Master's Thesis

The Impact of Unconventional Monetary Policies on Gender and Racial Wealth Inequality: Evidence from the Large-Scale Asset Purchases in the United States.

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Abstract

This thesis investigates the impacts of large-scale asset purchases (LSAPs), which are an unconventional monetary policy (UMP) used by the Fed in the response to the 2008 global financial crisis and recession, on gender and racial wealth inequality in the US. After demonstrating that monetary policies have gendered and racial impacts and that none of these studies have yet considered UMPs, the thesis will then explain theoretically what the transmission channels of LSAPs to the wealth distribution are. Empirical studies show that LSAPs created a wealth effect, through increasing the price of some asset owned by households, primarily stocks prices, and to a lesser extent house prices. Current literature on the impact of LSAPs in the US is still in dissension over whether it increased net wealth inequality or not. However, there is ample evidence from the current gender and racial economic literature that the wealth distribution in the US is significantly unequal, and a hole in the literature on the impact of LSAPs on the highly gendered and racial US wealth distribution. The thesis then begins to fill in some of these gaps in the literature by investigating what has happened to the financial and non-financial wealth of households disaggregated by gender and race in the period of the LSAPs, and whether the LSAPs did contribute to or reinforce these wealth inequalities. Due to limitations in the data collection the thesis is not able to conclude that there was a net negative gender wealth inequality effect. Nevertheless, there is strong empirical evidence that the LSAPs did increase racial wealth inequality, due to white households disproportionately owning stocks and having higher rates on homeownership.

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List of Abbreviations

ARDL – Autoregressive distributed lag model

CMP – Conventional monetary policy

CPI – Consumer Price Index

D-i-D – difference in differences

DSGE – Dynamic stochastic general equilibrium model

Fed – Federal Reserve

FFR- Federal Funds Rate

GDP- Gross Domestic Product

HFCS - Household Finance and Consumption Survey, Eurozone

HH – Household

LSAP – Large-scale asset purchases

MBS – Mortgage backed securities

MP- Monetary Policy

ONS- Office for National Statistics, UK

PSID – Panel Study of Income Dynamics

QE – Quantitative easing

SCF- Survey of Consumer Finances

s.d – standard deviation

TVP – Time varying parameter

UMP- Unconventional monetary policy

US – United States of America

VAR- Vector Autoregressions

1. Introduction

Inequality has become one of the most pertinent topics of discussion among economists and other social scientists in the 21st century. While the issue of income inequality in the United States has taken centre stage, the issue of wealth inequality has been relatively neglected, and yet wealth inequality, which is particularly driven by increasing wealth at the top of the distribution, has increased considerably in the last three decades in the US (Saez and Zucman 2016). These trends in wealth inequality have become a concern because they were the root cause of the 2008 global financial crisis (Stockhammer 2013). Hence the dimension of wealth inequality needs to be added to the discussion of the impact of unconventional monetary policies.

Wealth inequality is not only a problem in the US for economic reasons but for social reasons also. Given that the US has a social and economic system in which there much less public provision of public services such as higher education and healthcare, it means that households with lower wealth will have lower wellbeing and opportunities than the rest of US society. Wealth is a household's future potential income and safety net, and so it is a resource to help families if their regular income disappears in the short term, and to help them with upward mobility in the longer term.

The 2008 global financial crisis; often described as the worst in history (Tooze 2018), forced the United States' (US) Federal Reserve (Fed) and other central banks around the world to resort to a raft of unconventional monetary policies to rescue the global economy. The most prolific of which were the large-scale assets purchases (LSAPs) which occurred from the end of 2008 until 2014. Whilst commonly referred to as quantitative easing (QE), I will use the technically correct term of LSAPs throughout this thesis since this term also includes credit easing. UMPs use asset purchases or forward guidance to try to influence long-term interest rates. In general LSAPs use the growth rate of the central bank reserves (monetary base) as a policy instrument, with an intermediate target of lowering the term and yield spreads. The ultimate goals of UMPs are to stimulate economic activity and recover financial stability.

The LSAPs led to a 'wealth effect', which can be defined as when households increase their expenditures resulting from an increase in their wealth (Watkins 2014: 436). Many central bankers such as Greenspan (2013) and mainstream economists such as

Feldkircher and Huber (2018) have argued that the 'wealth effect' which is mainly driven by increases in the value of shares, has a positive impact for households and the economy as it leads to greater consumption and investment. However, households were not affected equally by the wealth effect because they are not heterogeneous in their wealth and portfolio holdings. It is important to discuss which assets were most affected by the wealth effect and which households own these, in order to understand whether wealthier households benefitted relatively more, which would then increase net wealth inequality. Thus, the impact of LSAPs on wealth distribution of US households is one of the main indirect effects of unconventional monetary policies, unlike conventional monetary policies used prior to the 2008 crisis, which had negligible effects on wealth inequality. However, there is a problematic issue that we cannot currently differentiate the empirical effects of the LSAPs from other UMPs such as forward guidance, but we can theoretically disentangle it from the overall effect of UMPs.

Whilst the impact these expansionary and unconventional monetary policies have had on wealth inequality is starting to be recognised (Domanski et al. 2016; Adam and Tzamourani 2016; Colciago et al. 2018), these studies have failed to acknowledge the further gendered and racial dimensions of this impact. These dimensions need to be added in order to uncover the greater unequal distribution of wealth between males and females, and whites and non-whites.

In this thesis I will take a Keynesian approach. In this view, monetary policies are not neutral and that their impacts continue past the short term. Furthermore, this approach acknowledges that households are not heterogeneous, and that there is a class distinction in the income and wealth distribution which can be altered by monetary policies.

On top of taking a Keynesian approach, I will also be adding a lens of intersectionality. An intersectional approach combines feminist and stratification economics. Crucially it is only by adding this analytical lens that one can uncover the true extent of the impacts LSAPs have had on exacerbating wealth inequality among households in the US. Intersectionality can be defined as the mutual reproduction of class, gender and racial relations of inequality (Acker 2006). The social construction of gender and race and class has almost always resulted in structural inequality, and they are overlapping and

cumulative in their effect of people's experiences (Belkhir and Mc Nair Barnett 2001: 157) in society and the economy.

Whilst intersectional frameworks have been used to study the impacts of policy responses since the global financial crisis, the majority of those have focused on government fiscal policy, and not the action of central banks (Seguino 2019). Research on monetary policies before the crisis has found that central bank policies are gendered and racially biased (Braunstein and Heintz 2008; Seguino and Heintz 2012). Therefore, it is unequivocally fundamental that when assessing the wealth inequality impact of a policy such as LSAPs, the intersectional aspects of gender and race are included, especially in the case of studying the US, which is an "ethnically heterogeneous society" (Seguino and Heintz 2012: 630).

Racial wealth inequality is a significant issue in the US. Decades and centuries of segregation and discrimination has impeded black families from accumulating wealth and passing it onto future generations. Not only do black and Hispanic households have fewer assets, but the ones they do own are worth significantly less than assets owned by white households. The inequalities of race and gender are interconnected and amass to create greater discrimination and inequalities for individuals and families, and so they should not be studied separately, but in the same analysis, to allow for the possibility of "multiple discrimination" (Seguino and Heintz 2012: 625). Thus, an intersectional lens needs to be adopted.

In the data analysis, a variety of US household surveys and data sources have been used. The main measure used to analyse changes in wealth inequality are the median net worth of households, and also the wealth gap ratios between two household categories. Most available data on the relationship between monetary policy and wealth inequality is not disaggregated by gender or race. Going forward I will refer to such gender and race 'blind' data, or studies which use such data, as discussing the 'aggregate' wealth impact. Gender- and racially-blind data then leads to gender-and racially-blind policies. "In the absence of gender-aware monetary policies, governments (or more precisely, central banks) could unintentionally undermine their country's gender equality goals" (Seguino 2019: 33), and not only gender but also racial equality goals too.

This thesis is organised as follows. In chapter 2 there will be a discussion on the distributional impacts of conventional monetary policies in the US, and what research has previously been done on any gendered and racial impacts. Chapter 3 will explain the history of LSAPs from 2008-2014, and establish both theoretically and empirically, that the transmission channels which had the biggest impact on US household net worth were the stock market and the housing and mortgage market. After determining in chapter 4 the results of studies already conducted on the aggregated and disaggregated wealth inequality impacts of LSAPs and on the unequal gendered and racial wealth distribution in the US and , Chapter 5 will fill some of the research gaps pointed out in previous chapters with the extensive descriptive data analyses, which will find out to what extent did the increases in stock prices caused by LSAPs (ceteris paribus) play a role in the exacerbation of racial and gendered disparities in household wealth, and whether the other 'wealth effect' of lower mortgage rates and increasing house prices (non-financial wealth) from the LSAPs could have reduced the net gender and racial wealth inequality impact. Chapter 6 concludes and summarises the findings before suggesting points for further research.

2. The distributional impacts of Monetary Policies

This chapter demonstrates that the first research question of whether monetary policies have a gendered and racial impact on wealth inequality is valid. The first part of the literature review discusses the findings of previous empirical studies on the distributional impact of conventional monetary policies, and whether these policies have any impact on wealth inequality, and then also whether monetary policies have gendered and racial impacts.

This section will focus on conventional monetary policies because prior to the financial crisis unconventional monetary policies had rarely been used by central banks, nor their impacts studied. Because CMPs generally lacked a significant transmission channel to the wealth distribution, it has meant that central bankers have in the past not been concerned with the potential of monetary policies to increase wealth inequality. Unlike CMPs, UMPs/LSAPs work mainly through the wealth channel (Feldkircher and Huber 2018), and do not just impact the economy through the market interest rate, but also impact asset prices, which are owned and distributed unequally between private individuals and households. Without including a discussion of the distributional impact of conventional monetary policies it is hard to gauge how substantially different and important the findings on the distributional impact of UMPs such as LSAPs on wealth inequality are.

First of all, it is imperative to differentiate between different types of monetary policy. Conventional monetary policy (CMP) normally refers to the tools used by central banks such as the federal funds rate, which is the short-term interest rate used by Federal Reserve to reach its legislated macroeconomic objectives of low stable inflation and maximum sustainable employment. CMPs can be either expansionary, in which Fed tries to increase money supply by either reducing short-term interest rate or increasing monetary base, or contractionary (disinflationary/monetary tightening) to reduce the money supply and increase interest rates in order to curb inflation.

Unconventional monetary policy (UMP) is usually employed when conventional policy cannot be used, because the economy has hit the zero-lower bound (ZLB). This happened during the financial crisis in 2008 when the Fed had already reduced short-

term interest rates to almost zero, and then they could not be reduced further to try to stimulate the economy. UMPs have so far only been expansionary, unlike CMPs

I will now briefly examine whether the distributional impact of a monetary policy differs depending on whether it is expansionary or contractionary (disinflationary/monetary tightening), and whether either has an impact on wealth inequality.

2.1. The distributional impact of CMPs in the US

2.1.1. Contractionary CMPs

Table 2-1. Empirical Studies on Contractionary CMPs

Author	Method	Country	Period	Main Result
Coibion et al. (2017)	Local projections method	US	1980-2008	Contractionary monetary policy of an increase in the official interest rate (policy rate) by 100 base points leads to an increase in income inequality through the earnings heterogeneity channel.
Davtyan (2017)	VAR	US	1983-2012	An increase the official policy interest rate by 1s.d. leads to a decrease in income inequality
Gornemann et al. (2016)	New-Keynesian 'sticky price' business cycle model. Heterogenous agent DSGE Model	US	1984 Q1-2008 Q3. (During 'tranquil' times).	2 types of households: 'Main Street' and 'Wall Street'. The latter own most of the assets in the financial sector and have more diversified portfolios. They simulate that raising the nominal interest rate by 6.25 basis points leads to an increase in income and wealth inequality, and hits 'Main Street' harder than 'Wall Street'.
Furceri et al. (2018)	Local projections method	32 countries, including US	1990-2013	An increase in the official interest rate (policy rate) by 100 base points leads to an increase in unemployment and in income inequality (earnings heterogeneity).

2.1.2. Expansionary CMPs

Table 2-2. Empirical Studies on Expansionary CMPs

Author	Method	Country	Period	Main Result
Doepke and Schneider (2006)	Scenario analysis	US	1952-2004	Expansionary monetary policy that increases inflation reduces wealth inequality
O'Farrell and Rawdanowicz (2017)	Microsimulati-ons	US and 7 other OECD countries	2007-2012	The decrease in the interest rate of 1% point led to a reduction in income inequality in the US. A 10% increase in stock and bond prices increases wealth inequality but a 10% house prices reduces wealth inequality. For US net wealth inequality is estimated to fall overall.
Romer and Romer (1999)	Multivariate, and cross-sectional regressions	US, and also cross-country study	1969-1994, and 1970-1990	In the short run expansionary MP leads to increased inflation, output & may decrease in income inequality, but only temporarily. MPs that keep inflation low are the best for all households, even the poor.

Empirically there is a lack of consensus, since the studies in Table 2-1 and Table 2-2 show both expansionary and contractionary MPs have both positive and negative impacts on inequality. Only Doepke and Schneider (2006) and O'Farrell and Rawdanowicz (2017) discuss the impact of expansionary MPs on wealth inequality. Based on these finding one would expect that LSAPs; as an expansionary monetary policy, would lead to inflation and a reduction in the concentration of wealth, or an increase in asset prices and no net effect on wealth inequality. The next chapter however will examine this in more detail, and question the assumptions made by mainstream economists such as Romer and Romer (1999) that the distributional impacts of monetary policy are only temporary. Nevertheless, these studies show that both contractionary and expansionary monetary policies can have impacts on wealth inequality.

2.2. Gendered and racial distributional impact of CMPs in the US

As previously evidenced, monetary policies do have distributional effects because households are heterogeneous (Gornemann et al. 2016), but it's only by adopting an intersectional economics lens that we can fully understand "…how the burden of

contractionary [monetary] policy is shared in society" (Thorbecke 2001: 65). Table 2-3 includes all studies which consider a gendered and/or racial distributional impact of monetary policies in the US.

Table 2-3. Empirical Studies on gender and racial impact of monetary policies

Author	Method	Country	Period	Indicators used	Main Result
Rodgers (2008)	Recursive VARs, and ADL model	US	January 1979 to October 2006	Federal funds rate and duration of unemployment disaggregated by race.	1 s.d. increase in federal funds rate: VAR- African-Americans more likely to face unemployment, but for shorter periods than whites ADL- white unemployment increases by 3%, African American unemployment increases by 6%.
Seguino and Heintz (2012)	Econometric state level panel data	US	1979-2008	Unemployment rates disaggregated by gender & race	They estimate that a 1% increase in FFR increases the unemployment ratio relative to white males by 0.015 for white women, by 0.029 for black men, and by 0.039 for black women, when controlling even for employment and education.
Sierminska and Takhtamanova (2009)	Single equation regression, VAR.	US and 8 other OECD countries	Quarterly for 1980-2004	Interest rates and employment rates by gender	For the US a short-term interest rate shock: Female employment more sensitive than male employment, with a 1 to 3-year lag. US was the only country in the study that this was the case.
Thorbecke (2001)	VARs	US	Sep 1973-Dec 1996	Unemployment rates disaggregated by race	Increases in the federal funds rate increase unemployment among blacks and Hispanics by 50-90% more than whites, who are disproportionately low-income workers.

Table 2-3 shows strong evidence that women and minorities disproportionately carry the negative effects of contractionary monetary policies, specifically in terms of loss of employment. This is a consistent empirical finding for the US. The studies in Table 2-3 only looks at conventional and contractionary monetary policies and not expansionary and unconventional ones. There have not yet been any studies on the gendered and

racial effects of monetary policies, specifically UMPs, since the financial crisis and Great Recession in the US. This is further evidence for the need of the analysis of this thesis.

They also use the disaggregated employment rate as the main unit of analysis to assess whether racial or gender inequality has increased as a result of central banks increasing the interest rate. Thorbecke (2001: 65) also mentions that the cost of disinflationary policies cannot be measured solely by the aggregate effects on unemployment and the economy. This is also the case for UMPs.

To summarise there is a lack of research and evidence prior to LSAPs and the 2008 financial crisis, on the impact monetary policies have had on both aggregated wealth inequality and disaggregated wealthy inequality in terms of gender and race. This is because the goals and channels that conventional monetary policy used were primarily controlling inflation through changes in the interest rates. However, Joyce et al. (2012) pointed out that since the financial crisis the theoretical foundations of monetary policy have changed. The aim of monetary policies is no longer solely low inflation. The extensive use of LSAPs during the Great Recession and subsequent years reflects the broadening of the scope of central banks and monetary policies. The next chapter will address in more depth how LSAPs as a representative of UMPs have impacted the wealth distribution and inequality in the US.

3. LSAPs in the US and transmission channels

3.1. History of Fed Reserve LSAPs

3.1.1. The origins of the financial crisis and response.

From 2007 onwards the US economy was faced with an unprecedented meltdown in the financial markets. The discovery of toxic subprime mortgages bundled up in mortgage backed securities (MBS) unravelled and spooked the world's money markets. Investors initially attracted to MBS due to their higher yields when compared to Treasury bonds, then faced significant loses, with rising default rates of subprime loans.

It has not just been the impacts since the financial crisis and the UMPs that have been gender and racially unequal, but also origins of the subprime crisis. In the 1990s commercial banks and mortgage lenders started using subprime loans as a form of predatory lending, which is when the financial lender takes advantage of a borrower by giving them a loan that is likely to lead to default or foreclosure, and so the loan is economically detrimental to the borrower. There was clear evidence of deteriorating standards used by mortgage lenders in the early 2000s, but Federal regulators refused to act (Hernandez 2009). Dymski et al. (2013) in their research highlight how the subprime crisis disproportionately affected female-headed households, and there is a higher proportion of female-headed households among racial and ethnic minorities. Banks and lenders were disproportionately financially exploiting previously excluded racial minorities and women in mortgage lending up until 2007 when the house price bubble burst. For many ethnic minority households in Sacramento California and many other regions across the US, getting subprime financing was the only way in which they could access the housing market (Hernandez 2009). When the Fed increased the federal funds rate (FFR) in 2007 many homeowners could no longer afford their mortgage repayments and so mortgages started to fail. There were significant increases in foreclosures, which disproportionately hit female and ethnic minority households that were given the unaffordable subprime mortgage loans. The US Congress did not support passing legislation for there to be a debt cramdown for mortgages to give homeowners the opportunity to avoid foreclosure. This gendered and racial aspect of the triggering of the financial crisis has been ignored by most mainstream and Keynesian economists. It reaffirms the need to use an intersectional lens.

The Fed initially responded by signalling reductions to the FFR and the discount rate (for commercial banks) between 2007-2008 by 3.25 percentage basis points to 2% and 2.25% respectively. With the bankruptcy of Lehman Brothers, one of the largest in history, in September 2008, the Fed had to step up substantially their efforts to save the economy. The FFR was lowered even further to 0.15%, approaching the zero-lower bound. These conventional monetary policies failed because during the financial crisis there was a discontinuation of the connection between official interest rates and market interest rates (Joyce et al. 2012).

According to Joyce et al. (2012) the LSAPs conducted by Fed from 2008 onwards were intended to affect the prices and yields of a wide range of assets, especially bonds issued to finance lending to companies and households, rather than manage a liquidity problem in the banking and financial system.

There is some confusion about using the terms of the different LSAPs of QE and credit easing interchangeably which needs to be clarified. In the case of the US, the purchasing of risky private sector assets such as MBS and agency debt in the financial markets and swapping them for safer public assets by the Fed is 'credit easing'. In theory this asset purchasing programme does not impact the size of reserves at the central bank, rather it modifies the composition of its balance sheet on the asset side, "in order to ease liquidity conditions in financial markets" (Lavoie and Fiebiger 2018). It can lead to an increase in reserves and the size the central bank's balance sheet, but this is not the purpose of 'credit easing'. Whereas QE is specifically the purchase of government bills and bonds from the private sector, which are relatively riskless bonds, and enlarges the central bank's balance sheet through increasing commercial bank reserves on the liability side of the balance sheet. The Fed did both asset purchasing programmes and in both cases the asset purchases were specifically about the quantity of assets bought in order to try and influence their yields and prices.

3.1.2. The stages of LSAPs

I will now outline briefly the different stages and programmes of LSAPs announced by the Federal Open Market Committee (FOMC) between 2008-2014. Firstly, there was QE1 which began in December 2008. The FED purchased $500bn in MBS and $100bn in agency debt (from Frannie Mae and Freddie Mac). Then between March 2009 to December 2009 the FED purchased $750bn of MBS and $300bn of US long-term

securities. The aggregate of these MBS purchases represented almost 15% of the value of the total of MBSs in US bond markets in 2008 (a total of $9trn). These asset purchases by the FED led to a tripling of the US monetary base (see Figure 3.1). According to (Nakajima 2015) the intention of the specific purchases of MBS and agency debt (80% of assets purchased in QE1) was to lower yield curves reduce mortgage interest rates to make it more affordable for borrowers to obtain a mortgage to buy a house or refinance an existing mortgage, thus stimulating the housing market, and also a positive knock on effect for financial markets. If QE1 really did affect the housing market then we would expect house prices to start increasing again (ceteris paribus), which would increase the net-worth of homeowners in the US, by increasing their home equity.

Even after QE1 the FED still wanted to lower long-term interest rates further, and so QE2 was announced in November 2010 with the purchase of $600bn of long-term Treasury securities only. The circumstances motivating this form of programme of QE were that while the financial markets had calmed down, economic activity in the real economy
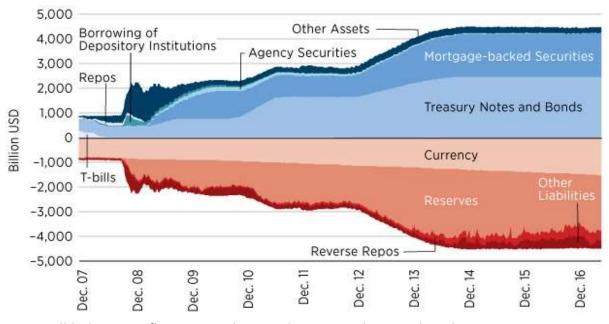
Figure 3.1 Federal Reserve Balance sheet. Source: Federal Reserve Board

was still lethargic. Inflation was also very low, around 1%, and so there were concerns that the US economy could fall into a deflationary spiral.

In September 2011 the FED began 'Operation Twist 2', also referred to as Maturity Extension Programme (MEP), a version of credit easing. The FED sold $667bn of short-term treasuries in exchange for long-term treasuries until December 2012, to extend the average maturity of securities in the FED's portfolio. This MEP was proposed to further

put downward pressure on longer-term interest rates and support the economic recovery by increasing the price of long-term treasuries by reducing their supply. It did not expand the monetary base because the FED was just swapping assets in sales rather than creating new electronic money to buy assets (see Figure 3.1). The final programme of the LSAPs referred to as QE3 started in September 2012 with the monthly purchase of $40bn worth of MBS and Treasuries, which was then increased to $85bn per month in December 2012. In October 2014 QE3 finishes at a total of $1.7bn. The LSAPs in total were $4.5trn.

Figure 3.1 shows the Federal Reserve balance sheet from December 2007 until 2017. It demonstrates how significantly LSAPs changed the size and composition of the Fed's balance sheet, and how LSAPs started with the creation of central bank reserves. It makes clearer the differences between each of the LSAPs in terms of whether they led to the creation of more central bank reserves or not, and which assets the purchases were concentrated on. QE1 from the end of 2008 led to a colossal increase of MBS on the Fed's balance sheet. During the period of 'Operation Twist' from September 2011 there was no increase in the amount of reserves, nor assets on the balance sheet. This highlights the importance of differentiating each asset purchasing programme of the LSAPs, because not each asset purchasing programme would have affected the same assets that households may own.

3.2. Theoretical frameworks of the transmission channels and wealth distributional effects of LSAPs

I will now discuss what the opposing views of in monetary policy theory of neoclassical and Keynesian economics have to say about the transmission channels of LSAPs. I will also try to link these channels to the transfer of the 'wealth effect'. It is the creation of a 'wealth effect' that is supposed to make LSAPs affect household wealth and the real economy positively.

The reason why I want to discuss the differences in theoretical assumptions between the views of Neoclassical and Keynesian economics on the distributional effects of monetary policies is to expose how they then predict dissimilar distributional impacts of these policies, and thus also for wealth inequality. In brief neoclassical economics deny

that monetary policies have any distributional impact on the real economy, let alone a gendered or racialised impact.

3.2.1. Theoretical discussion

I will start by discussing what the main views are within what is often described as 'mainstream' economics which incorporates the neoclassical and New Keynesian views of macroeconomics. With regard to the basis of neoclassical understanding of money and monetary policies generally, they believe that the central bank controls the money supply (Young 2018). They assume that money is neutral, and monetary policies will only have short term distributional impacts (Romer and Romer 1999).

Mainstream economics believes that LSAPs have a theoretical transmission mechanism which Lavoie and Fiebiger (2018) describe as the 'Friedmanian' mechanism, which has both a neoclassical and new Keynesian interpretation. The neoclassical monetarist view of this mechanism is that the increase in the central bank reserves from LSAPs leads to an increase in broad money and then inflation expectations, and so could spiral into hyper-inflation. This has been referred to by other scholars as the inflation channel. An inflation channel would in theory be 'good' for wealth inequality because there is a transfer of wealth from richer households, that tend to own more nominal assets (such as stocks and bonds), to poorer households, who tend to borrow more and have greater levels of nominal debt (Nakajima (2015)). Therefore, according to mainstream theory, if LSAPs do have an inflation channel then that would help to reduce wealth inequality, but only in the short run.

The second 'mainstream' theoretical transmission mechanism of LSAPs explained by Lavoie and Fiebiger (2018) is the New Keynesian form of the 'Friedmanian' mechanism, which does not agree that an increase in bank reserves and the quantity of money will lead to high inflation, but rather more loanable funds and credit that can then boost investment and economic activity. This has been more commonly referred to as the lending or credit channel of LSAPs. Both these views of the 'Friedmanian' mechanism of LSAPs rely on the assumption that money creation in the financial system is based on fractional reserve banking. They assume that the greater amount of loanable funds will help increase mortgage lending for example, and then increase house prices and net worth for households that own their own home, and benefit the middle classes. This 'lending' channel they propose would in theory also help to reduce wealth inequality in

the mid to long term because more households will have access to credit for example to get a mortgage and then buy a home and gain home equity.

As was just outlined above, within the mainstream there is not a consensus on the transmission channels of LSAPs and thus its effects on wealth inequality. It ultimately depends on the assumption of the degree of substitutability between financial assets that they use in their theoretical models. Wallace (1981) assumed perfect substitutability of private and public sector assets, which means that private sector investors who are rational representative agents that face no credit restrictions cannot distinguish between public assets (central bank and government bonds) from their own assets, hence any large-scale asset purchasing is completely ineffective, and thus have no direct impact on the wealth distribution. More recently Curdia and Woodford (2011) in their New-Keynesian model assume public assets were still perfect substitutes, and so LSAPs would still be ineffective, however credit easing would have an impact on demand, so government bonds and bank reserves need to have different characteristics in order for LSAPs specifically to work. However, since the financial crisis prominent New-Keynesian economists such as Kiyotaki and Moore (2012) have adopted more realistic assumptions of there being imperfect financial asset substitutability due to these assets having different levels of liquidity. For example, LSAPs of equities by the FED would ease a liquidity shock as equities are relatively less liquid and harder for firms to sell to finance investment. This would also increase stock prices and the wealth of households who own them in the short term.

Thus, according to Joyce et al. (2012) the portfolio rebalancing channel, in which investors are faced with imperfect asset substitution, is the most natural transmission through which LSAPs work (p277). Weale and Wieladek (2016) also agree on the importance of the portfolio balance channel in which investors have a preference for government bonds because they are less risky.

I will now explain the theoretical view of what I term 'Keynesian' economics, which is a combination of what is often know as 'traditional' Keynesian, and post-Keynesian theories, as opposed to the new Keynesians who are part of mainstream economics.

Firstly in terms of the Keynesian view on monetary policies broadly, a crucial difference between Keynesian economic theory and neoclassical economics is that the adherents

of the former believe that money (and thus MPs) are not neutral and do affect the real economy, and can have long term effects on the distribution of wealth. Whilst neoclassicals conclude the opposite, that money and MPs only affect the price levels in the economy. It was neoclassical economic theory that was behind the drive for contractionary monetary policies that were highlighted Table 2-3 to have disproportionately negatively affected women and minorities. A key tenet of Keynesian theory is endogenous money creation, in which commercial banks, not the central bank stimulates a country's money supply, through their lending decisions (Young 2018).

The 'Keynesian mechanism' of the LSAPs transmission explained by Lavoie and Fiebiger (2018) relies on the impact of interest rates rather than inflation or lending. LSAPs decrease the long-term rate of interest, but they also increase equity prices. This is because they assume that banks do not need reserves or deposits to make loans as money is created endogenously in the banking system. What determines whether commercial banks give out loans to firms and households is rather the animal spirits and confidence level that they have in the economy. Lowering interest rates and yields will not induce firms to borrow because banks are still unwilling to lend, which is contrary to what most mainstream economists would predict.Therefore, in terms of the lending channel of LSAPs and its impact on wealth inequality, this is expected to be negligible in Keynesian theory.

Metzger (Forthcoming) has a different method of categorisation to Lavoie and Fiebiger (2018) of the theoretical transmission channels of LSAPs. The first group consists of the direct transmission of the liquidity channel to the banking system. The second group are the channels with prices effects, either by reducing borrowing costs or increasing asset prices, which includes the inflation channel, the expectations channel, and also the asset price channel. Finally, in the third group we have the portfolio rebalancing channel which occurs as a result of the asset price channel, in which investors change the size and composition of their portfolios in response to LSAPs. Thus, the asset price channel as a second-degree transmission mechanism plays a significant role in the transmission of LSAPs. This will have repercussions on the wealth distribution, as it increases the values of assets owned by private households.

3.2.2. Empirical studies on the transmission mechanisms of the 'wealth effect' of LSAPs in the US

This subsection focuses on empirical studies done of the transmission mechanisms of LSAPs to wealth distribution for the US.

Table 3-1. Empirical Studies on the transmission of LSAPs to household wealth

Author	Method	Country	Period	Indicators used	Main Result
Feldkircher and Huber (2018)	Time-varying VAR with stochastic volatility (Bayesian TVP-SV-VAR).	US	QE1, QE2	Output growth	In theory LSAPs should trigger a decrease in the term spread. The "spread shock" (compression of the yield curve) affected output growth most strongly during QE1, but less so after. LSAPs have diminishing effects on real output growth. UMPs work mainly via the wealth channel. Less evidence for credit/banking channel.
Fuster and Willen (2010)	Event study approach	US	QE1	Micro dataset on mortgage applications, rejections and acceptances	At the announcement of QE1 in late 2008 interest rates reduced for borrowers, however not all borrowers were treated the same. Borrowers with good credit scores received lower mortgage rates, whereas those with poor credit scores saw relatively less of a reduction in their mortgage rates.
Hausken and Ncube (2013)	Counterfactual simulation	US, UK, Japan, Eurozone	Periods with QE1 and QE2		Their simulation for the US indicates that QE failed to boost the housing market, contrary to their prediction. However, S&P 500 stock price index would have been lower without QE. Estimated that the short-term effect mid-2009 was 8% or 70 points, with the long-term effect being even greater.
Hesse et al. (2018)	Bayesian VAR	US and UK	Nov 2008 to Oct 2014. Subsample Nov 2008-June 2011, then	CPI, 10-year treasuries, S&P 500, GDP	Weakening of the macro effects of LSAP announcement shocks over time. Simulated 10 basis points negative term spread shock: real GDP increase of real stock prices rise by max of 1.5% in US.

			July 2011-Oct 2014		LSAP shocks have a significant & persistent positive impact on stock prices.
Jawadi et al. (2016)	Bayesian Structural VAR. And VAR counterfactual	US	US monthly data 2008M9-2013M8	Stock prices, real industrial production, commodity prices, CPI.	Increase in Fed reserves due to QE gave a strong boost to asset prices. 4 months after QE shock- -real industrial production grows by just 0.1%. Stock prices 2.5% higher, house prices 1% higher. Spread between LT and ST IRs has risen by 20 basis points.
Krishnamur thy and Vissing-Jorgensen (2011)	Event study; changes in yields on the days of announceme nt, D-i-D approach supplemente d with information from derivatives	US – QE1 and QE2	Nov 2008–Mar 2009; Aug 2010–Nov 2010	Different maturities of Treasury yields, agency debt, MBS corporate bonds	LSAPs have greatest effect through the signalling channel- reduction of expectations of future short rates. QE1 announcements: MBS yields & mortgage rates declined significantly. A $1trn LSAP reduced 10-year US Treasury yields and low grade corporate bonds by 30-50 basis points. MBS and mortgage rates fell by about 66 basis points.
Lima et al. (2016)	ARDL model to find long run relationship	US	March 2001 to Dec 2007 Then Jan 2008 to Oct 2014	M0 (monetary base), M1, M2 and M3.	Dow Jones and SP500 fell by more than 30% sept 2008-Jan 2009. In Oct 2011 they had increased by more than 50%. Long-term coefficients show that QE (represented by monetary aggregates) has a positive and highly significant impact on the US stock market
Rodnyansky and Darmouni (2017)	D-i-D identification strategy	US	QE1, QE2 and QE3. 2008Q1 to 2014Q1	Lending data from commercial banks	In order to understand the distributive effects & transmission channels of QE, need to know the distribution of MBS across 'agents'. Large heterogeneities in commercial banks holding MBS that were bought in QE1 and QE3. Banks with relatively large amounts of MBS "aggressively expanded lending" after QE1 and QE3.
Weale and Wieladek (2016)	VAR model	US and UK	Monthly data from 2009M3 to 2014M5	GDP and CPI	Household and financial market uncertainty was rescued by the LSAPs. An asset purchase of 1% of GDP raises GDP by 0.58% and CPI by 0.62% Their conditional forecast estimates that QE1 increased CPI

					and GDP by about 2% points, and QE2 by about 6% points.

It should be emphasised that Table 3-1 above is a selective, not comprehensive review of all the studies done on the impacts of LSAPs in the US.

A lot of the empirical studies in Table 3-1 are based on data from a short time period, for example just the first LSAP such as Krishnamurthy and Vissing-Jorgensen (2011), and do not include the longer term effects of the policy shock, primarily because they implicitly use a mainstream economics framework. This is a shortcoming for a lot of mainstream research on the impacts of LSAPs on wealth inequality. Moreover, Belke (2018) argues the results these empirical studies find of the impact of LSAPs in the US, depends vitally on their assumptions regarding transmission channels. Therefore, if we incorporate a more 'Keynesian' approach into our analytical framework there will consequently be more of a stress on the asset price channel, and less on inflation and lending.

Figure 3.2 Transmission channels of quantitative easing. Source: Hausken and Ncube (2013).
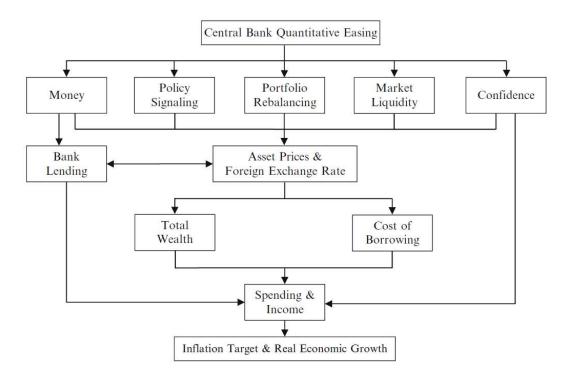

Figure 3.2 illustrates all the theoretical transmission channel of LSAPs, which have some similarity to reducing interest rates (CMPs). After considering the theoretical framework proposed by 'mainstream' economists, it is clear from Table 3-1 and Figure 3.2 that

unlike CMPs, UMPs and LSAPs do not have an explicit inflation channel to that impacts on the wealth distribution. Therefore the 'mainstream' theoretical framework is useful in explaining the transmission channels of LSAPs and UMPs to a lesser extent. Furthermore, only Rodnyansky and Darmouni (2017) found evidence of a lending channel, however the impacts on household wealth are less evident.

From examining Table 3-1, there is a general consensus that portfolio rebalancing was the main channel, which then boosted asset prices and directly influenced the wealth distribution in the US. The assumption is taken that different financial assets are imperfect substitutes for investors. So once the shock of the asset purchasing occurs, and there is a reduction in the relative supply of those assets, and their yields fall. Households and investors alter their portfolios accordingly and try to buy assets with similar liquidity characteristics. So not only the prices of the assets purchased by the LSAPs increased, but also the assets that are similar substitutes, and thus their yields and term premiums fall too (Hausken and Ncube 2013). However, the effectiveness of LSAPs rests on the extent of substitutability between assets, with the higher the substitutability then the more effective the LSAP will be (Watkins 2014). Furthermore, Christensen and Krogstrup (2019) have argued that in 'Operation Twist' 2011-2012, there was no reserve induced effects from the portfolio rebalancing channel because there was no change in the amount of reserves on the Fed's balance sheet. So, although this channel was not active throughout the whole period of LSAPs by the Fed, it was for the vast majority of the time period. In terms of the links to the impact on the wealth distribution, this portfolio rebalancing channel caused by LSAPs purchasing troubled assets led to investors increasing their exposure to risk "by investing in real estate, stocks and long-term debt" (Jawadi et al. 2016: 8), which increased the value of financial wealth for those households who owned those assets. The explanation that Lima et al (2016) give from assuming that there is a positive relationship between the stock market and expansionary monetary policy, and thus the wealth distribution, is that LSAPs lead to an increase in the monetary base which can translate to an increase in the money supply, which would mean more liquidity in the stock market. Higher liquidity spurs on the purchase of assets and the growth of the stock market.

To summarise the findings from Table 3-1 in relation to the wealth distribution, the first thing LSAPs did for the housing and financial markets was to reduce uncertainty (Weale and Wieladek 2016). Then in terms of the stock prices, whilst Table 3-1 includes lots of different estimates based on different measures of a LSAP (% of GDP, 10 negative basis points term spread, $1trn etc) most studies find that stock prices reacted more strongly and positively to LSAPs than house prices (Hausken and Ncube 2013; Jawadi et al. 2016). There is also some agreement that LSAPs have long run effects on the stock market (Hausken and Ncube 2013; Hesse et al. 2018; Lima et al 2016). It is important to reiterate however that the specific amount of the effect of LSAPs on the stock and house prices cannot be detached and calculated separately from the other UMPS and occurrences during the time period. The possibility that other macroeconomic variables or policies affected the 2 key variables cannot be ruled out from the empirical studies.

This chapter began by explaining the background of LSAPs implementation in the US and details of each LSAP programme. It also explored the predominately racial discriminatory origins of the financial crisis and by comparing mainstream and Keynesian approaches to the distributional effects of monetary policy, found Keynesian predictions better fit the empirical findings. It has been established in this chapter both theoretically and empirically that there is generally a consensus that LSAPs had an effect on the stock market and the housing and mortgage markets. It has also been confirmed that these channels will have an impact on the wealth distribution given that the purchase of assets by the Fed will "…create winners and losers depending on who holds those types of assets" (Nakajima 2015: 15). Next, I will establish what empirical evidence there is for this 'wealth effect' leading to an aggregate increase in wealth inequality in the US.

4. Empirical studies on the wealth distributional impact of LSAPs

The literature review will now look at the results from studies conducted on the wealth inequality impact of LSAPs because of the evidence of a strong 'wealth effect' produced by LSAPs in the previous chapter. I will focus on the impacts of LSAPs on wealth inequality in the US, and also other countries because this topic is an underdeveloped field in the US. Part of the reason why there have not been so many studies on the distributional impact of UMPS and QE is because central banks like the Fed only started using these policies since the global financial crisis.

4.1. Wealth distributional impact of LSAPs

4.1.1. US

We begin with the studies that just examine the wealth impacts of LSAPs in the US.

Table 4-1. Empirical Studies on the wealth impact of LSAPs US

Author	Method	Country	Period	Indicators used	Main Result
Bivens (2015)	Static wealth impact. And Counterfac-tual.	US	2008-2014	% of ownership by asset by section of the wealth distributio-n	Estimated LSAPs effect: increased house prices by 7%, in contrast to 5% for stock prices. LSAPs do not have long run effect on stock and house prices because these are a function of other variables (demand and supply for housing & land, and economic growth & corporate profits respectively). Compared to the baseline of not having LSAP, inequality would have been higher, LSAPs actually reduced wealth inequality.
Domanski et al. (2016)		US, UK, France, Germany Italy & Spain	2000-2012,	Household data (SCF for the US)	Increases in asset prices and high equity returns is the main driver of the increase in wealth inequality in the US. Bottom 80% of wealth distribution have most their wealth in real estate, whereas financial asset wealth is concentrated in the top of the wealth distribution. Net wealth of richer households grew four times as fast than poorer ones
Watkins (2014)	Data analysis of SCF, and Survey of Consumer	US	2007-2010 SCF data.	Net worth by decile of wealth distributio-n	Given that data shows that the distribution of ownership of financial assets is deeply unequal, and highly skewed to the top of the wealth distribution, QE increases inequality. It is a

	Expenditures 2008-2011				'triumph' for asset holders over income earners, as they feel the most benefit of the 'wealth effect' created by QE, and thus is a version of 'trickle-down' economics.

Bivens (2015) describes homeownership as "the more democratically held asset" (p16), because an appreciation in house prices disproportionately benefits the 'non-wealthy' bottom 90% of the wealth distribution. So, given Bivens' (2015) estimates in which house prices increased more than stock prices, it would seem apparent that LSAPs did not increase net wealth inequality. It depends on the exact amount of the increase of house prices compared to stock prices. This is hard to estimate though due to a high degree of uncertainty. However, in chapter 5 the distribution of ownership of housing by gender and race will be scrutinised in detail to verify the claims made by Bivens (2015).

Bivens (2015) most crucially contends that the counterfactual simulation is the strongest argument against there being an increase in net wealth inequality in the US as a result of LSAPs. It is right to argue that the economy would have been in a much worse state and perhaps would have experienced another Great Depression if it had not been for the intervention by the Fed in 2008 with the financial institution bailouts on top of the LSAPs. Nevertheless, I would strongly argue that despite the counterfactual argument, the counterfactual did not happen, furthermore it is crucial to understand what households have experienced and are still living through when it comes to the consequences of UMP and LSAPs. There needs to be a full and proper 'post-mortem', so that next time LSAPs are used measures can be taken to counterbalance the negative wealth inequality effects. Expansionary monetary policy should try to help the financial situation of less wealthy households, which are disproportionately female-headed and from racial minorities, and not just the wealthiest households, which are more likely to be white and male-headed. Given that the US is such a racially diverse country that has a long history of racial discrimination and inequalities, it feels like these studies are only showing the tip of the iceberg, by not disaggregating the wealth impact by race. Additionally, Rhys-Williams (2017) explained that researchers and policy makers are not conscious of the gender disparities in asset ownership and that women receive the economic benefits from LSAPs to a relatively lesser extent.

4.1.2. Other countries

I have included studies done on the impact UMPs have had on wealth inequality in other countries besides the US, given the relative scarcity of US-focused research, whilst recognising various contextual differences regarding transmission mechanisms and rates of home ownership, to name a few (Bhattarai and Neely 2016). Table 4-2 is also not a comprehensive literature review of all studies done on the wealth inequality impact of LSAPs/QE in all countries.

Table 4-2. Empirical Studies on the wealth impact of LSAPs in other countries

Author	Method	Country	Period	Indicators used	Main Result
Adam and Tzamourani (2016)	Descriptive analysis with data from HFCS and simulation.	Eurozone	2010	Household net wealth, and net wealth inequality. Gini coefficient	Simulating the HH capital gains from a 10% increase in asset prices: for housing = decreases Gini by 0.4 for stocks = increase Gini by 0.3. $\frac{3}{4}$ of the population would not benefit at all from the equity price increases, thus increased net wealth inequality. However, house price increases benefit middle classes and reduced net wealth inequality in some Eurozone countries. Depends on the levels and distribution of home ownership.
Pugh et al. (2018)	ONS wealth and asset survey panel data analysis, and counterfactual	UK	2008-2014	Gini coefficient, equity prices, house prices,	UMPs have had small effect on wealth inequality. Older households gained the most. Gini coefficient reduce by 0.017 2012-2014, so wealth inequality actually reduced, because of the net effect of house prices. House and equity prices actually fell in real terms over the period. So, the wealth gains were mitigating the lose for asset owners rather than making them better off.
Casiraghi et al. (2018)	Using the Survey of Household Income and	Italy	2011-2013 2010	Net worth	Overall effects on wealth inequality are negligible . Capital gains are higher for wealthier households.

	Wealth from Italy				No household loses wealth, and so there is a Pareto-improvement.
Lenza and Slacalek (2018)	Multi-country VAR model using data from HFCS	Germany, France, Italy & Spain		Interest rates, house prices, and stock prices	ECB asset purchases contributed to reduce net wealth inequality, but negligibly. QE has a positive impact on housing wealth, which is spread throughout the wealth distribution.

To summarise Table 4-2, none of these studies done on the UK or Eurozone economics considered race or gender as a household characteristic in their analysis.

4.2. Gendered and racial wealth distributional impact of LSAPs

The literature review will now explore what research does exist which use an 'intersectional' lens to investigate the gendered and racial distributional impact of LSAPs. This is a comprehensive list at the time of publication of this thesis. The very fact that there are only three, and none of them focus on the US, highlights the significant hole there is in the literature for this topic.

Table 4-3. Empirical Studies on the gendered and racial impacts of LSAPs/QE

Author	Method	Country	Period	Indicators used	Main Result
Metzger (Forthcoming)	Data- HFCS	Eurozone	HFCS 1st wave: end-2008 to mid-2011. 2nd wave: 2014	HH net worth	Full results yet to be published.
Rhys-Williams (2017)	Descriptive data analysis of ONS wealth and asset	UK	July 2010 to June 2014	Median net financial wealth. Lone Parent HHs with	Evidence of unequal gender distribution of assets. Lone parent families with dependent children had negligible net financial wealth 2010-2014. The

	panel survey			dependent children used as a proxy for female headed HHs.	biggest increase in net financial wealth was among older couple households. The asset bias of QE probably did increase/reinforce gender wealth inequality.
Young (2018)	Literature Review and descriptive data analysis on household data from the HFCS.	Eurozone	2008-2016	Net wealth distribution, percentage of ownership of risky assets.	UMPs have generated unequal outcomes between men and women. They have predominately increased private wealth that is owned by men. Biases in policy can be gendered or racialised, which then impact distributional outcomes (p244). Lack of data on the gendered effect of QE. In most Eurozone countries there is a positive correlation between being male and high ownership of risky financial assets, and a lower likelihood of single parents owning these assets. Most prominently higher income is associated with greater ownership of these assets.

One issue Rhys-Williams (2017) highlights in gendered analyses, are the assumptions regarding the data collected from household surveys. Since national household surveys, like the Office for National Statistics (ONS) in the UK and also ones such as the Survey of Consumers Finances in the US assume there is a free sharing of assets within households. They therefore do not collect data on the distribution of resources within households, and therefore miss, or ignore the wealth distribution within couple households along gendered lines (Grabka et al. 2015).

With regards to the Eurozone, Young (2018) brought up that the "great winners" of QE are the stock market (p247), as investors are using the liquidity created by QE to buy equities/stocks/shares. Young (2018) also describes LSAPs as having an asset bias, because the increase of the monetary base that resulted from most LSAPs benefits wealthy private households who own assets. Central bankers refuse to acknowledge

that their gender insensitivity policy discourse can contribute to gender inequalities (Young 2018), whether it be in terms of wealth, and also employment and income.

No studies have been done on the gendered and/or racial distributional impact of LSAPs in the US. Given that there is already evidence that QE and thus LSAPs have had a gendered impact on wealth inequality in other countries, it is imperative such research is conducted for the case of the US. This thesis is the first step in filling this gap.

4.3. Studies on the gender and racial wealth gap in the US

This part of the literature review will explain why it is important to investigate specifically the racial and gendered impact that LSAPs had on wealth inequality in the US and will review what feminist and stratification studies on the wealth distribution have found. After considering that there is a 'wealth effect' with LSAPs and that conventional monetary policies beforehand in the US had had unequal distributional impacts by gender and race, it is crucial now to consider whether LSAPs could have had a racial or gendered distributional impact.

Hanks et al. (2018) and (Dymski et al. 2013) have argued that the key reasons for the racial wealth gap are labour market discrimination, and in recent decades in particular, mortgage market discrimination. In addition, around 80% of assets are inherited from prior generations, which perpetuates the racial wealth gap (Jaggar 2008).

Table 4-4. Empirical studies on the gendered and racial wealth distribution US

Author	Method	Country	Period	Indicators used	Main Result
Chiteji (2010)	Raw data analysis using data from one wave of SCF	US	2004	Net-worth. Debt.	The ratio of debt to assets is twice as big for black households compared to whites, as the former hold disproportional amounts of debt. Main types of loans black families take are housing (71%), vehicle (8%) and education (6%). Key to influencing the amount of debt is the interest rates. Most debt in US has interest rate that compounds. Black families pay about 1% point more on mortgage rates than average white family and also have to on average borrow more for a mortgage due to lower incomes and

					lack of financial assistance from their families.
Deere and Doss (2006)	Literature review	US and other countries		Estimates of the gender wealth gap in different countries.	Little work has been done that disaggregates the ownership of assets within the household.
Dettling et al. (2017)	Raw data analysis comparison of SCF	US	2007, 2010, 2013 and 2016	Total mean and median household net wealth by race	Interestingly, in the Great Recession (comparing 2007 to 2010), median net-worth fell about 30% for all groups. However, in the recovery period (2010-2013) net-worth continued to fall by about 20% for black and Hispanic families, other by 10% and for white families a slight positive increase of ~5%. Wealth rose for all households between 2013-2016 but the white-black gap in median net-worth grew. 19% black households have zero or negative net worth, only 9% of white families do. 27% of black families are headed by a single parent, compared with 8% of white families.
Long (2018)	D-i-D analysis using SCF data. Excluded household heads over 65 years old.	US	1995-2013	Mortgage and educational debt. Household leverage (ratio of total household debt to gross household wealth.	Female households disproportionately experienced the growth in mortgage debt pre-crisis and persistence of mortgage debt post-crisis. This increase in indebtedness did not increase the wealth of lower income female-headed households.
McKernan et al. (2014)	Using SCF data, created synthetic cohorts to construct pseudo panel data	US	1983-2010		Families 'of color' and young families lost the largest fraction of their wealth. The value of home equity (-38%) fell more than financial assets (-20%). Wealth loss from the Great Recession twice as much as previous recessions for all households.

Painter II and Shafer (2011)	Regression analysis of data from National Longitudinal Survey of Youth 1979	US	1985 to 2004	Median net worth.	Differentiates between financial and non-financial household wealth. White households are more likely to invest in assets such as stocks and mutual funds. Observed racial/ethnic differences in net worth are primarily a function of non-financial wealth inequalities (homes and mortgages). The number of additional children has positive effect for net worth of white households, but a negative effect for black and Hispanic households.
Pfeffer et al. (2013)	Regression analysis using SCF data from 2007 and 2009, which was panel data. Also of data from PSID.	US	SCF-2007 and 2009. PSID 2007, 2009 and 2011.	Median net worth. Gini coefficient for wealth.	SCF estimates of net worth for any year were higher than for PSID probably due to oversampling of high-wealth households in the former. But find overall patterns are similar between the data sources. Regression results- strong racial bias in wealth losses for households between 2007 -2009 even when controlling for the same socioeconomic characteristics. Net worth loss 2007-2011 was higher for non-whites.
Thompson and Suarez (2015)	Reduced form OLS regressions	US	SCF data 1989-2013	Median and mean net worth,	Racial wealth gap rose sharply 2007-2013. Different portfolios and asset holdings are the explanation for the racial wealth gap between black and white families. Hispanic families hold less debt than black families. Although white household heads tend to be older, age cannot account for the racial wealth gaps in the US. Unexplained parts of the racial wealth gaps could be attributed to racial discrimination. They found that the relative racial differences in net worth were greater under the median than the mean.
Schmidt and Sevak (2006)	Regression analysis of wealth differences by marital status and gender	US	2001	Data from the Panel Study of Income Dynamics	Large differences in observed wealth between single-female-headed households and married couples. Controlling for life cycle, education and family earnings reduces but does not eliminate the wealth gap. No gender wealth gap among younger households. Female-headed households have less wealth than other households.

Sedo and Kossoudji (2004)	Cross-sectional study. Bivariate empirical equations with maximum likelihood procedures	US	SIPP 1996-2000	Home ownership rates, home values, and home equity.	Married couples are the family structure most likely to own a home, there is no gender difference in home ownership between single female and single male households. Black households have much lower home ownership rates and home values.
Sharp and Hall (2014)	Descriptive data analysis of PSID data.	US	1968-2009	Home ownership rates.	The racial gap in home ownership has widened substantially over time, especially 1990s onwards. Black homeowners in the 2000s were 50% more likely to lose their home than similar whites.
Yamokoski and Keister (2006)	Created pooled cross-sectional times-series data set. Used 3 likelihood based general linear regressions to model net worth.	US	1985 – 1990, 1992, 1993, 1995, 1996, 1998, and 2000	Median net worth by family type and gender from the National Longitudial Survey of Youth 1979.	From the raw data: largest gaps in median wealth between married couples with children and single females with children (the latter an increasing % of households). From their 3 regression models: education facilitates wealth accumulation. Age and parent's education have a positive effect on wealth accumulation. Net-worth was negatively impacted when calculated for black and Hispanic.

Table 4-4 supports the research questions of this thesis by showing there is a pertinent need to examine racial and gender wealth inequality given the stark differences in wealth accumulation between different US households. However, there is still further work needed since most of the studies just focus on analysing racial wealth, and fail to acknowledge the intersectional link between race, gender and single parenthood. Dettling et al (2017) just focus on race in their analysis, and Schmidt and Sevak (2006) only looked at differences by family structure and gender.

In Table 2-1 there has been no study of the gender wealth gap in the US since the 2008 financial crisis. None of the studies address whether LSAPs increased inequality between all these different groups or not, and yet it is strongly apparent from the previous subsections in this chapter that LSAPs do have a wealth effect. Furthermore, some only focus on net worth and not the breakdown of ownership of different types of assets and debt, such as in Yamokoski and Keister (2006).

A gendered and racial intersectional lens should be added to my theoretical framework given that there is a considerable gender and racial wealth gap in the US, as is clearly evident from the summary of empirical studies on the topic in Table 4-4. This therefore suggests that the wealth effect of LSAPs will have been gendered and racialised.

5. Data Analysis

5.1. Recent trends in wealth inequality in the US

As it has been explained in previous chapters, it is strongly apparent that the LSAPs by the Fed through their transmission channels to the financial markets created a 'wealth effect' for households who own certain assets, and some authors such as Domanksi et al (2016) and Watkins (2014) have also argued this increased wealth inequality in the US. In the preceding chapter, it was found that studies conducted thus far on LSAPs and wealth inequality have failed to acknowledge the considerably gendered and racial distribution of wealth in the US and thus the possibility that LSAPs may have increased wealth inequality between households with heads of different genders and races. This chapter will now consider in detail what has happened to gender and racial wealth inequality before, during, and after LSAPs, and whether the changes in these wealth inequalities can be linked to the 'wealth' effect created by LSAPs. The changes in the net wealth inequality in the US as a result of LSAPs depends overwhelmingly on the relative distribution of assets and liabilities between households. And as was already highlighted in Table 4-4, there is clear and compelling evidence of gendered and racial wealth gaps in the US.

As we saw in the studies on US wealth inequality in Table 4-4, the most prevalent measure of analysis for the disaggregated wealth distribution is the net worth of a household. Wolff (2018) defines net worth as the total current value of all a household's marketable or fungible assets minus the current value of debts. Total assets include housing, bank deposits and accounts and corporate stocks, and total liabilities are the sum of mortgage, consumer and other types of debt. The most common data source in Table 4-4 was the SCF. I will primarily use this data source but will also draw upon and compare SCF data with data from the PSID household survey. Wealth is also difficult to

measure as the value of assets especially is constantly changing; thus, it is important to have as many waves to draw upon from a survey as possible.

One of the ways to measure wealth inequality between different groups is by using the ratio of the wealth gap between them. Chiteji (2010) defines the racial wealth gap as NW^b/NW^w (net worth of black households divided by the net worth of white households), which is made up of 2 different parts. Firstly, the racial asset ratio gap between black and white households A^b/A^w, and then also the black-white debt ratio gap D^b/D^w. An increase in the former will lead to a reduction in racial wealth inequality, while an increase in the latter would imply a worsening of the racial wealth gap and inequality. The lower the percentage or the ratio overall, the less wealth that black households have compared to whites and thus the great the racial wealth gap, for example if the ratio was 100% then it would mean that black households have the same amount of median net-worth as white households. And if it was 25% then black households would only have a quarter of the net-worth of white households. The same formula can be used to understand the Hispanic-white net worth gap, and also the female-male wealth gap.

I will first briefly address the data on what happened to the overall aggregated wealth distribution in the US in the period 2007-2017, during the financial crisis and LSAPs. If we look at the wealth distribution in the US since 2007, we can see in Figure 5.1 that the wealth of the top 1% of households already starts to recover by 2009 Q1 and very much follows in parallel the trend of the value of their wealth in 'corporate equities and mutual fund shares'. This suggests this was the main variable that was pushing up net worth overall for the top 1%. Their wealth in stocks increased from $2.5 million at the beginning of 2009 to almost $9.5 million at the end of 2014. This heavily contributed to the top 1%'s net worth increasing from $14 million to over $25 million in the same period of the LSAPs. However for the bottom 50% of households in the wealth distribution in Figure 5.2, their net worth declined from Q3 2007, and continued to do so even after the start of the LSAPs. It reached negative levels in Q2 2010 and remained negative until Q1 2013. Furthermore, the value of 'corporate equities and mutual fund shares' is almost negligible for the bottom 50% of US households. 96% of these households in the top 1% of the wealth distribution are white, compared to just 1% being African-American (Moore 2017). Moreover, in the US, of the 586 people that had

asset wealth of over $1 billion in assets in 2018, only 13% were female (Forbes 2019). It would therefore be expected that the racial wealth gap between white and African-American households, and the gendered wealth gap would have increased as a result of LSAPs as well.

Figure 5.1. Source: Federal Reserve (2019), author's representation.

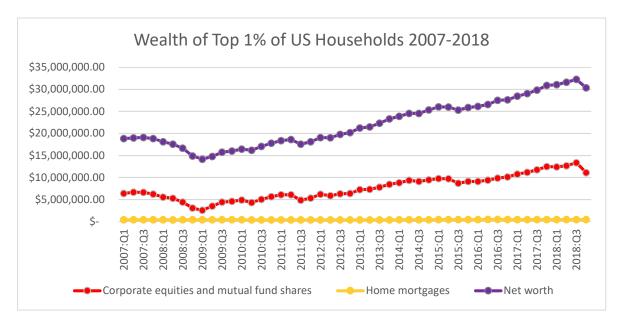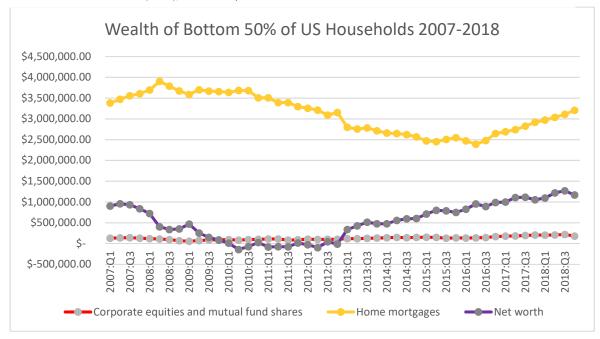*Figure 5.2. Source: Federal Reserve (2019), author's representation.*

Domanski et al (2016) estimate that for LSAPs to be "distributionally neutral" in the US and not increase wealth inequality, then a 10% increase in equity prices for example would need to be met with a 4.25% increase in house prices (a ratio of 45:100). However, their calculations on the wealth distribution to obtain these percentages does not

consider the race or gender distribution of assets, which is more unequal. Thus, it is likely that the ratio would be much larger for LSAPs to be racially and gender distributionally neutral, for example 65:100.

Figure 5.3 shows what happened to stock prices and house prices in the US during the period of the financial crisis and the subsequent LSAPs and provides an explanation for the trends in net worth that we saw in Figure 5.1 and Figure 5.2. Figure 5.3 has been set with the base of Dec 2008=100, as the Fed announced at the end of November 2008 it's implementation of QE1, and then started in December 2008.
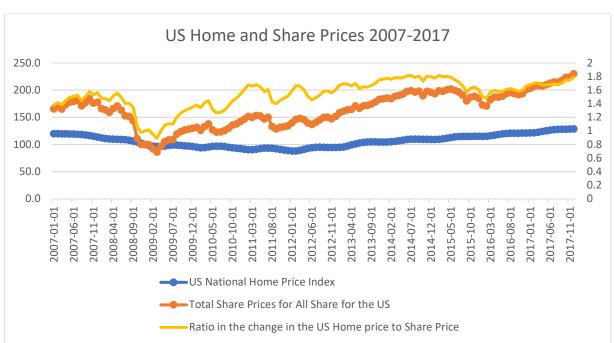
Figure 5.3 Source: Federal Reserve Economic Data (2019), author's representation.

In the first few months of QE1 between December 2008 to March 2009, stock prices and house prices were still falling slightly, however from April 2009 we see stock prices increasing again, although a lot more volatile than house prices, had increased by 37% in April 2010, and by April 2011 stock prices had almost doubled since December 2008. By the end of the LSAPs in October 2014, stock prices were 90% higher than in December 2008. House prices have seen quite a different trend from stock prices and were already declining at the beginning of 2007 and continued to fall until the beginning of 2012. By the end of QE3 in 2014 house prices had only increased by 9% compared to when the LSAPs started. Thus, stock prices had increased 10 times more than house prices during the period of LSAPs. It is not until July 2015 that we start to see the gains in house prices start to increase more than that of stock prices.

Since this analysis is not disaggregated then it means it hides the unequal distribution of stocks and housing that exists between households of different races and with different genders of the head of the household, as previously highlighted by Table 4-4.
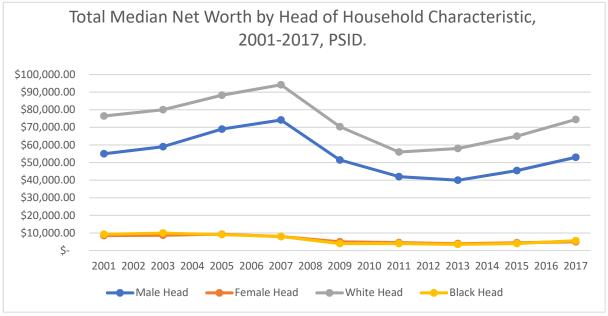
This chapter will now instigate an analysis on the overall recent trends in wealth inequality in the US by gender, family structure and race since the beginning of the 2000s. I have chosen for the timespan of the data analysis to start at the beginning of the 21st century (2001 for SCF and PSID) primarily because of the sharp decline in the FFR beginning in December 2000, due to the bursting of the dot.com bubble and subsequent recession in 2001 to a low of 1% (Figure 5.4). The Fed then sharply tightened monetary policy with a hike in the FFR from July 2004 until August 2006 to 5.25%, which helped to fuel the housing market bubble. The Fed then tried to burst this bubble in August 2007 by rapidly reducing the FFR to 0.15% by January 2009. These hasty and momentous changes in monetary policy by the Fed would have impacted considerably on the accumulation and concentration of wealth among households in the US. However, it will not have had a similar effect on all households, given that the distribution of wealth is so unequal in the US by race and gender (Table 4-4).

Since 2009 LSAPs became a crucial tool of the Fed. To understand the complete impact of the LSAPs, it needs to be considered what the state of wealth accumulation and concentration was like in the period preceding.

Figure 5.4. Source Federal Reserve Economic Data (2019)

I will start by comparing what happened to median net worth of households in the US by their head of household characteristic. I will address whether the wealth gap by gender and race increased during the period of LSAPs or not, and then correspondingly see what happened to specific assets and debts that were affected by the LSAPs. With

data from 3 sources, I will compare to what extent their estimates differ due to their different methodologies, explained in more detail in the appendix in Table 8-1.

SCF: Median net worth by family structure 2001-2016 (Thousands of $ 2016)

Legend:
- Single with child(ren)
- Single, no child, age less than 55
- Single, no child, age 55 or more
- Couple with child(ren)
- Couple, no child

SCF: Median net worth by race or ethnicity of respondent 2001-2016 (Thousands of $ 2016)

Legend:
- White non-Hispanic
- Black or African-American non-hispanic
- Hispanic or Latino
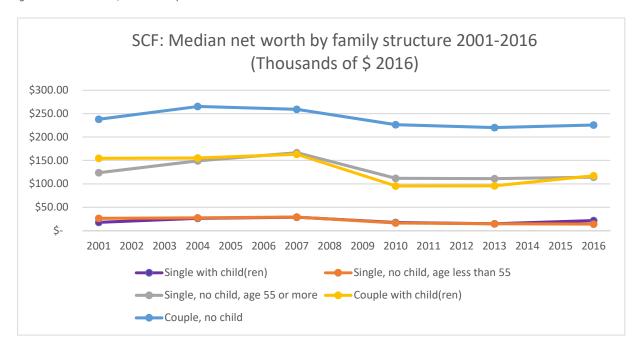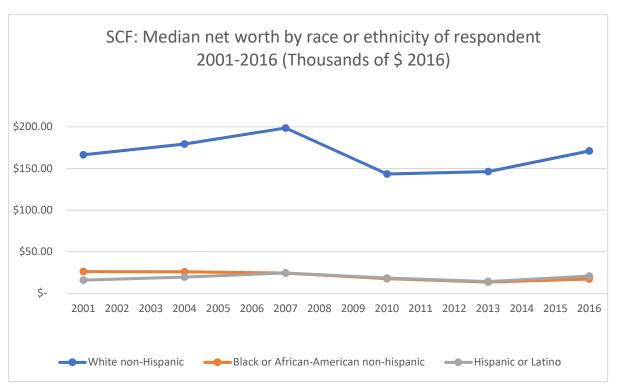
5.1.1. Recent trends in gender wealth inequality

The gender wealth gap is still a significant issue, with it being estimated that a woman at retirement age may have accumulated $1 million less in investments and savings than a man who continually was in the workforce (Merrill Lynch 2018), however there is a lack of research and literature on the gender wealth inequality since the financial crisis and Great Recession, so it is unclear what happened to gender wealth inequality in this period, and what impacts the LSAPs may have had.

I will use two different methods to calculate the gender wealth gap. Firstly, for PSID data I will use the 'Female Head' household median net worth divided by the 'Male Head' household median net worth. For the SCF data, the gender analysis gets more complicated as there is no specific category of the sex of the head of household or respondent included in the data that I have, but instead details of the family structure of the household. According to US Census Bureau (2016), 77% of single parent households were female headed. Therefore 'single with child(ren)' can be used as a proxy for female households. Furthermore, Dettling et al. (2017) highlighted that this type of household is more common among racial minorities, with 27% of black families compared to 8% of white families being headed by a single parent. This links back to the arguments made at the beginning of the thesis on intersectionality. African-American mothers are more likely to be single parents and not in a couple or dual income household. This lowers their potential to accumulate wealth. So, although I look at gender and race in different subsections in this chapter, they are still very much interlinked, and the inequalities faced by these groups are reinforced.

For the SCF data I will use the 'Single with child(ren)' household as a proxy for female headed households, and 'Couple with no child' as a proxy for male headed households. Neither is a perfect indicator and it is hard to draw a proper conclusion as they are proxy measures, however if there was no gender inequality, we could assume that female headed households would probably have 50% of the net worth of male headed households, given that the former household would probably be a single adult, whereas the latter would generally represent a cohabitating or married couple.
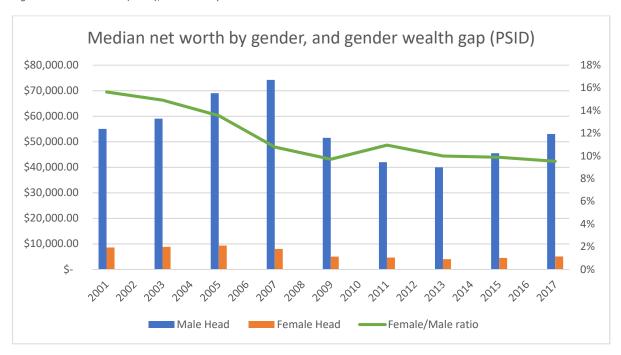
There is some literature however on the wealth distribution among different types of family structures. Yamokoski and Keister (2006) and Painter II and Shafer (2011) show that children are positively associated with wealth accumulation for married white

couples, but negatively associated for black and Hispanic families. Also, there are large differences between the wealth of single women with no children (who tend to be in the upper end of the wealth distribution) and single women with children, the household found to have the lowest median net worth (Yamokoski and Keister 2006). Therefore, it is difficult to obtain an analysis on the trends in gender wealth inequality from the SFC data source.

In terms of gender and family structure, starting with the data from PSID in Figure 5.6 for 'Male Head', which includes households that are both single male and a couple (with a male household head). The 'Male Head' household throughout the time series follows a parallel trend to 'White Households', but at a lower level (around $20,000 less throughout the period), peaking at $74,000 in 2007, falling in 2010, but unlike 'White Head', also continuing to fall slightly to $40,000 by 2013. Net worth for male households then recovers strongly in 2015 and 2017, reaching $53,000. The gap between them can be partially explained by the fact that 'Male Head' includes households with male heads of ethnic minorities, who on average have a lower median net worth.

For female headed households (Figure 5.5), their trend in net worth follows almost identically that of 'Black Head' Households, with a net worth of $8,600 and $9,300 respectively in 2001, which then had already started to fall in in 2007 before the crisis, to $8,000 and $8,025 respectively. The almost identical trend and level for these two households is probably due to the fact that a large proportion of female headed household are also black/African American. Both 'Female Head' and 'Black Head' households saw their net worth continue to decline to the lowest point in 2013 of $4,000 and $3,600 respectively. If we look at the gender wealth ratio ('Female Head' net worth/'Male Head') net worth in Figure 5.8, gender wealth inequality was already increasing before the financial crisis since, from 16% 2001 and by 2009 female headed households only having 10% of the net worth value as male headed households. Since the LSAPs in 2009, the ratio improved slightly to 11% in 2011, however afterwards began to decrease again and for 2013-2017 remained at 10%. Based on the assumption that a 'Female Head' household would have around half of the wealth of 'Male Head' households, it is clear there is still a significant gender wealth gap in the US.

Median net worth by gender, and gender wealth gap (PSID)

If we look at Figure 5.5 we can see that the 'Single with child(ren)' household throughout the period had one of the lowest levels of net worth. Net worth increased between 2001 and 2007 and peaked before the crisis at $28,000, and then fell to $17,000 and continued to fall after the recession to $14,000 in 2013. Their net worth is estimated to have increased by 2015 to $21,000. The 2013-2015 period was when house prices started to increase strongly. For households that were 'Couple with no children', their net worth was $238,000 in 2001, and by 2007 was almost $260,000. By 2010 they had lost around 14% of this wealth, and in 2013 it had decreased slightly again to $220,000. I have not included a ratio to compare these households as the results are harder to interpret in terms of the implications for gender wealth inequality. Nevertheless, the findings for 'Single with child(ren)' and 'Couple with no children' seem to reaffirm the findings for the difference between female and male headed houses net worth respectively.

To summarise it is not clear whether LSAPs did increase gender wealth inequality, however it would seem that the legacy of predatory mortgage lending practices had much more of an impact on gender wealth inequality than the LSAPs, and the net wealth effect of LSAPs on gender inequality 2009-2014 seems to have been relatively negligible.

5.1.2. Recent trends in racial wealth inequality

I will now establish what happened to racial wealth inequality during the period in question, with an emphasis on what has happened since 2009. Before getting deeper into the descriptive data analysis, it is crucial to clarify also what is meant by the different categories for race and ethnicity [1]used in the surveys. Due to lack of data on other racial and ethnic groups, the 3 racial categories I will focus on are white (non-Hispanic), African-American/Black [2] and Hispanic. According to data from the most recent census in the US, 60.7% is White non-Hispanic, 13.4% African American/Black, and 18.1% Hispanic or Latino, so Black and Hispanic households are just under a third of the total (US Census Bureau 2018). Hispanic is sometimes referred to as an 'origin' rather than an ethnicity or a race, because Hispanics can be of any race. Further explanation can be found in the Appendix in Table 8-1. Some authors such as Wolff (2018) use the terms Latino and Hispanic interchangeably. When referring to White households it is more precisely white-non-Hispanic households that are being referred to. I will be only be looking at the net worth of white, black and Hispanic households (for the SFC), and only white and black households (for the PSID).

A problem with the way the surveys are conducted is that the racial or ethnic identifications of the respondent may differ from that of the head of the household, as in 2010 9.5% of all couple households in the US had a spouse or partner of a different race or ethnicity (Lofquist et al. 2012), so really what surveys mean when they say 'African-American' or 'black' household is actually that the it is a household with a head or the respondent that African-American, and a small minority of these households will have members of other races.

I will start by comparing what happened to white (non-Hispanic) median net worth. From Figure 5.6 based on data from the PSID we see median net worth for white headed households increasing from 2001,peaking in 2007 at $94,000 and then started to fall once the crisis started and fell to the lowest point of $56,000 in 2011 before starting to recover again, at first slowly to $58,000 in 2013, and then more rapidly by 2017 to $74,500. If we compare this to the data on median net worth for white (non-Hispanic) households in Figure 5.7 from the Survey of Consumer Finances, there is the same trend

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[1] the self-identified race or ethnicity of the reference person of the household.
[2] I will use the term 'African-American' and 'black' interchangeably

of net worth increasing until a peak in 2007, however this peak is much higher at almost $200,000. It then fell to $143,000 by 2010 and began to recover in 2013 to $146,000, and grew quickly to $171,000 by 2016. The estimates from the SCF of the net worth of households is much higher than the PSID because of the methodology and sample used by the SCF. This is explained in more detail in the Appendix in Table 8-1.

We now turn to African-American/black household median net worth. In Figure 5.5Figure 5.6 we can see that 'Black Head' median net worth was quite stationary during the period 2001-2007, and had already started to decrease slightly from $9,100 in 2005 to $8,000 in 2007. By 2009 their wealth had halved to $4,000, whereas for white households in the same period 2007-09 in Figure 5.5 their relative wealth fell by only 25%. There was no change in black net worth 2009-11, but for 2013 net worth had fallen again to a low of $3,600, whereas White household wealth had already begun to recover at this point. By 2015 black net worth started to recover, and reached $5,700 by 2017, a 60% increase compared to 2013 (comparatively higher than for whites who saw 28% increase 2013-17). For the SCF data in Figure 5.7 there is also a similar pattern, although black net worth peaked already in 2001 at $26,000 and then started to slowly decline to $24,000 in 2007. Net worth almost halved during the Great Recession and even into the recovery period, with a low of $13,000 in 2013. Only in 2016 was black net worth recovering, to $17,000. In 2016 white net worth was 10 times higher than for black households.

To conclude, the differences between the experiences in black and white net worth during the whole period is that black wealth was already falling before the financial crisis hit, most likely due to their disproportionate exposure to the sub-prime mortgage crisis.

Black households then saw their net worth roughly halve between 2007-2013 and not start to recover again until after 2013. Whereas for white households, net worth peaked just before the financial crisis in 2007, they lost around a third of their wealth during the crisis and recession but wealth began to recover sooner in 2011, and, by the end of the data period had recovered the vast majority of their pre-crisis wealth.

Figure 5.9 shows the racial wealth gap between black and white and Hispanic and non-Hispanic white households 2001-2016. From 2001-2007 the wealth gap between black and white households was getting larger, growing by 3.5%, meaning that during the era of the subprime boom the racial wealth inequality gap was getting larger. Between 2007-2010 the ration remained rather stable, as both white and black households lost wealth during the financial crisis. However, between 2010-2013 the wealth gap
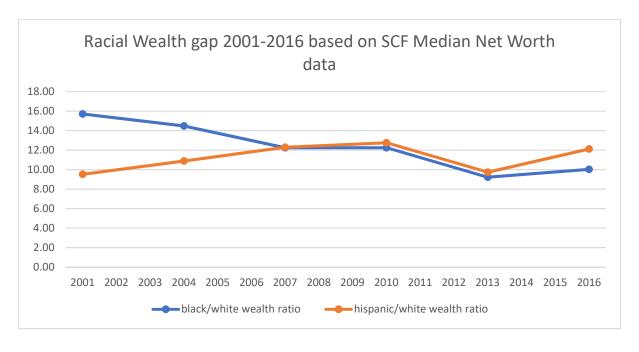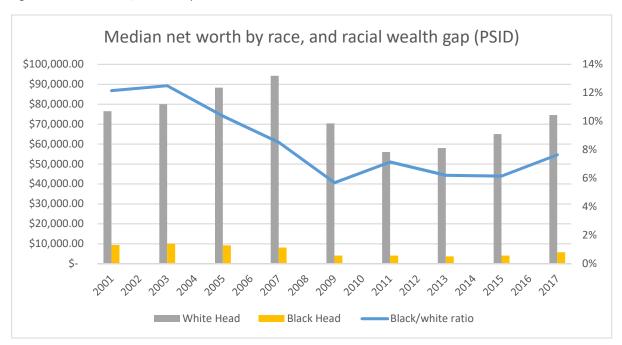
increases further by 3%. Only between 2013-2016 do we see a reduction in the black/white wealth gap, but of barely 1%.

The Hispanic/white ratio shows at first a different trend in Figure 5.9, with the wealth gap between these two groups slowly closing between 2001-2010 from 9.5% to 12.75%. Interestingly after 2010 the wealth gap ratio goes down to 9.7% by 2013 at a similar rate to that of the black/white ratio, suggesting that the increase in wealth inequality between Hispanics and White households was due mainly to the increase in net worth for white households. And then the Hispanic/white wealth ratio starts to increase back to the pre-crisis level in 2016 to 12.1%.

Looking at Figure 5.10 from PSID data, from 2003-2009 the black/white ratio went from 13% to 6%, increased slightly to 7% in 2011, but then went back to 6% 203-2015. We would expect the SCF data to overestimate the size of the racial wealth gap because they overrepresent households at the top of the wealth distribution compared to PSID, (see Table 8-1). But given that 96% of households in the top 1% of the wealth distribution are white, it is likely then that the PSID data is underestimating the wealth gap.

The legacy of the predatory lending practices pre-2008 not only significantly reduced black household wealth but will continue to do so even for future generations of black households, who are estimated by Burd-Sharps and Rasch (2015) to still only have home equity values 70% to that of their white counterparts (p24). This is because parental wealth is a statistically significant predictor of an adult child's home equity value, even when controlling for income and educational level (p20). Without the Great Recession home equity values for white and black families (ceteris paribus) were heading towards parity by 2050, but now they project that white home equity will be 1.6 times that of black households (p22). These figures highlight the importance of understanding the impacts of monetary policies such as LSAPs, because there can be an effect into the longer term.

Kochhar and Fry (2014) argue that another reason why black households did not see a recovery in their wealth in the 2009-2013 period, unlike white households, was because the value of financial assets such as corporate stocks recovered more quickly than housing since the recession ended, which I have been arguing was a knock-on effect of LSAPs. White households are much more likely than minority households to directly or

indirectly own stocks, mainly through retirement accounts. Even White working-class families have on average more assets than people of colour (Jaggar 2008).

Therefore, it is not just the access and provision of mortgages and homeownership that can explain the recent trends in the racial wealth gap, but also the effects of increases in the prices of financial assets on inequality needs to be investigated further. I will begin to fill in this gap empirically in the next subsections.

There are also other terminologies of analysis that can be used to simplify the explanation of the effects of LSAPs or any policy, to certain groups of households. Ampudia et al. (2018) in their research on wealth inequality in the Eurozone distinguished between "hand-to-mouth" and "non-hand-to-mouth" households (p11). The former are households characterised as either asset-poor or hold mainly illiquid assets (such as residential property or mortgage debt), and so must rely almost solely on their disposable income for consumption, and thus their consumption levels are strongly reactionary to changes in income. Whereas "non-hand-to-mouth" households do not need to alter their spending levels in the case of a temporary negative liquidity shock, primarily because they own relatively more liquid assets. In terms of the focus of this thesis, from the evidence on the median net worth in the US, it is accurate to assume that non-white households and single female households with children will be overrepresented in the "hand-to-mouth" household category.

To summarise the findings on the changes in net worth by race, the gap between black and white households increased between 2010-2013, during the period of the LSAPs. Thus unequal opportunities to rebuild wealth coming out of the crisis and Great Recession is leading to widening racial disparities (Burd-Sharps and Rasch 2015:1)

5.1.3. Limitations of the available empirical data

Full details of the methodology and limitations of the SFC and PSID can be found in Table 8-1.

5.2. Key trends in financial wealth for US households 2001-2017

The descriptive data analysis in the following subsections of 5.3. and 5.4. will firstly look at financial wealth, and then non-financial wealth; the two components of net worth. For all groups (race in particular) median net worth is much lower than the mean, due to the distribution of wealth being highly unequal and concentrated predominately in households at the top of the wealth distribution. The descriptive analysis will focus on the median values, which demonstrates the typical wealth for a household of each category, rather than the mean which can be skewed by outliers. However, when calculating the wealth gap between two types of households, using the median value rather than the mean will very likely underestimate the actual size of the wealth gap. Certainly, in the case of the racial wealth gap, because white households are far more likely to be in the top 1% of the wealth distribution.

I have also included households of all ages, even those with household heads over the age of 65 years. Long (2018) excluded these households from her study on mortgage debt in female headed households as the over 65s are much less likely to borrow and have accumulated more wealth over their lifetime. Therefore, if the over 65s were not included in this study, it would be expected that the gender and perhaps also racial differences in debt levels would be greater.

The extent that gender and racial wealth inequality has been impacted by LSAPs will also depend on the distribution and values of these assets and liabilities between the households by gender/family structure and race. Because of LSAPs relative strong effect in boosting stock markets and lesser extent housing market, I will focus on key indicators from these markets that can be linked to a household's net worth.

Financial wealth is made up of assets and debts. Financial assets include savings and stocks and are relatively more liquid than non-financial assets. Financial debts include personal loans such as for education. According to data analysis by Painter II and Shafer (2011) financial wealth is less common than non-financial wealth for most households, however it is much more prevalent in the top of the wealth distribution in the US. To link back to the LSAPs and whether they increased wealth inequality, financial assets will be the key focus, in particular stocks[3] and equities, which were established to be in

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[3] I will use the terms stocks, equities and shares interchangeably

chapter 3 a key channel of the 'wealth effect' of LSAPs. Although bond values were also affected by the LSAPs, there is no data on the ownership and value of bonds for racial minority and single parent households in the SFC data. The fact there is no data strongly suggests that these households do not tend to own any kind of bonds

5.2.1. By gender

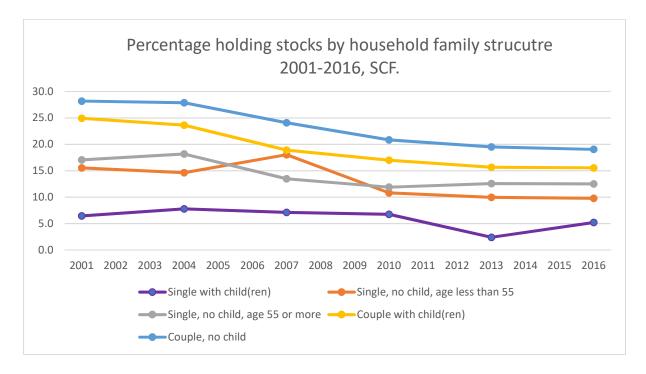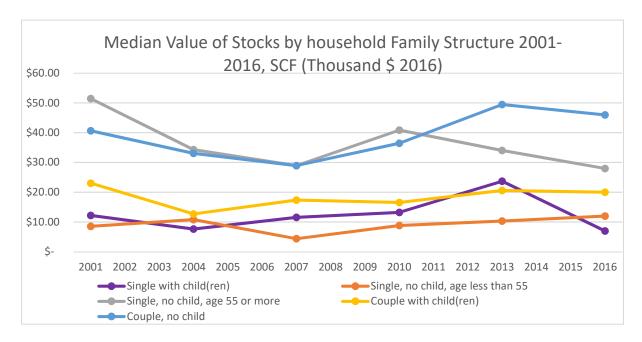*Figure 5.11. Source: SCF (2019), author's representation.*

Percentage holding stocks by household family strucutre 2001-2016, SCF.

Median Value of Stocks by household Family Structure 2001-2016, SCF (Thousand $ 2016)
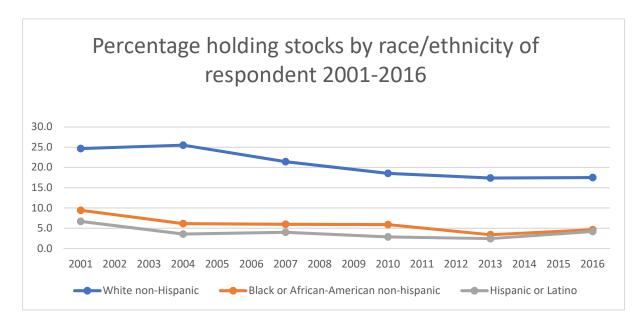
If we start by looking at what percentage of households owned stocks in Figure 5.11, defined by the SCF as direct holdings of publicly traded stocks, for households of all family structure types there was a general trend between 2007-2016 of slightly decreasing amounts of ownership of stocks. Although the percentage of 'couple, no child' households owning stocks declined in every subsequent SCF survey, they remained throughout the period the household type with the highest likelihood of ownership of stock assets, with 24% in 2007 and 19.5% in 2013. For 'Single with child(ren)' households, in Figure 5.11 we can see that throughout the time period this is the household with the lowest ownership of stock assets, with only around 7% of these households owning stocks in 2007 and 2010, and this drops further in 2013 to only 2.4%. Whilst the sample used in the survey did change between 2010 and 2013, it still gives a strong indication that only a very small percentage of these households held stocks during 2009-2014 when LSAPs were occurring in the US.

Looking now at the median values of the stocks owned by 'couple, no child' households in Figure 5.12, between 2007-2010 the value of their stocks went up from almost $29,000 to $36,500, and then increased at a faster rate 2010-2013 to $49,500, an increase of 70% over the 2007-2013 period. From Figure 5.3, stock prices overall increased by 90%. For 'single with child(ren)' households with stocks in Figure 5.12 as well, there was a marginal increase in their value 2007-2010 from $11,500 to $13,250, and then a stronger increase in 2013 to $23,700, almost an 80% compared to 2010.

Therefore, those who were owning stocks did see a significant growth in value of these assets, and the value increase was at a similar rate to the overall increase in stock prices in the period, as seen in Figure 5.3.

5.2.2.   By race

Figure 5.13. Source SCF (2019), author's representation.

Percentage holding stocks by race/ethnicity of respondent 2001-2016

We now look at Figure 5.13 on distribution of stocks by race of the household head. Since 2004 until the end of the series in 2016, the percentage of white households owning stocks fell from 25.5% to 17.5%. For black and Hispanic families, the percentage was already falling in 2001, from 9.4% and 6.7% respectively to 3.4% and 2.5% respectively in 2013. For both black and Hispanic households however, there was a slight increase in 2016, with around 4.5% of both households now owning stocks. This confirms that the findings of Blau and Graham (1990), and Keister and Moller (2000) that white households are more likely to own stocks and mutual funds, is not out of date, although this racial asset gap is beginning to close, based on the trends 2013-2016.

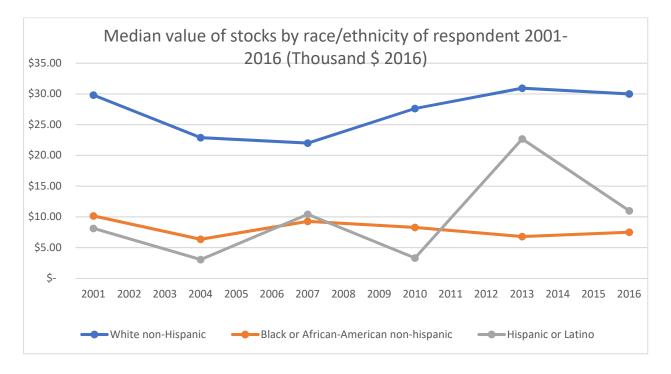Median value of stocks by race/ethnicity of respondent 2001-2016 (Thousand $ 2016)

Figure 5.14 shows that between 2007-2010 the median value of stocks for white households increased from $23,000 in 2007 to $28,000 in 2010, then to $31,000 in 2013. Also taking into consideration data from Figure 5.13, there are a higher percentage of white households that would have seen their stock wealth, and therefore also likely their net worth, increase between 2010-2013. For Black/African-American households, their median value of stocks decreased from $9,260 in 2007 to $8,290 in 2010, and continued to fall in 2013 to $6,810. For Hispanic households, from 2007 to 2010 their stock values decreased from $10,420 to $3,320. There seems to an anomaly in the data for the year 2013, with their median value in stock wealth being significantly higher than the trend, if we ignore this then after 2010 their stock holding values increased to $11,000. It is overwhelmingly apparent from this data that white households did benefit disproportionately from the stock market price increase 'wealth effect' created by the LSAPs, and that African-American households clearly did not.

5.3. Key trends in non-financial wealth for US households 2001-2017

Non-financial wealth can also be said to consist of assets and debts/liabilities. Firstly, non-financial assets such as homes and vehicles, and secondly non-financial liabilities like mortgage and vehicle debt, based on collateral and can also be securitised. Understandably during times of normality in the economy households see non-financial wealth such as housing as a more tangible and safe investment because these assets tend to grow in value. These are therefore more attractive investments for households that are "hand-to-mouth" than certain financial assets which face more volatility. In their research on racial wealth inequality, Painter II and Shafer (2011) found that the racial and ethnic differences in net worth were a function of non-financial wealth inequalities (p159).

In terms of the links of the impact of LSAPs (mainly QE1) on the value of non-financial wealth, the main mechanism that this analysis will focus on is on home equity which is a key component of net worth for many households. Housing and home equity are the largest item in the portfolio for the majority of households in the US (Nakajima 2015). It is argued by some authors in chapter 3 and 4 such as Bivens (2015) that with the 'middle class' and lower ends of the wealth distribution owning homes which then increased in value, net wealth inequality was prevented from increasing.

As explained in chapter 3, most of the asset programmes conducted by the Fed, especially QE1 with the purchasing of MBS and agency debt, were supposed to help the mortgage markets. As was shown from the evidence from studies on the impacts of LSAPs in chapter 3, immediately after the announcement of QE1 in November 2008 MBS yields and mortgage rates declined. However, in Figure 5.3 we saw that there was not increase in house prices in the US until 2012. The third round of QE which included the purchase of more MBS was announced that year.

Ivanova (2016) is critical of the neoclassical model used by the Fed which assumes that the growing wealth provoked by LSAPs encouraged households to re-mortgage. It ignores that household are also not homogenous, and that patterns of house ownership are deeply racialised, and also depend on the gender and family structure.
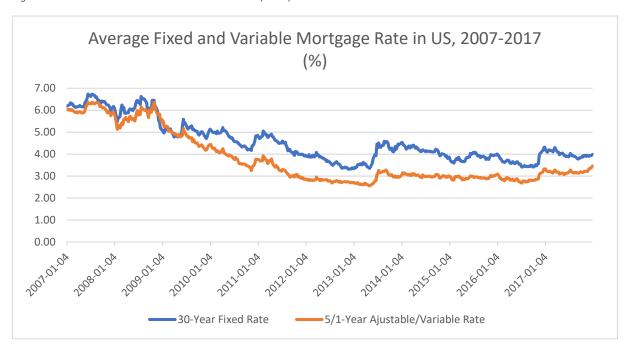
Home equity is defined as the difference between the market value of the home the household owns and the debts or mortgage that is still owed. The variables that alter

the level of home equity are therefore the level of house prices, and the level of mortgage payments.

One of the key sources for the demand for housing is the cost for households to get a mortgage, and the willingness and benchmark for accepting mortgage applications that banks and mortgage lenders have and give. A decrease in interest rates and mortgages rates means the amount a household needs to pay each month for their mortgage would decrease, so in the short run it would mean that the household paying off a mortgage on their home would have a slower rate of accumulation of home equity wealth. However lower mortgage repayments reduce the risk that the household will not be able to keep up with their mortgage payments and face foreclosure, thus in the long term there will be more households with home ownership and so with higher net worth. In the long run households borrowing for mortgages helps households to accumulate home equity and thus increase their net worth.

In the next sub-section I argue Black and Hispanic households are less likely to be homeowners or have a mortgage, and thus a lot of these households have zero home equity. In addition, there is a higher risk for black and Hispanic households to default on mortgage payments, even after the decrease in mortgage rates from LSAPs, as they have to pay relatively higher interest rates on their mortgage, due to a perceived extra risk in lending to these households, which arguably becomes a self-fulfilling prophecy. Chiteji (2010) found that black families pay about 1% more on mortgage interest rates than the average white family, and they also have to borrow more relative to their income. Thus, LSAPs helped black families to a lesser extent compared to white families.

Average Fixed and Variable Mortgage Rate in US, 2007-2017 (%)

Legend: 30-Year Fixed Rate — 5/1-Year Ajustable/Variable Rate

What we can see from Figure 5.15 on the average mortgage rates for both fixed and adjustable/variable rates is that at the end of 2008 when LSAPs started, both rates started to tumble. Both remain at a similar level between 2007 to mid-2009 when variable rates start to fall more than fixed rates. From 2010 over time the gap between fixed and variable rates grows, with the variable rate responding greater to the fall in the Federal funds rate.

According to Garriga et al. (2017) if households have more variable interest rate mortgages than fixed rate mortgages, then the transmission of monetary policy will be more powerful. As most of the households in the sample, regardless of the head of household characteristics, have fixed interest rate mortgages, and thus this channel will have not been so powerful. The data in Figure 5.15 fits with what Nakajima (2015) found that fixed term mortgages are more common in the US than many other countries. It means that their mortgage payments will not change, and thus there is not such a great of a 'wealth effect' to households with mortgages, through the reduction in mortgage rates from the LSAPs/QE1 and QE3.

Percentage of type of mortgage rate by household characteristic, 2007-2017, (PSID).

Monthly Mortgage Payment ($s 2016)
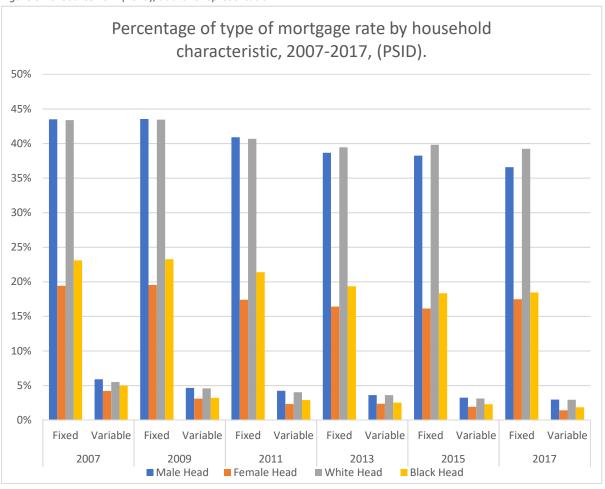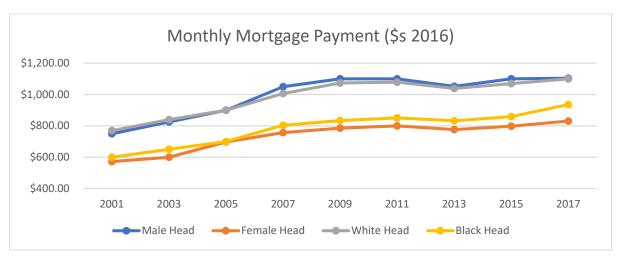
If we look at Figure 5.17, we can see that there was little decrease during the period of LSAPs. This is most likely due to the fact in the figure before we can see that most households with mortgages across all groups have a fixed rate mortgage. Therefore, this

channel of LSAPs did not benefit the wealth of households that already had mortgages or were already homeowners across all household categories.

Figure 5.17 may be misleading because although it shows white and male head households were paying larger mortgage payments per month than female and black headed households, it does not take into consideration the relative size of the mortgage, the property value and the income relative to the mortgage payment. Fuster and Willen (2010) found that although QE1 reduced borrowing rates, and in particular for mortgages, for those with poorer credit scores saw relatively less of a reduction in their mortgage rates compared to households with good credit scores.
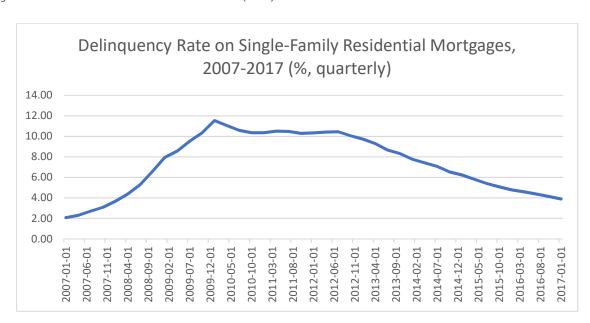
Figure 5.18 Source: Federal Reserve Economic Data (2019)

In order to fully understand why homeownership continued to decline, we must consider the rate of foreclosure, or delinquency in mortgages. Figure 5.18 shows the delinquency rate on residential mortgages, meaning what percentage of households with a mortgage are falling at least a month behind with their mortgage payments. This is not the same as the foreclosure rate, however if a mortgage payer is experiencing delinquency, their chances of experiencing foreclosure are much greatly increased. To further clarify what Figure 5.18 shows, 'Single-Family' does not mean a single parent family, but rather just one family in a dwelling. Figure 5.18 shows that the delinquency rate increased rapidly from 2% in 2007 to 11.5% in 2010, and then stayed relatively high until October 2012 when it began to decrease again. By the end of 2014 it had fallen to

6%. So, for most of the period of the LSAPs, delinquency rates were very high. This can partly be explained by the findings in Figure 5.16 that the vast majority of all household mortgages are fixed rate, and so would not adjust so much to the lowering of risk and rates induced by the Fed from buying excessive amounts of MBS.

Regardless of the impact of LSAPs on mortgage rates, what the high delinquency rate in the period 2009-2012 also suggests is that the foreclosure rate remained very high, and so some households were still losing their home equity, which was likely to be the majority of their wealth.

5.3.1. By gender

The analysis of the changes in non-financial wealth by gender is hindered by the fact that there is a lack of data on housing and mortgages by gender or family structure. In terms of the homeownership rate by gender and family structure there was not any disaggregated data for these categorise. I was also not able to find any data on the foreclosure or delinquency rate on mortgages not only not disaggregated by gender but also by the household family structure. In terms of previous research on this topic, Fishbein and Woodall (2006) found that female mortgage borrowers in 2005 were disproportionately likely to receive subprime loans across all income groups. Dymski et al. (2013) found that single mothers were being disproportionately targeted by the subprime mortgage lenders during the housing bubble, and more likely to face foreclosure.

If we then look at Figure 5.18 on the overall delinquency rate in the US, we can presume that families that are headed by a single parent will be overrepresented.

Difference in median net worth for households 'paying a mortgage' by gender

Female Head- with Mortgage
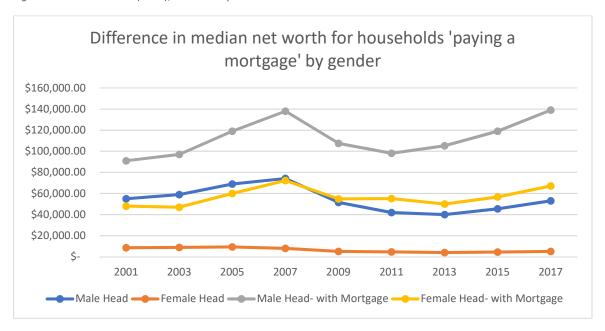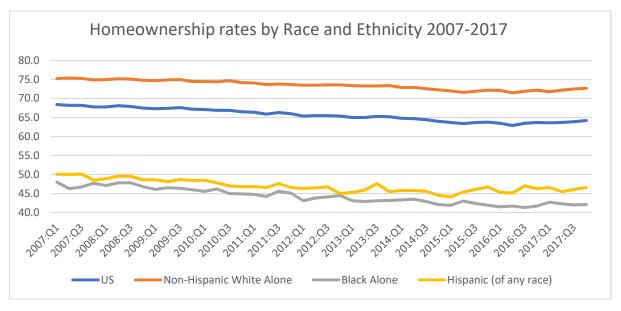
Figure 5.19 shows the stark difference between male head and female head households, even for those that do have mortgages and home equity. Thus the ownership of other assets such as stocks played a larger role in reinforcing the unequal gender distribution of wealth.

5.3.2. By race

For the racial analysis of non-financial wealth there is more data available to draw conclusions from on the impact of LSAPs on this type of racial wealth inequality. With regards to homeownership, Sharp and Hall (2014) found that during the early 2000s the

Homeownership rates by Race and Ethnicity 2007-2017

US   Non-Hispanic White Alone   Black Alone   Hispanic (of any race)

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racial gap in home ownership was widening, and African-Americans were 50% more likely than similar white households to lose their home.

If we look at Figure 5.20 we can see that the overall in the US homeownership was declining 2007-2017, from 68.4% to 64.2%. For white non-Hispanic households, the change was from 75.3% to 72.7%. Whereas for black households it went from 48% to 42.1%, and for Hispanic households

Although I was not able to get the foreclosure rate by race, other studies have found that between 2007-2009 the foreclosure rate per 10,000 loans by race of household was 452 for whites, 769 for Hispanics, and 790 for blacks (Gruenstein, Li, and Ernst 2010). It is likely this trend continued throughout the period of high foreclosure rates during and after the recession.

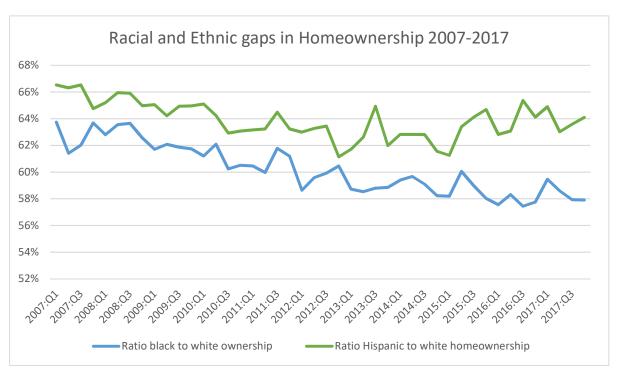*Figure 5.21. Source US Census Bureau (2019), author's representation.*

Figure 5.21 shows the racial gap in homeownership between black and white, and Hispanic and white households. A ratio of 100% would mean that the races have the same rates of homeownership. During the period of LSAPs, the black to white ratio in homeownership went from 63% in Q4 2008 to 59% Q3 2014. The Hispanic to white ratio

in homeownership went from 65% in Q4 2008 to 63% in Q3 2014. Thus, the racial gap in home ownership was increasing during the period of LSAPs in the US.

The LSAPs were not the cause of the increasing racial gaps in homeownership, but this trend will have meant that Hispanic and to a greater extent black households are less likely than white households to see their net worth increase from the 'wealth effect' created by LSAPs in the housing market. This was because firstly black and Hispanic households are less likely to have a mortgage, secondly, they have higher foreclosure rates, and so thirdly they have lower homeownership rates.
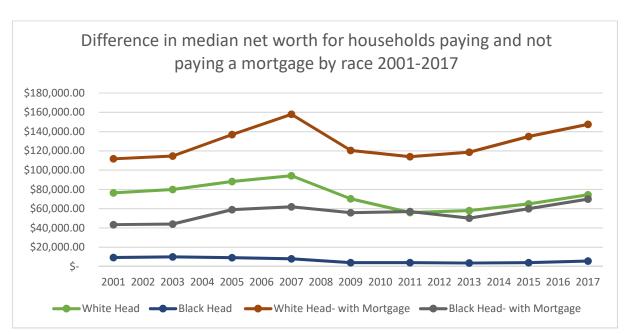
Figure 5.22. Source PSID (2019), author's representation.

Difference in median net worth for households paying and not paying a mortgage by race 2001-2017

Figure 5.22 shows the racial differences in net worth between households that have a mortgage (and thus some home equity) and those who don't have home equity. White households with mortgages have a significantly larger net worth than any other households. For black households with mortgages, their net worth went from $4,000 in 2009, and then to $3,600 in 2013, so they had further decreases in their net worth during the period of LSAPs. The gap in net worth between white households with mortgages and black households without mortgages from 2009 when LSAPs just started to 2015 just after they finished grew, from 3.3% to 2.96%. So, although households paying mortgages may have bigger debts, they also have a greater value of assets because of their home ownership.

Although African Americans tend to buy houses that are of a lower value than whites, Chitjei (2010) shows that African American households pay relatively higher mortgage rates and have to take relatively larger mortgages because of their lower incomes and creditors perceiving them to be higher risk borrowers. With the same collateral, a white household would be able to get a larger amount of credit and a lower interest rate. Thus, they have a relatively better quantity and quality of a loan compared to African-American households. Discrimination by mortgage lenders means that even if an African-American household applied for a mortgage for the same amount and years as a white household, the African-American household would on average be given a higher interest rate. Thus, they would have much higher relative monthly mortgage payments to make. Therefore, LSAPs reinforced the current unequal and discriminatory situation in the lending markets.

5.4. Relevance of results

5.4.1. Did the LSAPs increase gender and racial wealth inequality?

Overall racial wealth inequality did increase during the main period of LSAPs in the US. From the data on the ownership of financial assets it was clear that the increase in stock prices overwhelmingly benefitted white households. The unequal distribution of financial assets (stocks) is much starker by race than gender, and also the increases in stock prices were much greater than house prices. This fits with the finding of McKernan et al. (2014) that the fall in value of home equity was greater than the value of financial assets such as stocks. In terms of non-financial wealth, black and Hispanic households less likely to own a home in the first place, those who are able to get a mortgage are more likely than their white counterparts to default on payments and foreclose on their mortgage. Thus, much fewer households in these groups compared to whites would have experienced growing home equity.

Due to a lack of properly disaggregated data on gender, we cannot properly conclude the gendered wealth inequality effects of the LSAPs.

For homeownership there is more inequality in the distribution by race than gender, but that does not mean that gender is an aspect that should not be considered in the

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analysis, it should be included with race to get a more in depth understanding of which households benefitted the least or not at all from the 'wealth effects' of LSAPs. For example, Long (2018) has argued that racial differences in mortgage lending may have been exacerbated by gender inequality (p226). Thus, there may be a greater wealth gap if a gendered analysis is included, such as a separation in the disaggregated analysis of the changes in the wealth distribution between black women and black men.

Although the strength of the results and conclusions from this analysis could be disputed because there has not been an econometrical regression analysis to control for other household characteristics such as income, age and education, what has been found in previous regression analyses on the gender and racial wealth gap, is that even when controlling for other socioeconomic characteristics, the results still hold (Schmidt and Sevak, 2006), (Pfeffer, Danziger and Schoeni, 2013).

5.4.2. Policy recommendations

Analysing changes in wealth distribution through a gendered and racial lens does give a different conclusion to the extent of the increase of wealth inequality in the US during the period of the LSAPs, compared to a gender and racially blind 'aggregated' wealth distribution data analysis. It gives a more certain answer that there were increases in wealth inequality compared to 'aggregated' studies.

One of the arguments that has been made by some economists (generally mainstream economists) is we should not worry about the net wealth inequality effects of LSAPs because the outcome is "pareto optimal", which means no household was made worse off as a direct consequence of the LSAPs (Casiraghi et al. 2018). The LSAPs did not directly cause the widening in the racial wealth gap, however as pointed out in the introduction, there are significant economic and social problems associated with rising wealth inequality between different groups in US society. Therefore the 'cost' of the worsening of wealth inequality, whether it be aggregated or disaggregated by far outweighs the pareto optimal 'benefit'. Mainstream economists need to seriously reconsider their criteria to prevent LSAPs and other economic policies from reinforcing racial and gendered wealth inequalities. "Regrettably, social arrangements in twenty-first century America still rest upon structural racism, supported by institutional practices that exploit minority status" (Aguirre and Martinez 2014: 12). Moreover Seguino (2019) has argued that monetary policy has received less attention than fiscal policy as a tool for promoting

gender equality. If it is a tool to promoting gender equality, then of course it can also be a tool that can be used to inadvertently decrease gender equality also

Another critique of the LSAPS is from Keynesians, who would argue that expansionary monetary policy should be about giving a stimulus, and giving money to those that need it the most and have the highest propensity to consume would have the greatest economic benefits to the whole economy, which goes back to the 'hand to mouth' classification previously mentioned. The 'wealth effect' created by LSAPs tended to favour wealthier households, which also tend to be male headed, couple households and white households, who have the lowest propensity to consume on average than any other household, which means that the effectiveness of expansionary UMP stimulus is reduced Casiraghi et al (2018).

6. Conclusion

Wealth inequality is a serious issue in the US, and should be more on policy agenda, like income inequality, especially in countries like the US which have minimal welfare provisions and safety nets, as well as significant university fees and a strong culture of homeownership which requires households to rely on their own wealth much more. Furthermore, the US is very unequal in the distribution of wealth when broken down between households categorised by the gender and race of the head of the household. Therefore, this thesis has examined what impact the UMP LSAPs have had on gender and racial wealth inequality in the US.

In chapter 2 it was found there has been a complete lack of studies on the gendered and racial impacts of monetary policy in the US since the dramatic shift in the implementation of monetary policies by the Fed with UMPs in response to the global financial crisis. Chapter 3 explained theoretically and with empirical evidence the links between changes in US household wealth distribution and the LSAPs, with the largest 'wealth effect' coming from increases in stock prices, and to a lesser extent from house prices. Chapter 4 looked at the results of recent studies on the impact of LSAPs on aggregated gender- and racially-blind wealth inequality in the US, and found there was

no consensus on the net wealth inequality effect. However, the results from studies on other countries on the gendered impacts of QE indicated that there are negative wealth inequality effects. Moreover, the vast amount of literature on the unequal gender and racial wealth gap in the US emphasised the need for this thesis topic to be investigated further. The overall conclusion from the literature review chapters is there has not been and there is a compelling need for a study on the gender and racial wealth distributional impacts of LSAPs or UMPs in the US. Chapter 5 began with a description of the recent trends in wealth inequality in the US, and then discussed the changes in gender and racial wealth inequality in the period 2001-2017. The household data was further broken down by stock and housing assets. The main conclusion is that racial wealth inequality did increase as a result of the LSAPs (ceteris paribus).

The US and the global economy would have been worse off overall if LSAPs had not taken place. My research indicates that LSAPs did contribute to an increase certainly in the racial wealth gap, and perhaps also in the gender wealth gap, but is not an argument to say that the Fed should not have pursued the LSAPs. The point of research is to find out what really happened, and not stipulate the impact hypothetical predictions that did not occur, given the negative consequences or lack of benefits policies can have on some households. Thorough 'post-mortems' should be carried out of any economic policy, including LSAPs as they do have long term consequences. It will now take racial minority households longer to catch up to close the racial wealth gap in the US because white households disproportionately benefitted from LSAPs and their wealth effect. Thus, the wealth inequality effects of LSAPs should not be ignored, even if they are 'pareto optimal'.

This thesis has only been able to give a descriptive data analysis on the changes the key components of household wealth which related to the impact of LSAPs. To strengthen the empirical evidence, an econometric analysis should be carried out using the data that I have used. However, the methodology of the surveys that collect data on household finances and wealth in the US needs to be improved. The SCF is one of the most widely used and yet it is not a panel survey. The results from the SCF would be better for evaluating policies if it became a panel survey like the PSID.

Not only in household surveys, but in surveys more broadly there needs to be disaggregation of data by race and gender. Without this it is difficult to draw proper conclusions on the impact of economic policies on gender and racial inequalities.

Given that the Fed carried out its LSAPs differently to other central banks, in terms of which assets were bought and the quantity, such as buying MBS assets in order to improve the housing market, it is questionable whether the results are relevant to monetary policy making and the trends in wealth inequality in other countries that conducted LSAPs, such as the UK and the Eurozone. Thus, more research needs to be done to compare the gendered and racial inequality effects of LSAPs between the US and other countries.

This thesis on investigating impact of LSAPs in the US on gender and wealth inequality has taken more space to discuss than originally planned. However, we should be concerned if a monetary policy is fortifying poverty and inequality between white households and black and Hispanic households, and also women and men (Seguino and Heintz (2012). Hence given the importance of this topic, it was required for the analysis to be done properly and thoroughly.

7. Bibliography

Acker, J. (2006). Inequality Regimes: Gender, Class, and Race in Organizations. *Gender & Society*, 20(4), pp.441–464. [online]. Available from: http://journals.sagepub.com/doi/10.1177/0891243206289499 [Accessed March 28, 2019].

Adam, K. and Tzamourani, P. (2016). Distributional consequences of asset price inflation in the Euro Area. *European Economic Review*, 89, pp.172–192. [online]. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0014292116301234 [Accessed March 28, 2019].

Aguirre, A. and Martinez, R.O. (2014). The Foreclosure Crisis, the American Dream, and Minority Households in the United States: A Descriptive Profile. *Social Justice*, 40(3 (133)), pp.6–15. [online]. Available from: https://www.jstor.org/stable/24361645 [Accessed May 28, 2019].

Ampudia, M., Georgarakos, D., Slacalek, J., Tristani, O., Vermeulen, P. and Violante, G. (2018). Monetary policy and household inequality. *ECB Working Paper Series*, (No 2170).

Belke, A. (2018). The Effectiveness of the Fed's Quantitative Easing Policy - A Survey of the Econometrics. *Estudios de Economia Aplicada*, 36(1), pp.291 – 308.

Belkhir, J.A. and Mc Nair Barnett, B. (2001). Race, Gender and Class Intersectionality. *Race, Gender & Class*, Volume 8,(Number 3, 2001), p.(157-174).

Bhattarai, S. and Neely, C. (2016). A Survey of the Empirical Literature on U.S. Unconventional Monetary Policy. *Federal Reserve Bank of St. Louis Working Paper Series*, 2016–021A. [online]. Available from: https://research.stlouisfed.org/wp/more/2016-021 [Accessed March 29, 2019].

Bivens, J. (2015). Gauging the impact of the Fed on inequality during the Great Recession. *Hutchins Center Working Paper No 12*, pp.1–33.

Blau, F. and Graham, J. (1990). "Black-White Differences in Wealth and Asset Composition." *Quarterly Journal of Economics* 105(2):321-39.

Braunstein, E. and Heintz, J. (2008). Gender bias and central bank policy: employment and inflation reduction. *International Review of Applied Economics*, 22(2), pp.173–186. [online]. Available from: http://www.tandfonline.com/doi/abs/10.1080/02692170801889643 [Accessed March 28, 2019].

Burd-Sharps, S. and Rasch, R. (2015). Impact of the US Housing Crisis on the Racial Wealth Gap Across Generations. [online]. Available from: https://primarysources.brillonline.com/browse/human-rights-documents-online/impact-of-the-us-housing-crisis-on-the-racial-wealth-gap-across-generations;hrdhrd99702015008 [Accessed March 28, 2019].

Casiraghi, M., Gaiotti, E., Rodan, L. and Secchi, A. (2018). A "reverse Robin Hood"? The distributional implications of non-standard monetary policy for Italian households. *Journal of International Money and Finance*, 85, pp.215–235. [online]. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0261560617302292 [Accessed May 31, 2019].

Chiteji, N.S. (2010). The Racial Wealth Gap and the Borrower's Dilemma. *Journal of Black Studies*, 41(2), pp.351–366. [online]. Available from: http://journals.sagepub.com/doi/10.1177/0021934709353730 [Accessed March 28, 2019].

Christensen, J.H.E. and Krogstrup, S. (2019). Transmission of Quantitative Easing: The Role of Central Bank Reserves. *The Economic Journal*, 129(617), pp.249–272. [online]. Available from: https://academic.oup.com/ej/article/129/617/249/5250963 [Accessed March 28, 2019].

Coibion, O., Kueng, L., Gorodnichenko, Y. and Silvia, J. (2017). Innocent Bystanders? Monetary policy and inequality. *Journal of Monetary Economics*, 88, pp.70–89.

Colciago, A., Samarina, A. and de Haan, J. (2018). Central bank policies and income and wealth inequality: A survey. *DNB Working Paper*, No.594(May 2018), p.38.

Curdia, V. and Woodford, M. (2011). 'The central-bank balance sheet as an instrument of policy', *Journal of Monetary Economics*, vol. 58, pp. 54–79.

Davtyan, K. (2017). The distributive effect of monetary policy: The top one percent makes the difference. *Economic Modelling*, 65, pp.106–118. [online]. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0264999316305806 [Accessed June 8, 2019].

Deere, C.D. and Doss, C.R. (2006). The Gender Asset Gap: What Do We Know And Why Does It Matter. *Feminist Economics*, 12(1–2), pp.1–50. [online]. Available from: http://www.tandfonline.com/doi/abs/10.1080/13545700500508056 [Accessed March 28, 2019].

Dettling, Lisa J., Joanne W. Hsu, Lindsay Jacobs, Kevin B. Moore, and Jeffrey P. Thompson (2017). "Recent Trends in Wealth-Holding by Race and Ethnicity: Evidence from the Survey of Consumer Finances," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, September 27, 2017.

Doepke, M. and Schneider, M. (2006). Inflation and the Redistribution of Nominal Wealth. *Journal of Political Economy*, 114(6), pp.1069–1097. [online]. Available from: https://www.journals.uchicago.edu/doi/10.1086/508379 [Accessed March 29, 2019].

Domanski, D., Scatigna, M. and Zabai, A. (2016). Wealth inequality and monetary policy. *BIS Quarterly Review*, (March 2016), p.20. [online]. Available from: http://www.bis.org/publ/qtrpdf/r_qt1603f.htm [Accessed March 3, 2019].

Dymski, G., Hernandez, J. and Mohanty, L. (2013). Race, Gender, Power, and the US Subprime Mortgage and Foreclosure Crisis: A Meso Analysis. *Feminist Economics*, 19(3), pp.124–151. [online]. Available from: http://www.tandfonline.com/doi/abs/10.1080/13545701.2013.791401 [Accessed December 8, 2018].

Federal Reserve. (2019). *Distributional Financial Accounts*. Available from: https://www.federalreserve.gov/releases/efa/efa-distributional-financial-accounts.htm [Accessed March 24, 2019].

Federal Reserve Board. (2017). *Federal Reserve Balance sheet.* Available from: https://www.stlouisfed.org/publications/regional-economist/third-quarter-2017/quantitative-easing-how-well-does-this-tool-work [Accessed March 25, 2019].

Federal Reserve Economic Data. (2019). Available from: https://fred.stlouisfed.org/ [Accessed March 25, 2019].

Feldkircher, M. and Huber, F. (2018). Unconventional U.S. Monetary Policy: New Tools, Same Channels? *Journal of Risk and Financial Management*, 11(4), p.71. [online]. Available from: http://www.mdpi.com/1911-8074/11/4/71 [Accessed March 29, 2019].

Fishbein, A. and Woodall, P. (2006). 'Women are Prime Targets for Subprime Lending: Women are Disproportionately Represented in High-Cost Mortgage Market'. Consumer Federation of America. Available from: https://consumerfed.org/pdfs/WomenPrimeTargetsStudy120606.pdf [Accessed May 30, 2019].

Forbes. (2019). 'Billionaires- The Richest People in the World' [online]. Available from:

https://www.forbes.com/billionaires/#47d573ea251c [Accessed May 28, 2019].

Furceri, D., Loungani, P. and Zdzienicka, A. (2018). The Effects of Monetary Policy Shocks on Inequality. *Journal of International Money and Finance*, 85, pp.168–186.

Fuster, A. and Willen, P. (2010). '$1.25 Trillion Is Still Real Money: Some Facts about the Effects of the Federal Reserve's Mortgage Market Investments', Public Policy Discussion Papers 2010-04. Boston: Federal Reserve Bank of Boston, November.

Garriga, C., Ricketts, L.R. and Schlagenhauf, D. (2017). The Homeownership Experience of Minorities During the Great Recession. *Federal Reserve Bank of St. Louis Review,*, 99(1), pp.139–167. [online]. Available from: https://research.stlouisfed.org/publications/review/2017/02/15/the-homeownership-experience-of-minorities-during-the-great-recession/ [Accessed June 6, 2019].

Gornemann, N., Kuester, K. and Nakajima, M. (2016). Doves for the Rich, Hawks for the Poor? Distributional Consequences of Monetary Policy. *International Finance Discussion Paper*, 2016(1167), pp.1–40. [online]. Available from: http://www.federalreserve.gov/econresdata/ifdp/2016/files/ifdp1167.pdf [Accessed March 28, 2019].

Grabka, M.M., Marcus, J. and Sierminska, E. (2015). Wealth distribution within couples. *Review of Economics of the Household*, 13(3), pp.459–486. [online]. Available from: http://link.springer.com/10.1007/s11150-013-9229-2 [Accessed May 28, 2019].

Greenspan, A. (2013). *The Map and the Territory: Risk, Human Nature, and the Future of Forecasting.* New York: The Penguin Group.

Gruenstein, D., Li, W. and Ernst, K. (2010). *Foreclosures by Race and Ethnicity: The Demographics of a Crisis*. Oakland, CA: Center for Responsible Lending.

Hanks, A., Solomon, D. and Weller, C. (2018) 'Systematic Inequality- How America's Structural

Racism Helped Create the Black-White Wealth Gap'. *Center for American Progress* [online]. Available at:

https://www.americanprogress.org/issues/race/reports/2018/02/21/447051/syste

matic-inequality/ [Accessed March 9, 2019].

Hausken, K. and Ncube, M. (2013). *Quantitative Easing and Its Impact in the US, Japan, the UK and Europe*. New York, NY: Springer New York. [online]. Available from: http://link.springer.com/10.1007/978-1-4614-9646-5 [Accessed March 28, 2019].

Hernandez, J. (2009). Redlining Revisited: Mortgage Lending Patterns in Sacramento 1930-2004. *International Journal of Urban and Regional Research*, 33(2), pp.291–313. [online]. Available from: http://doi.wiley.com/10.1111/j.1468-2427.2009.00873.x [Accessed June 8, 2019].

Hesse, H., Hofmann, B. and Weber, J. (2018). The Macroeconomic Effects of Asset Purchases Revisited. *Journal of Macroeconomics*, 58, pp.115–138.

Ivanova, M.N. (2016). Quantitative Easing: A Postmortem. In '40 Years of the Cambridge Journal of Economics' Conference,. Cambridge UK, pp. 1–46.

Jawadi, F., Sousa, R.M. and Traverso, R. (2016). On the Macroeconomic and Wealth Effects of Unconventional Monetary Policy. *Macroeconomic Dynamics*, 21(05), pp.1189–1204. [online]. Available from: https://www.cambridge.org/core/product/identifier/S1365100515000292/type/journal_article [Accessed March 29, 2019].

Joyce, M. et al. (2012). Quantitative Easing and Unconventional Monetary Policy – an Introduction. *The Economic Journal*, 122(564), pp.F271–F288. [online]. Available from: https://academic.oup.com/ej/article/122/564/F271/5079447 [Accessed March 28, 2019].

Keister, L.A. and Moller, S. (2000). Wealth Inequality in the United States. *Annual Review of Sociology*, 26(1), pp.63–81. [online]. Available from: http://www.annualreviews.org/doi/10.1146/annurev.soc.26.1.63 [Accessed March 28, 2019].

Krishnamurthy, A. and Vissing-Jorgensen, A. (2011). The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy. *Brookings Papers on Economic Activity*, 42(2 (Fall)), pp.215–287.

Kiyotaki, N. and Moore, J. (2012). 'Liquidity, business cycles and monetary policy', NBER Discussion Paper no 17934, March 2012.

Kochhar, R. and Fry, R. (2014) 'Wealth inequality has widened along racial, ethnic lines since end of Great Recession' *Pew Research Center* [online]. Available from: https://www.pewresearch.org/fact-tank/2014/12/12/racial-wealth-gaps-great-recession/ [Accessed March 9, 2019].

Lavoie, M. and Fiebiger, B. (2018). Unconventional monetary policies, with a focus on quantitative easing. *European Journal of Economics and Economic Policies: Intervention*, 15(2), pp.139–146. [online]. Available from: https://www.elgaronline.com/abstract/journals/ejeep/15-2/ejeep.2018.02.05.xml [Accessed March 28, 2019].

Lenza, M. and Slacalek, J. (2018). How does monetary policy affect income and wealth inequality? Evidence from quantitative easing in the euro area. *ECB Working Paper Series*, (2190).

Lima, L. et al. (2016). The quantitative easing effect on the stock market of the USA, the UK and Japan: an ARDL approach for the crisis period. *Journal of Economic Studies*, 43(6), pp.1006–1021.

Lofquist, D., Lugaila, T., O'Connell, M. and Feliz, S. (2012). Households and Families: 2010. *US Census Bureau*, pp.1–21.

Long, M.G. (2018). Pushed into the Red? Female-headed Households and the Pre-crisis Credit Expansion. *Forum for Social Economics*, 47(2), pp.224–236. [online]. Available from: https://www.tandfonline.com/doi/full/10.1080/07360932.2018.1451762 [Accessed April 26, 2019].

McKernan, S.-M., Ratcliffe, C., Steuerle, E. and Zhang, S. (2014). Disparities in Wealth Accumulation and Loss from the Great Recession and Beyond. *American Economic Review*, 104(5), pp.240–244. [online]. Available from: http://pubs.aeaweb.org/doi/10.1257/aer.104.5.240 [Accessed March 28, 2019].

Merrill Lynch (2018) 'Women & Financial Wellness: Beyond the Bottom Line' [Online]. Available at:

https://www.bofaml.com/content/dam/boamlimage [Accessed March 9, 2019].

Metzger, M. and Young, B. (Forthcoming). 'No gender, please, we're central bankers'. Institute for International Political Economy HWR Berlin Working Paper.

Moore, A. (2017) 'America's Financial Divide: The Racial Breakdown of U.S. Wealth in Black and White' *Huffington Post* [online]. Available from: https://bit.ly/2IvNBQD [Accessed May 19, 2019].

Nakajima, M. (2015). The Redistributive Consequences of Monetary Policy. *Federal Reserve Bank of Philadelphia*, Second Quarter 2015, p.8.

O'Farrell, R. and Rawdanowicz, L. (2017). Monetary policy and inequality: Financial channels. *International Finance*, 20(2), pp.174–188. [online]. Available from: http://doi.wiley.com/10.1111/infi.12108 [Accessed March 28, 2019].

Painter II, M.A. and Shafer, K. (2011). Children, Race/Ethnicity, and Marital Wealth Accumulation in Black and Hispanic Households. *Journal of Comparative Family Studies*, 42(2), pp.145–169. [online]. Available from: https://utpjournals.press/doi/10.3138/jcfs.42.2.145 [Accessed March 28, 2019].

Panel Study of Income Dynamics. (2019). Available from: https://simba.isr.umich.edu/default.aspx [Accessed March 25, 2019].

Pfeffer, F.T., Danziger, S. and Schoeni, R.F. (2013). Wealth Disparities Before and After the Great Recession S. Danziger, ed. *The Annals of the American Academy of Political and Social Science*, 650(1), pp.98–123. [online]. Available from: http://journals.sagepub.com/doi/10.1177/0002716213497452 [Accessed March 28, 2019].

Pugh, A., Bunn, P. and Yeates, C. (2018). The Distributional Impact of Monetary Policy Easing in the UK between 2008 and 2014. *SSRN Electronic Journal*. [online]. Available from: https://www.ssrn.com/abstract=3156913 [Accessed December 20, 2018].

Rhys-Williams, F. (2017). 'Have gender norms and gendered inequalities been reinforced by post-crisis government policies in the UK?' Available from: https://t.co/0pvbiCQCzj [Accessed March 8, 2019].

Rodgers, W.M. (2008). African American and White Differences in the Impacts of Monetary Policy on the Duration of Unemployment. *American Economic Review*, 98(2), pp.382–386. [online]. Available from: http://pubs.aeaweb.org/doi/10.1257/aer.98.2.382 [Accessed March 28, 2019].

Rodnyansky, A. and Darmouni, O.M. (2017). The Effects of Quantitative Easing on Bank Lending Behavior. *The Review of Financial Studies*, 30(11), pp.3858–3887. [online]. Available from: https://academic.oup.com/rfs/article/30/11/3858/3867964 [Accessed March 29, 2019].

Romer, C. and Romer, D. (1999). *Monetary Policy and the Well-Being of the Poor*. Federal Reserve Bank of Kansas City. [online]. Available from: http://www.kansascityfed.org/publicat/econrev/PDF/1q99romr.pdf [Accessed May 27, 2019].

Saez, E. and Zucman, G. (2016). Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data. *The Quarterly Journal of Economics*, 131(2), p.53.

Schmidt, L. and Sevak, P. (2006). Gender, Marriage, and Asset Accumulation in the United States. *Feminist Economics*, 12(1–2), pp.139–166. [online]. Available from:

http://www.tandfonline.com/doi/abs/10.1080/13545700500508445 [Accessed March 28, 2019].

Sedo, S.A. and Kossoudji, S.A. (2004). Rooms of One's Own: Gender, Race and Home Ownership as Wealth Accumulation in the United States. *IZA Discussion Paper*, No. 1397, pp.1–41.

Seguino, S. (2019). Engendering Macroeconomic Theory and Policy. *Feminist Economics*, pp.1–35. [online]. Available from: https://www.tandfonline.com/doi/full/10.1080/13545701.2019.1609691 [Accessed June 8, 2019].

Seguino, S. and Heintz, J. (2012). Monetary Tightening and the Dynamics of US Race and Gender Stratification: Monetary Policy and Race/Gender Stratification. *American Journal of Economics and Sociology*, 71(3), pp.603–638. [online]. Available from: http://doi.wiley.com/10.1111/j.1536-7150.2012.00826.x [Accessed March 28, 2019].

Sharp and Hall. (2014). Emerging Forms of Racial Inequality in Homeownership Exit, 1968–2009. *Social Problems*, 61(3), pp.427–447. [online]. Available from: https://academic.oup.com/socpro/article-lookup/doi/10.1525/sp.2014.12161 [Accessed March 28, 2019].

Sierminska, E. and Takhtamanova, Y. (2009). Gender, Monetary Policy, and Employment: The Case of Nine OECD <span style="font-variant:small-caps;"> Countries. *Feminist Economics*, 15(3), pp.323–353. [online]. Available from: http://www.tandfonline.com/doi/abs/10.1080/13545700902893122 [Accessed March 28, 2019].

Stockhammer, E. (2013). Rising inequality as a cause of the present crisis. *Cambridge Journal of Economics*, 30(3). [online]. Available from: https://sci-hub.tw/https://doi.org/10.1093/cje/bet052 [Accessed June 9, 2019].

Survey of Consumer Finances. (2019). Available from: https://www.federalreserve.gov/econres/scfindex.htm [Accessed March 25, 2019].

Thompson, J.P. and Suarez, G.A. (2015). Exploring the Racial Wealth Gap Using the Survey of Consumer Finances. *Finance and Economics Discussion Series*, 2015(76), pp.1–62.

[online]. Available from: http://www.federalreserve.gov/econresdata/feds/2015/files/2015076pap.pdf [Accessed May 18, 2019].

Thorbecke, W. (2001). Estimating the effects of disinflationary monetary policy on minorities. *Journal of Policy Modeling*, 23(1), pp.51–66. [online]. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0161893800000296 [Accessed March 28, 2019].

Tooze, A. (2018). *Crashed: How a Decade of Financial Crises Changed the World.* New York: Viking.

US Census Bureau. (2016) 'The Majority of Children Live With Two Parents, Census Bureau Reports' [online]. Available from: https://www.census.gov/newsroom/press-releases/2016/cb16-192.html [Accessed March 17, 2019].

US Census Bureau. (2018). QuickFacts United States [online]. Available from: https://www.census.gov/quickfacts/fact/table/US/PST045218

Wallace, N. (1981). 'A Modigliani-Miller theorem for open-market operations', *American Economic Review*, vol.71, pp. 267–74.

Watkins, J.P. (2014). Quantitative Easing as a Means of Reducing Unemployment: A New Version of Trickle-Down Economics. *Journal of Economic Issues*, 48(2), pp.431–440. [online]. Available from: https://www.tandfonline.com/doi/full/10.2753/JEI0021-3624480217 [Accessed March 29, 2019].

Weale, M. and Wieladek, T. (2016). What are the macroeconomic effects of asset purchases? *Journal of Monetary Economics*, 79, pp.81–93. [online]. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0304393216300101 [Accessed March 28, 2019].

Wolff, E. (2018). *The Decline of African-American and Hispanic Wealth since the Great Recession*. Cambridge, MA: National Bureau of Economic Research. [online]. Available from: http://www.nber.org/papers/w25198.pdf [Accessed March 28, 2019].

Yamokoski, A. and Keister, L.A. (2006). The Wealth of Single Women: Marital Status and Parenthood in the Asset Accumulation of Young Baby Boomers in the United States. *Feminist Economics*, 12(1–2), pp.167–194. [online]. Available from: http://www.tandfonline.com/doi/abs/10.1080/13545700500508478 [Accessed March 28, 2019].

Young, B .(2018). 'Central Bank Policies and Unconventional Monetary Policies' in Elias, J. and Roberts, A. (eds). *The Handbook of IPE of Gender*. Cheltenham UK: Edward Elgar.

8. Appendix

Table 8-1. Methodology of the Household Surveys in the US

Survey	Years of waves	Methodology	My calculations
Survey of Consumer Finances (SCF)	2001-2016, conducted every 3 years.	SCF includes roughly 4,500 families per survey year. The data consists of a core sample, representative of the total population (two-thirds of the survey), combined with a high-income supplement, from the US Internal Revenue Service (IRS) (1/3rd of the survey), who have a high probability of having high net worth. Their estimates for median net worth and the value of assets is higher than for other surveys such as PSID because they oversample the wealthiest households in their methodology. The SCF defines net worth as the total sum of wealth, financial wealth, real assets and retirement wealth minus any liabilities such as mortgages and other debts. Further details can be found here on the definitions. The methodology of race and ethnicity categorisation changed in 2004. The question that has been asked since then about the self-identified race of the household is "Which of these categories do you feel best describe you: white, black or African-American, Hispanic or Latino, Asian, American Indian or Alaska Native, Hawaiian Native or other Pacific Islander, or another race?" respondents are allowed to give more than one, but only the first one, the one they identify most with is included in the survey data. Respondents are also asked whether they were of Hispanic/Latino culture or origin, regardless of race. The SCF is not a panel data set and so does not use the same households in every survey wave. This makes it more difficult to accurately conclude what the exact effect of an economic shock or policy was on a household's wealth.	For calculating the wealth gap ratios, I divided the median net worth and then the median value of stocks of black or Hispanic by white. The same method was used to calculate the female/male wealth gap from the PSID data.
Panel Study of	2001-2017,	The PSID is made up of two samples. The first is nationally representative, and the second draws on families from lower	I used the gender and race categories

Income Dynamics (PSID)	conducted regularly every 2 years.	income levels. Being a panel study and having the same households included in each wave means it is more plausible to get a better approximation of how a policy would have impacted the changes in the wealth of a certain type of household, as you are controlling for other household characteristics. It draws on fewer survey items than the SCF for the total net worth, but still covers all major wealth components. The main household categories that I use are based on whether the sex of the head of the household was female or male, and if the head of the household was white or black. Up until 2015 the survey took the male of a heterosexual couple (married or cohabitating) to be the head of the household, and only in 2017 did the survey change its questionnaire to ask the 'respondent' of the household. Therefore, the data on 'Male Head' includes single male households and also couple households, whereas the 'Female Head' does not include women that are in heterosexual couple households, and so the vast majority of these respondents are single. The categorisation of 'White Head' or 'Black Head' also does not consider the race or ethnicity of the spouse if there is one and only that of the head of the household, which will be male unless the household is single female.	to filter the households and then to calculate the median wealth, and then filtered by households that said they had monthly mortgage payment. I then calculated the median monthly mortgage payment from this and then what percentage of these households said they had fixed or variable rate mortgages from the total of all households in that gender or race category.