Finance and Economics Discussion Series

Federal Reserve Board, Washington, D.C.
ISSN 1936-2854 (Print)
ISSN 2767-3898 (Online)

Firm Dynamics, Inflation, and the Transmission of Monetary Policy

William L Gamber

2026-003

Please cite this paper as:
Gamber, William L. (2026). "Firm Dynamics, Inflation, and the Transmission of Monetary Policy," Finance and Economics Discussion Series 2026-003. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/FEDS.2026.003.

Firm Dynamics, Inflation, and the Transmission of Monetary Policy

William Gamber*

December 18, 2025

Abstract

I study how fluctuations in business formation and destruction affect inflation and the transmission of monetary policy. To do this analysis, I extend a New Keynesian model to include endogenous business formation and destruction and heterogeneous producers. A decline in the number of producers puts upward pressure on inflation, and I find that this mechanism can explain about half of the missing deflation following the Great Recession. I then study the transmission of monetary policy in this framework. I show that endogenous fluctuations in entry generate an intertemporal trade-off in monetary policy; a contractionary shock leads employment and inflation to decline on impact, but inflation later overshoots, as the shock also causes a decline in entry and an increase in exit.

*I thank Bence Bardoćzy, Eirik Brandsaas, John Coglianese, Edmund Crawley, Ryan Decker, Sebastian Graves, Antoine Lepetit, Dino Palazzo, Kunal Sangani, Anthony Savagar, and Michael Siemer for their helpful comments and suggestions. All errors are my own.

Contact: Federal Reserve Board, will.gamber@frb.gov

1. Introduction

The Great Recession led to a protracted period of elevated economic slack; yet, counter to the predictions of the canonical Phillips Curve, there was only a muted and relatively brief period of disinflation over this period. (Ball and Mazumder, 2011; Williams, 2010; Bernanke, 2010) In this paper, I put forth a new explanation of this "missing deflation puzzle." I argue that the large and persistent decline in the number of businesses generated by the crisis reduced the productive capacity of the economy, increasing the inflation rate above what it would have been otherwise.

To make this argument, I study inflation dynamics and business cycles in a New Keynesian model featuring endogenous entry and exit, heterogeneous producers, and a producer lifecycle. In this model, a decline in the number of producers of the magnitude observed during the Great Recession can account for about two thirds of the missing deflation puzzle. Intuitively, a decline in the number of producers requires incumbents to each produce a larger share of aggregate output. With decreasing returns at the producer level, each incumbent's marginal cost rises, leading prices to rise and labor productivity to decline. In other words, when there are decreasing returns at the producer level, it is more efficient to produce output with more firms.

I then use this model to evaluate the role of endogenous movements in business formation and destruction in the transmission of monetary policy. A contractionary monetary policy shock causes potential entrants and existing producers to discount the future at a higher rate, leading business formation to decline and business destruction to rise. While the shock leads inflation to decline in the near term, as in the standard New Keynesian model, it causes inflation to overshoot in the medium term, because demand returns to its steady state level but supply remains depressed. The shock also leads to a reduction in average labor productivity.

The New Keynesian model I study features sticky prices and wages, heterogeneous producers, and endogenous entry and exit. In the model, production is divided into two sectors: (1) an intermediate sector featuring heterogeneous producers, free entry, and endogenous exit, and (2) a retail sector, comprising a continuum of identical producers who each purchase a bundle of intermediates that they convert to retail goods and sell to consumers. The retail sector's producers face a cost to adjust their prices, generating a New Keynesian Phillips curve. Wages are also sticky. There is a monetary authority that sets the nominal interest rate according to a Taylor rule.

To understand the macroeconomic effects of fluctuations in the number of producers, I first study the economy's response to a surprise increase in the cost of entry, a proxy for an increase in the cost for new producers to access financing. To isolate the direct effects of the shock, I assume a monetary policy rule that keeps the real interest rate fixed. The shock leads the mass of operating producers to fall. Because the real interest rate is fixed and the representative household's Euler equation dictates consumption growth, the level of consumption is unchanged. So, the remaining producers must each increase their output to meet this fixed demand. Given that their production functions feature decreasing returns, in order to induce them to increase their output at a lower marginal product, the price must rise.[1] Average labor productivity also falls. In a simulation designed to match the U.S. experience during the Great Recession, I show that this mechanism can help account for "missing disinflation"; inflation runs persistently higher during the crisis and its recovery in this simulation than in one in which the number of producers remains fixed.

Next, I use this model to study how endogenous fluctuations in business formation and destruction affect the transmission of monetary policy. I start by estimating the sensitivities of entry and exit to the interest rate in U.S. data. Using quarterly data from the Bureau of Labor Statistics' Business Employment Dynamics (BED) database, I estimate the response of the number of entering and existing establishments, establishment births and deaths, and

[1] It is worth noting that this result does not rely on a pro-competitive effect of entry; in the model, producers face perfect competition. Pro-competitive effects would amplify this channel more. See Gamber (2023) for an analysis of the pro-competitive effects of entry in a model without nominal rigidities.

job creation and destruction due to establishment births and deaths to externally-identified monetary policy shocks. Following Ramey (2016), I estimate a local projection of these measures of producer dynamics on identified monetary policy shocks. I use the shocks from Bauer and Swanson (2022), who identify the effects of monetary policy using high-frequency changes in interest rate futures around Federal Open Market Committee announcements.

I find that a monetary tightening episode leads the mass of establishments to decline meaningfully and persistently. A 100 basis points contractionary shock leads the stock of establishments to decline by more than 2.5 percent after 20 months, and this effect only gradually dies out. These effects are generated by both a spike in exits and a persistent decline in entry. These findings complement evidence from Bergin and Corsetti (2008), who find that entry declines following a monetary tightening episode in a vector autoregression, though I apply an updated methodology to this question. I use these moments to discipline the model.

I then examine how endogenous producer dynamics affect the transmission of a monetary policy shock in the model. In a version of the model in which the central bank follows a Taylor rule, a shock that leads the federal funds rate to increase by 1 percentage point causes the number of producers to decline, falling by 2.6 percent after six quarters—about as much as in the data. The stock of producers only slowly returns back to its original level. Although this contractionary shock leads inflation and employment to fall on impact, they eventually overshoot, as demand recovers faster than the number of operating producers. While the shock leads inflation to decline by 0.4 percentage point on impact, it overshoots persistently thereafter—by nearly 0.2 percentage point at its peak—presenting an intertemporal tradeoff for monetary policy.

Existing literature. This paper contributes to a literature that studies the "missing deflation" phenomenon. This literature has put forward several hypotheses for the relatively stable inflation rate over this period, including financial frictions and a customer base investment motive (Gilchrist et al., 2017), kinked demand curves (Harding, Lindé and Trabandt, 2022), stable long-run inflation expectations (King and Watson, 2012; Ball and Mazumder, 2011; Coibion and Gorodnichenko, 2015), or an alternative measure of slack (Gordon, 2013; Krueger, Cramer and Cho, 2014). In this paper, I show that this puzzle can be resolved, in part, by accounting for a key phenomenon that occurred during the Great Recession: the sharp and persistent decline in the number of operating producers. This explanation does not require abandoning the Phillips Curve, which remains a component of this model.

I also innovate on a literature that studies the role of entry and exit in models with homogeneous producers (see, for example, Bilbiie, Ghironi and Melitz (2008); Bergin and Corsetti (2008); Bilbiie, Fujiwara and Ghironi (2014); and Bilbiie and Melitz (2020)). The models in these papers face two shortcomings. First, the assumption of homogeneity, which allows these models to achieve tractability, is clearly at odds with the data; entering producers are meaningfully smaller than incumbents (Midrigan, 2008). And, second, these papers assume that exit is exogenous, and so it does not fluctuate endogenously with aggregate conditions. In this paper, I incorporate both firm heterogeneity and endogenous exit into the model. Because my model includes a producer lifecycle, fluctuations in producer dynamics have long-lasting effects on real outcomes.

This paper also builds on recent work studying real business cycle models with endogenous producer dynamics and producer heterogeneity (Gamber, 2023; Clementi and Palazzo, 2016). These previous papers study models without nominal rigidities and so do not analyze the effects of producer dynamics on inflation or monetary policy. This paper embeds these real business cycle frameworks into a New Keynesian model, leveraging recent advances in solution techniques to achieve tractability (Auclert et al., 2021).

Lastly, this paper relates to recent work on the supply-side effects of monetary policy, including Baqaee, Farhi and Sangani (2024) and Graves, Huckfeldt and Swanson (2023). Relative to those papers, I study a different channel through which monetary policy affects the productive capacity of the economy: business formation and destruction.

2. A New Keynesian model with producer dynamics

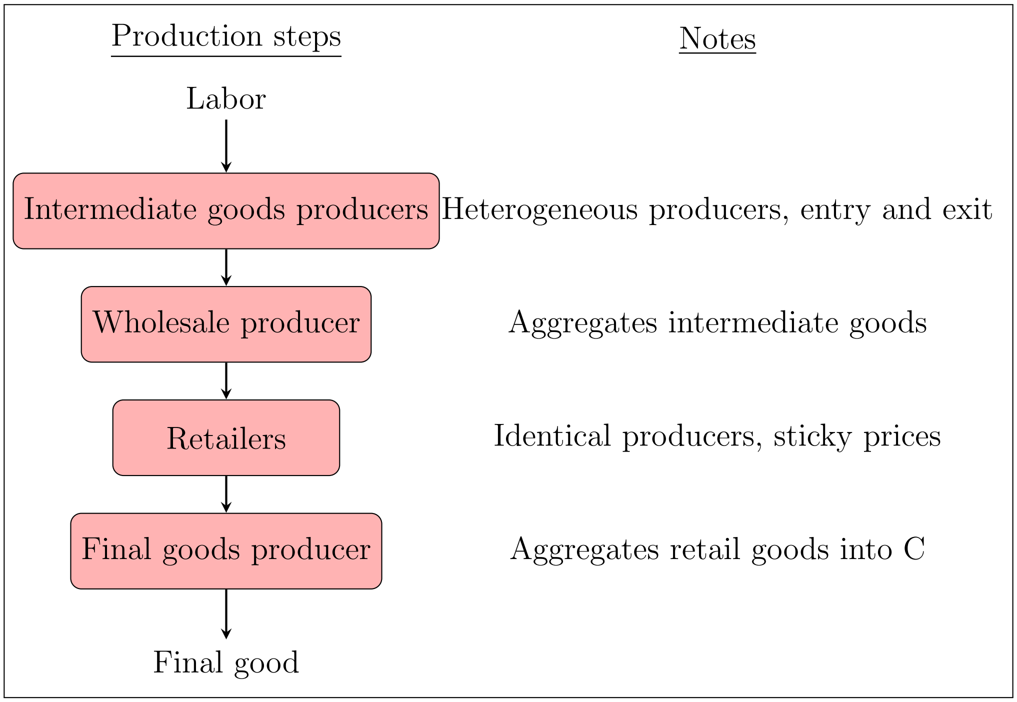
I embed a sector with heterogeneous producers and endogenous entry and exit into an otherwise-standard New Keynesian framework. As in the standard New Keynesian model, there is a representative household who consumes the final good, saves in a risk-free asset, and supplies labor; there is a monetary authority who sets the nominal interest rate according to a Taylor rule; and, there are two sources of nominal rigidities: sticky prices and sticky wages.

The primary point of departure from the textbook New Keynesian model is in the production structure of the economy, which is outlined in figure 1. There is an intermediate goods sector comprising a continuum of heterogeneous producers, each of which uses labor as its sole input. This sector resembles the model in Hopenhayn and Rogerson (1993) – producers face labor adjustment costs, heterogeneous stochastic TFP, and a random fixed cost of production. There is free entry in this sector.

There is also a wholesale sector, which is populated by a representative firm that purchases the output of the intermediate goods sector and converts it into a wholesale good. This firm behaves as though it is perfectly competitive. The remainder of the production structure is similar to the textbook New Keynesian model: In the retail sector, a continuum of identical producers each uses the wholesale good to produce a differentiated retail good, which it sells to the final goods producer. Retail producers face sticky prices à la Rotemberg (1982), and this sector generates a Phillips Curve. Lastly, a perfectly competitive final goods producer uses a CES production function to assemble the final good, which it sells to the representative household.

2.1. Representative household. There is a representative household who chooses state-contingent paths for consumption and hours worked to maximize the discounted sum of future utility. I assume that its utility function is separable across time and between labor and consumption:

Figure 1: Production structure in the model



$$\max_{C_t, N_t} \sum_{t=0}^{\infty} \beta^t u(C_t) - v(N_t) \tag{2.1}$$

I specify the following functional forms for the felicity function:

$$u(C) = \frac{C^{1-\varrho}}{1-\varrho}, \quad v(N) = \varphi \frac{N^{1+\frac{1}{\nu}}}{1+\frac{1}{\nu}} \tag{2.2}$$

where ν is the Frisch elasticity of labor supply, φ is a scaling parameter that determines the disutility of labor, and ϱ is the coefficient of relative risk aversion. A necessary first order condition of solution to the household's problem is the Euler equation:

$$C_t^{-\varrho} = \beta R_t C_{t+1}^{-\varrho}. \tag{2.3}$$

2.2. Wage-setting. The household supplies a continuum of differentiated varieties of labor. A representative producer buys these differentiated labor services and turns them into aggregate labor services L_t using a CES aggregator. The nominal wage for each variety is set by a labor union whose objective is to maximize the value of the representative household. These unions take as given the consumption-saving decision of the household, as well as the labor demand schedule of the labor bundling producer. There is a quadratic Rotemberg (1982) adjustment cost specified in utils of adjusting nominal wages. This setup is a relatively standard way to incorporate sticky wages into a model and generates a wage Phillips Curve:

$$\pi_t^w(\pi_t^w - 1) = \kappa_w \left(\frac{v'(N_t)}{u'(C_t)} - 1 \right) + \beta_t \mathbb{E}_t[\pi_{t+1}^w(\pi_{t+1}^w - 1)], \tag{2.4}$$

where κ_w is the slope of the wage Phillips Curve.

2.3. Intermediate goods sector. There is a sector comprising a variable measure N_t of intermediate goods producers, each indexed by $i \in [0, N_t]$. Producers hire labor ℓ_{it} in a Walrasian market, taking the real wage W_t as given. They choose their real price ρ_{it}, taking as given their demand schedule $x_{it} = d(\rho_{it}; S)$, where S denotes the aggregate states in the economy. As in Hopenhayn and Rogerson (1993), these producers face labor adjustment costs and a fixed cost of production, and there is endogenous exit and free entry.

Timing within each period works as follows:

1. Producers who operated in the previous period enter the period, having employed ℓ workers last period. Denote by z its productivity from the previous period.

2. Each incumbent producer draws an iid fixed cost $c_F \sim G(c_F)$. It then decides whether to pay the fixed cost and continue producing or to exit. The value of exit is normalized to 0. The fixed cost is paid in terms of the wholesale good.

3. New producers then enter the economy, pay the sunk entry cost, choose employment, output, and prices and receive the profits. They pay no initial employment adjustment cost.

4. Continuing incumbents observe their current draw of productivity z' $F(z'|z)$. All producers decide how much to produce and what price to set.

Turning to the recursive formulation of the producer's problem, the value of a producer who employed ℓ workers last period and had productivity z last period who has drawn fixed cost c_F is shown below.[2]

$$\tilde{V}(z, \ell; c_F) = \max \left\{ 0, \int V(z', \ell) dF(z'|z) - c_F \right\}, \tag{2.5}$$

where the continuation value V is given by:

$$V(z, \ell) = \max_{\rho, \ell'} \rho x - w\ell' - \phi(\ell, \ell') + \frac{1}{1+r} \int \tilde{V}(z, \ell; c_F) dG(c_F) \tag{2.6}$$

and the producer's choice of output, price, and employment must satisfy both the production function and demand curves:

$$x = F(z, \ell) \tag{2.7}$$

$$x = d(\rho; S) \tag{2.8}$$

Production function. The production function is below, where $\vartheta \in (0, 1)$ is the span-of-control parameter and z is idiosyncratic TFP:

$$F(z, \ell) = z\ell^{\vartheta} \tag{2.9}$$

Free entry. Each period, a mass m_t of new producers enters the economy. The mass of entrants is endogenous. There is an unlimited mass of potential entrants, each of whom observes the aggregate state of the economy and the sunk cost of entry c^E before deciding whether or not to enter. If a potential entrant decides to enter, it pays the sunk cost, draws

[2] For exposition, I drop the aggregate states from the producer value function.

an initial value of $z \sim H(z)$, and then chooses its initial employment freely.

A potential producer will only enter if the expected value of entry exceeds the cost of entry. In equilibrium, the value of entry will be such that $c_E = V^E$, and potential entrants will be indifferent between entering or not.

$$c_E \leqslant V^E \equiv \int \max_{\ell} V(z, \ell) dH(z) \tag{2.10}$$

2.4. Wholesale sector. A perfectly competitive wholesaler purchases the output of the intermediate producers, bundles it into a wholesale good, and sells the wholesale good to retailers.

Wholesale production function. In the baseline version of the model, the wholesaler production function takes the following form:

$$X = \int x d\Lambda \tag{2.11}$$

In this case, the demand for each variety is perfectly elastic at the prevailing price $\bar{\rho}_t$.[3]

2.5. Retail sector. In the last step of the production block, there is a unit mass of identical retailers who purchase the wholesale good M at real price ρ and use it to produce differentiated retail goods. These retail producers face CES demand with elasticity ϵ_p and their production function is given by

$$y = F(X) \equiv \Theta X^{\alpha}, \tag{2.12}$$

where α is the span of control for the retailers, and Θ is their total factor productivity. These producers face a quadratic adjustment cost, as in Rotemberg (1982). Assuming a

[3]Future work could consider alternative specifications for the wholesaler production function, including constant elasticity of substitution or the Klenow and Willis (2016) specification of Kimball (1995) demand. These alternatives generate love-of-variety effects that would amplify the inflationary impact of a reduction in the number of producers.

symmetric equilibrium in which all retailers have the same TFP and set the same price, the solution to their problem can be summarized by the following three equations:

1. Materials demand. Denote the marginal cost of the retailer by mc_t.

$$mc_t = \frac{\rho_t}{F_X(X_t)} \tag{2.13}$$

2. Phillips Curve. Denote gross price inflation by π_t, the slope of the Phillips Curve by κ_p, and the gross real interest rate by R_t.

$$\pi_t(\pi_t - 1) = \kappa_p\left(\frac{\epsilon_p}{\epsilon_p - 1} mc_t - 1\right) + \mathbb{E}\left[\frac{\pi_{t+1}(\pi_{t+1} - 1)}{R_t}\frac{Y_{t+1}}{Y_t}\right] \tag{2.14}$$

3. Production function

$$Y_t = F(X_t) = \Theta X_t^\alpha \tag{2.15}$$

2.6. Monetary authority. There is a central bank that sets the nominal interest rate according to the following Taylor rule:

$$i_t = r^* + \phi(\pi_t - 1) + \epsilon_t^m \tag{2.16}$$

where r^* is the natural rate of interest and ϵ_t^m is a monetary shock. The forward-looking real interest rate is defined as below.

$$R_t = \frac{1 + i_t}{\pi_{t+1}} \tag{2.17}$$

2.7. Equilibrium. Given a sequence of shocks $\{\epsilon_t^m\}$ an equilibrium is a set of sequences for wages, inflation, the real price of the intermediate good, the mass of entrants, and the nominal interest rate, $\{W_t, \pi_t, \rho_t, m_t, i_t\}$ such that

1. The New Keynesian Phillips Curve and the wage Phillips Curve both hold
2. The market for the intermediate good clears
3. The free entry condition holds
4. The household's Euler equation holds
5. The nominal interest rate obeys the Taylor rule

3. Steady state

3.1. Calibration of intermediate sector. In this section, I describe the steady-state calibration of the model. Parameters are chosen to match important empirical moments relating to producer-level employment dynamics and the lifecycle of establishment size.

Intermediate sector. I choose the steady state sunk cost of entry to match the average size of an establishment as reported in the 2007 BDS.[4] Entering producers draw their initial productivity value from a shifted version of the stationary distribution implied by the law of motion for incumbent productivity, $\mathcal{H}(log(z))$. In particular, entering producers draw their initial value of log productivity from the distribution $H(log(z)) = \mathcal{H}(log(z) + d_E)$. I choose the parameter d_E to match the average employment of entering establishments relative to the overall average in the BDS.

I assume that the fixed cost of production is log-normally distributed, with parameters μ_F and σ_F. I choose μ_F to match the exit rate, which equals the entry rate in steady state, and σ_F to target the average size of exiting establishments. A higher value of σ_F leads exit to be more random, increasing the average size of exiters.[5] Producer-level TFP follows an AR(1) process, with autocorrelation ρ_z and innovation dispersion σ_z. I set $\rho_z = 0.85$ and

[4] Equivalently, I could choose the wage to match the average size of an establishment. The cost of entry is then chosen to equal the expected value of entry.

[5] Note that these parameters do not affect these moments separately; in general, each parameter affects multiple moments.

Table 1: Calibration targets and model fit

Moment	Target	Model	Source
Avg. emp. of continuing producers	17.31	17.56	BDS, 2007
Entry rate	11.75%	11.64%	BDS 2007
Avg. emp. entrants	7.87	7.75	BDS, 2007
Avg. emp. exiters	8.10	8.51	BED/BDS, 2007
Autocorr. of log emp. growth	0.13	0.13	Gamber (2023)

Table 2: Calibrated parameters

Parameter	Description	Value
c_E	Sunk entry cost	7.41
μ_F	Mean of log fixed cost	-0.68
σ_F	Std. Dev. of log fixed cost	2.50
ϕ_ℓ	Labor adj. cost	0.012
d_E	TFP disadvantage of entrants	0.63

$\sigma_z = 0.15$, equal to their values in Gamber (2023). I set the span-of-control parameter, which determines the labor share, equal to $\vartheta = 0.6$.

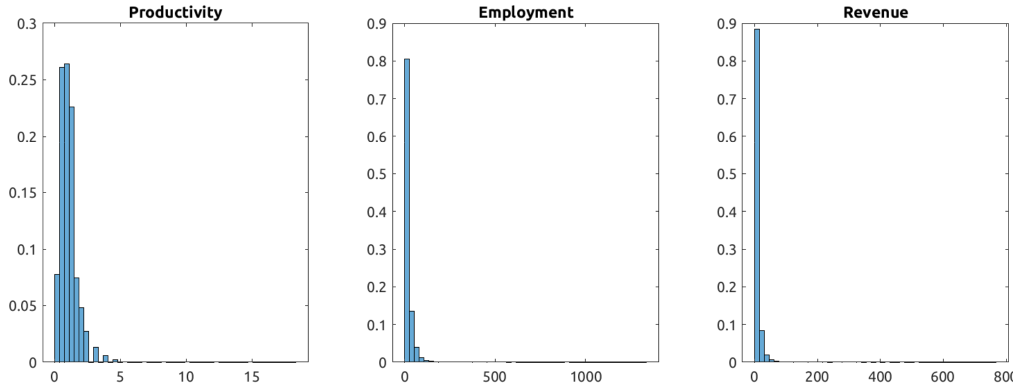
I impose a quadratic form for the labor adjustment cost: $\phi(\ell, \ell') = \phi_\ell(\ell' - (1-\delta)\ell)^2$. The parameters ϕ_ℓ and δ denote the size of the adjustment cost and the exogenous annual separation rate, which I set to 0.19. The size of the adjustment cost is determined by the parameter ϕ_ℓ. Following Gamber (2023), I choose ϕ_ℓ to target the autocorrelation of log employment growth.

Calibration targets and parameter values. Table 1 describes the targeted moments and model fit, and table 2 summarizes the calibrated parameters in the model. The model matches targeted moments well.

3.2. Remaining calibration. I choose several parameters that govern the macroeconomic dynamics of the model using standard values.

Phillips Curve slopes. Following Bardóczy and Velásquez-Giraldo (2024), who also calibrate

Figure 2: Distribution of selected producer-level variables



Note: Each panel shows a histogram of a simulated producer-level variable in steady state. Source: Author's calculations.

an annual model with sticky prices and wages, I set the slope of the price Phillips Curve to be $\kappa_p = 0.24$ and the slope of the wage Phillips Curve to be $\kappa_w = 0.03$.

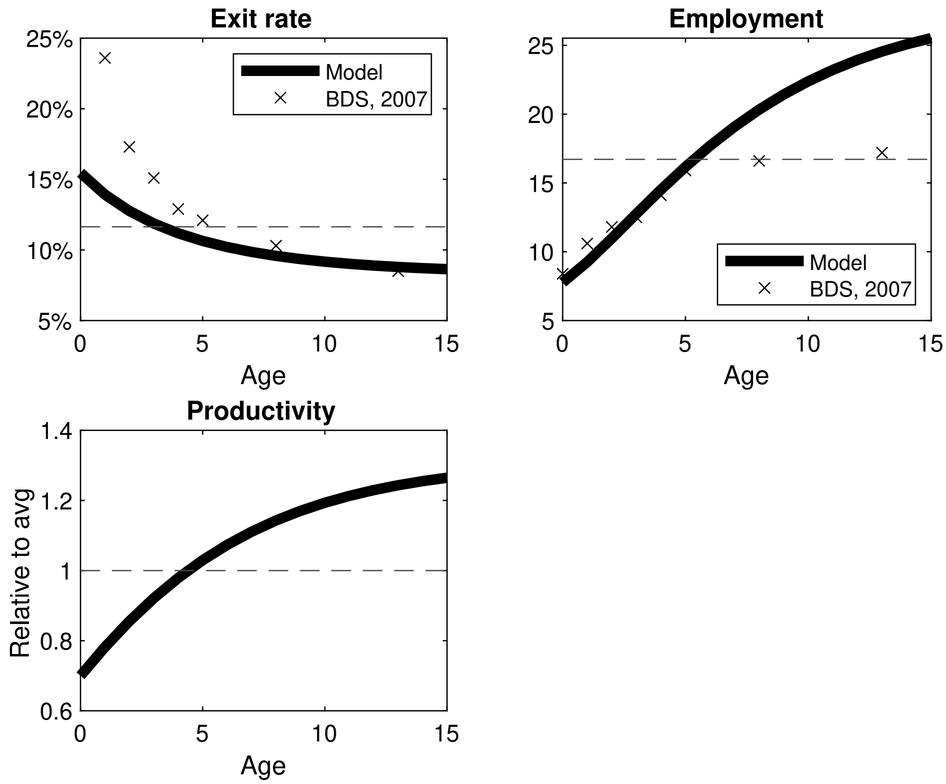
Taylor rule. The coefficient on inflation in the Taylor rule is $\phi = 1.5$, a standard value.

Household preferences. The Frisch elasticity of labor supply is 0.5 and the elasticity of intertemporal substitution is $\frac{1}{2}$. I choose the disutility of labor φ so that $v'(N) = u'(C)$ in steady state.

3.3. Producer heterogeneity. Figure 2 shows the distribution of producer-level productivity, employment, and revenue. Productivity, shown in the left panel, has a long right tail and a positive mode, reflecting both the log-normal stationary distribution of the producer-level productivity process, as well as the endogenous exit choice. The remaining variables all inherit the long right tails from the productivity process.

3.4. Producer lifecycle. Figure 3 shows the lifecycle of three producer-level variables in the model. The exit rate declines over the producer lifecycle, as producers' productivity grows and they are farther from the exit threshold. Average productivity rises over the lifecycle, reflecting reversion to the mean for the younger producers, as well as a selection effect—low productivity producers are more likely to exit, driving up the average productivity

Figure 3: Producer lifecycle in the model



Note: Each panel shows the average of a simulated producer-level variable conditional on producer age. Points marked with an "x" show the same moments from the Census Bureau's Business Dynamics Dataset, 2007. Source: Author's calculations and U.S. Census Bureau.

of the remaining producers in each cohort. Lastly, producer size grows with age, reflecting this rising productivity. The model fits data from the BDS on the lifecycle of employment for establishments well for the first decade or so, but after then, employment in the model continues growing more quickly than it does in the data.

4. Monetary policy and business dynamics in the data

So far, I have presented a steady-state calibration of the model. The objective of this paper is to study the response of the economy to aggregate shocks; so I now present evidence on the effects of exogenous fluctuations in interest rates on business formation and destruction, which I use to discipline these responses in the model.

4.1. Data on producer dynamics. For a quarterly measure of producer dynamics, I use data from the Bureau of Labor Statistics' Business Employment Dynamics (BED) database. From the BED, I extract quarterly series for establishment births and deaths. The BED does not report the *level* of the number of establishments, so I construct a series for the level by cumulating net births over time, using the Quarterly Census of Employment and Wages number of establishments in 1993Q1 as the initial condition. I exclude the pandemic period, so the time series for these variables runs from 1993:Q1 – 2019:Q4. For my main regressions, I interpolate the quarterly data linearly to obtain a monthly series.[6]

Figure 4 depicts these series. Panel 4a shows the establishment count. As discussed in Gamber (2023), the number of establishments declined following the Great Recession and did not return back to trend. Panel 4b shows establishment births and deaths. There is a significant amount of churn in establishments, with between 2 and 3 percent of establishments being destroyed and replaced with new establishments each quarter.

4.2. Data on monetary shocks. As a measure of exogenous fluctuations in monetary policy, I use shocks from Bauer and Swanson (2022). These shocks are identified from high-frequency movements in Eurodollar futures around monetary policy announcements, orthogonalized with respect to macroeconomic and financial variables.[7]

4.3. Empirical framework. Following Ramey (2016), I estimate the following local projection model:

$$y_{t+h} = \alpha_h + \beta_h \epsilon_t + \sum_{\ell=1}^{L} \gamma_{h,\ell} X_{t-\ell} + \delta_h t + \eta_{t,h} \tag{4.1}$$

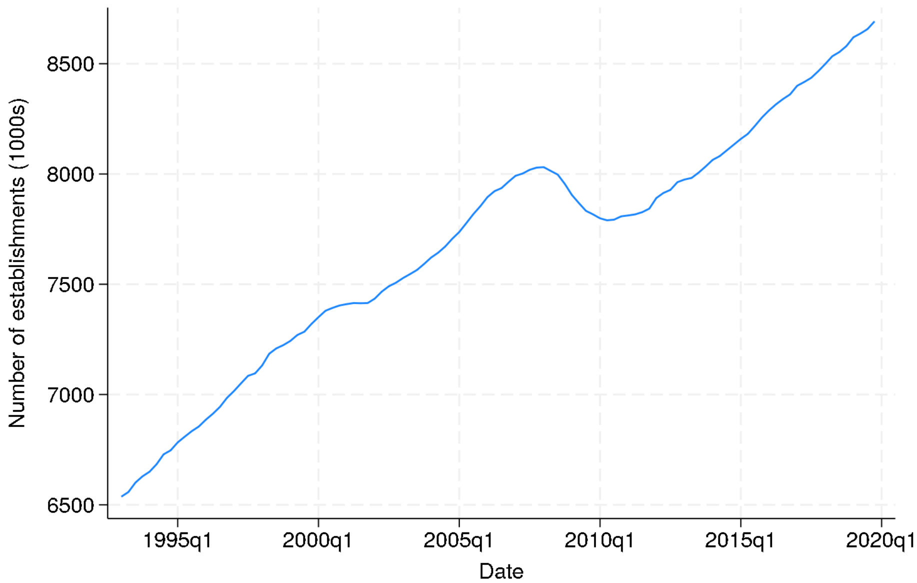
where y_t is the outcome variable of interest, ϵ_t is the shock, and X_t are controls. As discussed in Ramey (2016), because the shock is orthogonalized with respect to macroeco-

[6] I obtain similar results using un-interpolated results, where I aggregate the monthly monetary shocks to a quarterly frequency by summing.

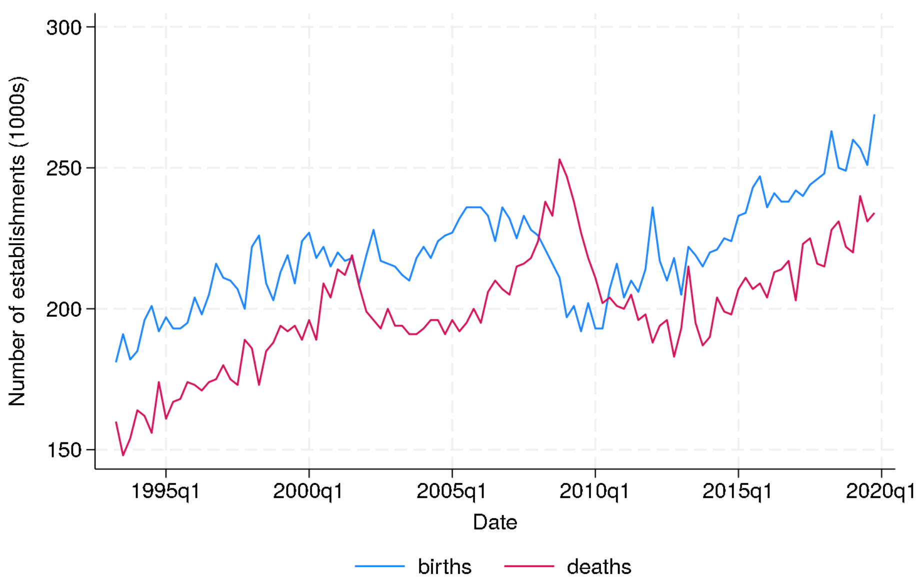
[7] I rescale these shocks so the effect on the federal funds rate on impact is one.

Figure 4: producer dynamics in the BED

(a) Establishment count



(b) Establishment births and deaths



Note: Each panel shows the time series of a variable used in the analysis in this paper.
Source: U.S. Bureau of Labor Statistics BED and QCEW data. Author's calculations.

nomic and financial variables, the only controls needed in X_t are lags of the outcome y_t and of the shock ϵ_t. Given the meaningful structural breaks around the Great Recession in business dynamism, I also include an indicator variable for whether the observation is post- or pre-2008. The parameters of interest are $\hat{\beta}_h$, which trace out the impulse response of the shock ϵ_t on the outcome variable y_t at horizon h. I set $L = 4$ and report these estimates with Newey and West (1987) robust standard errors.

4.4. Results. I establish two facts about the response of establishment dynamics to monetary policy shocks.

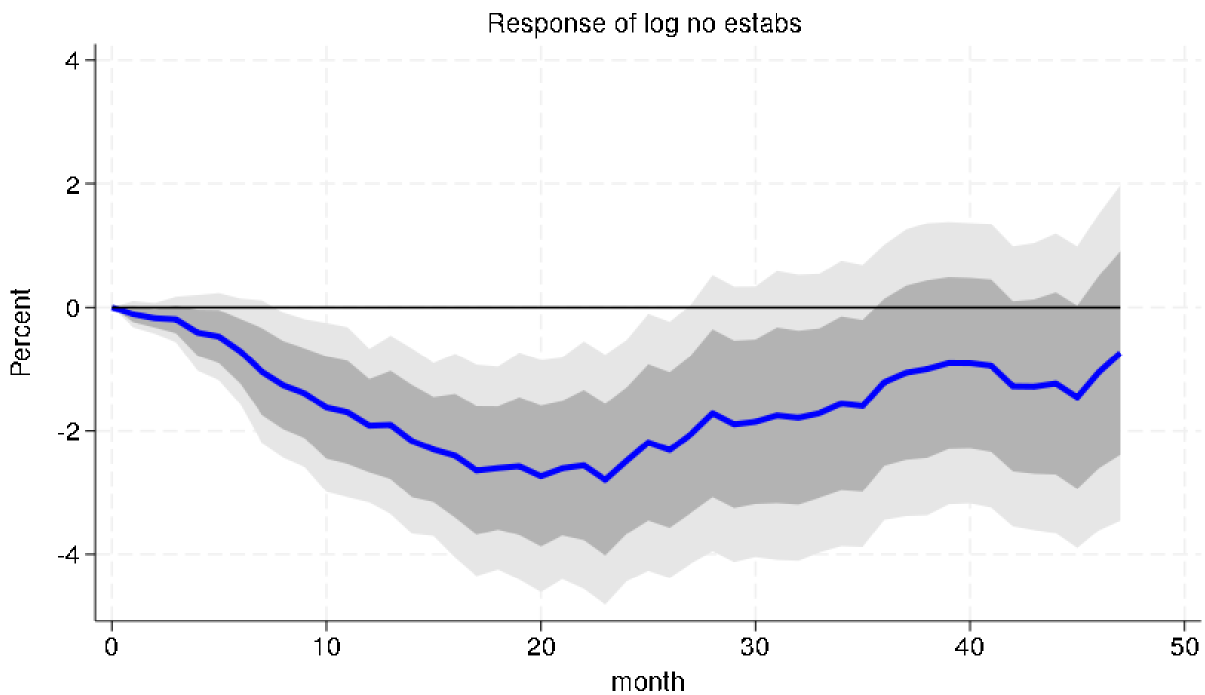
Fact 1: Surprise increases in the federal funds rate persistently reduce the number of establishments. Figure 5 depicts the response of the log number of establishments to the shock. As it shows, a surprise increase in the federal funds rate of 1 percentage point leads to an approximately 2.6 percent decline in the number of establishments after around 6 quarters. The effect of the shock is persistent, and the number of establishments only begins to recover after 2 years.

Fact 2: Both entry and exit account for the decline in the number of establishments. The number of establishments can decline either because entry falls or exit rises. To investigate which of these margins responds to monetary policy, I estimate the local projection of the number of log establishment births and deaths on the shock. Figure 6 depicts these responses. As the figure shows, establishment formation declines and and establishment destruction rises following the shock, with both margins contributing to the initial decline in the number of establishments. The establishment formation margin's response is more persistent and less noisy than the establishment destruction's margin.

4.5. Calibrating the responsiveness of producer dynamics in the model. I now choose parameters in the model to ensure that it fits this empirical evidence.

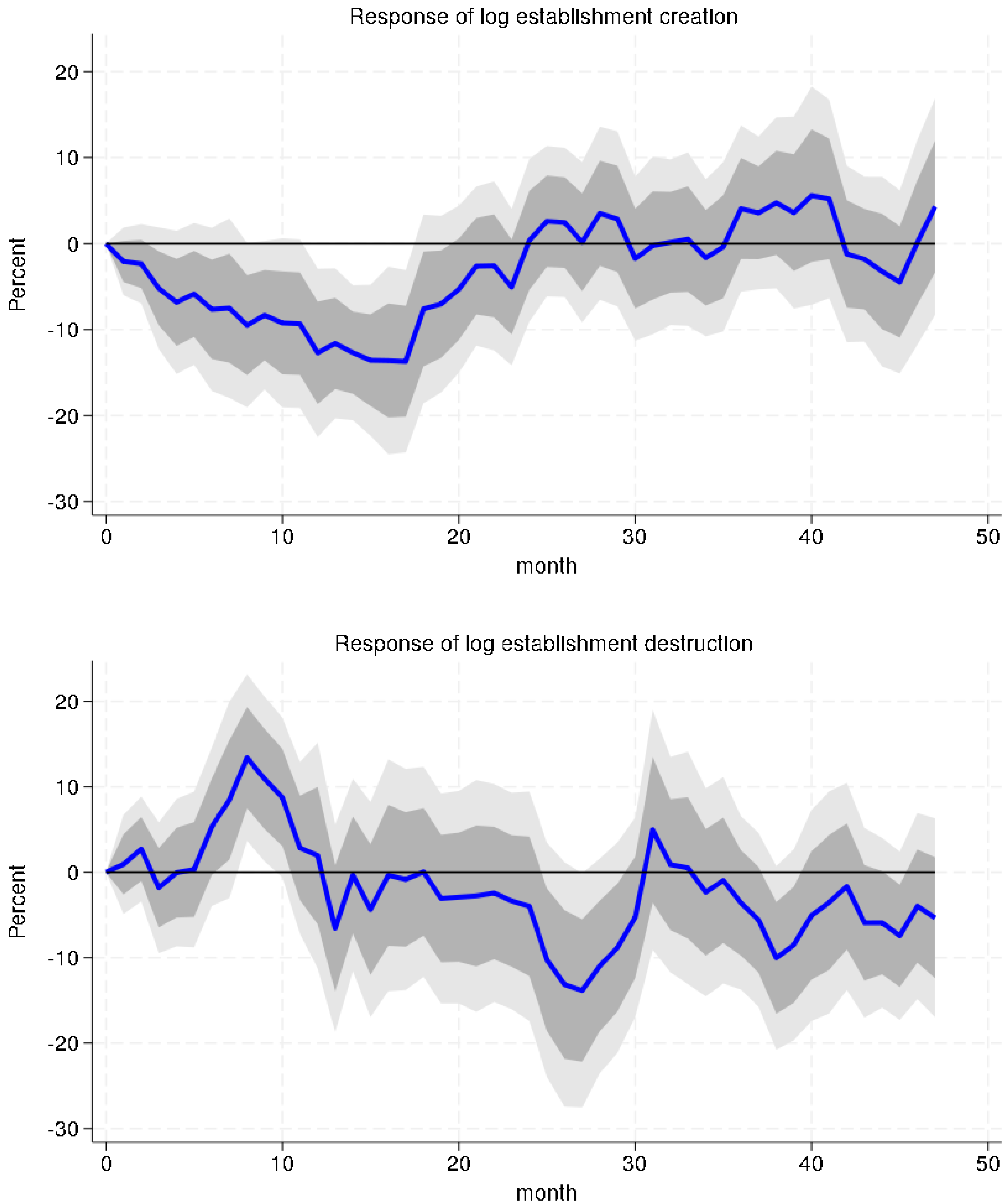
Entry margin. To match the empirical response of entry to a surprise increase in the

Figure 5: The effect of a monetary policy shock on the log number of establishments



Note: This figure shows the dynamic effect of a 100bps contractionary shock to the federal funds rate on the log number of establishments. Source: U.S. Bureau of Labor Statistics BED and QCEW data and Bauer and Swanson (2022) shocks. Author's calculations. Reported error bands show 68 percent and 90 percent confidence intervals.

Figure 6: The entry and exit margin response to the monetary policy shock



Note: These figures show the dynamic effect of a 100bps contractionary shock to the federal funds rate on the log number of establishment births and deaths. Source: U.S. Bureau of Labor Statistics BED and QCEW data and Bauer and Swanson (2022) shocks. Author's calculations. Reported error bands show 68 percent and 90 percent confidence intervals.

nominal interest rate in the model, I specify the following relationship between the cost of entry and the mass of entrants:

$$c_{E,t} = \bar{c}_E \left(\frac{m_t}{\bar{m}} \right)^{\epsilon_E} \tag{4.2}$$

where $\bar{c}_E$ is the steady-state entry cost and $\bar{m}$ is the steady state mass of entrants. The parameter ϵ_E governs the elasticity of the cost of entry to the mass of entrants. With a fixed cost of entry (i.e., $\epsilon_E = 0$), entry is more elastic to the interest rate than it is in the data. However, when $\epsilon_E > 0$, the cost of entry rises with the number of entrants, dampening fluctuations in entry. A similar mechanism is present in Gamber (2023) and Gutiérrez, Jones and Philippon (2021).

This specification can be thought of as a reduced-form for congestion effects—the more new establishments there are in a given period, the higher the cost is as they compete for the same financing or inputs. For the purposes of calibration, I can select the value of ϵ_E that delivers an impulse response of business formation to a monetary shock that matches the one in the data. I select a value of 5.

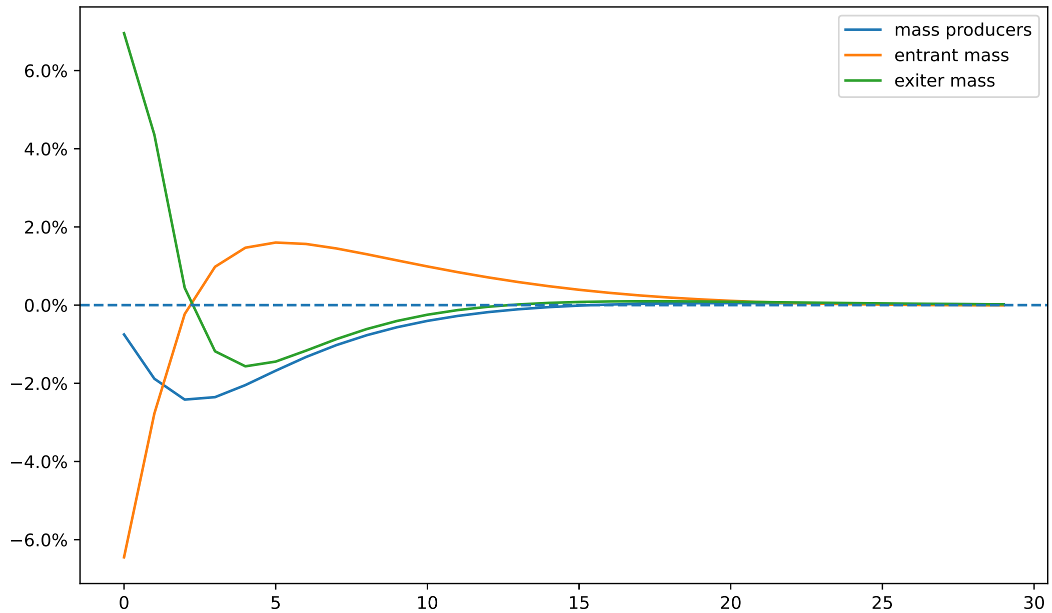
Exit margin. Similarly, I allow the fixed cost of production to fluctuate with the real interest rate in order to target the empirical response of exit to a monetary shock:

$$c_{F,t} = \bar{c}_F \left(r_t - \bar{r} \right)^{\epsilon_F} \tag{4.3}$$

where $\bar{c}_F$ and $\bar{r}$ are the steady-state values of the fixed cost of adjustment and the real interest rate, respectively. The parameter ϵ_F governs the extent to which the fixed cost of production varies with the real interest rate. In practice, $\epsilon_F > 0$, and so the fixed cost will increase with the real interest rate, consistent with a working capital channel. I select a value of 11.5.

Figure 7 shows the response of three measures of producer dynamics in the model following the shock. As it shows, the mass of entrants falls roughly 8 percent on impact, while

Figure 7: producer dynamics in the model following a monetary shock



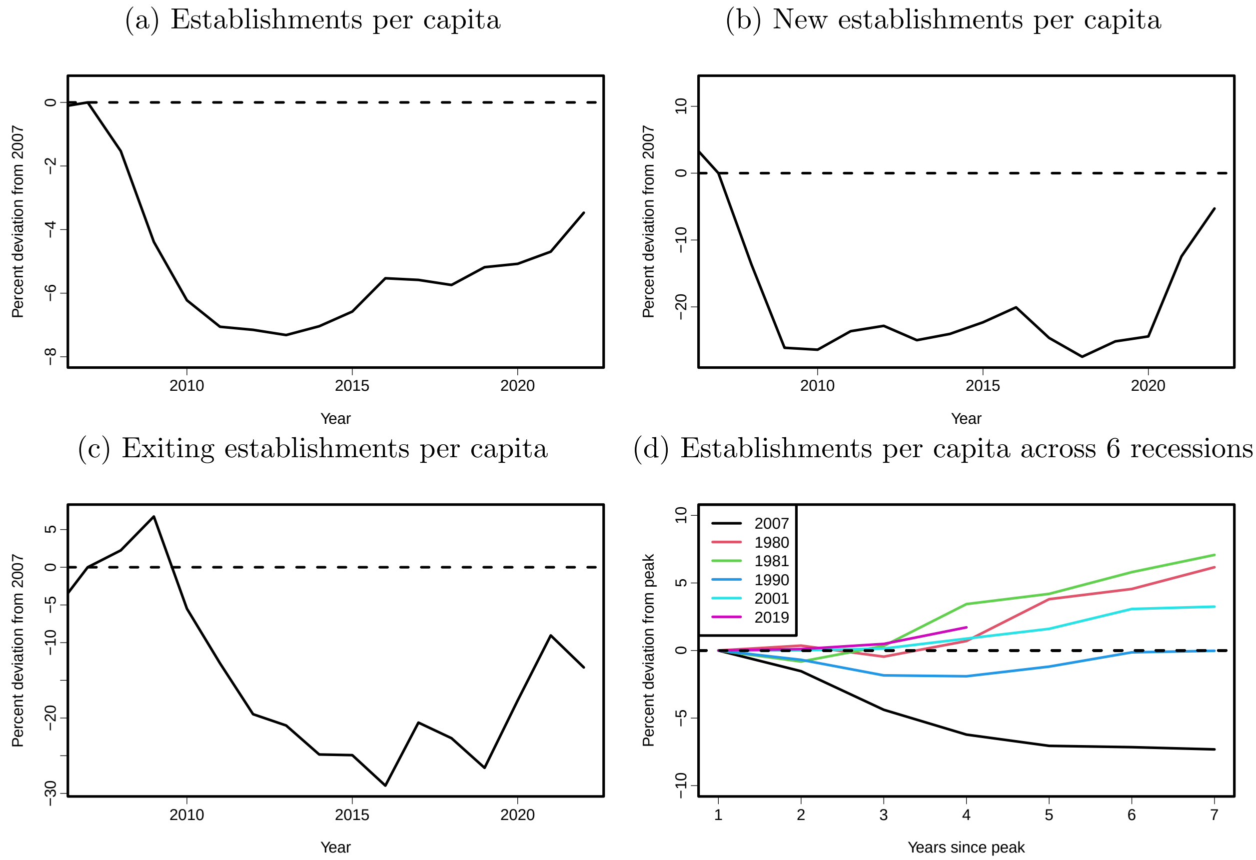
Note: This figure show the dynamic effect of a 100bps contractionary shock to the federal funds rate on the log number of establishments, births, and deaths in the model. Source: Author's calculations.

the mass of exiting producers rises by about 6 percent. These movements generate a decline in the mass of producers of 2.6 percent, in line with the data.

5. PRODUCER DYNAMICS AND INFLATION

5.1. U.S. business dynamics during the Great Recession. Figure 8 depicts the behavior of the number of establishments, entrants, and exiters per capita in the United States during the Great Recession and in other recessions. As the top left panel shows, there was a large and persistent decline in the number of establishments per capita during the Great Recession, declining to over 7 percent fewer establishments per capita than before the crisis. Looking at panels (b) and (c), this decline in establishments per capita was primarily driven by a decline in the number of new establishments, rather than an increase in exiters.

Figure 8: Business dynamics during the Great Recession



Note: Each panel depicts the path of a variable relative to its value in 2007. Panel A: Establishments per capita. Panel B: Entering establishments per capita. Panel C: Exiting establishments per capita. Panel D: Establishments per capita. Source: Establishments data come from the US Census Bureau Business Dynamics Statistics Database. Population data: U.S. Bureau of Economic Analysis, retrieved from FRED, Federal Reserve Bank of St. Louis, Variable: POPTHM.

Business exit did rise somewhat initially, but it declined dramatically during the recovery from the crisis, in part reflecting the fact that young producers are the most likely to exit. Lastly, as panel (d) shows, the experience during the Great Recession differed significantly from earlier recessions, in which the number of existing producers was flat or declined much more modestly.

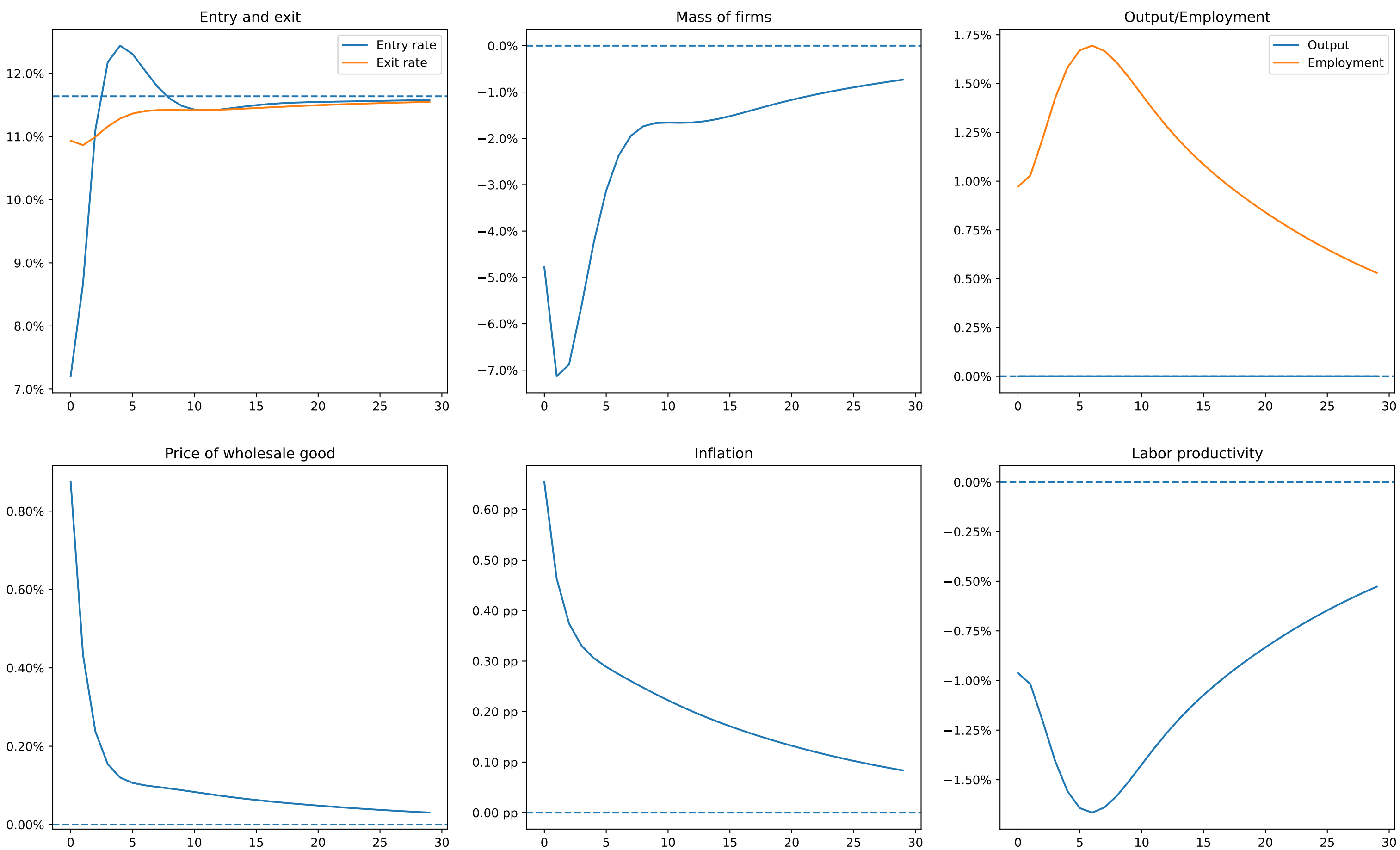
5.2. A shock to the cost of entry. To analyze the direct effects of fluctuations in the number of producers on inflation and other macroeconomic aggregates, I study a shock to the cost of entry. I choose the size of the shock to roughly match the decline in the number of establishments per capita in the US during the Great Recession. To isolate the effects of this shock, I have the central bank choose the nominal interest rate to target a fixed real interest rate. This choice isolates the effects of the decline in entry on inflation and neutralizes the endogenous response of monetary policy.[8]

Figure 9 shows the response of inflation and selected other variables to a shock to the cost of entry. The entry rate declines and recovers, with some slight overshooting. (Gamber, 2023) Output is determined by the Euler equation, and since the real interest rate is fixed, it remains unchanged. The remaining producers make up the slack in output from the missing entrants. However, because of decreasing returns to scale in the production function, these producers must use more labor to produce the same level of output, leading employment to rise.

As the bottom right left panel shows, the real price of the wholesale good then rises by over one percent in order to induce the remaining producers to meet demand for their output. The increase in the real price reflects their increased marginal costs, as well as the cost to adjusting labor that these producers must pay. The increase in the price of the wholesale good then passes on to inflation through the price Phillips Curve, resulting in a persistent increase in the inflation rate of nearly 0.7 percentage point on impact. Labor productivity, defined as the ratio of output to employment declines by 2 percent, reflecting the higher marginal costs of the incumbent producers.

[8]That said, it produces counterfactual output and employment dynamics; since output is determined by the Euler equation and the interest rate is fixed, output is unchanged. The reduction in the number of producers requires remaining producers to grow, but because output has diminishing returns, overall employment must grow to produce the same quantity of output. In the following section, I study an economy with a Taylor rule.

Figure 9: Shock to the cost of entry with a fixed real interest rate



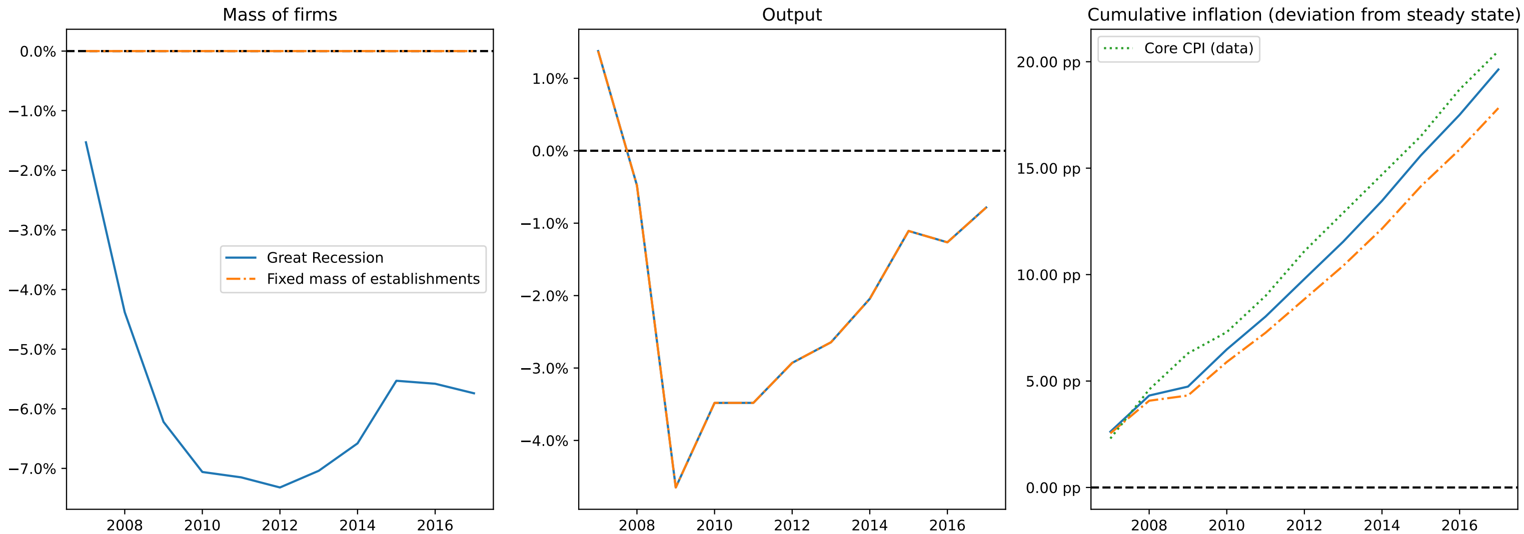
5.3. The Great Recession through the lens of the model. To investigate precisely how much of the lack of disinflation during the Great Recession that I can explain through the decline in the number of businesses, I choose a sequence of shocks so that the model replicates data on the output gap and the number of establishments per capita over this period.[9,10] Specifically, I choose shocks to the discount rate and cost of entry to exactly match data on these two variables. At each date, agents in the model observe the shock and make decisions, assuming that the shock returns to 0 with a half life of 1 year. I compare this simulation to one in which I choose shocks that targets the actual output gap and a counterfactual where the number of establishments remains fixed.

Figure 10 depicts the behavior of the baseline simulation in the solid blue line and the behavior of the "fixed number of establishments" simulation in orange. The inflation path, shown in the rightmost panel, is the main object of interest. As the green dotted line shows, inflation remained relatively stable during the Great Recession. This stands in contrast to the "fixed mass of establishments" simulation, which misses 2.7 percentage points — or over ten percent — of the cumulative inflation between 2007 and 2017. The simulation where the mass of establishments varies (shown in the solid blue line) accounts for about 2/3 of the difference between the data and the fixed-establishments simulations.

[9] I think of the "per capita" normalization as serving two purposes: (1) it makes the measure nearly stationary in the years leading up to the Great Recession, and (2) it represents the number of producers relative to some measure of the "potential" number of producers. If I instead de-trend the series using a linear trend estimated on data through 2007, the decline in producers is much larger.

[10] The output gap here is defined as real GDP less potential output, as computed by the Congressional Budget Office. (`GDPC1 - GDPPOT` on FRED)

Figure 10: The Great Recession in the model



Note: Figure shows two model simulations. The first, shown in the blue solid line, shows the path of the economy under a sequence of shocks to the cost of entry and the discount rate that generate paths for the mass of producers and output that match the U.S. experience during the Great Recession. In the second, shown in the dashed orange line, I set the shocks to the cost of entry to 0.

6. Producer dynamics and monetary policy

With a model that is calibrated to match the cross-sectional distribution of business characteristics, as well as the time series behavior of producer dynamics following a surprise monetary tightening, I now turn to the following question: What is the role of producer dynamics in the propagation of monetary policy? To answer this question, I study the response of the economy to monetary policy shocks.

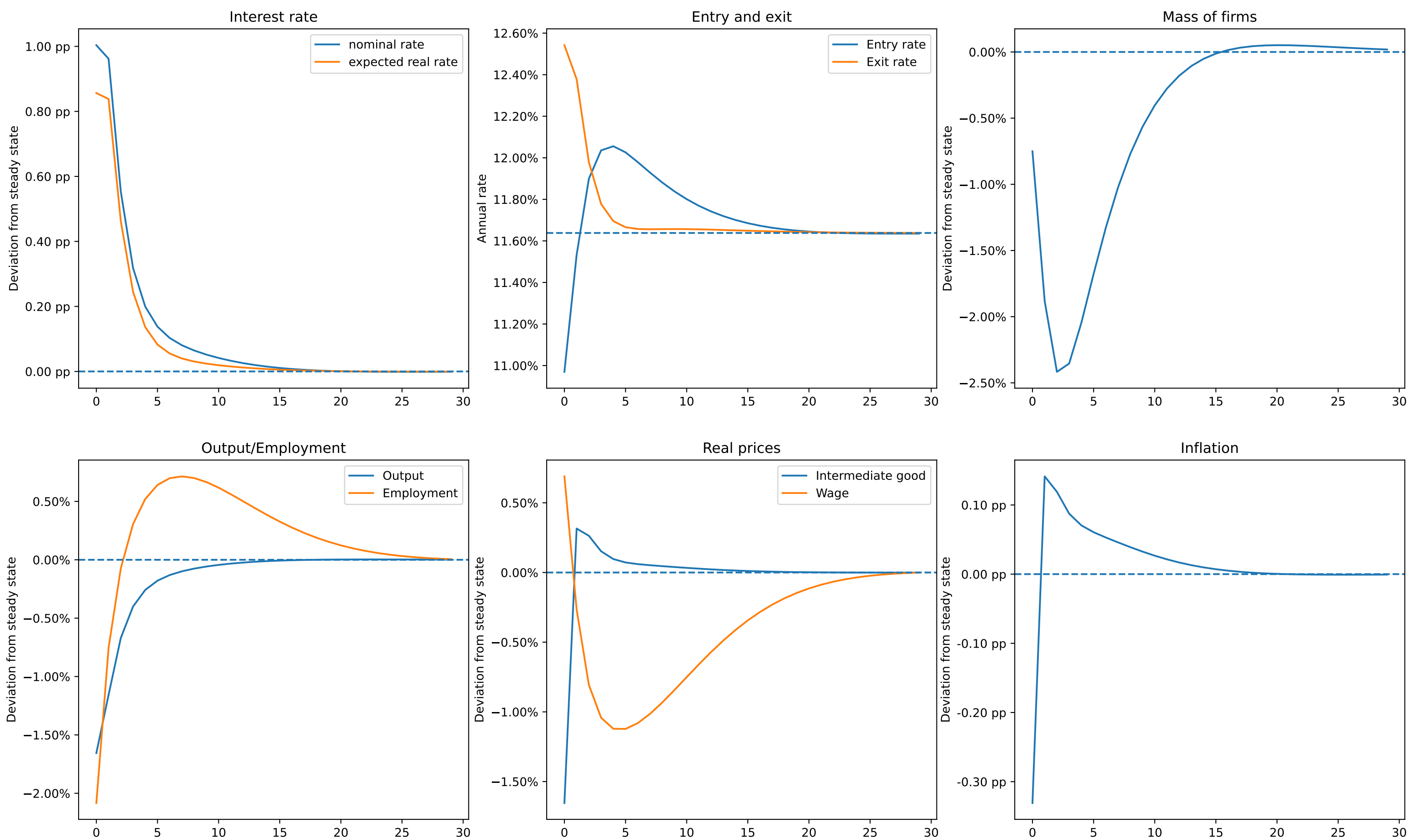
6.1. Monetary shocks with endogenous producer dynamics. I next explore the real effects of monetary policy when business formation and destruction endogenously respond to the interest rate. To that end, figure 11 shows the impact of a persistent contractionary shock to monetary policy in the economy. I choose the size of the shock to generate a 100bps increase in the federal funds rate on impact, and it decays at a rate of 50 percent per year. The increase in the nominal interest rate leads the real interest rate to rise persistently, as shown in the top left panel.

As shown in the top middle panel, the higher interest rate leads the mass of entering producers to decline and the mass of exiting producers to rise—in line with time series evidence. These effects occur both through the direct effects of the interest rate on the value of entry and the value of continuing, as well as through the effects of the increase in the interest rate on the cost of entry and the fixed cost to produce. These effects were calibrated to match the evidence presented in section 4. The mass of producers, shown in the top right panel, has a hump-shaped response, peaking at around 2.6 percent below its steady state level.

Following the monetary tightening, output and employment decline, as shown in the bottom left panel. The impact responses are standard in a New Keynesian model. However, employment rises above its steady state level in the medium-term. This reflects the fact that demand returns back to its steady state before the number of producers does, and so incumbent producers need to expand their output in order to meet demand, and their decreasing returns production functions lead their marginal costs and prices to rise. The next panel shows the responses of the real price of the wholesale good and the wage. The price of the wholesale good declines on impact, as weaker demand lowers the wholesale producer's desired level of production. However, as demand recovers but the mass of producers remains persistently depressed, the price for the intermediate good rises somewhat above its steady state level. These dynamics feed into inflation, shown in the bottom right panel. While the shock lowers inflation by 0.4 percentage point on impact, it quickly overshoots as the increase in the intermediate good price passes through into final goods prices. Inflation peaks at around 0.2 percentage point above its steady state level and then gradually returns back to steady state.

Baqaee, Farhi and Sangani (2024) show that labor productivity declines in response to a contractionary monetary policy shock, identified using the Romer and Romer (2004) methodology. This paper provides an alternative explanation for this phenomenon: the reduction in the number of producers leads output to reallocate toward incumbents, who must increase their scale to do so. Because they face decreasing returns, incumbents' marginal products fall, leading labor productivity (Y/L) to decline.

Figure 11: A monetary shock

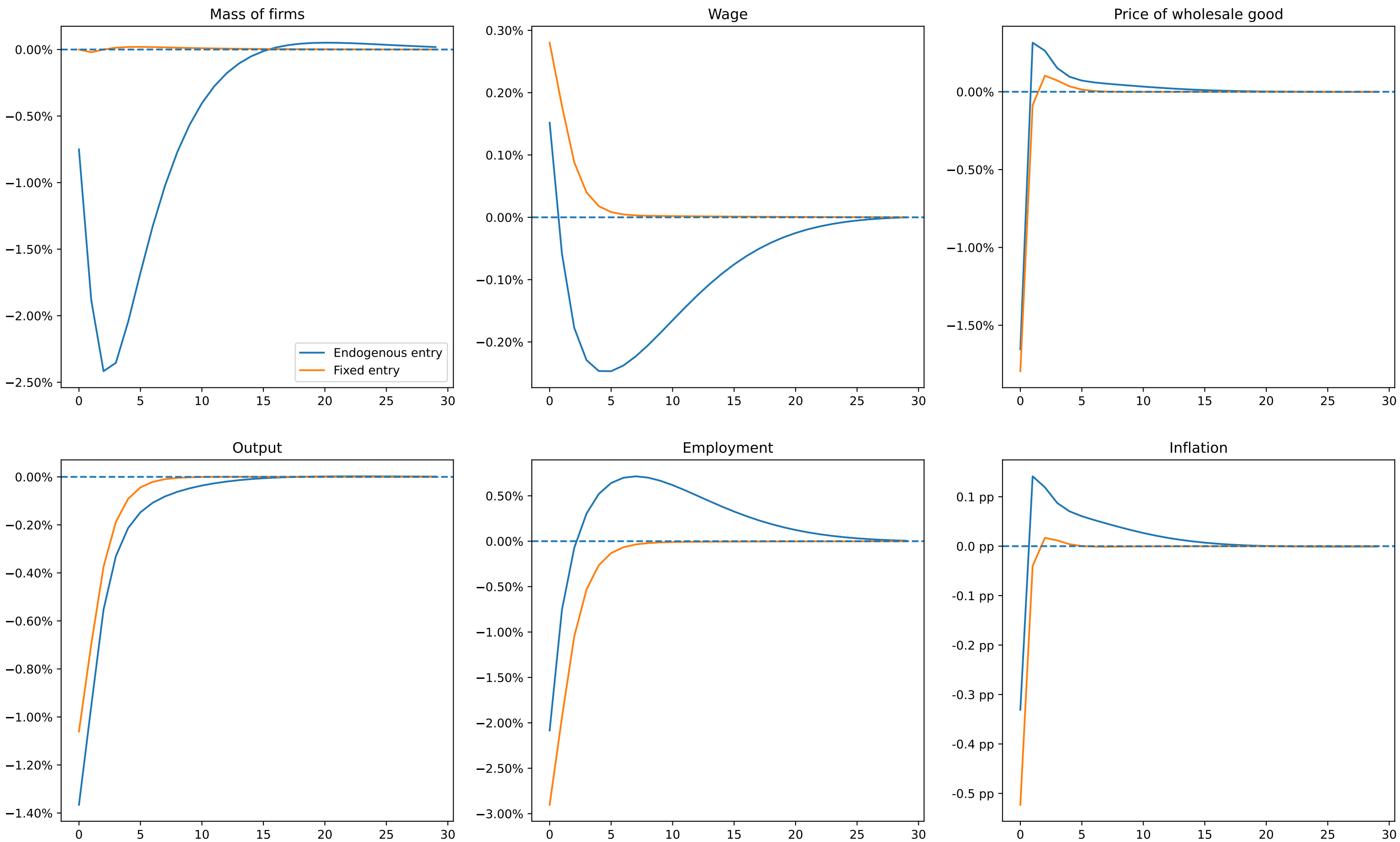


6.2. The role of producer dynamics. To understand the role of entry in the transmission of policy, I compare the impulse response of the baseline economy to one in which I keep the mass of entrants and exiters at its steady state level.[11] Figure 12 shows the effect of the shock in these two models.

Introducing endogenous fluctuations in business formation meaningfully affects the responses of employment, inflation, and the real wage. First, the presence of producer dynamics in the model amplifies the output and employment responses on impact, by a bit under 20 percent. Moreover, despite having a contractionary effect on impact, the shock to the Taylor Rule leads employment and inflation to overshoot quite persistently in the periods following the shock. In this model, monetary policy thus has different effects at different horizons; after having an initial contractionary effect for employment and inflation, it has a more expansionary effect thereafter. This pattern suggests a tradeoff for policymakers with a dual mandate; a change in the policy rate to move inflation or employment closer to a target in the short-run will move it further away in the medium-run.

[11]In practice, I set the elasticity of the entry cost to the mass of entrants to a very high number, and I choose an elasticity of the exit cost to the interest rate that dampens most of the fluctuation in exit.

Figure 12: The role of producer dynamics



7. Conclusion

In this paper, I study how producer dynamics affect inflation and the transmission of monetary policy in the context of a New Keynesian model with endogenous business formation and destruction. I use this model as a laboratory to study the transmission of shocks and inflation dynamics during the Great Recession. I find two key results: (1) a decline in business formation (or an increase in destruction) leads inflation to rise and average labor productivity to decline persistently; (2) endogenous fluctuations in business formation change the transmission of monetary policy shocks, leading inflation to overshoot in the medium-run, as monetary policy affects the productive capacity of the economy. I show that this phenomenon is a potential explanation for the "missing deflation" experienced by the U.S. during the Great Recession.

References

Auclert, Adrien, Bence Bardóczy, Matthew Rognlie, and Ludwig Straub. 2021. "Using the Sequence-Space Jacobian to Solve and Estimate Heterogeneous-Agent Models." *Econometrica*, 89(5): 2375–2408.

Ball, Laurence, and Sandeep Mazumder. 2011. "Inflation Dynamics and the Great Recession." *Brookings Papers on Economic Activity*, 42(1 (Spring): 337–405.

Baqaee, David R., Emmanuel Farhi, and Kunal Sangani. 2024. "The Supply-Side Effects of Monetary Policy." *Journal of Political Economy*, 132(4): 1065–1112.

Bardóczy, Bence, and Mateo Velásquez-Giraldo. 2024. "HANK Comes of Age." Board of Governors of the Federal Reserve System (U.S.) Finance and Economics Discussion Series 2024-052.

Bauer, Michael D., and Eric T. Swanson. 2022. "A Reassessment of Monetary Policy Surprises and High-Frequency Identification." *NBER Macroeconomics Annual 2022, volume 37*, 87–155. University of Chicago Press.

Bergin, Paul R., and Giancarlo Corsetti. 2008. "The extensive margin and monetary policy." *Journal of Monetary Economics*, 55(7): 1222–1237.

Bernanke, Ben S. 2010. "The Economic Outlook and Monetary Policy." *Speech at the Federal Reserve Bank of Kansas City Economic Symposium, Jackson Hole, Wyoming*, August 27, 2010.

Bilbiie, Florin O, and Marc J Melitz. 2020. "Aggregate-Demand Amplification of Supply Disruptions: The Entry-Exit Multiplier." National Bureau of Economic Research Working Paper 28258.

Bilbiie, Florin O., Fabio Ghironi, and Marc J. Melitz. 2008. "Monetary Policy and

Business Cycles with Endogenous Entry and Product Variety." *NBER Macroeconomics Annual 2007, Volume 22*, 299–353. University of Chicago Press.

Bilbiie, Florin O., Ippei Fujiwara, and Fabio Ghironi. 2014. "Optimal monetary policy with endogenous entry and product variety." *Journal of Monetary Economics*, 64: 1–20.

Clementi, Gian Luca, and Berardino Palazzo. 2016. "Entry, Exit, Firm Dynamics, and Aggregate Fluctuations." *American Economic Journal: Macroeconomics*, 8(3): 1–41.

Coibion, Olivier, and Yuriy Gorodnichenko. 2015. "Is the Phillips curve alive and well after all? Inflation expectations and the missing disinflation." *American Economic Journal: Macroeconomics*, 7(1): 197–232.

Gamber, William. 2023. "The Importance of Entry in the Business Cycle: What Are the Roles of Markups, Adjustment Costs, and Heterogeneity?" *Journal of Political Economy Macroeconomics*, 1(3): 551–585.

Gilchrist, Simon, Raphael Schoenle, Jae Sim, and Egon Zakrajšek. 2017. "Inflation Dynamics during the Financial Crisis." *American Economic Review*, 107(3): 785–823.

Gordon, Robert J. 2013. "The Phillips Curve is Alive and Well: Inflation and the NAIRU During the Slow Recovery." *NBER Working Paper*, , (19390).

Graves, Sebastian, Christopher K Huckfeldt, and Eric T Swanson. 2023. "The Labor Demand and Labor Supply Channels of Monetary Policy." National Bureau of Economic Research Working Paper 31770.

Gutiérrez, Germán, Callum Jones, and Thomas Philippon. 2021. "Entry costs and aggregate dynamics." *Journal of Monetary Economics*, 124: S77–S91. The Real Interest Rate and the MarginalProduct of Capital in the XXIst CenturyOctober 15-16, 2020.

Harding, Martin, Jesper Lindé, and Mathias Trabandt. 2022. "Resolving the missing deflation puzzle." *Journal of Monetary Economics*, 126(C): 15–34.

Hopenhayn, Hugo, and Richard Rogerson. 1993. "Job Turnover and Policy Evaluation: A General Equilibrium Analysis." *Journal of Political Economy*, 101(5): 915–938.

Kimball, Miles S. 1995. "The Quantitative Analytics of the Basic Neomonetarist Model." *Journal of Money, Credit and Banking*, 27(4): 1241–1277.

King, Robert G., and Mark W. Watson. 2012. "Inflation and Unit Labor Cost." *Journal of Money, Credit and Banking*, 44: 111–149.

Klenow, Peter J., and Jonathan L. Willis. 2016. "Real Rigidities and Nominal Price Changes." *Economica*, 83(331): 443–472.

Krueger, Alan B, Judd Cramer, and David Cho. 2014. "Are the long-term unemployed on the margins of the labor market?" *Brookings Papers on Economic Activity*, 2014(1): 229–280.

Midrigan, Virgiliu. 2008. "Comment on "Monetary Policy and Business Cycles with Endogenous Entry and Product Variety"." In *NBER Macroeconomics Annual 2007, Volume 22. NBER Chapters*, 355–364. National Bureau of Economic Research, Inc.

Newey, Whitney K., and Kenneth D. West. 1987. "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." *Econometrica*, 55(3): 703–708.

Ramey, V.A. 2016. "Chapter 2 - Macroeconomic Shocks and Their Propagation." In . Vol. 2 of *Handbook of Macroeconomics*, , ed. John B. Taylor and Harald Uhlig, 71–162. Elsevier.

Romer, Christina D., and David H. Romer. 2004. "A New Measure of Monetary Shocks: Derivation and Implications." *American Economic Review*, 94(4): 1055–1084.

Rotemberg, Julio J. 1982. "Sticky Prices in the United States." *Journal of Political Economy*, 90(6): 1187–1211.

Williams, John C. 2010. "Sailing into headwinds: The uncertain outlook for the US economy." Federal Reserve Bank of San Francisco Presentation. Presentation to the Seattle Community Development Roundtable, Seattle, Washington, September 22, 2010.

A. Model appendix

A.1. Derivation of key equations. There is a unit mass of identical retailers indexed by $j \in [0,1]$ who engage in monopolistic competition. They have production function

$$y_{jt} = F(X_{jt}) = \Theta X_{jt}^{\alpha}$$

and face demand curve

$$y_{jt} = \left(\frac{p_{jt}}{P_t}\right)^{-\epsilon_p} Y_t$$

They set their prices subject to a quadratic adjustment cost

$$\Xi(p_{jt}, p_{jt-1}) = \frac{\chi_p}{2}\left(\frac{p_{jt}}{p_{jt-1}} - 1\right)^2$$

The profit maximization problem of a producer (dropping subscript j) is

$$V(p_{t-1}) = \max_{p_t, X_t} \frac{p_t}{P_t} y_t - \rho X_t - \Xi(p_t, p_{t-1}) Y_t + \mathbb{E}_t\left[\frac{V_{t+1}(p_t)}{R_t^e}\right]$$

Materials demand. The first order condition with respect to X_t is

$$\eta_t = \frac{p_t}{P_t} - \frac{\rho}{\partial_X F(X)}$$

where η_t is the lagrange multiplier on the demand curve constraint, which equals the marginal profit from producing and selling an additional unit. The marginal cost is given by the second half of this expression.

Phillips Curve. It is helpful to first note a couple of partial derivatives:

$$\partial_{p_t}\Xi(p_t, p_{t-1}) = \chi_p\left(\frac{p_t}{p_{t-1}} - 1\right)\frac{1}{p_{t-1}}$$
$$\partial_{p_{t-1}}\Xi(p_t, p_{t-1}) = -\chi_p\left(\frac{p_t}{p_{t-1}} - 1\right)\frac{p_t}{p_{t-1}^2}$$

The first order condition for p_t is then

$$0 = \frac{1}{P_t}F(X_t) - \partial_{p_t}\Xi(p_t, p_{t-1})Y_t + \mathbb{E}_t\frac{\partial_p V_{t+1}(p_t)}{R_t^e} - \eta_t\left[\epsilon_p\left(\frac{p_t}{P_t}\right)^{-\epsilon_p - 1}\frac{Y_t}{P_t}\right]$$

Denote gross inflation by $\pi_t \equiv P_t/P_{t-1}$, and impose a symmetric equilibrium (i.e., $y_t = Y_t, p_t = P_t$, etc):

$$0 = \frac{Y_t}{P_t}(1 - \eta_t\epsilon_p) - \chi_p(\pi_{t-1})\frac{Y_t}{P_{t_1}} + \mathbb{E}_t\frac{\partial_p V_{t+1}(p)}{R_t^e}$$
$$\therefore 0 = Y_t(1 - \eta_t\epsilon_p) - \chi_p\pi_t(\pi_{t-1})Y_t + P_t\mathbb{E}_t\frac{\partial_p V_{t+1}(p_t)}{R_t^e}$$
$$\therefore \chi_p\pi_t(\pi_t - 1) = (1 - \eta_t\epsilon_p) + \frac{P_t}{Y_t}\mathbb{E}_t\frac{\partial_p V_{t+1}(p_t)}{R_t^e}$$

The envelope condition is

$$\begin{aligned}\partial_p V_t &= -\partial_{p_{t-1}}\Xi(p_t, p_{t-1})Y_t \\ &= \chi_p\left(\frac{p_t}{p_{t-1}} - 1\right)\frac{p_t}{p_{t-1}^2}Y_t \\ &= \chi_p\pi_t(\pi_t - 1)\frac{Y_t}{P_{t-1}}\end{aligned}$$

Combining these gives us

$$\chi_p \pi_t(\pi_t - 1) = (1 - \eta_t \epsilon_p) + \chi_p \mathbb{E}_t \left[\frac{\pi_{t+1}(\pi_{t+1} - 1)}{R_t^e} \frac{Y_{t+1}}{P_t} \right] \frac{P_t}{Y_t}$$

$$\pi_t(\pi_t - 1) = \frac{\epsilon_p}{\chi_p} \left(\frac{1}{\epsilon_p} - \eta_t \right) + \mathbb{E}_t \left[\frac{\pi_{t+1}(\pi_{t+1} - 1)}{R_t^e} \frac{Y_{t+1}}{P_t} \right]$$

Substituting in $\eta_t = 1 - mc_t$, and rearranging, we get

$$\pi_t(\pi_t - 1) = \underbrace{\frac{\epsilon_p}{\chi_p} \frac{\epsilon_p - 1}{\epsilon_p}}_{\kappa_p} \left(\frac{\epsilon_p}{\epsilon_p - 1} mc_t - 1 \right) + \mathbb{E}_t \left[\frac{\pi_{t+1}(\pi_{t+1} - 1)}{R_t^e} \frac{Y_{t+1}}{P_t} \right]$$

A.2. Solution method. To solve the model, I use the sequence-jacobian package developed by Auclert et al. (2021).

One challenge is that this package does not accomodate entry and exit decisions. To overcome this, I compute the jacobians of the producer problem in MATLAB and import them into python. One key set of jacobians that I must compute is the jacobian of the value of a potential entrant with respect to the inputs of the producer problem. With this jacobian in hand, I then impose the free entry condition along any transition path.

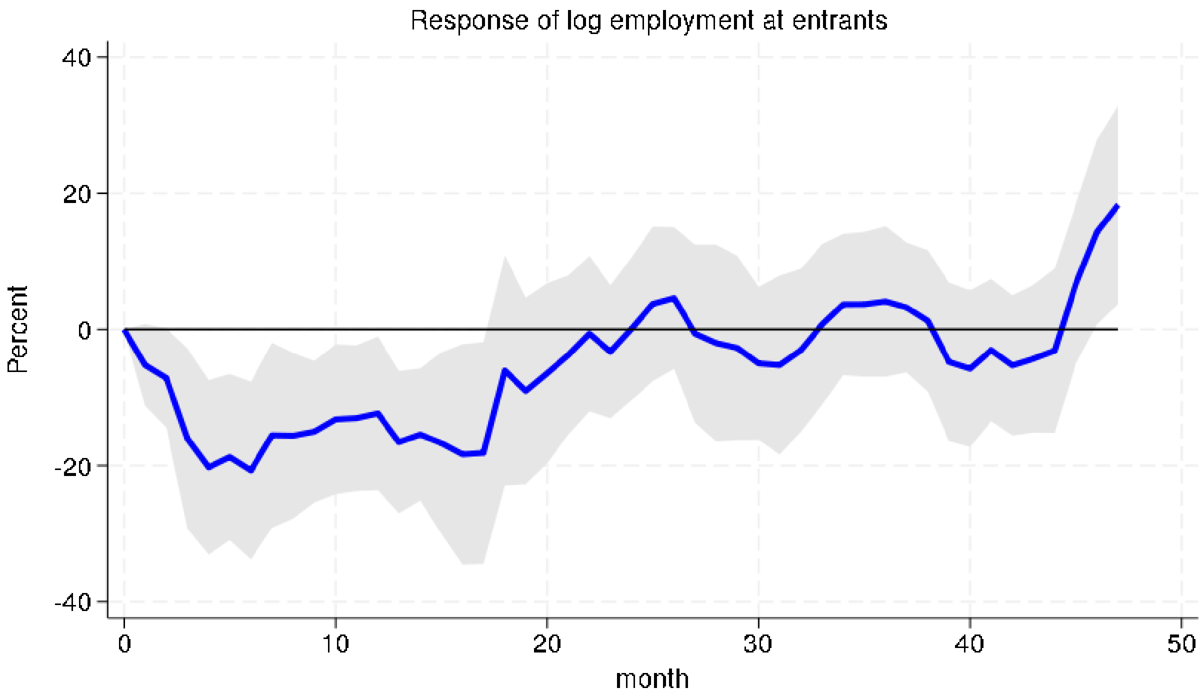
B. Empirical appendix

B.1. Additional results.

B.1.1 Employment effects

In the two figures below, I show the effects of the Bauer and Swanson (2022) shocks on the employment created and destroyed due to business formation and destruction.

Figure 13: Response of employment created by business formation



B.1.2 Results without interpolation

In my baseline results, I interpolate quarterly measures of business dynamics to a monthly frequency. An alternative is to aggregate the monthly monetary policy shocks to a quarterly frequency by summing. The charts below show these results. As these charts show, the results are broadly similar to the monthly regressions.

Figure 14: Response of employment eliminated by business destruction

Figure 15: Response of the number of establishments, quarterly regression

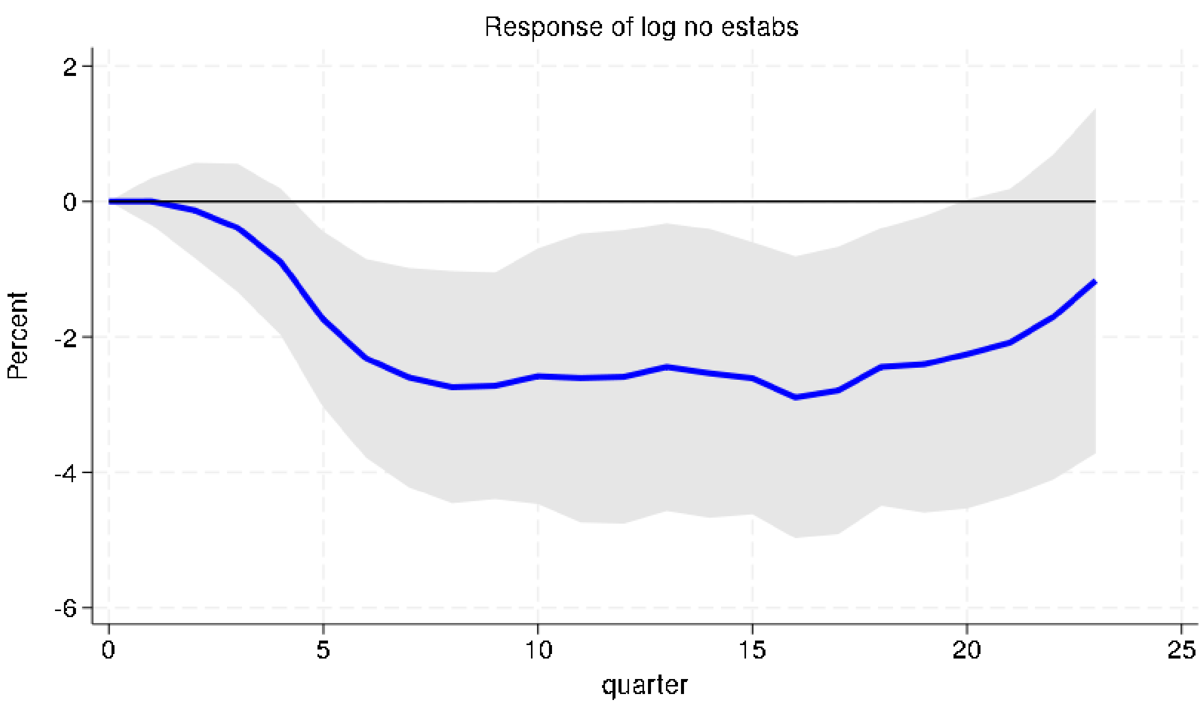


Figure 16: Response of business formation, quarterly regression

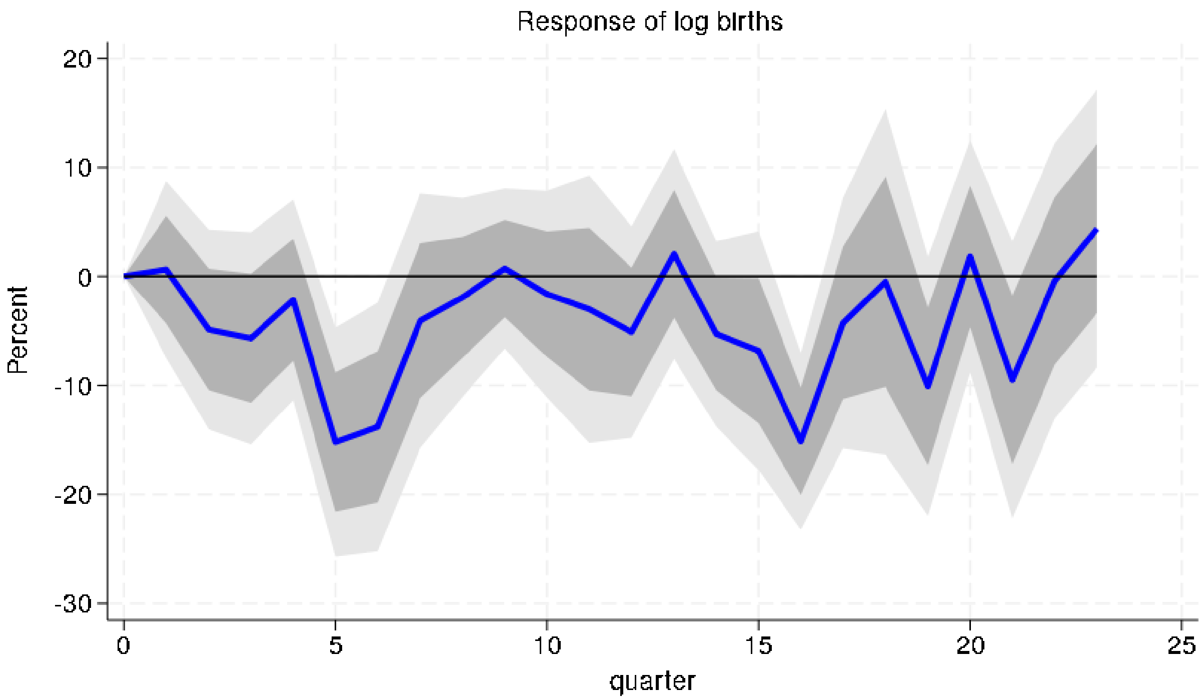


Figure 17: Response of business destruction, quarterly regression