

# Monetary Policy, Labor Market, and Sectoral Heterogeneity<sup>†</sup>

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We study the effects of monetary policy on the labor market in different sectors. This is interesting for several reasons. First, since one of the objectives of monetary policy is to impact aggregate employment, an understanding of how employment in different sectors responds to policy will inform monetary authorities regarding which sectors drive the aggregate effect. Second, the heterogeneous employment response across sectors to a monetary policy shock suggests that there will be distributional effects of monetary policy for both the worker and the firm. Knowing the extent of such effects is important from the perspective of aggregate output and welfare. Finally, the results of this empirical analysis will enable us to uncover the importance of underlying frictions in order to inform structural models that study the impact of monetary policy on the labor market.

Our empirical findings reveal that the employment and hiring responses to monetary policy shocks are stronger for firms in the manufacturing and construction sectors relative to firms in the service sector. This result is in line with existing literature emphasizing that the investment and expenditure on durable goods are more sensitive to monetary policy relative to that on nondurable goods (e.g., Howes 2021; Erceg and Levin 2006; Barsky, House, and Kimball 2003). We contribute to this literature by showing that similar conclusions apply to the response of the labor market to monetary policy shocks.

Our second set of results exploits differences in firm size and differences across sectors. First, we find that the differences across manufacturing and services and across construction and services are present within firms of the same size. That is, large

firms in manufacturing and construction respond more than large firms in services. Similarly, small firms in manufacturing and construction respond more than small firms in services.

Second, we find that within sectors employment and hiring growth respond more in large firms than in small firms after monetary contractions; the growth response is lower after monetary expansions. This is in line with the findings of Singh, Suda, and Zervou (2021)—hereafter, “SSZ”—who consider employment and hiring growth in the aggregate economy.

Finally, we find that the differences across firm size within sectors are more pronounced in firms in the manufacturing and construction sectors than they are for firms in services. That is, there are sizable differences in the responses of large versus small firms in the manufacturing and construction sectors, while those differences are muted in the service sector.

The theoretical underpinnings of the sectoral and firm-size responses differ. In Section II, where we discuss our results, we argue that both the frictions behind sectoral heterogeneity (e.g., different degree of price stickiness and/or elasticity of substitution between durable and nondurable goods sectors) and the frictions that are usually proxied by the firm size (e.g., financing frictions) are important for understanding the labor market response to monetary policy shocks.

## I. Data and Methodology

We use labor market variables from the Quarterly Workforce Indicators (QWI) dataset of the US Census Bureau. We use the extended series of monetary policy target shocks from Campbell et al. (2012).<sup>1</sup>

The QWI dataset include all private employers that are covered by unemployment insurance

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<sup>1</sup>As noted in SSZ, the statistical properties of positive and negative target shocks are different, and as a result their impact on labor market variables is also different.

in the United States, aggregated by state, industry, and firm size. The cross-sectional dimension of our panel is specified by the triplet “state-industry-size.” Our sample consists of 17 states, including California and Texas, and covers the period from 1995:I to 2014:I. The QWI reports five firm-size categories; we focus on the smallest firms (size 1), that have 0–19 employees, and on the largest firms (size 5), that have more than 500 employees. The sectors that we consider are manufacturing (North American Industry Classification System (NAICS) sector codes 31–33) and services (NAICS sector codes 31, 54–54, 61–62, 71–72, and 81), and we also compare construction (NAICS sector code 23) with services in the online Appendix. The number of observations per industry range from 6,090 in construction and manufacturing to 54,678 in services. See the online Appendix for summary statistics of the labor market variables for these sectors.

To measure the impact of high-frequency target monetary policy shocks on the labor market, we employ the local projections method. In our analysis, the dependent variable is the cumulative growth rate of employment.<sup>2</sup> To examine the heterogeneous response to positive and negative target shocks of firms that differ in size, we interact the target shock with firm size. The specification below is estimated separately for each industry  $i$ :

$$\begin{aligned} \Delta_h n_{gis,t+h} = & \alpha_{gis}^h + \beta_{s,Target^+}^h \epsilon_t^{Target^+} \mathbf{I}_s \\ & + \beta_{s,Target^-}^h \epsilon_t^{Target^-} \mathbf{I}_s \\ & + \Gamma^h Z_t + u_{gis,t+h}^h, \end{aligned}$$

where  $\Delta_h n_{gis,t+h} \equiv \log N_{gis,t+h} - \log N_{gis,t}$  is the cumulative difference of the log labor market variable  $N$  in state  $g$ , industry  $i$ , and firm size  $s$ ,  $h$  periods after the monetary policy shock in period  $t$ . We control for state-size fixed effects for each industry  $i$ ,  $\alpha_{gis}^h$ . We also include state unemployment interacted with firm size, positive and negative path shocks, federal funds rate, and change in federal funds rate as the control variables in the vector  $Z_t$ .  $\mathbf{I}_s$  is a size-specific indicator variable. The impulse

response functions presented in Figures 1 and 2 are constructed using the coefficients  $\beta_{s,Target^+}^h$  and  $-\beta_{s,Target^-}^h$  from corresponding regressions.<sup>3</sup> We cluster standard errors using the panel identifier.

## II. Empirical Results and Discussion

In this section, we compare the response to target shocks in the two largest sectors of the economy, manufacturing and services. In the online Appendix, we also compare construction to services. We then discuss our results and relate them to the existing literature.

Figures 1 and 2 depict the responses of small and large firms in manufacturing and services to a one standard deviation positive (tightening) and negative (expansionary) target shocks. We see that in general, a positive target shock decreases employment growth, while a negative one increases employment growth.<sup>4</sup> The response is strong and immediate after monetary contractions but delayed, muted, or, at times, not significantly different from zero after monetary expansions. This is consistent with the results in SSZ for the aggregate economy.

We now emphasize the differential response across sectors, the main focus of this analysis. As we see in the top and middle panels of Figures 1 and 2, the response of firms in the manufacturing sector is larger (in absolute terms) compared to that of firms in the service sector. The same holds when comparing construction and services (see the online Appendix). Thus, examining the response across sectors, our first result is that the employment and hiring growth of firms in manufacturing and construction sectors respond more to surprise target shocks compared to firms in the service sector.

Figures 1 and 2 also present our second set of results, exploiting differences across sectors along with differences across firm size. First, we observe that the differences across manufacturing and services are present in firms of the same size. That is, large firms in manufacturing respond more than large firms in

<sup>3</sup>In the online Appendix, we also present results for simpler empirical specifications; first, just target shocks, and then, target shocks interacted with firm size.

<sup>4</sup>The qualitative conclusions we make for employment growth also hold for hiring growth. See the online Appendix for the relevant figures.

<sup>2</sup>In the online Appendix, we present the results for the growth rate of hiring.

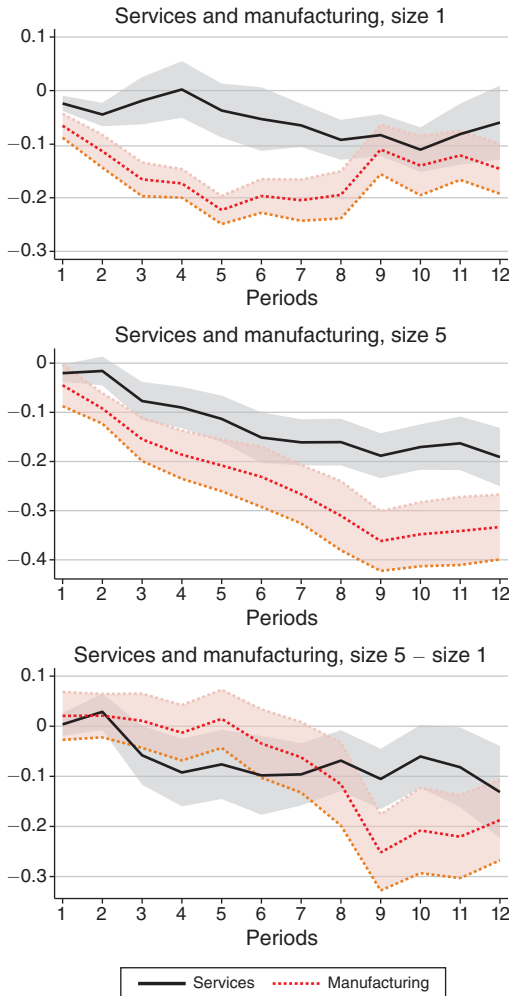


FIGURE 1. RESPONSE OF EMPLOYMENT GROWTH TO POSITIVE TARGET SHOCK

*Notes:* The figure plots the response of small (top panel) and large (middle panel) firms and the difference between them (bottom panel) in services (black solid line) and manufacturing (dotted red line). The horizontal axis measures time (in quarters), and the vertical axis measures the response in percent. The shaded area is the 80 percent confidence bands.

services; similarly, small firms in manufacturing respond more than small firms in services.

Second, comparing impulse responses within each sector, we find that large firms respond more than small firms to a positive target shock, while they respond less to a negative target shock.

Third, we see that the difference in the response of large and small firms is heterogeneous across sectors. The bottom panels of Figures 1 and 2 show that this differential response to monetary policy shocks based on firm size is more pronounced for firms in manufacturing than in services. That is, large firms in manufacturing and services decrease employment growth more than the small firms do, but this difference across firm size is larger for manufacturing compared to services.

We now discuss our results. All of our results also hold when we compare firms in the construction and service sectors. Consequently, we regard the sectoral heterogeneity in monetary policy responses as differences across the durable (manufacturing and construction) and nondurable (services) goods sectors. The theoretical underpinning of sectoral differences has been highlighted, for example, by Barsky, House, and Kimball (2007). They show that durable goods investment responds more to monetary policy shocks as durable goods have higher elasticity of substitution and lower degree of price stickiness relative to nondurable goods. Bils and Klenow (2004) and Nakamura and Steinsson (2008), among others, find that prices in the service sector are stickier than those in manufacturing; Barsky, House, and Kimball (2003) find that prices in the nondurable goods sectors are stickier than those in the durable goods sectors.

Another line of theoretical literature (e.g., Bernanke, Gertler, and Gilchrist 1999) highlights that through the financial accelerator effect, financing frictions play an important role in driving firms' heterogeneous responses to interest rate changes. A common proxy for financing constraints is firm size. Therefore, sectors that have many small firms (e.g., services) should respond more to monetary policy relative to those that have relatively more large firms (e.g., manufacturing). However, Ottonell and Winberry (2020) and SSZ show that under some conditions large firms respond more than small firms to a monetary policy shock.

The theoretical predictions of these two lines of research suggest that the sectoral differences in the response to monetary policy could be attributed to various frictions. That is, observing the sectoral response to monetary policy shocks would not render conclusions for the underlying operating channels.

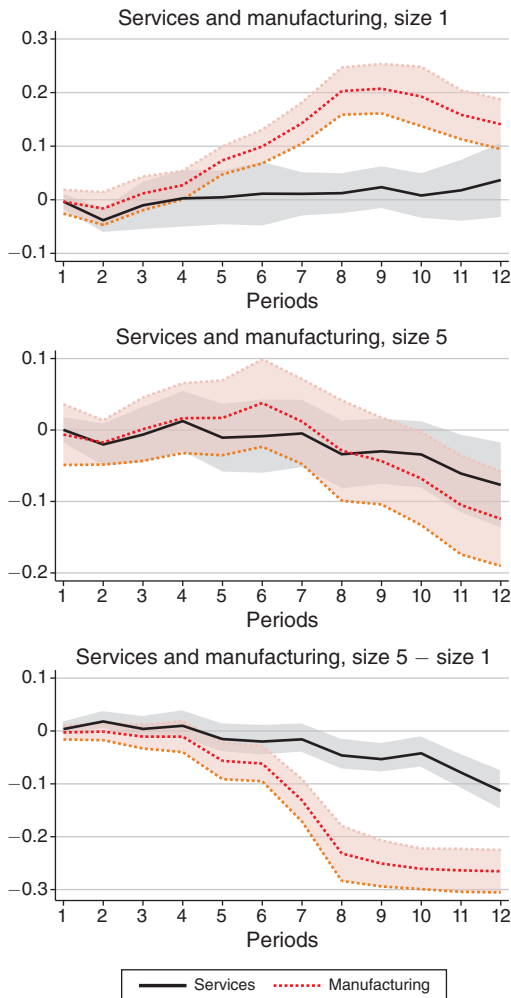


FIGURE 2. RESPONSE OF EMPLOYMENT GROWTH TO NEGATIVE TARGET SHOCK

*Notes:* The figure plots the response of small (top panel) and large (middle panel) firms and the difference in responses between them (bottom panel) in services (black solid line) and manufacturing (dotted red line). The horizontal axis measures time (in quarters), and the vertical axis measures the response in percent. The shaded area is the 80 percent confidence bands.

One way to distinguish among those channels is by looking at the responses of firms that differ in firm size and goods' durability; this is what we examine in our analysis. Demand-side explanations are sector specific, suggesting that the deviations in response among firms across different sectors are large; yet, those

explanations are silent on the deviations among firms of different sizes within a sector. The contrary is true for explanations that rely on financing frictions; the factors that help us understand deviations across firms of different sizes are silent on the different response of firms of the same size across sectors.

Our second set of results contributes to this related literature by examining differences among large and small firms within and across sectors. Our finding that within firm size, firms that operate in the manufacturing and construction sectors respond more than those in the service sectors is in agreement with the literature that studies sectoral frictions mentioned above.

Moreover, our finding that within sectors the employment and hiring growth in large firms respond more than they do in small firms after monetary contractions but do so less after monetary expansions is in line with the earnings channel suggested in SSZ. The earnings channel emphasizes that if earnings decrease after a monetary contraction, a working capital constraint might imply that large firms respond more. This is because a decrease in wages might be more beneficial for financially constrained firms compared to unconstrained firms.

Overall, our findings suggest that there are distinct differences in the response of firms to monetary policy shocks across both sectors and firm size. As such, the frictions emphasized in the sectoral response literature and those analyzed in the financing constraints literature play a role in determining employment response to monetary policy.

### III. Conclusions

We examine the labor market response to monetary policy, highlighting differences across sectors and firm size. We find that both aspects of the data are important in determining firms' responses to monetary policy.

Overall, in terms of policy implications, our results indicate that large firms in the manufacturing and construction sectors are hurt the most by monetary contractions, while small firms in the manufacturing and construction sectors benefit the most from monetary expansions. Firms in the service sector have a more muted response to either monetary expansion or contraction.

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