

First Thesis Proposal

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Abstract

Inequality has been markedly neglected from economists and policy-makers, but is gaining more attention recently especially after the extensive quantitative easing (QE) programs that implemented by major Central Banks. In my thesis, I focus explicitly on the monetary policy of European Central Bank (ECB) and its implications on inequality across the Euro Area countries. By either estimating or finding a variable to proxy monetary policy changes, I test whether these changes have an effect on inequality through a Vector Autoregression (VAR) analysis.

Key words: Inequality, income distribution, wealth distribution, monetary policy.

Information table

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1 Introduction

In this section, I provide a brief description of my project and I will try to highlight why the connection of Monetary Policy with Inequality constitutes a significant area of research. My purpose is to focus explicitly on Euro Area due to the fact that European Central Bank (ECB, henceforth) launched her Quantitative Easing (QE, henceforth) purchase program in January 2015 and at the same time because Euro Area consists of heterogeneous economies with different growth patterns and needs. Moreover, I describe the potential/feasible empirical methodology that I can follow to create the causal link between monetary policy shocks and inequality. The methodology I adopt is originated from the relevant literature I have studied so far, which I am going to describe more diligently in section 2. My expectations about the results are affected by the extant literature but this does not necessarily mean that my results would be in line with my expectations.

1.1 Working title of my thesis

“Monetary Policy of ECB and Implications On Inequality”

1.2 Motivation

Mainstream economics and policy-makers have not paid much attention to the significant role of monetary policy and her contribution to inequality (Saiki and Frost, 2014). Interestingly, monetary policy shocks have bolstered historical cyclical changes in consumption and inequality especially since 90’s (Coibon et al, 2012). For the United States, two different schools of thought exist. On the one hand, represented by Ron Paul, “Austrians” economists believe that expansionary monetary policy augments inequality by reallocating income from workers to capitalists. On the other hand, New-Keynesians, represented by James Galbraith, advocate that contractionary policy intensifies inequality by the bottom ends of the of income distribution.

The concerns about the role of monetary policy are not isolated only *within* the United States but they expanded to other advanced economies such as the Euro Area and Japan. For instance, Panetta (2015) underlines that inequality has an upward trend even in the most developed countries. Its magnitude and timing varies *across* countries, while it was affected by the grade that the financial market were predominant. Over the last years, intriguingly inequality *across* countries tend to decline, whereas the *within* country inequality have the tendency to increase. In the same spirit, Draghi (2016) argues that the redistribution of financial income seems more significant *within* countries rather than *across*. Therefore, we have to be prudent when we think about the distributional implications of monetary policy both in general and in the context of a Monetary Union.

Apparently, I am going to focus only on how the monetary policy of ECB affected inequality. However, this is not the only interesting aspect of Euro Area. We have to recall that the conventional monetary policy of ECB takes the form of “one-size-fit-all” Taylor Rule. Empirical analysis such as the analysis of Nechio (2011) argues that this policy does not fit under different fundamentals and circumstances. In other words, monetary policy has to be adjusted individually for each country and if not, then with the absence of fiscal integration the creation of “winners” and “losers” is inevitable. However, one-size policies do not create “winners” and “losers” *across* but also *within* countries themselves. Thus, it would be insightful to define inequality in a way to examine the condition of various societal groups and compare whether those dynamics apply throughout Euro Area.

It is transparent that monetary policy does affect inequality and has to be regarded as potential tool that should be used to help economies rebound during recessions but with presidency. Although, inequality could be an obscure notion and it has to be defined with an intuitive and unbiased way in order to derive credible conclusions. In section 2, I provide further information how the extant literature defines inequality and which data are used to measure the effect of monetary policy shocks. For that purpose, the literature tries to study channels through which monetary policy could affect inequality. Furthermore, researchers not only try to identify which countries but also which societal groups are affected the most from the changes in monetary policy. For instance, when an extensive QE asset purchase program takes place, it has the tendency to increase asset prices and this results to lower interest rates. Low interest rates benefit borrowers, but

there are detrimental for savers. Nevertheless, savers with a well-diversified *portfolio* might be able to offset this spillover.

All in all, we are able to grasp that the role of monetary policy lies beyond her traditional role as a complementary tool of the economy. However, via specific channels is competent to affect the corresponding dynamics of inequality patterns *within* and *across* countries. Hence, seemingly monetary policy seems beneficial for the whole economy but behind the spotlight she may aggravate both income and wealth distribution by benefiting one societal group against the other. This redistribution could possibly take place in the context of whole generations. The aforementioned phenomenon might not be unique but it is plausible that occurs in various countries throughout the world.

1.3 Research Question

“The relation between monetary policy (shocks) of ECB and inequality”. My research question will be examined with respect to income or wealth distribution and how they evolved over the time, across Euro Area countries.

1.4 Potential Empirical Methodology

In this subsection, I will present the potential methodology¹ I can follow based on the relevant literature. There is a variety of methods that can be followed for the purpose of examining how inequality is affected by changes in monetary policy. However, I was able to observe a convergence how the literature tries to model the shocks as “exogenous” in order to establish a credible causal link. In addition in this subsection, I will present which data can be used and whether are accessible or not with an intuitive table.

I start the description of my methodology based on a paper that influenced me substantially, which is the paper of Furceri, Loungani, & Zdzienicka(2016). The relevant literature usually uses the method developed by Romer and Romer (2004) to model the monetary policy shocks as exogenous. However, more recent literature also uses the method introduced by Auerback and Gorodnichenko (2013). Namely, they calculate the forecast errors of the policy rates (FE_t^i) defined as the difference between the actual policy rates (ST_t^i) and the rate expected by the analysts as of October of the same year (CT_t^i), using forecasts from Consensus Economics².

$$FE_t^i = ST_t^i - CT_t^i \quad (1)$$

The authors use the specific method for each country and similarly, they calculate the relevant forecast errors of inflation (FE^{inf}) and output growth (FE^g) with ultimate aim to plug these forecast errors in the following regression:

$$FE_i^{i,t} = \alpha + \beta FE_{inf}^{i,t} + \gamma FE_g^{i,t} + \epsilon_{i,t} \quad (2)$$

where the residual— $\epsilon_{i,t}$ — is able to capture the exogenous monetary policy shocks (*MP*). In this way, it is possible to plug-in the *MPs* within a regression. The specific method provides two advantages that help to isolate confounding effects on causal estimations of the effect of monetary policy on inequality. Firstly, using forecast errors the authors eliminate the problem of “policy foresight”. Namely, the agents may receive any kind of news about the upcoming changes in advance and may change their consumption and investment behaviour well before the actual policy takes place. Apparently, this might lead to inconsistent estimations. Secondly, by inserting inflation and growth patterns (equation 2) in the forecast errors, the model is less likely to capture plausible endogenous responses of monetary policy with respect to the state and the prospects of the economy. The final step of the methodology to estimate the impact of monetary policy shocks on inequality (mainly in the short- and medium-run) is to estimate the Impulse Response Functions (IRFs,

¹The methodology explained in this sub-section is proper for a panel data analysis.

²These forecasts are not available for free and this constitutes a problem in my analysis, perhaps I can construct a Taylor Rule for Euro Area and its difference with the actual policy reference rates or find another variable as a proxy for monetary policy changes/ shocks such as the annually changes in *M3* monetary supply of each country (e.g. on aggregate for ECB and specific decomposition of *M3* for each country individually).

henceforth) as they proposed by Jorda (2005). Very briefly, the IRFs are derived from VAR analysis to form local projections. To be precise, for each future period k the following equation is estimated on annual data:

$$y_{i,t+k} - y_{i,t} = \alpha_i^k + \theta_t^k + \beta^k MP_{i,t} + \pi^k X_{i,t} + \epsilon_{i,t}^k \quad (3)$$

- $y \rightarrow$ net or market income inequality
- $MP_{i,t} \rightarrow$ exogenous monetary policy shocks
- $\alpha_i \rightarrow$ country fixed effects
- $\theta_t \rightarrow$ time fixed effects to control for global shocks (recession or growth)
- $X \rightarrow$ set of controls for both lagged monetary policy shocks, changes in inequality and demographics
- clustered robust standard errors included, with respect to countries

Alternative measures of inequality: Except for the Gini indices from the Standardized World Income Inequality Database (SWIID), the authors use two more measures of inequality for the purpose of robustness. Namely, (i) the top income share series from the World Wealth and Income Database (WID) and (ii) the share of wage income in GDP from Organisation for Economic Co-operation and Development (OECD) database.

1.5 Table with information about available or potential databases

Database	Description
Standardized World Income Inequality Database (SWIID)	The SWIID provides comparable Gini indices of gross and net income inequality for 176 countries for as many years as possible from 1960 to the present along with estimates of uncertainty in these statistics.
World Wealth and Income Database (WID.world)	Available database on the historical evolution of the world distribution of income and wealth, both within countries and between countries. It gives the opportunity compare over long periods of time and across countries the income shares captured by top income groups (e.g. the top 10, 5 and 1%).
OECD-Productivity statistics	Share of wage income in GDP. This variable has been used as index of inequality by the extant literature.
Eurostat; World Bank and National Statistical Authorities	In these databases I can find various control variables for my econometric model such as GDP per capita and data for income and wealth distribution, from which I can compute my own inequality measures or Gini coefficients. In particular, from Eurostat I might be able to find data for various assets prices (e.g. houses, bonds and equities) in order to run simple panel regressions (see example of equation 5) in order to test which theoretical monetary channels are applicable for the Euro Area. For instance, equities' prices can be approximated by the values of the Stock Exchanges.
Statistical Data Warehouse of European Central Bank (ECB)	In this database, I can search whether there are data for monetary policy shocks. Alternatively, I can find a few proxies for the changes in monetary policy such as the i) Changes in monetary aggregate supply $M3$; ii) Changes in the balance sheets of ECB or Asset held by the BoJ, seasonally adjusted and divided by GDP. Perhaps, it is plausible to find these variables for every country of the Euro Area individually through the system of Central Banks. This will help me to decompose the aggregate data that ECB reports.

1.6 Expected results

The expected results are in line with the literature. Thus, the expected results with panel-data analysis are the following: 1) By using unexpected changes in monetary policy shocks (or at least a good proxy), expansionary monetary policy reduces inequality. In addition, this result is both statistically and economically significant based on the limited variation of Gini coefficients; 2) Inequality effects are higher in countries with smaller redistribution policies (i.e. those with lower income and wealth disparities between the richest and poorest quantiles) and higher labour share of income; 3) At last, monetary policies driven by growth reduce inequality while unexpected increase of policy rates which augments inequality. Nevertheless, it has to be mentioned that the results in the relevant literature are not unanimous which version of monetary policy (i.e. expansionary or contractionary) intensifies or alleviates inequality.

2 Literature Review

The connection of monetary policy and inequality started to attract researchers' interest after the bust of global economic crisis when the governments forced to intervene with unconventional measures in order to stabilize financial markets and curtail the deleterious spread of financial collapse to other sectors. Initially, the difference between conventional and unconventional policy has to be clarified. By the term *conventional* policy, we refer to a policy based on a variant of Taylor Rule or inflation targeting while the term *unconventional* refers to putting more liquidity into the financial market to support assets prices by directly purchasing private financial assets and subsequently setting nominal interest rates equal to zero, the so called zero-bound interest rates.

For the subject of monetary policy and its implications, the literature is richer for other countries, such as the United States or Japan because their QE programs have been launched quicker and for longer time period. On the other hand, ECB's QE started officially in January 2015 while the United States and Japan launched their QE programs very near to the collapse of Lehman Brothers (i.e. 2008Q3 approximately). In addition, the monetary policy in this countries hold more degrees of freedom in contrast to Euro Area where many heterogeneous countries have agreed to delegate their monetary policy to ECB. The main goal of ECB is to preserve price stability (European Central Bank, 2012).

Beginning from the United States, Coibion et al. (2012) examine which monetary policy shocks aggravate inequality in terms of income, consumption, earnings and expenditure. Their motivation is based on the fact that two schools of thought exist in the United States. On the one hand, "Austrian Economists" who advocate that expansionary monetary policies augment inequality, in contrast to "new-Keynesians" who argue that the contractionary monetary policies intensify inequality. The authors for the purpose of examining whether and which of the aforementioned causalities exist, try to establish potential channels via monetary shocks affect inequality. Those channels are more or less similar for the extant literature. A few channels³ proposed are:

1. *income composition* \rightarrow heterogeneity across households in terms of income resources
2. *financial segmentation* \rightarrow households which are connected with financial markets have privilege over those which do not have any experience
3. *portfolio* \rightarrow low-income tend to hold relatively more currency and inflationary actions would distribute income from low-income towards high-income households
4. *savings redistribution* \rightarrow an unexpected increase of interest rates and will benefit saver but it will be detrimental for borrowers
5. *earnings heterogeneity* \rightarrow labour earnings of low and high-income households might respond differently at monetary shocks. Consequently, unemployment might evolve disproportionately.

³Amaral (2017) enlists also these channels with quite similar description.

After enumerating the plausible channels, the authors underline that all those channels imply that monetary policy on economic inequality is a priori ambiguous⁴.

In order to examine the effect of monetary policy, the authors extract data, in quarterly frequency, from the Consumer Expenditures Survey (CEX) database since 1980 on households' consumption. Due to the fact that CEX data do not contain measurements for currency holdings and household's access to financial markets, the channels of *financial segmentation* and *portfolio* cannot be examined. In terms of methodology, the authors constructed measures for inequality for total income, wage income, consumption and total expenditures. Moreover, they define three ways of measuring inequality: 1) Gini coefficients of levels; 2) cross-sectional standard deviations of log levels; and 3) differences between 90th and 10th percentile of the cross-sectional distribution of log levels. Regarding monetary innovations, their model identifies them using the method developed by Romer and Romer (2004). In particular, this model investigates how contractionary monetary policy actions affect macroeconomic income and consumption aggregates.

The authors find, at odds with the opinion of "Austrian economists", that contractionary monetary policy shocks appear to have significant long-run effects on inequality across households with respect to labour earnings, income, consumption and total expenditure. In addition, monetary policy affects significantly the cyclical fluctuation and the trend of inequality. Two channels seem to be empirically significant because of the fact that monetary innovations affect considerably labour earnings. Namely, the income composition and earnings heterogeneity channels. Finally, the response of consumption and expenditures is larger for the high net-worth households than the corresponding low-worth, after unexpected changes in interest rates and inflation. However, Saiki and Frost (2014) critique these findings by mentioning that there are driven mainly by the data before 1990, when the Fed under Paul Volcker implemented extravagant measures to curb inflation.

Saiki and Frost (2014) underline that economists were mainly focused on the trade-of between equality and efficiency, although evidence from studies have indicated that great levels of inequality may curtail growth and worsen financial stability. In that spirit, monetary policy and especially the unconventional one has ignored as factor of inequality. Authors' motivation was originated by the fact that Japan's unconventional monetary policy of quantitative easing led to an increase of monetary base which was faster than any other major economy, after 2010. The data are originated from households survey ("Kakei Chosa" database) on quarterly basis. In particular, the authors use the savings and liabilities survey because it is representative for almost all the Japanese households. However, usefulness is limited as the data are not a panel because the sample is completely replaced every 1.5 years. They define *income* inequality through Gini coefficients while for approximating *wealth* inequality, via *portfolio* channel, they estimate a panel regression with year fixed effects to assess whether wealthier households will hold a higher percentage of their savings in securities. Furthermore, to test formally how monetary policy affects income inequality they use a VAR analysis. The authors find: 1) overall, UMP⁵ widens income inequality, mainly via the portfolio channel; 2) UMP raise asset prices disproportionally compared to their fundamentals; and 3) without UMP, the overall outcome might be even worse⁶ due to job losses, bankruptcy and financial panic. In conclusion, they recommend that the Japanese government should consider to implement complementary tax and structural reforms in order to offset the detrimental of impact of UMP.

Furceri, Loungani and Zdzienicka (2016) identify various causes of inequality such as technological progress, demographics⁷, globalization and structure of the labour market⁸. However, due to the extensive quantitative easing programs implemented by the central banks of the most developed economies, their concerns oriented towards how monetary policy stance affect income and wealth distribution. Interestingly, the authors examines the impact on inequality for both advanced and emerging economies and expand their analysis by assessing how effects of monetary policy shocks vary over time with respect to type of shock

⁴The specific remark can be found also in Draghi (2016) and Amaral (2016).

⁵Unconventional Monetary Policy

⁶Amaral (2017) recommends that Studies should compare the effects of unconventional with the counterfactual (alternative) of no expansionary policy. In this way, we will be able to judge the net final outcome.

⁷Amaral (2017) underlines income and wealth inequality are heavily influenced by demographics and not only from monetary policy. Hence, models should be developed to take into account heterogeneity across households' characteristics.

⁸Panetta (2015) mentions those aspects as *structural drivers*.

(tightening vs. expansionary), business cycle, initial levels of inequality and share of labour income to total income. In terms of methodology, the specific paper was very interesting for me and that is why I describe in detail their methodology in sub-section 1.4, which might adopt if it feasible to find the relevant data and my technical abilities permit to replicate such a model. The authors find that: 1) by using unexpected changes in monetary policy shocks, expansionary monetary policy reduces inequality; 2) contractionary (positive) monetary policy shock has larger inequality effects than expansionary (negative), especially during expansions; and 3) monetary policies driven by growth reduce inequality.

The aforementioned paper uses data from the Standardized World Income Inequality Database (SWIID, henceforth) which developed by Frederick Solt. Very briefly, SWIID uses a custom missing-data multiple imputation algorithm to standardize observations collected from various institutions (e.g. World Bank, OECD, United Nations) and statistical authorities (e.g. Eurostat) around the world. Luxembourg Income Study (LIS) database serves as the standard. SWIID uniqueness, as described in Solt (2016), maximizes the compatibility of available income inequality data for the broadest possible sample of countries and years.

Nechio (2011) highlights the complex case of the Euro Area according to Taylor’s guideline. With respect to member states macroeconomic fundamental he designates them as part either Euro Area’s *core* or *periphery*⁹. He finds that single monetary policy does not fit under different growth patterns while he recommends “one-size-fit-all” policy requires high labour mobility and integrated fiscal policy to alleviate this divergence.

Panetta (2015) mentions that ECB’s QE program accused of flattening the yield curve¹⁰ and this may disturb the behaviour of ordinary investors. Monetary policy generated spillover effects, when there is not full economic integration with common fiscal policy. These spillovers create “winners” and “losers” between Member States, although it is not simple to measure redistributive effects across Euro Area because of the different definitions about income and wealth. Thus, the differences *within* countries have to be regarded¹¹. Panetta (2016) finds that the recent expansionary monetary policies produce the greatest benefits for the households which: 1) are highly indebted; 2) own a house; 3) have a mortgage, and 4) are in countries where real estate prices have risen¹². Panetta (2016) concludes, firstly that Central Banks must take into account the redistributive effects otherwise they fail to delineate in depth the transition mechanisms. Secondly, he warns if monetary policy leads to extreme inequality then the central government might intervene and pressure Central Bank to alter her policy. In other words, this implies to potential loss of independence¹³. At last, he supports that the Central Banks have to act to tackle “saving glut¹⁴” phenomena and subsequently, recommends that the transition mechanism of representative agent has to be developed¹⁵ by adding the heterogeneity of households based on household’s incomes and asset portfolios.

Adam and Tzamourani (2016) observe the unconventional policy of ECB surged the prices of equities, sovereign bonds and houses. Their aim is to study the distributional consequences of these price increases for Euro Area households. They define household’s net wealth as the difference of all assets minus all liabilities, as they stated in the HFCs and subsequently, they scale them with respect to that measurement. Moreover, the authors find that capital gains from asset price inflation lead to heterogeneous distributional implications in the Euro Area. In particular, gains from bonds and equities are concentrated to among the richest quantiles while the corresponding gains from housing prices are more wide spread and more prominent to countries with housing ownership rate. Overall, price increases in equities intensify inequality contrary to house prices while bonds leave inequality unchanged.

⁹Core is consisted of Austria, Belgium, France, Finland, Germany, the Netherlands & Italy while *periphery* contains Greece, Ireland, Portugal & Spain.

¹⁰Draghi (2016) states that the goal of QE is to flatten risk-free curve and compress risk premia.

¹¹Draghi (2016) focuses explicitly on the dynamics of *within* countries inequality.

¹²Adam and Tzamourani (2016) examine the distributional effects from asset price inflation including housing prices.

¹³Acemoglu and Johnson (2012) underline that the independence of Central Banks is a perpetual issue. For the case of Federal Reserve they debunk her disinterested policy and warn that monetary policy is affected by specific interests, especially those of major bankers.

¹⁴Setting very low natural rate may heighten the danger of slipping into a period of persistent low interest rates, low inflation, low growth, and greater inequality.

¹⁵Coibion et al. (2012) suggest also that the standard representative agent models may understate considerably the welfare costs of zero-bound interest rates.

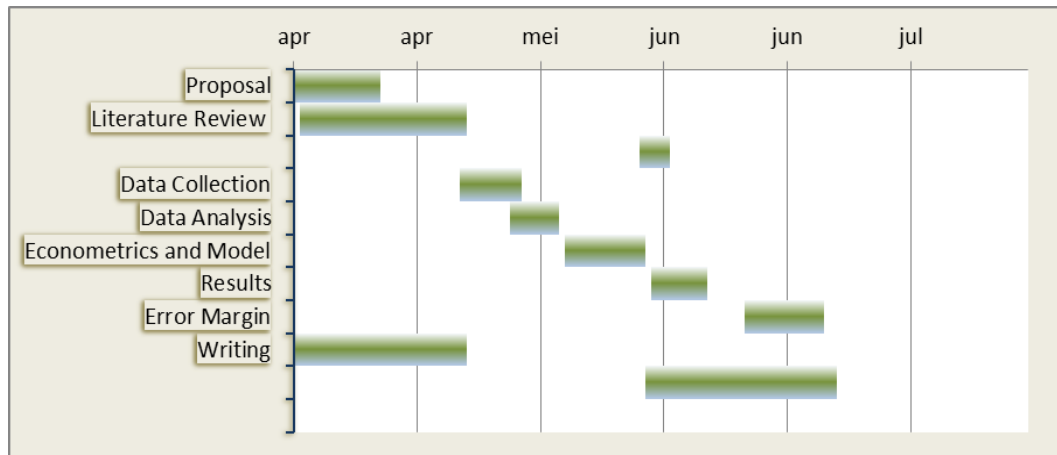
Draghi (2016) unveils the interest of ECB about the potential distributional effects of monetary policy. In addition, he mentions that falling interest rates is not something new but it is something that was happening the last 30 years. Furthermore, he supports that it is necessary to augment natural rates back to normal because zero-bound interest rates entail detrimental side-effects for financial markets and especially for savers. At last, Draghi (2016) argues that two available ways exist to go back to normal. The first way is through investments and fiscal policies aimed at rising productivity while the second one is via structural reforms to alleviate excess saving over investment. Nevertheless, Draghi underlines that the second way is quite challenging due to the ageing population of Euro Area.

2.1 Gantt Chart

Important Deadlines:

- Exams; Regular Period: 10-18/05/2017
- Proposal Submission: 16/04/2017
- Proposal's Grading and Feedback: 23/04/2017
- Proposal Resit: 08/05/2017 → I might need this deadline because the quality of my initial proposal would be deteriorated considerably by the exams and the substantial workload before of the courses before the exams.
- Exams; Resit Period: 08-15/05
- Thesis Submission: 30/06/2017
- Defence: Before 15/07/2017
- Meetings with supervisor: Not known a priori, although they can be adjusted with punctual communication with my supervisor, as we have already discussed.

Gantt Chart



My Gantt chart¹⁶ depicts approximately how many days I will invest on each task for the purpose of completion of my thesis. However, this Gantt chart is not definite but it is based on my current expectations and it might change. In this case I have to inform my supervisor in advance. Significant factor for my planning will be my performance in the exams at the regular periods. The “error margin” that I included,

¹⁶I have already sent a more analytical Gantt chart to my supervision in order to improve our cooperation.

represents the days that I might invest to study for the resits' period if the results are not sufficient during the regular period of the exams. In particular, the exact dates and the duration (in days) for each task are the following:

- Proposal: 02–16/04; Duration: 14 days
- Literature Review: 03–30/04 & 28/05–02/06; Duration: 32 days
- Data Collection: 29/04–09/05; Duration: 10 days
- Data Analysis: 07–15/05; Duration: 8 days
- Econometrics and Model: 16–29/05; Duration: 13 days
- Results: 30/05–08/06; Duration: 9 days
- Error Margin: 14–28/06; Duration: 14 days
- Writing: 02–30/04 & 29/05–29/06; Duration: 59 days

2.2 Work Plan & Remarks

1. Clarify my research question further and perhaps, if it is possible to make it even “sharper”. This will help to concentrate my efforts to find data easier and even restrict the sample of Euro Area countries. Nonetheless, the main aspect of my research question remains “the relation between monetary policy (shocks) of ECB and inequality”.
2. Study as well as I can the relevant literature. In this way, I can find interesting databases and variables because a few authors provide the datasets they created for their work. The literature will provide me with a few insights how to develop my empirical model.
3. Start to search and collect data. I can draw a few graphs or perform correlations analysis to see unofficial with variables, including monetary policy, affect inequality. Simultaneously, I can create tables with descriptive statistics for the variables that will be part of my model with certainty.
4. The most difficult part comes after the creation of my panel dataset (observations for Euro Area countries over the time). I have to be prudent and build an alternative well-structured econometric model because the one that I described in section 1.4 seems infeasible, regarding the availability of data and my abilities to replicate or even approximate such a model. For that reason, I provide the equations (4) and (5) as an indicative alternative model.

This is the section where I will need the most help not only from my supervisor. As far as I am concern, the model which I am going to use is a Vector Autoregression (VAR) analysis in order to estimate Impulse Response Functions (IRFs). Except of my main econometric model, I might need to run other regressions to prove which theoretical channels, as I described in section 2, transfer the impact of monetary policy for the case of Euro Area. An indicative econometric model could be:

$$y_{i,t+k} - y_{i,t} = \alpha_i^k + \theta_t^k + \beta^k MP_{i,t} + \gamma^k X_{i,t} + \delta QE_t^k + \epsilon_{i,t}^k \quad (4)$$

Where the dependent variable $y_{i,t+k} - y_{i,t}$ on the left hand side will denote the change on inequality after k of change in monetary policy or “exogenous” monetary shock ($MP_{i,t}$). Potential proxies for this parameter might be the changes in: i) M3 monetary supply (on aggregate level for ECB or individually for each central bank of the Euro Area member states; ii) the proportion of assets held by Central Banks divided by the GDP of each country of the Euro Area. These two variables are proxies in the case I will not be able to find data for monetary policy shocks. Regarding, $X_{i,t}$ is variable that can contain controls such as the lags of the selected inequality index, GDP per capita etc. α and β denote country and time fixed effects, respectively. Finally, if I have complete data up to 2016 I can include

a dummy variable for the QE program which takes the value 0 before 2015 and 1 afterwards. In this way I will be able to observe whether QE had an additional impact on the patterns of inequality. An interactions term with the $MP_{i,t}$ could be a good idea. At last, i denotes the country and t the year, respectively.

An indicative panel regression to prove the validity of *portfolio* channel, for instance, could be the following:

$$Percentage_{t,j} = c + \beta Annual\ Income_{t,j} + u_{t,j} \quad (5)$$

Where t denotes year, j the income decile based on the annual income, while the $Percentage_{t,j}$ represents the percentage of savings in securities or other assets, such as equities. The sophistication behind is whether wealthier households hold a higher percentage of their savings in securities or other assets.

5. Finally, after creating a credible econometric model I will start the interpretation of the results and I will start writing intensively the final version of my thesis.

2.3 Contingency Table and Risks

Risk	Likelihood	Severity	Solution
Not enough data	Low	High	Change econometric model, use alternative design, less countries or years in the sample.
Not capable to model the “exogenous” monetary policy shocks	High	Moderate/High	Find fixed dataset or ask supervisor and other professors to recommend easier methods or good proxies. High severity if I am not able to find either a dataset or a more approachable method for my abilities. To ameliorate the hazard, I provide an alternative econometric model through the equations (4) and (5) but it is not entirely clear to me whether the model is technically correct and credible.
Not capable to design the econometric model	Moderate	Low	Consult colleagues in Master’s; PhDs from the Econometric courses; professors and supervisor.
Results are not statistically significant	Moderate	Low	Check again the relevant literature. It is not uncommon to end up with insignificant results even if the econometrics behind the model are correct.
Writer’s block	High	Low	Just relax and take a brake. Brainstorming with other people.
Problems with writing structure of the thesis	Moderate	Low	Check the course materials for Applied Economic Analysis 2, emulate how the authors write in the economic literature and try to improve further my repertoire.

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