Monetary Policy Transmission to Consumption: Inequalities by Gender and Race

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Abstract

This paper finds evidence that contractionary monetary policy shocks raise consumption inequality by gender and race, along with raising unemployment and income inequality. Following a 25 basis point contractionary shock, spending on durable goods falls by 15% for households headed by black men while only 5% for households headed by white men. Additionally, spending on nondurable goods and services is decreased by 1.3% for households headed by black women, but by less than 1% for households headed by white men or women. Household characteristics such as composition or income do not explain differences in consumption responses. I also show that contractionary, rather than expansionary, shocks generally drive transmission inequalities.

Understanding the distributional effects of monetary policy is crucial for effective policy-making. Previous studies have emphasized that the effects of monetary shocks on household outcomes differ by wealth or income. Some studies argue that monetary policy might be less effective if those that benefit from expansionary policy and have higher incomes also have low marginal propensities to consume (Auclert 2019; Cloyne, Ferreira, and Surico 2020; Bartscher et al. 2021). Others explore the disproportionate burden of contractionary policy on certain groups through labor market and income outcomes (Seguino and Heintz 2012; Coibion et al. 2017; Furceri, Loungani, and Zdzienicka 2018). However, it is unclear whether heterogeneous effects on consumption are driven solely by differences in finances, or if discrimination and barriers to employment and credit also determine responses.

This paper addresses this question by providing an investigation into the transmission of monetary policy to consumption separately for white men, white women, black men, and black women. It is the first, to my knowledge, that estimates and explains consumption responses by gender and race with a state-of-the-art methodology and shock identification method. Contractionary policy is expected to lower consumption, raise unemployment, and lower incomes. However, some demographic groups are affected more than others. Studying heterogeneous reactions solely through income inequality obscures additional reasons why monetary policy affects groups differently.

This paper first estimates how monetary policy affects consumption differently for U.S. households disaggregated by gender and race. I find that contractionary monetary policy shocks raise consumption inequality. These gaps in consumption responses persist when accounting for household composition, age, education, mortgage debt, and income. Thus, monetary policy transmission channels such income inequality or mortgage refinancing do not fully explain heterogeneous responses by gender and race to policy shocks.

I next provide evidence that differences in consumption responses are associated with variations in labor earnings by estimating effects on unemployment, labor force participation, and salary income. Some of the different effects of monetary policy on salary income are explained by worker concentration in certain sectors, although I also find that some differences persist within sectors. This unexplained inequality suggests discrimination and societal barriers existing in the labor market.

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Lastly, I estimate consumption, labor market, and income responses separately for contractionary and expansionary monetary policy shocks. I find contractionary shocks impact most outcomes and inequalities with larger magnitude than expansionary shocks.

I use the Consumer Expenditure Survey (CE) to measure household consumption and income. The higher frequency and comprehensive expenditure data of this survey is an advantage over other U.S. household surveys. To complement the analysis on consumption and income, I study labor market outcomes using Bureau of Labor Statistics aggregates of individual-level data.

As a measure of exogenous monetary policy shocks, I use the series identified by Bauer and Swanson (2023). The identification method of orthogonal shocks in Bauer and Swanson (2023) is one of the latest for high frequency shocks that is most relevant and exogenous. These shocks span both conventional and unconventional monetary policy times, which allows for the analysis of a longer period compared to the prominent literature that estimates effects up to the Great Recession. This research contributes to the literature studying gender and racial inequality by examining the effects of unexpected changes in monetary policy rather than movements in realized interest rates.

I estimate the previously mentioned effects of monetary policy shocks on group outcomes from 1988 to 2019 with the local projections instrumental variables methodology (Jordà 2005). Local projections have been widely used to estimate effects of monetary policy (Coibion et al. 2017; Bartscher et al. 2021; Bauer and Swanson 2023). I also conduct several exercises that confirm the robustness of the results. These include using alternative monetary policy shock series, running OLS local projections, changing control lag lengths, omitting controls, and differing time periods.

The results show that contractionary monetary policy shocks most negatively impact the consumption of households headed by black men and black women. Following a 25 basis point (bp) contractionary shock, spending on durable goods falls by 15% for households headed by black men while only 5% for households headed by white men. Spending on nondurable goods and services is decreased by 1.3% for households headed by black women, but by less than 1% for households headed by white men or women.

I additionally estimate consumption responses while accounting for differences in the

head of household's marital status, age, and education, and the household's number of paid workers, debt category, and percentile of family income.[1] The comparison of outcomes for all of these groups is an additional contribution to the literature, especially given that gender and racial inequalities in household responses still appear within these groups.

The analysis also explores several channels through which contractionary shocks affect consumption. These include the differential responses of labor earnings, various types of incomes, and debt burden. I find that earnings heterogeneity largely explains differences in consumption responses. The lower consumption responses of Black households are accompanied by higher unemployment, occupational concentration in exposed sectors, and lower household salary incomes. Groups with higher unemployment rates and concentration in lower-wage jobs likely have very different consumption patterns than employed and richer workers. Care and unpaid work responsibilities additionally influence labor market decisions and consumption baskets, especially due to the large burden on women of color.

The earnings heterogeneity channel results are as follows. After a 25bp contractionary monetary policy shock, the unemployment rate rises 1 percentage point (pp) higher for black men than white men. Labor force participation rises for white women but falls for blacks. Also, household salary incomes fall for all groups, but 20% more for blacks than whites.

I next investigate how income, savings, and debt interact with monetary policy transmission. I estimate the income composition channel, which distinguishes between household primary sources of income (labor earnings, business, or finance). I find that falls in salary and business incomes drive the total income results for all groups. Although households with mortgages decrease their spending more than owners or renters following contractionary shocks, racial gaps in responses persist within these groups.

This paper contributes needed insight into the debate on the distributional effects of monetary policy. The results show that consumption heterogeneity exists by gender and race which is unexplained by other household characteristics. Also, that contractionary shocks affect most outcomes more than expansionary shocks. Central banks can use these estimates of individual-level implications to determine the aggregate effects of interest rate policies.

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1. Debt category refers to whether households have a mortgage, own their house, or rent following Cloyne, Ferreira, and Surico (2020).

Future work should build macroeconomic models that include gender and racial heterogeneity and shock asymmetry to inform policymakers of potential unequal policy impacts.

Contributions Relative to the Literature

This paper contributes to the growing literature studying how monetary policy affects inequality.[2] Much research finds clear gaps in household reactions by different income and debt groups (Coibion et al. 2017; Auclert 2019; Cloyne, Ferreira, and Surico 2020). For example, Cloyne, Ferreira, and Surico (2020) find that households with mortgages drive aggregate consumption responses during conventional monetary policy periods, relative to households that own their homes or rent. Furceri, Loungani, and Zdzienicka (2018) show that shock signs have asymmetric effects, with contractionary shocks clearly increasing income inequality.

Yet, little is understood about whether income and debt inequality drive all differences in reactions to monetary policy, or if systemic inequalities related to gender and race also contribute. This paper adds to this literature by finding that income and household balance sheets do not fully explain household response heterogeneity. Also, that the negative effects of contractionary monetary policy shocks on household consumption, labor market outcomes, and income outweigh the benefits from expansionary shocks.

There is evidence that consumption and savings patterns vary by gender and race. Banks (2020) attributes racial differences in household distributions of paid and unpaid work to racial and ethnic group disparities, theorizing the community as an additional site of non-market production for non-white women. Patterson (2023) also shows that marginal propensities to consume vary by race, although gaps are implied to be due to economic inequalities. In this paper, I discuss household divisions of paid and unpaid work in its analysis and add evidence that the added worker effect exists only within white households. I also show that racial consumption gaps persist within other economic characteristics.

This paper also relates to the literature on monetary policy's effects on gender and racial inequality.[3] This literature has focused on studying the policy transmission to labor market outcomes. In the U.S., monetary tightening rises unemployment most for black women

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2. See Kappes (2023) for a comprehensive survey.
3. See Seguino (2019) for a review.

and men versus whites (Thorbecke 2001; Rodgers 2008; Seguino and Heintz 2012; Ume and Williams 2019; Bergman, Matsa, and Weber 2020).[4] Bartscher et al. (2021) finds that expansionary monetary policy increases employment more for blacks, but the effect is small and dwarfed by the large wealth effects that benefit whites more than blacks.

There are numerous gaps in this research on gender and racial inequality and monetary policy. It is yet to be determined whether or not gender and racial gaps are fully explained by group differences in income. Also, gender and racial inequalities are studied solely in employment and wealth, and in isolation. This paper fills these numerous gaps by estimating consumption responses by household characteristics, linking consumption, labor market, and income outcomes, and studying both gender and racial differences in households. Additionally, this paper estimates monetary policy transmission with state-of-the-art shocks and methods that allow for an analysis of a long period of conventional and unconventional monetary policy as well as the separation of contractionary and expansionary shocks.
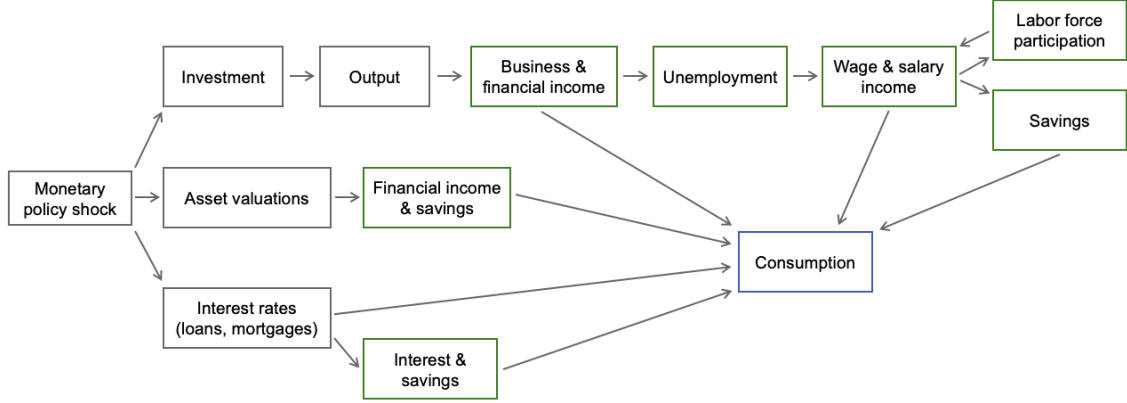
The estimates in this paper can be used as calibration targets for quantitative models studying optimal monetary policy. These theoretical models studying inequality focus on labor market mechanisms for monetary policy transmission (Lee, Macaluso, and Schwartzman 2021; Nakajima 2023). My finding that the negative impact of contractionary shocks outweigh gains from expansionary shocks contrasts theoretical papers that argue that gains and losses from monetary policy shocks are evenly distributed or that blacks gain more than whites (Lee, Macaluso, and Schwartzman 2021; Nakajima 2023; McKay and Wolf 2023). The asymmetry of shock transmission also shows that although expansionary policies are progressive as in Del Canto et al. (2023), economists must consider the relatively large losses from contractionary policies.

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4. There is contrasting evidence on how monetary policies impact gender gaps in the labor market in cross-country studies. Flamini et al. (2023) find that contractionary policy negatively affects men more than women, Takhtamanova and Sierminska (2009) and Akin (2020) find no significant relationship in the OECD, and Braunstein and Heintz (2008) show that women's employment is more negatively impacted in developing countries.

1 Background: The Granular Effects of Monetary Policy

Monetary policy is theoretically transmitted to the public directly through its changes in interest rates and indirectly through fluctuations in labor market outcomes and income (see Figure 1). Coibion et al. (2017) identify the earnings heterogeneity channel and the income composition channel as two indirect transmission channels of monetary policy shocks to consumption. I follow Kappes (2023) in my discussion of monetary policy's direct transmission through the debt burden channel.

Figure 1: Transmission of monetary policy to consumption

Note: The chart shows an illustration of the transmission of monetary policy shocks to consumption through various economic variables; variables estimated in this paper are in color. Arrows show the direction of the effects in partial equilibrium.

Household total (pre-tax) income can thus be broken down into various components:

$$y_{g,t} = w_{g,t} N_{g,t} LF_{g,t} + rA_{g,t} + \Delta V St_{g,t} + div_{g,t} + \pi_{g,t} - iL_{g,t}, \tag{1}$$

where y is the average income available to spend for demographic group g at time t. The first term represents labor market income, with wages (w), number of working hours (N), and a dummy for whether someone is in the labor force (LF). Finance income is composed of wealth such as savings and bonds (A) with interest r, changes in valuations (V) of assets such as stocks (St), and dividends (div). Total income is also determined by business income in the form of profits (π) and loans (L) such as mortgages or credit cards with interest (i). This equation is adapted from Montecino and Epstein (2017) to the data that will be used

in the empirical analysis in the next sections of this paper.

Household consumption and saving are determined by their total after-tax income and government transfers. The household budget constraint follows as:

$$C_{g,t} + \Delta Sa_{g,t} = y_{g,t} + T_{g,t}, \tag{2}$$

where C is consumption of durable goods, nondurable goods, and services and ΔSa is changes in savings. Average income (y) is as defined in equation (1). Vector T includes other sources that could add or subtract from household total income, such as government transfers and taxes.

1.1 Earnings Heterogeneity Channel

The earnings heterogeneity channel traces the effects of monetary policy shocks on consumption through labor market outcomes and earnings. A plausible chain of events is that higher interest rates increase the cost of capital, which reduces investment as firms are less likely to take out loans. Decreased firm revenue may lead to higher unemployment, as businesses lay off workers to cut costs, and therefore lower average salary incomes for households. As salary incomes fall, households have less disposable income to spend and save. Workers in low-wage jobs that are first to be fired and in industries that are sensitive to interest rates are likely the most exposed to these effects.

Black workers are likely more affected by monetary policy than white workers, however, in certain cases women might be more exposed but in others men might be more exposed. Blacks and women are more concentrated in low-wage and precarious jobs with stagnant wages given the history of discrimination in the U.S. that has created barriers in access to equal opportunities in education and employment advancement (Thorbecke 2001; Seguino and Heintz 2012). Blacks and women are additionally more often the last hired and thus first fired workers (Seguino and Heintz 2012). In contrast, men's higher concentration in industry sector jobs likely results in their higher exposure relative to women due to employment in these jobs being highly sensitive to business cycle fluctuations (Duzhak 2021; Flamini et al. 2023). It thus theoretically follows that black male workers are most likely to be

unemployed and have lower labor earnings following contractionary monetary policy. In equation (1), I expect that monetary policy shocks have a negative relationship with w and N with the largest magnitudes for black men. The ambiguity of the theoretical sign of the gender gaps needs to be clarified with empirical work.

There are several additional reasons why labor market gender gaps may change in response to monetary policy. Higher unemployment of men relative to women may lead households to adjust who enters the labor force per the added worker effect (see Juhn and Potter (2007) and sources cited therein). For example, if the husband is unemployed then the wife may enter the labor force to supplement their family income. The division of paid and unpaid care work within the household can also dictate how labor market outcomes respond to monetary policy.[5] The effects of monetary policy on gender gaps in employment may differ between races. On average, white women tend to leave the labor force due to unpaid household work while black women cannot afford to stop working in addition to providing unpaid household and community care work (Banks 2020). In equation (1), I thus expect that monetary policy shocks impact LF positively for women, especially white women, but negatively or neutrally for men.

Changes in household labor income could affect both consumption and savings behaviors. As a result of lower earnings, households might either spend less or spend the same amount by saving less, using existing savings, or taking out a loan. These households would thus see consumption (C) and savings (Sa) fall in equation (2). This is especially relevant for durable goods that can fluctuate, however, nondurable goods spending might not change for certain groups. Constrained households, which are more likely be blacks and women than whites and men, may not be able to purchase fewer necessities such as food and clothing, and thus take on credit card or other debt to finance this spending.

Consumption patterns also differ between households that have different relationship statuses (single vs married) and numbers of employed spouses. Intra-household consumption decisions vary between married and single households. Also, two-earner households probably have more consumption flexibility than one- or zero-earner households. It is especially

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5. The theoretical model in Akin (2020) explains how macroeconomic policy shocks affect gender gaps in employment through labor market segregation, gender division of labor, and labor supply dynamics.

important to consider these groups by race since black women are more often single heads of household and have both unpaid and paid work responsibilities. Monetary policy thus affects the labor market outcomes of groups disaggregated by gender and race very differently, and therefore their spending behaviors may also differ.

1.2 Income Composition Channel

The income composition channel sheds light on differences in household consumption responses due to receiving different types of income. Households headed by men and blacks have larger shares of salary income than women and whites. In contrast, business and finance incomes comprise a larger share of total income for households headed by whites compared to blacks. Households headed by women, especially black women, receive larger portions of their incomes from other sources such as government benefits, welfare and alimony. It is thus important to analyze these demographic groups separately since the average compositions of their incomes differ. Montecino and Epstein (2017) find that asset changes during Quantitative Easing policy outweighed other effects such as employment and mortgage refinancing.

Contractionary monetary policy shocks that lower firm investment should theoretically decrease output and thus business income for business-owners.[6] Monetary policy should thus have a negative relationship with business income due to changes in profits π.

Determining the sign of financial income is complex given that its various components react to monetary policy in opposite directions. Higher interest rates devalue assets since firm activity falls, resulting in lower financial income for shareholders from stocks. Financial income could at the same time be raised due to higher interest generated on savings accounts and bonds. Therefore, monetary policy has an ambiguous relationship with finance income in equation (1) due to falling stock valuations ΔVSa and dividends div, but rising interest on other assets rA.

Business income and each component of financial income are not theoretically supposed to react differently for demographic groups. What matters, are the size of the share of each category for total household income. Since assets compose a larger share of incomes for

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6. Leahy and Thapar (2022) find that age explains exposure to monetary policy for entrepreneurs starting businesses, with older age groups responding more to policy shocks.

whites than blacks, finance incomes of white households are likely more negatively exposed to monetary policy (Bartscher et al. 2021).

As incomes fall and assets become devalued, households could either consume less or find other means to finance their consumption. Racial gaps in consumption responses likely exist within income percentiles since the consumption of black households is 50% more sensitive to income shocks than white households (Ganong et al. 2020). In equation (2), lower y could lead to falls in consumption (C) and savings (Sa). Spending likely falls most for people who cannot rely on their savings to smooth their consumption.[7] Demographic characteristics other than gender and race, such as age, education, and employment seniority likely inform these income and consumption gaps. This paper accounts for these characteristics to determine whether they drive different consumption responses between genders and races.

1.3 Debt Burden Channel

Household debt burdens rise on average following contractionary monetary policy due to higher rates on loans. In equation (1), monetary policy shocks have a positive relationship with loan interest payments iL given that this policy changes interest rates. During periods of high rates, groups could on average have larger interest payments due to new loans, forced refinancing, or floating loan rates. Larger mortgage payments greatly constrain household disposable income and likely shrink savings and consumption, especially if households cannot refinance due to tight credit standards (Montecino and Epstein 2017). Empirical analysis that separates the effects of contractionary and expansionary monetary policy shocks would be useful in disentangling refinancing activities.

In the U.S., although fixed-rate mortgages are prevalent, Cloyne, Ferreira, and Surico (2020) find that households with mortgages drive overall consumption responses to monetary policy when accounting for income and age. However, Wong (2015) suggests that young populations drive this result due to having higher propensities to refinance existing loans or enter new loans. Credit card and student loans also greatly constrain households, especially

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7. Wealth, such as in unrealized capital gains, could similarly affect consumption as wealthier households can use this wealth to smooth consumption. However, cash-on-hand in the form of income and liquid savings is a larger driver of differences in consumption behaviors (Patterson 2023). The empirical analysis in this paper is focused on income and savings rather than wealth also due to limited wealth data in the sample.

when contractionary monetary policy raises rates and thus interest payments on variable rates or new loans. The empirical estimation accounting for loans is focused on mortgages in this paper due to data limitations.

Contractionary monetary policy is especially burdensome on people that are charged higher-than-average interest rates. This is especially relevant if the pass-through of monetary policy is higher for certain groups (Gerardi, Willen, and Zhang 2023). Groups that have lower financial standing, such as lower credit scores, or that are more often discriminated against would be more affected by changes in monetary policy. Although minorities have lower home-ownership rates, blacks will be disproportionately affected by higher rates on mortgages than whites due to higher initial rates, lower refinancing opportunities, higher insurance premiums, and higher property taxes (Aronowitz, Golding, and Choi 2020; Avenancio-León and Howard 2020; Gerardi, Willen, and Zhang 2023).

Households that are renters, which on average blacks are more than whites (Puig 2022), can also be disadvantaged due to rental payments not automatically being counted towards building credit history. Households that rent may additionally be negatively affected by contractionary policy due to higher rental payments. When there are higher mortgage rates, people could be discouraged from buying new houses and instead rent. Dias and Duarte (2022) show that rental unit prices could therefore increase due to high demand, even though rent may be sticky.

High debt burdens shrink y in equations (1) and (2). Households that are affected by this channel may respond to monetary policy by lowering their consumption and savings in equation (2). These exposed households thus see large changes in their consumption and savings due to the combined effects of the earnings heterogeneity, income composition, and debt burden channels.

2   Data & Methodology

2.1   Data

The time frame of analysis is 1988-2019. The data for consumption and income are U.S. household survey data from the Consumer Expenditure Survey (CE). The CE surveys house-

holds every quarter about their previous three months of consumption, income, and expenditures. It is a rotating panel, meaning that households are dropped once they are surveyed for four consecutive quarters. I impute data prior to 2004 following Coibion et al. (2017) to account for the CE's imputation of data after 2004. The data are aggregated to a quarterly frequency and seasonally adjusted using a four quarter moving average. Values are deflated by the Consumer Price Index to create a real series in 2019 prices and converted into per capita values to control for differences in household size.[8]

Categorization of durable goods, nondurable goods and services, and total income follows the classifications in Coibion et al. (2017). Total income is composed of salary, business, finance, and other income sources such as transfers net of taxes.[9] Capital gains and losses, including dividends, are included in the definition of household finance income. I additionally estimate the effects of shocks on finance income as a share of wealth to study realized versus unrealized capital gains and losses. A limitation of the CE is its less comprehensive income and wealth data; however, it is still preferable over other surveys given this paper's focus on consumption outcomes.

To calculate the gender and racial gaps in outcomes, households in the CE are disaggregated by the demographics of their head of household. The CE assigns a reference person for each household who provides the most information on family composition, income, taxes, and expenditures. The researchers classify this individual as the head of household due to their extensive knowledge of household details and role in the survey.[10] Details on the age, education, sex, and race of the reference person and other family members are provided in the raw data. I follow Cloyne, Ferreira, and Surico (2020) and Coibion et al. (2017) in using this classification of reference person as the household head. The racial analysis fo-

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8. The constructed total consumption CE series is highly correlated (0.87) with the quarterly Real Personal Consumption Expenditures series by the Bureau of Economic Analysis. The constructed total after tax income CE series is correlated (0.54) with the Income After Taxes series by the Bureau of Labor Statistics (BLS). The lower correlation between the income series can be attributed to differences in their construction. The constructed CE series is quarterly and excludes certain households, while the BLS series is annual, includes all households, and needs to be converted to real values. See Appendix A for additional details on CE data cleaning.

9. I do not estimate transfers separately from total income by gender and race due to data limitations.

10. In households with spouses, the CE allows for either person to be the reference person. This flexibility is an advantage over other popularly used household surveys that automatically assign this position to the male in the household.

cuses on comparing households headed by whites and blacks due to the small sample sizes of households headed by Asians, Native Americans, and Hispanics.[11]

The data used to study the unemployment rate, employment by sector, and labor force participation are from the Bureau of Labor Statistics (BLS). The BLS collects data at the individual level and reports group aggregates that are seasonally adjusted.

Monetary policy shocks are the high frequency orthogonalized series by Bauer and Swanson (2023) at a quarterly frequency. Following Bauer and Swanson (2023), this series is used in conjunction with controls for industrial production sourced from the Board of Governors of the Federal Reserve System, the consumer price index (CPI) from the BLS, the core commodity price index from Thompson Reuters, and the excess bond premium from Favara et al. (2016). The control variables are measured as the average value in each quarter.

2.2 Descriptive Statistics

The CE data resembles the gender and racial composition of the U.S. and gaps between groups (see Table 1). In the sample, 48% of households are headed by women and 52% by men. Also, 82% are headed by whites and 12% by blacks, mirroring the division of race within the U.S. population during this time period. On average, consumption is considerably lower and more volatile for households headed by blacks compared to whites. Blacks, especially black men, have higher unemployment rates than whites. Labor force participation is higher for men than women, but higher for black women than white women. Additionally, households headed by blacks and women have lower incomes and savings than whites and men. Overall, gaps are larger by race than by gender except for labor income.

This distribution reflects the trends in the U.S. population, as men and white workers have more access to high paying and stable jobs. It may also be explained by the proportion of dual income earner households in each group since black, especially women, heads of household are more likely to be single and thus support their family alone both in income and care work. Black households also have less access to public and private goods; relying more on community care that is often provided by black women (Banks 2020).

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11. The CE collects data on Hispanics starting in 2009, with data on a few Latin American nationalities starting in 2003. This limits studying this ethnicity with the entire sample and comparing responses to white and black populations.

Table 1: Median quarterly outcome variable over the full sample

Outcome	White Men	White Women	Black Men	Black Women
HH consumption of durable goods ($)	729	620	557	411
HH consumption of nondurable goods & services ($)	3,874	3,643	3,045	2,745
Unemployment rate (%)	4.7	4.5	10.5	9.6
Labor force participation rate (%)	76.2	59.7	70.9	63.4
HH total (after tax) income ($)	28,790	22,499	21,440	14,487
HH labor income ($)	24,085	12,618	19,115	7,666
HH business income ($)	2,475	1,471	944	425
HH finance income ($)	3,527	2,948	1,695	920
HH savings ($)	2,138	1,671	558	236

Note: The table shows median quarterly outcomes for white men and women and black men and women. Consumption and income are at the household level (HH = Household), identified by the head of household. Labor market statistics are at the individual level. Dollar amounts are in 2019$ and per capita. Savings statistics describe households that have positive savings since most households have zero savings.

In households headed by men, 55% of wives who do not work in formal employment instead take care of the household, providing unpaid care work and increasing familial welfare. In households headed by women, husbands who do not to work are usually retired (67%) or ill or disabled (21%), possibly providing pensions to the household, but not explicitly contributing to housework. This arrangement may lead to an additional burden on these working women heads who provide unpaid care to their elderly, ill, or disabled husbands. This inequality of within-household distribution of income and unpaid work likely affects decision-making around spending on consumption (Doss 2021).

The significant differences in distribution of work and income between households disaggregated by gender and race puts into question the generalizability of aggregate household results. It is thus important to analyze the effects separately by groups of households.

2.3 Monetary Policy Shock Identification

Interest rates are endogenous to economic variables, as central bankers often set policy in response to aggregate economic fluctuations. It is therefore crucial to correctly identify monetary policy shocks to estimate the effects of unexpected policy rate changes on economic outcomes. Numerous methods of identifying monetary policy shocks have been used in the literature, although some result in puzzling effects on aggregate variables.

The monetary policy shocks used in this paper are the orthogonalized series by Bauer and Swanson (2023), aggregated to a quarterly frequency by the sum of all shocks within the quarter.[12] Bauer and Swanson (2023) identify an exogenous monetary policy shock series from 1988-2019. They increase the relevance of their series relative to others by expanding the set of monetary policy announcement events with publicly available data. They then remove the component of their series that is correlated with economic and financial data to ensure exogeneity. This orthogonalized shock series produces conventionally-signed and large effects on macroeconomic variables.

2.4 Empirical Methodology

The effects of monetary policy shocks on various demographic groups are estimated through the local projections instrumental variables methodology (Jordà 2005). I regress the dependent variable on its lags, the Federal Funds Rate instrumented with the shock series, and macroeconomic aggregates at each horizon. The below equation is estimated:

$$
x_{g,t+h} - x_{g,t-1} = c_g^{(h)} + \sum_{j=1}^{J} \alpha_{g,j}^{(h)}(x_{g,t-j} - x_{g,t-j-1}) + \sum_{j=1}^{J} \beta_{g,j}^{(h)} FFR_{t-j}
$$
$$
+ \sum_{j=1}^{J} \gamma_{g,j}^{(h)} Z_{t-j} + e_{g,t+h} \; ; \;\; h = 0, ..., H
$$
(3)

where x can be log consumption, labor market outcomes, or log income. Regressions are run separately for each demographic group g (individuals or households headed by white men, white women, black men, and black women). All variables are over quarterly time t through to time horizon h.

The Federal Funds rate is FFR. Equation 3 is estimated with a GMM estimator using the Bauer and Swanson (2023) orthogonalized shock as the instrument for FFR and Newey–West standard errors.[13] Control variables are included to account for variations in macroeconomic outcomes over time. The controls, Z, include lags of log industrial production for a measure

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12. See the robustness section for a discussion of alternative monetary policy shock series. Results are consistent across different measures.

13. See Bauer and Swanson (2023) for a discussion on instrument relevance and exogeneity conditions.

of economic output, log CPI for overall market price fluctuations, log commodity prices to track prices of basic goods first affected by economic conditions, and the excess bond premium for investor sentiment in the corporate bond market. As a benchmark, $J=2$ and the estimates cover $H=20$ quarters.

3 Results

The local projections produce conventionally signed effects on macroeconomic aggregates. The first row in Figure 2 shows that following a 25bp contractionary monetary policy shock, industrial production falls by almost 6% while the excess bond premium initially increases. These estimates are consistent in direction and magnitude with Bauer and Swanson (2023).
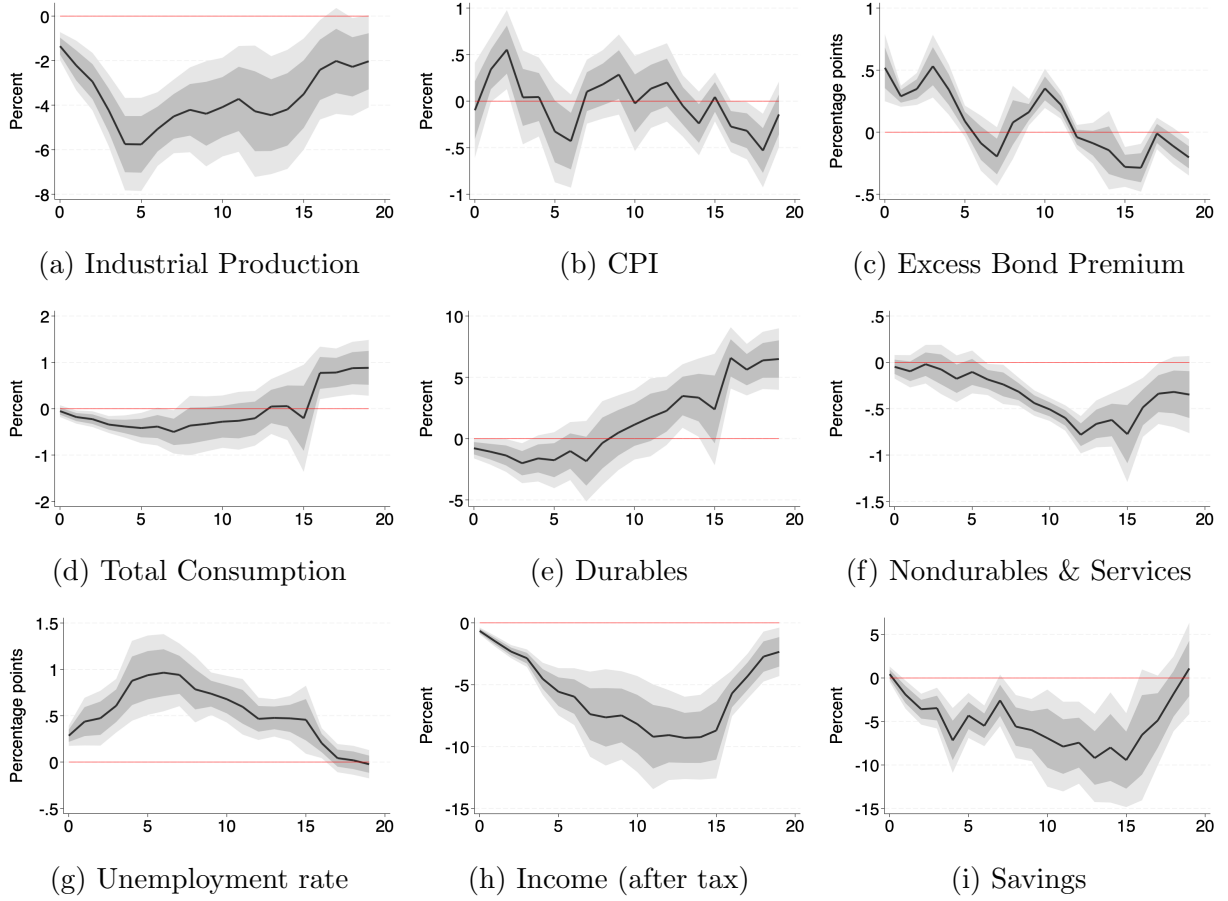
Contractionary monetary policy shocks also lower consumption, income, and savings, and raise unemployment. A 25bp contractionary shock drops total consumption by less than 1%, although consumption falls more for durable goods than nondurables and services. Unemployment rises by about 1pp, while income and savings drop by almost 10%. These results also follow the literature (Coibion et al. (2017) and Cloyne, Ferreira, and Surico (2020), among others).

3.1 Consumption Responses

There are clear gender and racial gaps in household durable goods and nondurable goods and services consumption responses to contractionary monetary policy shocks (see Figure 3). Consumption falls more for households headed by men than women. However, the racial gap differs by the type of goods consumed.

Figure 3 shows that households headed by blacks decrease their consumption more than whites. Following a 25bp contractionary monetary policy shock, households headed by black men reduce their spending overall by almost 2% and on durable goods by 15%. In contrast, consumption of households headed by white men only falls by 0.8% overall and 4% for durables. Consumption of durables is decreased more for households headed by men than women. Since black households on average spend less than white households, as seen in Table 1, this result implies that consumption inequality rises after a contractionary shock

Figure 2: Effects of monetary policy shocks on aggregate variables

(a) Industrial Production

(b) CPI

(c) Excess Bond Premium

(d) Total Consumption

(e) Durables

(f) Nondurables & Services

(g) Unemployment rate

(h) Income (after tax)

(i) Savings

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on aggregate variables. Dark and light grey shaded areas represent one and 1.65 standard deviation confidence intervals respectively.

consistent with Coibion et al. (2017).

In contrast to durable goods, nondurable goods and services spending is decreased most by households headed by black women in the medium term, by about 1.3% two years after a 25bp rate hike. Specifically, households headed by black women decrease their expenditures on vehicles, home improvement, insurance, education, and health care more than other groups.[14] Consumption of childcare, eldercare, and housekeeping services is decreased more by households headed by women than men. I also find that black households decrease their spending on essential goods and luxury products more than white households in the fourth year after the shock. The different reactions of durable and nondurable goods spending shows

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14. Estimates available upon request.

Figure 3: Effects of monetary policy shocks on household consumption

(a) Total

(b) Durables

(c) Nondurables & Services

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on household consumption, separately by households headed by white men, white women, black men, and black women. Sub-figures show consumption of (a) total goods, (b) durable goods, and (c) nondurable goods and services. Shaded areas denote one standard deviation confidence intervals.

that it is important to consider the baskets of goods that households typically consume when understanding consumption behaviors.

I next investigate whether the gaps in responses in Figure 3 are driven by household characteristics other than gender and race. If, for example, gender and racial consumption gaps were solely driven by income inequality, these gaps would not exist within income percentiles. However, I find that gender and racial gaps in consumption responses persist even when accounting for household characteristics that could theoretically drive the gaps between groups. As shown in Figure 4, spending continues to be decreased more by households headed by blacks than whites, with a clear racial gap in responses of durable goods consumption.[15]

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15. See Appendix B for the responses of household consumption of nondurable goods and services by

This result is consistent with the racial consumption gaps found in Ganong et al. (2020).

I first show that household composition does not drive racial and gender gaps in consumption responses. I separate households by whether the head of household is single or married. It is important to study households separately by relationship status because the responses of single households more closely identify that individual's preferences, while married households spending may be a joint decision between spouses given shared responsibilities or divisions of paid and unpaid work.
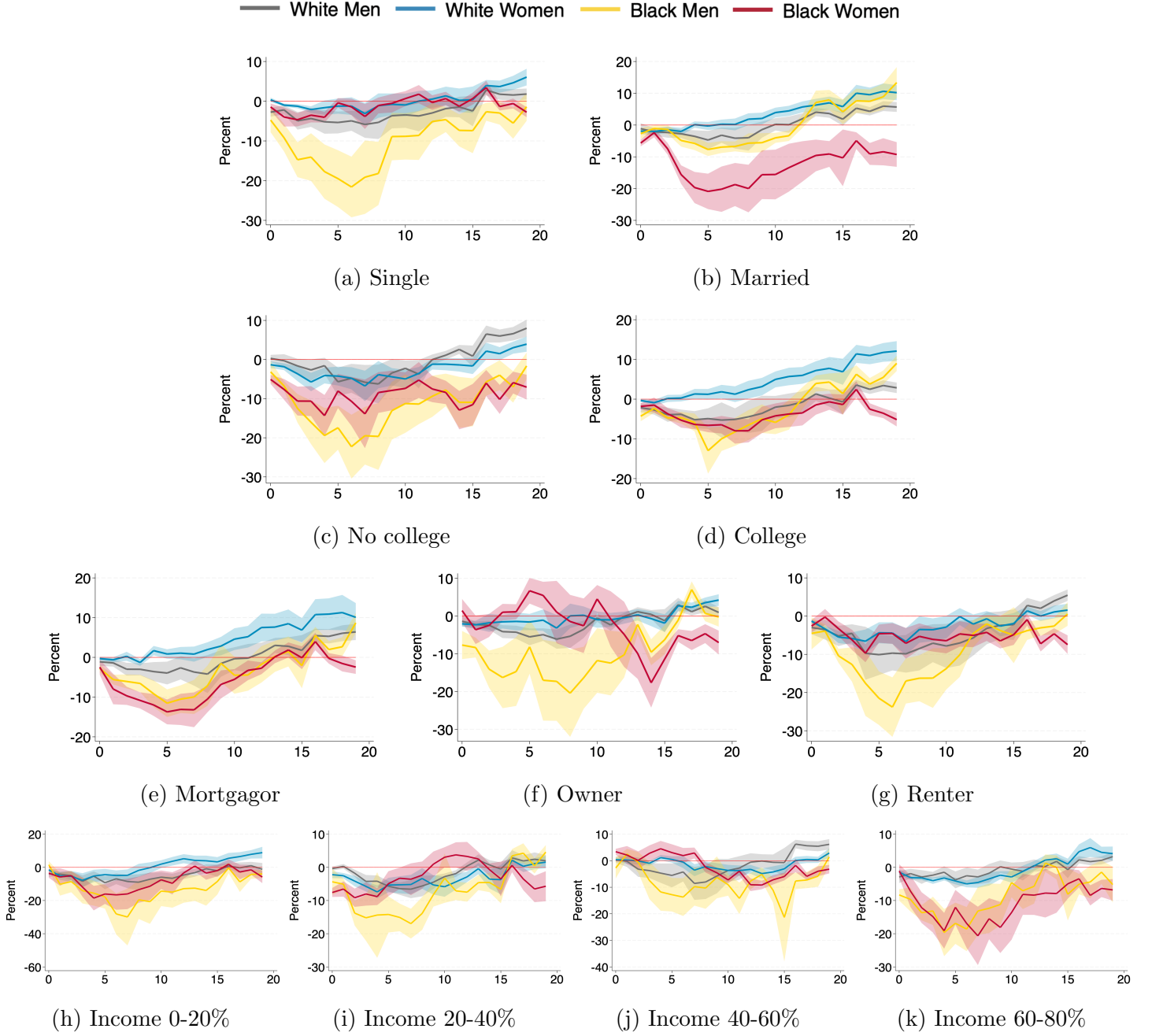
The main results from Figure 3 hold for single and married households. Among single households, those headed by black men decrease their consumption of durable goods the most. However, single men decrease their consumption more than single women. This may be due to households headed by single women, especially black women, more often having children and thus mainly buying basic durable goods that cannot be decreased. Among married households, those headed by black women decrease their consumption of durable goods the most. Black households experience the combined negative effects on black women and black men that constrain their spending, such as higher unemployment rates and lower overall incomes.[16]

The education level of the head of household also does not remove gender and racial gaps in consumption responses to monetary policy. Households are separated based on whether or not the head has at least some college education. Racial gaps are most prominent amongst households without a college education. However, households headed by black men still decrease their consumption more than others in both education categories.

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subgroups. Household differences by race and gender are smaller than for durable goods consumption and vary by subgroup, with certain characteristics increasing or eliminating gaps.

16. Women tend to bear the majority of the house and care work in married households, even in households where both spouses are employed (Thébaud 2010). I thus confirm that the results by marriage status are consistent with households separated by the number of spouses with paid work. Households with two spouses may have one who is working for pay and the other providing unpaid work for the household, or two working for pay. Households who have one (two) income earner have similar responses as singles (married).

Figure 4: Effects of monetary policy shocks on durable goods consumption by subgroups

(a) Single

(b) Married

(c) No college

(d) College

(e) Mortgagor

(f) Owner

(g) Renter

(h) Income 0-20%

(i) Income 20-40%

(j) Income 40-60%

(k) Income 60-80%

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on household consumption of durable goods, separately by households headed by white men, white women, black men, and black women. Each row displays different breakdowns of the total sample. Sub-figures compare households whose heads are (a) single versus (b) married, (c) do not have a college degree vs (d) have a college degree, (e) mortgage vs (f) own vs (g) rent their home, and (h-k) quintiles of the family income distribution. The highest quintile of income is not displayed due to limited data. Shaded areas denote one standard deviation confidence intervals.

I next show that neither household mortgage debt nor income explain the gender and racial consumption gaps from Figure 3. To measure the debt burden channel of monetary policy, I separate households by whether they have a mortgage on their house, own their house, or rent. Overall, I find that households with mortgages decrease their spending the most compared to owners and renters, consistent with Cloyne, Ferreira, and Surico (2020). However, racial and gender gaps in consumption responses persist within these debt categories. Black households drive the fall in mortgagor spending on durable goods. Also, renter households headed by black men decrease their durable goods consumption more than whites. Lastly, gender and racial consumption gaps persist within different levels of family income.[17] Consumption of durable goods falls more for households headed by blacks than whites in almost all percentiles.

The age of the head of household additionally does not drive gender and racial consumption gaps.[18] Households headed by blacks consistently decrease their durable goods consumption more than other groups in every age band. Thus, there is no clear trend between younger versus older households as in Leahy and Thapar (2022) or Wong (2015). Consumption gaps in Figure 3 are maintained across age bands, consistent with Cloyne, Ferreira, and Surico (2020).

Geographical location is also important to consider, as monetary policy's effects on inequality vary by the share of each demographic group in that region (Seguino and Heintz 2012). I find that households headed by blacks decrease their consumption most in rural areas, in places where they are highest concentrated (i.e., the South), and in places that are most exposed to shocks.[19]

These results demonstrate that monetary policy does not influence consumption to the same degree for all demographic groups. Gender and racial consumption gaps are in part unexplained by differences in household composition, age, education, debt, and income. The proceeding sections investigate how labor market and income outcomes determine households' abilities to spend when there is an unexpected change in monetary policy. Black

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17. Family income percentile thresholds are the same for all gender and racial groups. These results hold when using a measure of household labor earnings instead of total income. I also find similar gaps when disaggregating households by their savings and wealth. Estimates are available upon request.

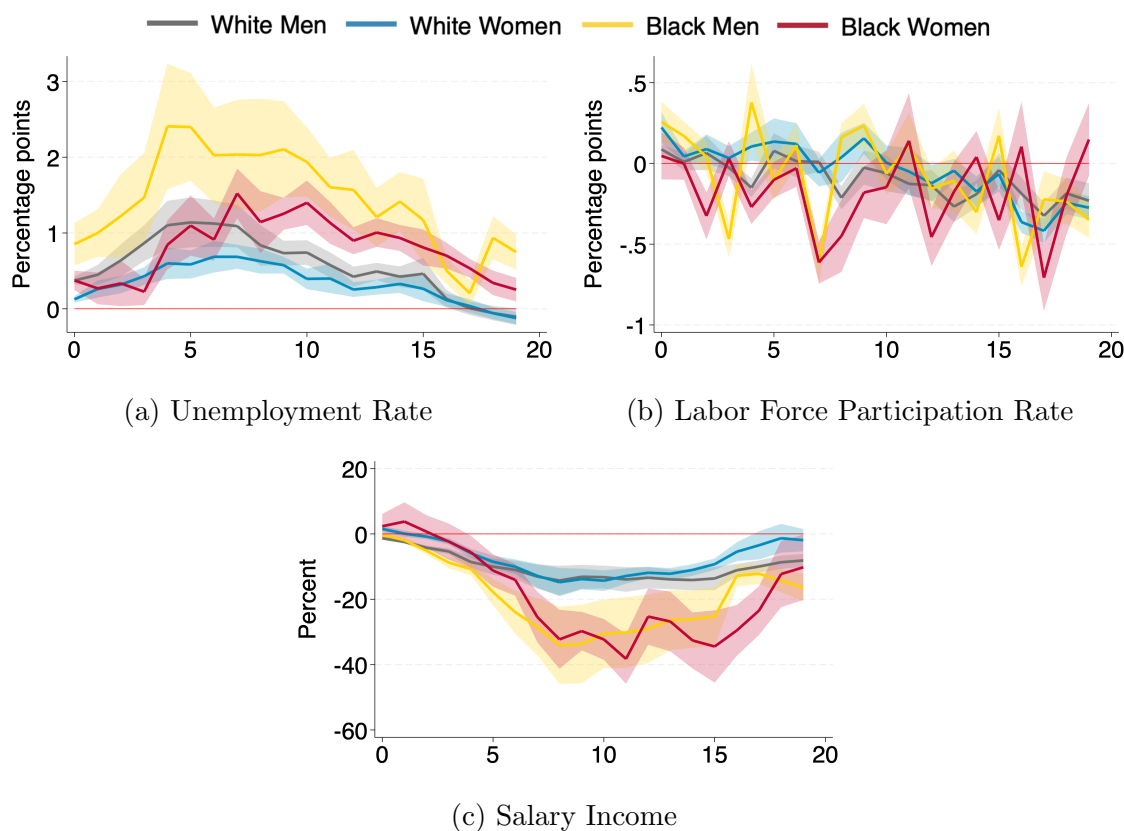18. See Appendix C for the impulse responses of consumption by age band.

19. See Appendix D for the impulse responses of consumption by geographical location.

households are more likely to be credit constrained, and thus are expected to decrease their spending most due to disproportionate job and income losses.

3.2   Channel: Earnings Heterogeneity

Monetary policy shocks are transmitted to consumption in large part through the earnings heterogeneity channel. This channel groups fluctuations in people's unemployment, labor force participation, and salary incomes.

Figure 5: Effects of monetary policy shocks on labor market outcomes

(a) Unemployment Rate

(b) Labor Force Participation Rate

(c) Salary Income

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on the labor market, separately by households headed by white men, white women, black men, and black women. Sub-figures show the (a) unemployment rate, (b) labor force participation rate, and (c) salary income. Shaded areas denote one standard deviation confidence intervals.

Figure 5 shows the impact of contractionary monetary policy shocks on labor market outcomes. Following a 25bp contractionary shock, unemployment rates rise above 2pp for

black men, while only 1pp for white men.[20] Within the first year after the shock, men have significantly higher unemployment rates than women. However, in the second year after the shock, black women's unemployment rises above whites. Thus, the racial gap between blacks and whites widens as blacks are more exposed. This racial unemployment gap result is consistent with Bartscher et al. (2021) who find that expansionary monetary policy shocks decrease the unemployment gap between whites and blacks.

The unemployment gaps in Figure 5 are correlated with changes in employment by sector. Employment in industry is more exposed to monetary policy shocks than in services, which clearly follows from industry firms being more dependent on changes in interest rates.[21] Construction and manufacturing have the largest employment losses in industry, while real estate, business services, and wholesale and retail trade have the largest losses in services. Men's high concentration in industry jobs versus women's concentration in services jobs drives the gender gap in unemployment, while black worker concentration in wholesale and retail trade, service jobs, and manufacturing drives the racial gap in unemployment. These estimates mirror the findings in Duzhak (2021) that male black and Hispanic workers face higher unemployment during downturns in part due to their occupational concentration. However, sector exposure does not fully explain the unemployment gaps because I find gender and racial gaps within responses of certain sectors. This component of labor market gaps that is unexplained by occupational concentration calls for further investigation into labor market inequalities.

There is a gender gap in the response of labor force participation to monetary policy that follows the added worker hypothesis. After a contractionary shock, labor force participation initially rises for white women while falling for other groups.[22] Also, salary incomes of households headed by women fall by the same amount as men, although households headed by blacks are hardest hit. When white women are entering the labor force during contractionary shock periods, they take lower-paying jobs just to make ends meet when their spouses are

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20. The unemployment rate results holds for employment and employment-to-population ratios (estimates available by request). Employment falls for all groups following a contractionary monetary policy shock, however it clearly falls for men more than women and blacks more than whites.

21. See Appendix E for the impulse responses. Results are consistent with Flamini et al. (2023).

22. This result is clearer when separately estimating the effects of contractionary and expansionary shocks as in Figure 8.

unemployed.[23] These results show that the added worker hypothesis holds in response to unexpected monetary policy episodes.

The result that households headed by blacks have the most exposed salary incomes fits expectations, as black workers are more unemployed than whites following a shock. Contractionary monetary policy shocks therefore increase earnings inequality since salary incomes are lower for households headed by blacks than whites. This evidence of salary income gaps contrast Coibion et al. (2017) and Bartscher et al. (2021), which both find that monetary policy shocks do not clearly affect earnings or wage inequality. However, past literature does not disaggregate groups further than by income percentile or race. My results provide a deeper look into individual-level responses that might be obscured with aggregated groups.

3.3 Channel: Income Composition

After a 25bp contractionary shock, total income inequality rises as incomes fall by 10-15% for households headed by blacks while only by 5-10% for households headed by whites (see Figure 6).[24] The differences in falls in household income are largely explained by rising salary income inequality since the average household in the sample receives the majority of its income from labor earnings.

However, Figure 6 shows that business income also falls significantly more for households headed by blacks than whites - for households headed by black women in the first year and for black men starting in the second year after the shock. Households headed by black men see a peak fall in business income of 40-60% after a 25bp shock. This value is significantly higher than the drop of business income for households headed by white men, which is less than 20%. Households headed by blacks therefore see a larger reduction of their relatively smaller business incomes.

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23. This result holds in the literature and when tested in an OLS regression using CE data. During a contractionary shock, a household in which a wife enters the labor force following her husband's unemployment (an added-worker household) has significantly lower labor earnings than a household in which only the wife is employed, controlling for the woman's age, race, and education. These results hold when estimating the effects during all quarters and when comparing added-worker households to all households in which a woman is employed.

24. Results for total income are consistent between the measure after tax and before tax. Total income after tax is used for results to be comparable with the literature.

Figure 6: Effects of monetary policy shocks on income and savings

(a) Total Income

(b) Savings

(c) Business Income

(d) Finance Income (share of wealth)

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on household finances, separately by households headed by white men, white women, black men, and black women. Sub-figures show (a) total family income after tax, (b) savings, (c) business income, and (d) finance income as the share of wealth. Shaded areas denote one standard deviation confidence intervals.

I also calculate the effect of contractionary shocks on finance income as a share of household wealth. The share of finance income rises for most households, even doubling in size (100%) after a 25bp contractionary shock for all except households headed by white women. The rise in this income is consistent with Coibion et al. (2017). Although this share rises, most households hold small amounts of financial income relative to labor income. The fall in total incomes are therefore largely driven by falls in salaries.

It is additionally important to look at how household savings fluctuate during monetary policy changes. Following higher unemployment and lower income, households will need to use other means to finance consumption to avoid decreasing it. Households with larger savings will have a secure buffer against income losses, enabling them to continue to consume

the same or similar basket of goods. Figure 6 shows the impact of contractionary monetary policy shocks on savings.[25] Savings for households headed by black women decrease the most over any other group with a significant gap. Following a 25bp contractionary shock, savings of households headed by whites fall by about 5%, while those of black women fall by almost 40%. Although savings of households headed by black men rise, the estimate is highly uncertain. The savings gap between households headed by black women and others thus further widens.

Falls in savings in Figure 6 suggest that most households use existing savings to smooth their consumption, especially of essential goods. Following contractionary monetary policy shocks, households headed by blacks experience higher unemployment, lower incomes, and lower savings. Households headed by black women use the largest percentages of their saved income, consistent with being the most likely to be constrained by a minimum consumption of essentials due to lower income and higher dependent-care responsibilities.

4 Shock Asymmetry

I next test whether the direction of monetary policy shocks are transmitted asymmetrically to each outcome. I run local projections for each demographic group, including a dummy variable for whether the shock is contractionary (positive) or expansionary (negative) as in Furceri, Loungani, and Zdzienicka (2018). The below equation is estimated:

$$
\begin{aligned}
x_{g,t+h} - x_{g,t-1} = c_g^{(h)} &+ \sum_{j=1}^{J} \alpha_{g,j}^{(h)}(x_{g,t-j} - x_{g,t-j-1}) + \sum_{j=0}^{J} \beta_{g,j}^{(h)} shock_{t-j} D_{t-j} \\
&+ \sum_{j=0}^{J} \beta_{g,j}^{(h)} shock_{t-j}(1 - D_{t-j}) + \sum_{j=1}^{J} \gamma_{g,j}^{(h)} Z_{t-j} + e_{g,t+h} \; ; \;\; h = 0, ..., H
\end{aligned}
\tag{4}
$$

where all variables are specified as in equation (3), except rather than using an instrument, *shock* is the monetary policy shock and D is a dummy variable that equals one when the shock is positive and zero otherwise.

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25. Savings is measured for households that have positive savings accounts given that the majority of the sample does not hold positive savings.

Section 3 estimates are generally driven by contractionary rather than expansionary shocks, consistent with the literature. Additionally, the difference in responses to each monetary policy shock sign is statistically significant for most outcomes and groups.[26] Responses fluctuate more for households headed by blacks than whites.

4.1 Consumption Responses

Changes in household consumption following contractionary shocks are about twice larger in magnitude relative to expansionary shocks (see Figure 7). Consumption of durable goods is decreased by 40% but increased only by about 20% by households headed by black men in response to 25bp contractionary and expansionary shocks respectively.

A similar relationship is found for consumption of nondurable goods and services, although there is more uncertainty in these estimates. Households headed by black men are the only group who statistically significantly increase their consumption of nondurables following expansionary shocks.

The gains in consumption from expansionary monetary policy are outweighed by the losses from contractionary policy. Consumption inequality therefore rises overall, driven by the effects of contractionary shocks.
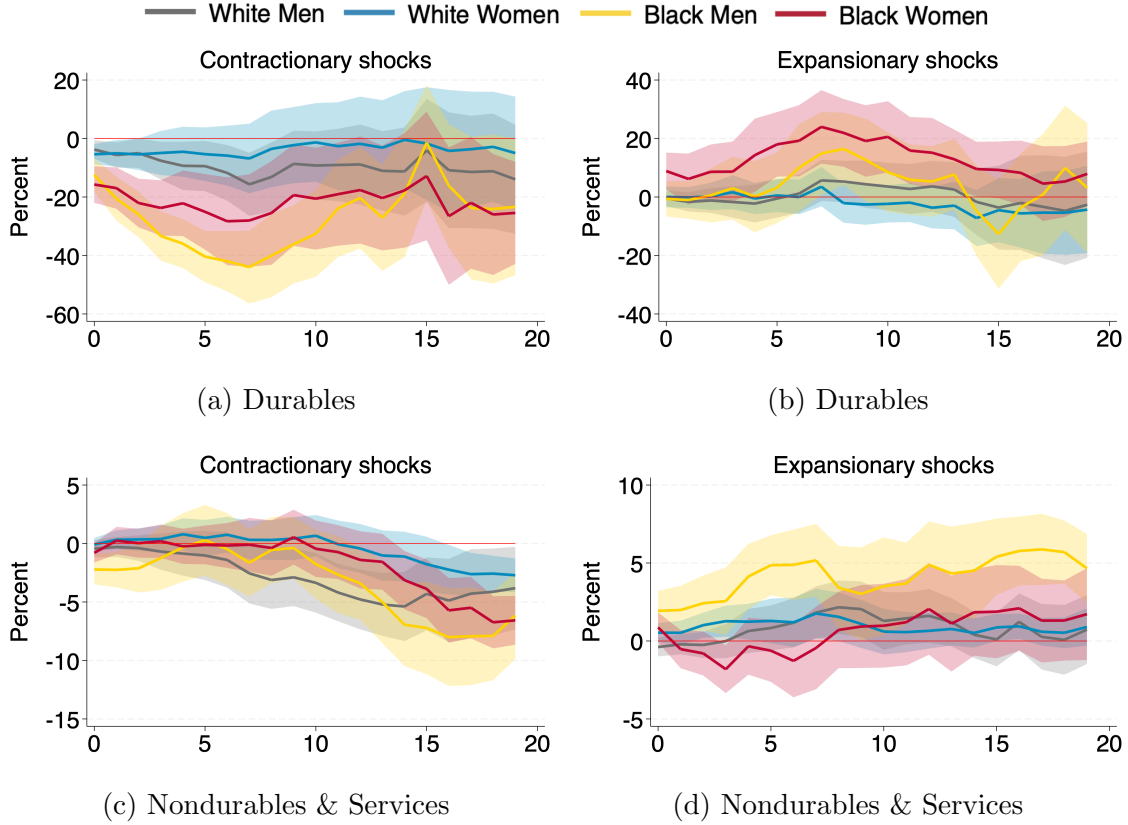
4.2 Labor Market & Income Responses

Positive and negative monetary policy shocks are also transmitted asymmetrically to labor market outcomes and income (see Figure 8). A 25 bp contractionary shock raises the unemployment rate most for blacks, for a maximum of 5pp for black men. Although expansionary shocks lower unemployment most for blacks, the magnitudes are about 1pp smaller. These estimates cast doubt on assuming a symmetric transmission when studying expansionary policy and unemployment.

The added worker effect in response to contractionary policy only appears in white women's in labor force participation (see Figure 8 (c)). Following a contractionary monetary policy shock, the labor force participation rate falls most for black men and women, while uncertainly changing for white men and rising for white women. Thus, the added

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26. See Appendix F for tables with F-test results.

Figure 7: Asymmetric effects of monetary policy shocks on consumption

(a) Durables

(b) Durables

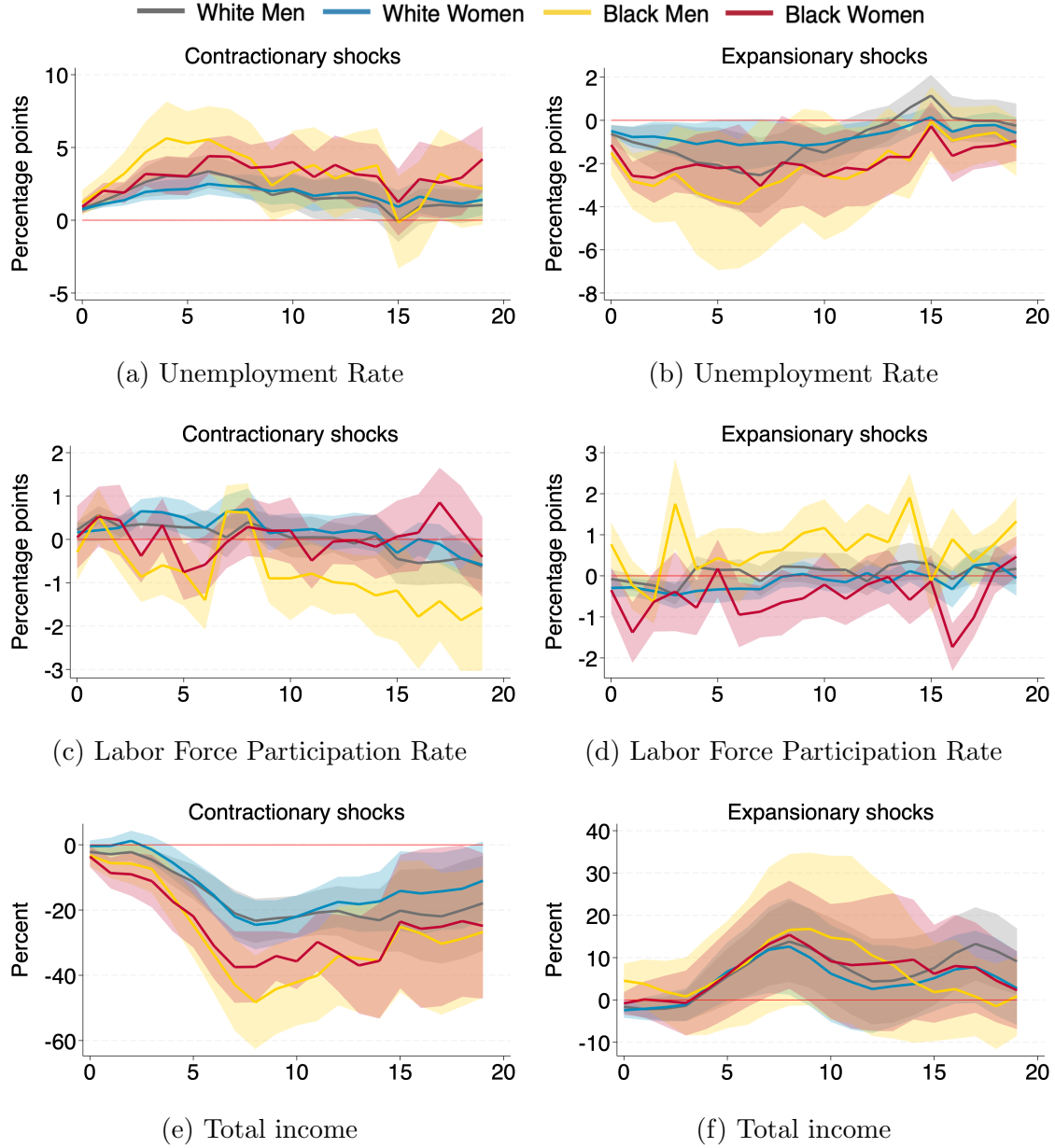(c) Nondurables & Services

(d) Nondurables & Services

Note: The figure shows the effects of 25bp monetary policy shocks on household consumption, separately by households headed by white men, white women, black men, and black women. The first column shows responses to contractionary shocks and the second column shows responses to expansionary shocks. The first row is durable goods consumption, while the second row is nondurable goods and services consumption. Shaded areas denote one standard deviation confidence intervals.

worker effect only appears for white households, since black women also experience higher unemployment rates seen by men. This racial difference also follows from differences in women's roles between white and black households. In contrast to white women, black women often cannot afford to leave the labor force to focus on house and care work. They are thus more exposed to labor market dynamics like black men. Black men increase their labor force participation following expansionary shocks, although there is much uncertainty in the estimates for all groups. Overall, participation decisions are more sensitive to monetary policy shocks for blacks than whites, consistent with Cajner et al. (2017).

Following contractionary shocks, household total incomes also fall more for households

Figure 8: Asymmetric effects of monetary policy shocks on labor market outcomes

(a) Unemployment Rate

(b) Unemployment Rate

(c) Labor Force Participation Rate

(d) Labor Force Participation Rate

(e) Total income

(f) Total income

Note: The figure shows the effects of 25bp monetary policy shocks on labor market and income outcomes, separately by households headed by white men, white women, black men, and black women. The first column shows responses to contractionary shocks and the second column shows responses to expansionary shocks. The first row is the unemployment rate, the second is the labor force participation rate, and the third is total family income after tax. Shaded areas denote one standard deviation confidence intervals.

headed by blacks than whites. Racial gaps widen during these periods. In contrast, expansionary shocks clearly raise total incomes equally for all groups. However, the gains in higher

incomes from expansionary shocks are outweighed by the large losses from contractionary shocks, similar to the case of consumption.

5 Robustness

I conduct several additional robustness checks to verify the results in section 3. I first test for the sensitivity of the results to the monetary policy shock specification. I substitute the instrument in equation (3) with two alternative shock series: the Jarocinski and Karadi (2020) monetary policy median shocks and the Wu and Xia (2016) shadow rates. Each series is used from 1990-2019 and is aggregated to a quarterly frequency by the sum of all shocks within the quarter. The effects of contractionary monetary policy on consumption, labor market outcomes, and income are consistent with those presented using the Bauer and Swanson (2023) orthogonalized shocks.[27]

I then check whether the results are affected by different specifications of equation (3) such as OLS, lag lengths, and controls. I confirm that the main results using local projections-instrumental variables are consistent with local projections-OLS. The main results are also similar up to four lags; including controls and shocks with five or more lags distorts the results. Using less than five lags is consistent with the local projections literature. I next test for the importance of the vector of controls Z in equation (3) by running the local projections without this vector. The majority of results are consistent. I also test removing only the commodity prices measure, and the results are qualitatively similar. However, it is important to include all Z controls in the estimation to separate out the effects of macroeconomic conditions. Omitting all or some of the controls likely produces incorrect estimates.

I next study the dependence of the consumption results on different periods.[28] I separate the sample post-2001 and pre- and post-2008 to study recessions and whether using shocks only from the unconventional monetary policy period affect the estimates. I find that the results for the full sample are qualitatively consistent with those using data post-2001, pre-2008, or post-2008. Consumption of all goods and durable goods falls more for households

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27. See Appendix G for the estimates of main outcomes in response to the two alternative shock measures.
28. Results available upon request.

headed by blacks than whites. To further investigate the effects of recessionary periods, I run local projections using equation (4), changing D to be a dummy variable that equals one when the economy is in a recession and zero otherwise. Following a contractionary shock, households decrease their consumption more when the economy is in a recession. However, I find that households still decrease their consumption in non-recession years, with households headed by black women decreasing their consumption more than other groups.

6   Conclusion

This paper is the first to estimate gender and racial gaps in household consumption responses to monetary policy shocks with this methodology and extended time period, as far as I know. It is also novel in explaining consumption responses through estimated impacts on labor market and income outcomes. Consumption behaviors are influenced by total disposable income, which in turn is determined by access to education, employment, and financial opportunities. These other forms of inequality, which are more often faced by people of color and women, are masked by measures of income inequality. Since income gaps obscure these other inequalities that affect how monetary policy is transmitted, focusing solely on income inequality has limited previous research.

I fill this gap in the literature by separately studying consumption responses of households headed by white men, white women, black men, and black women while accounting for various household characteristics. I also trace monetary policy transmission through labor market and income outcomes. Consistent with theory, the empirical results show that falls in consumption following contractionary monetary policy shocks are associated with rising unemployment rates and falling incomes.

However, the transmission of monetary policy is not equal for all demographic groups. Gender and racial gaps exist, with blacks experiencing the largest negative effects of contractionary shocks. The ultimate result of the labor market and income responses is that consumption gaps widen by gender and race. Households headed by blacks, especially black men, decrease their spending of durable goods more than other groups. Neither household composition, age, education, balance sheets, nor income explain gender and racial consumption gaps. Lastly, I find evidence that contractionary monetary policy shocks widen

inequalities that are not reversed by expansionary shocks.

The findings in this paper are relevant for central banks who may intend to affect household spending through interest rate policy. Policymakers must understand the determinants of aggregate outcomes. Also, how responses differ between positive and negative rate shocks to know whether monetary policy changes are having their intended effects. This can be done by studying the unequal transmission of policy at the individual level and delving into the complexities of household spending behaviors. Quantifying the effects of monetary policy is especially needed given the recent reliance on the Federal Reserve to stabilize the U.S. economy.

More research is needed to trace the causal effects of monetary policy. Daily or monthly survey data that is representative and records comprehensive household member demographics, financial details, and reactions to policies is crucial for the use of high frequency monetary policy shocks. Additional efforts are needed to incorporate gender and racial heterogeneity into models studying the effects of monetary policy. My empirical estimates can inform model parameters to reflect gender and racial heterogeneity in labor market, income, and consumption outcomes. The results also provide motivation for quantitative models to explore non-linearities in monetary policy shocks, especially when studying expansionary policy.

References

Akin, Selin Secil. 2020. "Three Essays on Gender-Specific Employment Outcomes of Macroeconomic Policies." *Doctoral Dissertations, University of Massachusetts Amherst* 1906.

Aronowitz, Michelle, Edward L. Golding, and Jung Hyun Choi. 2020. "The Unequal Costs of Black Homeownership." *MIT Golub Center for Finance and Policy.*

Auclert, Adrien. 2019. "Monetary Policy and the Redistribution Channel." *American Economic Review* 109 (6): 2333–67.

Avenancio-León, Carlos F., and Troup Howard. 2020. "The Assessment Gap: Racial Inequalities in Property Taxation." *Opportunity and Inclusive Growth Institute Working Papers 34, Federal Reserve Bank of Minneapolis.*

Banks, Nina. 2020. "Black Women in the United States and Unpaid Collective Work: Theorizing the Community as a Site of Production." *The Review of Black Political Economy* 47 (4): 343–62.

Bartscher, Alina K., Moritz Kuhn, Moritz Schularick, and Paul Wachtel. 2021. "Monetary Policy and Racial Inequality." *FRB New York Staff Report No. 959.*

Bauer, Michael D., and Eric T. Swanson. 2023. "A Reassessment of Monetary Policy Surprises and High-Frequency Identification." *NBER Macroeconomics Annual* 37 (1): 87–155.

Bergman, Nittai, David A. Matsa, and Michael Weber. 2020. "Heterogeneous Labor Market Effects of Monetary Policy." *SSRN.*

Braunstein, Elissa, and James Heintz. 2008. "Gender Bias and Central Bank Policy: Employment and Inflation Reduction." *International Review of Applied Economics* 22 (2): 173–86.

Cajner, Tomaz, Tyler Radler, David Ratner, and Ivan Vidangos. 2017. "Racial Gaps in Labor Market Outcomes in the Last Four Decades and over the Business Cycle." *Finance and Economics Discussion Series 2017-071. Washington: Board of Governors of the Federal Reserve System.*

Cloyne, James, Clodomiro Ferreira, and Paolo Surico. 2020. "Monetary Policy When Households Have Debt: New Evidence on the Transmission Mechanism." *The Review of Economic Studies* 87 (1): 102–29.

Coibion, Olivier, Yuriy Gorodnichenko, Lorenz Kueng, and John Silvia. 2017. "Innocent Bystanders? Monetary Policy and Inequality." *Journal of Monetary Economics* 88:70–89.

Del Canto, Felipe, John Grigsby, Eric Qian, and Conor Walsh. 2023. "Are Inflationary Shocks Regressive? A Feasible Set Approach." *Working Paper.*

Dias, Daniel A., and Joao B. Duarte. 2022. "Monetary Policy and Homeownership: Empirical Evidence, Theory, and Policy Implications." *International Finance Discussion Papers 1344. Washington: Board of Governors of the Federal Reserve System.*

Doss, Cheryl. 2021. "The Routledge Handbook of Feminist Economics." Chap. Intrahousehold Decision-Making and Resource Allocation. Routledge.

Duzhak, Evgeniya A. 2021. "How Do Business Cycles Affect Worker Groups Differently?" *Federal Reserve Bank of San Francisco Economic Letter* 2021-25.

Favara, Giovanni, Simon Gilchrist, Kurt F. Lewis, and Egon Zakrajšek. 2016. "Updating the Recession Risk and the Excess Bond Premium." *FEDS Notes. Washington: Board of Governors of the Federal Reserve System.*

Flamini, Valentina, Diego B. P. Gomes, Bihong Huang, Lisa Kolovich, Aina Puig, and Aleksandra Zdzienicka. 2023. "Monetary Policy and Labor Market Gender Gaps." *IMF Working Paper No. 23/211.*

Furceri, Davide, Prakash Loungani, and Aleksandra Zdzienicka. 2018. "The effects of monetary policy shocks on inequality." *Journal of International Money and Finance* 85:168–86.

Ganong, Peter, Damon Jones, Pascal Noel, Diana Farrell, Fiona Greig, and Chris Wheat. 2020. "Wealth, Race, and Consumption Smoothing of Typical Income Shocks." *Becker Friedman Institute Working Paper No. 2020-49.*

Gerardi, Kristopher, Paul S. Willen, and David Hao Zhang. 2023. "Mortgage prepayment, race, and monetary policy." *Journal of Financial Economics* 146 (3): 498–524.

Jarocinski, Marek, and Peter Karadi. 2020. "Deconstructing Monetary Policy Surprises— The Role of Information Shocks." *American Economic Journal: Macroeconomics* 12 (2): 1–43.

Jordà, Òscar. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review* 95 (1): 161–82.

Juhn, Chinhui, and Simon Potter. 2007. "Is There Still an Added Worker Effect?" *Federal Reserve Bank of New York Staff Report* 310.

Kappes, Sylvio Antonio. 2023. "Monetary Policy and Personal Income Distribution: A Survey of the Empirical Literature." *Review of Political Economy* 35 (1): 211–30.

Leahy, John V., and Aditi Thapar. 2022. "Age Structure and the Impact of Monetary Policy." *American Economic Journal: Macroeconomics* 14 (4): 136–73.

Lee, Munseob, Claudia Macaluso, and Felipe Schwartzman. 2021. "Minority Unemployment, Inflation, and Monetary Policy." *Working Paper*.

McKay, Alisdair, and Christian K. Wolf. 2023. "Monetary Policy and Inequality." *Journal of Economic Perspectives* 37 (1): 121–44.

Montecino, Juan Antonio, and Gerald Epstein. 2017. "Did Quantitative Easing Increase Income Inequality?" *Institute for New Economic Thinking Working Paper Series* 28.

Nakajima, Makoto. 2023. "Monetary Policy with Racial Inequality." *Federal Reserve Bank of Minneapolis, Institute Working Paper 70*.

Patterson, Christina. 2023. "The Matching Multiplier and the Amplification of Recessions." *American Economic Review* 113 (4): 982–1012.

Puig, Aina. 2022. "The Unequal Effect of Interest Rates by Race, Gender." *Federal Reserve Bank of San Francisco Economic Letter* 2022-19.

Rodgers, William. 2008. "African American and White Differences in the Impacts of Monetary Policy on the Duration of Unemployment." *American Economic Review* 98 (2): 382–86.

Seguino, Stephanie. 2019. "Engendering Macroeconomic Theory and Policy." *Feminist Economics.*

Seguino, Stephanie, and James Heintz. 2012. "Monetary Tightening and the Dynamics of US Race and Gender Stratification." *American Journal of Economics and Sociology* 71 (3): 603–38.

Takhtamanova, Yelena, and Eva Sierminska. 2009. "Gender, Monetary Policy, and Employment: The Case of Nine OECD Countries." *Feminist Economics* 15 (3): 323–53.

Thébaud, Sarah. 2010. "Masculinity, Bargaining, and Breadwinning: Understanding Men's Housework in the Cultural Context of Paid Work." *Gender & Society* 24 (3): 330–54.

Thorbecke, Willem. 2001. "Estimating the Effects of Disinflationary Monetary Policy on Minorities." *Journal of Policy Modeling* 23 (1): 51–66.

Ume, Ejindu S., and Miesha J. Williams. 2019. "The Differential Impact of Monetary Policy on Blacks and Whites since the Great Recession." *Journal of Economics, Race, and Policy* 2 (3): 137–49.

Wong, Arlene. 2015. "Population Aging and the Aggregate Effects of Monetary Policy." *SSRN.*

Wu, Jing Cynthia, and Fan Dora Xia. 2016. "Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound." *Journal of Money, Credit, and Banking* 48 (2-3): 253–291.
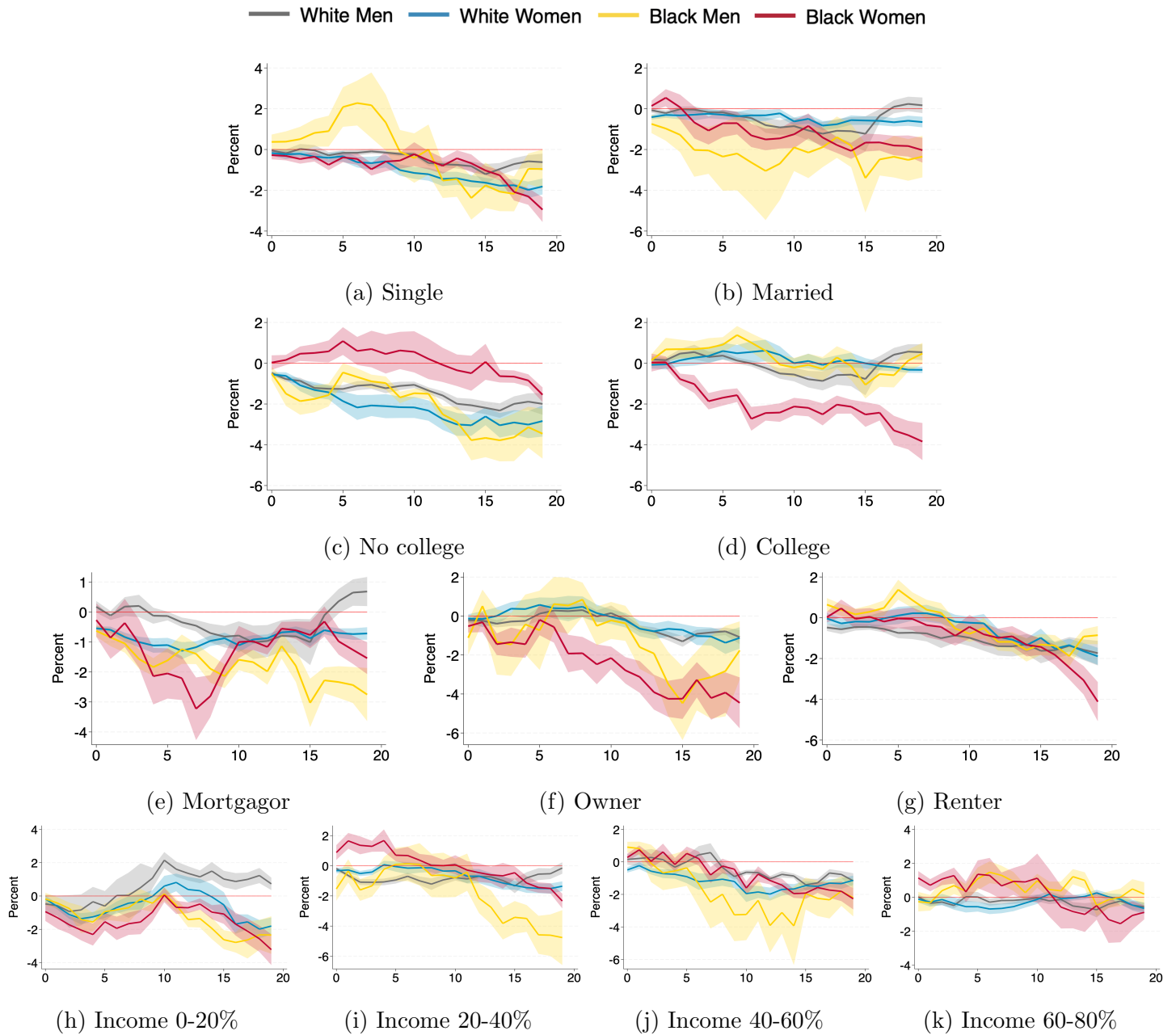
A Appendix: CE Data Cleaning

This section describes the data cleaning process for the Consumer Expenditure Survey (CE). The CE raw data files are available for download on the Bureau of Labor Statistics website. The expenditures data is aggregated from the MTAB files and the income data is constructed from the FMLI and MEMI files.

To create a quarterly expenditure series, expenditures are aggregated across months within the reported quarter. Observations are dropped if they report negative consumption on durable or nondurable goods and services. They are also dropped if they report negative net income data. I adjust for outliers by dropping households in the top or bottom 1% of expenditures in each quarter. This deletes about 3% of households. Since I am interested in studying how mortgage debt affects consumption, I also drop households that change their mortgage debt status during the year they are interviewed, following Cloyne, Ferreira, and Surico (2020). I only keep households whose head is white or black, given the small percentage of other race individuals in the sample. Following Cloyne, Ferreira, and Surico (2020), I also drop households whose heads are below 25 or over 75 years old, and keep households that were interviewed less than for their full survey period.

Categorization of consumption and income from the MTAB and MEMI CE files follows the classifications in Coibion et al. (2017). Data prior to 2004 are imputed according to Coibion et al. (2017) to account for CE imputations post-2004. Sample breaks and bracketed income values are also handled according to Coibion et al. (2017). The data are seasonally adjusted using a four quarter moving average.
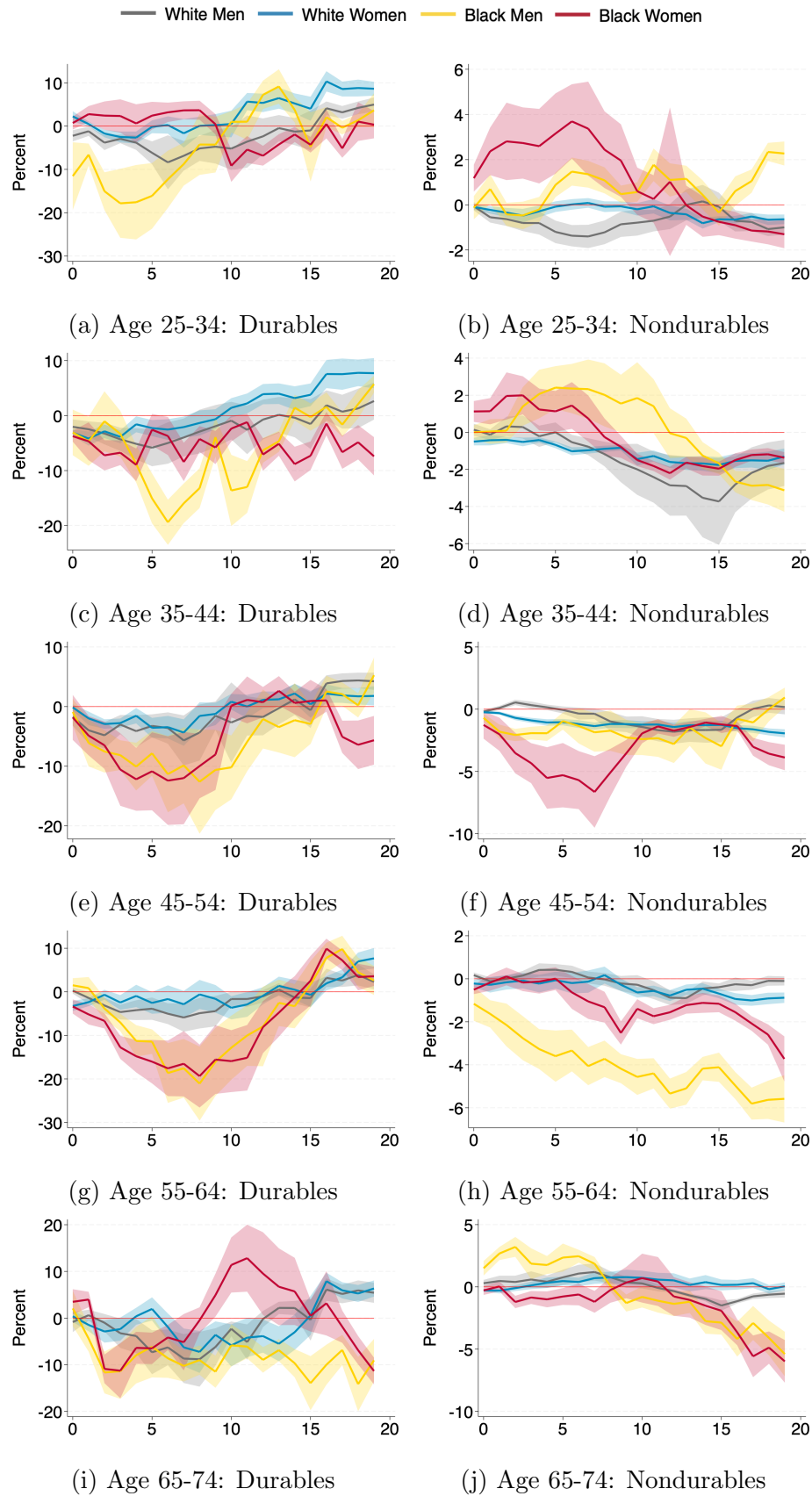
For comparability over time, expenditure and income variables are deflated by the CPI to 2019 prices. To control for differences in household size, I adjust expenditures by the OECD scale of effective household size following Coibion et al. (2017). All series are thus in real and per capita values. I additionally weight the series by the CE household weights.

B Appendix: Effects of monetary policy shocks on nondurable goods and services consumption by subgroups

(a) Single

(b) Married

(c) No college

(d) College

(e) Mortgagor

(f) Owner

(g) Renter

(h) Income 0-20%

(i) Income 20-40%
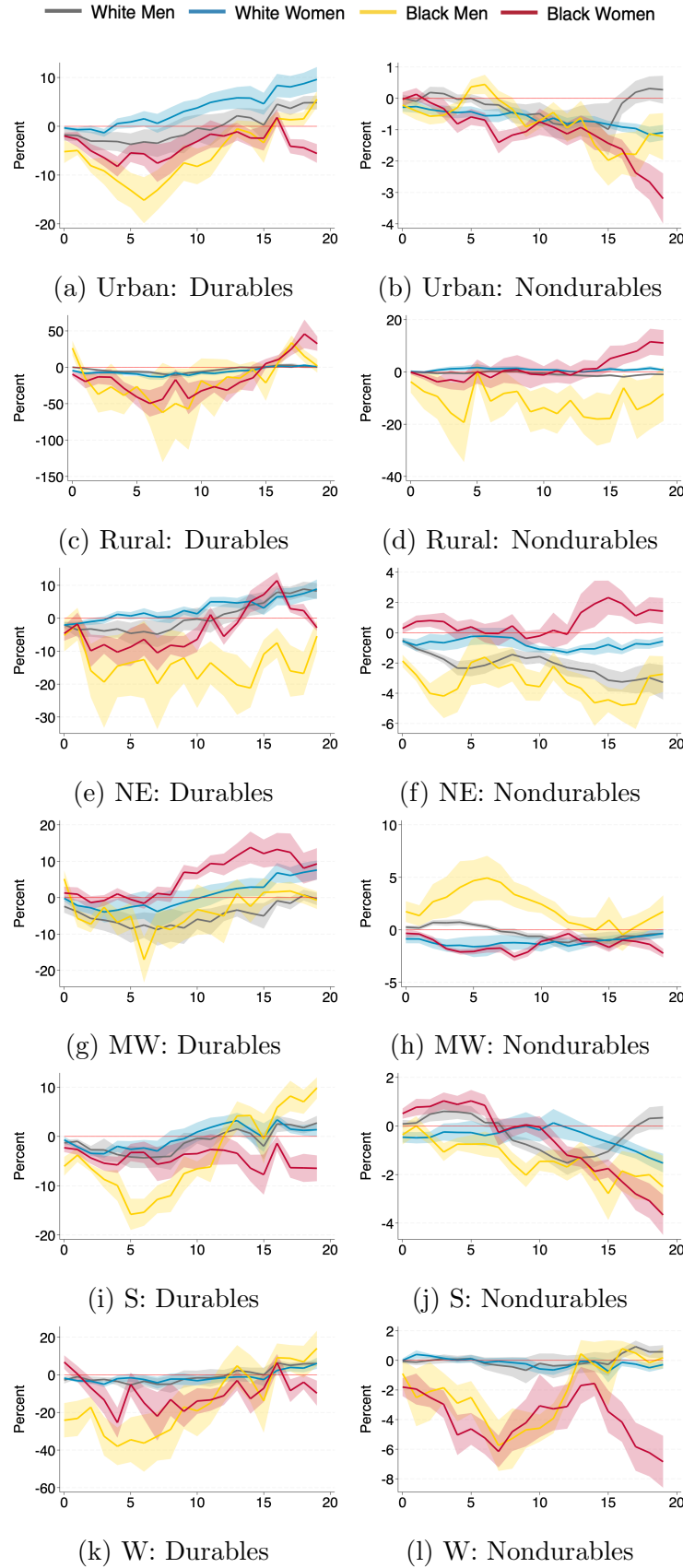
(j) Income 40-60%

(k) Income 60-80%

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on household consumption of nondurable goods and services, separately by households headed by white men, white women, black men, and black women. Each row displays different breakdowns of the total sample. Sub-figures compare households whose heads are (a) single versus (b) married, (c) do not have a college degree vs (d) have a college degree, (e) mortgage vs (f) own vs (g) rent their home, and (h-k) quintiles of the family income distribution. The highest quintile of income is not displayed due to limited data. Shaded areas denote one standard deviation confidence intervals.

C   Appendix: Effects of monetary policy shocks on consumption by age

(a) Age 25-34: Durables

(b) Age 25-34: Nondurables

(c) Age 35-44: Durables

(d) Age 35-44: Nondurables

(e) Age 45-54: Durables

(f) Age 45-54: Nondurables

(g) Age 55-64: Durables

(h) Age 55-64: Nondurables

(i) Age 65-74: Durables

(j) Age 65-74: Nondurables
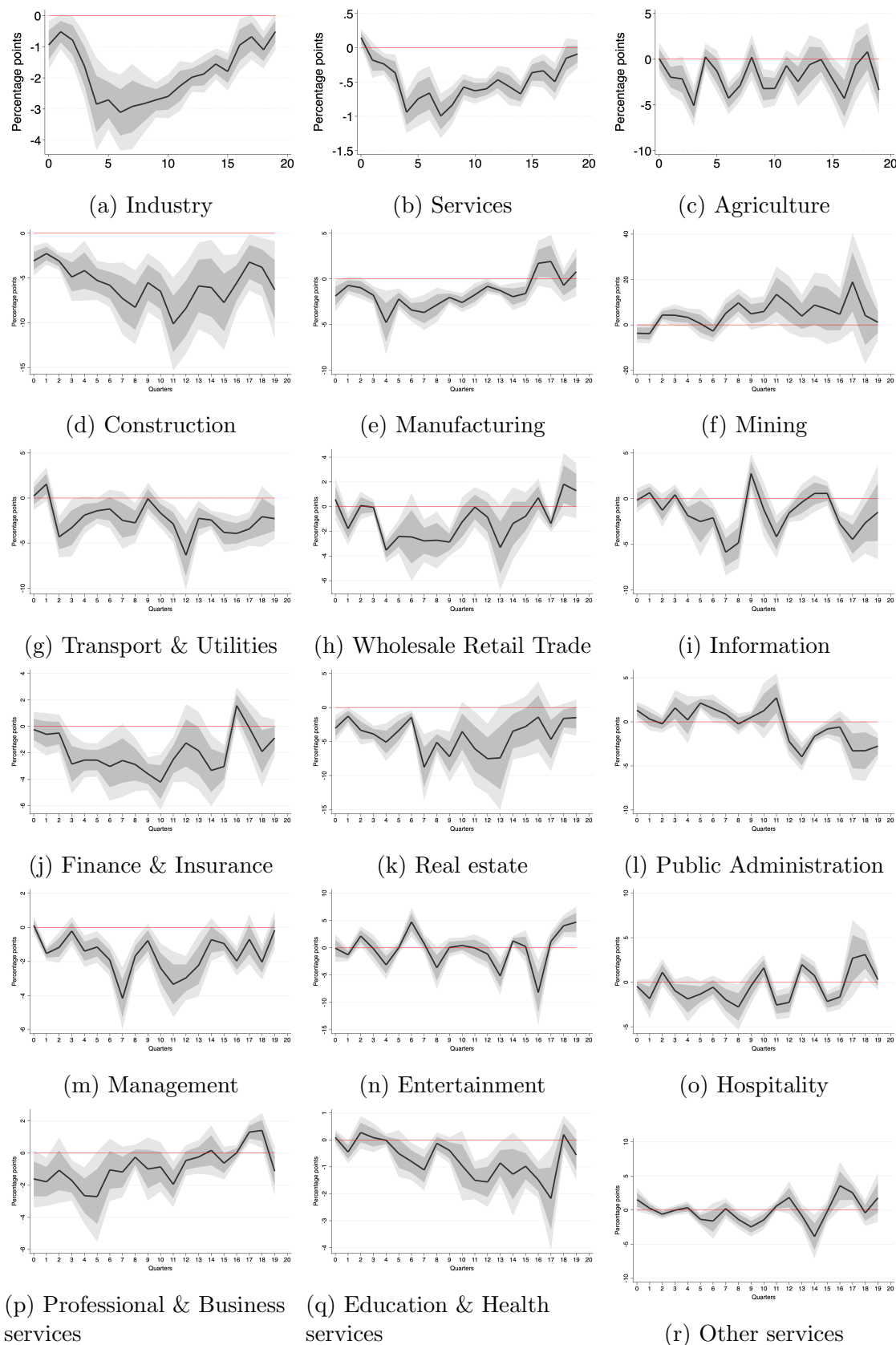
Note: The figure shows the effects of a 25bp contractionary monetary policy shock on log consumption by the age of the head of household. The first column shows responses of consumption of durable goods while the second column of nondurable goods and services. Each row corresponds to households within a different age band. Shaded areas denote one standard deviation confidence intervals.

D Appendix: Effects of monetary policy shocks on consumption by geography

(a) Urban: Durables

(b) Urban: Nondurables

(c) Rural: Durables

(d) Rural: Nondurables

(e) NE: Durables

(f) NE: Nondurables

(g) MW: Durables

(h) MW: Nondurables

(i) S: Durables

(j) S: Nondurables

(k) W: Durables

(l) W: Nondurables

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on log consumption by geographical location of household. The first column shows responses of consumption of durable goods while the second column of nondurable goods and services. The first four rows split the sample between urban households (a-b) and rural households (c-d). Sub-figures e-l show estimates for households located in the North-East (NE), Mid-West (MW), South (S), and West (W) of the U.S. Shaded areas denote one standard deviation confidence intervals.

E   Appendix: Effects of monetary policy shocks on employment by sector & sub-sector

(a) Industry

(b) Services

(c) Agriculture

(d) Construction

(e) Manufacturing

(f) Mining

(g) Transport & Utilities

(h) Wholesale Retail Trade

(i) Information

(j) Finance & Insurance

(k) Real estate

(l) Public Administration

(m) Management

(n) Entertainment

(o) Hospitality

(p) Professional & Business services
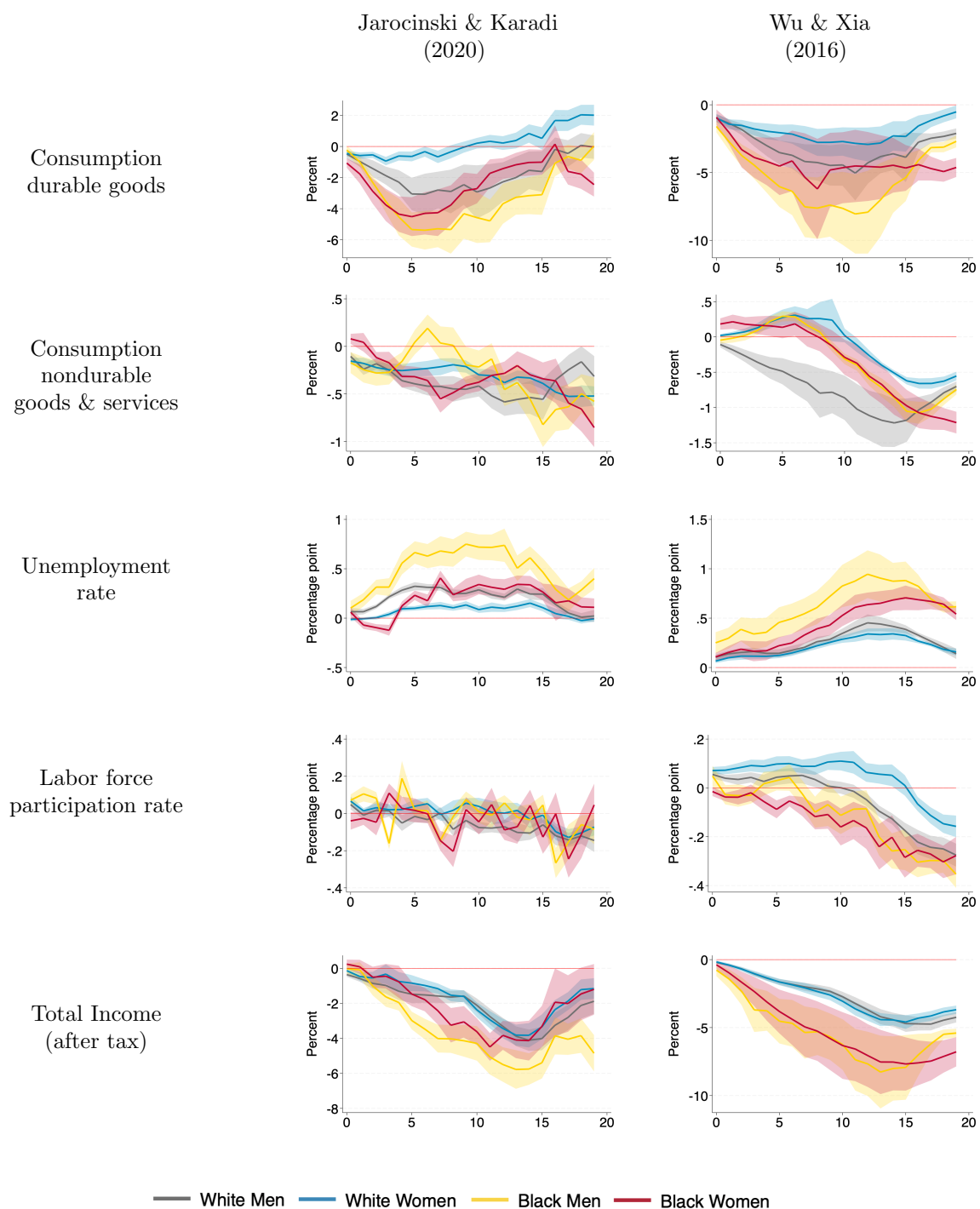
(q) Education & Health services

(r) Other services

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on log employment by sub-sector. Dark and light grey shaded areas denote one and 1.65 standard deviation confidence intervals respectively. Data in sub-figures a-c is from the ILO. Other data is from the BLS and covers 2000-2019.

F   Appendix: F-test of asymmetric monetary policy shocks

	Households headed by			
	White Men	White Women	Black Men	Black Women
Consumption: Durable goods	2.028	0.818	9.632	5.657
	(0.158)	(0.368)	(0.003)	(0.020)
Consumption: Nondurable goods	3.130	5.111	7.046	6.430
	(0.081)	(0.027)	(0.010)	(0.014)
Unemployment rate	6.033	10.263	5.951	20.598
	(0.016)	(0.002)	(0.017)	(0.000)
Labor force participation rate	5.110	4.301	6.531	3.294
	(0.026)	(0.041)	(0.013)	(0.074)
Total income (after tax)	7.516	5.134	5.457	8.517
	(0.008)	(0.026)	(0.022)	(0.005)

Note: The table shows estimates of the F-test for the difference in effect between positive and negative monetary policy shocks on consumption, unemployment, labor force participation, and income. Estimates are the maximum F-stat in the 20-quarter horizon, generated from equation (4). F-test significance level in parentheses.

G   Appendix: Effects of alternative monetary policy shocks on main outcomes

Note: The figure shows the effects of a 25bp contractionary monetary policy shock on household outcomes, separately by households headed by white men, white women, black men, and black women. These results are estimates of equation (3), substituting the instrument with two alternative monetary policy shock series: the Jarocinski and Karadi (2020) monetary policy median shocks; and the Wu and Xia (2016) shadow rates. Shaded areas denote one standard deviation confidence intervals.