

Online Appendix for: Demographic Trends and the Transmission of Monetary Policy

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Abstract

In this online appendix

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JEL classification: E31, E52, J11

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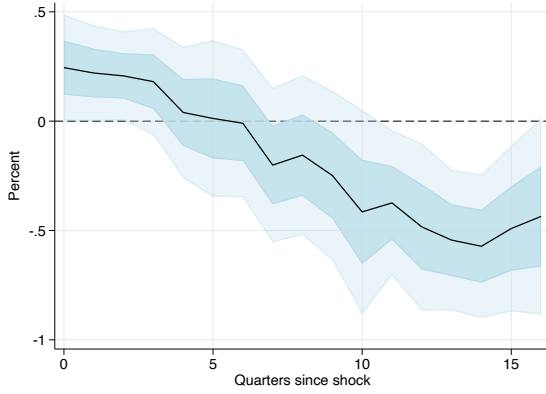
A Data sources

A.1 CEX

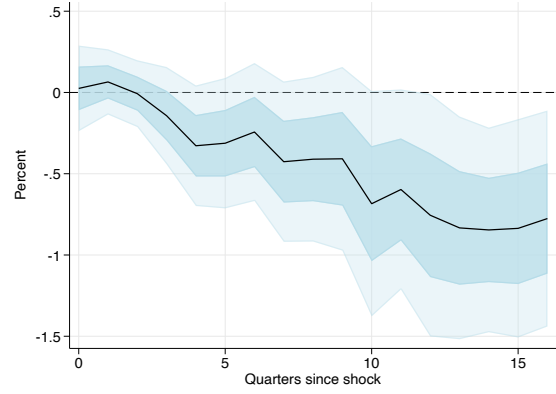
B Robustness for the regional responses

Figure 1: Impact of monetary policy on regional variables, dropping states

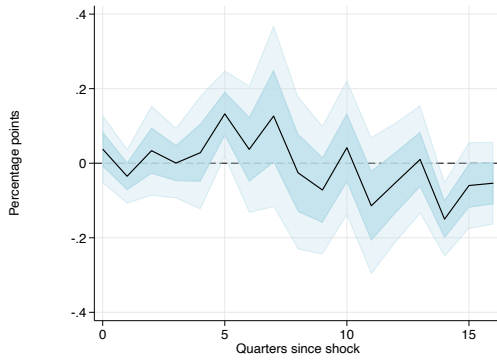
A. Real personal income excluding Alaska, North Dakota, Wyoming, Vermont, District of Columbia



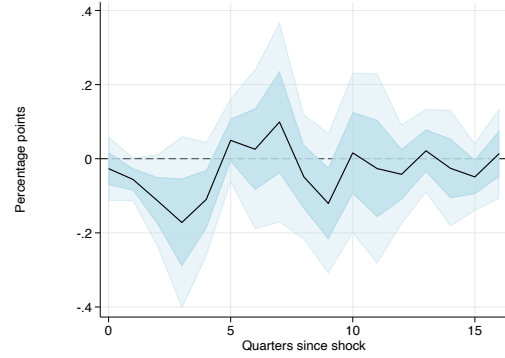
B. Real personal income excluding Florida



C. Inflation rate excluding Alaska, North Dakota, Wyoming, Vermont, District of Columbia



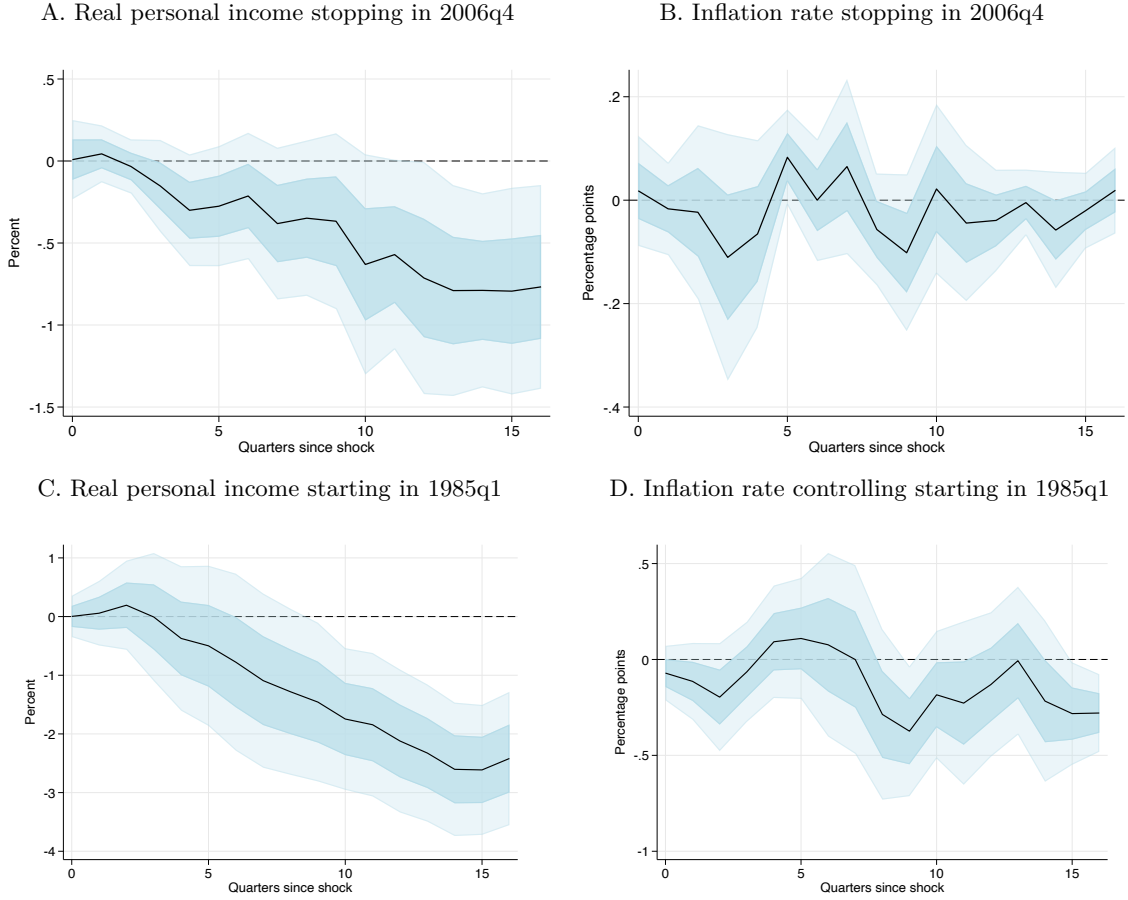
D. Inflation rate excluding Florida



Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level real personal income or the inflation rate. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

In this section I consider a number of robustness checks to the baseline specification. First, I repeat the same empirical analysis excluding the five smallest states by population, i.e., Alaska, North Dakota, Vermont, Washington D.C., and Wyoming as well as Florida. As can be seen in Figure 1, this has basically no effect on the interaction coefficients both for real personal income (top row) and inflation (bottom row).

Figure 2: Impact of monetary policy on regional variables, different subperiods

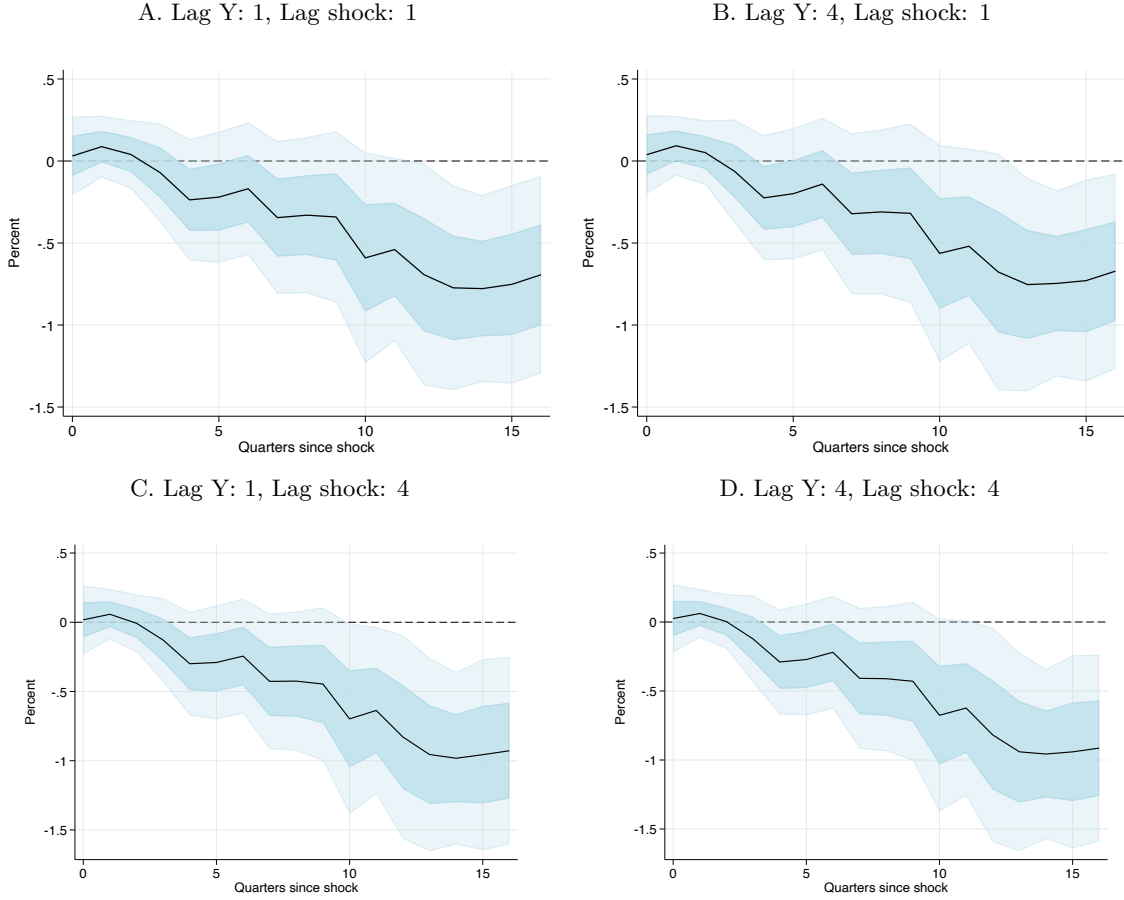


Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level real personal income or the inflation rate. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

Second, I investigate whether our results are sensitive to altering the beginning and the end of the sample. [Coibion \(2012\)](#) shows how few episodes in the early 80s can be the main drivers of the impulse responses computed using local projection with [Romer and Romer \(2004\)](#) shocks. Therefore, I perform the same analysis starting our sample in 1985 as well as truncating all data in 2006 to exclude the financial crisis period. The results are reported in Figure 2. In this case, the results are also robust.

Third, I evaluate whether including different lags of the dependent variable y and the shock might alter the results. I then compute the responses of real personal income and inflation controlling for one lag of y and one lag of the shock, four lags of y and one lag of the shock, one lag of y and four lags of the shock, four lags of y and four lags of the shock. Figure 3

Figure 3: Impact of monetary policy on the regional real personal income, different lags

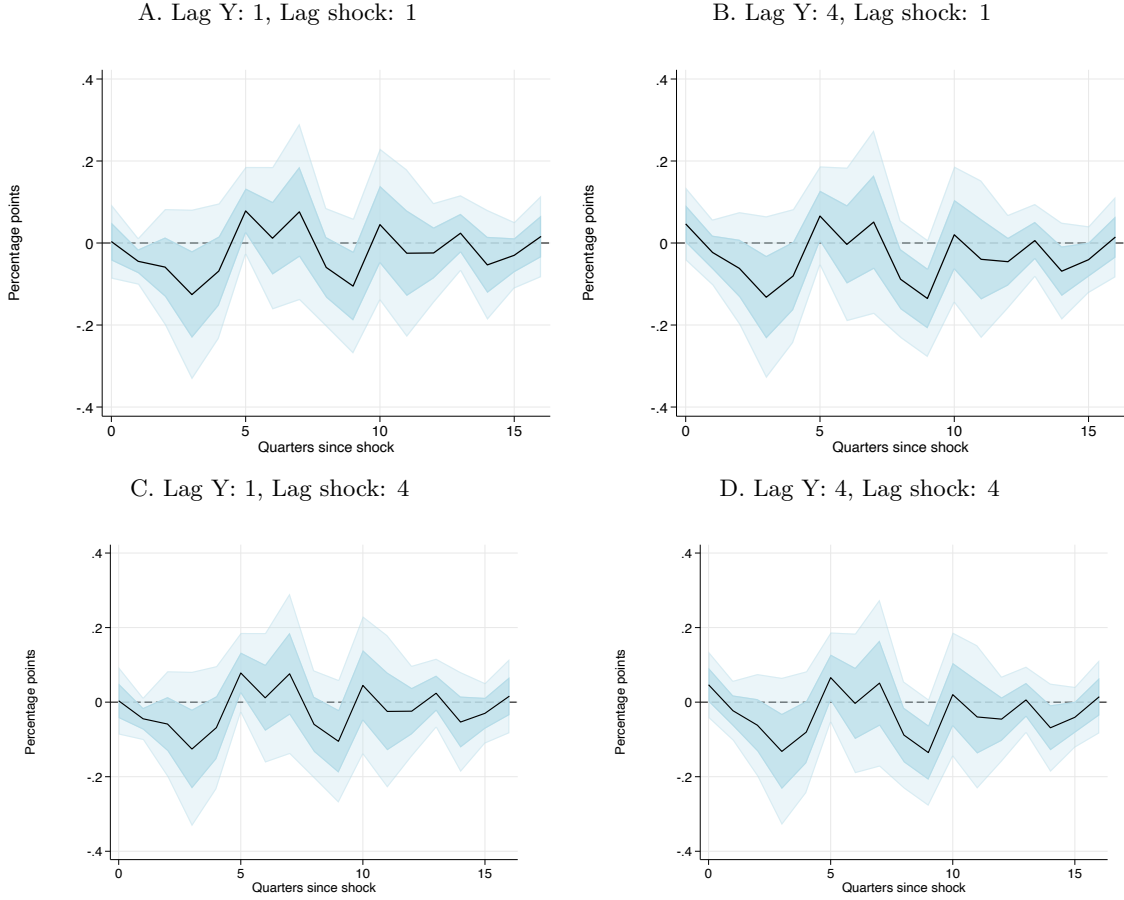


Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level real personal income. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

and Figure 4 show the responses. The results are basically unaffected by the alternative lag specifications.

Fourth, spillover effects from other states might bias the results. It could be the case that the stronger response of personal income and GDP observed in more service intensive states is actually due to an increase in the demand for tradable goods from the surrounding states rather than from the different frequencies of price adjustment across age groups. I test this hypothesis by using the services component of GDP as the dependent variable and as a proxy for the consumption of non-tradable goods: since services are usually not traded across states, differences in responses to shocks are mainly caused by local characteristics. The results are reported in Figure 5. The response of services in states with a higher service to manufacturing

Figure 4: Impact of monetary policy on the regional inflation rate, different lags



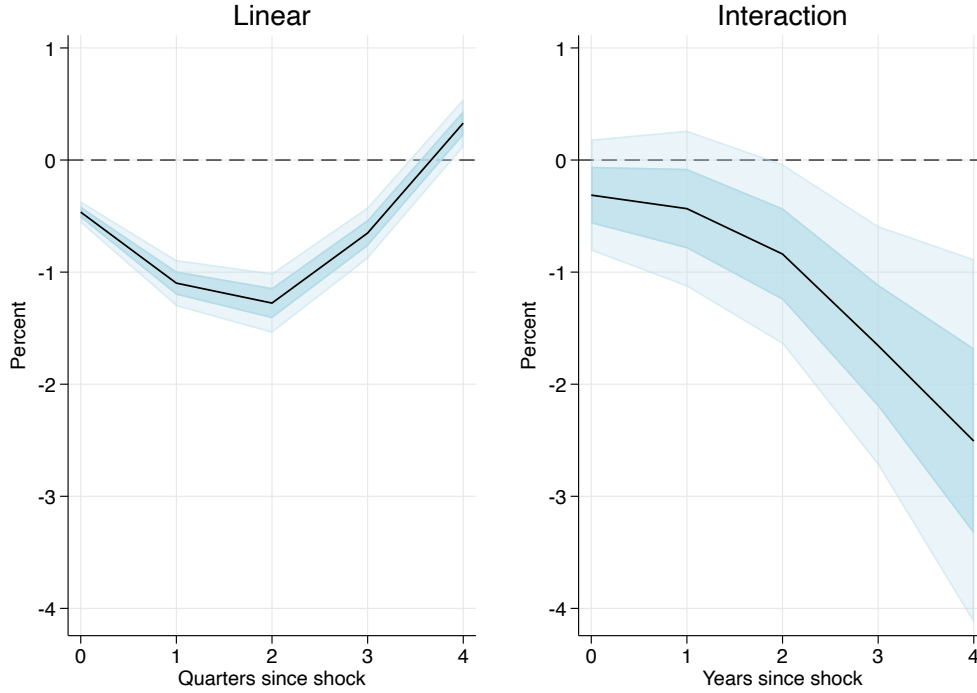
Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level inflation rate. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

GDP ratio is significantly stronger suggesting that the main results are not driven by spillover effects.

Another source of concern might be that state characteristics other than the services intensity may confound the results. To control for these state characteristics, I extend the baseline specification by interacting different control variables with the monetary policy shock¹. For example, [Wong \(2021\)](#) document that the consumption of young homeowners react more strongly to monetary policy shocks. Therefore, I consider different measures of the housing market like house prices and the fraction of mortgages that are adjustable-rate mortgages (ARMs) both retrieved from the FHFA. I also control for the share of males workers, white workers, college educated workers, small firms (below 249 employees), young firms

¹The results are not affected if the controls are not interacted with the shocks.

Figure 5: Impact of monetary policy on the regional services production



Notes: The left panel of the figure plots the response of the state level log of the real services production to a percentage point contractionary monetary policy shock, as well as the 68% (dark shaded area) and 95% (light shaded area) confidence intervals. The horizontal axis is in years. The right panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution.

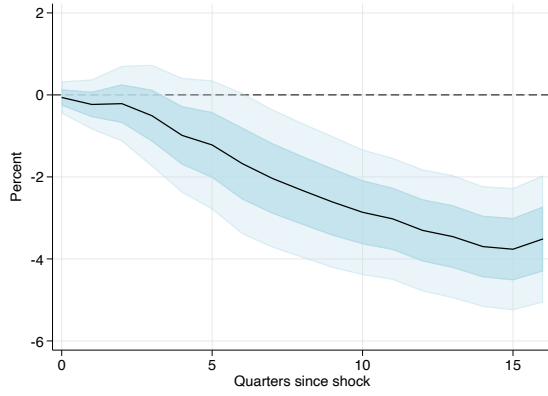
(younger than 5 year old) using data from the LEHD. As suggested by [Leahy and Thapar \(2020\)](#), to take into account that the entrepreneurial activities of the middle-aged might lead to different responsiveness across states, I include the log of establishment deaths and births from the BLS. Finally, [Cravino et al. \(2020\)](#) argue that higher-income households tend to purchase goods with stickier prices. Since households' age and income tend to be positively correlated, the results could reflect this mechanism. To control for this, I add the interaction between state GDP per capita and the monetary shocks as an additional regressor. I report all these extra robustness checks in Figures 6 to and Figure 10.

Wu 1990q1-2021q2 [Wu and Xia \(2016\)](#) NS 1999q2-2021q2 [Nakamura and Steinsson \(2018\)](#)

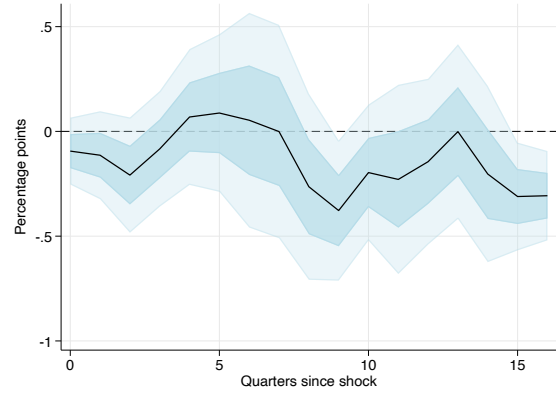
Figure 11

Figure 6: Impact of monetary policy on regional variables, extra controls

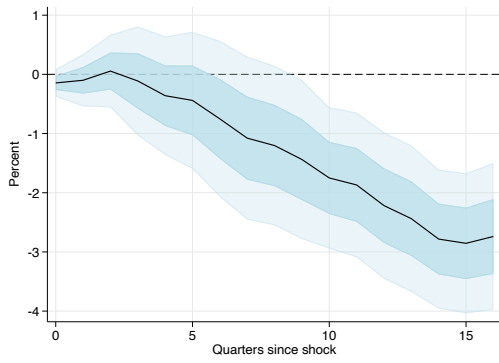
A. Real personal income controlling for house prices



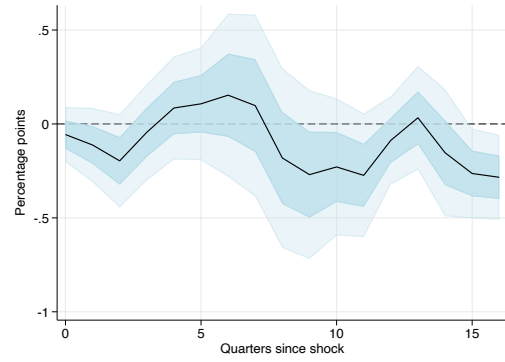
B. Inflation rate controlling for house prices



C. Real personal income controlling for fraction of ARMs



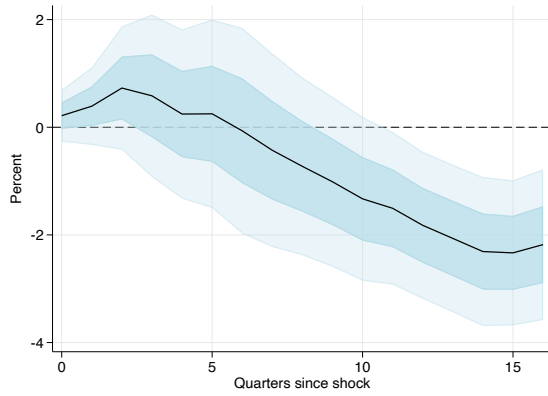
D. Inflation rate controlling for fraction of ARMs



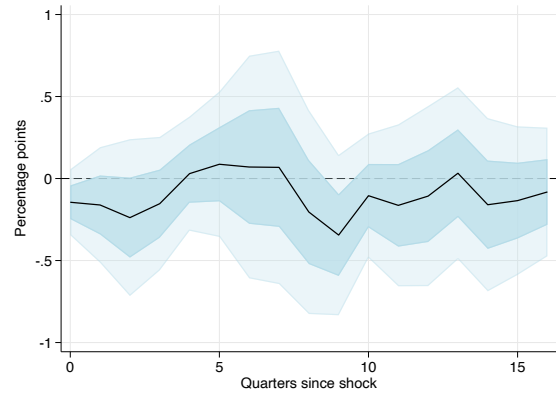
Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level real personal income or the inflation rate. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

Figure 7: Impact of monetary policy on regional variables, extra controls

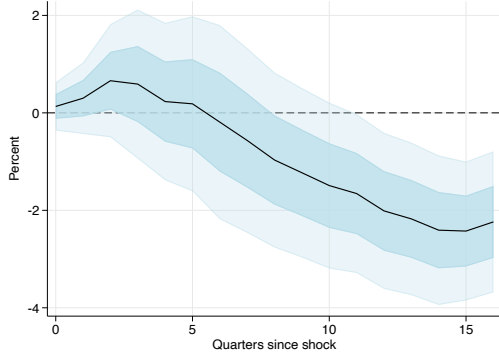
A. Real personal income controlling for workers' sex



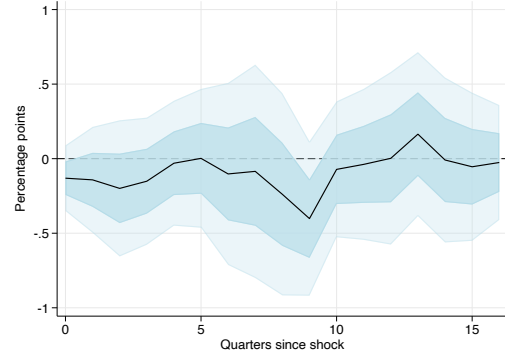
B. Inflation rate controlling for workers' sex



C. Real personal income controlling for workers' race



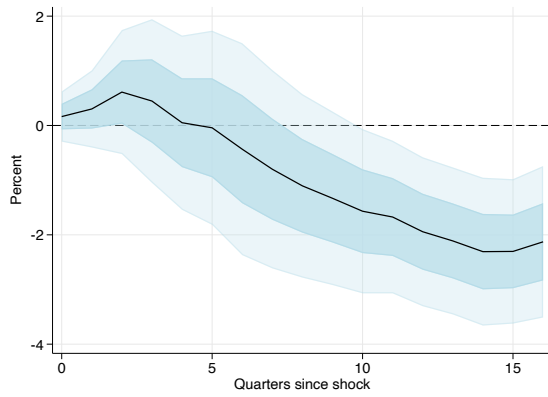
D. Inflation rate controlling for workers' race



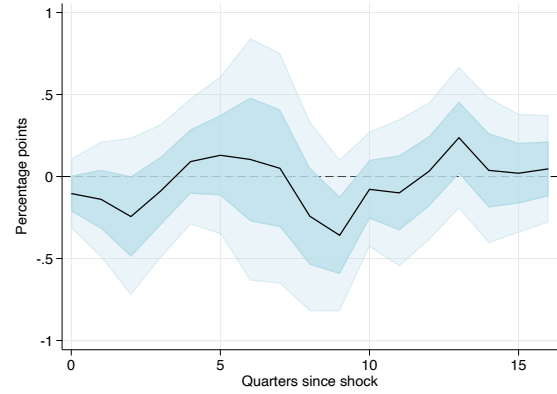
Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level real personal income or the inflation rate. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

Figure 8: Impact of monetary policy on regional variables, extra controls

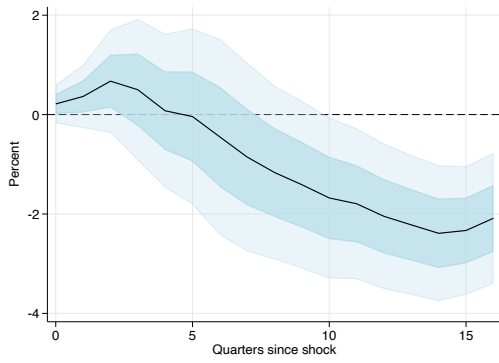
A. Real personal income controlling for workers' education



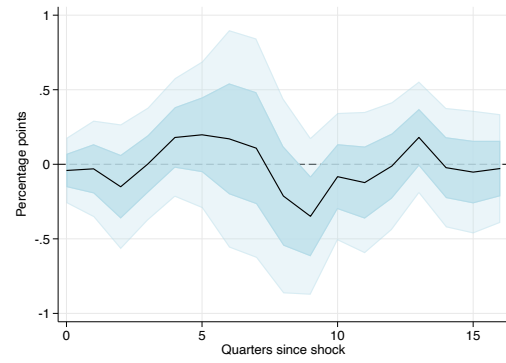
B. Inflation rate controlling for workers' education



C. Real personal income controlling for firms' size



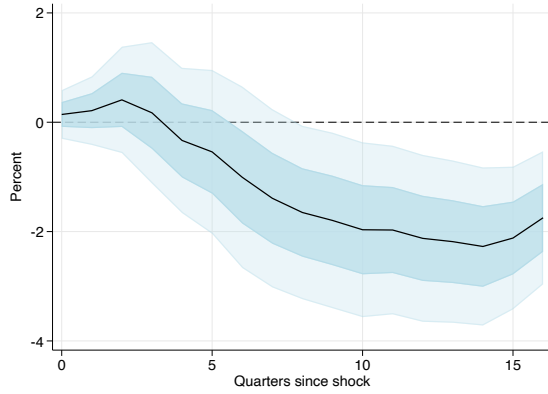
D. Inflation rate controlling for firms' size



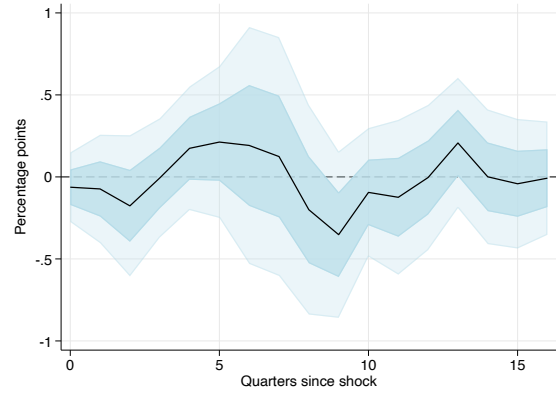
Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level real personal income or the inflation rate. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

Figure 9: Impact of monetary policy on regional variables, extra controls

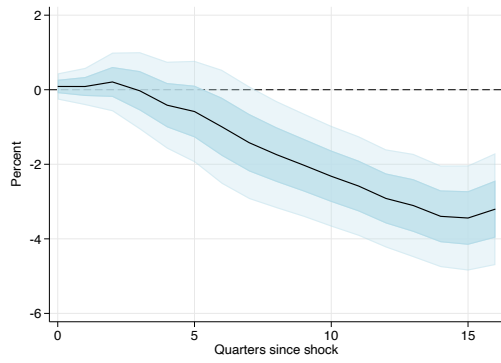
A. Real personal income controlling for firms' age



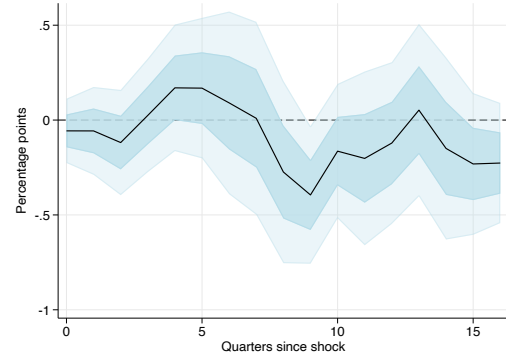
B. Inflation rate controlling for firms' age



C. Real personal income controlling for establishment births



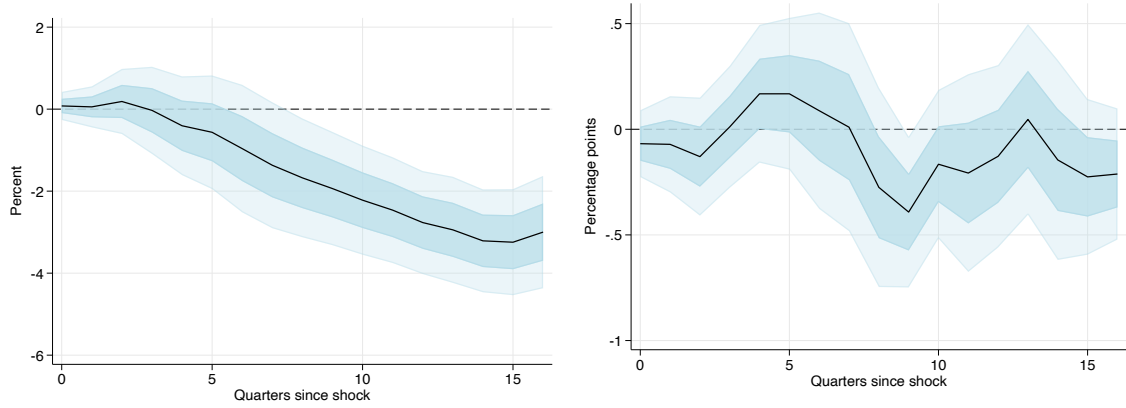
D. Inflation rate controlling for establishment births



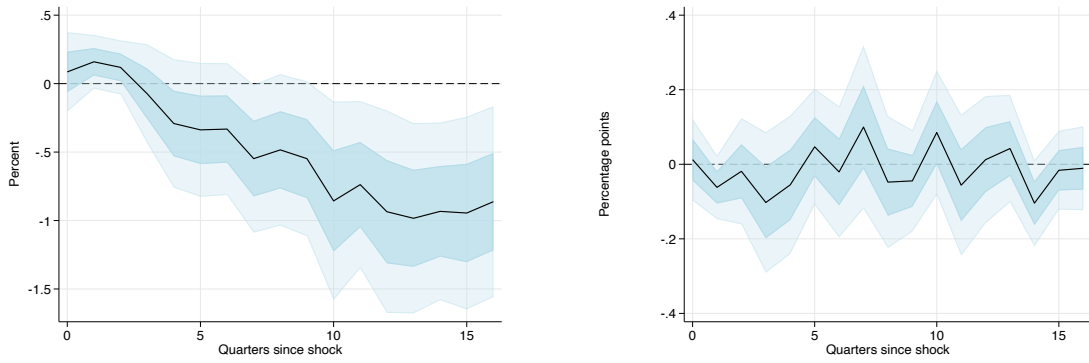
Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level real personal income or the inflation rate. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

Figure 10: Impact of monetary policy on regional variables, extra controls

A. Real personal income controlling for establishment deaths
B. Inflation rate controlling for establishment deaths



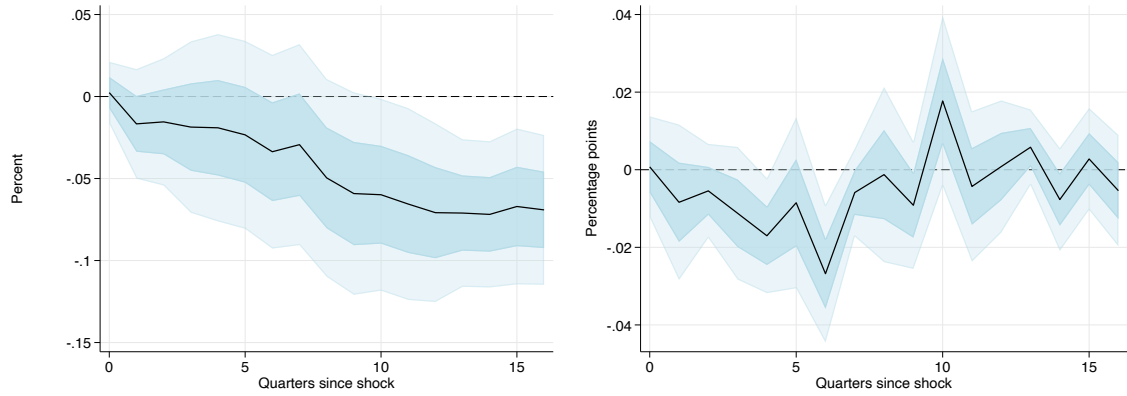
C. Real personal income controlling for GDP per capita
D. Inflation rate controlling for GDP per capita



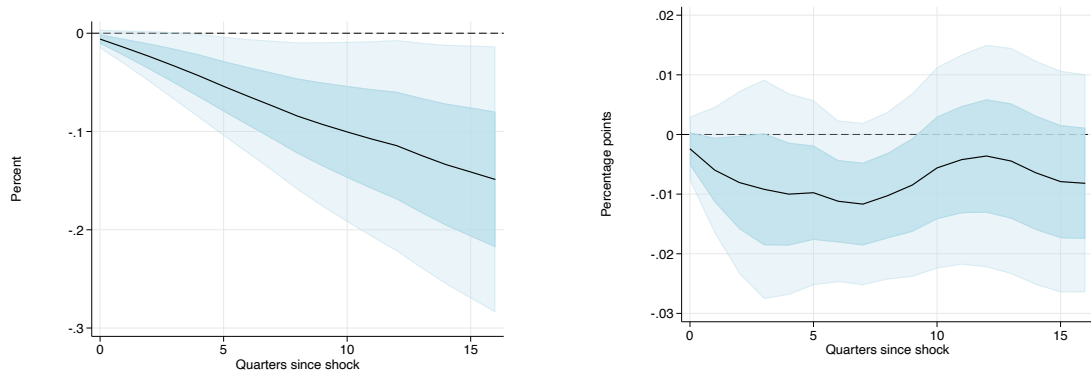
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Figure 11: Impact of monetary policy on regional variables, different monetary shocks

A. Real personal income with shocks from Nakamura and Steinsson (2018) B. Inflation rate with shocks from Nakamura and Steinsson (2018)



C. Real personal income with Wu and Xia (2016)' shadow rate D. Inflation rate with Wu and Xia (2016)' shadow rate



Notes: Each panel reports the interaction coefficients between the monetary policy shock and the dummy identifying the top 20% of the services/manufacturing production ratio distribution using as dependent variable either the state-level real personal income or the inflation rate. The dark shaded area and the light shaded area represent the 68% and the 95% confidence intervals respectively. The horizontal axis is in quarters.

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