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Monetary Policy and Racial Inequality

ABSTRACT This paper aims at an improved understanding of the relationship between monetary policy and racial inequality. We investigate the distributional effects of monetary policy in a unified framework, linking monetary policy shocks both to earnings and wealth differentials between Black and white households. Specifically, we show that, although an accommodative monetary policy shock increases employment for Black households more than for white households, the overall effects on earnings are small. At the same time, an accommodative monetary policy shock has large effects on the wealth difference between Black and white households, because Black households own fewer assets that appreciate in value. This suggests an important trade-off if policymakers aim to reduce racial inequalities.

> The Fed has a profound impact on our economy. . . . Its existing mandate promotes maximum employment, and stable prices. . . . The Fed should add to that responsibility, and aggressively target persistent racial gaps in jobs, wages, and wealth.
>
> —Joseph Biden, "Racial Equity Plan Speech," July 28, 2020

> With regard to the employment side of our mandate, our revised statement emphasizes that maximum employment is a broad-based and inclusive goal. This change reflects our appreciation for the benefits of a strong labor market, particularly for many in low- and moderate-income communities.
>
> —Jerome H. Powell, "New Economic Challenges and the Fed's Monetary Policy Review," August 27, 2020

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The racial tensions that spread across the United States in 2020 attracted the attention of monetary policymakers. Fifty years past the accomplishments of the civil rights movement, racial gaps in income and wealth remain enormous. There is widespread recognition that despite a decline in overt labor market discrimination and gains in educational opportunities since the onset of the civil rights movement, racial gaps persist and have even grown larger by some measures (Bayer and Charles 2018; Dettling and others 2017; Kuhn, Schularick, and Steins 2020; Thompson and Suarez 2017; Wolff 2017). The size and persistence of the gaps between both the income and wealth of Black and white households are striking (Chetty and others 2020; Emmons 2020). According to the 2019 Survey of Consumer Finances (SCF), the median wealth of a white household was $181,400, compared to only $20,700 for the median Black household, implying that the typical Black household owns only about 11 percent of the wealth of the typical white household. The income ratio is smaller but still large: the median income for Black households ($38,700) is 58 percent of the median income for white households ($67,200).[1]

Traditionally, macroeconomists and monetary policymakers held the view that racial inequities were outside their purview. However, the view that central banks should pay attention to racial inequalities in income and wealth has recently gained ground. For instance, Raphael Bostic (2020), president of the Federal Reserve Bank of Atlanta, suggests that the Federal Reserve "can play an important role in helping to reduce racial inequities and bring about a more inclusive economy" (par. 8). Yet, so far, we lack a deeper understanding of the impact monetary policy has on racial inequities, a topic that has for a long time received little attention from the research community. Our goal in this paper is to examine the effects of monetary policy on the income and wealth of Black and white households.

One line of thinking that links monetary policy to distributional outcomes runs as follows: at the business cycle frequency, a more accommodative monetary policy lowers unemployment and increases labor income for workers who would otherwise have become or stayed unemployed. Marginal workers who are drawn into the labor market by such policies are often from low-income and minority households. Consequently, the gap

1. Board of Governors of the Federal Reserve System, "Survey of Consumer Finances (SCF)," https://www.federalreserve.gov/econres/scfindex.htm.

between unemployment rates of Black and white households can be expected to shrink under a more accommodative policy.[2] In support of this view, Carpenter and Rodgers (2004) find a higher sensitivity of Black workers' labor market outcomes to monetary policy shocks. Coibion and others (2017) call this effect on low-income workers the *earnings channel*.

At the same time, monetary policy affects heterogeneous household balance sheets through its impact on asset prices (Brunnermeier and Sannikov 2012; Kaplan, Moll, and Violante 2018). Asset price changes will affect the racial wealth distribution if portfolios differ systematically between Black and white households. Using SCF data, we show that portfolio heterogeneity is a very pronounced fact in the data: Black households hold substantially different portfolios and in particular fewer financial assets than white households, so that monetary policy shocks potentially have larger effects on white households' portfolios. The median Black household has no stock holdings nor owns a house. Thus, any effect that monetary policy has on the price of such assets bypasses the majority of Black households. The effects could be particularly pronounced in the case of unconventional monetary policy, which explicitly aims at affecting asset prices (Bernanke 2020; Wu and Xia 2016).

In addition to the earnings and portfolio effects, monetary policy will have an impact on interest rates and dividends directly. We call the effect on interest earnings on savings and bonds, dividend earnings and the gains or losses from mortgage refinancing the *capital income effect*. To the extent that Black and white households' portfolios differ, there will be differential capital income effects of monetary policy.

Since accommodative monetary policy boosts asset returns, it is likely that the portfolio and earnings effects go in opposite directions. On the one hand, more accommodative monetary policy may benefit Black households by reducing unemployment and increasing labor market participation and earnings, thereby helping to reduce the racial income gap—and, over time, even the wealth discrepancy if part of the additional income is saved.

2. This channel is often emphasized in policy discussions (Aliprantis and Carroll 2019). In the words of Atlanta Fed president Raphael Bostic (2020): "The Federal Reserve acts to create a foundation upon which businesses, families, and communities can thrive. Our success means that businesses can grow faster and hire more workers and that more innovation can be supported, which would mean more opportunities for African Americans and others who have not been as attached to the economy" (par. 9).

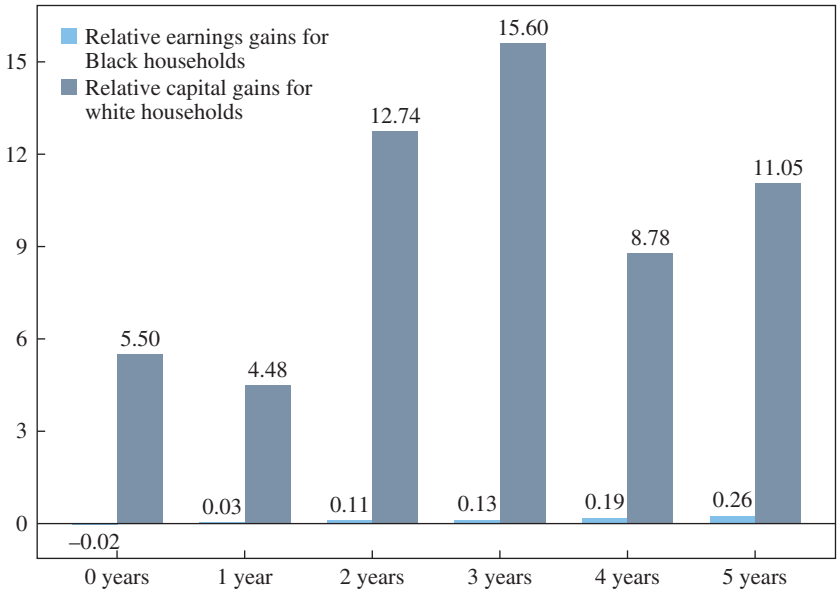
On the other hand, the same policies may widen racial wealth differences if white households benefit more from rising asset prices than Black households due to their different portfolio composition and greater wealth. The capital income effects can go in either direction, since lower interest rates reduce household interest income but the opportunity to refinance mortgages at a lower rate can have positive effects on disposable income.

This paper quantifies and compares the size of the earnings, portfolio, and capital income effects of monetary policy. We begin with a comparative statics exercise, examining the impact of a given change in asset prices and interest rates. We then develop a unified empirical framework that uses instrumental variable local projections following Stock and Watson (2018) and Jordà, Schularick, and Taylor (2020) to study the effects of a monetary policy shock on asset prices, interest rates, and Black-white employment gaps over a five-year horizon. For this analysis, we rely on the most widely used monetary policy shock series—the (extended) Romer-Romer shocks (Coibion and others 2017). We apply the asset price and interest rate changes to the portfolios of white and Black households from the most recent SCF wave in 2019 and determine the effect on the net wealth of Black and white households. We further combine the estimated effects on the unemployment gap with unemployment and earnings data from the SCF and compare them to the portfolio effects in response to the estimated monetary policy shocks over different time horizons.

KEY FINDINGS A 100 basis point accommodative monetary policy shock leads to larger employment gains for Black households but also to larger wealth gains for white households. More precisely, the Black unemployment rate falls more than the white unemployment rate after an unexpected accommodative interest rate shock. This translates into a relative earnings gain for the mean Black household relative to the mean white household. Our results indicate that after five years the cumulative earnings gain for Black households relative to white households is $134.

The same monetary policy shock pushes stock and house prices up, while lowering bond yields and increasing dividend payments. Since the average wealth of white households is about six times that of Black households, and moreover the composition of Black and white portfolios is markedly different, there are large differences in the effects on the wealth of Black and white households. For white households, we find that on average, a 100 basis point accommodative policy shock leads to capital gains from asset price changes of $18,900 after five years, which is almost one-fifth of their average annual income. The wealth gains for Black households

Figure 1. Comparison of Relative Earnings and Portfolio Effects



Source: Authors' calculations.

Note: The graph compares the cumulative relative earnings effect for Black households to the relative portfolio effect for white households based on an expansionary 100 basis point monetary policy shock. The effects are reported as a percentage share of average annual household income of the respective racial group. See section V.D for the calculation of the relative earnings effect. The relative portfolio effect is the difference between the capital gains of white and Black households from figure 10.

are substantially smaller, about $3,300, corresponding to 6 percent of their average annual income.

In figure 1, we show the year-by-year accumulated earnings and portfolio effects as a percentage of each group's income. For an easier comparison, we constructed the differences to be always positive. Capital gains are larger for white households and earnings gains are larger for Black households. The earnings effect is the relative earnings gains for Black households, and the portfolio effect is the relative capital gains for white households.[3] The details on how these effects are calculated can be found in section V.E.

3. The earnings effect applies to a flow, while the portfolio effects reflect capital gains on the stock of wealth. To take this into account, we accumulated the differential earnings effects over time.

Even as the earnings effect accumulates over time, it remains orders of magnitude smaller than the effects from capital gains.

While the earnings effect increases the consumption possibilities of households directly, capital gains need to be realized first. To make a fair comparison of the wealth and earnings effects, we thus look at the consumption effects of capital gains. Typical estimates indicate that the marginal propensity to consume (MPC) out of capital gains is about 3 percent. This means that our estimated difference between the capital gains received by white and Black households after five years, about $15,600, leads to additional consumption expenditures of $470 for white compared to Black households. The relative consumption effect of capital gains for white households in year 5 is three and a half times larger than the relative earnings gain for Black households cumulated over five years. An accommodative monetary policy would need to have a much larger effect on Black employment and earnings in order to match the impact of changes in asset prices on the consumption of white households.

Our empirical findings strongly suggest that monetary policymakers face a trade-off: monetary accommodation widens racial wealth inequality as it reduces income inequality. There is little reason to think that monetary policy can play a significant role in reducing racial inequities in both income and wealth at the same time. The conventional tools of monetary policy seem ill suited for these important tasks.[4]

STRUCTURE OF PAPER In section I, we briefly discuss prior literature on the channels of monetary policy and its distributional effects. In section II, we discuss racial inequalities in income and wealth, present the data, and discuss portfolio differences between Black and white households. In section III, we examine the effect of a 10 percent change in asset prices and a 100 basis point change in interest rates on the portfolios of Black and white households.

We present our estimates of the effects of a monetary policy shock on asset prices, interest rates, dividends, and the wage and unemployment gaps in section IV. In section V, we examine the impact of a typical monetary policy shock on Black and white wealth and capital income and compare the wealth effects to the estimated earnings effects. The last section concludes.

4. Our analysis is based on a surprise change to the federal funds rate; we do not examine the effects of nonconventional policies at the zero lower bound, such as quantitative easing.

I. Policy Channels and Empirical Literature

We begin with a brief discussion of the theoretical literature that relates monetary policy–induced asset price change to consumption. We then summarize the empirical literature on the distributional effects of monetary policy.

I.A. Policy Channels, Consumption, and Welfare

There are at least two notable channels through which monetary policy–induced asset price changes can affect consumption: wealth effects and collateral constraints.[5] First, changes in both house and stock prices can affect household consumption. For housing, Berger and others (2018) demonstrate that a calibrated heterogeneous agent model is quantitatively consistent with large estimated house price effects on consumption. Chodorow-Reich, Nenov, and Simsek (2021) study stock market wealth effects and also find significant effects on consumption.

In addition, capital gains can lead to redistribution and welfare effects when some households sell assets to realize their capital gains, as emphasized in Moll (2020). Households planning to buy assets that appreciate will experience welfare losses, while households who plan to sell will experience gains. For instance, households at different points of the life cycle differ in whether they plan to buy or sell assets (Greenwald and others 2021). Glover and others (2020) explore such life cycle redistribution with a focus on the consequences of the large asset price changes during the financial crisis. A similar logic can be applied to racial differences in asset holdings. If past discrimination in housing markets implies that Black households are structurally "short" in housing and have plans to become homeowners, asset price increases would tend to make those households worse off.

Second, rising asset prices may also temporarily relax collateral constraints and facilitate borrowing for housing or entrepreneurial investments. To the extent that such effects fall predominantly on white households, they can induce permanent effects on income and wealth inequality (Boerma and Karabarbounis 2021). Similarly, after an accommodative monetary

5. Recent theoretical macro models with heterogeneous agents have emphasized the asset price channel of monetary policy transmission (Auclert 2019; Auclert, Rognlie, and Straub 2020; Caramp and Silva 2021; Kekre and Lenel 2020).

policy shock households can permanently lock in lower mortgage rates through refinancing. The evidence we present below is consistent with such permanent gains accruing predominantly to white households.

This discussion implies that even if monetary policy shocks only have temporary effects on asset prices, they can have persistent economic consequences. Moreover, our estimated effects of a policy rate shock on asset prices remain visible over a multiyear period, as in other recent research (Paul 2020). Hence, even temporary policy shocks can alter the equilibrium characteristics of the economy with long-lasting effects.

I.B. Empirical Literature

There is a large body of literature on the distributional consequences of monetary policy that mostly focuses on income and consumption inequality.[6] Coibion and others (2017) find that a contractionary monetary policy shock increases inequality in pretax incomes and consumption. They estimate the effects of monetary policy shocks in the spirit of Romer and Romer (2004) on aggregate inequality measures. Using a similar approach and administrative data from Norway, Holm, Paul, and Tischbirek (2021) find evidence that contractionary monetary policy shocks increase inequality in disposable income and consumption but decrease wealth inequality. By contrast, Andersen and others (2021) find an increase in disposable income inequality after an accommodative monetary policy shock. They use Danish micro data and exploit the peg of the Danish krone to the euro in order to identify monetary policy shocks. Unlike the previous two studies, the authors consider household income distribution within age groups and estimate inequality effects based on income effects at the household level, instead of estimating the effects on aggregate measures of inequality. While Andersen and others (2021) find monotonically increasing effects of accommodative monetary policy shocks on disposable incomes along the income distribution, Amberg and others (forthcoming) find *U*-shaped income effects based on Swedish administrative data. They identify monetary policy shocks with a high-frequency approach and study the effects on total posttax income. Similar to Andersen and others (2021), they compute inequality effects from income effects at the individual level. Due to the *U*-shape of income effects, the overall effects on income inequality depend on the inequality measure considered. For instance, they find that inequality increases as measured by the

6. See Colciago, Samarina, and de Haan (2019) for an overview.

Gini coefficient, yet decreases as measured by the ratio of the 90th to the 10th percentile.

Only a few papers have explicitly focused on the effect of monetary policy on wealth inequality. Adam and Tzamourani (2016) use euro area data from the Household Finance and Consumption Survey to estimate the impact of changes in different asset prices along the wealth distribution. Albert and Gómez-Fernández (2021) use the high-frequency monetary policy shocks of Gertler and Karadi (2015) in a structural vector autoregressive (VAR) model with US data to estimate the effects on interest rates, dividends, and stock and house prices. They link these effects to data from the 2016 SCF and find that an expansionary monetary policy shock increases wealth inequality, especially in the long run. Lenza and Slacalek (2021) examine the effect of quantitative easing shocks in the euro area on wealth and income distributions. They find little effect on the wealth distribution and a noticeable effect on the income distribution due to increased employment in lower-income households, although the effects are not long lasting. Mäki-Fränti and others (2022) study the effects of both conventional monetary policy and quantitative easing shocks on income and wealth inequality in Finland, finding positive but small effects on both income and wealth inequality for both types of shocks.

Although we are not aware of any other examination of the effect of monetary policy on the racial wealth gap, the size and persistence of the wealth gap has been shown in previous work, most recently by Emmons, Kent, and Ricketts (2019), Kent and Ricketts (2021), and Aladangady and Forde (2021). The differential effect of monetary policy on Black and white unemployment rates was observed in the 1990s; see, for example, Zavodny and Zha (2000). Carpenter and Rodgers (2004) find a higher sensitivity of Black workers' labor market outcomes to monetary policy shocks. Finally, Rodgers (2008) explores differential effects of monetary policy on the duration of unemployment for Black and white workers. His evidence points toward a stronger effect on the unemployment duration of Black workers than for white workers after contractionary monetary policy shocks.

II. Racial Inequalities in Income and Wealth

In this section, we describe the Survey of Consumer Finances (SCF) data and present summary statistics. The data from the 2019 SCF indicate that the median wealth of white households was almost nine times higher than for Black households, while white median income was 1.7 times greater than for Black households. Not only is the wealth gap between Black and

white households large, it has hardly changed over the last fifty years. We show trends in the financial situation of Black and white households with the data compiled by Kuhn, Schularick, and Steins (2020) from early waves of SCF going back to 1950.

II.A. SCF Data

The SCF provides representative data on the financial situation of US households, employing a survey design that oversamples wealthy households. The detail of the financial information, the data quality, and the extent of the household coverage have made the SCF the primary source for studying the distribution of income and wealth among US households. In the 2019 SCF data, 68 percent of household heads reported being white, 16 percent reported being non-Black and non-white, and 16 percent of households reported that they have a Black head of household. For our analysis, we focus on households who either have a Black or a white head.[7]

We follow the definitions of income and wealth in previous literature (Bricker and others 2016; Kuhn and Ríos-Rull 2016; Kuhn, Schularick, and Steins 2020). In particular, wealth is the sum of all assets minus all debt of a household. We consider marketable wealth so that we do not include claims against Social Security or defined-benefit retirement plans. Defined-contribution retirement plans are part of marketable wealth and constitute 17 percent of wealth in the United States (Kuhn and Ríos-Rull 2016). Housing includes the primary residence, other residential real estate, and the net value of nonresidential real estate. For income, we consider income from all sources; for earnings, we use wage and salary income. We convert all nominal variables throughout the paper to 2019 dollars using the Consumer Price Index (CPI).

We use the approach of Bricker and others (2017) to construct household holdings of all asset classes, calculating total stock and bond positions as the sum of direct and indirect holdings. Directly held bond and stock investments are allocated to their respective positions. For indirect holdings, we allocate stock and bond investment components for stock and bond mutual funds, annuities and trusts, retirement accounts, and investment savings accounts to the respective total stock and bond holdings. In the end, total stock holdings are the sum of directly held stocks, stock mutual funds (where we take 50 percent of the holdings of combination mutual

7. The SCF convention is that in a couple the male spouse is the head of household, and we follow this convention.

Table 1. Mean and Median Black and White Wealth and Income in the 2019 SCF

	Means		*Medians*		*Share with holdings (%)*	
	White	*Black*	*White*	*Black*	*White*	*Black*
Bonds	122,700	19,600	0	0	47	27
Housing	353,500	104,700	170,000	0	75	46
Equity	474,000	40,900	9,000	0	64	35
Other nonfinancial assets	33,400	13,500	17,000	8,000	90	72
Liquid assets	57,000	13,900	8,000	1,400	99	95
Other financial assets	28,400	7,600	0	0	37	30
Net wealth	951,300	139,800	181,400	20,700		
Debt	117,300	60,400	35,000	10,100		
Income	113,300	58,100	67,200	38,700		

Source: Authors' calculations.

Note: All dollar values are rounded to the nearest $100. Housing includes other real estate. Equity includes business wealth. Nonfinancial assets are the value of vehicles and other nonfinancial assets (e.g., jewelry or gold). Liquid assets are the sum of checking accounts, saving accounts, call accounts, money market deposit accounts, prepaid accounts, and certificates of deposit. Other financial assets include the cash value of life insurance.

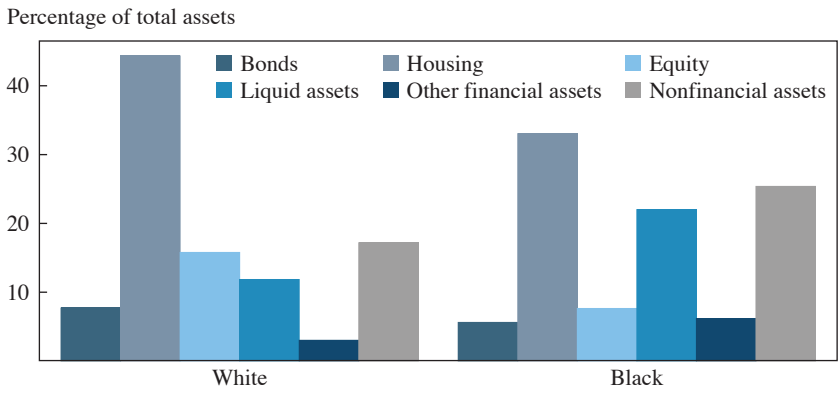
funds), and the share of retirement plans, other managed investments, and investment saving accounts which are invested in stocks, as reported by the survey participants. We proceed accordingly for bonds.

2019 SCF SUMMARY STATISTICS Table 1 provides a summary of the financial situation of Black and white households in the United States in 2019. We report several asset components from household balance sheets, as well as total debt, wealth, and income. We report means and medians for asset positions, wealth, debt and income, and in addition the share of households with positive holdings of each asset class.

The SCF data show that the average Black household has 51 cents for each dollar of white household income. The average wealth gap is dramatically larger; the average Black household has only 15 cents per dollar of white household wealth. The racial wealth gap is prevalent on the entire household balance sheet but it is much smaller for nonfinancial assets. For example, for housing, the average Black household owns 30 cents per dollar of the average white household. By contrast, if we look at equities, Black households hold on average only 9 cents for every dollar of equity held by white households.

Comparing means and medians highlights the large skewness of the US wealth distribution, with means being much larger than medians. The racial wealth gap is larger at the median than at the mean, with the typical Black household owning only about 11 percent of the wealth of the

Figure 2. Average Portfolio Shares of White and Black Households



Source: Authors' calculations.

typical white household.[8] For many asset types, the median is zero or close to zero because the share of households with holdings is small. The last two columns of table 1 show that only 35 percent of Black households own equities, just a bit more than half the share of white households. Black households are heavily underrepresented at the top of the US wealth distribution, where financial wealth is concentrated (Kuhn and Ríos-Rull 2016). Many Black households in the United States do not have any financial assets at all, so if asset prices increase, they will not benefit.

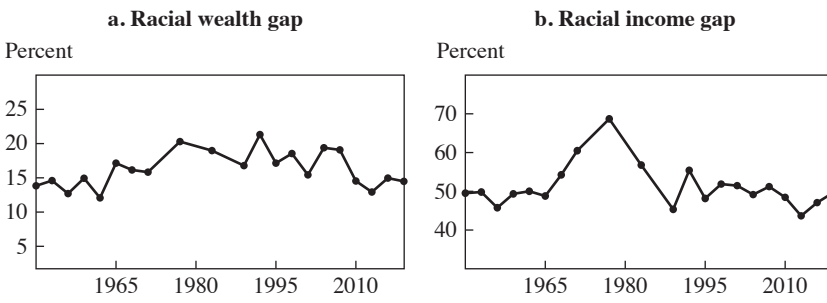
Figure 2 displays the portfolio composition of Black and white households by showing the average share of each asset class in total assets.[9] Housing is the largest portfolio component for both Black and white households. The housing share is larger for white households, who on average hold 44 percent of their assets in housing, compared to an average share of 33 percent for Black households.

The equity share of white households (around 16 percent) is about twice as high as for Black households. For bonds, the discrepancy in average portfolio shares between Black and white households is smaller. Differences in portfolio composition translate into differences in exposure to asset

8. Medians are computed within asset classes and therefore might not correspond to the asset holdings of the median-wealth household.

9. Note that the figure shows average portfolio shares, which differ from the portfolio shares of the average household obtained by dividing the average holdings of each asset class by average total assets (as found in table 1). The latter would amount to an asset-weighted average of the household-level portfolio shares.

Figure 3. Long-Run Trends of the Racial Wealth and Income Gaps



Source: Authors' calculations.

Note: Panels show the evolution of the ratio of average Black to average white wealth and income over time. The data were Winsorized at the 1st and 99th percentile within each year-race bin.

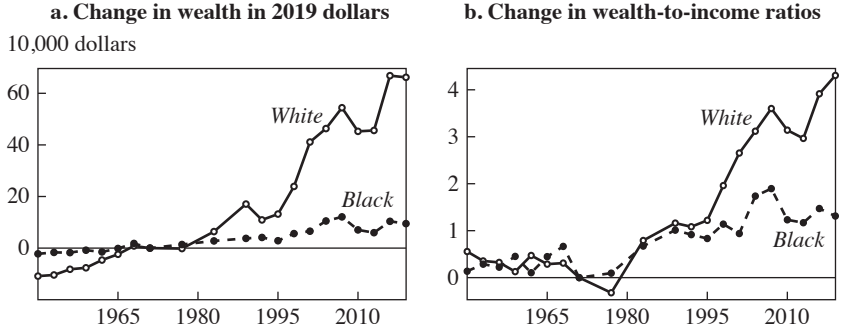
price changes (Kuhn, Schularick, and Steins 2020). The portfolio shares for housing, equities, and bonds are larger for white households, making them more exposed to changing asset prices than Black households, who have a larger share of low-return liquid assets, life insurance, and nonfinancial assets such as vehicles.

II.B. Trends in Racial Income and Wealth Inequality

We use data from Kuhn, Schularick, and Steins (2020) to show trends in racial wealth and income gaps since the 1950s. Based on these data, figure 3, panel a, shows the racial wealth gap, that is, the ratio of average Black to average white wealth, and panel b shows analogous results for income. The racial wealth gap decreased somewhat from the 1970s until the 2008 financial crisis; it now stands at about 15 percent, just as in the 1950s. This reversal was largely driven by the collapse of house prices (Kuhn, Schularick, and Steins 2020; Wolff 2016). In particular, despite some fluctuations over time, the ratio of Black to white average stock and business wealth has remained at persistent low levels, without any indication of an upward trend (see online appendix figure A.1, panel a). The same holds true for the second major asset class, namely, housing. The housing wealth gap only closed for a short period in the 2000s (see online appendix figure A.1, panel b). The trends in the income gap are similar. There was a reduction in racial income inequality since the mid-1960s, which was followed by a return to earlier levels of the gap in the 1990s.[10]

10. Similar patterns emerge when looking at medians, although the median gaps in income and wealth are slightly smaller in the 2010s than in the 1950s.

Figure 4. Change in Wealth and Wealth-to-Income Ratios Relative to 1971



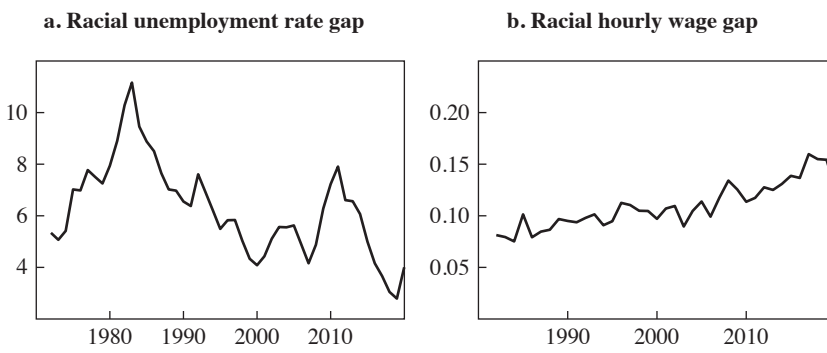
Source: Authors' calculations.
Note: Changes shown are the differences from the 1971 values.

In figure 4, panel a, we contrast the dollar changes in average wealth of Black and white households in the United States over the past seventy years relative to 1971. While average white wealth increased by about $650,000 in 2019 dollars, the wealth of Black households increased by a little more than $100,000, keeping the wealth gap at roughly the same level as in the 1950s. The stock market boom of the 1990s provided a boost to white wealth, which increased by about $400,000 per household between 1995 and 2007, while average Black wealth increased by less than $100,000. Such large differences stem from the much higher exposure to equity markets of wealthy, typically white, US households.[11]

Figure 4, panel b, compares the changes in wealth-to-income ratios of Black and white households relative to the 1971 ratio. We find a strong co-movement from the early 1950s to the mid-1990s, when a rapid divergence took place. By 2019, white households owned $8.4 of wealth per dollar of income, while Black households owned only $2.4 (see table 1). Between the early 1970s and today, Black households increased their wealth by only slightly more than one year's income, while the wealth of white households increased by about four times their annual income. This stark difference was mainly driven by equity and business wealth. Online appendix figure A.2 shows the counterfactual change in Black and white wealth-to-income ratios when keeping wealth from equity, businesses, and defined-contribution pension accounts (which are to a large extent

11. Increases in equity prices during the 1990s also tended to increase wealth inequality *among* white households (Kuhn, Schularick, and Steins 2020).

Figure 5. Racial Unemployment and Wage Gaps



Source: Authors' calculations based on FRED and Current Population Survey (CPS) outgoing rotation groups.

Note: The left panel shows the racial unemployment gap from 1972 to 2020 (in percentage points), computed as the difference between the average annual unemployment rates of Black and white workers. The right panel shows the racial (log) wage gap from 1982 to 2020 for annual averages of log wage data for Black and white workers who are paid by the hour.

invested in equities) fixed at their 1971 levels. Without the equity- and business-induced wealth gains, wealth-to-income ratios would have remained relatively stable from the mid-1990s to today, apart from a short-lived housing-based increase around the financial crisis. In particular, Black and white wealth-to-income ratios would have evolved in a strikingly similar way. High wealth-to-income ratios imply that changes in asset prices lead to large wealth gains relative to income. Accordingly, differences in saving rates, which operate on income flows, can have only a small impact on the wealth gap compared to the impact of asset price changes, which operate on much larger wealth stocks (Kuhn, Schularick, and Steins 2020).

UNEMPLOYMENT AND WAGE GAP TRENDS In addition to the large wealth and income differences between Black and white households, there are differences in labor market outcomes of Black and white households. Specifically, the racial gaps in unemployment rates and wages are large. The racial unemployment gap is the focus of discussions about the earnings effect of monetary policy. We use Bureau of Labor Statistics (BLS) data on unemployment rates starting in 1972, when Black unemployment rate data become available.[12] Figure 5, panel a, shows the Black-white annual unemployment gap from 1972 to 2020. The gap has rarely been smaller

12. The gap is the difference between Black and white unemployment rates, where the data are seasonally adjusted with Census X-12 ARIMA.

than 4 percentage points. It almost reached 12 percentage points during the 1982 recession and hit a low of 3 percentage points in the tight labor market prior to the COVID-19 pandemic.

For the wage gap, we use data for Black and white workers from the Current Population Survey (CPS) (Flood and others 2021). Wage data for all employed workers paid by the hour in the CPS outgoing rotation groups are available from January 1982 onward. The racial wage gap shown in figure 5, panel b, is the difference between log wages of Black and white workers. The series has an upward trend from 8 percent lower wages for Black workers in 1982 to almost 15 percent today. The wage gap does not show systematic cyclical fluctuations around this secular trend. The increasing wage gap counteracts some of the effects of the historical decline in the racial unemployment gap shown in figure 5, panel a.[13]

III. Household Portfolios, Asset Prices, and Interest Rates

In the following, we illustrate the different sensitivity of Black and white household asset portfolios to changes in asset prices and interest rates.

III.A. Portfolio Composition and Asset Price Changes

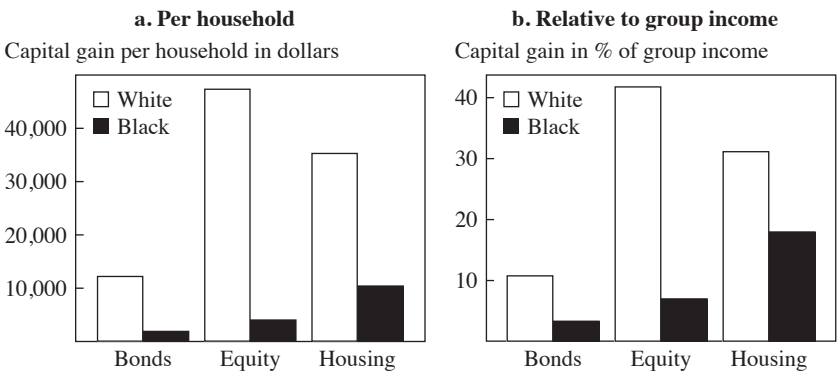
To illustrate the effect of asset price changes, we consider a 10 percent increase in the price of each asset and look at how this affects the wealth of the average Black and white household.[14] Figure 6, panel a, shows the dollar wealth changes for three major asset classes—bonds, equity, and housing—following a 10 percent asset price increase. Changes in asset prices lead to much larger capital gains for white compared to Black households, which is not surprising given the large differences in the average wealth levels shown in table 1.

These racial differences in capital gains are only partially mitigated when we look at the wealth gains relative to household income, as shown in figure 6, panel b. Even in relation to income, we find the differences still to

13. Another reason for the trend might be changes in the group of workers who are paid by the hour. We also considered data on the racial gap in mean and median weekly earnings and found our results to be robust.

14. A 10 percent change seems to be a reasonable benchmark in light of the substantial increases in asset prices that have occurred during the past fifteen years. Over this time period, US home prices rose by 69 percent, stock prices by 95 percent, and bond prices by 22 percent. These numbers are based on the annual average S&P/Case Shiller US National Home Price Index, the end-of-year S&P 500 stock price index, and the annual average US ten-year government bond yield with the assumption that duration is seven years.

Figure 6. Capital Gains from 10 Percent Increase in Asset Prices



Source: Authors' calculations.

Note: Capital gains are computed as the product of the price change and the average stock of asset holdings of the respective racial group.

be large. For example, if stock prices rise by 10 percent, capital gains for white households are over 40 percent of annual income. For Black households, the corresponding number is less than 10 percent. These results mean that any capital gains from asset price changes accrue disproportionately to white households.

Housing, the largest asset of most Americans, is particularly important due to the possibility of racial discrimination in housing markets.[15] Table 1 already showed that homeownership rates are lower for Black households. Zero housing wealth at the median implies that not even every second Black household owns a house. By contrast, the housing wealth of white households at the median is already $170,000, more than the average total wealth of Black households. In online appendix III, we conduct counterfactual analyses where we equalize the homeownership rates of Black and white households or the house values of Black and white homeowners. We find that the average gap in capital gains relative to income between Black and white households would be almost closed if Black households had the same propensity to be homeowners as white households, and it would be more than closed if Black homeowners' houses were as valuable as those of white homeowners.

Whether it is redlining, other forms of discrimination, or other factors that have led to Black households owning fewer and less valuable homes,

15. See, for example, Zonta (2019) and Joint Center for Housing Studies (2020).

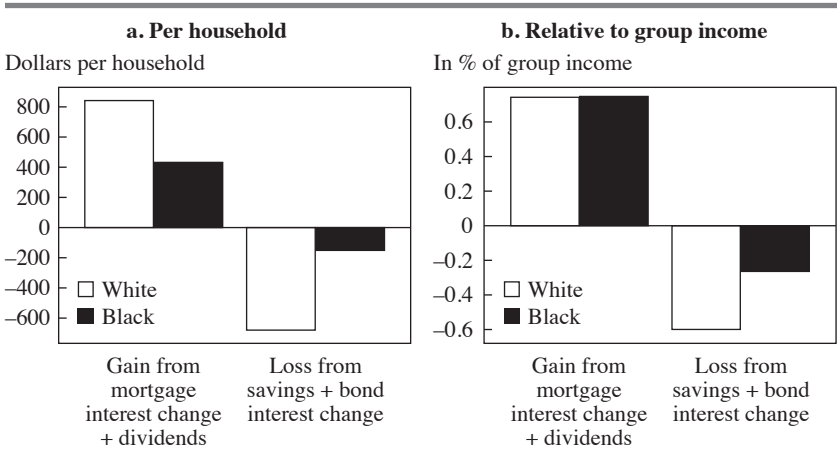
these differences mean that Black households gain less from overall home price appreciation. This potentially fuels further racial inequalities when monetary policy leads to capital gains in the housing market.

III.B. Portfolio Composition and Interest Rate Changes

Black and white households are also affected differently when interest rates and dividend payments change. Households are affected by such changes in several ways after an accommodative monetary policy shock. First, lower interest rates will lead to lower interest income on bank accounts and deposit-type assets. Unlike for fixed-rate bonds that will increase in value, the money value of an account balance will not change. What will change are the future income flows from this balance, making a household with a positive balance poorer in expectation. Falling interest rates also reduce the interest earnings on bonds when maturing bonds are reinvested at a lower rate. Around 13.4 percent of corporate and 20.6 percent of mortgage-backed bonds are refinanced each year, which leads to a loss in interest income when rates fall.[16] Second, we assume that a policy accommodation that leads to increased equity prices and profits will also lead to an increase in dividend payments. Given the higher stock market participation and average stock holdings of white compared to Black households, this source of income mainly matters for white households. The final way in which households are affected by lower interest rates is via borrowing, in particular if the household borrows with a mortgage contract that allows refinancing at a lower interest rate. Most US mortgages are fixed-rate mortgages with a built-in call option that allows for the opportunity to prepay. Although refinancing is costly and cumbersome, refinancing activity typically increases when interest rates fall. The lower rates will persist for the remaining duration of the mortgage (Bhutta and Keys 2016). Refinancing activity is therefore an important example where even transitory changes in interest rates resulting from monetary policy can have long-lasting redistributive effects as households lock in the lower interest rate for the duration of the mortgage. If the mortgage balance is not increased upon refinancing, but future interest payments are lowered, the household is effectively richer. In this sense, households with reduced monthly payments will be richer even if their net worth is unchanged in an accounting sense.

16. The proportions of bonds maturing are estimated as total issuance less the change in bonds outstanding as a fraction of bonds outstanding, averaged over the ten years since 2011, based on data from the Securities Industry and Financial Markets Association; https://www.sifma.org/resources/archive/research/statistics/.

Figure 7. Capital Income Effects from a Decline in Interest Rates after One Year



Source: Authors' calculations.

Note: The left panel shows the average gains for Black and white households after a 100 basis point decline in mortgage interest rates and a 1 percent increase in dividend income, and their average losses after a 100 basis point decline in savings and bond interest rates. The right panel shows the same gains and losses as a percentage share of each group's total income.

Exploring the capital income effects of a monetary accommodation through interest rate, dividend, and refinancing effects, given changing balances and maturities, is very complex. To examine the impact of monetary policy–induced interest changes, we will consider a 100 basis point fall in interest rates over a one-year horizon. First, we compute the loss in income from lower rates on deposit-type assets and refinanced corporate and mortgage-backed bonds for the one-year horizon. This effect is the foregone income due to the fall in interest rates. Second, to compute the effect from reduced mortgage payments, we assume that all fixed-rate mortgages are refinanced to the lower rate without changing the mortgage balance or remaining time to maturity. The latter effect reflects the change in annual mortgage payments if a household locks in the new lower interest rate by refinancing a fixed-rate mortgage. Finally, we consider a 1 percent increase in dividend incomes.

Figure 7, panel a, shows the average loss in interest income on liquid assets and newly issued bonds after a 100 basis point decline in interest rates and the average gain from mortgage refinancing and higher dividend incomes. Given that the average holdings of liquid assets and bonds are larger for white households (as shown in table 1), it is expected that the decline in interest income is much larger for white than for Black

households. Over one year, the interest income of the average Black household goes down by about $160, and it goes down about four times as much for white households. Expressing these losses relative to income, figure 7, panel b, shows that they are small: about 0.6 percent of annual income for white households and about half as much for Black households.

Mortgage debt balances of US households, after four decades of growth, are large and correspond to almost 100 percent of SCF household income (Bartscher and others 2021). The dollar decline in mortgage payments from refinancing after a 100 basis point decrease in interest rates is shown in figure 7, panel a, along with the gain from higher dividend incomes—which is, however, small. We find that mortgage payments per household decline by $800 for white households and by roughly half as much, $400, for Black households. Figure 7, panel b, shows that, as a fraction of current annual income, the responses are almost equal. For both Black and white households, the reduction in mortgage payments corresponds to roughly 0.7 percent of annual income. It is however important to keep the distribution of homeownership in mind; more than every second Black household does not own a house and therefore typically also does not owe mortgage debt. Moreover, the calculations are based on a scenario in which all households actually take advantage of the fall in the mortgage interest rate and refinance. Yet recent evidence by Gerardi, Willen, and Zhang (2021) suggests that Black households benefit less because they are substantially less likely to refinance when interest rates decline.

IV. Monetary Policy, Asset Prices, and the Unemployment Gap

In section II, we showed the heterogeneity in portfolio composition between Black and white households and differences in the racial unemployment and wage gaps. In section III, we showed that portfolio heterogeneity leads to different gains when an expansive monetary policy results in an increase in asset prices and dividends and a decline in interest rates. In the following, we will develop estimates of the effects of a monetary policy shock on the prices of assets—equities, houses, and bonds—as well as on interest rates, dividends, and labor market outcomes. In section V, we will combine these estimates with the household portfolio data from the SCF in order to investigate the wealth and capital income effects of an accommodative policy shock for Black and white households and compare them to the earnings effects that result from changes in the racial unemployment gap.

To study the effects of monetary policy shocks on asset prices and other outcomes, we use instrumental variable local projections following Stock

and Watson (2018) and Jordà, Schularick, and Taylor (2020). We employ the widely used extended Romer and Romer series for policy shocks (Coibion and others 2017; Romer and Romer 2004) as an instrument for the change in the federal funds rate. In the interest of comparability and transparency, we will also show simple local projection results for uninstrumented changes in the federal funds rate. Although there is a wide range of estimates of the effects of policy shocks on macroeconomic outcomes in the economic literature, we maintain that our estimates provide plausible approximations that illustrate the underlying economic mechanisms.

We show estimates of the impact of monetary policy shocks over a five-year period. There is a growing consensus in the literature that monetary policy moves asset prices over extended periods. Rigobon and Sack (2004) and Bernanke and Kuttner (2005) pioneered empirical approaches, finding substantial effects of policy surprises on stock prices that mainly come from changes in risk premia (excess returns). In both studies, a surprise 100 basis point shock lowers stock prices by between 5 and 7 percent. Jordà, Schularick, and Taylor (2015) document substantial effects of exogenous changes in monetary conditions on all major asset classes over multiyear horizons in a long-run cross-country data set. A recent paper by Paul (2020) argues that monetary policy today has larger and more persistent effects on asset prices than in the past. Similar findings have been reported for nonconventional monetary policy (Bernanke 2020; Wu and Xia 2016). The same mechanism that we describe in this paper—greater wealth effects for white households than for Black households following monetary policy–induced asset price gains—can be applied to these findings as well. Only the size and duration of the effects will vary across different studies.

IV.A. Estimation of the Effects of Monetary Policy

We treat the monetary policy shock measure as a proxy for the structural shocks in the instrumental variable local projections setup. The intuition is that surprises and structural shocks are imperfectly correlated. Monetary surprise measures suffer from measurement error due to noise and random zero observations in months without Federal Open Market Committee meetings. Instrumenting the federal funds rate instead of future rates also reduces the problems raised by the potential release of private central bank information (Nakamura and Steinsson 2018). Throughout the analysis, we scale the policy shocks to represent a 100 basis point surprise cut in the federal funds rate.

Let Δr_t denote the change in the federal funds rate at time t. We denote as x the vector of controls, which includes two lags of the outcome and the

interest rate variables, as well as other variables such as the unemployment rate, inflation, industrial production, corporate bond yields, the dividend-price ratio, money growth, and asset prices. Consider the following set of local projections relating future economic outcomes such as stock and house price changes, as well as the Black-white unemployment rate, to changes in interest rates today:

$$(1) \qquad y_{t+h} = \alpha_h + \Delta r_t \beta_h + x_t \gamma_h + \nu_{t+h}; \text{ for } h = 0, \ldots, H-1,$$

where $t = 1, \ldots, T$.

Estimates of this equation will show the effects of changes in the federal funds rate but will not allow for a causal interpretation, as changes in the interest rates are endogenous to the state of the economy. To obtain exogenous variation in Δr_t, we will use the structural policy shocks introduced by Romer and Romer (2004). The Romer-Romer shocks are the component of policy changes that are orthogonal to the Federal Reserve's information set, Federal Reserve Greenbook projections for GDP, inflation, and unemployment. Taking account of the delay in the publication of the Greenbook, the data are currently available for the period from 1969 to 2015. More specifically, let Δz_t denote the surprise component. We will estimate the following set of local projections using instrumental variables:

$$(2) \qquad y_{t+h} = \alpha_h + \Delta \hat{r}_t \beta_h + x_t \gamma_h + \nu_{t+h}; \text{ for } h = 0, \ldots, H-1,$$

The estimates of $\Delta \hat{r}_t$ come from the first-stage regression:

$$(3) \qquad \Delta r_t = \Delta z_t b + x_t g + \varepsilon_t.$$

Data for the outcome variables and the controls are all standard, publicly available macroeconomic time series. Specific variable definitions and sources are shown in table 2.

IV.B. Effects of Monetary Policy: Results

Our estimates of the response of financial and labor market outcomes to a 100 basis point expansionary monetary policy shock are shown in figure 8. The results use the Romer-Romer shock series as an instrument for changes in the federal funds rate. The estimations show a large response of stock prices that peaks at about 5 percent in less than three years. The effect declines to about 3 percent by year 5 but remains sizeable over the entire horizon. By contrast, the house price response takes more than a year to get started and peaks at a little more than 2 percent after five years. Treasury yields fall on impact but then return to their original level after

Table 2. Macroeconomic Data

Variable	*Description*	*Time Period*	*Source*
Federal funds rate	Federal funds target	11/1988 to 9/2017	FRB
Unemployment rate	Seasonally adjusted unemployment	1/1960 to 9/2017	BLS
Unemployment gap	Difference in Black and white unemployment rates	1/1972 to 9/2017	BLS
Hourly wages	Black and white workers	1/1982 to 9/2017	BLS
Weekly earnings	Black and white workers	1/1982 to 9/2017	BLS
Industrial production	Industrial production index	1/1960 to 9/2017	FRB
Stock price	S&P 500 price	1/1960 to 9/2017	S&P
Inflation	CPI, all urban consumers	1/1960 to 9/2017	BLS
M2 growth	Real money stock	1/1960 to 9/2017	FRB
House price	Case-Shiller house price index	1/1975 to 9/2017	S&P CoreLogic
Dividends	Real dividends, S&P 500	1/1960 to 9/2017	R. Shiller
Corporate bond yield	Moody's seasoned corporate BAA yield	1/1960 to 9/2017	FRB
Treasury yield	Ten-year constant maturity T-note yield	1/1960 to 9/2017	FRB

Sources: Federal Reserve Bank; Bureau of Labor Statistics; S&P CoreLogic Case-Shiller Home Price Indices; R. Shiller, http://www.econ.yale.edu/~shiller/data.htm.

about three years.[17] The coefficient estimates at projection horizons ranging from impact to five years are shown in table 3.[18]

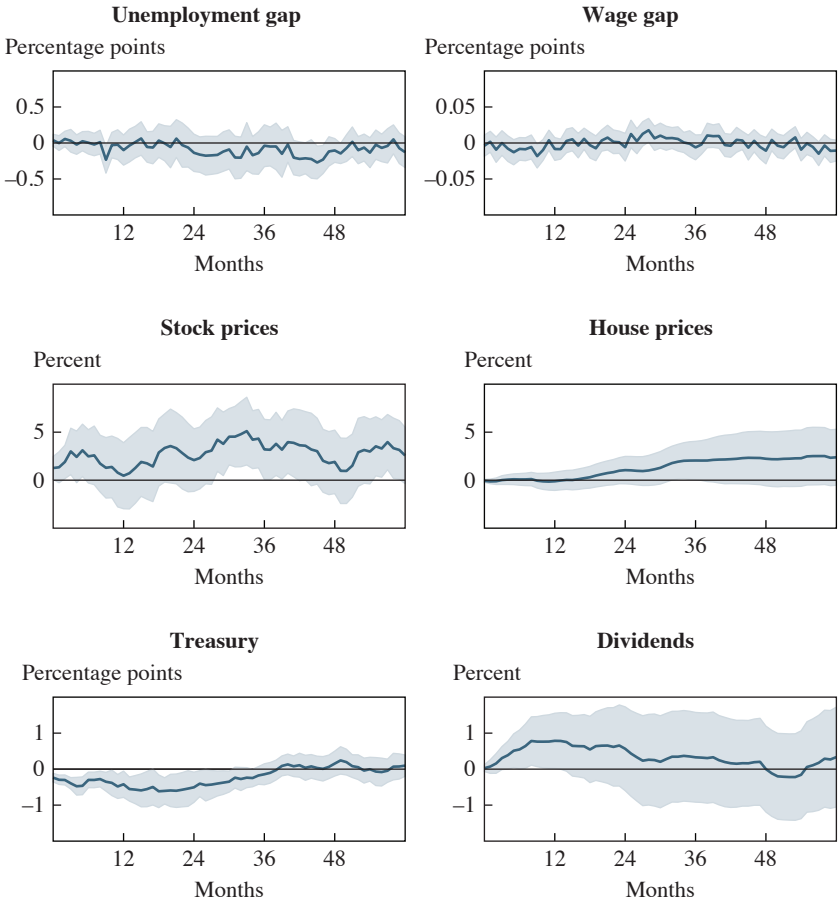
LABOR MARKET OUTCOMES Both the results with the instrumented and uninstrumented change in the federal funds rate indicate that there is a small effect on the unemployment gap, which is sometimes significant at the 90 percent level. After a 100 basis point expansionary shock, the unemployment gap closes by 0.14 percentage points. Similar results are reported in Carpenter and Rodgers (2004), who find that a one-standard-deviation monetary policy shock reduces the Black unemployment rate on average by 0.15 percentage points more than the white unemployment rate. Their estimated effect is also persistent; it declines slightly over time but remains significant even after four years.

The results above do not suggest any discernible effect of an expansionary monetary policy shock on the mean Black-white hourly wage gap. We also examined alternative measures of earnings, namely, the gap in

17. The results can be compared to the simple LP-OLS estimation from equation (1) where the change in the federal funds rate is not instrumented. These results, shown in online appendix figure A.5, are similar. Unsurprisingly, the equity and house price effects are smaller.

18. The effects of the policy shock on inflation and the BAA corporate bond yield are not shown to conserve space.

Figure 8. Effects of a 100 Basis Point Monetary Policy Shock



Source: Authors' calculations.

Note: The figure shows the impulse responses after a Romer-Romer 100 basis point expansionary monetary policy shock. Impulse responses are shown as solid lines and shaded areas show 90 percent confidence bands.The vertical axes show asset price changes as a percentage for stocks and houses, in basis points for ten-year Treasury yields, and in percentage points for the racial unemployment gap.

Table 3. Estimates for Response to 100 Basis Point Expansionary Monetary Policy Shock

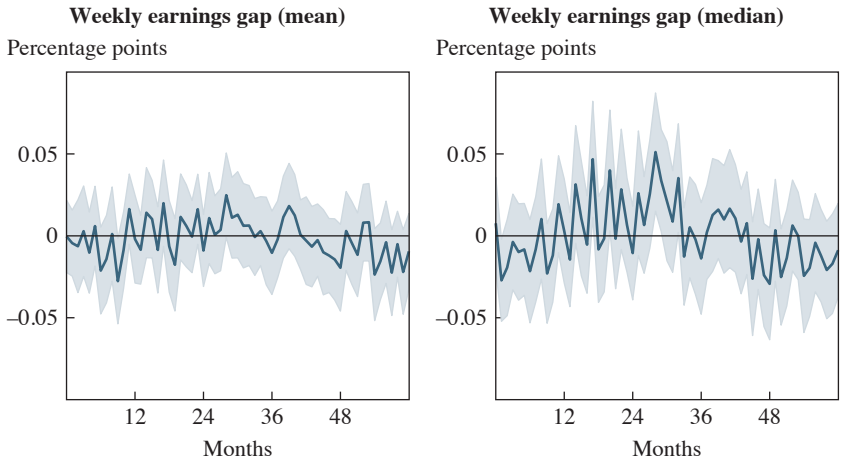
Horizon	*Unemployment gap (%)*	*Wage gap (%)*	*Stock prices*	*House prices*	*Ten-year Treasury yields*	*Dividends (%)*
Zero months	0.038	–0.004	1.268*	–0.074	–0.236***	0.026
	(0.121, –0.045)	(0.011, –0.018)	(2.461, 0.074)	(0.069, –0.217)	(–0.117, –0.355)	(0.119, –0.067)
6 months	0.004	–0.008	2.479	0.080	–0.299**	0.548*
	(0.161, –0.154)	(0.008, –0.024)	(5.254, –0.295)	(0.687, –0.527)	(–0.082, –0.516)	(1.088, 0.007)
12 months	–0.009	–0.008	0.463	–0.118	–0.420*	0.787*
	(0.111, –0.308)	(0.007, –0.024)	(3.903, –2.976)	(0.835, –1.070)	(–0.055, –0.785)	(1.553, 0.020)
24 months	–0.137	–0.006	2.089	1.046	–0.505**	0.566
	(0.123, –0.396)	(0.013, –0.025)	(5.346, –1.169)	(2.475, –0.383)	(–0.085, –0.925)	(1.731, –0.598)
36 months	–0.038	–0.006	3.206*	2.047*	–0.143	0.328
	(0.253, –0.328)	(0.011, –0.023)	(6.333, 0.078)	(4.044, 0.051)	(0.148, –0.434)	(1.575, –0.918)
48 months	–0.104	–0.011	1.905	2.230	0.154	0.001
	(0.061, –0.269)	(0.008, –0.029)	(5.211, –1.401)	(5.049, –0.589)	(0.500, –0.192)	(1.195, –1.193)
60 months	–0.129	–0.011	2.564	2.383	0.097	0.334
	(0.084, –0.342)	(0.004, –0.025)	(5.493, –0.365)	(5.299, –0.533)	(0.393, –0.199)	(1.723, –1.054)

Source: Authors' calculations.

Note: Parentheses below the point estimates at each horizon show the 90 percent confidence interval.

* significance at the 10 percent level; ** significance at the 5 percent level; *** significance at the 1 percent level.

Figure 9. Effects of a 100 Basis Point Monetary Policy Shock on the Weekly Earnings Gap



Source: Authors' calculations.
Note: Impulse responses are shown as solid lines and shaded areas show 90 percent confidence bands.

mean and median weekly earnings of Black and white workers from the BLS. The effect of the policy shock on each of these series is shown in figure 9. The results confirm the previous picture based on average hourly wages, with no discernible effect on the relative weekly earnings. The estimation results for the earnings gap also suggest that hours react little so that employment changes stem mainly from the extensive margin of employment. Our conclusion is that any effect that more accommodative monetary policy has on labor market outcomes of Black Americans is likely to come from employment gains and less from the relative wage effect.

ALTERNATIVE SHOCK SERIES Our estimates above rely on the widely used shock series by Romer and Romer (2004) to instrument the change in the federal funds rate. The Romer-Romer policy shocks are the component of the change in the federal funds rate that is not explained by the Federal Reserve's information set. There are many other ways to estimate policy shocks, including estimates that utilize information from the federal funds futures markets. However, Ramey (2016) shows that estimates of the effects of policy shocks are often sensitive to small changes in technique, definition, or estimation period. Moreover, confidence intervals for policy effects are often wide. Thus, we do not claim to have identified precise point estimates for policy effects, but we suggest that our benchmark estimates with the Romer-Romer shocks are within a plausible range suggested by different approaches.

In online appendix II we show that results with three other shock series are broadly similar to the results shown above. The first series shown is the measure introduced by Bernanke and Kuttner (2005) that sparked interest in the effect of monetary policy on asset prices. It is based on the difference between the federal funds target rate and the rate implied by futures contracts. The second series is based on shocks from Gertler and Karadi (2015) that use high-frequency responses from the federal funds futures markets immediately following each Federal Open Market Committee meeting to identify a policy shock. The third series uses monetary policy surprises based on federal funds futures contract from Paul (2020).[19]

V. Earnings and Portfolio Effects of Monetary Policy

The empirical results in section IV show substantial and persistent positive asset price effects of a surprise monetary easing, in combination with a reduction in the Black-white unemployment gap. In this section, we use these estimates to calculate the effects of a monetary policy shock on the wealth of the average Black and white households. Since the wealth distribution is highly skewed, we also examine the portfolio effects along the wealth distribution and around the median. Finally, we calculate the effect of a monetary policy shock on the gap between Black and white earnings and compare the size of the portfolio and earnings effects over different horizons.

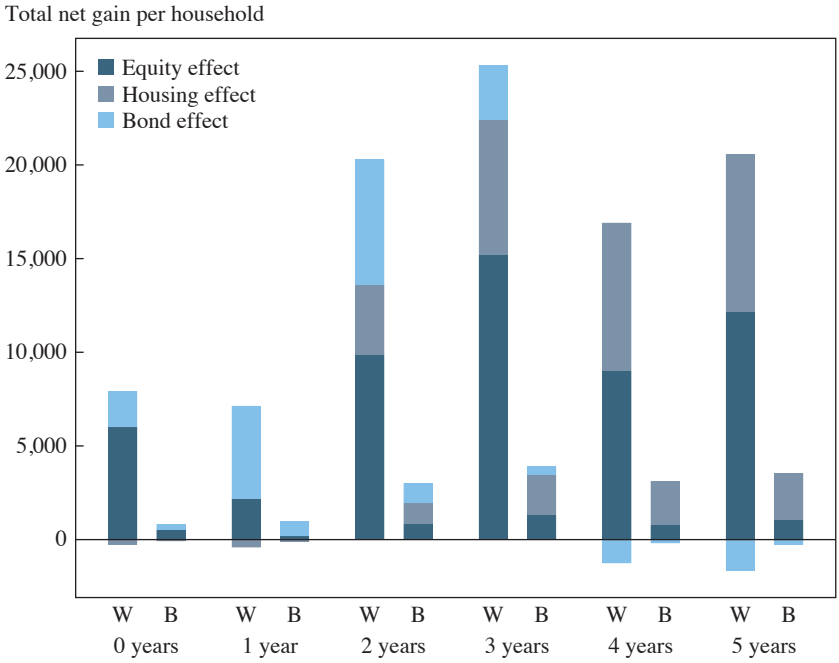
V.A. Effects on Household Wealth

One additional step is needed before we can estimate the impact of a monetary policy shock on wealth. For bonds, we need to transform the effect on interest rates into a change in the asset price using an assumption about duration. We use duration estimates taken from Bloomberg on October 30, 2020. The average duration of outstanding ten-year Treasuries (9.47), mortgage-backed securities (5.43), and corporate bonds (7.07) are applied to the corresponding asset categories in the SCF data.[20]

19. We also estimated a time-varying VAR (TV-VAR), following Paul (2020). The TV-VAR aims to capture different responses of asset prices to monetary policy shocks over time, depending, for instance, on risk appetite in markets. The results are generally similar and available upon request. In particular, the stock price response is very persistent also with the TV-VAR, and even larger than in the LP-IV regressions.

20. We use corporate bond duration and yield for corporate and foreign bonds, Treasury duration and yield for government, state, and municipal bonds, and mortgage-backed securities duration and corporate yield for mortgage-backed bonds.

Figure 10. Capital Gains for Black and White Households from Monetary Policy Shocks over Time



Source: Authors' calculations.

Note: The figure shows the average wealth effects for Black (B) and white (W) households after a 100 basis point monetary shock over time. The wealth effects are computed by combining the estimates from table 3 with portfolio data from the SCF.

To be consistent with stock and house price changes, which are real, the nominal change in each bond wealth category is deflated using the estimated responses of inflation to the policy shock.

We are now in a position to estimate the effects of the monetary policy shock (a 100 basis point surprise decline in the federal funds rate) on household wealth. The portfolio capital gains on each asset class are shown in figure 10. At every horizon, the total capital gains from an unanticipated monetary policy accommodation are much larger for white households than the gains to Black households. The largest effects are after three years, reaching $25,300 for white households and $3,900 for Black households. The biggest impact comes from the large and persistent effect of equity prices. The house price effect increases for around three years and then remains roughly constant. The bond effects are small because bond holdings are only a small fraction of total wealth for both Black and white households.

An unanticipated monetary policy accommodation leads to asset price changes that benefit white households to a much larger extent than Black households because average white wealth is much larger and a larger fraction is held in equities, where asset prices react most strongly.

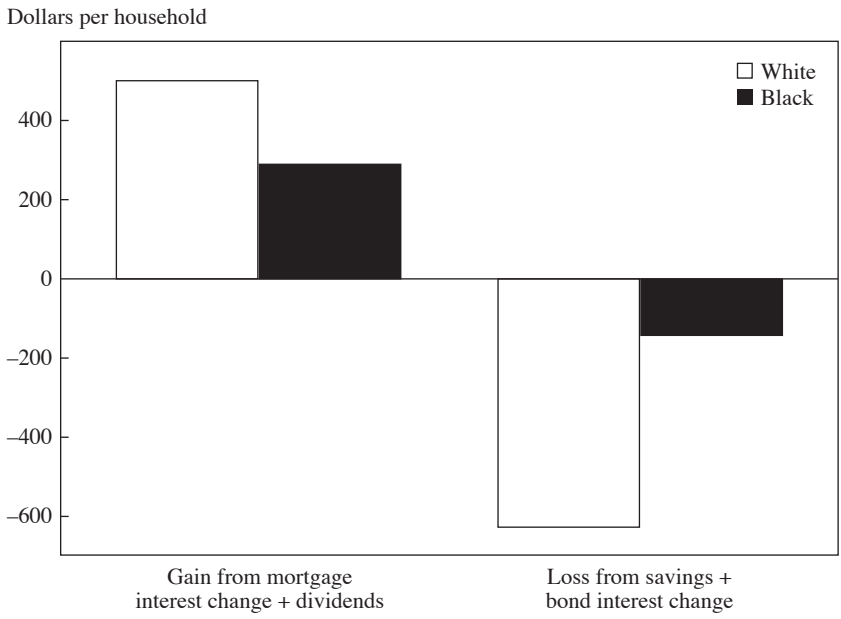
In addition to the direct effects on capital gains from the monetary shock, there are also indirect effects on capital income. That is, monetary policy shocks can reduce mortgage interest rates and the interest earned on deposit-type assets and corporate and mortgage-backed bonds and increase dividends. We estimate the effects based on the results from table 3 and the method described in section III.B. We assume that the impact of the 100 basis point accommodative monetary shock on mortgage rates is given by the impact on the ten-year Treasury rate and use the estimate at a one-year horizon to calculate the savings on annual mortgage payments. For liquid assets, we assume that the decline in interest earnings is the same size as the monetary policy shock, 100 basis points. For bonds, we use the effects on Treasury (–42 basis points) and BAA corporate bond yields (–36 basis points) after one year, and for dividends we apply the percentage change after one year (0.8 percent) to average Black and white dividend income from the SCF.

In figure 11, we show the capital income (dividend and interest rate) effects from the accommodative monetary shock. Black households, with small deposit balances to begin with, lose little from lower interest rates, and on net, the average Black household gains more from mortgage refinancing. White household deposit interest losses, which amount to around $600, are about $100 larger than the average annual gains from refinancing and dividend increases. This calculation is again based on a scenario in which all households refinance. Lower refinancing rates of Black households would increase the gap between Black and white households (Gerardi, Willen, and Zhang 2021).

ON THE PERSISTENT EFFECTS OF POLICY SHOCKS Although monetary policy shocks by construction capture cyclical variation, they can still have persistent effects on inequality. First, we find that asset prices change after monetary policy shocks for an extended period of five years. Our results build on a growing body of literature that estimates persistent asset price changes in response to monetary policy shocks (Bernanke and Kuttner 2005; Jordà, Schularick, and Taylor 2015; Paul 2020; Rigobon and Sack 2004). Such a period can easily account for 10 percent of the economically active lifetime of a household.

Second, recent theoretical and empirical work suggests that monetary policy shocks can affect the long-run equilibrium interest rate (Bianchi,

Figure 11. Effects of Monetary Policy Shocks on Capital Income for Black and White Households after One Year



Source: Authors' calculations.

Lettau, and Ludvigson 2022; Rungcharoenkitkul, Borio, and Disyatat 2021). Bianchi, Lettau, and Ludvigson (2022) show that monetary policy leads to regime shifts with long-lasting effects on relative asset prices. In this case, there can be permanent impacts on asset prices.

Moreover, distributional effects may persist even if gains and losses average out over time and asset prices revert to an equilibrium, as indicated in theory (Auclert 2019). This is because portfolio decisions by households are often driven by changes in their life cycle situation rather than financial returns. For example, household formation or changes in family composition can lead to portfolio adjustments such as the purchase or sale of a house. In such instances, households cannot simply wait for asset prices to revert back to their long-run level without welfare consequences from not adjusting their asset positions. In general, the life cycle puts young households systematically on the buyer side and older households on the seller side of the market and will induce constant trading needs that are not governed by asset price movements. That is, capital gains are often realized by households due to life cycle events such as marriage, divorce, family

formation, job loss, or job change. Hence, differences along racial lines in household demographic structure or unemployment experience can induce differences in the propensity to buy and sell assets, in addition to the racial differences in the exposure to asset price change.

Also, asset price changes may alleviate or tighten collateral constraints as, for example, discussed in Iacoviello (2005). An expansionary monetary policy shock relaxes borrowing constraints and offers the opportunity to access additional credit for consumption or investment. This collateral effect will likely play out differently along racial lines, as the fraction of homeowners is larger among white households and housing is the key asset through which the collateral channel can work. Even a short-lived price change can trigger this channel, given that borrowing constraints only have to hold when the loan is originated.

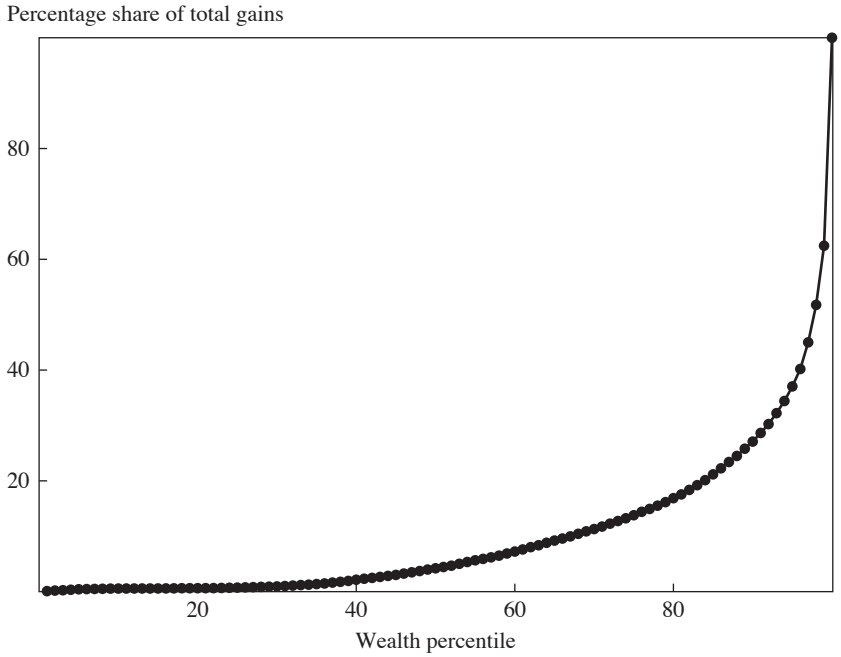
V.B. Portfolio Effects along the Wealth Distribution

Our estimates of the portfolio effects of asset price changes shown above consider the average Black and white household. Since the US wealth distribution is highly skewed (Kuhn and Ríos-Rull 2016; table 1), these results might not be fully representative. In this section, we examine this issue in two ways. First, we show the distribution of gains from a monetary policy surprise along the wealth distribution, and second, we look at results that restrict the sample to households around the median.

DISTRIBUTION OF GAINS The distributional implications of the portfolio effects after five years are shown in figure 12. The figure is a Lorenz curve of the wealth gains from a 100 basis point monetary policy surprise along the wealth distribution for all households. About 75 percent of all gains accrue to households in the top 10 percent of the wealth distribution and about 38 percent go to the top 1 percent. Notably, this distribution is substantially more unequal than the distribution of wealth itself. The facts that equity gains account for a large share of the total gains and equity holdings are highly concentrated along the wealth distribution lead to a high concentration of the gains from monetary policy in the—mainly white—top 10 percent of the wealth distribution.[21]

21. The Black households in our data are very unequally distributed along the wealth distribution. Among the bottom 50 percent of households, the share of Black households is 24 percent. Their share is 9 percent among households between the 50th and 90th percentile. Only 2 percent of households among the top 10 percent wealthiest households are Black.

Figure 12. Lorenz Curve of Estimated Portfolio Gains after Expansionary Monetary Policy Shock



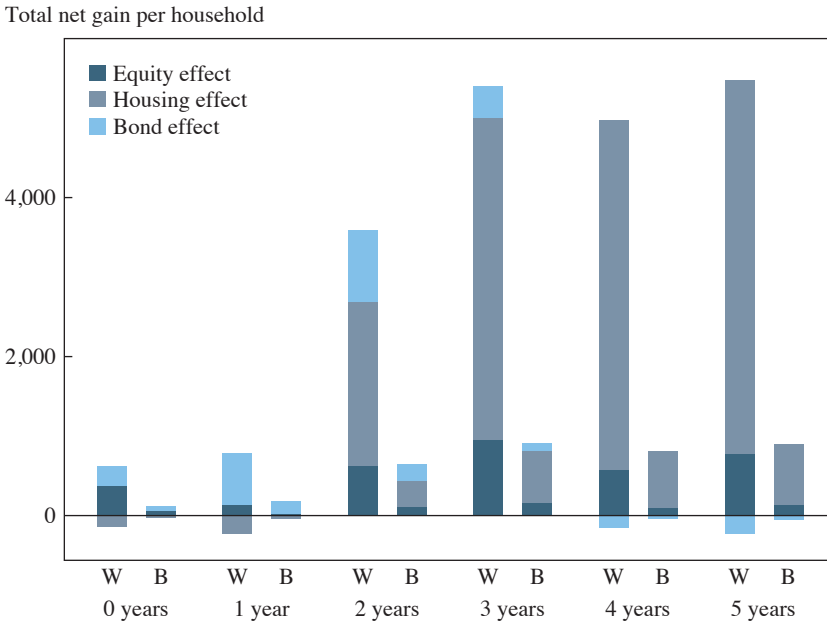
Source: Authors' calculations.

Note: The graph shows the Lorenz curve of the total portfolio effect in year 5 after an expansionary 100 basis point monetary policy shock.

HOUSEHOLDS AROUND THE MEDIAN Since portfolio gains are so highly concentrated among wealthy households, it is reasonable to suspect that the wealth gap among more "typical" households is less affected by asset price changes. In order to examine this, we look at Black and white households around the median, which we define as households between the 40th and 60th percentiles of their respective wealth distributions.

The portfolio effects of a monetary policy surprise on Black and white households around the median are shown in figure 13. Comparing the effects around the median to the average effects in figure 10, we find that gains are smaller in levels but that the relative differences between Black and white households persist. We still find that the gains of white households are more than four times larger than for Black households. The gains around the median differ in their composition relative to the mean effects because of the differences in the portfolio composition along the wealth distribution.

Figure 13. Capital Gains for Black and White Households around the Median from Monetary Policy Shocks over Time



Source: Authors' calculations.

Note: The figure shows the average wealth effects for Black (B) and white (W) households around the median after a 100 basis point monetary shock over time. The wealth effects are computed by combining the estimates from table 3 with portfolio data from the SCF. The underlying portfolios are constructed by averaging across all households between the 40th and 60th percentile of the respective wealth distributions separately for Black and white households.

We find that around the median, most of the gains stem from housing, whereas equity gains are the largest part at the mean. As a result, it takes about two years for gains to accumulate, and they are persistent after that. The capital gains are about the same size in year 5 as in year 3.

In table 1, we reported that a large share of Black households do not own any assets of several types and if they do, their holdings are often small. To see the implications of this, we look at the shares of Black and white households who have portfolio gains that are less than 1 percent of their annual income five years after an expansionary shock. We refer to households with a portfolio gain below 1 percent of income as having no portfolio effect. We find that about one-fourth of white households (24 percent) have no portfolio effect after five years. By contrast, the share among Black households is more than twice as large (53 percent). Hence, almost half of Black

households are left with no portfolio gains five years after an expansionary monetary policy shock.[22]

By construction, Black and white households with similar portfolios will have similar capital gains. Figure 14, panel a, shows that capital gains for Black and white households are indeed similar when looking at households between the 40th and 60th percentile of the *overall* wealth distribution. The effects are only slightly smaller for Black households, mostly due to somewhat smaller housing capital gains. The remaining differences in capital gains disappear when normalizing by income, as shown in online appendix figure A.3. However, Black households are underrepresented in the middle and upper parts of the aggregate wealth distribution. Online appendix figure A.4 shows that the share of Black households in the upper half of the wealth distribution has consistently been lower than the overall population share of Black households since the 1950s. Moreover, since the 1970s Black households have become less likely to make it to the top 10 percent, and more likely to be in the bottom 50 percent.

Figure 14, panel b, looks at capital gains for Black and white households around the median of the aggregate *income* distribution. Here, we again see pronounced differences between Black and white households. In other words, even Black households who by construction have similar incomes as white households do have lower wealth and therefore reap lower capital gains after expansionary monetary policy shocks. On average, the capital gains of white households between the 40th and 60th percentile of the aggregate income distribution are two to three times larger than those of their Black counterparts.

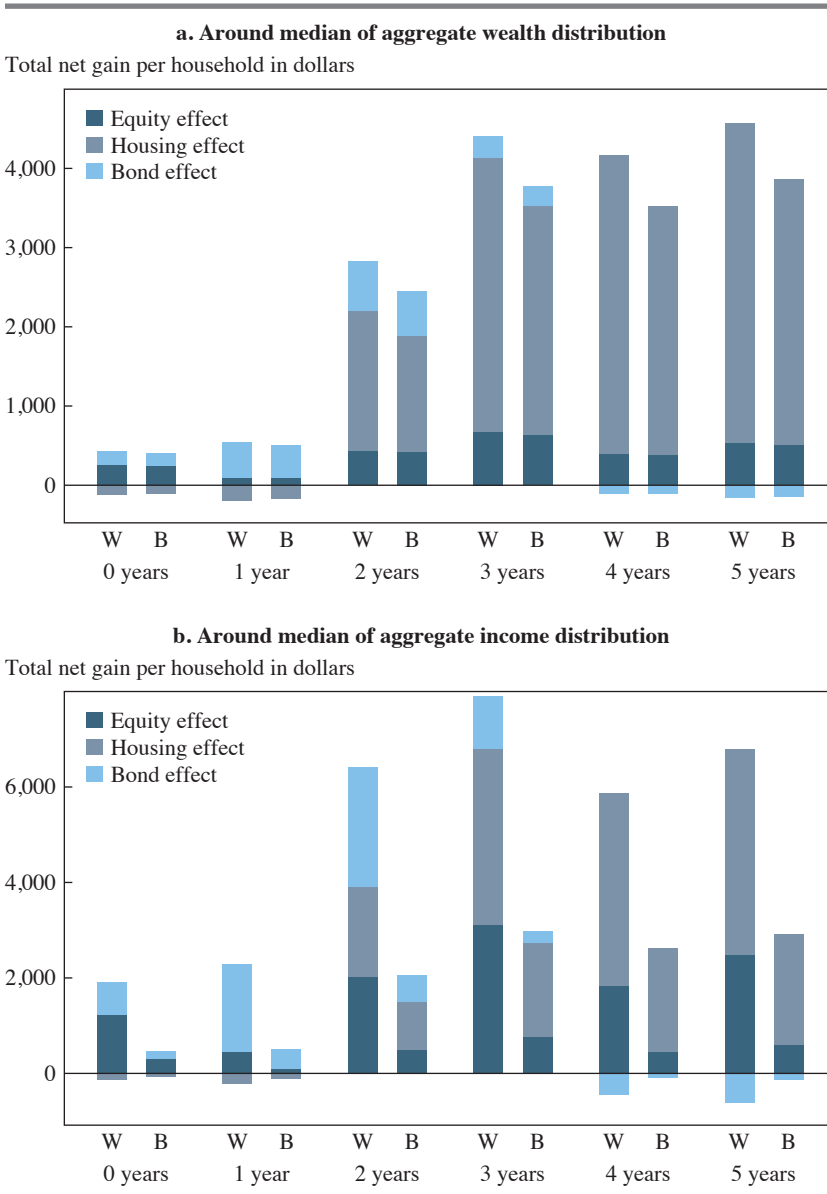
In figure 15, we show the capital income effects of a monetary policy shock for Black and white households around the median, using the same assumptions as in the results for the mean households in figure 11. White households around the median have gains from mortgage refinancing which are about three times larger than the gains for Black households, a much larger difference than for the mean household because many more of the Black households around the median do not own a home.

V.C. Differences among Households by Marital Status and Sex

The analysis so far has examined the portfolio effects for Black and white households and has not addressed any additional demographic characteristics, although there are significant differences in the demographic

22. If we consider a 5 percent threshold instead of the 1 percent threshold, the shares increase to 41 percent for white households and 68 percent for Black households.

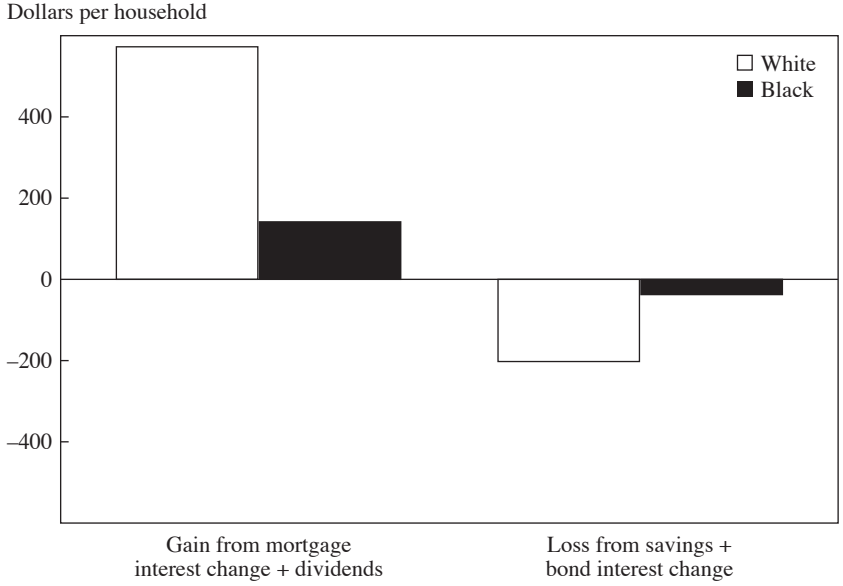
Figure 14. Capital Gains for Black and White Households around the Median of the Aggregate Wealth and Income Distribution



Source: Authors' calculations.

Note: The figure shows the average wealth effects for Black and white households around the median of the *aggregate* wealth (panel a) and income (panel b) distribution after a 100 basis point monetary shock over time. The wealth effects are computed by combining the estimates from table 3 with portfolio data from the SCF. The underlying portfolios are constructed by averaging across all households between the 40th and 60th percentile of the aggregate wealth (income) distribution.

Figure 15. Effects of Monetary Policy Shocks on Capital Income for Black and White Households around the Median after One Year



Source: Authors' calculations.

Note: The graph shows the average gains for Black and white households around the median after a decline in mortgage interest rates and increase in dividend income, and their average losses after a decline in savings and bond interest rates, as implied by the monetary policy shock after one year. The underlying portfolios are constructed by averaging across all households between the 40th and 60th percentile of the respective wealth distributions for Black and white households.

composition of households with white and Black heads.[23] Many more white households consist of married or cohabiting couples and more of the single Black households are led by women. In online appendix IV, we show the effects of a Romer-Romer monetary policy shock first on households separated by marital status and second on single households separated by sex of the head of household. The overall findings of the paper are unaffected when we examine results disaggregated by household type. The portfolio gains of white households of any type are almost always larger in both absolute terms and relative terms than for the corresponding group of Black households. Notably, the gains to single white households are typically larger than the gains to married Black households.

23. As only 15 percent of the SCF households have a Black head of household, the granularity of further breakdowns is limited.

V.D. Quantifying the Earnings Effect

Our estimates in section IV.B indicate that an accommodative monetary policy shock reduces the unemployment rate for Black households more than for white households, although there are no discernible effects on the gap in wages. Nevertheless, the employment effects will reduce the gap in mean earnings by increasing the relative number of people receiving labor income. In this section, we aim to quantify the earnings effects from the reduced unemployment rates. We combine the low-frequency 2019 SCF data on labor income with our estimates of the impact of monetary policy shocks on the unemployment gap. Using this estimate, we are in a position to compare the relative gains from the earnings and wealth effects for Black and white households.

For our calculation, we focus on prime-age household heads (age 25–55) and on the information if the head of household has been unemployed during the twelve months before the interview.[24] There are large differences in the unemployment experiences of Black and white households. The share of Black household heads experiencing unemployment in the year prior to the interview is 12.4 percent, while the share for white household heads is 8.3 percent. Comparing earnings of households who have been and who have not been unemployed during the past twelve months, we find that average earnings of Black households whose head has not been unemployed are $56,200. For households whose head experienced unemployment within the last twelve months, the average annual labor income is $27,500.[25] By contrast, we find that white households who experienced unemployment during the last twelve months still report average earnings of $50,300—almost the level of Black households without unemployment experience. White households without unemployment experience over the last twelve months report an average labor income of more than $103,000 in the 2019 SCF data.

To derive the earnings effect, we multiply the difference in earnings between Black households that have and have not experienced unemployment by our estimates of the impact of monetary policy on the differential between Black and white unemployment rates from table 3. We then make a conservative assumption in order to relate the change in the unemployment gap to earnings changes. In particular, we assume that each household

24. We consider the last twelve months rather than the current labor force status at the interview because the surveyed labor income also refers to the previous calendar year.

25. Sample sizes are small: we observed 182 white households and 64 Black households whose head of household reported unemployment during the last twelve months.

that finds employment receives the average earnings gain of a Black household with a household head who did not experience unemployment, thus the earnings gain is \$56,200 – \$27,500 = \$28,700. The relative income gain of Black households is computed by multiplying the estimated impact of the monetary policy shock on the unemployment gap with the average earnings gain of \$28,700.

More formally, let us denote the estimated effect on the unemployment gap at projection horizon h by $\Delta_h u$ and the earnings gain from leaving unemployment for Black households by $\Delta Y^B = Y_E^B - Y_U^B$ where Y_E^B denotes average labor income for Black households who have not been unemployed over the past twelve months and Y_U^B denotes average labor income of Black households who have been unemployed at least for some time in the past year. In the 2019 SCF data, we find ΔY^B = \$28,700. Our estimate for the relative earnings gain for Black households relative to white households in period h after the shock, $\Delta_h Y$, is thus

$$\Delta_h Y = \Delta_h u \Delta Y^B = \Delta_h u \left(Y_E^B - Y_U^B \right).$$

The effect on the unemployment gap in table 3 peaks after two years, when the unemployment rate gap is reduced by 0.137 percentage points. The relative earnings gain is found by multiplying this number with the average earnings gain, which yields a relative gain per Black household of \$39.30, or 0.07 percent of annual total income for all Black households.

V.E. Comparing Earnings and Portfolio Effects

The impact of the monetary policy shock on the *difference* in earnings between Black and white households is $\Delta_h Y$. The appropriate comparison is to the *difference* in capital gains accruing to Black and white households. The calculation above showed that the maximum earnings difference occurs after two years, $\Delta_2 Y$ = \$39.30. At the same horizon, capital gains received by the average white household are about \$17,300 more than those of the average Black household (see figure 10). This comparison suggests that the relative portfolio gain for white households is orders of magnitude larger than the relative earnings gain for Black households.

However, there are important conceptual differences between the capital gains on assets and changes in earnings. First, the earnings effect applies to the flow of earnings, while the capital gains are a gain on the stock of wealth. Thus, the capital gain is a onetime change in the valuation of assets, while the earnings effect applies to incomes year by year. To take this into account, we compare the difference in capital gains between white and Black households over the five-year horizon to the accumulated estimate

of the differential earnings effect over this time period. Second, the earnings effect directly increases the consumption possibilities of households, whereas the capital gain needs to be realized first before it increases households' consumption possibilities.

The year-by-year accumulated earnings effects and the difference in the portfolio effects for Black and white households as a percentage of each group's income were shown in figure 1. As pointed out earlier, the earnings effects are tiny in comparison to the portfolio effects.

Finally, we turn to the consumption effects of capital gains in order to make the portfolio and earnings effects more directly comparable. We find that under plausible and conservative assumptions, the consumption consequences of the wealth effect for white households is larger than the entire earnings effect for Black households. There is a large body of literature that estimates the marginal propensity to consume (MPC) out of wealth. In recent work, Chodorow-Reich, Nenov, and Simsek (2021) exploit regional variation in stock market exposure in the United States and estimate an annual MPC out of capital gains of 3.2 percent.[26] As this estimated consumption response to capital gains is annual, it implies a consumption increase in each year with capital gains.

Our estimated capital gain five years after an accommodative monetary policy shock is about $15,600 more for white than for Black households (figure 10), which corresponds to additional consumption expenditures of almost $500 in year 5 alone, abstracting from consumption increases in other years, making this a conservative estimate for the differential consumption response. Thus the portfolio effect on consumption for white households in year 5 after the shock is already three and a half times as large as the entire accumulated relative earnings effect for Black households of $134.

Given that we are unaware of estimates for the MPC out of capital gains by race, we assume that the MPCs are identical for Black and white households. If Black households had a higher MPC out of capital gains, the differential capital gains would have to be adjusted for these differences. However, if we assume that the MPC estimate of 3.2 estimated by Chodorow-Reich, Nenov, and Simsek (2021) is a population-weighted average between Black and white households' MPCs, we can calculate how large Black and white MPCs would have to be in order to offset the relative

26. This estimate is typical of the literature on the MPC out of capital gains. Poterba (2000) and Paiella (2009) summarize the literature. More recently Di Maggio, Kermani, and Majlesi (2020) and Chodorow-Reich, Nenov, and Simsek (2021) present estimates based on micro data.

income effect of $134. This back-of-the-envelope calculation shows that Black MPCs would have to be roughly three times larger than white MPCs for the relative consumption effect from capital gains to be as large as the relative earnings effect. Ganong and others (2020) estimate that the consumption response of Black households to typical labor income shocks is about 50 percent larger than for white households. While this paper does not estimate MPCs out of capital gains, it may still serve as a guideline for what plausible differences in Black and white MPCs might look like. We are therefore confident that our result of a larger relative consumption gain for white households compared to the relative earnings gain for Black households remains valid under plausible assumptions on Black and white MPCs out of capital gains, even if they were not equal.

There is evidence that expansionary monetary policy improves the labor market situation of Black households more than for white households. Yet, when we contrast the consumption effects of capital gains from asset price changes to the earnings effect, we find that the earnings gains of Black households are dwarfed by the consumption changes implied by the portfolio gains of white households.[27]

VI. Conclusion

We have shown that policy shocks that change asset prices have differential effects on the wealth of Black and white households. White households gain more because they have more financial wealth and hold portfolios that are more concentrated in interest rate–sensitive assets such as equities. At the same time, monetary policy shocks reduce the gap between Black and white unemployment rates and entail larger earnings gains for Black households. Bringing the two together, however, leads to a stark finding: the reduction in the earnings gap pales in comparison to the effects on the wealth gap.

Our analysis therefore does not bode well for the suggestion made by politicians and central bankers that a more accommodative monetary policy helps alleviate racial inequalities. With the instruments available—all of which work through effects on asset prices and interest rates—a central bank would not be able to design policies for an income gap reduction objective without increasing wealth inequality. Clearly, this does not mean

27. The earnings effects for single households led by men and women are shown in online appendix figure A.12. They are small when compared to the corresponding portfolio effects.

that achieving racial equity should not be a first-order objective for economic policy. We strongly think it should. But the tools available to central banks might not be the right ones and could possibly be counterproductive.

One possible conclusion of our research is that there is no role for central banks in addressing society's concern with racial gaps or inequality. This conclusion would be consistent with the traditional view that a central bank should have a singular focus on price stability. However, as Wachtel and Blejer (2020) show, this idealized view of central banking does not agree with historical experience and has been repeatedly challenged by the financial and pandemic crises. Furthermore, the traditional view conflicts with the concerns expressed by Federal Reserve officials about racial gaps.[28]

In light of our results, is there any role for central banks in addressing the challenges of racial wealth and income gaps? No Federal Reserve official has suggested that the conventional tools of monetary policy should be used to address racial gaps except as an offshoot of the full employment mandate. They do imply that the Federal Reserve has a role in bringing public attention to wealth and income gaps in a way that might influence both fiscal policy and the behavior of the private sector. More concretely, the Federal Reserve System has become an influential center for research on inequality.[29] Even these efforts have not been without criticism; Senator Pat Toomey, the ranking member of the Senate Banking Committee, tried to launch a review of Federal Reserve mission creep and "research [that] appears to be focused on how matters unrelated to monetary policy impact narrow subgroups of people."[30] So an additional insight from our research is that despite all the rhetoric about central bank independence, central bankers are inevitably part of the political and policy discourse about inequality.

28. See, for example, Powell (2020), Bostic (2020), and Daly (2020).

29. For example, the Minneapolis Federal Reserve established the Opportunity and Inclusive Growth Institute in 2017, and the St. Louis Federal Reserve established the Institute for Economic Equity in 2021.

30. United States Senate Committee on Banking, Housing, and Urban Affairs, "Toomey Launches Review of Mission Creep by Regional Federal Reserve Banks," press release, March 29, 2021, https://www.banking.senate.gov/newsroom/minority/toomey-launches-review-of-mission-creep-by-regional-federal-reserve-banks.

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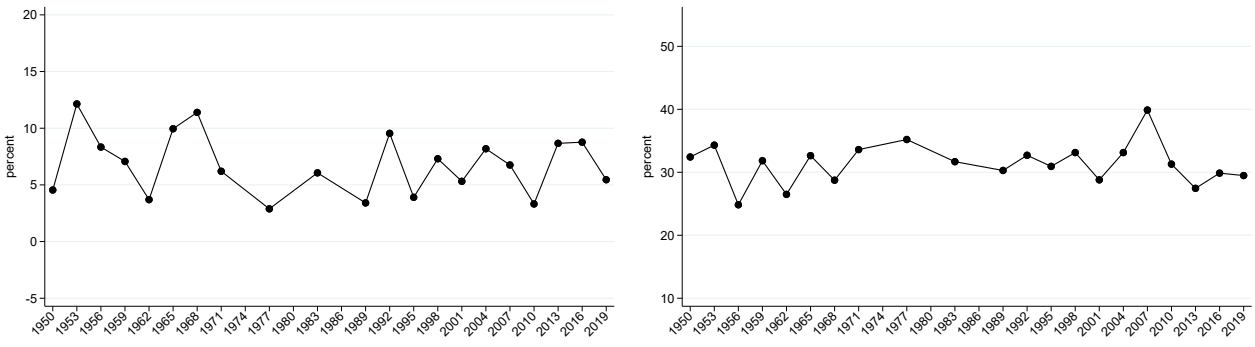
I. Supplementary results

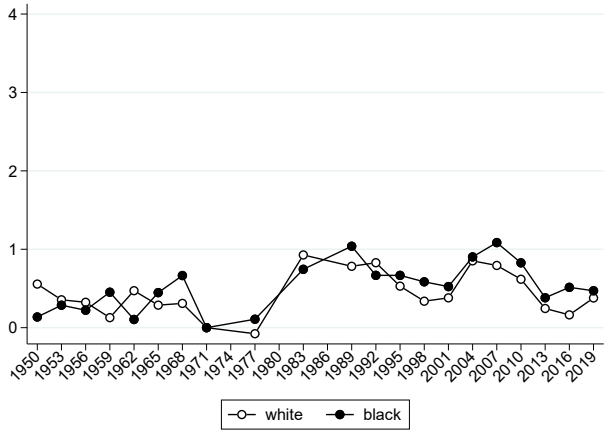
Figure A.1: *Long-run trends of the racial equity and housing gaps*

(a) *Racial equity and business wealth gap* **(b)** *Racial housing wealth gap*



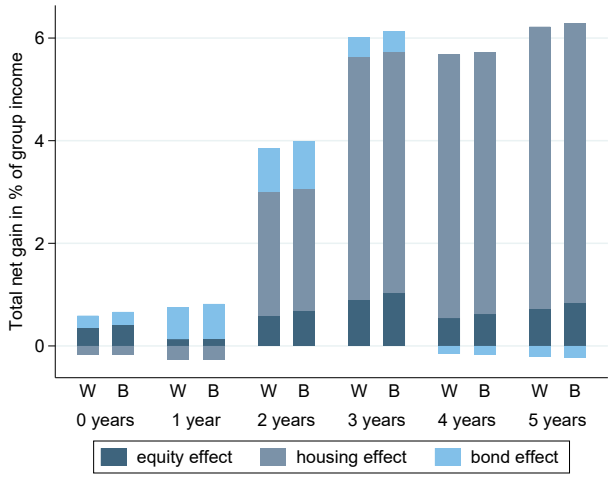
Notes: The left (right) panel shows the evolution of the ratio of average black to average white equity and business (housing) over time. The data were winsorized at the 1st and 99th percentile within each year-race bin. Equity and business wealth includes mutual funds and other managed assets. Housing includes the net value of other real estate.

Figure A.2: *Counterfactual change in wealth-to-income ratios relative to 1971*



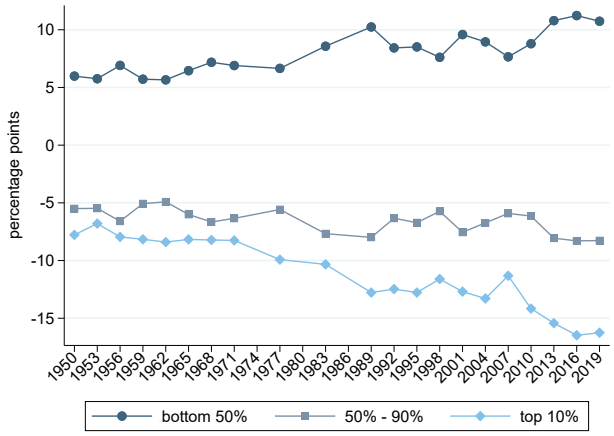
Notes: The graph shows the counterfactual change in wealth-to-income ratios of black and white households over time when fixing wealth from equity (comprising mutual funds and other managed assets), business and pensions at its 1971 level for subsequent years. Changes are shown as differences to the 1971 values for each group.

Figure A.3: *Capital gains for black and white households around the median of the aggregate wealth distribution, normalized by income*



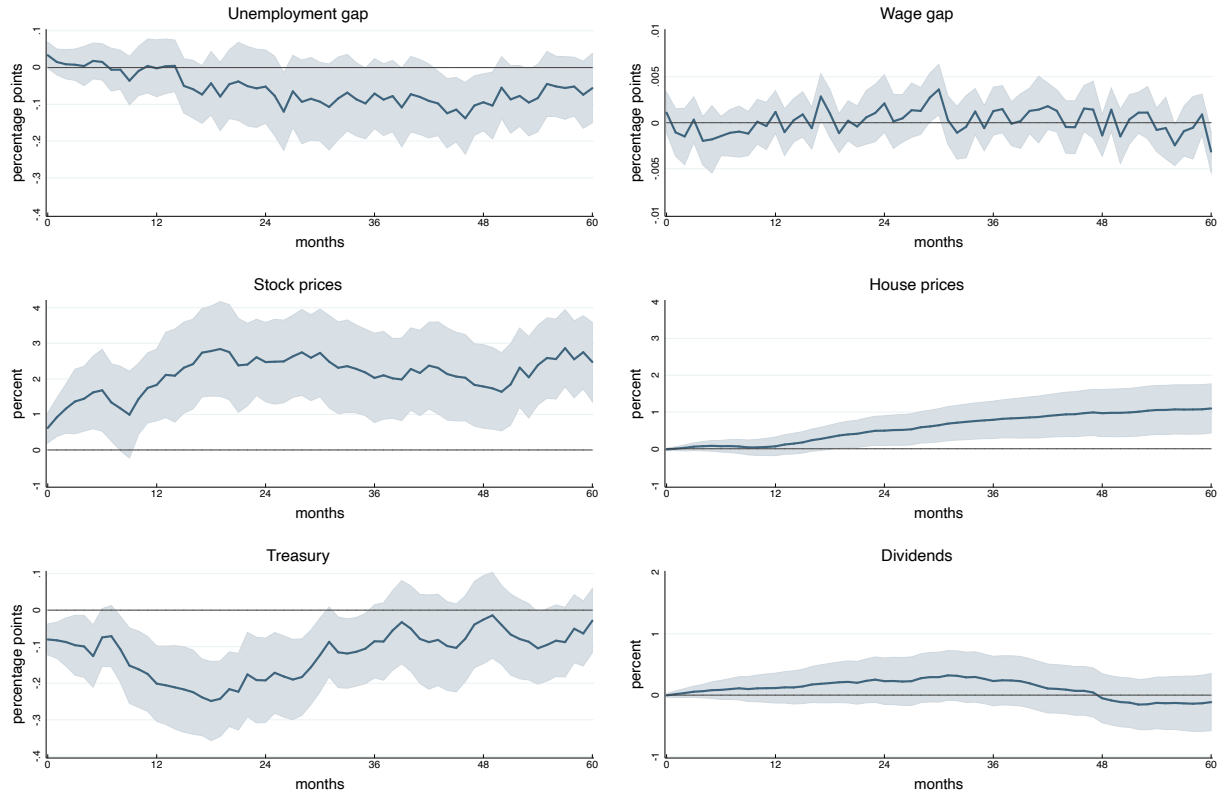
Notes: The figure shows the wealth effects for black and white households around the median of the *aggregate* wealth distribution after a 100bp monetary shock over time, normalized by each group's average income. The wealth effects are computed by combining the estimates from Table 3 for the Romer-Romer shocks with portfolio data from the SCF. See text for details. The underlying portfolios are constructed by averaging across all households between the 40th and 60th percentile of the aggregate wealth distribution.

Figure A.4: *Share of black households in different parts of the aggregate wealth distribution, relative to overall population share*



Notes: The figure shows the share of black households in the bottom 50%, middle 40% and top 10% of the aggregate wealth distribution over time, normalized by subtracting the overall population share of black households in the given year.

Figure A.5: *Effects of a 100bp decline in Fed Funds Rate (LP-OLS)*

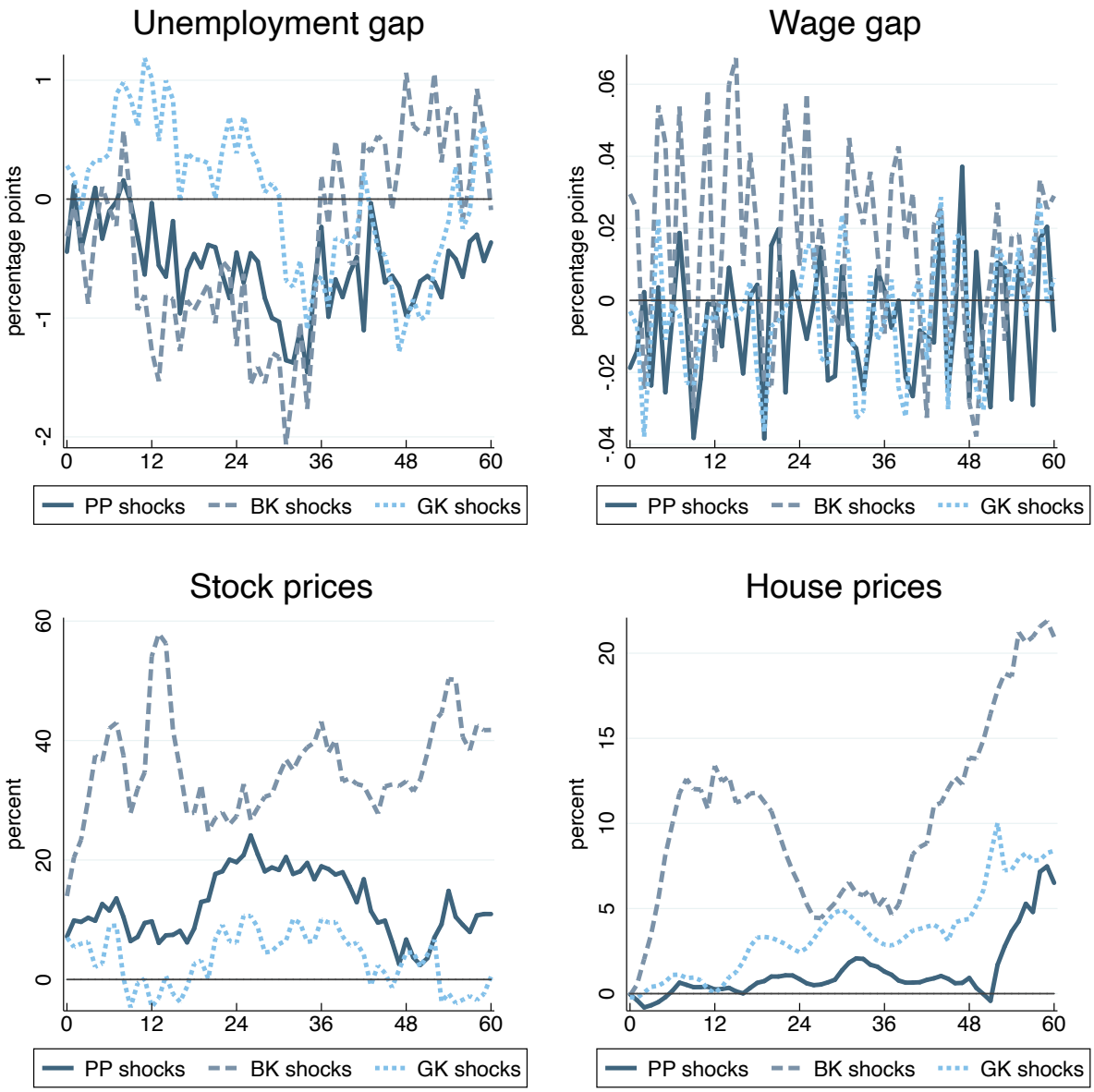


Notes: The figure shows the impulse responses for stock prices, house prices, 10-year treasury yields, the unemployment and wage gaps, and dividends after a 100bp expansionary monetary policy change in the Fed Funds rate. Impulse responses are shown as solid lines and shaded areas show 90-percent confidence bands. The horizontal axes shows calendar time in months and the vertical axes show asset price changes in percent for stocks and houses, change in basis points for 10-year treasury yields, and the percentage point change in the racial unemployment and wage gap.

II. Alternative shock estimates

Figure A.6 shows the impact of the alternative monetary policy shocks discussed in Section IV.B. on key outcomes . The measure introduced by Bernanke and Kuttner (2005) (BK) produces substantially larger asset price effects than the benchmark RR series. A 100bp decline in the Fed Funds rate pushes up stock and house prices by 20 percent or more over an extended period. Also the effects on the unemployment gap are larger than with the RR estimate. The shocks based on Gertler and Karadi (2015) (GK) that use high-frequency Fed Funds futures markets data show smaller asset price effects. In this case, stock prices rise by a little less than 10 percent over a three-year horizon, but the response is similar and more persistent in the case of house prices. By contrast, with the GK shock series, the unemployment gap is essentially unaffected for three years after a monetary shock. All in all, the alternative shock series lend support to the idea that more accommodative monetary policy boosts asset prices over some time horizon. In many of our estimates that time horizon is an extended one, encompassing multiple years. There is also evidence, mixed with respect to statistical significance, that accommodative monetary policy has a short-run effect on the unemployment gap between black and white workers. The wage gap is never really affected.

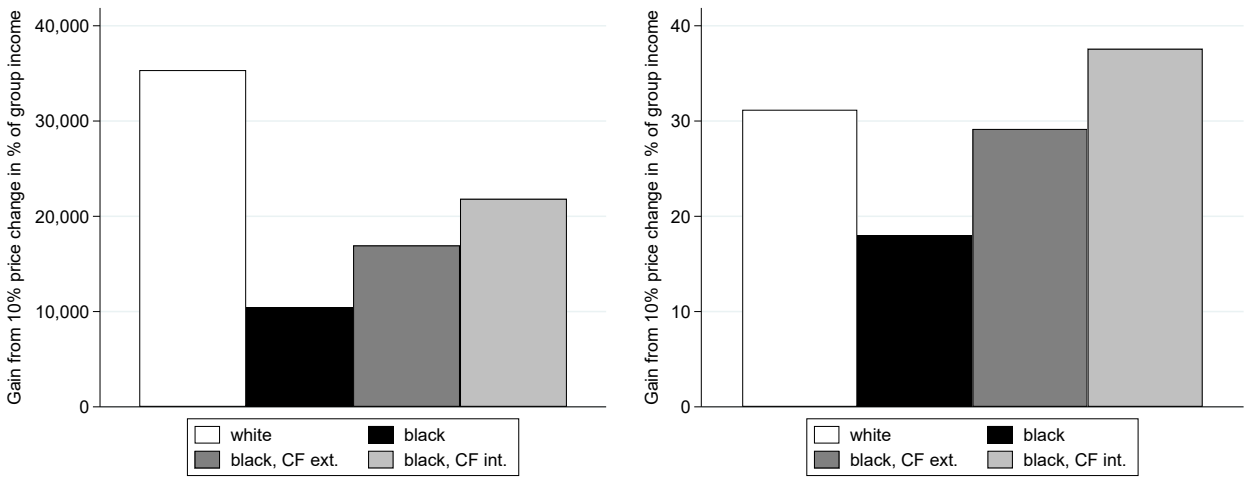
Figure A.6: *LP-IV estimates: other shock measures*



Notes: The figure shows the impulse responses for the unemployment and wage gap, stock prices, and house prices after BK, PP, and GK shocks. The horizontal axes shows calendar time in months and the vertical axes show asset price changes in percent for stocks and houses, and in percentage points for the racial unemployment and wage gap.

Figure A.7: *Capital gains from 10 percent house price increase*

(a) *Per household* **(b)** *Relative to group income*



Notes: The left panel shows the average capital gains from a 10-percent increase in house prices for black and white households, as well as two counterfactual experiments for black households: *CF ext.* shows the counterfactual capital gain if black households had the same homeownership rate as white households. *CF int.* shows the counterfactual capital gain if black households owned houses of the same average value as white households. The right panel shows the same capital gains as a percent of each group's total income.

III. Counterfactuals: capital gains from housing

To explore how much differences in homeownership and in the level of housing wealth contribute to the capital gain differences from the housing market, we conduct two counterfactual experiments. In the first experiment, we increase black homeownership at the extensive margin by equalizing homeownership rates of black and white households (*CF ext.*). In the second experiment, we increase homeownership at the intensive margin by equalizing the average value of houses of black and white homeowners (*CF int.*). Considering a 10-percent increase in house prices as before, Figure A.7a shows the dollar capital gains and Figure A.7b shows the gains as a fraction of income.

If we consider the counterfactual situation where white and black households have the same homeownership rate (black, *CF ext.*) and consider a 10-percent house price shock, we find that the gap closes slightly in levels (Figure A.7a) and almost completely as a fraction of income (Figure A.7b). This result suggests that a substantial part of the differences in capital gains in the housing market stems from differences in homeownership; 75 percent of white households are homeowners but only 46 percent of black households. Lastly, we consider the effect from equalizing house values for black and white households (black, *CF int.*). That is, we show what the capital gains to the average black household would be if black-owned homes were as valuable as white-owned homes. The effects are large because homes owned by white households are more than twice as valuable as homes owned by black households. In levels, the capital gains of the average black household are now almost two-thirds of the capital gain of the average white household, while it was less than one third in the baseline. If we look at the relation to income in Figure A.7b, we find that the capital gains as a fraction of income are now even larger for black than for white households because of the underlying racial income gap.

IV. Demographic composition of households

The results in the body of the paper take all black and all white households together without any attention paid to other demographic differences. The portfolio holdings and unemployment responses of households might differ for reasons other than race, such as marital status and the sex of the household head. If households with a single versus a married or male versus female head have different asset portfolios, they are likely to be affected differently by a monetary policy shock. In this Online Appendix, we will examine the impact of monetary policy shocks on the income and wealth of black and white households of different types.

Since only 15% of the SCF households have a black head, the granularity of other demographic characteristics will be limited. We start with a distinction between households with a single rather than married head, where married includes cohabiting couples. Two-thirds of white households are married, while the proportion for black households is only 35%. Households with a single head can further be distinguished into male and female heads, whereas the head is always male for married couples by the SCF's convention. Among black single households, 66% have a female head, while among white single households 56% have a female head.[33]

Table A.1: *Summary statistics by marital status and sex*

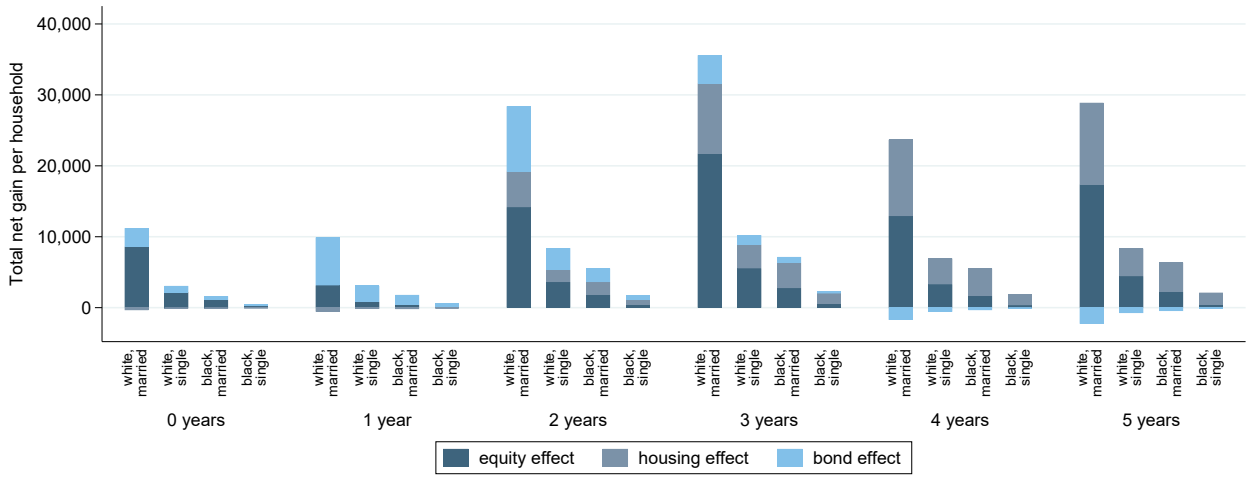
	Mean income	Mean wealth	Share of housing in total assets	Share of equity in total assets
			White	
Single	57614	403456	0.36	0.38
Men	69194	469742	0.30	0.45
Women	49373	356279	0.41	0.31
Married	151141	1323076	0.32	0.46
			Black	
Single	41466	82248	0.58	0.15
Men	51961	118201	0.54	0.20
Women	36146	64022	0.62	0.10
Married	90825	253066	0.49	0.24

Notes: The table shows average wealth and income, as well as the shares of housing and equity in total assets for black and white households, by marital status and sex.

Summary statistics for black and white households by type are shown in Online Appendix Table A.1. The racial wealth gap is large for all household types. White single and married households have about 5 times as much wealth as comparable black households. Average income of white single households with male or female heads is about 1.3 times the average income of the corresponding black households. For married households, the ratio of white to black average income is 1.7. The table also shows two key elements of the portfolio distribution, the shares of housing and equity in total assets. Black households of all types own larger shares of their assets in housing than white

[33] Single households include both individuals living alone and individuals with children. A further breakdown is not feasible because of small sample sizes in sub-categories. There are only 166 black households with a single male head, our smallest category.

Figure A.8: *Total effects over time by marital status, per household*



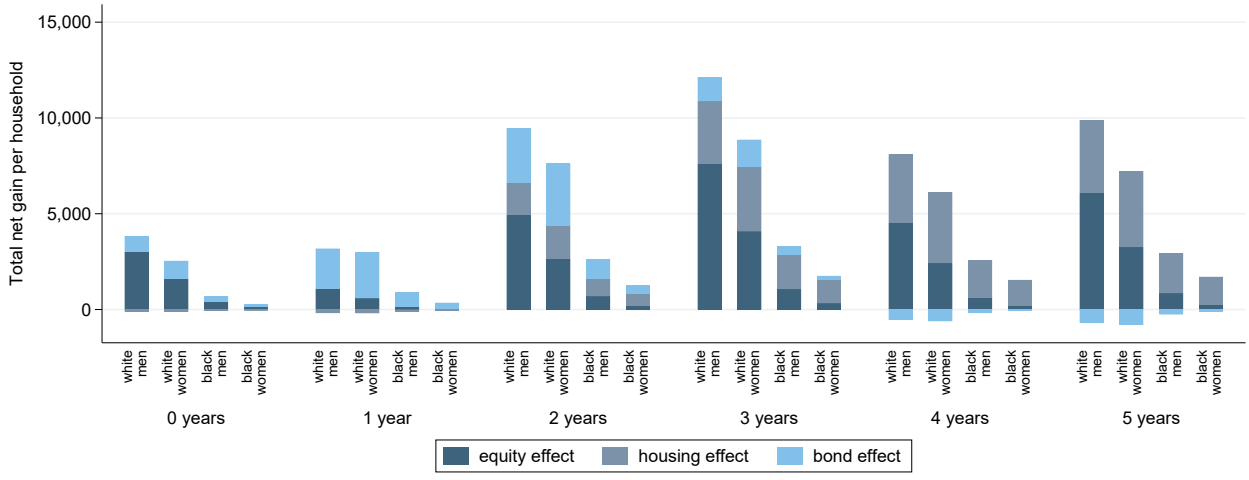
Notes: The figure shows the average wealth effects for black and white households after a 100bp monetary shock (Romer-Romer shocks) over time, stratified by marital status. The wealth effects are computed by combining the estimates from Table 3 with portfolio data from the SCF.

households, although average housing assets for black households are only a fraction of the average housing assets of white households of the same type. By contrast, black households have very small equity shares compared to white households across all household types.

We use our benchmark RR shocks to examine the impact of an accommodative monetary policy shock on the portfolios of different household types. The average portfolio effects by marital status are shown in Online Appendix Figure A.8 and by sex for singles in Online Appendix Figure A.9.

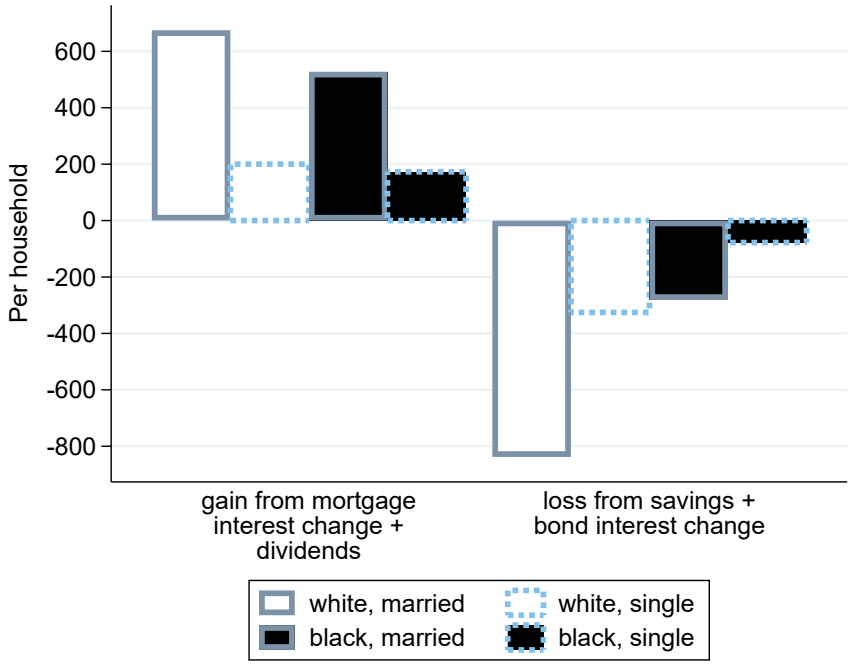
The portfolio gains for white households of all types are much larger than the gains for black

Figure A.9: *Total effects over time by sex (singles), per household*



Notes: The figure shows the average wealth effects for black and white households after a 100bp monetary shock (Romer-Romer shocks) over time, stratified by sex. The wealth effects are computed by combining the estimates from Table 3 with portfolio data from the SCF.

Figure A.10: *Effects of monetary policy shocks on capital income by marital status, per household*



Notes: The figure shows the effects of an expansionary policy shock on capital income after one year for married and unmarried black and white households. See Section V.A. for details.

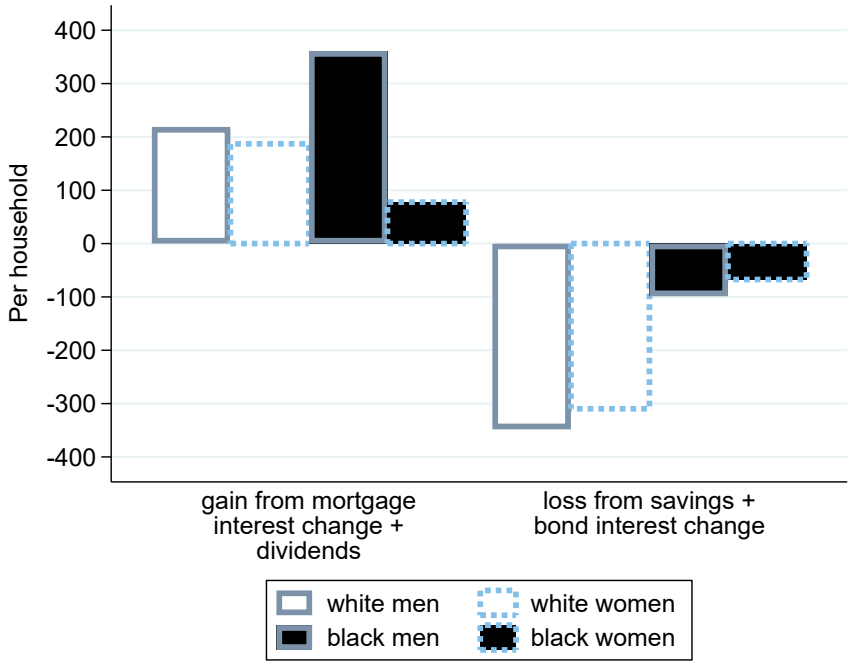
households. This is true for the absolute dollar gains shown in the figures and also for the gains relative to income in each group. Because the racial wealth differences are so much larger than the income differences (see Online Appendix Table A.1), the differences in capital gains are still large when we examine them relative to income.

Looking at year 3, the capital gains of white married households are about 5.5 times larger than for black married households, and the difference is similar for single households.The capital gains for white male singles are 4 times larger than for their black counterparts, and for white and black women the corresponding ratio is almost 6. At all time horizons, the gains for white households of any type are considerably larger than for black households of the same type. Moreover, white single households have larger gains than black married or single households. To a large extent, these comparisons are due to differences in equity ownership. White married couples and single men own more equity than other household types. Other household types benefit more from housing gains, but these are smaller and less persistent.

The effects of the benchmark (RR) monetary policy shock on capital income, the gains from mortgage refinancing increases and the loss in interest earnings on savings, are shown in Figure A.10 for marital status and Figure A.11 by sex for singles.

The savings from mortgage refinancing are similar for black and white households, although somewhat larger for white households, in particular if they are married. However, the gains of black singles mostly accrue to men, whereas they are more equally distributed among white single men and women. White married households have substantially higher liquid asset holdings than the other groups, and therefore also lose a higher amount due to a change in savings interest rates. Among the singles, there are only small differences between men and women for both black and white households.

Figure A.11: *Effects of monetary policy shocks on capital income by sex (singles), per household*

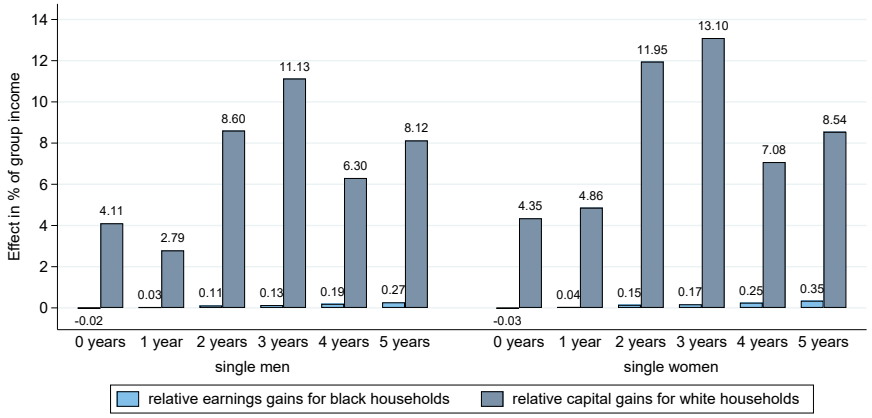


Notes: The figure shows the effects of an expansionary monetary policy shock on capital income after one year for male and female black and white singles. See Section V.A. for details.

To estimate the earnings effects of a monetary policy shock, we need to estimate the impact of the shock on the difference in unemployment rates for each household type. Unemployment rates are not available by marital status but they are available by race-sex category. We use the same methodology as before to estimate the impact of the RR shock on the racial unemployment rate gaps for men and women. We then use the same assumptions as before regarding the incomes of newly employed individuals to estimate the impact of a monetary policy shock on the difference in earnings between black and white single men and women.

The effect of the monetary policy shock on the racial earnings gap can be compared to the difference in portfolio effects for each group, as shown in Online Appendix Figure A.12. The earnings effects as a percent of average income are small when compared to the portfolio effects for both single male and single female households.

Figure A.12: *Comparison of earnings and portfolio effects by sex (singles)*



Notes: The figure compares the cumulated earnings effect to the portfolio effect based on the Romer-Romer shocks for single men and women. The effects are reported as a percentage of average annual household income of the respective racial group. The relative earnings effect is computed by combining the estimated effect of the monetary policy shock on the unemployment gap for singles with earnings data from the SCF using the methodology in Section V.D.. The relative portfolio effect is calculated as the difference between the capital gains of white and black households from Online Appendix Figure A.9.