Monetary Policy and Racial Inequality in Housing Markets

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Disclaimer: The views expressed in this paper are those of the authors and do not necessarily represent those of the Bank of Canada.

Motivation

Housing inequality across racial groups remains a significant and persistent issue

- **Homeownership gap:**
  75% of White households own homes vs. <50% for Black and Hispanic households
- **Price appreciation disparity:**
  2006-2017, 7% $\downarrow$ in Black neighborhoods vs. 2% $\uparrow$ in White neighborhoods

Housing inequality limits Black and Hispanics' capacity to build equity and wealth

Motivation

Existing literature: significant and sizable impact of monetary policy on housing

- Williams, 2016: 100 bps $\downarrow$ fed funds rate $\Rightarrow$ real house prices $\uparrow$ 6% in 2 years
- Ungerer, 2015: 100 bps $\downarrow$ fed funds rate $\Rightarrow$ housing sales rate $\uparrow$ 20% immediately

However, the literature largely overlooks whether monetary policy influences housing market outcomes (e.g., transactions and prices) differently for various racial groups.

- We attempt to address this gap in knowledge

This paper studies how monetary policy impacts Black and Hispanic households

Our strategy:

- compile a new race-specific housing market metrics database
  - construct measures of home purchases and sales by race
  - estimate repeat-sale home price indices by homeowners' race
    compute average home price appreciation for each racial group
  - quarterly frequency, covering 136 U.S. cities from 1995 to 2017
- study the heterogeneous effects of monetary policy on housing outcomes
- explore the potential transmission mechanisms

Overview of Findings

Relative to White households, Black and Hispanic households experience

- greater reduction in net home purchases after contractionary monetary policy
- greater reduction in home price appreciation after contractionary monetary policy

Potential mechanisms: the financing channel and the employment channel

- fed funds rate has similar pass-through to mortgage rates across racial groups
- but it exerts a stronger influence on Black and Hispanic employment

Effects of racial segregation within a city:

- Neighborhood matters!
  For a given race, those living in minority neighborhoods experience greater home price depreciation compared to those in predominantly White neighborhoods

Literature

- Monetary Policy and Racial Inequality:
  - Bartscher et al. (2022), Lee, Macaluso, and Schwartzman (2021), Bergman, Matsa, and Weber (2022), Nakajima (2023), Gerardi, Willen, and Zhang (2022), Ringo (2024)...
- Racial Inequality in Housing:
  - Bayer, Ferreira, and Ross (2016), Bayer et al. (2017), Bayer, Ferreira, and Ross (2018), Kermani and Wong (2021), Diamond and Diamond (2024)...
- Monetary Policy on Housing:
  - Fratantoni and Schuh (2003), Iacoviello (2005), Taylor (2007), Iacoviello and Neri (2010), Bernanke (2010), Williams (2016), Füss and Zietz (2016), Beraja et al. (2019), Eichenbaum, Rebelo, and Wong (2022), Aastveit and Anundsen (2022), Gorea, Kryvtsov, and Kudlyak (2022)...

Data

We construct race-specific housing metrics by linking micro CoreLogic and HMDA data

- CoreLogic
  - property information (e.g., location)
  - housing transactions (e.g., exact date, price)
  - mortgage transactions (e.g., exact date, loan type, loan amount, lender name, mortgage rate whenever available)
- Home Mortgage Disclosure Act (HMDA)
  - the near-universe of mortgage application records:
    year, census tract, race, ethnicity, income, loan type, loan amount, lender name, etc.
- Linking CoreLogic with HMDA
  - for each CoreLogic mortgage transaction, we find HMDA applications that match exactly on year, census tract, and loan type/amount
    then select the closest match based on textual similarity of lender names and drop low-quality matches

Matching rate is 54%

- In line with the matching rate in Bayer et al., 2016
- similar across different types of neighborhoods

Neighborhood White Pop. Share	# of CoreLogic Transactions	# of Matches	Matching Rate
Low	20641040	10768551	0.52
Middle	20784490	11268578	0.54
High	21017432	11517090	0.55
Neighborhood Median Income	**# of CoreLogic Transactions**	**# of Matches**	**Matching Rate**
Low	20681980	10873438	0.53
Middle	20720888	11156979	0.54
High	20484524	11229846	0.55

Reformat the CoreLogic-HMDA Micro Data

- keep only the completed spells where both purchases and sales are observed
- include arm-length single-family home transactions, except when a house is purchased without a mortgage or by a corporation
- exclude cases where a house is sold within 6 months of purchase

Our final sample comprises over 13 million completed ownership spells

Race-specific Home Purchase and Sale

We focus on three racial groups in our analysis:

- Non-Hispanic White (White)
- Non-Hispanic Black (Black)
- Hispanic

We construct a database at the City-Quarter-Race level from 1995-2017 that include

- Home purchases, home sales (raw counts & dollar volumes)
- Average mortgage rate, purchase with Federal Housing Administration (FHA) loans, foreclosures, etc

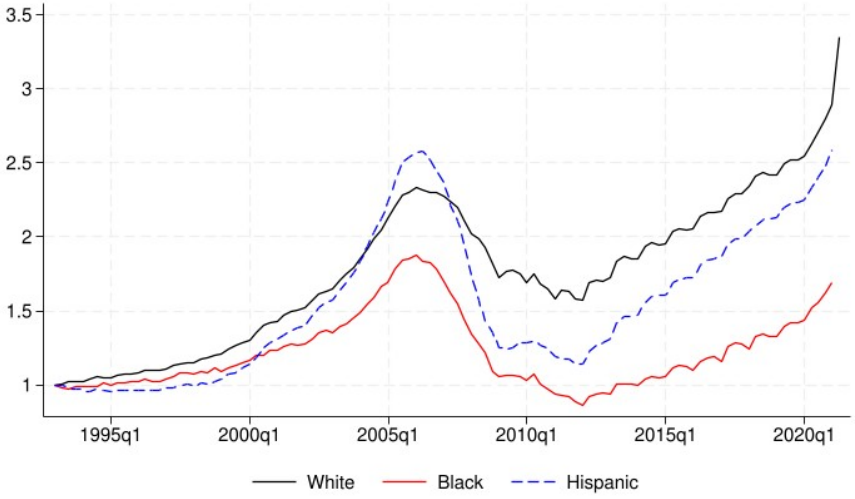
Race-specific House Price Indices

- split completed ownership spells by race of homeowners
- estimate repeated sale HPI separately for each city l and race r:

$$\log p_{i,l,t'} - \log p_{i,l,t} = b^r_{l,t'} - b^r_{l,t} + \epsilon_{i,l,t,t'}.$$

  - t' and t are the sale and purchase quarter, respectively
  - $p_{i,l,t'}$ and $p_{i,l,t}$ are the sale and purchase price of house i, respectively
  - r is the race of homeowner of house i from t to t'
  - $b^r_{l,t'}$ and $b^r_{l,t}$ are coefficients to be estimated
    $b^r_{l,t}$ represents log HPI of race r in city l and quarter t
- Home price appreciation at the City-Quarter-Race level, measured by Δlog(HPI)

Race-specific House Price Indices at national level



Advantages of our method to construct race-specific housing metrics

Our method: determines the race of each homebuyer from the CoreLogic-HMDA link

Alternative: ZIP code-based method

- does not attempt to determine the race of individual homebuyers
- assumes that within each ZIP code, a racial group's share of purchases is proportional to their population share
- only needs and the number of purchases in each ZIP code z & the racial composition of each ZIP code z:

$$\text{Purchase}_{l,t,r} = \sum_{z \in l} \text{Purchase}_{z,t} \times \frac{\text{Population}_{z,t,r}}{\sum_r \textit{Population}_{z,t,r}}$$

ZIP code-based method overestimates the purchase shares for minority

The distributions of purchase shares by race, constructed using the two methods:

- the average share of purchases of Black households rises from 5.6% to 9.3%
- the average share of purchases of Hispanic households rises from 9.7% to 11.9%

Figure: Black households

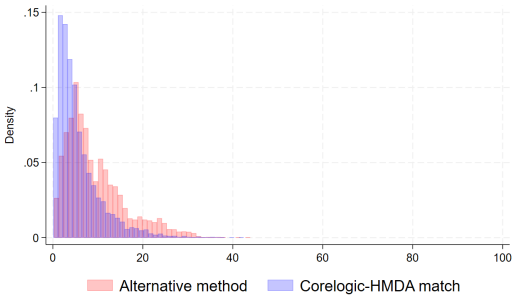
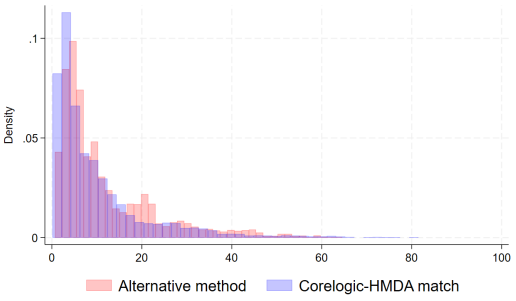


Figure: Hispanic households



Other city-level data

- Labor market
  - race-specific full-quarter employment (stable) from the US Census Bureau's Quarterly Workforce Indicators (QWI) program
  - race-specific end-of-quarter hiring rate
  - race-specific beginning-of-quarter separation rate
  - unemployment rate from Bureau of Labor Statistics
- Income and earnings
  race-specific average earnings data; income per capita
- Racial composition
  the Black population share and Hispanic population share
- Lender concentration
  the share of mortgages held by the top four lenders, Herfindahl–Hirschman Index

Empirical Strategy

Empirical Strategy

Use the panel data local projections method to estimate a dynamic system of $[i_t, Y_{l,t}]$

- i_t represents the average federal funds rate in quarter t
- $Y_{l,t}$ include the log of home purchases and sales, home price appreciation, employment growth, and log earnings for three racial groups in city l in quarter t

The setup allows:

- joint dynamics of local labor and housing market outcomes (Guren et al., 2021)
- outcome variables are observed for each racial group
- interactions among different racial groups

Main specification

$$y_{l,t+h} = \beta_y^{(h)} i_t + \text{controls} + \text{error}_{l,y,t}^{(h)}, \quad h = 0, 1, 2, \ldots,$$

- $y_{l,t+h}$ is one of the variables in $Y_{l,t+h}$
- controls includes four lagged values of $Y_{l,t}$ and i_t
- city fixed effects are also included
- we use the total population in each city as weights

$0.25 \times \beta_y^{(h)}$ measures the effect of a 25-bp increase in i_t on $y_{l,t+h}$

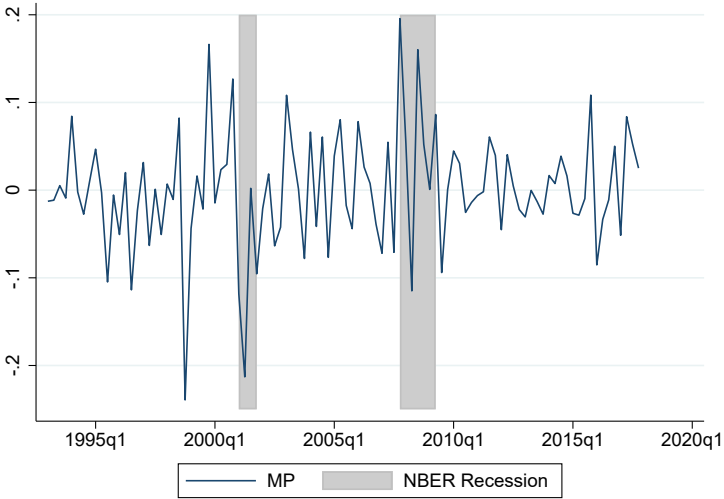
Instrumental variable for monetary policy

Endogeneity issue: i_t is set by the FOMC in response to macroeconomic conditions

Solution: use high-frequency monetary policy surprises as an instrumental variable

- constructed from asset price changes occurring in 30-minute windows around FOMC announcements
- Our baseline results use the Bauer and Swanson (2023) series
  asset price changes are purged to make them plausibly exogenous to all publicly known macroeconomic variables before the FOMC decisions.
- We also checked alternative monetary policy surprises: the first principal component of asset price changes without purging.

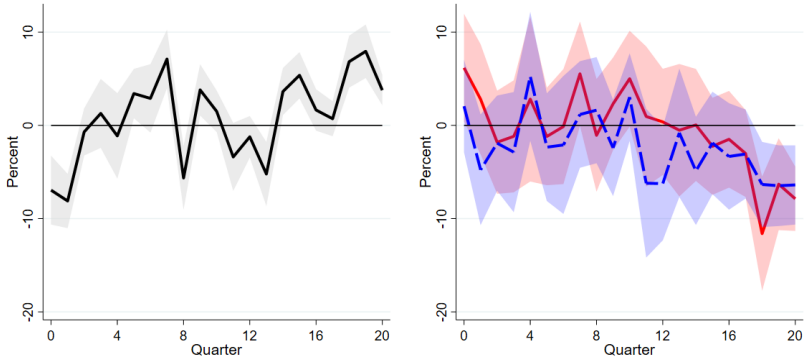
Monetary policy shock at quarterly frequency



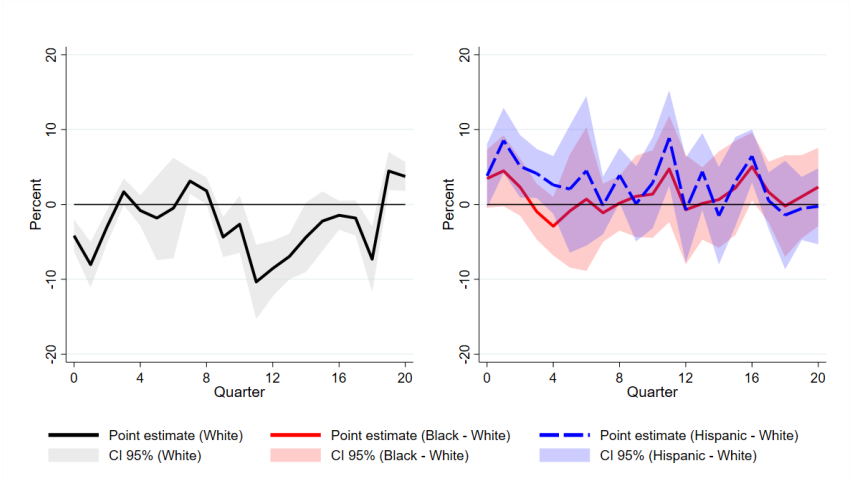
Main results

Black and Hispanic households reduce **gross purchase** relative to White households

In response to a 25 bps increase in i_t

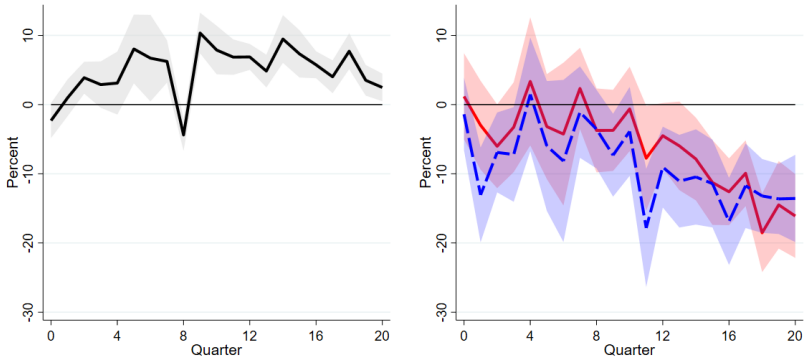


Black and Hispanic households increase **gross sales** relative to White households

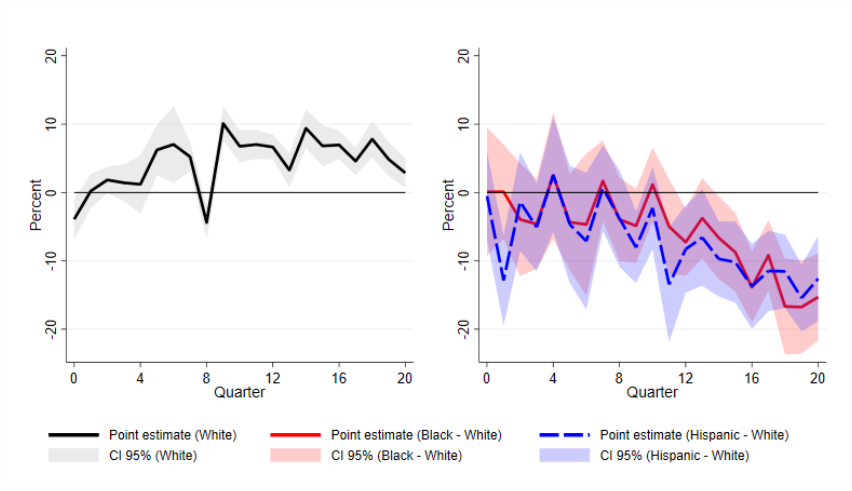


Net Home Purchase = ln(gross purchase)-ln(gross sale)

16 quarters after, Black and Hispanic decline by 12.6 and 16.9 pp, relatively



Similar pattern using purchase and sale dollar volumes instead of raw counts



Sum up

The relative reductions in home purchases and increases in sales jointly lead to the diminished net purchase intensity of Black and Hispanic households compared to White households following monetary tightening.

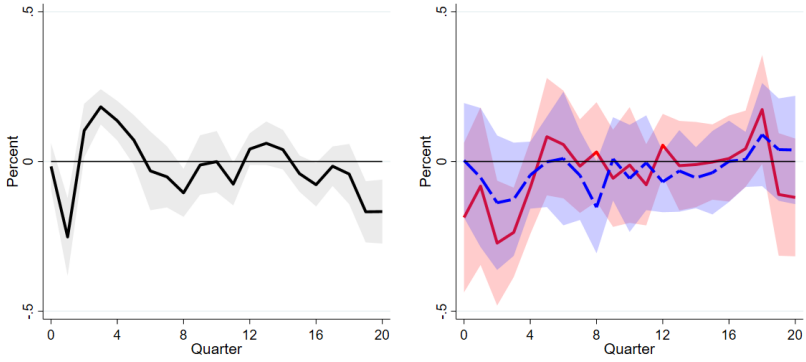
What causes Black and Hispanic households to retreat from the housing market?

Potential Mechanisms

- the financing channel
  Lower mortgage interest rates reduce the cost of borrowing for home buyers
- the employment channel
  Receiving mortgage approval necessitates a work history spanning at least 2 years

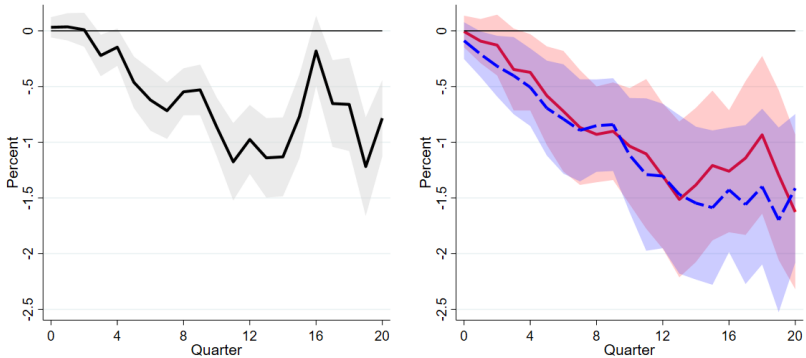
Potential Mechanisms – Mortgage Rate

i_t has a similar pass-through to the average mortgage rate (at purchase) across race



Potential Mechanisms – Employment

i_t has heterogeneous effects on cumulative employment growth by race



Separation margin actually helps minority workers, but the hiring margin dominates

Figure: Hiring Rate

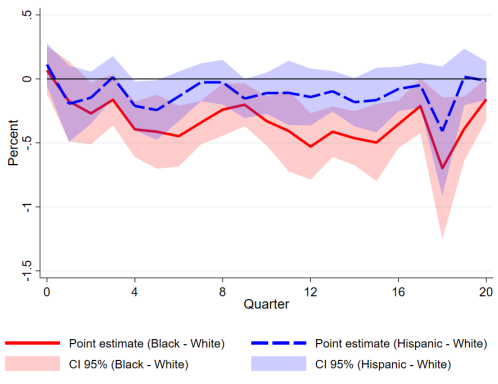
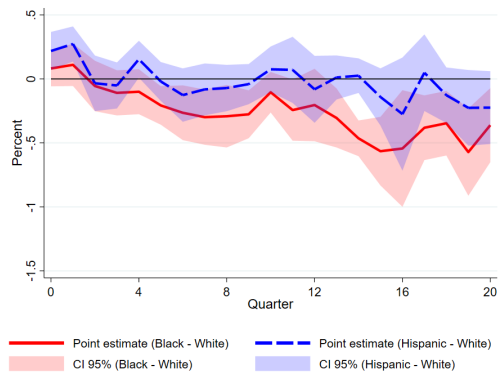
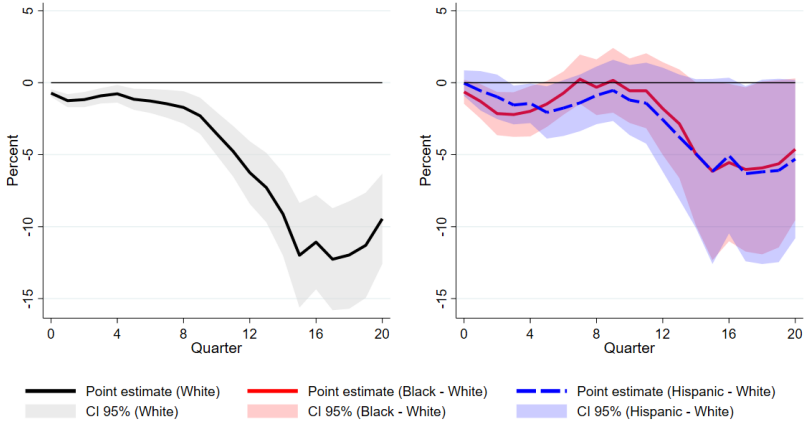


Figure: Separation Rate



Cumulative home price appreciation

16 quarters after, Black and Hispanic decline by 5 and 5.5 pp, relatively



Robustness Checks Overview

- Alternative instrument for monetary policy Details
- Using Purchase and Sale Dollar Volume rather than counts Details
- Real HPIs Details
- Alternative Specification with $\triangle i_t$ Details
- With Additional Controls Details
- With Additional Controls (Extended) Details
- Without City Fixed Effects Details
- Time-clustered lag-augmented heteroskedasticity-robust standard errors, suggested by Almuzara and Sancibrián, 2024 Details
- Time Variation (1995-2013) Details (2000-2017) Details (excl. 2008-2009) Details
- Unweighted Regression Details
- Reduced-Form Analysis Details

Discussion

Effects of Residential Segregation

What might explain the disparity in home price appreciation after monetary tightening?

- There is a causal relationship between homeowners' race and purchase/sale prices
- Another possibility is that it is about residential segregation by race
  - Black and Hispanic homeowners often live in minority neighborhoods
    Black and Hispanic households' housing demand is more sensitive to monetary policy
    Their home price appreciations may be more significantly affected by monetary policy

To explore the role of residential segregation in shaping racial disparities

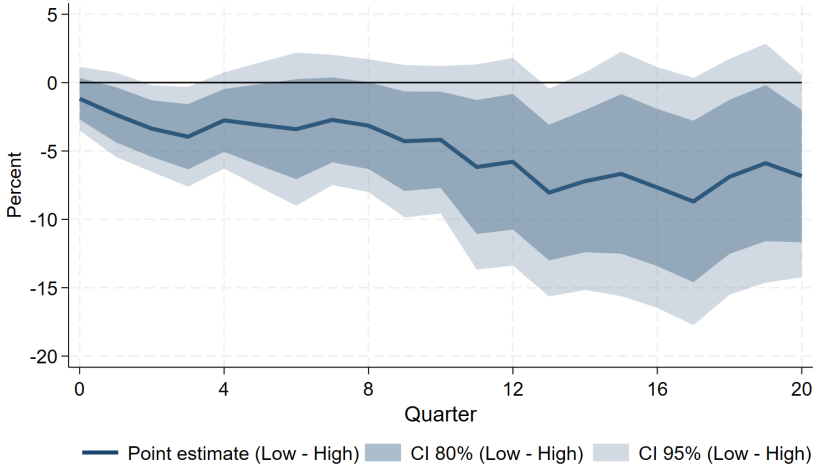
For each city-quarter,

- split homeowners into three groups, based on the White population share within census block group

  distinguishing those living in minority, mixed and predominantly White neighborhoods

- construct race-specific home purchases, sales, HPIs, for each type of neighborhood

White Homeowners in minority neighborhoods encounter steeper declines in housing prices than those in predominantly white neighborhoods



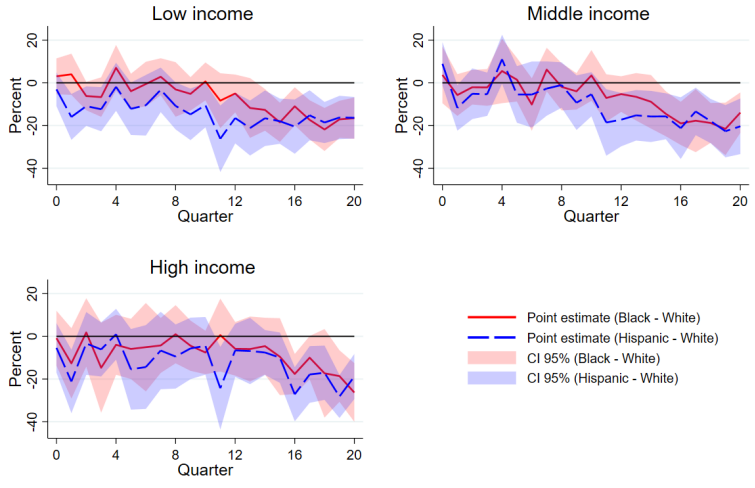
Discussion: Role of Income

Does the observed racial heterogeneity purely arise from persistent income disparities?

To answer this question,

- In the baseline regression, we control the race-specific earn at city-quarter level
- The impulse responses of log earnings are similar across racial groups
- In addition,
  - split homeowners into three income groups: low, middle, and high, based on the quantiles of mortgage applicants' income for each city and quarter
  - construct race-specific home purchases, sales, HPIs, for each income group

Net Purchase Intensity by Applicant's Income



$\Rightarrow$ income differences cannot fully explain the racial differences

Discussion: from home purchase to homeownership

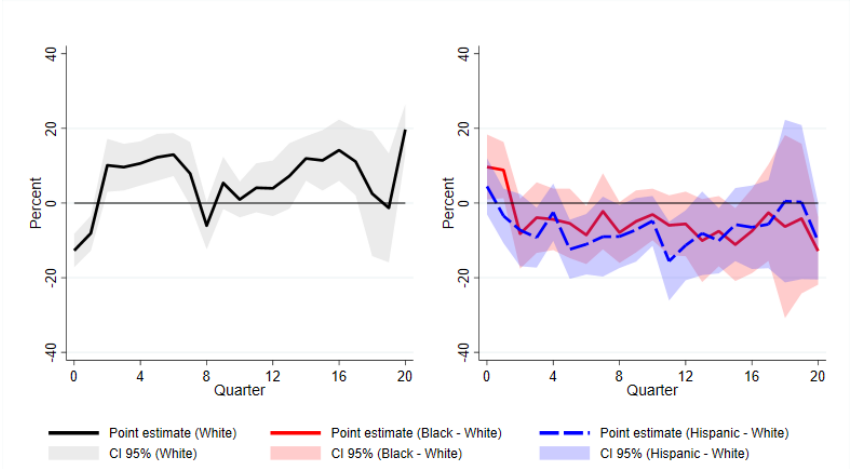
Does the decrease in home purchases among Black and Hispanic households necessarily lead to a reduced homeownership?
Could it be a reduction in the upgrading of homes or purchases of second homes?

We look at home purchases with Federal Housing Administration (FHA) loans

83 percent of FHA purchase mortgages were issued to first-time home buyers

Thus, FHA purchases are good proxies for entries into homeownership.

Home Purchase with FHA loans



$\Rightarrow$ monetary tightening leads to a relative reduction of entries into homeownership for Black and Hispanic households

Discussion: Role of Foreclosure

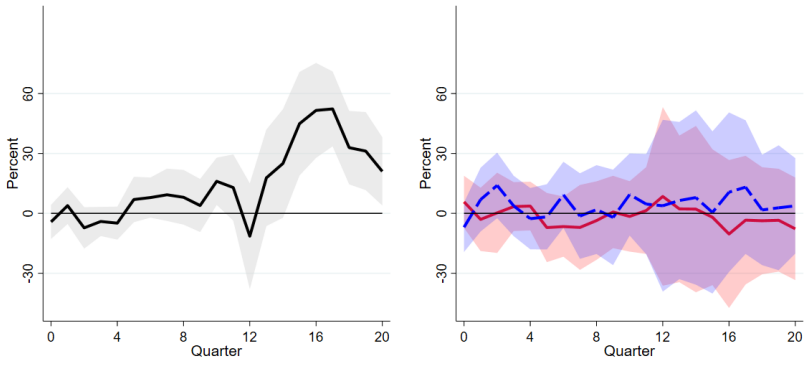
Papers, e.g., Kermani and Wong, 2021 and Diamond and Diamond, 2024, have studied the racial disparities in foreclosures

Our baseline results include foreclosures as a form of sale

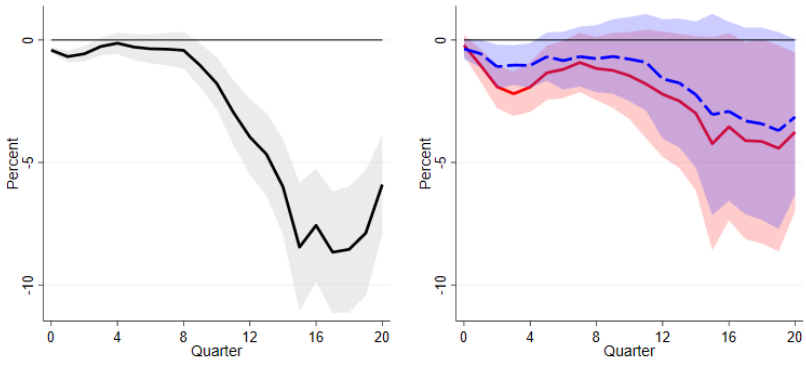
Are the racial differences in response to monetary policies driven by foreclosure?

$\Rightarrow$ we can also separately examine foreclosure and foreclosure-free HPIs

The response of foreclosure is quite similar across races



Looking at foreclosure-free HPI, minority still experiences larger declines



Both results suggest that foreclosure is not the main mechanism that causes racial heterogeneity in response to monetary policy.

Additional Discussions: asymmetric effects of monetary policy?

$$y_{l,t+h} = \beta_y^{\text{pos},(h)} \max(\text{MP}_t, 0) + \beta_y^{\text{neg},(h)} \min(\text{MP}_t, 0) + \text{controls} + \text{error}_{l,y,t}^{(h)}, \quad h = 0, 1, 2, \ldots$$

- Contractionary monetary policy disproportionately harms Black and Hispanic households, leading to greater drops in net purchases, larger decreases in home price appreciation, and worse employment outcomes; conversely
- Expansionary policy does not disproportionately benefit these minority groups

Additional Discussions: cash vs. mortgage homebuyers

Using HMDA to identify home buyers' race means that we miss all cash transactions

Cash vs. mortgage purchase is a margin of substitution that may be affected by MP

We approximate the race-specific mortgage purchase share by calculating the ratio of ZIP code-based race-specific mortgage purchases to total purchases (including both mortgage and cash)

Monetary policy does affect substitution, but there is no significant racial heterogeneity

Conclusion

Key Points

- Black and Hispanic households exhibit heightened sensitivity in their housing responses to monetary policy shocks compared to White households.
- Our analysis underscores the importance of the employment channel in explaining the excess responsiveness of Black and Hispanic housing outcomes to monetary tightening
- Racial differences in the response of home prices to monetary policy can be attributed to residential segregation by race

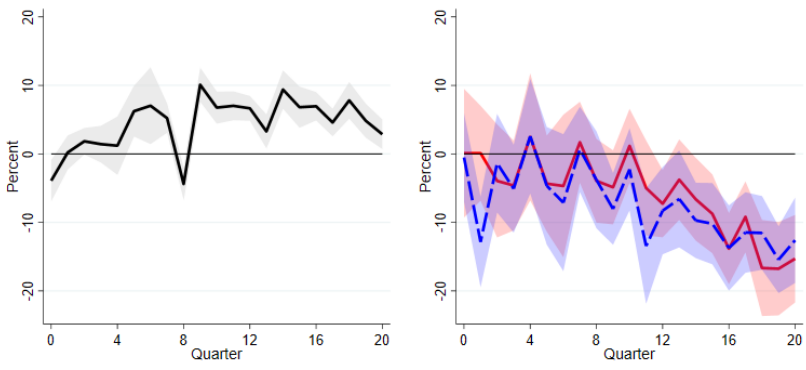
Policy Implications

Our research highlights the importance of recognizing the uneven effects of monetary policy on housing outcomes for Black and Hispanic households.

- To alleviate the uneven effects, policymakers might consider targeted measures, such as hiring credits and employment protection subsidies, to support labor market opportunities for Black and Hispanic groups during monetary tightening.
- Additionally, promoting minority homeownership in predominantly White neighborhoods and reducing residential segregation could help stabilize home values for Black and Hispanic households.

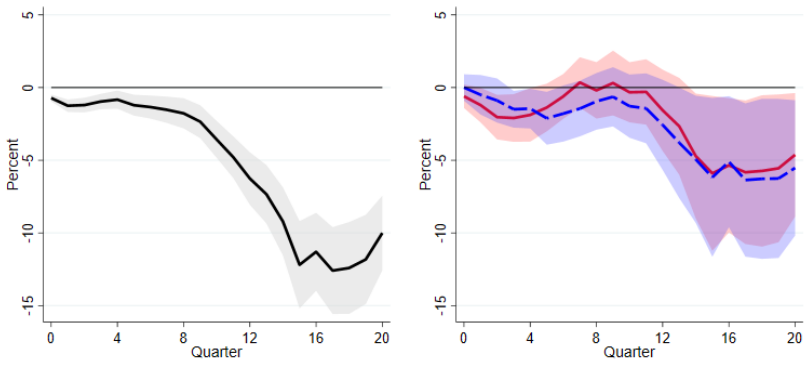
Appendix

Alternative instrument for monetary policy: Net Purchase Intensity



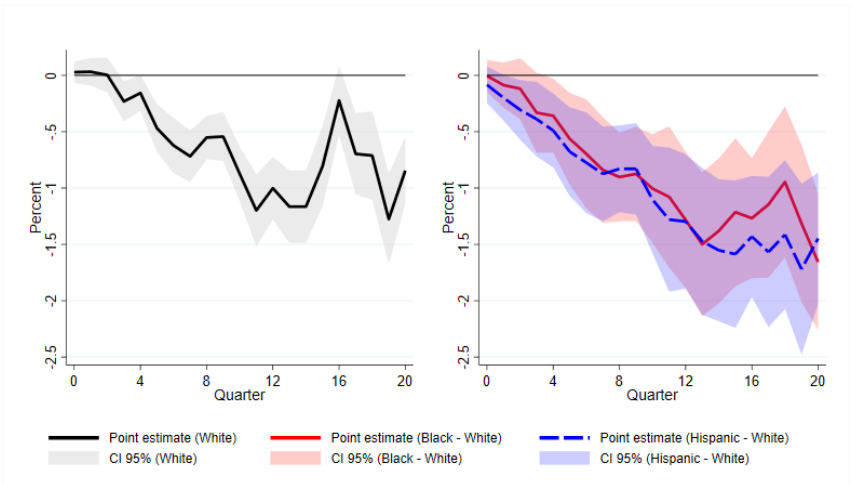
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Alternative instrument for monetary policy: Home Price



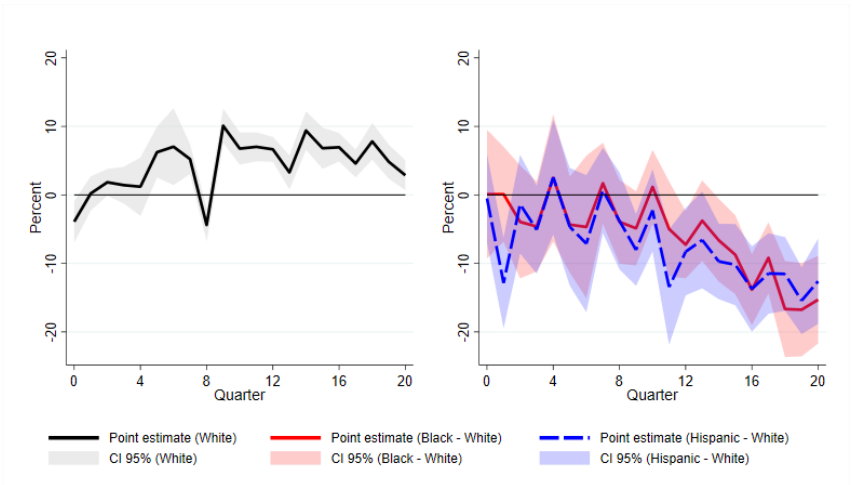
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Alternative instrument for monetary policy: Employment



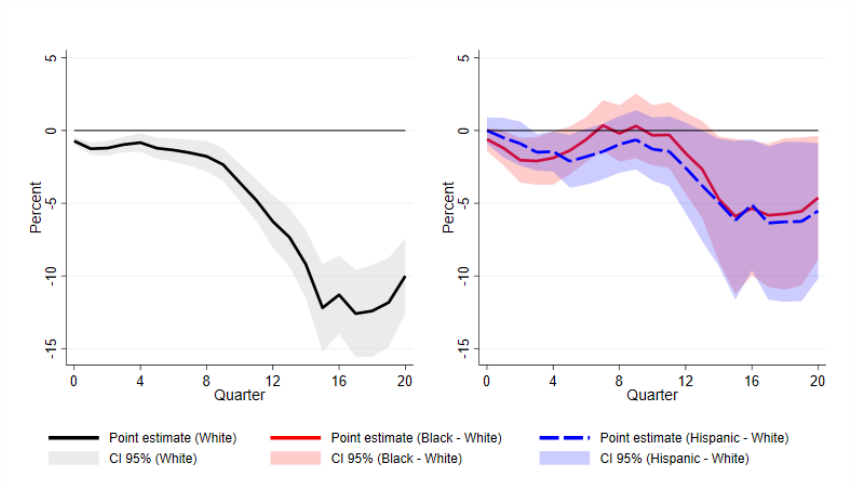
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Net Purchase Volume Intensity Robustness: Net Purchase Intensity



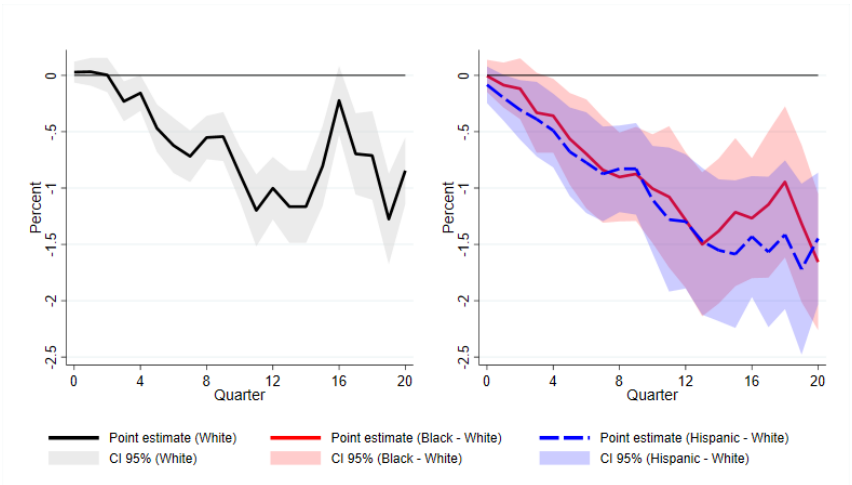
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Net Purchase Volume Intensity Robustness: Home Price



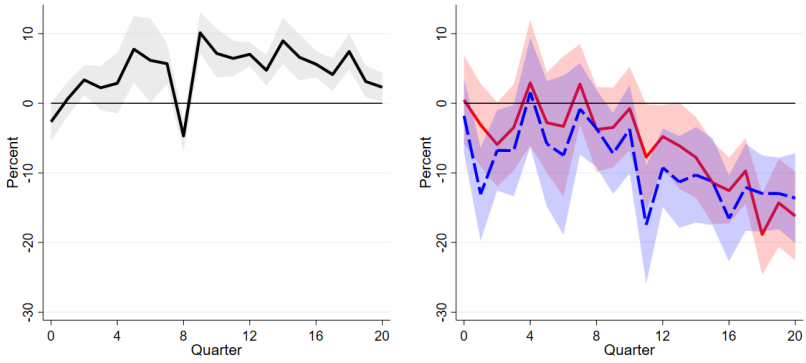
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Net Purchase Volume Intensity Robustness: Employment



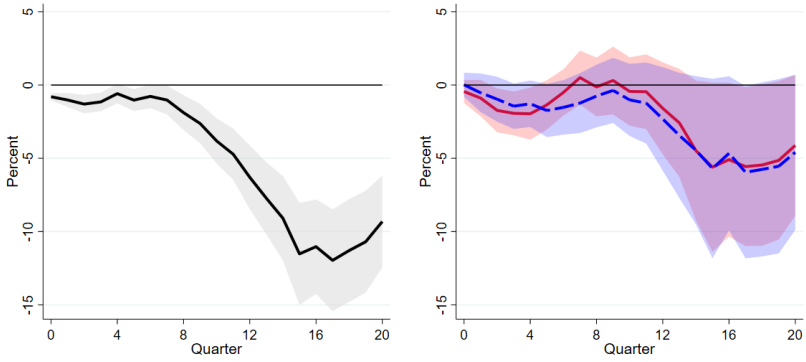
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Real HPIs Robustness: Net Purchase Intensity



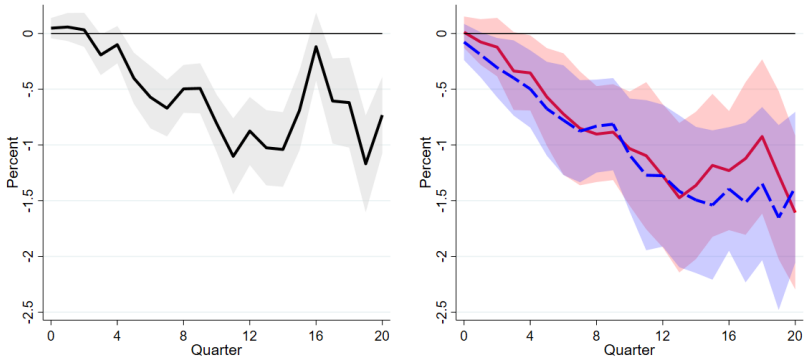
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Real HPIs Robustness: Home Price



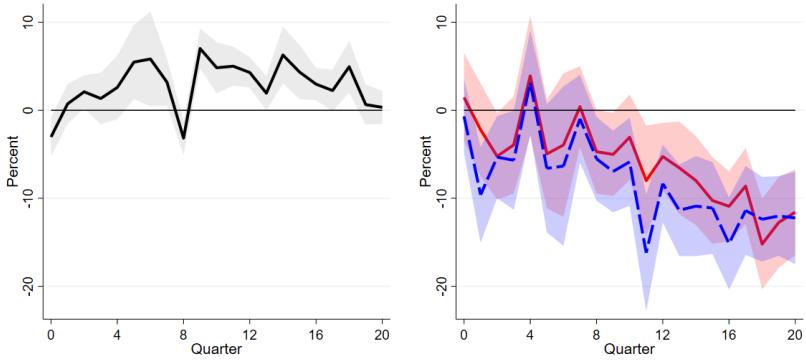
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Real HPIs Robustness: Employment



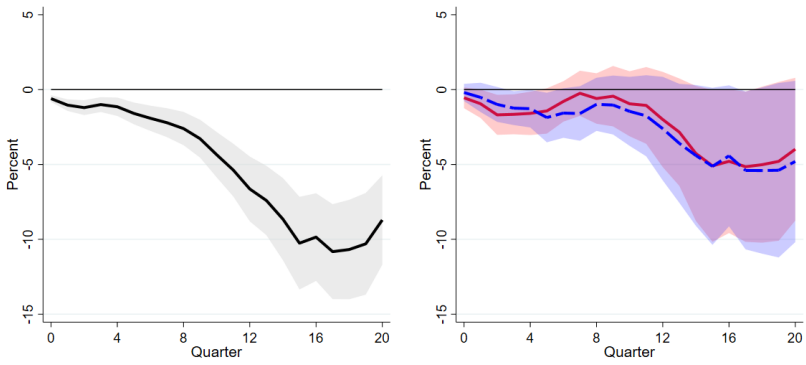
▸ Back to Robustness Overview

Alternative Specification with $\triangle i_t$: Net Purchase Intensity



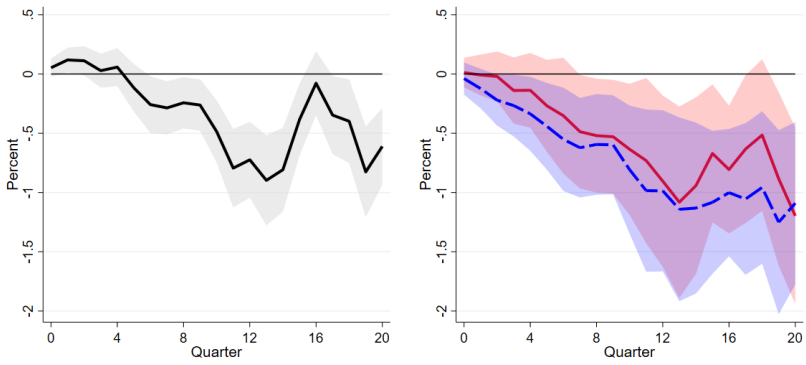
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Alternative Specification with $\triangle i_t$: Home Price



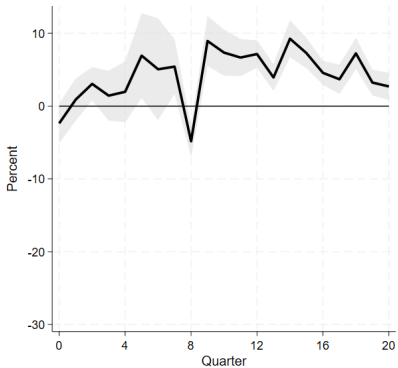
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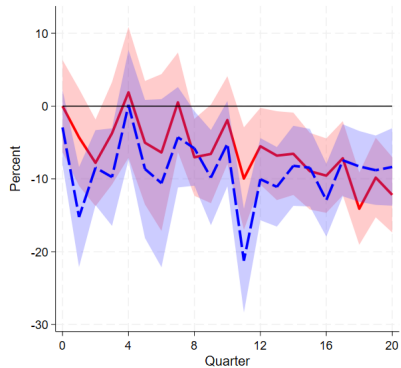
Alternative Specification with $\triangle i_t$: Employment



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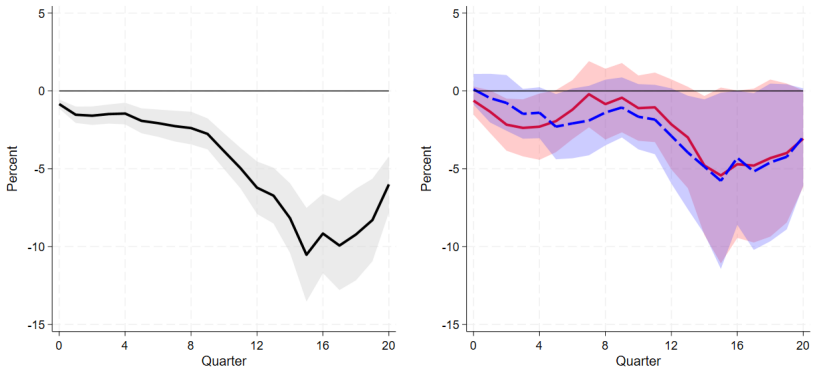
With Additional Controls (Extended): Net Purchase Intensity





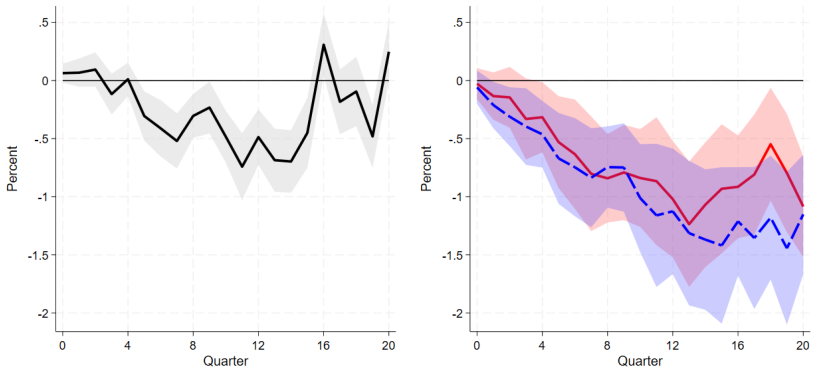
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With Additional Controls (Extended): Home Price



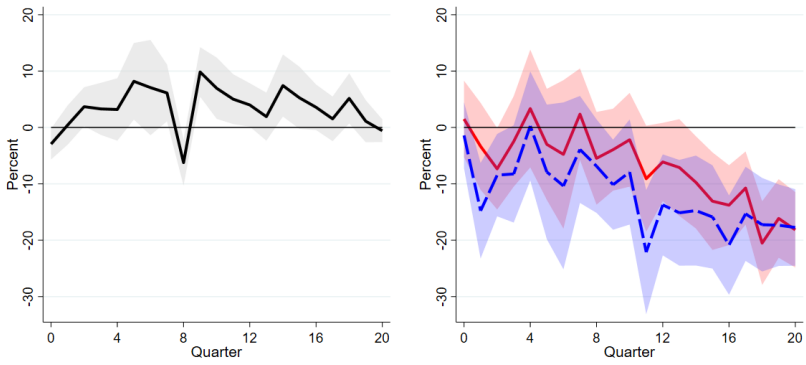
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With Additional Controls (Extended): Employment



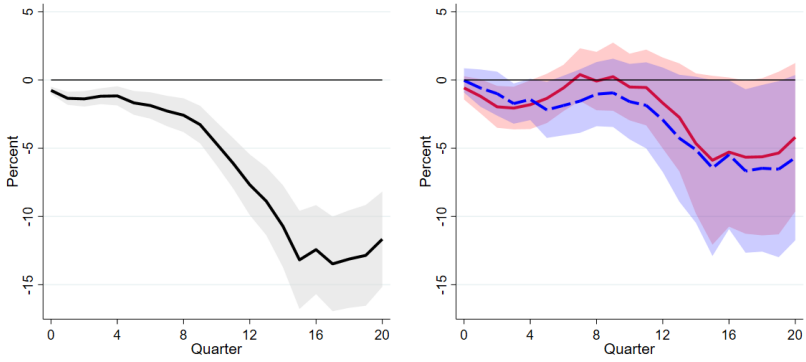
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Without City Fixed Effects: Net Purchase Intensity



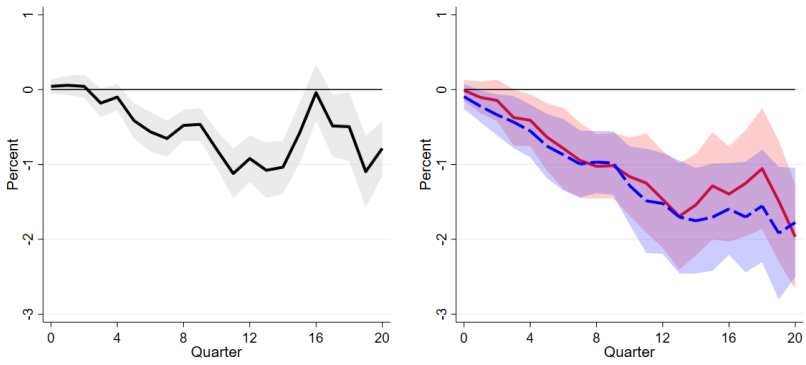
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Without City Fixed Effects: Home Price



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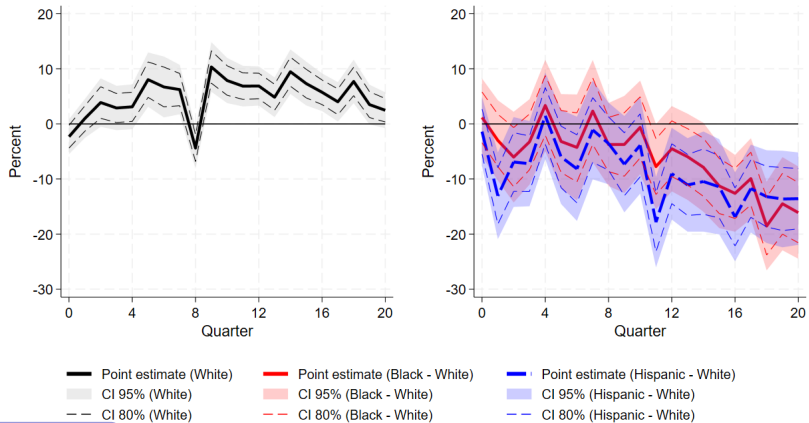
Without City Fixed Effects: Employment



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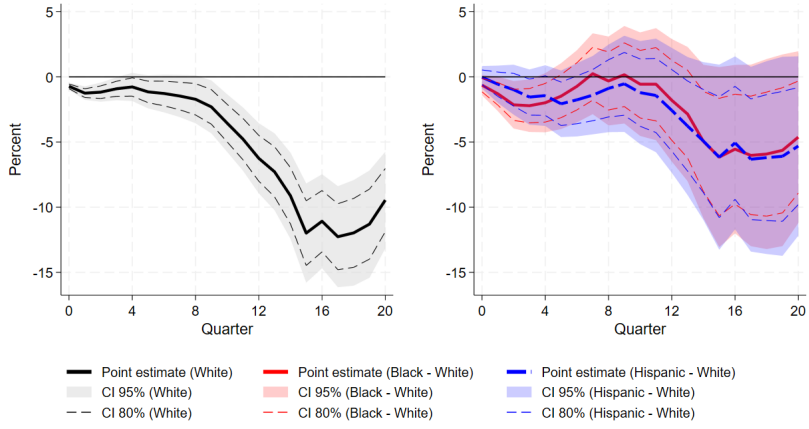
Alternative Standard Errors: Net Purchase Intensity

Time-clustered lag-augmented heteroskedasticity-robust, suggested by Almuzara and Sancibrián, 2024



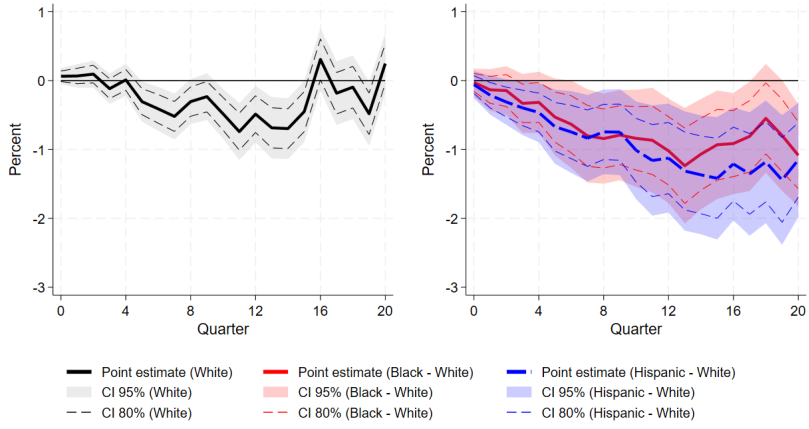
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Alternative Standard Errors: Home Price



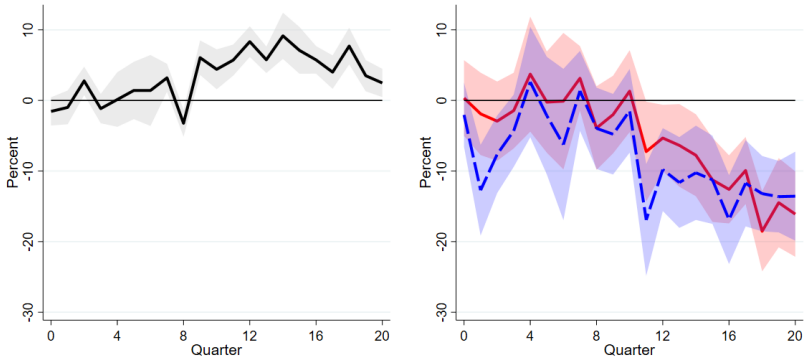
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Alternative Standard Errors: Employment



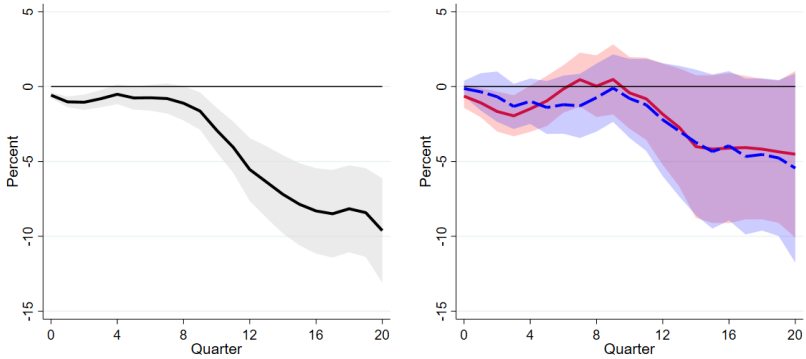
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Time Variation (1995-2013): Net Purchase Intensity



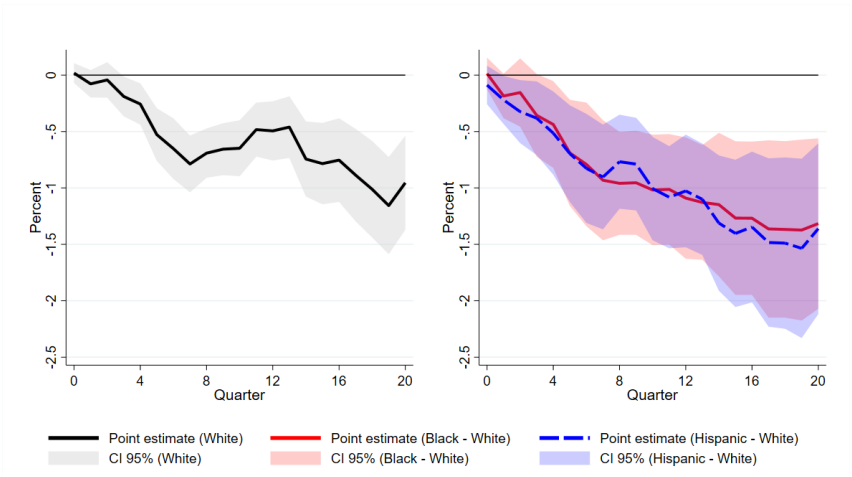
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Time Variation (1995-2013): Home Price



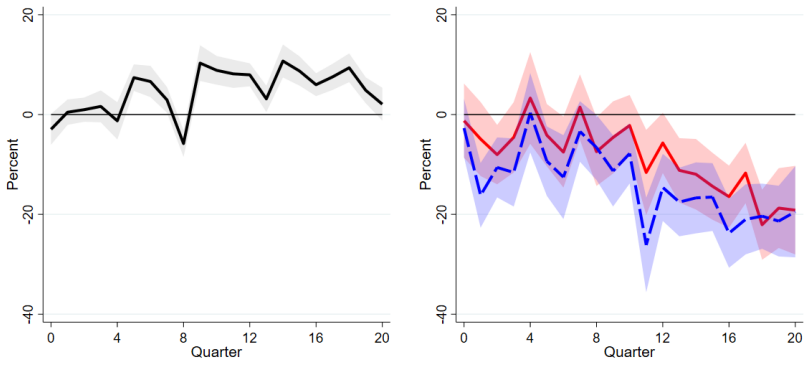
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Time Variation (1995-2013): Employment



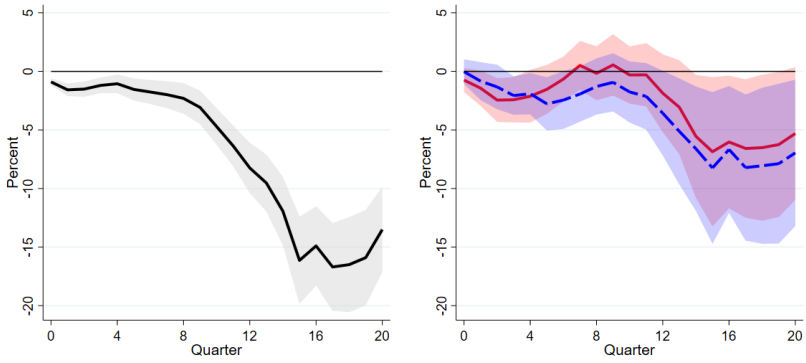
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Time Variation (2000-2017): Net Purchase Intensity



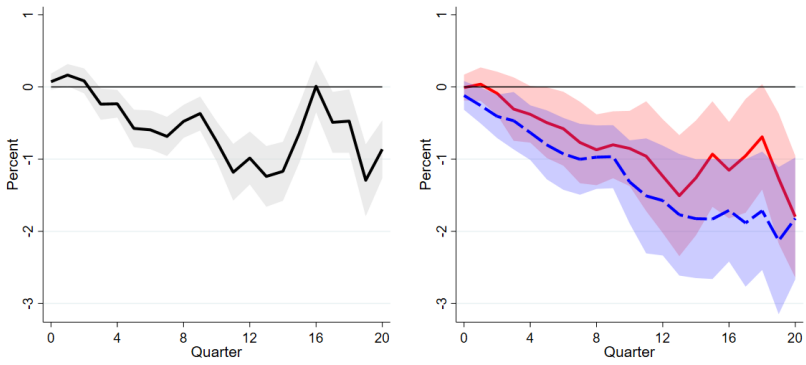
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Time Variation (2000-2017): Home Price



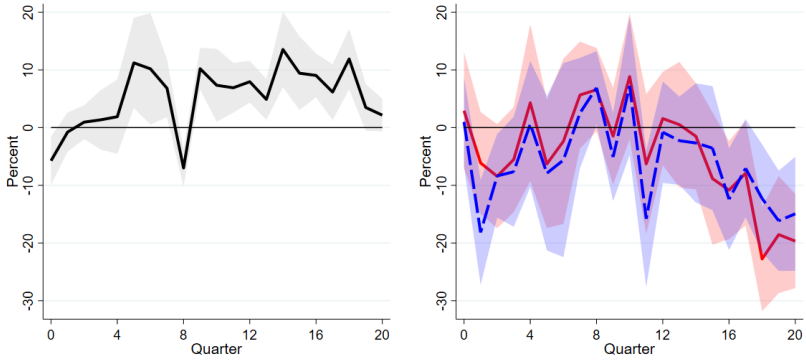
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Time Variation (2000-2017): Employment



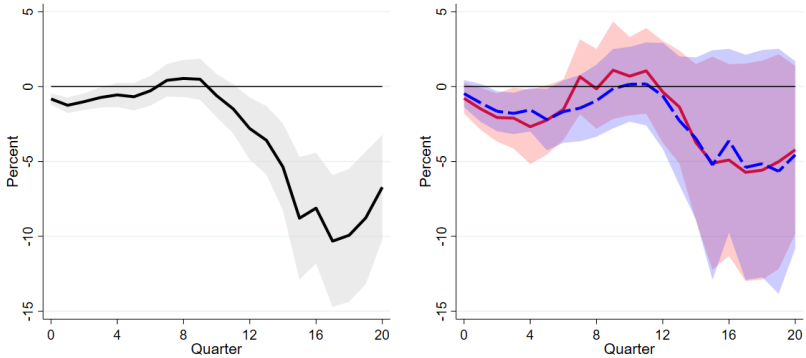
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Time Variation (Excluding 2008-2009): Net Purchase Intensity



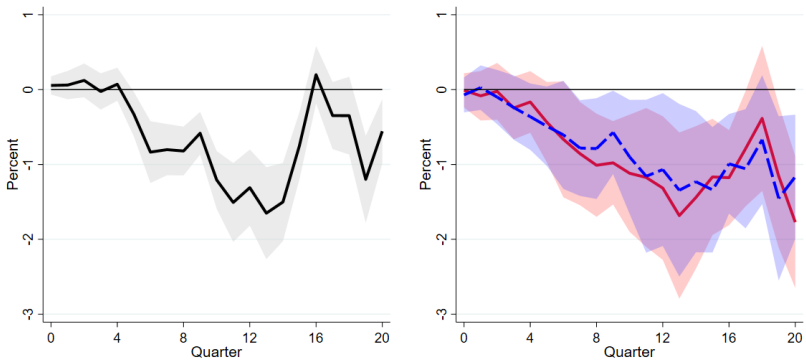
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Time Variation (Excluding 2008-2009): Home Price



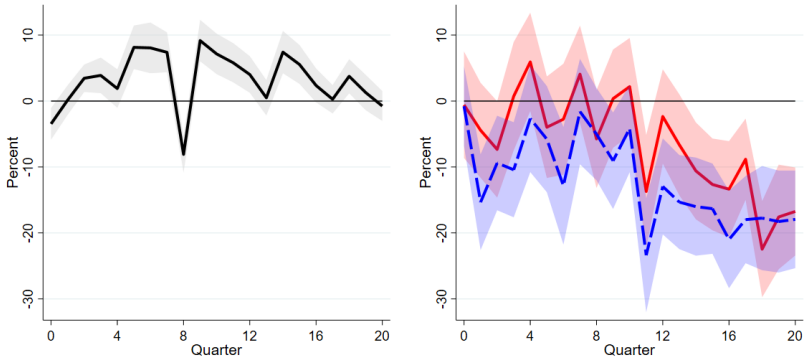
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Time Variation (Excluding 2008-2009): Employment



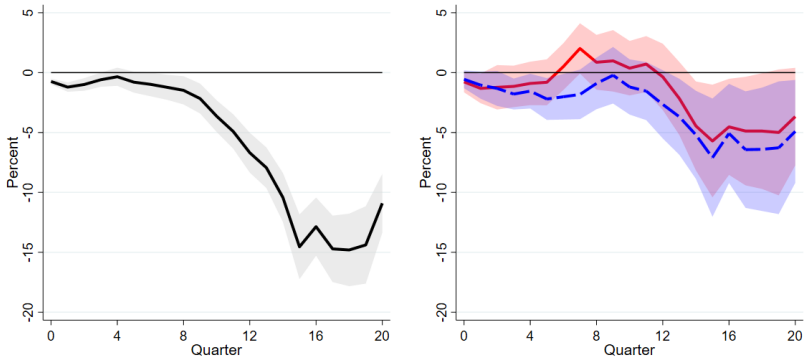
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Unweighted Regression: Net Purchase Intensity



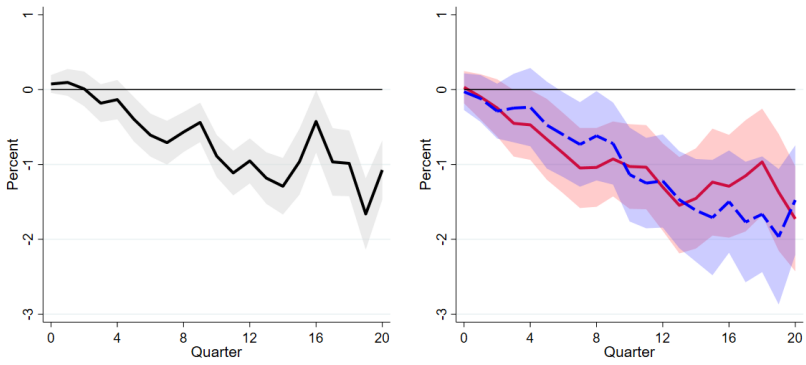
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Unweighted Regression: Home Price



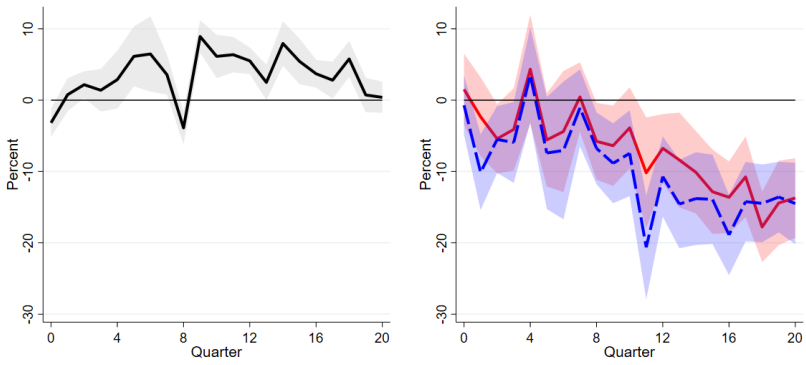
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Unweighted Regression: Employment



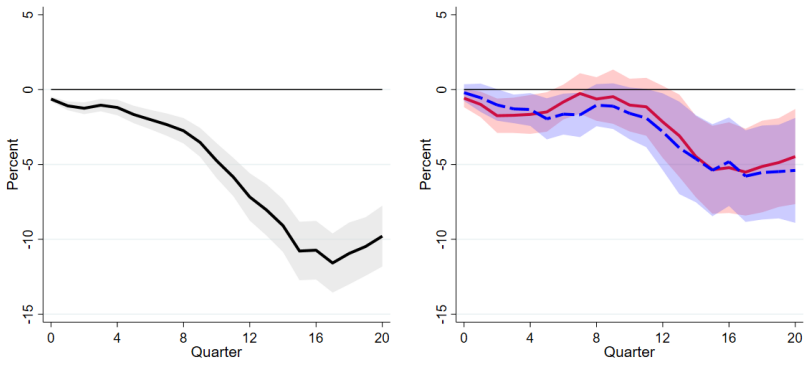
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Reduced-Form Analysis: Net Purchase Intensity



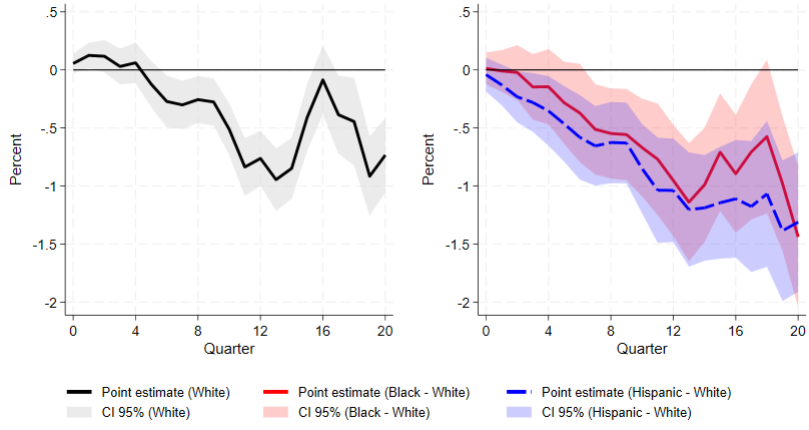
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Reduced-Form Analysis: Home Price



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Reduced-Form Analysis: Employment



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