebalancing and signaling.

Portfolio rebalancing operates on the remise the risk-return trade off of different financial assets can change as a results of central bank policy causes changes in interest rates. In response, investors modify their portfolio in an attempt to find the best returns after accounting for the potential risk change. First there is a change in asset prices and returns. Bond prices increase and thus yields decrease when the ECB pursues expansionary monetary policy, which is the effect of lowering interest rates or implementing QE. Lower yields on bonds make them less attractive to investors, who may then turn to alternative investments, for example real estate. Interest rates changes affect how risk and return are perceived by investors. Riskier assets may become more appealing due to low interest rates, which could cause investors to reallocate their portfolios to higher yield securities. This impacts the prices and yields of various financial assets. Then finally the portfolio rebalancing affects the economic activities, because it changes investment decisions, contributing to changes in overall economic output. So the change in asset prices indirectly change the household wealth and thus consumption.

The ECB uses several communication tools to signal their assessment of the current economic conditions and their intended policy path. These tools are mentioned in the previous section,

for example interest rates decisions and forward guidance. By sending out the signals to the market, the ECB directly influences expectation management of households, financial institutions and firms. The signaling channel influences interest rate expectations, affecting short and long-term interest rates. The economic players modify their investment and consumption choices in response to expected shifts in interest rates. This aligns the economic expectations contributing to macroeconomic stability.

2.4 Loans and profitability determinants of commercial banks

In addition to the preceding sections, this part will provide an elucidation of the two main variables of interest of this thesis, namely loans and profitability. Supported with existing literature the coherence between the two primary variables and their determinants will be explained.

Petria et al (2015) provided evidence from several banking system of the EU to identify the main factors that affected the profitability of EU commercial banks. They split the determinants into two groups, internal (bank specific factors) and external (industry specific factors). As a proxy for profitability Return on Average Assets (ROAA) and Return on Average Equity (ROAE) are used. The authors expects that internal bank specific factors where size (+), capital (+), credit risk (-), management efficiency (-), liquidity risk (-) and business mix indicator (+). External factors where market concentration (-), inflation (+) and economic growth measured in GDP (+). Ultimately they concluded that all determinants where significantly influencing profitability, except for inflation.

In a paper written by Malede (2014) the determinants of commercial banks lending are given with evidence from Ethiopia. Since the majority of commercial banks focus their primary business on lending, the loan portfolio is the main source of income for banks. Bank lending is also depending on internal and external factors. For internal factors, bank size, credit risk, deposit and liquidity are used. External factors are cash required reserve and gross domestic product. After performing an OLS estimation, the author concluded that bank size, credit risk, GDP and liquidity ratio had a positive significant effect on commercial bank lending.

Based on the above, we observe that bank size is the common factor in determining the effect on profitability and lending behavior. Both demonstrate a positive and significant effect. Further details on this will be explored in the methodology section.

2.5 The effects of APP and hypothesis

As the factors influencing the primary variables of interest are now somewhat understood, the literature currently available about the impact of APP on the lending behaviour and profitability will be covered in the following part.

The Deutsche Bundesbank estimated the effect of the APP on GDP, consumer prices and bank loans to non-financial firms by using a simulation approach based on the monetary policy shocks. Their results indicate positive output effects and also positive but weaker effects on the inflation on consumer prices. They also estimate substantial positive effect of the APP on bank lending. A limitation to this research is that the identification model has some strong assumptions.

Albertazzi et al. (2018) states that the extent of which banks transmit monetary impulses via shifts in lending supply are determined by capital and economic constraints. Close coordination is required between the central bank and supervisory authority during stressed period and may weaken the effectiveness of monetary policies on bank capitalization levels. These policy measures tend to flatten the yield curve and thus the effect on the profitability of the bank tend to be overall net positive.

When assessing the influence of the APP on asset prices, Altavilla et al. (2015) observed a substantial impact in times of high financial distress. This underscores the significance of the timing of the APP implementation. Furthermore, Glick et al. (2012) show that the announcement of the purchases led to lower long-term interest rates and depreciation. In this context, it implies that the potential borrowing costs for commercial banks tends to decline, thereby reducing their overall interest expenses. Consequently, commercial banks can offer more attractive loans to market participants, leading to an increased demand for loans. The depreciation can cause higher profitability, as the value of bank's foreign assets may rise in the event of local currency depreciation.

Combining these findings with the literature of Cecoioni and Jiménez mentioned in the introduction the following hypothesis will be tested:

I hypothesize that

Effect on bank lending
H_0: APP has a significant positive impact on the bank lending of commercial banks
H_a: APP does not has a significant positive impact on the bank lending of commercial banks

Effect on bank profitability
H_0: APP has a significant positive impact on the bank profitability of commercial banks
H_a: APP does not has a significant positive impact on the bank profitability of commercial banks

Effect between North and South Europe
H_0: There is a significant positive difference between North and South European countries
H_a: There is no significant positive difference between North and South European countries

3. Empirical approach

3.1 Data

The data utilized in this study was sourced from the esteemed financial data platform DataStream, provided by Refinitiv. This comprehensive database of historical financial data and time series analysis is widely respected in both academic and financial sectors. In constructing the panel dataset, a combination of static and time-series components was undertaken, encompassing a vast array of micro and macro-level banking information from around the world.

or this research, the primary commercial bank is selected from the following countries: Belgium, France, Greece, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain. To compare North and South, the dataset is divided into two subsets. Spanning from December 31, 1999, to December 31, 2019, the dataset offers a substantial timeframe for comprehensive analysis, ensuring its informative representativeness. The study focused on banks classified under the Standard Industrial Classification (SIC) code 6029, corresponding to commercial banks. The dataset encompasses information from 96 active banks in these countries by the end of 2019, involving a total of 981 commercial banks throughout the considered period.

A crucial component of the time series data is the balance sheet data. The variables are essential for the analytical framework of this research. Based on the determinants mentioned by Petria et al. (2015), Malede (2014), and Kenourgios et al. (2019), a determination of how the variables should be measured in this analysis is made. The table below presents the dependent variables, the independent variables, and the control variables, including the explanation of how a variable is measured. Different from what Petria et al. (2015) did, as a proxy for profitability, not the average total assets, but the total assets are taken into account, as Kenourgios et al. (2019) did in their paper. In the appendix section of this thesis, a detailed list of all variables sourced from the balance sheets is provided. Each variable is accompanied by a corresponding search code and an explanation sourced directly from DataStream. For the control variables GDP, inflation, and bank interest rates, the ECB Data Portal is merged with the balance sheet dataset.

Table 1: Description of variables in the regression model

Type of variable	Notation	Variables description
Dependent	LOANS$_{i,t}$	Total loans to customers
	RoA$_{i,t}$	Return on Assets (Total profits / total assets) by the bank
Independent	EMP$_t$	ECB's monetary policy (Before (1998-2008) and after (2009-2019) the financial crisis
	SIZE$_{i,t}$	Bank size measured in total assets
	CAP$_{i,t}$	Capitalization (Leverage) (Equity at time t / total assets)
	RoEA$_{i,t}$	Return on Earning Assets (income of loans)
	LRISK$_{i,t}$	Liquidity risk measured in Total loans / total deposits
	IBL$_{i,t}$	Interbank Loans
	GDP$_t$	Gross Domestic Product
Control	CRISK$_{i,t}$	Credit risk measured in failed loans / total loans
	INF$_t$	Inflation at time t
	IR $_t$	Interest rates at time t

The asset purchase programs from the ECB consist of corporate sector purchase programme (CSPP), public sector purchase programme (PSPP), asset-backed securities purchase programme (ABSPP), and third covered bond purchase programme (CBPP3). Commencing in October 2014, these programs have played a important role in the recovery of the economy after the economic crisis. In the appendix there is a chart provided by the ECB containing the net asset purchases by programme. The study encompasses the entirety of these purchases until the end of 2019. Specifically, the purchase programs included:

1. €60 billion of net purchases from March 2015 to March 2016;
2. €80 billion of net purchases from April 2016 to March 2017;
3. €60 billion of net purchases from April to December 2017;
4. €30 billion of net purchases from January to September 2018;

5. €15 billion of net purchases from October to December 2018;
   no net purchases, only reinvestments of redemptions, from January to October 2019;

All those moments are captured in a dummy variable named 'ECP'. Which contains the value of 1 if there was a net purchase the respective quarter. The net purchase program figure in the literature review shows that is the purchases grow over time during this period.

3.2. Methodology

In this section, the empirical foundation of the study, examining the impact of asset purchase programs on lending behavior and profits of commercial banks, is outlined. The approach follows elements of the empirical strategy proposed by Kenourgios and Ntaikou (2019), with additional variables integrated based on the literature review. Given the focus on analyzing the influence of bank-specific data across Europe and macroeconomic variables over time, a panel data regression emerges as the most suitable model, accommodating both cross-sectional and time-series dimensions.

A binary variable, "purchase_ECP" (ECP), indicating the occurrence of a purchase program in a specific quarter, is introduced to the dataset. Combining this with other variables from Table 1, the regression formulas for assessing the effects of the Asset Purchase Program (APP) on lending and profitability are formulated:

Lending

$$(\ln)\text{LOANS}_{i,t} = \beta_0 + \beta_1*(\text{ECP}t*\text{SIZE}_{i,t}) + \beta_2*\text{ECB}t + \beta_3*\text{SIZE}_{i,t} + \beta_4*\text{CAP}_{i,t} + \beta_5*\text{ROEA}_{i,t} + \beta_6*GDPt + \beta_7*\text{IBL}_{i,t} + \beta_8*\text{CRISK}_{i,t} + \beta_9*\text{LRISK}_{i,t} + \beta_{10}*\text{INF}t + \beta_{11}*\text{IR}t + \varepsilon_{i,t}$$

Profitability

$$(\ln)\text{ROA}_{i,t} = \beta_0 + \beta_1 * (\text{ECP}t*\text{SIZE}_{i,t}) + \beta_2*\text{ECB}t + \beta_3*\text{SIZE}_{i,t} + \beta_4*\text{CAP}_{i,t} + \beta_5*GDPt + \beta_6*\text{IBL}_{i,t} + \beta_7 * \text{CRISK}_{i,t} + \beta_8 * \text{LRISK}_{i,t} + \beta_9*\text{INF}t + \beta_{10} * \text{IR}t + \varepsilon_{i,t}$$

In this context, the dependent variables are measured for a specific commercial bank 'i' at time 't'. Recognizing that bank size is a pivotal determinant influencing both variables, it is selected as the variable for the interaction term. The interaction term β_1 captures the average treatment effect, evaluating the differential change in loans and profitability between the treatment (ECB intervention =1) and control group (no ECB intervention = 0). This assessment considers the interaction with the natural logarithm of bank size, measured in total assets, alongside the natural logarithms of other independent variables and control variables within the model. The coefficient derived from this interaction term represents the percentage change in lending

behavior and profitability associated with a one percent change in the explanatory variables. To ascertain potential differences between North and South Europe, these regressions will be conducted three times: initially with the complete dataset encompassing all countries, then with only North European countries, and finally, with South European countries.

The Augmented Dickey Fuller test is applied to all variables to verify the stationarity if the dataset and assure stationarity. The p-values of the test results, displayed in Table 2 below, provide evidence to reject the null hypothesis, indicating stationarity. This implies that the mean and variance of the data remain constant throughout time, attesting to the dataset's reliability. To further ensure the validity of the estimates, a test for multicollinearity is conducted using the Variance Inflation Factor (VIF). The VIF measures how much the variance of an estimated regression coefficient increases if predictors are correlated. A VIF value less than one signifies no multicollinearity, and values less than five are generally acceptable but may indicate some presence (Brooks, 2020). Notably, the VIF results for ROA and ROEA exhibit significant deviation and fall outside the permissible range. Consequently, ROEA is excluded from the regression equation when determining profitability. Overall, the VIF levels stay within the acceptable range, ensuring the model's robustness and stability This, in turn, underscores the reliability of the regression coefficients calculated in the results section. Although the VIF level for size slightly exceeds five, the variable is retained in the regression based on the literature review, where size measured in total assets is deemed one of the most crucial variables influencing both effects and should be considered.

Table 2: Results tests VIF and ADF

Variable	**VIF (LOANS)**	**VIF (ROA)**	**ADF (p-value)**
(ln)LOANS			0.01
(ln)ROA			0.01
(ln)SIZE	6.12	6.97	0.01
(ln)ROEA	2.26	18.71	0.02
(ln)CAP	4.51	4.45	0.01
(ln)IBLOANS	5.21	3.62	0.01
(ln)LRISK	2.74	2.74	0.01
(ln)CRISK	2.03	2.20	0.03
(ln)GDP	3.99	4.08	0.03
(ln)IR	4.53	4.51	0.02
(ln)Inflation	1.64	1.64	0.04

Given that the dataset comprises panel data, an additional robustness check will be conducted. Two models, namely the random-effects model and fixed-effects model, are considered for the panel data analysis. The fixed-effects model controls for all time-invariant individual-specific effects, while the random-effects model assumes that these effects are random and uncorrelated with the independent variables. To determine which model better suits the Ordinary Least Squares (OLS) estimation, the Hausman test will be employed. This statistical method evaluates the effectiveness and consistency of the fixed-effects and random-effects models. The null hypothesis posits that both Fixed Effects and Random Effects estimators are consistent and efficient, with no correlation existing between the individual-specific effects and the independent variables.

Table 3: Results Hausman test

	LOANS	ROA
Chi2	5.8776	15.664
p-value	0.681	0.110

The outcomes reveal that the p-value is greater than the common significance level of 0.05, indicating the inability to dismiss the null hypothesis. This suggests a negligible efficiency distinction between fixed-effects and random-effects models. In the robustness check, the preference leans toward the fixed-effects model, addressing time-invariant individual effects explicitly. Recognized for its robustness, this model controls these effects, while the random-effects model assumes their uncorrelation with independent variables. This decision complements the initial pooled OLS results.

4. Empirical results

In this section, the results of the aforementioned regressions and methodology are presented, encompassing descriptive statistics, regression outcomes, robustness checks, and discussion.

4.1 Descriptive statistics

The summary of the descriptive statistics from the end of 1999 to the end of 2019 is presented below. Table 1 provides essential insights into the characteristics of the dataset. To enhance the consistency and interpretability of analysis results, strategic adjustments have been made to the explanatory variables' specification. Differences in scale among these variables complicated inter-variable comparability and could impact coefficient precision. Appendix 3 presents the original descriptive statistics, revealing significant differences in scalability. o improve comparability and result interpretation, the natural logarithm transformation was intentionally applied to standardize variable scales. This transformation potentially stabilizes variance, and coefficients are now interpreted as average percentage changes in lending behavior and profitability, as discussed later in this section. Moreover, important to notice is that some observations drop because of lack of data. A view additional variables, but not direct determinants for the regression analysis, had to be dropped, since data for the relevant period was not available. Still adding those variables could result in a biased results. the remaining categories still provide sufficient observations for regression analysis.

Table 4. Summary descriptive statistics converted to natural logarithm

Variable	Obs.	Mean	St.Dev.	Min	Max
Inflation	2975	0.9393	0.4124	-0.446	1.575
Interest rate	2975	1.1502	0.4199	0.365	1.850
GDP	2975	21.650	0.0657	21.52	21.78
Total assets (SIZE)	1141	24.720	2.3828	17.49	28.75
Total debt	1127	23.595	2.6637	0.555	27.85
Interbank loans	1035	21.890	2.3813	15.47	26.10
Loans	662	22.550	2.7980	13.23	27.34
Return on Earning Assets	1019	3.4093	0.1865	0.842	3.579
Return on Assets (ROA)	980	25.760	2.2108	1.640	29.54
Capitalization	1039	1.8330	0.5691	0.329	4.598
LRISK	1060	5.2630	0.8151	3.331	8.336
CRISK	812	0.7184	1.1930	-4.605	3.402

The interest rate, characterized by a mean of 1.1502, exhibits notable fluctuations. Meanwhile, GDP maintains a relatively steady trend, hovering around an average of 21.650. The range of Total Assets spans from 17.49 to 28.75, underscoring the diverse scale of banks within the

dataset. Total debt unveils a mean of 23.595, pointing to significant variability. Interbank loans, loans, and return on assets display nuanced patterns.

4.2. Regression results

In Table 2, the pooled OLS results of the dependent variable (ln) loans are presented, revealing several noteworthy findings. The intercept coefficients signify expected values when all independent variables are zero, delineating baseline differences between Total, North, and South. Particularly, the stark intercept disparity between North and South countries suggests a considerably higher starting point for North countries. The interaction term exhibits a significant negative effect in Total and South regions, implying that the impact of the Asset Purchase Program (APP) on loans weakens with increasing bank size. Conversely, for North countries, this interaction yields a positive but insignificant effect.

The size coefficient demonstrates positive effects on loans across all regions, underscoring the pivotal role of bank scale in facilitating lending behavior. Capitalization consistently exerts a negative influence on bank lending throughout all regions, emphasizing the risk-averse tendencies of well-capitalized banks. Interbank Loans exhibit a positive and significant impact on loans across regions, signifying that changes in interbank borrowing are proportionally associated with alterations in lending behavior. Both credit risk and liquidity risk significantly and negatively affect bank lending, underscoring the crucial role of risk factors in shaping lending decisions, particularly during uncertain economic times.

Consistent with the procyclical nature of lending, macroeconomic factors remain pivotal, with GDP negatively impacting bank lending across all regions. The interest rate negatively affects lending, and while inflation positively impacts lending, both estimates lack statistical significance, except for the estimate in the South. The high R-squared and Adjusted R-squared values suggest that the model explains a substantial portion of the variance in loans. The significant F-statistic further corroborates the overall significance of the regression model in each region, bolstering its validity.

Table 2. Pooled OLS results on lending behavior

	Total	**North**	**South**
Dependent variable (ln) loans			
Intercept	90.59179***	232.38178***	17.87688***
	(33.27984)	(70.697343)	(28.01925)
ECP*SIZE	-0.15464*	0.075308	-0.09674*
	(0.09188)	(0.125950)	(0.08876)
ECP	3.84547	2.013200	2.50768
	(2.37012)	(3.2479596)	(2.29618)
SIZE	0.80438***	1.267003***	0.06995**
	(0.09639)	(0.165572)	(0.09219)
Capitalization	-0.95402***	-2.261790***	-0.27789***
	(0.22114)	(0.374492)	(0.23561)
Return on Earning Assets	5.46781	-11.683071	-2.51792
	(1.88361)	(11.027846)	(1.93684)
Interbank Loans	0.06473***	1.026716***	0.67660***
	(0.10419)	(0.180861)	(0.09318)
CRISK	-0.45971***	-0.466131***	-0.35418***
	(0.05828)	(0.073709)	(0.10654)
LRISK	-0.8516***	-1.290860***	-0.78494***
	(0.16906)	(0.264415)	(0.23268)
GDP	-4.67537***	-7.693010***	-0.34668***
	(1.49806)	(2.543780)	(1.30587)
Interest Rate	-0.40976	-0.269834	-0.38203*
	(0.26616)	(0.413279)	(0.22554)
Inflation	0.15747	0.005048	0.38113*
	(0.17998)	(0.232578)	(0.19913)
Rsquared	0.7708	0.7618	0.8338
Adjusted R2	0.7656	0.7524	0.8246
F-statistic	150.1***	81.12***	91.21***

*** $p < .01$, ** $p < .05$, * $p < .1$; Robust standard errors

In Table 3, the pooled OLS results with the dependent variable ROA are presented, offering key insights into the determinants of Return on Assets across Total, North, and South regions. Notably, the intercepts for North and South are 46.43038 and -99.34917, respectively, revealing substantial variations in starting points between these regions. The interaction term ECP*SIZE shows no significant effect in any region, suggesting that the interplay between the ECB's APP and bank size does not significantly impact the profitability of commercial banks. The positive effect of ECP on ROA in all regions is not statistically significant, possibly due to lagged effects, ineffective transmission, or anticipation of the program's impact by market participants, which will be discussed later in this section.

Size exhibits a positive and significant effect on ROA across all regions, underscoring the role of bank size in enhancing Return on Assets. This could be attributed to economies of scale, where larger banks benefit from lower fixed costs and maintain more diverse portfolios, along with better access to funding markets. Conversely, capitalization shows a negative impact on ROA, indicating that well-capitalized banks may experience lower returns, possibly due to higher cost of capital or risk-averse behavior favoring lower-return investments for capital protection.

Interbank Loans display a negative and significant effect on ln ROA in all regions, suggesting that changes in interbank borrowing are proportionally associated with a decrease in Return on Assets. Liquidity risk (LRISK) has a significant negative effect on ROA across all regions, highlighting the adverse impact of increased liquidity risk on Return on Assets. GDP positively influences ROA in the Total and South, while negatively affecting ROA in the North. Interest Rate and Inflation lack statistical significance in explaining variations in ROA across regions. The R-squared, Adjusted R-squared, and F-statistic collectively indicate that the regression model is statistically significant and explains a notable portion of the variability in ROA. However, the modest R-squared values also suggest that there may be other factors not included in the model that contribute to the variation in Return on Assets.

Table 3. Pooled OLS results on profitability

	Total	**North**	**South**
Dependent variable Ln ROA			
Intercept	-6.96804**	46.43038***	-99.34917**
	(35.41541)	(16.60814)	(58.07438)
ECP*SIZE	-0.09105	-0.01700	-3.87157
	(0.13991)	(0.04114)	(26.31273)
ECP	2.23477	0.50277	7.14998
	(3.65678)	(1.06085)	(5.13560)
SIZE	0.46955***	0.30516***	0.46753***
	(0.09044)	(0.05232)	(0.15499)
Capitalization	-0.63364**	-0.04807**	-1.66714***
	(0.19889)	(0.11623)	(0.36346)
Interbank Loans	-0.50966***	-0.35112***	-0.47316***
	(0.09232)	(0.05643)	(0.15106)
CRISK	-0.05223	0.01027	-0.23568*
	(0.06524)	(0.02452)	(0.13249)
LRISK	-0.65472***	0.34228***	0.85175***
	(0.10667)	(0.07220)	(0.18098)
GDP	1.38370	-1.03978	5.71296*
	(1.62237)	(0.77342)	(2.65699)
Interest Rate	0.02254	0.12995	-0.35823
	(0.28847)	(0.12569)	(0.48945)
Inflation	0.08405	0.12212*	-0.06496
	(0.20301)	(0.07244)	(0.41773)
Rsquared	0.3906	0.4205	0.3501
Adjusted R2	0.3663	0.3986	0.3369
F-statistic	25.402***	25.275***	24.529***

*** $p < .01$, ** $p < .05$, * $p < .1$; Robust standard errors

Overall, these results now reveal no significant impact of the asset purchase program on the lending behavior and profitability of commercial banks in the Euro Area. The coefficients do, however, indicate a potential positive change, aligning with existing literature. Mandler et al. (2020) have previously identified positive effects on bank lending to firms. Additionally, Altavilla et al. (2015) demonstrate that larger banks tend to experience increased profits due to higher asset prices as a result of introducing APP.

The other explanatory variables, as highlighted by Petria et al. (2015) and Malede (2014), appear to influence the dependent variables, consistent with their respective findings.

The difference between North and South suggests that the impact of the variables on lending and profitability is not uniform, indicating heterogeneity in the results. There are no differences

in significance, but there are some disparities between the coefficients. As Georgiadis (2015) mentioned this could be the cause of asymmetries in the transmission of monetary policy. In the upcoming section, robustness checks will be conducted to assess whether additional adjustments yield altered outcomes.

4.3 Robustness checks

To ensure the validity of the above mentioned results, some robustness checks will be performed.

Starting with lagging the ECP variable by one quarter period, by introducing a one-period time lag in my regression analysis. This may be relevant due to the fact that unconventional monetary policies may not have an immediate impact on the variables. There could be a time delay in the effect on lending behavior and profitability when the purchase program is introduced so that could give different estimates. Also the market could anticipate on the announcement of APP so the participants reacts to the policy change before they are implemented. The results are listed in the table below using the total dataset containing all countries.

Table 4. Pooled OLS results with lagged ECP by one period

Dependent variable:	**(ln) LOANS**	**(ln) ROA**
Intercept	76.01796**	-3.75807
	(34.68141)	(35.31952)
Lagged_ECP*SIZE	-0.10963	-0.19030
	(0.09690)	(0.12697)
Lagged_ECP	2.66313	4.85277
	(2.50003)	(3.30256)
SIZE	0.90022***	0.48788***
	(0.09775)	(0.19812)
Capitalization	-1.10127***	-0.6525***
	(0.22747)	(0.19812)
Return on Earning Assets	6.86499***	
	(1.93991)	
Interbank Loans	-0.06447	-0.52639***
	(0.10450)	(0.09221)
CRISK	-0.42161***	-0.05179
	(0.05997)	(0.06512)
LRISK	-0.49418***	0.66215***
	(0.15557)	(0.1058)
GDP	-4.27494***	1.23105
	(1.55996)	(1.61809)
Interest Rate	-0.42354	0.02288
	(0.28003)	(0.28922)
Inflation	0.14817	0.08371
	(0.18656)	(0.19974)
Rsquared	0.7436	0.3618
Adjusted R2	0.7379	0.3544
F-statistic	132.1***	24.877***

*** $p < .01$, ** $p < .05$, * $p < .1$; Robust standard errors

Comparing the results of lagged and non-lagged regression for both Loans and ROA highlights some notable changes in the coefficients. However, it's crucial to note that these changes don't affect the significance levels. In other words, introducing a lag to the analysis doesn't cause a significant shift in the statistical importance of the variables. This implies that the relationships between the variables remain consistent even when considering a time lag.

While most of the literature, such as Tomak (2013), Petria (2015), and Cottarelli (1986), recognizes that bank size measured by total assets is the most important determinant influencing both variables, Kenourgios (2019) emphasizes capitalization as a pivotal determinant. As an additional robustness check, I will modify the regression to examine if there are different results when using capitalization instead of size as the interaction term. There can be concluded that

changing the interaction term does not significantly alter the relationship between the APP and the dependent variables. The results are presented in Appendix 4.

As final robustness check as mentioned in section 3.2 a fixed-effect model is estimated as addition to the pooled OLS results. Adding fixed effects controls for individual-specific effects of a variable that is constant over time. Since the data that is used contains of panel data this can potentially affect the results by controlling for unobserved heterogeneity. By including α_i I account for all time-invariant factors for each country that might be correlated with the dependent variable as well as the independent variables. The interpretation also changes a bit, because the coefficients now capture the within-country variation over time.

Table 5. Results fixed effects models

Dependent variable:	**(ln) LOANS**	**(ln) ROA**
ECP*SIZE	-0.0085	-0.0841
	(0.0628)	(0.0528)
ECP	0.32509	2.1871
	(1.6207)	(1.3795)
SIZE	0.89936***	-0.0989
	(0.2077)	(0.1159)
Capitalization	0.09918	1.58465***
	(0.2740)	(0.1567)
Return on Earning Assets	-1.5375	
	(1.7284)	
Interbank Loans	-0.0866	0.0136
	(0.0979)	(0.0551)
CRISK	-0.6121***	-0.1038***
	(0.0481)	(0.0290)
LRISK	0.04567	1.0177***
	(0.2443)	(0.1454)
GDP	-2.69125	0.6753
	(1.7483)	(0.9817)
Interest Rate	-0.50737**	0.4659***
	(0.2005)	(0.1183)
Inflation	0.00758	0.0658
	(0.1314)	(0.0804)
Rsquared	0.342	0.287
Adjusted R2	0.283	0.246
F-statistic	21.067***	18.376***

*** $p < .01$, ** $p < .05$, * $p < .1$; Robust standard errors

In the context of lending, the persistent significance of entity size, even after considering unique entity characteristics, underscores its crucial role in determining lending behavior. The robust negative association between Credit Risk and loans remains intact, suggesting that entities

facing higher credit risk consistently engage in reduced lending activities. Moreover, the consistent negative impact of higher interest rates on loans offers valuable insights for policymakers.

Shifting focus to profitability, the fixed effects model reveals that entity size remains a significant positive predictor of profitability. This reaffirms the enduring influence of entity size on financial outcomes. While some variables, like Return on Earning Assets, Capitalization, and GDP, do not exhibit statistically significant relationships with lending and profitability, these findings are in line with the complex interactions within the financial variables.

In summary, the inclusion of fixed effects strengthens our findings, aligning them with established economic theories by Cecioni (2016) and Glick (2012). The observed relationships between entity size, credit risk, interest rates, and profitability offer insights grounded in economic principles, contributing to a more comprehensive understanding of financial dynamics in this study.

4.4 Discussion

The empirical findings suggest that the Asset Purchase Program (APP) does not significantly impact the lending behavior and profitability of commercial banks. Therefore, this section discusses some key considerations and potential limitations within the framework of this study.

First, the control variables are based on averages within the Eurozone rather than being specified per country. This introduces potential variability in the results, as countries within the Eurozone possess different economic structures, regulatory rules, and financial systems. Further research could enhance the analysis by incorporating control variables scrutinized at the country level, facilitating a more nuanced comparison between the North and South regions.

Additionally, the absence of policy implications between countries is notable. Ignoring cross-country regulatory differences might obscure the impact of national regulatory and monetary policies on both lending behavior and profitability. During economic downturns, the implementation of expansionary fiscal policies can lead to varied lending behaviors and exert pressure on the profitability of commercial banks. Furthermore, local government expenditures, not accounted for in this research, can contribute to differences in the results.

In the determination of profitability, management efficiency and market concentration, as emphasized by Petria (2015), were not included. Management efficiency gauges how effectively commercial banks deploy their resources to generate profits, while market

concentration influences the competitive landscape, affecting profitability. The exclusion of these variables could potentially yield negative effects, as suggested by existing literature.

In the determination of lending behavior, the omission of the cash required reserve, highlighted by Malede (2014), is noteworthy. This regulatory tool, set by the central bank, can significantly impact the liquidity and lending capacity of commercial banks. The absence of this variable might lead to an overestimation of the coefficient of loans.

Future research can benefit from incorporating these discussion points into the research design for a more robust and suitable analysis. By addressing these considerations, researchers can enhance the comprehensiveness of their studies and gain a more nuanced understanding of the intricate dynamics influencing lending behavior and profitability in the Eurozone.

5. Conclusion

In conclusion, this paper conducts a regression analysis to investigate the impact of unconventional monetary policy, specifically APP, on the lending behavior and profitability of commercial banks in the Euro area between 1999 to 2019. This thesis used the work of Cecoioni et al (2016) and Glick, R et al(2012) as baseline study and builds op on the work of Kenourgios et al(2019). I intend to augment their study by employing an alternative analytical approach, extending the research period, and specifically examining a particular monetary policy implemented by the ECB, namely APP.

The results show several findings that adds depth to the comprehension of the interplay between the APP, bank size, capitalization, risk factors, and macroeconomic indicators. Notably, the APP did not wield a significant impact on the lending behavior and profitability of commercial banks within the Euro Area. However, the coefficients hinted at potential positive changes, aligning with insights from existing literature. The observed heterogeneity between North and South regions underscored the nuanced nature of the relationships, possibly influenced by asymmetries in the transmission of monetary policy. By lagging the ECP variable and introducing fixed effects provided deeper insights into the persistency of certain factors. The consistent significance of entity size, credit risk, interest rates, and profitability in the face of these adjustments affirmed the robustness of the results. These robustness checks not only validated the primary findings but also enriched our comprehension of the enduring influence of certain variables within the Euro Area.

A limitation to this paper was the use of Eurozone averages for control variables was acknowledged as a potential source of variability, prompting a call for future research to explore country-specific controls for a more nuanced analysis. The absence of policy implications between countries highlighted the need to consider cross-country regulatory differences, especially during economic downturns when fiscal policies diverge. In the determination of profitability and lending behavior, the omission of certain variables, such as management efficiency, market concentration, and cash required reserves, served as focal points for future investigations, offering avenues for more comprehensive analyses.

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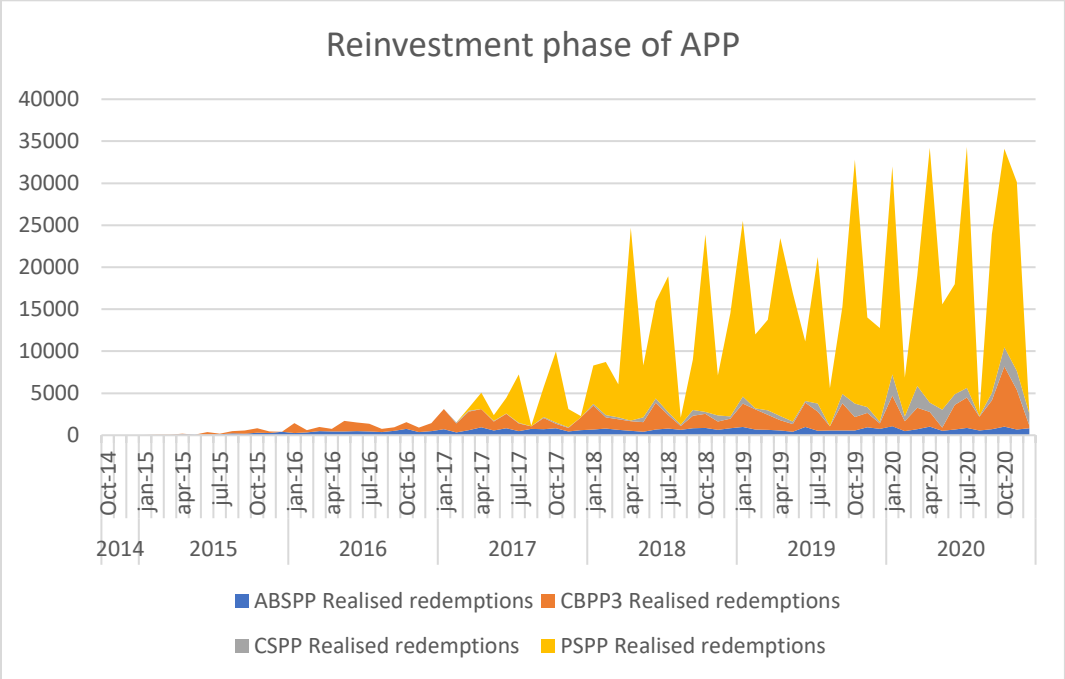
7. Appendix

Appendix 1

Variabele	Code	Explanation
Total assets	WC02999A	The sum of cash & due from banks, total investments, net loans, customer liability on acceptances (if included in total assets), investment in unconsolidated subsidiaries, real estate assets, net property, plant and equipment and other assets.
Total debt	WC03255A	All interest bearing and capitalized lease obligations. It is the sum of long and short term debt.
Total Liabilities & Shareholders' Equity	WC03999A	The sum of total liabilities, minority interest, non-equity reserves, preferred stock and common equity.
Interbank loans	WC02055	Transactions between banks that are not classified as cash.
Consumer & installment loans	WC02266	Loans made to consumers.
Return on Earning Assets	WC15567	Net Income before Preferred Dividends / Average of Last Year's and Current Years (Investments-Total + Last Year's Loans-Net) * 100
Return on Equity	WC08295	Profitability ratio. Net Income-GAAP / Last Year's Common Equity-GAAP * 100
Return on Assets	WC08326	Profitability ratio. Net Income before Preferred Dividends + ((Interest Expense on Debt-Interest Capitalized) * (1-Tax Rate))) / Average of Last Year's (Total Assets - Customer Liabilities on Acceptances) and Current Year's (Total Assets - Customer Liabilities on Acceptances) * 100. Customer Liabilities on Acceptances only subtracted when included in Total Assets
Common Equity % Total Assets	WC08241	Leverage ratio. Common Equity / (Total Assets - Customer Liabilities on Acceptances) * 100 Customer Liabilities on Acceptances only subtracted when included in Total Assets.
Loan Loss Coverage Ratio	WC15139	(Pre-tax Income + Provision for Loan Losses) / Net Loan Losses
Total Loans % Total Deposits	WC15049	Loans-Total / Deposits-Total * 100
Non-Performing Loans % Total Loans	WC15061	Non-Performing Loans / Loans-Total * 100

Appendix 2

Figure 5: Reinvestment phase of the APP, data used ECB



Appendix 3

Table 6: Summary descriptive statistics original values

Variable	Obs.	Mean	St.Dev.	Min	Max
Inflation%	2975	1,745	0,8836	-0,36	3,83
Interest rate%	2975	3,44	1,403645	1,44	6,36
GDP*	2975	2530150	166448,3	2208577	2863192
Total assets (SIZE)*	1141	352700000	560675900	39230	3058000000
Total debt*	1127	101600000	158748200	0	1246000000
Interbank loans*	1035	17386485	25139000	5242	215618000
LOANS*	662	93637227	192063700	559	751109000
Return on Earning Assets	1019	0,5357	2,512574	-27,6	5,83
Return on Assets (ROA)*	980	0,7572	2,217445	-23,36	4,54
CAP	1039	7,6	7,540702	1,39	99310
LRISK	1060	310,64	532,0366	27,97	4169,61
CRISK	812	3,162	3,109273	0,01	30,03

* Times 1000

Appendix 4

Table 7: Pooled OLS results with Capitalization as interaction term

Dependent variable:	**(ln) LOANS**	**(ln) ROA**
Intercept	73.32474**	-5.40124
	(34.75919)	(35.35960)
ECP*CAP	-0.21967	0.61541
	(0.57675)	(0.60305)
ECP	0.36052	1.34143
	(1.22268)	(1.22395)
SIZE	0.87615***	0.47388***
	(0.09728)	(0.09002)
Capitalization	-1.09671***	-0.65476***
	(0.22886)	(0.20016)
Return on Earning Assets	6.98471***	
	(1.93972)	
Interbank Loans	-0.04930	-0.51692***
	(0.10472)	(0.09204)
CRISK	-0.41426***	-0.04939
	(0.06001)	(0.06518)
LRISK	-0.47285 ***	0.67132***
	(0.15632)	(0.10567)
GDP	-4.16308***	1.31207
	(1.56364)	(1.61970)
Interest Rate	-0.41314	0.02007
	(0.27973)	(0.28842)
Inflation	0.15007	0.07465
	(0.18887)	(0.20288)
Rsquared	0.7429	0.3481
Adjusted R2	0.7372	0.3382
F-statistic	131.5***	25.23***

*** $p < .01$, ** $p < .05$, * $p < .1$; Robust standard errors