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Effect of monetary policy shocks on the racial unemployment rates in the US☆

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ABSTRACT

This study analyzes the effect of monetary policy shocks on the unemployment rate of different racial groups in the US, using data from 1969Q2 to 2015Q4. Employing a narrative approach to identify monetary policy shocks and local projections, we find that although an expansionary monetary shock affects White workers positively and significantly, the effect on Black workers is larger, and for Hispanic workers it is not statistically different from zero. These results are robust when considering unconventional monetary policy measures in the specification, and when exploring the impact of monetary policy on different genders and age groups. We also highlight how recession affects the transmission channel of monetary policy to the labor market for White and Hispanic workers. Finally, further extensions suggest that the Fed's monetary policy is effective in reducing the racial unemployment gap, particularly between Whites and Blacks, and during economic booms.

1. Introduction

Amid the 2020 COVID-19-related recession, Jerome Powell, the chair of the Federal Reserve Bank (Fed), emphasized on June 10 2020 that Black and Hispanic workers had been the most affected ones by the rising unemployment.[1] Minorities were indeed taking the biggest hit, with 44 % and 61 % saying that either they or someone in their household, respectively, lost a job or experienced a pay cut because of the pandemic, according to a survey conducted by the Pew Research Center in April 2020. Powell's concern for minorities is not recent given that he already indicated in 2019 that "unemployment for minorities generally remains higher than for the workforce as a whole."[2] The media also reports that he is "emphatic about the benefits of this high-pressure labor market to people who have long been left behind," and that he wishes to "extend the fruits of a growing economy to those who rarely benefit from it, such as African-American families." Furthermore, Democrats are increasingly calling for the Fed to pay closer attention to the Black unemployment rate when making key policy decisions (Bernstein and Jones, 2020). As an illustration, the policy blueprint of the Biden team during the 2020 United States (US) presidential elections suggests that the Fed chairman would be required to report

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[1] Transcript of Chair Powell's Press Conference Opening Remarks. June 10, 2020.

[2] https://www.federalreserve.gov/newsevents/speech/powell20190823a.htm.

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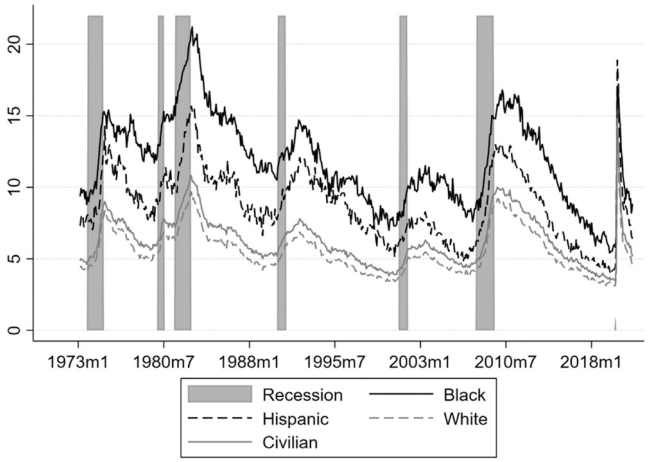

Fig. 1. Racial unemployment rates in the US (1973m1–2021m8).

on what the central bank is doing to reduce "the extent of racial employment and wage gaps."[3] Examining data on the unemployment rate of minorities clarifies why policymakers are concerned about this. Fig. 1 shows a large and persistent racial unemployment gap in the US, which challenges the maximum employment objective of the Fed.

Against this background, this study aims to test whether the current framework of the Fed's monetary policy is similarly effective in reducing the unemployment rate of all racial groups, or if a specific racial group of workers benefits more from the expansionary monetary policy. For this purpose, the research proceeds in two steps: First, we measure US monetary policy shocks using Romer and Romer (2004) (RR) narrative approach. The RR approach has been widely used to investigate the effect of monetary policy shocks on international financial conditions (Rey, 2016), bank risk taking (Angeloni et al., 2015), and consumption and income inequality (Coibion et al., 2017). Second, we use Jordà (2005) local projections to analyze how the racial unemployment rates react to an expansionary monetary policy shock, using data from 1969Q2 to 2015Q4. Local projections have numerous advantages over standard vector autoregressions models (VAR) in computing impulse responses, given that the latter are considered as a mis-specified representation of the data generating process (see Jordà, 2005, for more details). Hence, local projections are increasingly popular for assessing how different types of shocks (monetary, fiscal, and technological) explain fluctuations in key macroeconomic variables (see Jordà et al., 2013, among others).

By doing so, this study relates to the literature on the impact of monetary policy on minorities' employment. Thorbecke (2001), studying data from 1973 to 1996, finds that a one-standard-deviation increase in the nominal federal funds rate (FFR) increases the difference between Black and White unemployment rates by 0.05 % points (pp). Carpenter and Rodgers (2004) use VAR models to explore whether contractionary monetary policy lowers the employment-population ratio of Blacks, finding that this happens primarily by raising the unemployment rate. Rodgers (2008) analyzes the differential impact of disinflationary monetary policy on the duration of unemployment of Whites and Blacks using recursive VAR models. He finds that Blacks bear a disproportionate impact of the Fed's monetary action. De et al. (2019) examine how three macroeconomic shocks (monetary policy shock, aggregate demand shock, and aggregate supply shock) impact the labor market outcomes for Blacks and Whites in the US using a factor augmented VAR framework. They find that the labor market responses of Blacks are more sensitive to macroeconomic shocks, and that contractionary monetary policy shocks exacerbate racial labor market differences. More recently, Bartscher et al. (2021) study the effect of monetary policy shocks on both asset prices and Black-White employment gaps. They report that, over a five-year horizon, the effects of expansionary monetary policy on the wealth of Black and White households are comparatively large, while the effects on employment are comparatively small, highlighting the trade-off between racial income and wealth inequality for monetary policymakers.

This study aims to complement and extend these contributions by shedding further light on the impact of monetary policy shocks on racial unemployment rates: (i) disaggregated by age and gender, (ii) utilizing an empirical methodology that has not been widely used previously, considering (iii) unconventional policy measures, and (v) the business cycle in which the monetary policy shock is implemented.

Our results show disparities in the responsiveness of racial unemployment rates to monetary policy shock. On the one hand, we find that the White unemployment rate decreases by 0.2 pp three years after a 100 basis point expansionary monetary shock. On the other hand, the Black unemployment rate's response is larger and more persistent following the same shock, since it decreases by 0.3 pp four years after. These results remain similar even when we consider a particular age group, out-of-school teenagers, in the specification. Interestingly, when we distinguish between male and female workers, we find that the response associated with the White male unemployment rate is larger than the response of the White female unemployment rate, while we detect no large difference between the response of the unemployment rate of Black male and female workers. To account for the

[3] See https://www.whitehouse.gov/wp-content/uploads/2022/09/Biden-Economic-Blueprint-Report-720PM-MASTER-DOC.pdf.

different employment fluctuations over the business cycle between population groups, we interact the recession dates with the monetary policy shocks, and find that the response associated with the unemployment rate is stronger during a recession for all racial groups. This finding suggests the existence of a "recession effect" on the transmission mechanism of monetary policy to the labor market. Finally, we adopt an alternative method, the Gertler and Karadi (2015) high-frequency identification approach, to identify monetary policy shocks. The results are in line with those of the baseline model, that is, a larger response is associated with the Black unemployment rate following an expansionary monetary policy shock. Additional extensions show that the Fed's monetary policy is effective in reducing the racial unemployment gap, particularly between White and Black workers, and that the findings are robust to the inclusion of unconventional policy measures, through Wu and Xia (2016) shadow rate, in the simulation.

The remainder of this study is organized as follows: Section 2 presents the main results on the effects of a monetary policy shock on the racial unemployment rate, disaggregated by age and gender. Section 3 highlights a potential channel, the "recession channel," which influences the transmission of the Fed's monetary policy to the labor market, while Section 4 provides further extensions. Finally, Section 5 concludes the paper.

2. Effect of monetary policy shocks on the racial unemployment rates

2.1. The identification of monetary policy shocks

We follow the RR narrative approach for identifying US monetary policy shocks. RR first derive a series of FFR changes during the Federal Open Market Committee (FOMC) meetings using narrative methods. Second, they regress the funds rate change on the current rate and on the Greenbook forecasts of output growth and inflation over the next two quarters to separate the endogenous response of policy from the exogenous shock. They use the estimated residuals in dynamic regressions, to find very large effects of these shocks on the output. Following RR, we orthogonalize changes in the FFR at each FOMC meeting on real-time Greenbook forecasts (denoted by F) prepared by the Fed staff before each meeting, from May 1969 to December 2015.[4] The estimation is as follows:

$$\begin{aligned}\Delta ff_m &= \alpha + \beta ffb_m + \sum_{i=-1}^{2} \eta_i F_m \pi_{m,i} + \sum_{i=-1}^{2} \theta_i (F_m \pi_{m,i} - F_{m-1}\pi_{m,i}) \\ &+ \sum_{i=-1}^{2} \gamma_i F_m \Delta y_{m,i} + \sum_{i=-1}^{2} \lambda_i (F_m \Delta y_{m,i} - F_{m-1}\Delta y_{m,i}) + \mu_0 F_m ue_0 + \varepsilon_m;\end{aligned} \tag{1}$$

where m denotes the FOMC meeting, Δff_m is the change in FFR between meeting $m-1$ and m, and ffb_m is the target FFR during the meeting m. $F_m\pi_{m,i}$ is the Greenbook forecast of GDP deflator inflation in different quarter horizons i around meeting m (-1 is the previous quarter, 0 is the current quarter, 1 is one-quarter ahead, and 2 is two-quarters ahead). $F_m\Delta y_{m,i}$ are Greenbook forecasts of real output growth, and $F_m ue_0$ are Greenbook forecasts of the current quarter's unemployment rate. The predicted residuals $\tilde{\varepsilon}_m$ reflect the monetary policy shocks, which are orthogonal to the Fed's staff information set (for summary statistics, see Table A1). Any movement in the target funds rate not predicted by the Greenbook forecast can be used as an instrument to identify the effect of monetary policy shock: a positive (negative) value of $\tilde{\varepsilon}_m$ indicates a more restrictive (expansionary) monetary policy than the one recommended by the Greenbook forecasts. Table A2 in the Appendix shows the estimated results of Eq. (1).

We follow Coibion et al. (2017), and use a quarterly measure of monetary policy shocks by summing the shocks from each meeting within a quarter. Fig. 2 shows that FOMC monetary policy shocks are volatile over time, particularly during the 1970 s stagflation era and the 1980 s Volcker disinflation period. The Great Moderation in the mid–1980 s was characterized by less volatile policy shocks, while the beginning of the 2000 s was more expansionary than expected, given the staff forecasts of macroeconomic conditions. The positive value of the monetary policy shock starting in 2005 may reflect a pre-emptive strike against inflation in the housing market (Taylor, 2007).

2.2. The monetary policy shocks and the racial unemployment rates

We investigate how an expansionary monetary policy shock affects the unemployment rate of different racial groups in the US using data from 1969Q2 to 2015Q4. We follow Jordà (2005) and estimate the response of racial unemployment rates to a monetary policy shock at different horizons h using local projections:

$$u^R_{t+h} = c^{(h)} + \sum_{j=1}^{J} \alpha_j^{(h)} (u_{t-j}) + \sum_{j=1}^{J} \gamma_j^{(h)} (GDP_{t-j}) + \sum_{i=1}^{I} \beta_i^{(h)} MP^{RR}_{t-i} + \varepsilon_{t+h}; \quad h = 0, \ldots, H \tag{2}$$

where u^R_{t+h} is the civilian or the racial unemployment rate (White, Black or Hispanic), GDP_{t-j} the quarterly growth change of the real Gross Domestic Product, and MP^{RR}_{t-i} the quarterly monetary policy shock estimated with Eq. (1). We generate accumulated impulse responses to monetary policy shocks from the estimated $\{\beta_i^{(h)}\}_{h=0}^{H}$. We set $J = 2$, $I = 20$ and we consistently use $H = 20$ quarters.

[4] The sample period ends in December of 2015 given that the Greenbook projections are made available to the public after a lag of five years.

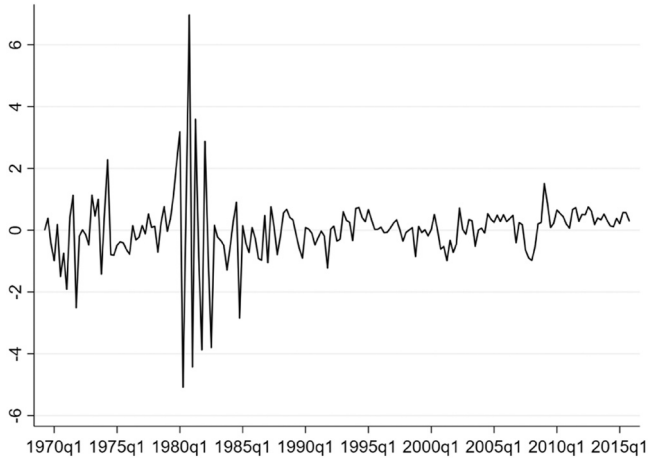

Fig. 2. Quarterly monetary policy shocks in the US (1969Q2–2015Q4).

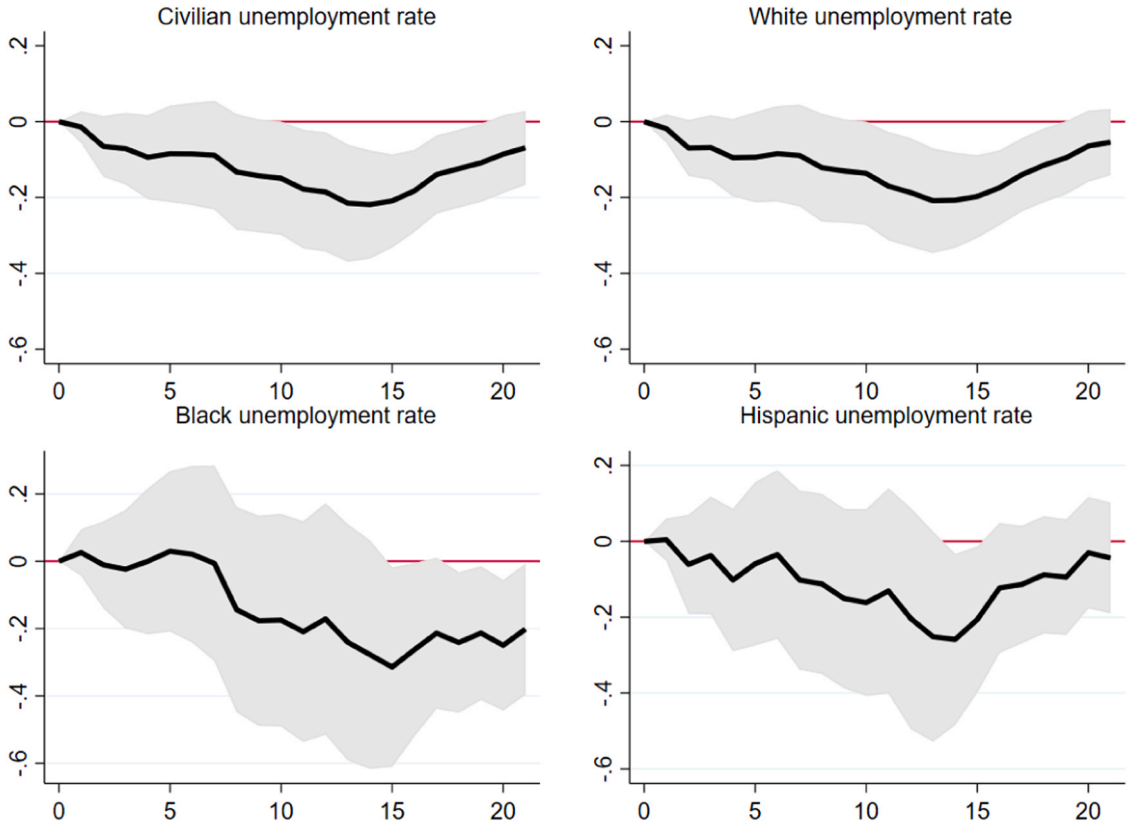

Fig. 3. Effect of a monetary policy shock on the racial unemployment rates (1969Q2–2015Q4). *Note*: The figures present impulse responses of racial unemployment rates to 100 b.p. expansionary monetary policy shock. Time (horizontal axis) is in quarters. Gray–shaded areas indicate 68 % confidence bands.

Fig. 3 plots the impulse response functions (IRFs), graphing the effect of a 100 basis point innovation to the FFR on the civilian and the racial unemployment rates. The IRFs show that the civilian and the White unemployment rates have similar declining responses, both significantly different from zero. The negative value is an indication that a negative interest rate shock leads to a decrease in the unemployment rate or, in other words, an improvement in employment. Moreover, an unexpected decrease in the FFR

causes the Black unemployment rate to decline more markedly than the White one, although this decline occurs later. Specifically, a one 100 basis point expansionary policy shock decreases the Black (White) unemployment rate by 0.3 (0.2) pp four (three) years after the initial shock. While the effect of monetary policy on the Black unemployment rate is more persistent, the response associated with the White unemployment rate vanishes five years after the initial shock. The pattern of the IRFs is consistent with other research on the economic effects of monetary shocks. For instance, Romer and Romer (2004) find that the maximum effect of monetary shocks on GDP occurs two years after a shock, and the effect remains significant for longer time. Finally, the IRFs for the Hispanic and the White unemployment rates do not indicate a difference in the magnitude of the response; however, the estimate for the Hispanic unemployment rate is more uncertain. Overall, Fig. 3 suggests that the Fed's expansionary shock tends to mostly affect Black unemployment rate, while the responses affecting the White and the Hispanic unemployment rates are weaker and less persistent over time.

2.3. The monetary policy's effect on gendered racial unemployment rates

Section 2.2 highlights the effect of a monetary policy shock on racial unemployment rates. However, a gender-related effect might occur, since the unemployment rates of men and women differ significantly across racial groups (see Table A1 and Fig. A2 in the Appendix). In a case study, Duzhak (2021) show that women in every racial group face less sensitivity than men across the business cycle, while Albanesi and Şahin (2018) suggest that female workers face lower volatility as measured by the cyclical component of aggregate hours worked per capita.

The literature emphasizes several reasons that explain the different effects of monetary policy on women's unemployment rate. First, empirical evidence show that women work in a different range of occupations than men. For instance, in the US in the 1990 s, 21 % of men were employed in manufacturing and 25 % in services, while the percentages for women were 11 % and 47 %, respectively. Among women, about 30 % of both Black and Hispanic workers held service-sector jobs in 2018, compared to about 20 % of White women, who were more likely to be in management and financial-operations occupations, according to the 2020 Labor Department analysis. This raises the possibility that changes in interest rates will have an unevenly distributed employment effect if these sectors have different interest rate sensitivites. Second, gender differences in the division of part-time or full-time work and labor market attachment can result in a different sensitivity of men's and women's unemployment rates to interest rate changes.[5] Third, the difference in job tenure between men and women can explain the various employment responses to a monetary policy change. Munasingh et al. (2008) state that women have shorter tenure in general, so they may be more exposed to interest rate changes. Finally, gender discrimination can result in the gendered employment effect of monetary policy. Azmat et al. (2006) show that in male-dominated occupations in the US, women's unemployment rate is more sensitive to economic downturns.

Against this background, we aim to assess the gendered racial unemployment rates' responses to a monetary policy shock using Jordà (2005) local projections for White and Black workers. We do not consider Hispanic workers in this analysis, given that the data for the male and female unemployment rates are not available for several years, which makes the comparison of the results with the baseline model in Fig. 3 irrelevant. Fig. 4 presents the IRFs for each gendered racial unemployment rate, using data from 1969Q2 until 2015Q4 and the associated confidence bands. Consistent with the conventional wisdom on monetary policy lags, the IRFs show that monetary policy affects unemployment rates with a lag. On the one hand, the IRFs indicate that three years after the shock, the response associated with the White male unemployment rate (− 0.25 pp) is larger than that of White female unemployment rate (− 0.15 pp). One potential explanation for the weaker unemployment rate response by females is that they, and particularly married women, may have a higher propensity to exit the labor force when unemployed. On the other hand, not only are the responses associated with the Black unemployment rates larger (− 0.4 pp for the male workers and − 0.3 pp for the female workers) after four years, but they are also more persistent.

2.4. The monetary policy shock on racial unemployment rates disaggregated by age groups

To explore whether the employment status of less-skilled and less-educated workers is more sensitive to innovations in the FFR, we estimate local projections on the unemployment rate of out-of-school teenagers (aged 16–19 years) based on their racial group. The advantage of estimating models for teenagers is that we can observe whether youth labor market outcomes respond differently to those of the general population.[6]

We use Jordà (2005) local projections to evaluate the impact of a 100 basis point expansionary monetary shock on teenagers' unemployment rate. We replace the dependent variable in Eq. (2) by the 16–19 year olds' civilian unemployment rate and the 16–19 year olds' White and Black unemployment rates. As in the case of the gendered racial unemployment rates, data for Hispanic youth workers are not available for several years. Thus, we removed this category from the analysis to make the comparison with the baseline model more appropriate. The IRFs shown in Fig. 5 provide interesting insights into relative magnitudes of youth's unemployment rate responses to a monetary policy shock, confirming the relevance of previous findings. The unemployment rate for

[5] In the US, women have a considerably lower presence in full-time work compared to men and concentrate in temporary and part-time jobs (Bardasi and Gornick, 2008, see).

[6] It is worth noting that the share of this age-group is approximately similar for all racial groups, 13 %, according to the 2020 demographic analysis made by the Census bureau. See: https://www.census.gov/data/tables/2020/demo/popest/2020-demographic-analysis-tables.html

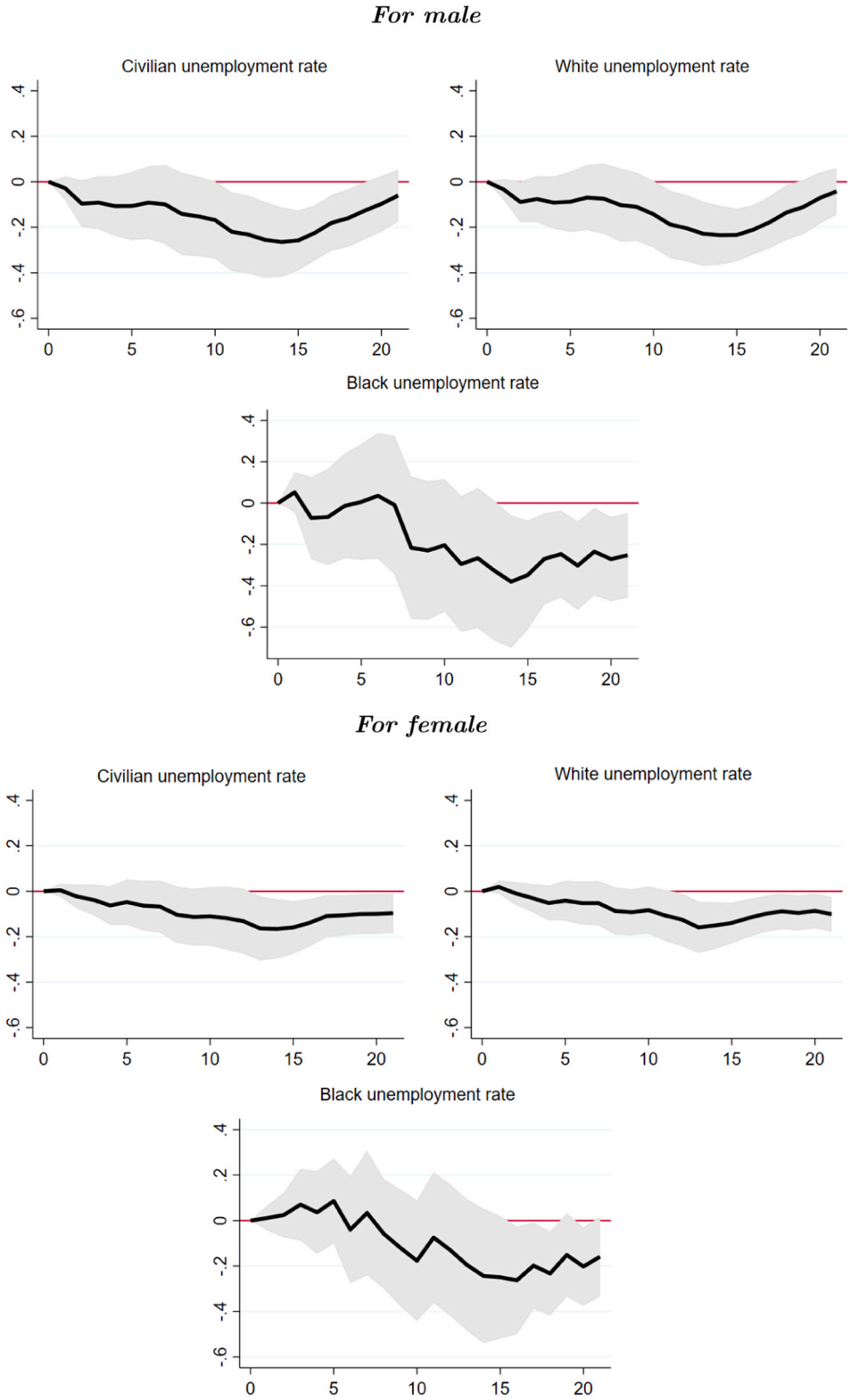

Fig. 4. Effect of a monetary policy shock on the gendered racial unemployment rates (1969Q2–2015Q4) Note: The figures present impulse responses of racial unemployment rates to 100 b.p. expansionary monetary policy shock. Time (horizontal axis) is in quarters. Gray–shaded areas indicate 68 % confidence bands.

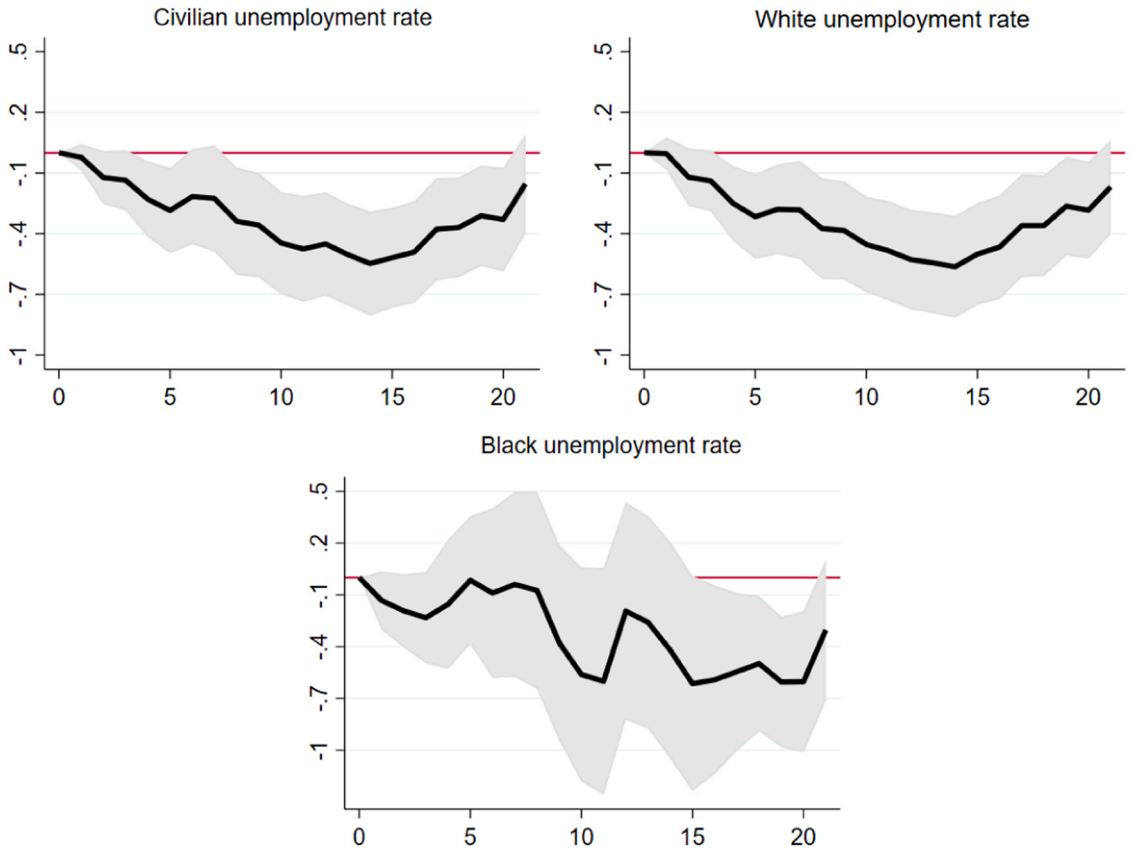

Fig. 5. Effect of a monetary policy shock on teenagers' unemployment rates (1969Q2–2015Q4). Note: The figures present impulse responses of racial unemployment rates to 100 b.p. expansionary monetary policy shock. Time (horizontal axis) is in quarters. Gray–shaded areas indicate 68 % confidence bands.

Black teenagers is more sensitive to an innovative decrease in FFR than for White teenagers. As an illustration, a 100 basis point expansionary shock reduces the White unemployment rate by about 0.15 pp five years after the shock, while the response associated with the unemployment rate of Black teenagers is larger and more persistent over time (0.3 pp).

2.5. Discussion of the results

To achieve its maximum employment objective, the Fed relies on the indirect effect of monetary policy, the earning heterogeneity channel (Auclert, 2019).[7] However, this indirect effect produces heterogeneous consequences among individuals because different pools of workers (e.g., low-skilled vs. high-skilled) display various elasticities to the change in aggregate expenditures. For instance, Blanchard and Katz (1997) find that unskilled individuals have higher labor supply elasticities than skilled individuals; thus, a decrease in demand for labor following a monetary contraction will have a larger effect on the employment prospects of less-skilled workers than those of high-skilled ones. Hence, given that African-American and Hispanic workers have, on average, fewer skills than White workers (Carpenter and Rodgers, 2004), they are more likely to be affected by the Fed's monetary policy shock.

The results depicted in Figs. 3–5 are consistent with this interpretation. They show that Black workers are the ones most affected by the Fed's monetary policy over multiple quarters, even when considering gender and age effects in the simulation. An additional explanation of the differential labor market responses across racial groups to monetary shocks is offered by the occupational segregation theory, which emphasizes the differences in industrial representation. Indeed, different sectors of the economy are over- or under-represented by minorities, making them more or less sensitive to the business cycle. For instance, industries that were more affected by the Great Recession, such as construction and extraction, have more Hispanic workers. Following this line of thought, Hoynes et al. (2012) show that the demographic composition of sectoral employment can account for significant differences in employment volatility among minorities. Moreover, the asymmetric effects of monetary policy shocks across the US (Furceri et al., 2019) can also account for these differential effects since racial groups are heterogeneously distributed across the country, with a

[7] The reduction in policy rates and the introduction of QE stimulate household expenditure and firms' investment, which leads to an increase in output and, indirectly, in employment.

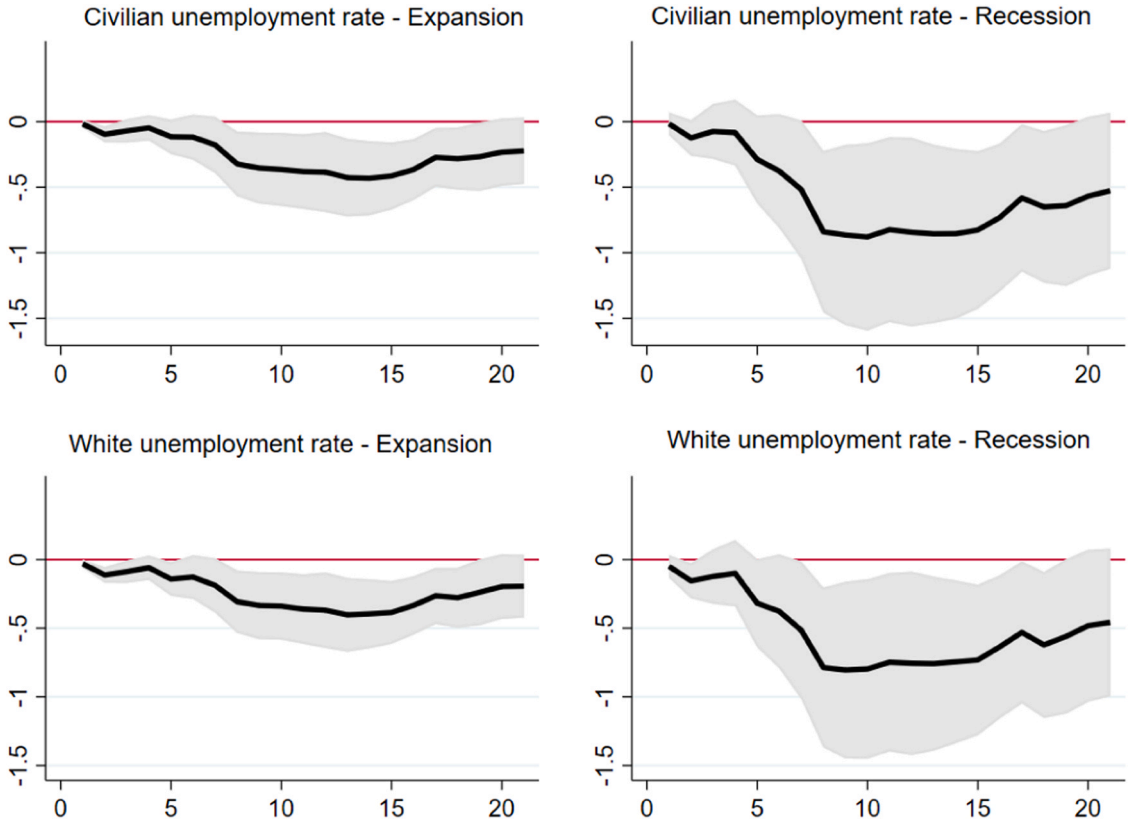

Fig. 6. Effects of monetary policy shocks on the racial unemployment rates in economic recessions and expansions (1969Q2–2015Q4). Note: The figures present impulse responses of racial unemployment rates to 100 b.p. expansionary monetary policy shock in economic expansion (left panel) and economic recession (right panel). Time (horizontal axis) is in quarters. Gray–shaded areas indicate 68 % confidence bands.

high representation of Blacks in southern counties, while Hispanics are highly represented in a broad range of counties from California to Texas.

3. The recession effect on the transmission mechanism of monetary policy to the labor market

Minorities are more likely to be laid off following an economic recession than White workers. For instance, the widespread shutdown of businesses following the COVID-19 pandemic has hurt Black and Hispanic workers at a higher pace than White ones.[8] Following this line of thought, Aaronson et al. (2019) find high "beta responses" for minorities to change in economic conditions. For example, the 1.8 coefficient for Blacks means that a one-percentage-point increase in the overall unemployment rate is associated with a 1.8 point increase in unemployment for Blacks. For Hispanic workers, the coefficient is 1.4 while for Whites, it is only 0.9.

To explain the differential effects of recession on labor market outcomes, the literature suggests that White workers benefit from traditional protective factors such as professional or technical employment, union membership, and firm tenure (McBrier and Wilson, 2004), while minorities experience a decline in unionization rates, deregulation of industries, and eroded worker protections. However, psychological factors can contribute to the amplification of unemployment inequality across minorities caused by a recession. Anderson et al. (2020) find a significant relationship between economic conditions and racial animus against Blacks in the US, while Johnston and Lordan (2014) show that racial prejudice increases with unemployment.

To account for the different labor market responses across racial groups to monetary policy shocks over the business cycle, we add a dummy variable that takes the value 1 during a recession and 0 otherwise, using the business cycle reference dates published by the National Bureau of Economic Research, and an interaction term including the dummy variable and the monetary policy shock. The estimation becomes:

[8] The recent economic downturn have also been born disproportionately by minorities. For instance, Black (Hispanic) unemployment at the onset of the Great Recession was above 8 % (6 %) and sky-rocketed to 16 % (12 %) at its peak. Meanwhile, the White unemployment rate hovered above 3 % in 2007 and increased to roughly 8 % in 2009.

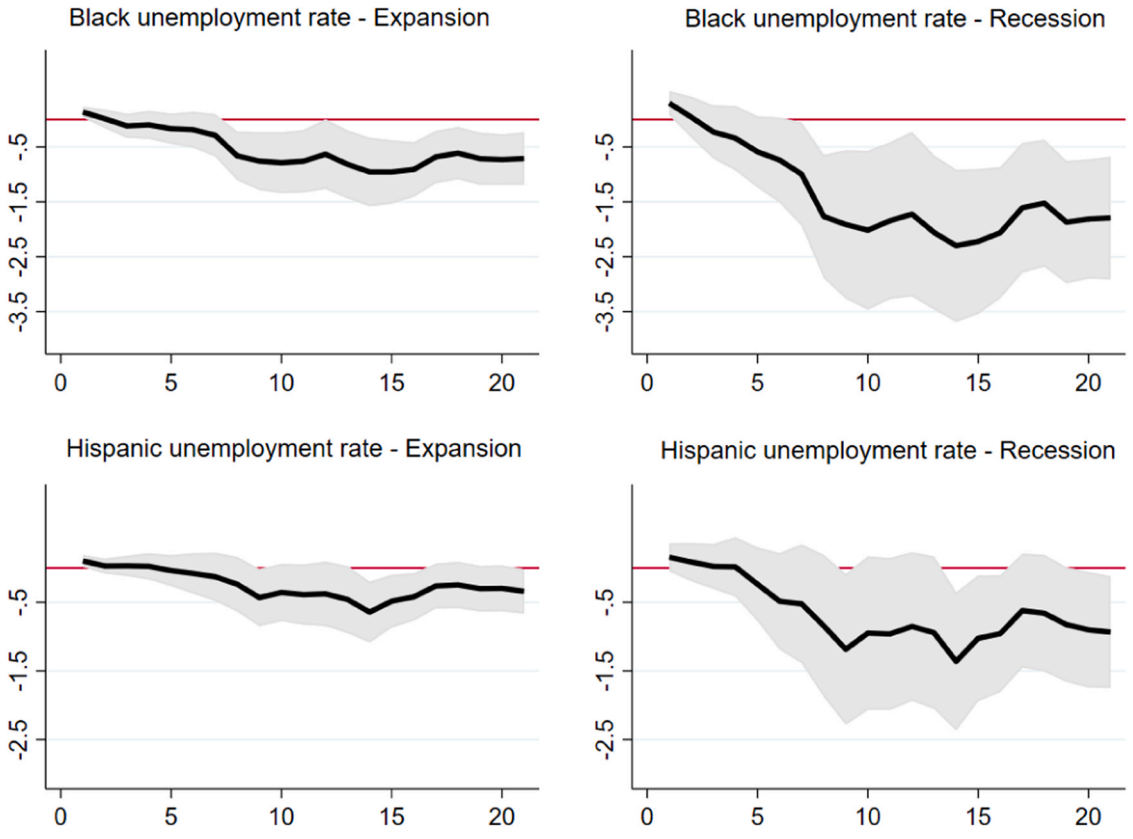

Fig. 6. (*continued*)

$$u^R_{t+h} = c^{(h)} + \sum_{j=1}^{J} \alpha_j^{(h)}(u_{t-j}) + \sum_{j=1}^{J} \gamma_j^{(h)}(GDP_{t-j}) + \sum_{i=1}^{I} \beta_i^{(h)} MP^{RR}_{t-i} + Rec_{t+h} + \sum_{k=1}^{K} \beta_k^{(h)}(MP^{RR}_{t-k} \times Rec_{t+h}) + \varepsilon_{t+h}; \quad h = 0, ..., H \tag{3}$$

where Rec_t is the NBER recession dummy variable and $\beta_i^{(h)}$ is the unemployment response across racial groups to a monetary policy shock in an expansion, while $\beta_i^{(h)} + \beta_k^{(h)}$ is the response during an economic recession. In doing so, we simulate a switching model in which the coefficients for the projection depend on whether the economy is in recession or expansion. This allows us to compare the impulses between the two economic states.

The IRFs depicted in Fig. 6 suggest that over the business cycle, the unemployment response across racial groups to an expansionary shock has a similar pattern over time, but with different magnitudes. Additionally, there is more uncertainty regarding the impulses generated when the economy is in a period of decline. This is no surprise, given the relatively small number of quarters during which the US economy was in a recession throughout the sample period (1969–2015). For the civilian, the White and the Hispanic unemployment rates, the maximum gap between the unemployment rate's response to a monetary policy shock implemented in the two economic states is reached two years after the shock ($\approx$ 0.55 pp). The response associated with Black unemployment rate has the strongest gap (1.2 pp), three years after the monetary policy shock.

4. Further extensions

4.1. The unconventional monetary policy shocks

Following the Great Recession of 2007–2009 and the GFC, the FOMC pushed short-term interest rates to nearly zero. This push was accompanied by additional policy tools, and the unconventional measures, including forward guidance through communication about future short-term interest rates and the purchase of government bonds aiming to revive the output and employment growth.

Against this backdrop, we introduce FOMC's unconventional policy measures in the empirical analysis using the shadow rate developed by Wu and Xia (2016). The shadow rate is quantified using a Gaussian affine term structure model. However, while it captures the time-varying lower bound, it only partly reflects quantitative easing and forward guidance. We measure the shadow

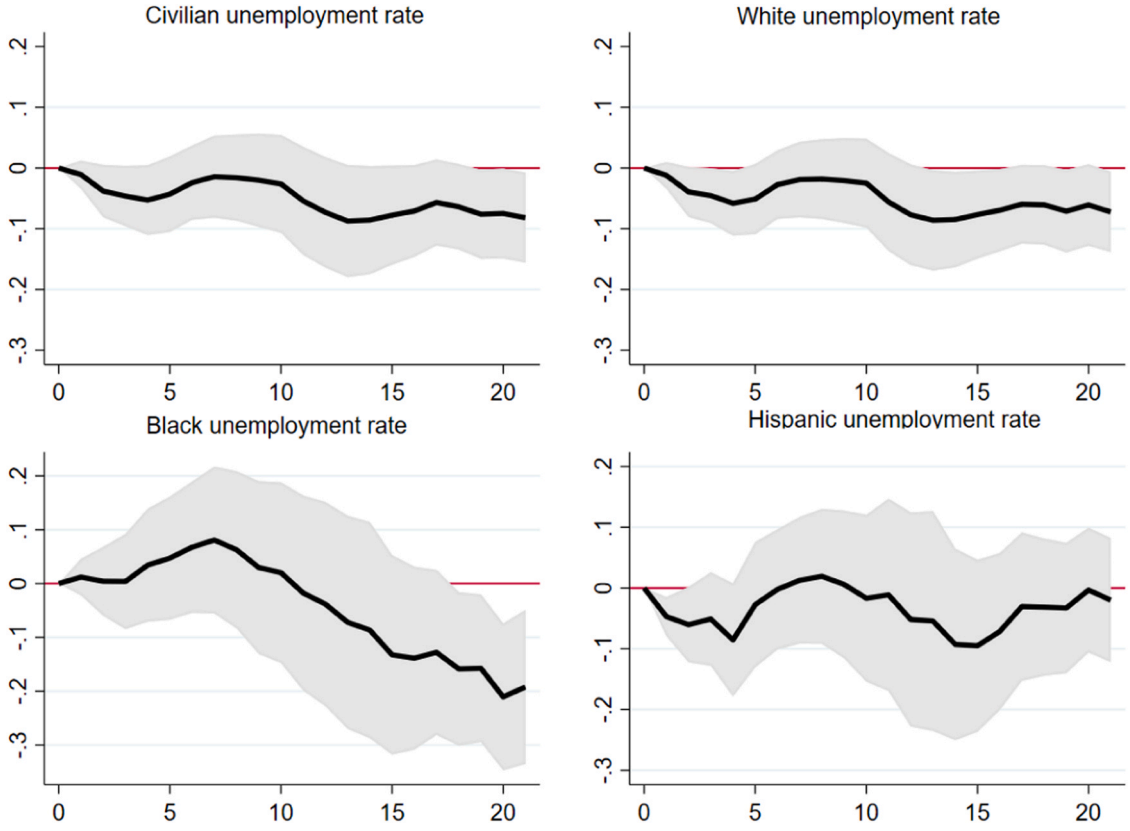

Fig. 7. Effect of a shadow policy shock on the racial unemployment rates (1969Q2–2015Q4). Note: The figures present impulse responses of racial unemployment rates to 100 b.p. expansionary monetary policy shock. Time (horizontal axis) is in quarters. Gray–shaded areas indicate 68 % confidence bands.

policy shock by replacing the FFR in Eq. (1) by Wu and Xia (2016) shadow rate.[9] The evolution of the shadow shock shown in Fig. A1 is very similar to the evolution of the monetary shock computed with the FFR, except in 2009 and 2010, where the shadow shock is lower than the FFR shock. This period corresponds to the launch of the first two phases of quantitative easing, QE1 and QE2, in the beginning of 2009 and mid-2010, respectively. This lower value reflects the Fed's monetary policy expansionary stance during that period, which is not reflected in the FFR. Moreover the late 1980s were characterized by a high level of volatility in the shadow rate. This might be due to the collapse in stock markets in 1987, which fell 22 %, and the Fed's resulting reaction, flooding the economy with liquidity to avert a recession. This increase in liquidity is reflected in the shadow rate but not in the FFR.

We use Jordà (2005) local projections to assess how an expansionary shadow shock affects the civilian and the racial unemployment rates. To achieve this, we replace the monetary policy shock computed using the FFR in Eq. (2), MP_{t-i}^{RR}, with the shadow shock. Fig. 7 shows the estimated effects of an unanticipated shadow shock on racial unemployment rates and associated confidence bands. The IRFs indicate that monetary policy easing through unconventional measures leads to a long-lasting decrease in civilian and White unemployment rates. Hence, an unanticipated decrease of 100 basis points lowers the White unemployment rate by about 0.1 pp after three years. However, although the response of the White unemployment rate initially outpaces the Black one, gains in Black employment become more pronounced four years after the shock, with a decline of about 0.2 pp. Over the same time horizon, White unemployment declines by 0.1 pp. Finally, the response of the Hispanic unemployment rate to an expansionary shadow shock is not statistically different from zero over the 20 quarter horizon. Hence, the IRFs reveal that, relative to the other categories of workers, Blacks get the full benefit, in terms of employment, of the innovations in the unconventional measures.

4.2. High-frequency surprises as monetary policy shocks

To assess the effect of a monetary policy shock on racial unemployment rates, we follow the narrative approach of Romer and Romer (2004). However, their procedure has several drawbacks as it does not attempt to separate different sources of shocks, such as changing operating procedures or policymakers' evolving beliefs about the workings of the economy, variation in the Fed's objectives,

[9] For robustness purposes, we also use the Krippner (2013) shadow rate and we find that the results are qualitatively and quantitatively similar. Results available upon request.

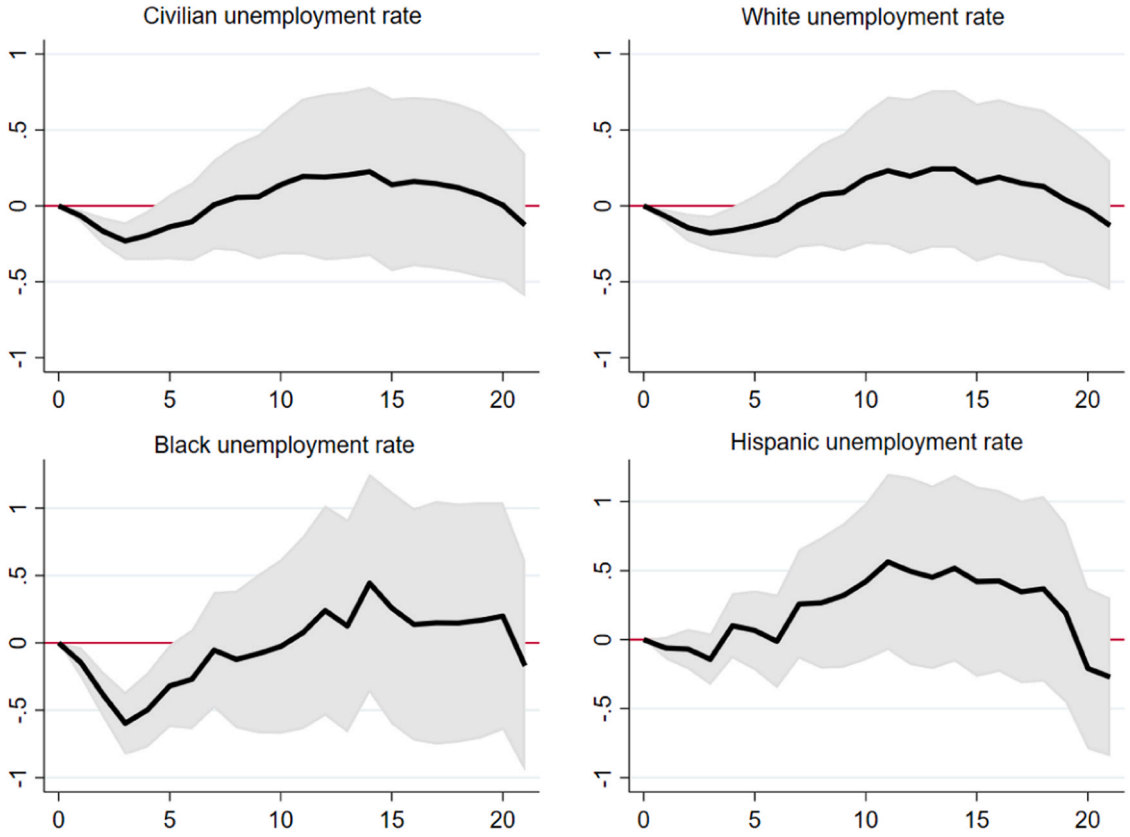

Fig. 8. Effect of an alternative monetary policy shock on the racial unemployment rates (1969Q2–2015Q4). Note: The figures present impulse responses of racial unemployment rates to 100 b.p. expansionary monetary policy shock. Time (horizontal axis) is in quarters. Gray–shaded areas indicate 68 % confidence bands.

and political pressures. Some of these changes could be interpreted as innovations to the central bank's policy rule, while others are characterized as transitory deviations from a policy rule.

Therefore, we use an alternative method to identify monetary policy shocks and test the robustness of our findings using a high-frequency identification approach. Specifically, we adopt the monetary policy shock computed by Gertler and Karadi (2015) which identifies shock as the surprise component of monetary policy actions, estimated using movements in Fed Funds futures contract prices on the day of the FOMC monetary policy announcements. Gertler and Karadi (2015) isolate surprises in future rates within a 30-minute window of the FOMC announcement. They find that a contractionary monetary policy shock has a significant negative effect on output. We include Gertler and Karadi (2015) (GK) monetary policy shocks in the empirical specification, Eq. (2). Next, we use Jordà (2005) local projections to estimate the effect of this shock on the racial unemployment rates.

Fig. 8 shows that for all racial groups, except Hispanics, the unemployment rate decreases immediately following the expansionary shock. Hence, the maximum effect on unemployment occurs one year after the easing shock: The IRFs indicate that an unexpected decrease of 100 basis point in the FFR lowers the White unemployment rate by 0.2 pp while the Black unemployment rate declines by 0.55 pp. However, the response associated with the Hispanic unemployment rate is not statistically different from zero. These findings suggest that the effect of monetary policy shock on racial unemployment rates is robust to the type of shock used in the empirical analysis, although the magnitude and persistence of the responses change depending on the shock type.

4.3. Are racial unemployment gaps significantly affected by Fed's monetary policy?

To test for the differential effects of monetary policy among racial groups, we include the differences in unemployment rates between races, the racial unemployment gaps, in the baseline model. Fig. 9 shows that the effect of a monetary policy shock on the Black-White unemployment gap declines significantly, by about 0.2 pp four years after the shock. However, the Hispanic-White unemployment gap does not differ significantly from zero.

Fig. 9. Effect of a monetary policy shock on the racial unemployment gaps (1969Q2–2015Q4). Note: The figures present impulse responses of racial unemployment rates to 100 b.p. expansionary monetary policy shocks. Time (horizontal axis) is in quarters. Gray–shaded areas indicate 68 % confidence bands.

5. Conclusion

The COVID-19 pandemic highlighted the vulnerability of minorities in the US labor market and the willingness of the Fed to diminish the racial unemployment gap. Raphael Bostic, President of the Atlanta Federal Reserve Bank, recently argued that the Fed "can play an important role in helping to reduce racial inequities and bring about a more inclusive economy" (Bostic, 2020). Against this backdrop, this studys aims to test the impact of the Fed's monetary policy on the unemployment rate of all racial groups. For this purpose, we first compute monetary policy shocks using Romer and Romer (2004) narrative approach. Second, we use Jordà (2005) local projections to test how the racial unemployment rates react to a 100 basis point expansionary shock in the FFR..

We find that the Black unemployment rate is most responsive to an expansionary monetary policy shock. By contrast, the response associated with the Hispanic unemployment rate is uncertain. These results are robust even when (i) we include unconventional policy measures in the simulation, (ii) we distinguish between male and female unemployment rates, (iii) we consider out-of-school teenagers, and (iv) we adopt a different method, the high-frequency identification approach, to identify monetary policy shocks. We also highlight how recessions affect the transmission channel of monetary policy on the labor market outcomes for all racial groups. These findings provide new insights into the demographically diverse effects of monetary action on the unemployment rate.

Appendix A. Appendix

Tables A1, A2, A3.
Figs. A1 and A2.

Table A1
Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Macroeconomic variable					
Federal funds target rate	442	5.6	3.7	0.07	19.04
Shadow rate	442	5.6	4.1	− 2.8	22
Greenbook forecast (horizon)**					
Unemployment rate	442	6.1	1.6	3.3	10.9
Real Output Growth (− 1)	436	2.4	3.3	− 11.3	13.2
Real Output Growth (0)	442	2.4	2.7	− 10.9	9
Real Output Growth (1)	435	2.6	2.2	− 5	8.5
Real Output Growth (2)	416	2.8	1.8	− 4.5	7.8
GDP Price Deflator (− 1)	442	3.8	2.6	− 0.3	14.4
GDP Price Deflator (0)	442	3.8	2.5	− 0.6	12.9
GDP Price Deflator (1)	434	3.7	2.3	0	11.5
GDP Price Deflator (2)	420	3.6	2.2	0.4	10.4
Unemployment rate					
Civilian	514	6.4	1.5	3.8	10.8
White	514	5.6	1.4	3.4	9.7
African American	514	12.2	2.8	7	21.2
Hispanic	514	9.07	2.2	4.8	15.7
Unemployment rate (Male)					
Civilian	475	6.4	1.7	3.7	11.2
White	475	5.04	1.5	2.7	9.6
African American	475	11.2	3.07	6	20.7
Hispanic	475	7.6	2.4	3.3	15.6
Unemployment rate (Female)					
Civilian	475	6.3	1.4	3.8	10.4
White	475	4.8	1.1	2.9	8.3
African American	475	8.5	1.9	4.1	15.9
Hispanic	475	10.3	2.5	4.8	17.8
Unemployment rate (16–19)					
Civilian	475	18.1	3.2	12.3	27.2
White	475	15.8	3.03	10.4	24.8
African American	475	35.5	6	20	52.1
Hispanic	475	22.8	5	12.4	37.4
Monetary policy shock					
Romer and Romer (2004)'s FFR shock*	414	0	0.6	− 5.7	3.5
Wu and Xia (2016)'s shadow shock*	414	0	1.19	− 8.5	6.8
Gertler and Karadi (2015)'s shock)	284	− 0.01	0.05	− 0.4	0.1

Note: *Author's calculation. ** − 1 is previous quarter, 0 is current quarter, 1 is one-quarter ahead and 2 is two-quarters ahead.

Table A2
Estimating US monetary policy shocks (1969M03–2015M12).

Δff_m	Coef.	Std. Error
α	− 0.19	0.22
β	0.03	0.025
η_{-1}	0.07*	0.04
η_0	− 0.9*	0.05
η_1	− 0.03	0.08
η_2	0.03	0.11
θ_{-1}	− 0.06	0.05
θ_0	0.12**	0.06
θ_1	0.16**	0.07
θ_2	− 0.0001	0.01
γ_{-1}	− 0.004	0.017
γ_0	0.09**	0.04
γ_1	− 0.06	0.06
γ_2	0.04	0.05
λ_{-1}	0.016	0.02
λ_0	0.0001	0.04
λ_1	0.1**	0.05
λ_2	− 0.08	0.05
μ_0	− 0.02	0.02
Obs.	399	
R^2	0.15	

*, ** and *** denote significance at the 10 %, 5 %, and 1 % levels, respectively.

Table A3
Estimating US shadow monetary policy shocks (1969M03–2015M12).

Δsh_m	Coef.	Std. Error
α	− 0.41	0.38
β	0.1**	0.04
η_{-1}	0.05	0.06
η_0	− 0.16	0.12
η_1	− 0.19*	0.1
η_2	0.18	0.13
θ_{-1}	− 0.02	0.08
θ_0	0.12	0.12
θ_1	− 0.15	0.13
θ_2	− 0.02	0.03
γ_{-1}	− 0.02	0.02
γ_0	0.1	0.07
γ_1	− 0.13	0.1
γ_2	0.15*	0.08
λ_{-1}	− 0.007	0.03
λ_0	0.02	0.06
λ_1	0.14*	0.08
λ_2	− 0.07	0.09
μ_0	0.006	0.05
Obs.	399	
R^2	0.14	

*, ** and *** denote significance at the 10 %, 5 %, and 1 % levels, respectively.

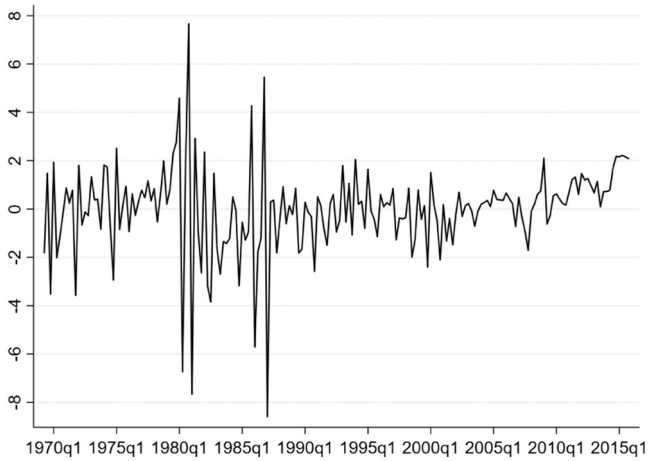

Fig. A1. Quarterly shadow monetary policy shocks in the US (1969Q2–2015Q4).

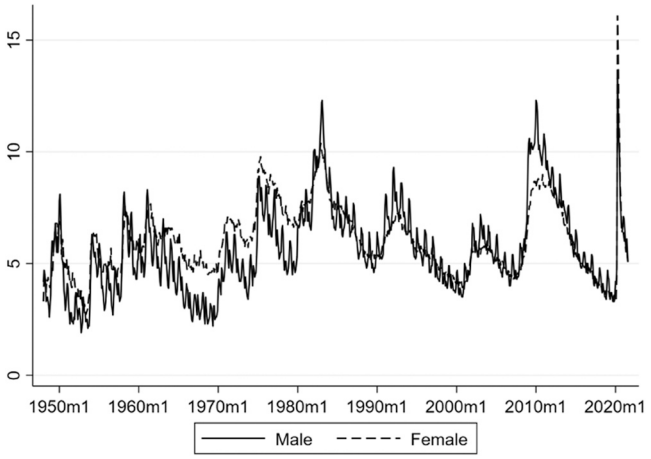

Fig. A2. Gender-related unemployment rate (1950m1–2021m08).

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