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Document de Travail
Working Paper
2021-8

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February 11, 2021

Abstract

This paper analyses the effects of monetary policy on labor market responses of different racial groups in the US from 1970-2013. Employing a narrative approach to identify monetary policy shocks and local projections, we find that monetary policy has a significant impact on White's unemployment rate. Empirical evidence indicates that an accommodative monetary shock affects positively and significantly White workers, while the effect on African-American workers is more uncertain and not significant for the Hispanic workers. 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. Finally, we highlight that these results are mainly driven by a "recession effect", whereby as a result of occupational, segregation minorities do not benefit from the Federal Reserve's accommodative monetary policy during recessions. Our findings suggest that monetary policy is ineffective in reducing the unemployment gap among minorities in the US, and that the Fed should specifically target the African-American unemployment rate in its reaction function. Finally, structural policies that aim to improve the skills of minorities and the fight against racial discrimination in the labor market, in particular during recessions, are also likely to mitigate the racial unemployment gap.

Keywords: minorities; monetary policy; unemployment rate.

JEL classification: E52, E58

*Thanks to Noémi Berlin, Florent Dubois, Pauline Gandré, Benjamin Monnery, Matthias Neuenkirch, Davide Romelli, and Peter Tillmann for helpful comments on earlier versions of the article. The usual disclaimer applies.

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1. Introduction

"*When White America catches a cold, African-Americans get pneumonia.*"

Amid the 2020 coronavirus recession, Jerome Powell, the chair of the Federal Reserve (Fed), emphasized on June 10 that African-American and Hispanic workers have been the most affected by the rise in joblessness.[1] Indeed, African-Americans and Hispanics are taking the biggest hit, with, respectively, 44% and 61% saying they or someone in their household lost a job or experienced a pay cut because of the pandemic, according to an April survey by the Pew Research Center. Powell's concern for minorities is not recent, given that he already indicated on 2019 that "unemployment for minorities generally remains higher than for the workforce as a whole".[2] The media also report 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".[3] Furthermore, political representatives are putting pressure on the Fed to consider the racial unemployment gap when setting monetary policy,[4] and calls from democrats are growing for the Fed to pay closer attention to the African-American unemployment rate when it makes its policy decisions.[5] 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 on "the extent of racial employment and wage gaps" and what the central bank is doing to reduce them.

Against this background, this paper aims to test whether the Fed's monetary policy, in its current framework, can be effective to reduce the unemployment rate of all racial groups similarly or whether a specific group benefits more from an expansionary policy. This analysis is carried out in the context of the recent global financial crisis (GFC), which was characterized by (i) the existence of a zero lower bound (ZLB) on nominal interest rates and (ii) the introduction of unconventional monetary policy measures. Indeed, with the advent of quantitative easing (QE), the potential re-distributional effects of monetary policy have increasingly gained attention among academics and policymakers (Coibion et al., 2017).

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

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

[3] Miller R. and Torres C., (2019). Fed Chair Jerome Powell Likes the Economy Hot. Bloomberg.

[4] Cox J. (2018). House Democrats keep going after Fed Chair Powell for Trump's policies. CNBC.

[5] Bernstein J. and Jones J., (2020). The Impact of the COVID19 Recession on the Jobs and Incomes of Persons of Color. Center on Budget and Policy Priorities.

The willingness of the Fed chair to reduce the racial unemployment gap reflects a revolution of thinking. Indeed, the Fed hasn't always been closely attuned to the distributional impacts of its interest-rate decisions. As an illustration, Volcker and previous Fed chairs raised interest rates so severely that they undermined the labor market opportunities for African-Americans, and the interest-rate hikes that helped produce the 1957-58 recession catalyzed the Washington March that helped push through the Civil Rights Act of 1964 (Stein, 2017). Moreover, in a series of interviews with former members of the Board of Governors, Greider (1989) found they believed their policies to be distributionally neutral and their decisions, rather than rewarding one group or another, simply pursued their vision of sound macroeconomic management. In a speech held before African-American investors, the previous Federal Open Market Committee (FOMC) Vice-Chairman Robert Ferguson said that "monetary policy is a blunt tool that cannot be calibrated to exempt a particular segment of the economy, such as the minority labor force" (Ferguson, 2000). Finally, minutes from the FOMC meetings reveal that members rarely mention the African-American or the Hispanic unemployment rates when they make key policy decisions. While the unemployment data show that there is a large and persistent racial unemployment gap in the US (for summary statistics, see Table A1), the effictiveness of the Fed's monetary policy in achieving its maximum employment mandate for all racial groups is challenged.

Figure 1: Racial unemployment rates in the US (1973m1-2020m5)

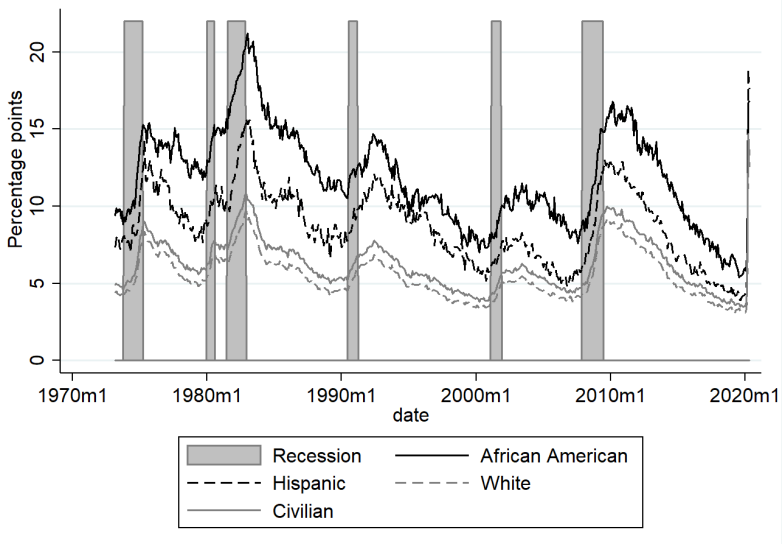


Figure 1 shows significant racial inequality in the U.S. labor market. Compared to Whites, African-Americans and Hispanics are more likely to be unemployed. Before the GFC, the African-Americans had an unemployment rate of 9.1%, the Hispanics 6.9%, and the whites 4.5%. The literature suggests that some part of the racial unemployment gap is due to average group differences in productivity (i.e., a human capital gap), and some part is due to average group differences in treatment (i.e., a discrimination gap). However, even if the difference in labor market outcomes between minorities and whites reflects the skills workers bring to the labor market, several studies show that discriminatory treatment is a significant cause of this inequality. For instance, Stratton (1993) and Cajner et al. (2017) find that less than half of the African-American/White male unemployment gap in the US can be attributed to observable factors other than race. Moss and Tilly (2001) show that employers often hold negative views of both the "hard" and "soft" skills of African-Americans in entry-level jobs, and Giuliano et al. (2009) that non-African American managers hire more Whites and fewer African-Americans than African-American managers do. More recently, Ritter and Taylor (2011) examine unemployment and non-employment using additional waves of the National Longitudinal Survey of Youth. They find that controls, including the Armed Forces Qualification Test, can explain at most about one-half of the unemployment and non-employment differentials.

Moreover, analyses using experimental designs, such as racial "testing" audits, have shown that African-Americans are less likely to be hired (Pager, 2003). Fewer callbacks have also been documented for resumes with African-American sounding names (Bertrand and Mullainathan, 2004). Segregated networks exacerbate these patterns; i.e., networks that hurt African-Americans' chances of being hired (Royster, 2003). Minorities are also more likely than Whites to be laid off following an economic recession. For instance, the widespread shutdown of businesses following the coronavirus crisis has hurt African-American and Hispanic workers at a higher pace than White workers.[6] Following this line of thought, Aaronson et al. (2019) find "high-beta responses" by various groups to changes in economic conditions. For example, the 1.8 coefficient for African-Americans means that a one-percentage-point increase in the overall unemployment rate is associated with a 1.8 point increase in unemployment for African-Americans. For Hispanic workers, the coefficient is 1.4. But for whites, the coefficient is 0.9, a "low-beta" response. This might be explained by the fact that

[6]Isidore C. (2020). Early coronavirus job losses hitting minorities, women, teens particularly hard. CNN Business, 4 April 2020.

Whites benefit from traditional protective factors such as professional or technical employment, union membership, and firm tenure (McBrier and Wilson, 2004). At the same time, minorities experienced a decline in unionization rates, deregulation of industries, and eroded worker protections.

Can the disproportionate impact of economic downturns on the unemployment rate of minorities be reduced through monetary policy? This paper aims to answer to that question by testing whether the Fed's accommodative monetary policy is affecting the unemployment rate of all racial groups similarly, in the context of the ZLB on nominal interest rates and the introduction of the unconventional policy measures. For that purpose, we proceed in two steps. First, we measure the monetary policy shocks using the Romer and Romer (2004)'s narrative approach. Second, we use the local projections method à la Jordà (2005) to analyze how the racial unemployment rates react to a one hundred basis point accommodative monetary policy shock.

Our results show significant disparities in the responsiveness of the racial unemployment rates to a monetary policy shock. Specifically, we find that, on the one hand, the white unemployment rate is the most responsive to an accommodative monetary shock and decreases, on average, by 0.35 percentage points (pp) 3 years after the initial shock. On the other hand, even though the African-American unemployment rate is more responsive to an accommodative shock, the confidence intervals related to this response are larger. The effect of a monetary policy accommodation is thus more uncertain for this racial group. Finally,we find that the Hispanic unemployment rates are not significantly affected by an accommodative monetary shock. These results are robust even when (i) we include the unconventional policy measures, through the Wu and Xia (2016)'s shadow rate, in the empirical analysis, (ii) we distinguish between male and female unemployment rates and (iii) we consider a particular age group, the out-of-school teenagers, in the specification. We also use a different method to identify monetary policy shocks besides the Romer and Romer (2004) narrative approach, the high-frequency identification approach. We find that the effect of an accommodative shock on White workers is significant, while this is not the case for African-American and Hispanic workers. Further extensions show that the impacts of monetary policy shocks on the racial unemployment rates are significantly different and that they are asymmetric for African-Americans. Specifically, a positive monetary shock affects both the White and the African-American unemployment rates, while a negative monetary shock affects the White unemployment rate only. Finally, we highlight that these

results are mainly driven by a "recession effect", whereby as a result of occupational segregation, minorities do not benefit from the Fed's accommodative policy during recessions. These findings suggest that the Fed's monetary policy is ineffective in reducing the unemployment rate for all racial groups with a similar magnitude. As a consequence, the Fed's policy response must include a racial perspective that has been absent by giving more substantial weight to racial disparities. For instance, given the high-beta coefficient of 1.8 found by Aaronson et al. (2019) for African-Americans, the Fed should consider targeting not only the overall unemployment rate in its reaction function, but so the African-American unemployment rate. Moreover, implementing structural policies like, e.g., improving the skills of African-Americans and Hispanics and fighting against racial discrimination in the labor market, in particular during recessions, might also be effective in reducing the racial unemployment gap.

The rest of the paper is structured as follows. Section 2. presents a short review of the literature, and Section 3. the main results on the effect of monetary policy shocks on the unemployment rates disaggregated by race, gender, and age group. Section 4. highlights a potential channel, the "recession effect", that explains the ineffectiveness of the Fed's monetary policy in affecting the racial unemployment rates similarly. Section 5. provides further extensions while Section 6. concludes.

2. Related Literature

To achieve its maximum employment objective, the Fed relies on an indirect effect of monetary policy, the earning heterogeneity channel (Auclert, 2019). Specifically, 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. As suggested by Ampudia et al. (2018), the indirect effect is relatively more powerful for QE and is likely to be the most important determinant of monetary policy's distributional consequences. However, the indirect effect produces heterogeneous consequences among individuals since different pools of workers (low-skilled vs. high-skilled) display different elasticities to the change in aggregate expenditures. Blanchard and Katz (1997) find that unskilled individuals have higher labor supply elasticities than skilled individuals, and so, a fall in the demand for labor following a monetary contraction will have a larger effect on the employment prospects of less-skilled workers than for high-skilled workers. Since African-American and Hispanic workers have, on average, fewer skills than white workers (Carpenter and Rodgers III, 2004), they are thus more

likely to be impacted by the Fed's contractionary monetary policy.

Following this line of thought, Thorbecke (2001) finds that from 1973 to 1996, a one-standard-deviation increase in the nominal federal funds rate raises the difference between the African-American and the White unemployment rate by 0.05 percentage points. Carpenter and Rodgers III (2004) use vector autoregressions and Romer and Romer (1989, 1994)'s dates[7] to explore whether contractionary monetary policy lowers the employment-population ratio of African-Americans. They find that contractionary monetary policy lowers the employment-population ratio primarily by raising the unemployment rate. These results suggest that African-Americans work in sectors that are more sensitive to increases in the federal funds rate. Hence, as the Fed slows the economy through a contractionary monetary policy, they tend to lose their jobs first and have greater difficulty finding employment.

3. The effects of monetary policy shocks on the racial unemployment rates

3.1. The identification of monetary policy shocks

We follow Romer and Romer (2004) (RR) to identify US monetary policy shocks. RR first derive a series of federal funds rate changes during 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, and they find very large effects of these shocks on output. Following RR and Coibion et al. (2017), we orthogonalize changes in the federal funds rate at each FOMC meeting on real-time Greenbook forecasts (denoted by F) prepared by the Fed staff before each meeting, from September 1969 until December 2013. We consider the residual form this regression as a proxy of the monetary policy

[7] The Romer and Romer dates are monetary contractionary episodes identified by Romer and Romer (1989, 1994).

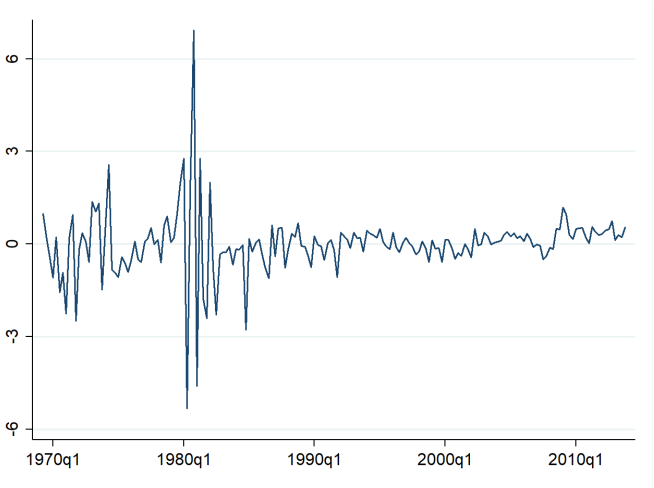
shock that is orthogonal to the Fed's staff information set. The estimation is as follows:

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

where m denotes the FOMC meeting, Δff_m the change in the federal funds rate 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 previous quarter, 0 is 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's 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 that is not predicted by the Greenbook forecast of unemployment can be used as an instrument to identify the effect of monetary policy shock on unemployment. A positive (negative) value of $\tilde{\varepsilon}_m$ indicates a more restrictive (accommodative) monetary policy than would have been recommended by the Greenbook forecasts. Table A2 in the Appendix shows the estimated results of eq. (1). We use a quarterly measure of monetary policy shock by summing the shocks from each meeting within a quarter.

Fig. 2 shows that the FOMC monetary policy shocks are volatile over time, particularly during the 1970s' stagflation era and the 1980s' Volcker disinflation period. The Great Moderation in the mid–1980s and the 1990s is characterized by less volatile policy shocks, while the beginning of the 2000s was more accommodative than would have been expected given the staff forecasts of macroeconomic conditions. The positive value of the monetary policy shock starting in 2005 might reflect a pre-emptive strike against inflation in the housing market (Taylor, 2007).

Figure 2: Quarterly monetary policy shocks in the US (1969Q2-2013Q4)



3.2. The RR monetary policy shocks and the racial unemployment rates

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

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

where u^R_{t+h} is the civilian or the racial unemployment rate (White, African-American or Hispanic) and MP^{RR}_{t-i} reflects the quarterly monetary policy shocks estimated in eq. (1). We generate accumulated impulse responses to monetary policy shocks from the estimated $\{\beta_i^{(h)}\}_{h=0}^{H}$. We set J=2 and I=20. For each impulse response, we present one and 1.65 standard deviation confidence intervals. We consistently use $H = 20$ quarters.

Fig. 3 plots the impulse response functions (IRFs), graphing the effect of a one hundred basis point innovation to the federal funds rate (FFR) on the civilian and the racial unemployment rates, using data from 1969Q2 to 2013Q4 and from 1969Q2 to 2008Q4 to exclude the zero lower bound period, respectively. The IRFs show that the civilian and the white unemployment rates have similar declining responses and that the latter are significantly different from zero. Moreover, an unexpected

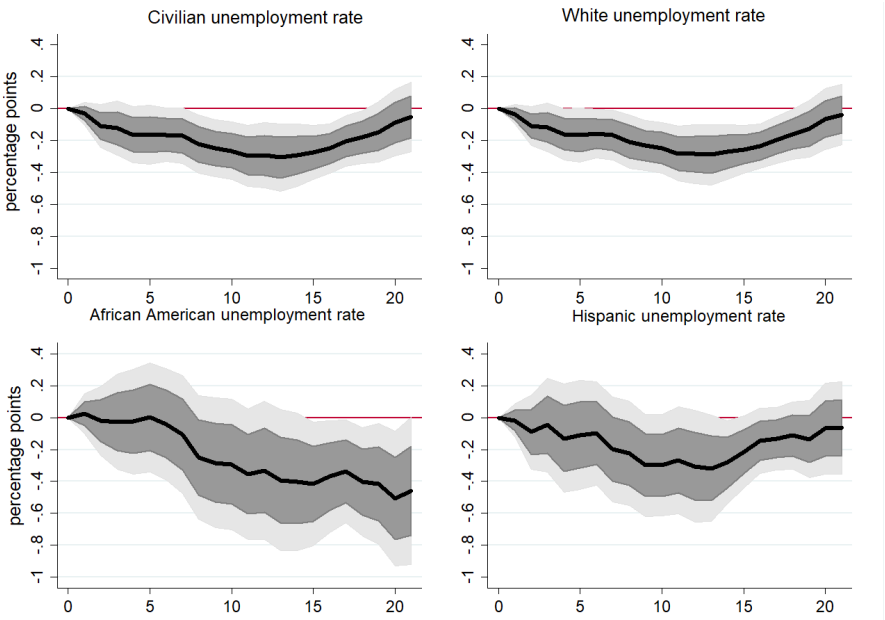
decrease in the FFR causes the African-American unemployment rate to decline more markedly than the White unemployment rate, although this decline happens later. Specifically, a one hundred basis point accommodative policy shock decreases the African-American (White) unemployment rate by 0.5 percentage points (pp) (0.3) after 5 (3) years. However, the upper bound of the 65 percent confidence interval related to the African-American unemployment rate's response suggests that the latter is less precise. The persistence of the impulse response is consistent with other evidence for 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 quite some time. Our findings are in line with the empirical magnitudes of monetary policy (MP) shocks. Finally, the IRFs for the Hispanic and the White unemployment rates do not indicate a difference in terms of magnitude, however, the response of the Hispanic unemployment rate to a shock is not statistically different from zero.

We also consider the effects of a MP shock on the racial unemployment rates excluding the zero lower bound period (1969Q2-2008Q4). We find that the civilian and the White unemployment rates decline gradually after one to three years, ultimately falling by 0.35 pp. The IRFs also indicate that the response of the African-American and the Hispanic unemployment rates to an accommodative shock are slightly stronger than the response including the ZLB. The African-American unemployment rate is mostly affected 3 years after the monetary policy shock, thus falling by 0.54 pp, but stil withl a large confidence interval. Regarding the Hispanic unemployment rate, the latter decreases by 0.4 pp following a one hundred basis point accommodative shock, but the effect is not statistically significant.

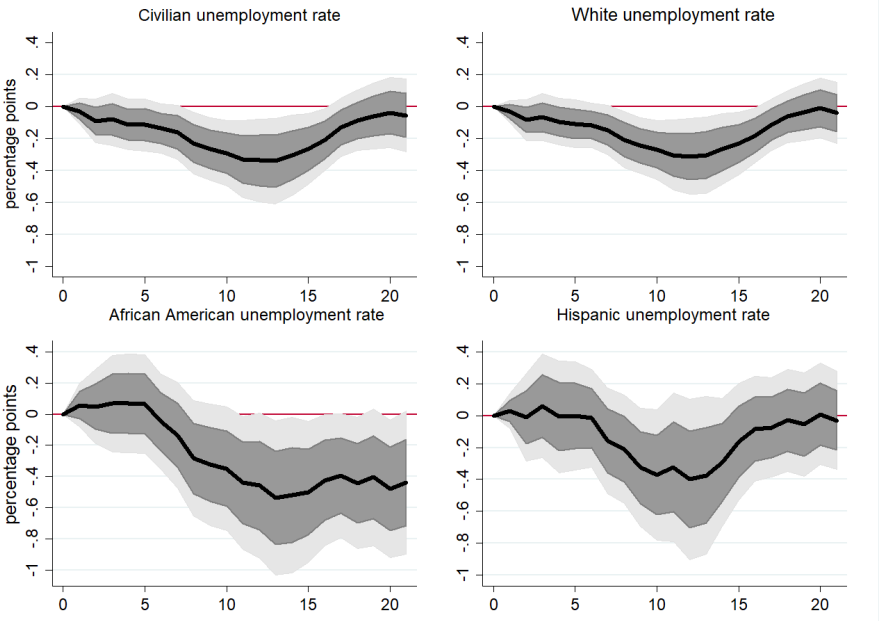
Overall, Fig. 3 suggests that the inequality between the unemployment rate of different racial groups is positively related to an unexpected reduction in the FFR, in particular between the White and the Hispanic workers. Hence, the Fed's accommodative shock tends to decrease mostly the White unemployment rate whereas for the African-American unemployment rate, the effect is less precise.

Figure 3: Effect of a monetary policy shock on the racial unemployment rates

1969Q2-2013Q4



1969Q2-2008Q4



Note: The figures present impulse responses of racial unemployment rates to a 100 b.p. accommodative monetary policy shock. Time (horizontal axis) is in quarters. The dark and light grey shaded areas indicate, respectively, 1 and 1.65 standard deviation confidence intervals.

3.3. The unconventional policy shocks and the racial unemployment rates

Following the Great Recession of 2007-2009 and the GFC, the FOMC pushed short-term interest rates to near zero. This push was accompanied by additional policy tools to revive output and employment growth. These unconventional measures included forward guidance through communication about future short-term interest rates and the purchase of government bonds. These unconventional policies helped to reduce long-term yields and to ease overall financial conditions.

Against this backdrop, we introduce the 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, it captures the time-varying lower bound, and it allows to study unconventional monetary policy's impact on the real economy. The findings of Wu and Xia (2016) support the view expressed by Krippner (2013) who advocate the potential of the shadow rate to describe the monetary policy stance when the interest rate reaches its ZLB. We compute the shadow monetary policy shock by replacing the FFR in eq. (1) by the Wu and Xia (2016)'s shadow rate.[8] The estimation takes the following form:

$$\begin{aligned}\Delta sh_m = \alpha + \beta shb_m + \sum_{i=-1}^{2} \eta_i F_m \pi_{m,i} + \sum_{i=-1}^{2} \theta_i (F_m \pi_{m,i} - F_{m-1}\pi_{m,i}) \\ + \sum_{i=-1}^{2} \gamma_i F_m \Delta y_{m,i} + \sum_{i=-1}^{2} \lambda_i (F_m \Delta y_{m,i} - F_{m-1}\Delta y_{m,i}) + \mu_0 F_m ue_0 + \varepsilon_{sh,m};\end{aligned} \tag{3}$$

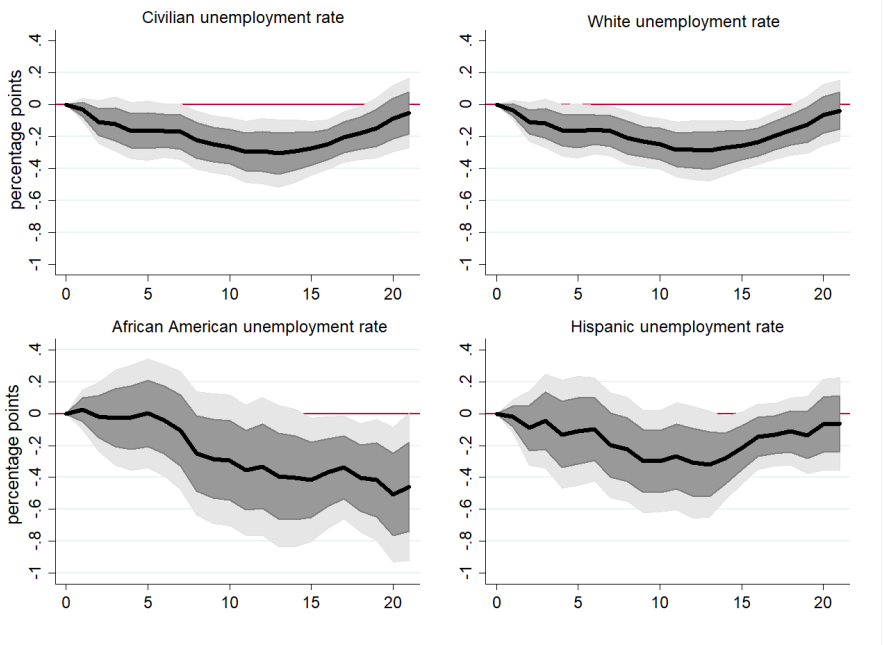
where Δsh_m is the change in the shadow rate between meeting $m-1$ and m and shb_m the shadow rate during the meeting m. The rest of the left-hand-side and right-hand-side variables are similar to eq. (1). The predicted residuals, $\tilde{\varepsilon}_{sh,m}$, reflect the shadow monetary policy shocks, which are orthogonal to the Fed's staff information set (for more details, see Table A1 in the Appendix). Table A4 in the Appendix shows the estimated results of eq. (3). We use a quarterly measure of the shadow monetary policy shock by summing the shocks from each meeting within a quarter. The evolution of the shadow monetary policy shock is very similar to the one of the shock computed with the FFR, except in 2009 and 2010, where the shadow shock is lower than the FFR shock (see Fig. A11 in the Appendix). This period corresponds to the launch of the

[8] 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.

two first phases of quantitative easing, QE1 and QE2, at the beginning of 2009 and mid-2010, respectively. This lower value reflects the accommodative stance of the Fed's monetary policy during that period.

Next, we use local projections à la Jordà (2005) to assess how an accommodative shadow shock affects the civilian and the racial unemployment rates. More precisely, we replace the monetary policy shocks computed with the FFR in eq. (2), MP_{t-i}^{RR}, with the shadow policy shocks computed in eq. (3). Fig. 4 shows the estimated effects of an unanticipated shadow monetary policy shock on the racial unemployment rates and the associated confidence intervals. The IRFs indicate that monetary policy easing through the unconventional measure leads to a long-lasting decrease in the civilian and the White unemployment rates. More precisely, an unanticipated decrease of 100 basis points lowers the white unemployment rate by about 0.28 pp after 3 years. The effect eventually dies out after five years. The response of the Hispanic unemployment rate to an accommodative shadow shock is not statistically different from zero over the sample period, while the IRF related to the African-American unemployment rate drops by 0.5 pp 5 years after the shock, but the estimate is more uncertain. Overall, these findings are similar to those of the baseline simulations (i.e., Fig. 3). This suggests that even when considering the unconventional policy measures through the Wu and Xia (2016)'s shadow rate in the specification, the Fed's monetary policy affects mainly the White unemployment rate and the effect on the African-American is more uncertain, while the response on the Hispanic unemployment rate is not significant.

Figure 4: Effect of a shadow policy shock on the racial unemployment rates (1969Q2-2013Q4)



Note: The figures present impulse responses of racial unemployment rates to a 100 b.p. accommodative shadow policy shock. Time (horizontal axis) is in quarters. The dark and light grey shaded areas indicate, respectively, 1 and 1.65 standard deviation confidence intervals.

3.4. The gender bias of monetary policy's effects on the racial unemployment rates

Section 3.2. highlights the effects of monetary policy shocks on the racial unemployment rates. However, there might be a gender-related effect as well since the unemployment rate of men and women differs significantly across racial groups (for more details, see Table A1 and Fig. A12 in the Appendix). As a case in point, African-American and Hispanic women have been hardest hit during the coronavirus downturn. In April 2020, the unemployment rate among African-American women aged 20 and over was 16.4%; for Hispanic women, it was 20.2%, and for white women, it was 15%.

The literature emphasizes several reasons that explain the different effects of monetary policy on women's unemployment rate than men's. Empirical evidence shows that women work in a different range of occupations than men. For instance, in the US

in the 1990s, 21% of men were employed in manufacturing and 25% in services, while 11% of women were working in manufacturing and 47% in services. Among women, about 30% of both African-American and Hispanic women held service-sector jobs in 2018, compared with about 20% of White and Asian 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 the interest rate will have an unevenly distributed employment effect if these sectors have different interest rates sensitivity. Furthermore, gender differences in the division of part-time/full-time work and labor market attachment can result in a different sensitivity of men's and women's unemployment rate to interest rate changes.[9] Third, the difference in job tenure between men and women can explain the different employment response to a monetary policy change. As a matter of fact, women have shorter tenure, and thus, they may be more exposed to interest rate changes (Munasingh et al., 2008). Finally, gender discrimination can result in a gendered employment effect of monetary policy. Azmat et al. (2006) show that in male-dominated occupations in the US, the women's unemployment rate is more sensitive to economic downturns. As a consequence, gender and racial effects of monetary policy can overlap, such that the unemployment rate of White women, African-American women/men, and Hispanic women/men react differently to a monetary policy shock than the White male's unemployment rate.

We aim to assess the gender and racial unemployment rates' responses to a monetary policy shock. For that purpose, we use Jordà (2005)'s local projections and we distinguish between male and female unemployment rates for White, African-American, and Hispanic workers.

$$u_{t+h}^{G,R} = c^{(h)} + \sum_{j=1}^{J} \alpha_j^{(h)}(u_{t-j}) + \sum_{i=1}^{I} \beta_i^{(h)} MP_{t-i}^{RR} + \varepsilon_{t+h}; \quad h = 0, ..., H \tag{4}$$

where $u_{t+h}^{G,R}$ is the racially-based gender unemployment rate (G: male, female / R: White, African-American, Hispanic). The rest of the right-hand-side variables are similar to eq. (2).

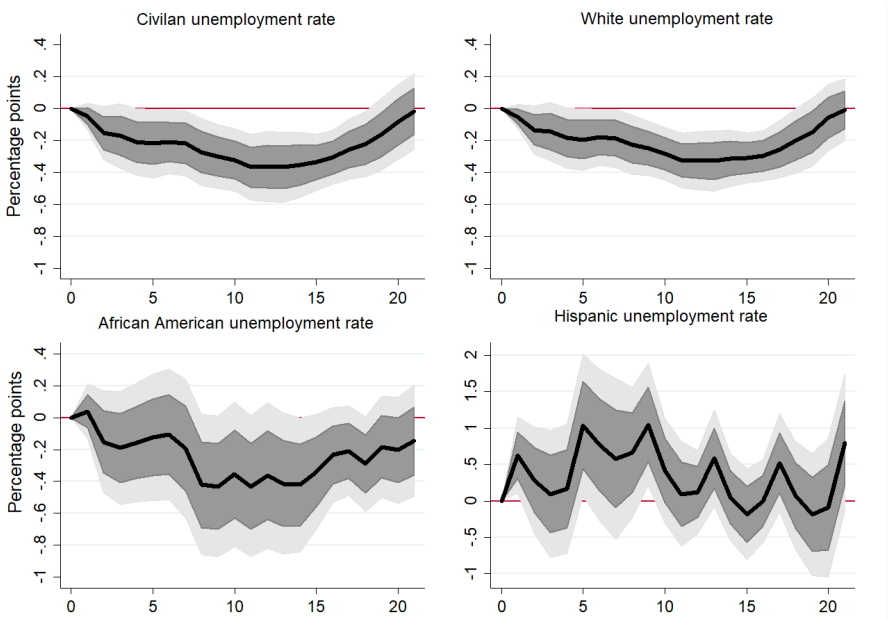
Fig. 5 presents the IRFs from estimates of eq. (4) for each racially-based gender unemployment rate using data from 1969Q2 until 2013Q4 and the associated 1 and 1.65

[9] 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).

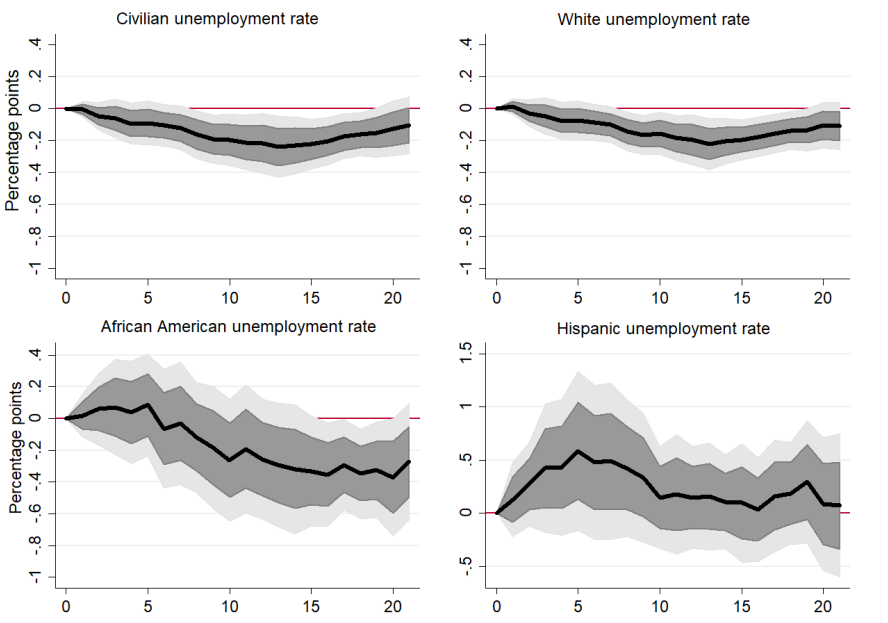
standard deviation confidence intervals. Consistent with the conventional wisdom on monetary policy lags, the IRFs show that monetary policy affects the unemployment rates with a lag. For instance, we observe a delayed response in the civilian and White unemployment rates following a monetary policy shock, with most of the decrease occurring one to two years after the shock. The IRFs indicate that the response associated with the White male unemployment rate (-0.32 pp after 3 years) is the most statistically meaningful than any of the other responses, followed by the response of the White female unemployment rate (-0.22 pp after 3 years). This response remains negative and significant for five years after the shock, but it diminishes in magnitude over time. Hence, even though the responses of the African-American male (-0.4 pp after 3 years) and female (-0.37 pp after 5 years) are larger, the latter are barely significant, especially for the male one. Finally, the responses associated with the male and female Hispanic unemployment rates are not consistent nor significant over time. Overall, we find that male unemployment rate is more sensitive to an accommodative monetary policy shock than the female's one, except for the African-American workers. These results might be attributed to employment segregation patterns.

Figure 5: Effects of monetary policy shocks on the racially-based gender unemployment rates (1969Q2-2013Q4)

For male



For female



Note: The figures present impulse responses of racial unemployment rates to a 100 b.p. accommodative monetary policy shock. Time (horizontal axis) is in quarters. The dark and light grey shaded areas indicate, respectively, 1 and 1.65 standard deviation confidence intervals.

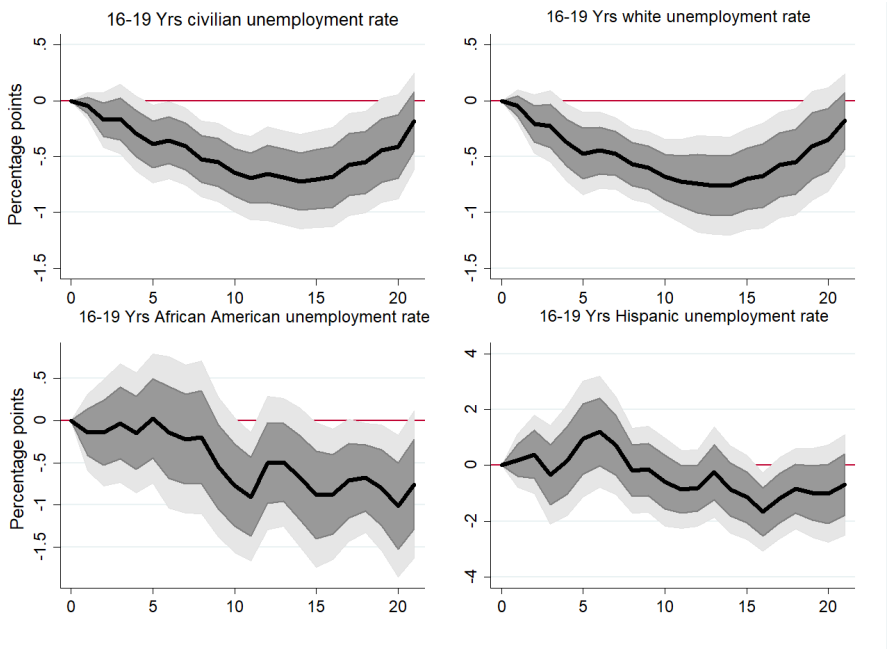
3.5. The monetary policy shocks on the racial unemployment rates by age groups

To explore whether the employment status of less-skilled and less-educated workers is more sensitive to innovations in the federal funds rate, we estimate local projections on the unemployment rate of out-of-school teenagers based on their racial group (ages 16 to 19). This group has the least skills and has decided, at least in the short term, to forgo further investments in their formal education. Moreover, they are characterized by higher rates of unemployment compared to adults (see Table A1). The advantage of estimating models for teenagers is that we can observe whether youth labor market outcomes respond differently than labor market outcomes of the population in general. 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.[10]

We estimate local projections à la Jordà (2005) to evaluate the impact of a one hundred basis point accommodative monetary shock on teenagers' unemployment rate. We replace the dependent variable in eq. (2) by the 16-19 Yrs civilian unemployment rate and the 16-19 Yrs White, African-American, and Hispanic unemployment rates. The IRFs depicted in Fig. 6 bring evidence to bear on the relative magnitudes of the youth's unemployment rate responses to innovations in monetary policy, and they confirm the relevance of the previous findings. For instance, we find that a one hundred basis point accommodative shock reduces the white unemployment rate by about 0.7 pp at the trough; that is, 3 years after the shock. Hence, even though the unemployment rate of African-American teenagers is more responsive to an innovative decrease in the FFR than that of White teenagers, this effect is more uncertain.

[10] See: https://www.census.gov/data/tables/2020/demo/popest/2020-demographic-analysis-tables.html.

Figure 6: Effects of monetary policy shocks on teenagers' unemployment rates (1969Q2-2013Q4)



Note: The figures present impulse responses of racial unemployment rates to a 100 b.p. accommodative monetary policy shock. Time (horizontal axis) is in quarters. The dark and light grey shaded areas indicate, respectively, 1 and 1.65 standard deviation confidence intervals.

3.6. Alternative monetary policy shocks

In assessing the effect of MP shocks on the racial unemployment rates, we have followed 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, and political pressures. Some of these changes could be interpreted as innovations to the central bank's policy rule, while others would be characterized as transitory deviations from a policy rule.

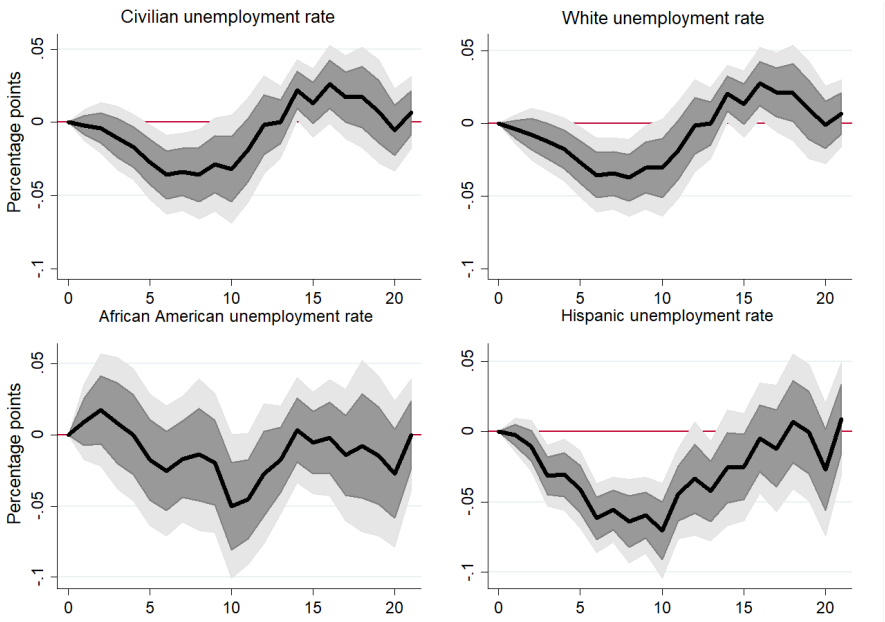
We use an alternative method to identify monetary policy shocks to test the robustness of our findings, the high-frequency identification method. Specifically, we use the monetary policy shocks computed by Barakchian and Crowe (2013) and Gertler and Karadi (2015). The latter identify shocks as the surprise component of monetary

policy actions, estimated using movements in Fed Funds futures contract prices on the day of FOMC monetary policy announcements. However, while Barakchian and Crowe (2013) measure the surprise component by comparing the price on the day of the meeting with that on the day before the meeting, Gertler and Karadi (2015) isolate the surprise in the future rates within a 30-minute window of the FOMC announcement. They both find that a contractionary monetary policy shock has a significant negative effect on output. We include the Barakchian and Crowe (2013) (BC) and the Gertler and Karadi (2015) (GK) monetary policy shocks in the empirical specification, eq. (2). Next, we use Jordà (2005)'s local projections method to estimate the effect of these shocks on the racial unemployment rates (Fig. 7).

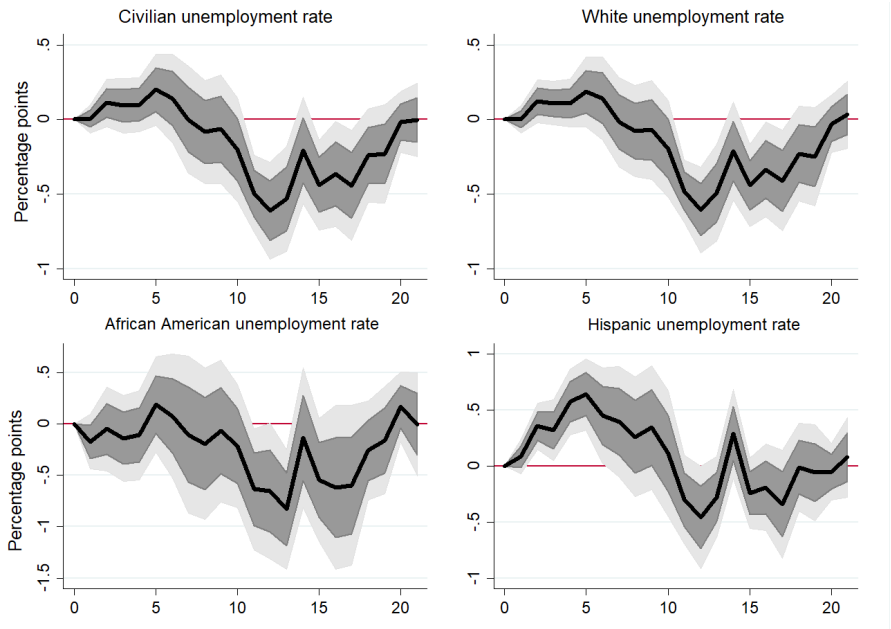
For all racial groups, unemployment decreases following the accommodative shock. The maximum effect on unemployment occurs one to two years after the easing. On the one hand, the IRFs indicate that a one hundred basis point unexpected decrease in the funds rate lowers White unemployment rate by 0.04 (0.6) pp after 2 (3) years when using the BC (GK) monetary shock, and Hispanic unemployment rate by 0.07 pp after 1 year with the BC shock. On the other hand, the African-American unemployment rate's response is not statistically different from zero. These findings show that the effect of the monetary policy shock on the racial unemployment rates is robust to the type of shock used in the empirical analysis. Specifically, we find that the effect of an accommodative monetary shock on White workers is consistent across the different shocks identified with both the narrative and the high-frequency methods.

Figure 7: Effects of alternative monetary policy shocks on the racial unemployment rates (1969Q2-2008Q4)

The Barakchian and Crowe (2013) MP shock



The Gertler and Karadi (2015) MP shock



Note: The figures present impulse responses of racial unemployment rates to a 100 b.p. accommodative monetary policy shock. Time (horizontal axis) is in quarters. The dark and light grey shaded areas indicate, respectively, 1 and 1.65 standard deviation confidence intervals.

4. The recession effect

It is well known that the impact of a recession is not shared equally by all workers across racial groups. Evidence has shown that the effects of the recent economic downturn have been born disproportionately by minorities. For instance, African-American (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.

The literature about the labor market suggests that the occupational segregation theory, i.e., differences in industrial representation and racial discrimination, may play a role in explaining the differential labor market responses across racial groups to macroeconomic shocks. On the one hand, different sectors of the economy are over- or under-represented by minorities. For instance, Hispanics are being sorted into certain industries, such as construction that were more affected by the Great Recession and are hurt more than other individuals that are not in this sector. This is in accordance with Hoynes et al. (2012), who show that the demographic composition of sectoral employments can account for significant differences in employment volatilities among minorities. On the other hand, psychological factors can contribute to the amplification of unemployment inequality across minorities caused by the recession. For instance, Anderson et al. (2020) find a significant relationship between economic conditions and racial animus against African-Americans in the US. Johnston and Lordan (2014) show that racial prejudice increases with unemployment, with the effect owed to large increases among highly-educated, middle-aged, and full-time employed men. This suggests that competition for scarce resources that occurs during a recession can fuel behavioral discrimination towards minorities.

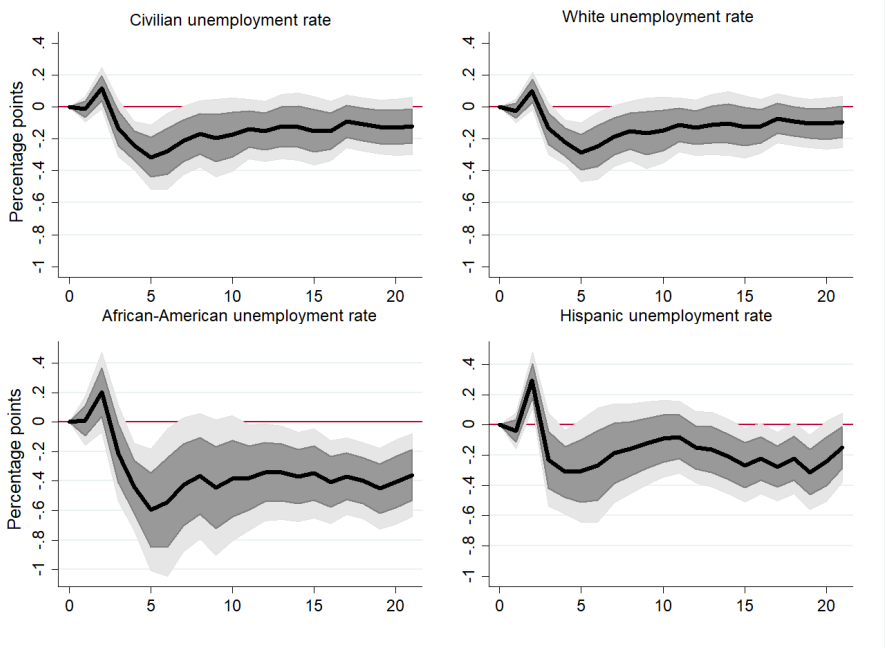
The results obtained so far may be biased by the different labor market responses across racial groups to the adverse macroeconomic shocks. Hence, we remove the recession dates from the sample 1969Q2-2013Q4, using the business cycle reference dates published by the NBER and we re-estimate eq. (2) accordingly.[11] Fig. 8 shows the response of the racial unemployment rates to a one hundred basis point accommodative policy shock. The IRFs suggest that when removing the recession dates, the unemployment's response across racial groups to an accommodative shock

[11] As a robustness, we interact the monetary policy shock with the NBER recession dummy. This gives us two IRFs, one in an expansions and one in a recession. To save space, the IRFs are available upon request.

has a similar evolution over time, although with a different magnitude. We find that one year after the shock, the response of the African-American unemployment rate is the strongest (-0.5 pp), followed by the Hispanic unemployment rate (-0.4 pp) and, finally, the White unemployment rate (-0.2 pp). Moreover, all IRFs are significant and persistent over time, in particular, the African-American unemployment response. These results suggest that the large confidence intervals associated to the African-American and the Hispanic unemployment rates found in the baseline model (i.e. Fig. 3) are mainly driven by the behavior of these variables during recessionary episodes.

Therefore, the ineffectiveness of the Fed's monetary policy to reduce minorities' unemployment during cyclical downturns appears to be due to at least two factors: (i) minorities tend to be employed in industries more sensitive to economic fluctuations; and (ii) the discrimination that appears to be specific to economic downturns.

Figure 8: Effects of monetary policy shocks on the racial unemployment rates without recession dates (1969Q2-2013Q4)



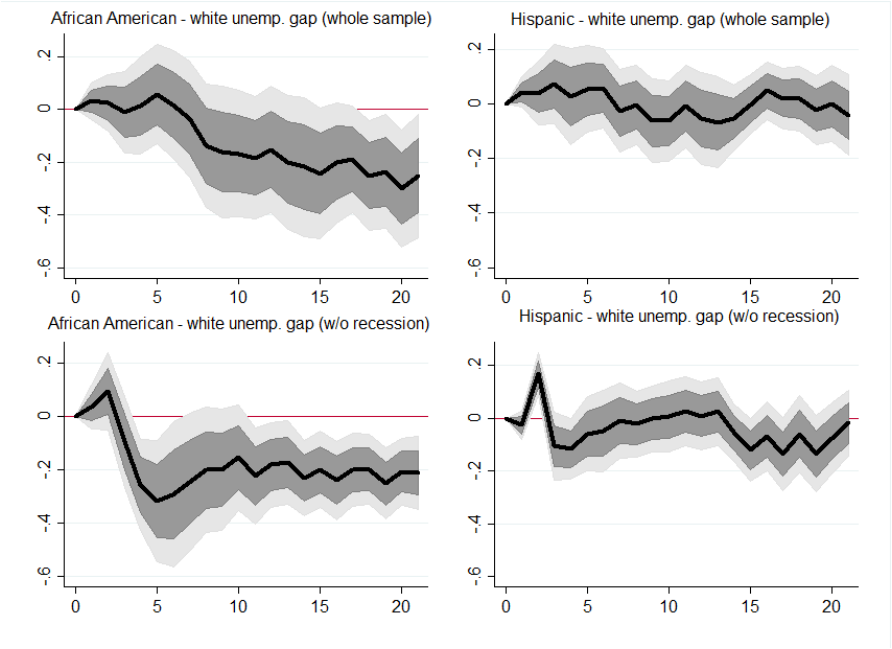
Note: The figures present impulse responses of racial unemployment rates to 100 b.p. accommodative monetary policy shocks. Time (horizontal axis) is in quarters. The dark and light grey shaded areas indicate, respectively, 1 and 1.65 standard deviation confidence intervals.

5. Further extensions

5.1. Are the effects of the monetary policy shocks on the racial unemployment rates significantly different ?

We test whether the differences in the racial unemployment rates' response to a monetary policy shock are significant. For that purpose, we measure the difference between the African-American (Hispanic) and the White unemployment rate, and we include it in the baseline model, eq. (2), as a left-hand-side variable. Since the results of the previous section (i.e., section 3.) suggest that the Fed's monetary policy on the African-American unemployment rate is more effective during expansions, we make two simulations: (i) a simulation that includes the whole sample and a (ii) simulation that excludes the recession episodes.

Figure 9: Effect of a monetary policy shock on the differences between the racial unemployment gaps (1969Q2-2013Q4



Note: The figures present impulse responses of the differences between the racial unemployment rates to a 100 b.p. accommodative monetary policy shock. Time (horizontal axis) is in quarters. The dark and light grey shaded areas indicate, respectively, 1 and 1.65 standard deviation confidence intervals.

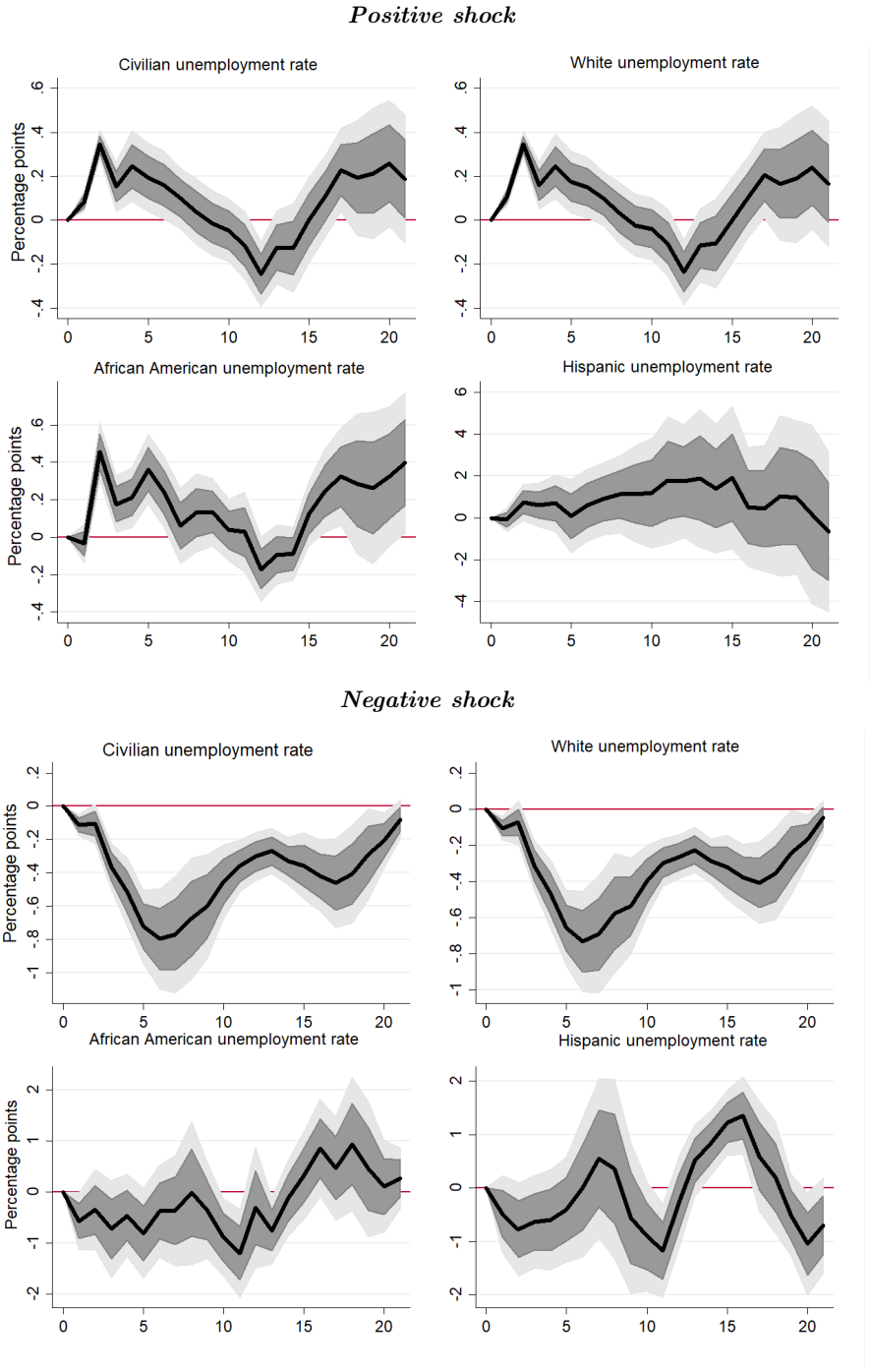
In line with the previous findings, Fig. 9 shows that the difference between the

monetary policy's effect on the African-American unemployment rate and the white unemployment rate is more significant when we excluse the recession episodes from the sample. Indeed, the simulation including the recessions suggests a significant difference in the long-term only; that is, 4 years after the initial shock.

5.2. Are the effects of the monetary policy shocks on the racial unemployment rates symmetric ?

The IRFs depicted in the baseline model (i.e., Fig. 3) show that even though the response of the African-American's unemployment rate to an easing policy is positive, it is still uncertain. But is it also the case with a tightening policy? To check if there is symmetric response to a monetary policy shock, we separate the effects of positive and negative shocks on the racial unemployment rates and we estimate the local projections, eq. (2), accordingly.

Figure 10: Effects of monetary policy shocks on the racial unemployment rates (1969Q2-2013Q4)



Note: The figures present impulse responses of racial unemployment rates to a 100 b.p. accommodative monetary policy shock. Time (horizontal axis) is in quarters. The dark and light grey shaded areas indicate, respectively, 1 and 1.65 standard deviation confidence intervals.

Fig. 10 shows that following a positive monetary policy shock, the African-American and the White unemployment rates react similarly; that is, a positive innovation in the FFR is associated with higher unemployment rate for both racial groups. However, a negative shock seems only to affect the White unemployment rate, while the IRF related to the African-American unemployment rate is not statistically different from zero. Specifically, a positive shock is positively associated with African-American unemployment, however, this relationship is not significant when there is a negative monetary policy shock. This suggests an asymmetric response of the African-American unemployment rate to a monetary policy shock.

6. Conclusion

The coronavirus crisis highlighted the vulnerability of minorities in the US labor market and the willingness of the Fed to diminish the racial unemployment gap. Indeed, 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."[12] Drawing on the empirical and theoretical literature about the effect of monetary policy on the unemployment rate, this paper aims to test whether Fed's monetary policy affects the unemployment rate of all racial groups similarly, or whether a specific racial group benefits more from an accommodative monetary policy shock. For that purpose, we first compute the monetary policy shocks using the Romer and Romer (2004)'s narrative approach. Second, we use the local projections method à la Jordà (2005) to test how the racial unemployment rates react to a one hundred basis point accommodative monetary policy shock.

We find that the white unemployment rate is the most responsive to an accommodative monetary shock. In constrast, the responses associated to the African-American and Hispanic unemployment rates are, respectively, more uncertain and not significant. These results are robust even when (i) we include the unconventional policy measures in the empirical analysis, (ii) we distinguish between male and female unemployment rates, (iii) we consider a particular age group, the out-of-school teenagers, in the specification, and (iv) we use a different method to identify monetary policy shocks, the high-frequency identification approach. Further extensions show that the impacts of monetary policy shocks on the racial unemployment rates are significantly different

[12]Bolter, R., (2020). A Moral and Economic Imperative to End Racism. Federal Reserve Bank of Atlanta.

and that they are asymmetric for African-Americans. Hence, a positive monetary shock affects both the White and the African-American unemployment rates, while a negative monetary shock affects the White unemployment rate only. Finally, we highlight that these results are mainly driven by a "recession effect", whereby as a result of occupational segregation, minorities do not benefit from the Fed's accommodative policies during recessionary episodes.

Therefore, the Fed must heed the Humphrey-Hawkins Full Employment Act and reduce disparities in unemployment rates among racial groups. For instance, the central bank could directly target the African-American unemployment rate in its reaction function. Moreover, implementing structural policies, such as improving the skills of minorities and fighting against racial discrimination in the labor market, in particular during recessions, might also be effective in reducing the racial unemployment gap.

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Appendix

Table A1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Macroeconomic variable					
Federal funds target rate	562	5.75	3.72	0.07	19.1
Shadow rate	562	5.63	3.91	-2.13	19.1
Greenbook forecast (horizon)**					
Unemployment rate (0)	426	6.2	1.65	3.3	10.9
Real Output Growth (-1)	425	2.5	3.38	-11.3	13.2
Real Output Growth (0)	431	2.45	2.84	-10.9	9
Real Output Growth (1)	424	2.65	2.33	-5	8.5
Real Output Growth (2)	405	2.81	1.92	-4.5	7.8
GDP Price Deflator (-1)	426	3.91	2.63	-0.3	14.4
GDP Price Deflator (0)	426	3.96	2.51	-0.6	12.9
GDP Price Deflator (1)	418	3.79	2.36	0.1	11.5
GDP Price Deflator (2)	404	3.69	2.22	0.4	10.4
Unemployment rate					
Civilian	863	5.73	1.64	2.5	10.8
White	561	5.49	1.48	3.1	9.7
African-American	561	11.85	3.1	5.4	21.2
Hispanic	561	8.73	2.43	3.9	15.7
Unemployment rate (Male)					
Civilian	860	5.6	1.84	2.3	11.2
White	791	4.46	1.56	1.7	9.6
African-American	575	10.66	3.22	5.1	20.7
Hispanic	522	7.31	2.52	2.5	15.6
Unemployment rate (Female)					
Civilian	860	6.01	1.46	2.7	10.4
White	791	4.74	1.17	2.8	8.3
African-American	575	10.01	2.62	4.3	17.8
Hispanic	522	8.29	2.17	3.4	15.9
Unemployment rate (16to19)					
Civilian	863	16.15	3.84	6.4	27.2
White	791	14.7	3.03	8.4	24.8
African-American	575	34.59	6.65	15.7	52.1
Hispanic	522	22.2	5.26	11.8	37.4
Monetary policy shock					
Romer and Romer FFR shock*	399	0	0.59	-5.86	2.89
Wu and Xia shadow shock*	399	0	0.59	-5.87	2.9
Barakchian and Crowe (2013)	235	0	0.81	-5.53	3.83
Gertler and Karadi (2015)	284	-0.015	0.059	-0.42	.145

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 (1969M03-2013M12)

Δff_m	Coef.	Std. Error
α	-0.106	0.18
β	0.028	0.023
η_{-1}	0.038	0.051
η_0	-0.11*	0.066
η_1	0.078	0.107
η_2	-0.007	0.16
θ_{-1}	-0.066	0.046
θ_0	0.083	0.067
θ_1	-0.03	0.082
θ_2	-0.01	0.12
γ_{-1}	-0.031	0.019
γ_0	0.107***	0.045
γ_1	-0.057	0.066
γ_2	0.031	0.063
λ_{-1}	0.024	0.016
λ_0	-0.031	0.033
λ_1	0.073	0.053
λ_2	-0.056	0.051
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 monetary policy shocks (1969M03-2008M12)

Δff_m	Coef.	Std. Error
α	-0.041	0.17
β	0.052*	0.027
η_{-1}	0.023	0.052
η_0	-0.11*	0.067
η_1	0.064	0.11
η_2	0.031	0.16
θ_{-1}	-0.057	0.04
θ_0	0.079	0.073
θ_1	-0.02	0.086
θ_2	-0.022	0.12
γ_{-1}	-0.032*	0.019
γ_0	0.104**	0.044
γ_1	-0.067	0.066
γ_2	0.08	0.069
λ_{-1}	0.029*	0.016
λ_0	-0.024	0.033
λ_1	0.076	0.052
λ_2	-0.065	0.052
μ_0	-0.087***	0.025
Obs.	359	
R^2	0.18	

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

Table A4: Estimating US shadow monetary policy shocks (1969M03-2013M12)

Δsh_m	Coef.	Std. Error
α	-0,09	0,18
β	0,02	0,02
η_{-1}	0,04	0,051
η_0	-0,11*	0,06
η_1	0,09	0,10
η_2	-0,01	0,16
θ_{-1}	-0,07	0,04
θ_0	0,08	0,067
θ_1	-0,031	0,08
θ_2	-0,001	0,12
γ_{-1}	-0,02	0,019
γ_0	0,10**	0,04
γ_1	-0,06	0,06
γ_2	0,031	0,062
λ_{-1}	0,023	0,01
λ_0	-0,032	0,03
λ_1	0,075	0,05
λ_2	-0,054	0,05
μ_0	-0,023	0,021
Obs.	399	
R^2	0.14	

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

Figure A11: Quarterly shadow monetary policy shocks in the US (1969Q2-2013Q4)

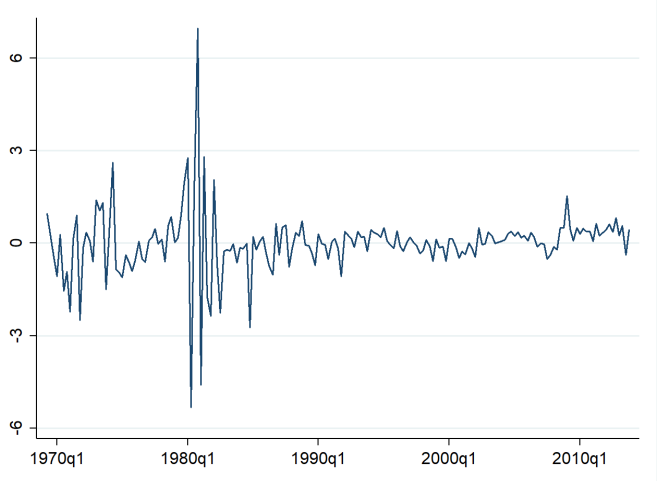

Figure A12: Gender-related unemployment rate (1970m1-2019m08)