Heterogeneous Firms, Rational Inattention, and Monetary Policy*

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Abstract

This paper studies monetary policy in an economy where heterogeneous firms endogenously choose how much information to acquire about aggregate nominal conditions. We develop a rational-inattention model of price setting with variable demand elasticities in which firm size has offsetting effects on the value of information: larger firms have more sales at risk, but they also tend to face lower demand elasticities and choose lower desired pass-through, which makes information less valuable for them. As a result, demand curvature governs the equilibrium relationship between firm size and attention, implying that larger firms need not be more attentive. Under Kimball demand, attention is hump-shaped in firm size for moderate curvature and decreasing when curvature is sufficiently strong. This endogenous allocation of attention shapes both the heterogeneity of monetary transmission and the supply-side effects of nominal shocks through relative-price and markup dispersion. In the empirically relevant low-curvature regime, small and medium-sized firms account for a disproportionate share of the aggregate real response, and an expansionary nominal shock slightly increases measured TFP on impact. By contrast, under a counterfactual that shuts down the decline in attention among the largest firms, the same shock reduces TFP. Using textual analysis of firms' Form 10-K filings, we document a robust hump-shaped relationship between firm size and attention to macroeconomic conditions, consistent with the model's mechanism.

Keywords: Firm heterogeneity; Rational inattention; Monetary policy; Strategic complementarities; Information frictions

JEL Classification: E31; E52; D83; L11; E23.

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1 Introduction

Information frictions are a classic source of monetary non-neutrality. In the seminal contributions of Lucas (1972) and Phelps (1970), nominal shocks have real effects because firms do not perfectly observe aggregate nominal conditions when making decisions. More recent work endogenizes these informational limits by modeling attention as a costly choice, as in rational inattention models (Sims 2003; Mackowiak and Wiederholt 2009). Much of this literature, however, abstracts from heterogeneity across firms. That omission matters. In the data, firms differ sharply in size, market power, markups, and pass-through. If becoming informed is itself a choice, these differences should shape which firms track aggregate nominal conditions closely. This paper asks three questions: which firms choose to become informed about aggregate nominal conditions, do larger firms *necessarily* pay more attention, and what are the aggregate and distributional implications of the resulting allocation of attention?

We study an economy with heterogeneous firms and variable demand elasticities in which firms face a common, unobserved aggregate nominal-demand shock and choose how much information to acquire before setting prices. The central object is the joint distribution of firm size and attention. Size creates two opposing forces. Larger firms have more sales at risk, so mispricing is more costly. But they also tend to face lower local demand elasticities and lower desired pass-through, so their desired prices are less sensitive to nominal shocks. The size–attention relationship is therefore not pinned down by size alone; it depends on demand curvature and the strategic complementarity it induces in price setting. Our main result is that larger firms need not pay more attention. When demand curvature is strong, attention declines with firm size. When curvature is more moderate, attention is hump-shaped. This endogenous allocation of attention in turn determines which firms drive monetary transmission and whether nominal disturbances raise or lower allocative efficiency and measured TFP.

The Theory We first develop a general framework that isolates the channels linking firm size to information acquisition. A continuum of monopolistically competitive firms sets prices in the presence of an aggregate nominal-demand disturbance. Firms differ in permanent productivity and therefore in market share, and these differences are common knowledge. Before setting prices, each firm chooses how much information to acquire about the aggregate nominal state, trading off more accurate pricing against an explicit cost of attention. Prices are freely adjustable, but imperfect information implies that

chosen prices respond incompletely to aggregate conditions, generating an endogenous wedge between the full-information desired price and the implemented price.

On the demand side, we impose minimal structure. The demand system permits local demand elasticities, desired pass-through, and demand curvature to vary with a firm's position on its demand curve. Lemma 1 provides a general decomposition of the curvature of the profit-loss function into firm size, elasticity, and super-elasticity. This result is useful beyond our application because it reduces the value of information in a broad class of heterogeneous-firm pricing problems to three sufficient statistics that can be mapped into observables or model primitives.

Building on that decomposition, Proposition 1 shows that four forces are central for attention. A *size channel* makes larger firms want more information because a given pricing error has larger profit consequences. An *elasticity channel* works in the opposite direction because lower local demand elasticities reduce the sensitivity of profits and desired prices to nominal shocks.[1] A *pass-through channel* also lowers attention among larger firms because lower desired pass-through reduces the value of tracking aggregate nominal conditions precisely. In equilibrium, the size–attention relationship reflects the interaction of these forces.

We then obtain sharp comparative statics under a Kimball demand system.[2] This specification preserves variable elasticities and allows for strategic complementarity while delivering a tractable characterization of pricing incentives.

Proposition 2 shows that the size–attention relationship depends crucially on demand curvature. When demand curvature is high, larger firms acquire less information. When demand curvature is lower, attention is hump-shaped in firm size: it rises from small to medium firms and then declines among the largest firms. Large firms need not be the most attentive firms in the economy.

Policy Implications This endogenous allocation of attention changes how monetary policy is transmitted across firms. Proposition 3 shows that firms' real responses to monetary shocks reflect two distinct margins: a real-rigidity margin driven by heterogeneous desired pass-through and a nominal-rigidity margin driven by heterogeneous attention. Absent heterogeneity in nominal rigidity, the model implies that output responses are increasing in firm size, which runs counter to evidence that small and young firms tend to

[1] A further force operates through how elasticity varies with the firm's position on the demand curve (super-elasticity); depending on its sign, it can reinforce or offset the elasticity channel.

[2] We use the Kimball specification in Klenow and Willis (2016).

respond more strongly to monetary policy shocks than large firms.[3] Once information acquisition is endogenous, that ranking need not survive: depending on demand curvature, and hence strategic complementarity in price setting, the attention channel can reinforce or offset the pass-through channel, and small firms can respond more strongly than large firms (Corollary 2).

A second policy implication is that the *sign* of the supply-side effects of monetary policy depends on the endogenous cross-sectional distribution of attention.[4] Proposition 4 shows that monetary policy affects allocative efficiency and measured productivity by inducing dispersion in relative prices and markups. Whether aggregate TFP rises or falls therefore hinges on how attention covaries with pass-through (and markups) across firms, which in turn is shaped by demand curvature (Corollary 3).

Quantitatively, a calibration disciplined by micro evidence on firms' demand elasticities implies a hump-shaped attention–size relationship. Under this empirically relevant calibration, monetary policy has larger real effects on small firms than on large firms, and small and medium-sized firms account for a disproportionate share of the aggregate real output response relative to their sales share. Expansionary monetary policy mildly raises measured TFP on impact. A counterfactual that shuts down the downturn in attention among the largest firms and instead forces Kalman gains to keep rising with size implies a contractionary supply-side effect.

Evidence We also provide empirical evidence consistent with the mechanism. Using textual analysis of annual Form 10-K filings, we construct firm-level measures of attention to macroeconomic conditions based on references to general economic conditions (Song and Stern 2022). Both unconditional patterns and regression evidence point to a robust hump-shaped relationship between firm size and attention. This evidence aligns more naturally with the lower-curvature region of the model and helps discipline the quantitative analysis.

Related literature. This paper contributes to several literatures.

Informational frictions and monetary non-neutrality. Starting with Lucas (1972) and Phelps (1970), the central insight is that nominal disturbances have real effects when agents do not perfectly observe the aggregate nominal state, even when prices are freely adjustable.

[3] See, for example, Gertler and Gilchrist (1994), Cloyne et al. (2023), and Gnewuch and Zhang (2025).

[4] The supply-side effect is defined as in Baqaee et al. (2024): the effects of monetary policy on measured aggregate TFP via its effects on misallocation.

Subsequent work studies the magnitude and persistence of these effects using noisy signals, staggered information updating, and imperfect common knowledge (e.g., Mankiw and Reis 2002; Woodford 2003a). A central modern theme is that persistence can arise endogenously through belief hierarchies and strategic interactions: higher-order beliefs and coordination motives can amplify modest informational frictions into protracted real responses (e.g., Angeletos and La'O 2009; Nimark 2017; Huo and Takayama 2024). Relatedly, Adam (2007) shows that limited attention can generate imperfect common knowledge and strong policy implications in flexible-price economies with monopolistic competition. More recently, Chahrour and Ulbricht (2023) and Chahrour and Jurado (2025) revisit the propagation of nominal-demand shocks in incomplete-information environments, while Afrouzi et al. (2024) show how measured beliefs and price data can identify the relative contributions of pricing and information frictions to monetary non-neutrality. Finally, Angeletos (2018) and Angeletos et al. (2018) emphasize frictional coordination and higher-order beliefs as a disciplined way to generate Keynesian-like demand fluctuations and persistence in general equilibrium. Our contribution to this literature is to shift the focus from aggregate persistence to the endogenous cross-sectional allocation of attention across heterogeneous firms, and to study how that allocation shapes heterogeneous transmission and supply-side effects.

Rational inattention and price setting. Our analysis also builds on the rational inattention literature initiated by Sims (2003), in which agents optimally choose how much information to acquire subject to information-processing constraints. In price-setting applications, rational inattention can generate endogenous nominal rigidities and realistic monetary non-neutrality even without physical adjustment costs (e.g., Woodford 2009; Mackowiak and Wiederholt 2009; Maćkowiak and Wiederholt 2015; Paciello and Wiederholt 2014; Afrouzi and Yang 2021). A related strand studies optimal monetary policy with rationally inattentive firms. Ou et al. (2026) analyze optimal stabilization in a multi-sector model with heterogeneous frequencies of price adjustment and endogenous information acquisition, while Wu et al. (2025) incorporate input–output linkages and rational inattention into the design of optimal policy.

Recent work has also enriched rational-inattention price-setting models with industrial-organization features. Afrouzi (2024) embeds oligopolistic competition in a dynamic general-equilibrium rational-inattention model and shows how competitive structure shapes firms' attention to aggregate variables and, in turn, inflation dynamics and monetary non-neutrality. But that paper is not about firm-level asymmetry in our sense: firms are

symmetric within industries, and the relevant asymmetry comes from the number of competitors rather than from differences in market share, market power, or demand curvature. Our contribution is to bring firm-level asymmetry into this literature and show how heterogeneity in firm size, market power, and pass-through generates a non-monotone relationship between firm size and attention.

Information acquisition with heterogeneous firms. Related work studies information acquisition in heterogeneous-firm environments. This literature is concerned mainly with firm-level uncertainty, information production, and misallocation over the longer run, rather than with the business-cycle transmission of nominal shocks. David et al. (2016) show how imperfect information about firm-level fundamentals generates misallocation and productivity losses. More recent papers endogenize information choices. In particular, Asriyan and Kohlhas (2025) develop a theory in which data acquisition scales with firm size and shapes product choice, pricing, and market power, implying that larger or more productive firms acquire more information.[5] Our contribution is to connect endogenous information acquisition to monetary transmission and to show, both theoretically and empirically, that the relationship between firm size and attention can be hump-shaped once pricing incentives depend on variable demand elasticities and pass-through.

Heterogeneous monetary transmission and supply-side effects. Finally, the paper speaks to the literature on heterogeneous monetary transmission, where small and young firms are found to respond more strongly to monetary policy shocks than large firms (Gertler and Gilchrist 1994; Cloyne et al. 2023; Jeenas 2023; Ottonello and Winberry 2020; Gnewuch and Zhang 2025). We provide a complementary mechanism based on endogenous attention rather than financial frictions or adjustment costs. On the normative side, our paper is also related to work showing that heterogeneity across firms or products can matter for inflation design. Adam and Weber (2019) show in a sticky-price model with heterogeneous firms and systematic firm-level productivity trends that the optimal trend inflation rate can differ sharply from the homogeneous-firm benchmark, while Adam and Weber (2023) use product-level relative price trends over the product life cycle to discipline the optimal inflation target. Our focus is different: rather than steady-state trend inflation or product turnover, we study how endogenous heterogeneity in attention shapes the impact effects of monetary policy and the sign of its allocative consequences. In that respect, the paper also connects to work showing that monetary shocks can affect allocative

[5] Adams et al. (2025) study heterogeneous firms with incomplete information and irreversible investment, emphasizing the implications of information frictions for investment dynamics and firm behavior.

efficiency, markup dispersion, and measured productivity through relative prices and markups (Baqaee et al. 2024; Meier and Reinelt 2024). More broadly, Flynn and Sastry (2024) show that fluctuations in firms' attention can themselves generate aggregate productivity effects. In our framework, these supply-side effects depend on how attention is allocated across firms.

The paper proceeds as follows. Section 2 presents the general environment and firms' information-acquisition problem. Section 3 derives the mechanisms governing heterogeneous attention. Section 4 characterizes equilibrium attention profiles under Kimball demand and develops the implications for heterogeneous real effects and supply-side effects. Section 5 presents the quantitative analysis and empirical evidence. Section 6 presents additional results, including a discussion of the preference specification, persistent shocks, and attention to idiosyncratic shocks. Section 7 concludes.

2 The General Framework

This section lays out the baseline environment. Firms are monopolistically competitive, heterogeneous in productivity, and choose how much information to acquire about an aggregate nominal-demand shock before setting prices. The framework nests both Constant Elasticity of Substitution (CES) and Kimball demand systems, allowing us to characterize how firm size and demand curvature jointly shape attention, pricing, and monetary transmission.

2.1 Households

There is a continuum of identical consumers. Preferences over the aggregate consumption bundle Y and labor L are represented by $U(Y, L) = \log Y - L$. Time is discrete. In the baseline model, we consider one-period shocks that are independent across time; accordingly, we suppress the time subscript t to simplify notation. Section 6 generalizes the findings to a dynamic setting.

The consumption bundle Y consists of a continuum of differentiated varieties indexed by $i \in [0, 1]$. Consumers have homothetic preferences over varieties, and Y is defined implicitly by

$$\int_0^1 G\left(\frac{Y_i}{Y}\right) di = 1,$$

where Y_i denotes consumption of variety i and G is increasing and concave. CES preferences obtain as a special case when G is a power function. We allow for a general aggregator G whose derivative G' may vary across varieties. As a result, the demand function derived below, which maps relative prices into relative demands, may also vary across varieties. This specification nests Kimball (1995) preferences as a special case, in which the demand mapping is variety-invariant, and is therefore more general than the standard Kimball aggregator.[6]

This formulation is deliberately general. It allows us to distinguish results that rely only on local properties of demand from those that require a specific parametric structure. In Section 3, only local elasticity, super-elasticity, and pass-through matter. In Section 4, we then specialize to Kimball demand to obtain sharper comparative statics.

The representative consumer maximizes utility subject to the budget constraint

$$\int_0^1 P_i Y_i \, di = WL + \Pi,$$

where W is the wage, L denotes total hours worked, and Π are profits. Utility maximization yields the inverse demand curve for variety i:

$$\frac{P_i}{P} = G'\left(\frac{Y_i}{Y}\right), \tag{2.1}$$

where the price aggregator P is defined as $P \equiv P^Y / \int_0^1 G'\left(\frac{Y_i}{Y}\right)\left(\frac{Y_i}{Y}\right) di$ with P^Y denoting the ideal price index.[7] The ideal price index coincides with price aggregator P when the goods aggregator is a CES aggregator. Moreover, up to the first order, the ideal price index describes the Consumer Price Index (CPI).

Equation (2.1) shows that relative demand for variety i depends only on its relative price, P_i/P. For notational convenience, let z_i denote this relative price:

$$z_i \equiv \frac{P_i}{P}.$$

In the equilibrium we study, larger and more productive firms are associated with lower values of z_i.

The key demand objects for what follows are the local elasticity and super-elasticity.

[6] See Matsuyama and Ushchev (2017) for a more detailed discussion of these differences.

[7] More specifically, $P^Y \equiv \min_{\{Y_i\}} \left\{ \int_0^1 P_i Y_i \, di : Y = 1 \right\}$.

The price elasticity of demand for variety i, denoted ϵ_i, is

$$\epsilon_i \equiv -\frac{\partial \log Y_i}{\partial \log P_i} = \frac{G'\left(\frac{Y_i}{Y}\right)}{-\left(\frac{Y_i}{Y}\right) G''\left(\frac{Y_i}{Y}\right)}, \tag{2.2}$$

which can vary across varieties. Note that $\epsilon_i > 1$ for all i, implying positive markups.

The super-elasticity (the elasticity of the elasticity) is denoted by η_i and defined as

$$\eta_i \equiv \frac{\partial \log \epsilon_i}{\partial \log z_i} = \frac{z_i \epsilon_i'}{\epsilon_i}, \tag{2.3}$$

where $\epsilon_i' \equiv \partial \epsilon_i / \partial z_i$ measures how sensitive the elasticity is to the relative price z_i.

2.2 Monetary Authority

The monetary authority chooses aggregate nominal demand Q:

$$Q \equiv PY. \tag{2.4}$$

We interpret Q as a monetary policy shock. In equilibrium, the nominal wage depends on Q, so Q directly shifts firms' nominal marginal cost.

Aggregate nominal demand Q is stochastic and follows a log-normal distribution. Specifically, letting $q \equiv \log Q$, we assume

$$q \sim N\left(0, \sigma_q^2\right). \tag{2.5}$$

2.3 Firms

The economy contains a continuum of monopolistically competitive firms. Firms differ in productivity and therefore in size and market power. Information is imperfect: firms do not observe the monetary shock directly, but they can acquire noisy signals whose precision is chosen endogenously at a cost.

Timing within the period is as follows. First, firms choose the precision of the signals they will observe. Next, the aggregate shock is realized. Firms then observe their signals and set a pricing plan (i.e., a good-level supply curve) conditional on their information sets. Production, consumption, and profits are subsequently realized.

Firms are heterogeneous in productivity. A firm of type i has productivity e^{a_i} and produces using labor as the sole input:

$$Y_i = f(e^{a_i}, L_i) = e^{a_i} L_i,$$

where L_i denotes labor hired by firm i. The type parameters $\{a_i\}_{i\in[0,1]}$ are non-stochastic constants and are common knowledge. Aggregate labor is

$$L \equiv \int_0^1 L_i \, di.$$

Price setting. Each firm sets its price to maximize expected profits conditional on its information set I_i, which we describe below.

The firm's optimal price P_i^* is defined as the solution to

$$P_i^* = \arg_{P_i} \max \mathbb{E}\left(P_i Y_i - W L_i \middle| I_i\right), \tag{2.6}$$

subject to the demand curve (2.1).

Given the demand system, the elasticity ϵ_i in (2.2) implies that, absent information frictions, the firm would set its price as a markup over marginal cost, with desired markup

$$\mu_i \equiv \frac{\epsilon_i}{\epsilon_i - 1}.$$

When setting prices, firms do not observe the aggregate nominal-demand shock q. We next describe their endogenous information acquisition problem.

Endogenous Information Acquisition. In this scalar Gaussian environment, it is optimal for firm i to allocate attention to a signal of the form

$$s_i = q + e_i, \qquad e_i \sim N\left(0, \sigma_{e,i}^2\right). \tag{2.7}$$

This follows because q is the only unobserved aggregate state relevant for the firm's profit-maximization problem (Mondria, 2010). This reduced-form signal structure is without loss of generality in the present environment. Since the payoff-relevant uncertainty is one-dimensional and Gaussian, any optimal information structure can be summarized by a one-dimensional sufficient statistic about q. The firm's choice is therefore equivalent to choosing how noisy that sufficient statistic will be.

Firm i chooses its information capacity κ_i before shocks are realized to maximize ex ante expected profits net of information-acquisition costs:

$$\kappa_i^* = \arg\max_{\kappa_i} \mathbb{E}[P_i^* Y_i - W L_i] - \lambda f(\kappa_i), \tag{2.8}$$

taking as given the optimal pricing rule in (2.6). The firm's information choice is subject to the information-flow constraint

$$I(\sigma_q^2, \hat{\sigma}_{q,i}^2) = \kappa_i, \tag{2.9}$$

where $\hat{\sigma}_{q,i}^2$ denotes firm i's posterior variance of q, given by

$$\hat{\sigma}_{q,i}^2 = \left(\frac{1}{\sigma_q^2} + \frac{1}{\sigma_{e,i}^2} \right)^{-1}. \tag{2.10}$$

Here κ_i measures the amount of information acquired by firm i, $f(\kappa_i)$ is the cost of information acquisition, and λ governs the marginal cost of attention. We focus on heterogeneity that arises from differences in the marginal benefit of information acquisition, so both $f(\cdot)$ and λ are common across firms. Allowing these objects to vary across firms would be straightforward.

Under Shannon mutual information, the information flow is

$$I(\sigma_q^2, \hat{\sigma}_{q,i}^2) = \frac{1}{2} \log_2 \left(\frac{\sigma_q^2}{\hat{\sigma}_{q,i}^2} \right), \tag{2.11}$$

so κ_i is the reduction in entropy generated by the signal s_i.

Given its optimal information choice, firm i updates its belief about q according to Bayes' rule:

$$\mathbb{E}(q \mid s_i) = K_i s_i, \tag{2.12}$$

where

$$K_i \equiv \frac{\sigma_q^2}{\sigma_q^2 + (\sigma_{e,i}^*)^2} \tag{2.13}$$

is the Kalman gain. Thus, choosing κ_i^* is equivalent to choosing the posterior variance

$\hat{\sigma}^2_{q,i}$, the signal precision $1/(\sigma^*_{e,i})^2$, or the Kalman gain K_i. We will use these objects interchangeably. High attention, high information capacity, high signal precision, low posterior variance, and a high Kalman gain are all equivalent descriptions of the same choice.

2.4 Linear-Quadratic Approximation

We characterize the model using a linear-quadratic approximation around the steady state. For any variable X, let x denote the log deviation of X from its steady-state value.

Linearized Price Setting. The linearized version of the optimal pricing condition in (2.6) is

$$p_i^* = \mathbb{E}[p_i^\diamond \mid s_i]\,, \tag{2.14}$$

where $p_i^\diamond$, following Mackowiak and Wiederholt (2009), is firm i's full-information profit-maximizing price. It depends on aggregate nominal demand through nominal marginal cost and on the aggregate price level p. Formally,

$$p_i^\diamond = \rho_i q + (1-\rho_i)p, \tag{2.15}$$

where ρ_i denotes firm i's desired partial-equilibrium pass-through, defined as the elasticity of its ideal price with respect to nominal marginal cost, holding economy-wide aggregates constant. This pass-through coefficient is given by

$$\rho_i = \frac{1}{1 - \frac{\partial \log \mu_i}{\partial \log z_i}},$$

where

$$\mu_i = \frac{\epsilon_i}{\epsilon_i - 1}$$

denotes the desired markup.

Equation (2.14) provides the key bridge between information and pricing. Because the loss function is quadratic and the only uncertainty concerns q, the firm's actual price is simply the conditional expectation of its full-information target. Information frictions, therefore, matter only through forecast errors about the target price $p_i^\diamond$.

Under CES preferences, desired markups do not depend on the firm's position on the demand curve. As a result, desired pass-through is equal to one for all firms, $\rho_i = 1$, and firms exhibit complete desired pass-through. More generally, however, a firm's desired markup may vary with its position on the demand curve, implying incomplete desired pass-through. For brevity, we hereafter refer to ρ_i simply as the firm's pass-through.

A firm's pass-through is inversely related to the strength of strategic complementarities in price setting. Equation (2.15) shows that the desired price is a weighted average of the nominal marginal-cost component q and the aggregate price level p, with weights ρ_i and $(1-\rho_i)$. A lower ρ_i means that the firm puts more weight on the aggregate price level, so its desired price comoves more strongly with competitors' prices. In this sense, $(1-\rho_i)$ is a natural measure of strategic complementarity. This is a micro notion of strategic complementarity that operates through variable desired markups, and it differs from the macro-level complementarities emphasized in CES sticky-price models; see, for example, Adam (2005), Woodford (2003b), and Nakamura and Steinsson (2010).

The log-linearized aggregate price indices p and p^Y are

$$p = \int_0^1 \widetilde{\epsilon}_i p_i \, di, \qquad p^Y = \int_0^1 \widetilde{s}_i p_i \, di, \tag{2.16}$$

where

$$\widetilde{\epsilon}_i \equiv \frac{\bar{P}_i \bar{Y}_i \bar{\epsilon}_i}{\int_0^1 \bar{P}_i \bar{Y}_i \bar{\epsilon}_i \, di}, \qquad \widetilde{s}_i \equiv \frac{\bar{P}_i \bar{Y}_i}{\int_0^1 \bar{P}_i \bar{Y}_i \, di}.$$

Linear-Quadratic Information Acquisition. A second-order Taylor approximation of the profit function yields the firm's quadratic loss from mispricing. Whenever the implemented price differs from the full-information benchmark in (2.15), profits fall because the firm prices suboptimally. As established by Mackowiak and Wiederholt (2009), the loss function before paying information-acquisition costs is

$$\frac{|\pi_{pp,i}|}{2} (p_i - p_i^{\diamond})^2, \tag{2.17}$$

where $|\pi_{pp,i}|$ is the absolute value of the second derivative of the profit function with respect to price, evaluated at the initial equilibrium. The paper derives an analytical characterization of $|\pi_{pp,i}|$ in a setting with heterogeneous firms and a non-CES demand system.

This expression captures the profit loss from mispricing, that is, from setting $p_i \neq p_i^\diamond$ because of imperfect information. The term $|\pi_{pp,i}|$ measures the curvature of the loss function: a larger value implies that profits decline more steeply when the firm's price deviates from its profit-maximizing level, thereby strengthening the firm's incentive to acquire information.

At this point, the economics of the problem can be summarized simply. A firm cares more about information when two conditions hold: mispricing is more costly, and the full-information target price is more sensitive to the unobserved shock. The first force is captured by $|\pi_{pp,i}|$; the second will be captured by pass-through. This decomposition is what allows us to map observable firm characteristics such as size and market power into information choices.

The optimal information-acquisition problem in (2.8) can therefore be rewritten as a linear-quadratic problem:

$$\kappa_i^* = \arg\min_{\kappa_i} \mathbb{E}\left[\frac{|\pi_{pp,i}|}{2}\left(p_i^\diamond - p_i^*\right)^2\right] + \lambda f(\kappa_i), \tag{2.18}$$

subject to (2.14), (2.15), and the information-flow constraint (2.9).

We are now ready to discuss the main mechanisms governing firms' heterogeneous information-acquisition decisions. The next section shows that two objects summarize the incentive to acquire information: the curvature of the profit-loss function, $|\pi_{pp,i}|$, and the pass-through coefficient, ρ_i. The first measures how costly a pricing mistake is, while the second captures how much the firm's desired price would move if the aggregate nominal state were known. Heterogeneous attention arises from the joint behavior of these two objects across firms.

3 Mechanisms

This section isolates the economic forces linking firm size to attention before any parametric specialization. The goal is not yet to sign the overall relationship between firm size and information acquisition, but to decompose it into transparent components that can later be signed under Kimball demand. The section proceeds in two steps. We first characterize how costly mispricing is for a given firm. We then show how the demand system maps firm size into elasticity, super-elasticity, and pass-through, which together determine the value of learning about aggregate nominal conditions.

3.1 Curvature of the Profit-Loss Function.

We begin by characterizing the curvature of the profit-loss function, $\pi_{pp,i}$. Lemma 1 shows that the curvature depends on only three objects: firm size $s(z_i)$, elasticity ϵ_i, and super-elasticity η_i. This decomposition lets the rest of the analysis proceed in modular fashion.

Lemma 1 (Curvature Decomposition of the Profit-Loss Function)**.** *The curvature of the profit-loss function, $\pi_{pp,i}$, is given by*

$$|\pi_{pp,i}| = s(z_i)\left[\epsilon_i - 1 + \eta_i\right], \tag{3.1}$$

where $s(z_i) = \frac{P_i Y_i}{PY}$ is firm i's market share, and ϵ_i and η_i denote the elasticity and super-elasticity defined in (2.2) and (2.3), respectively.

The curvature of the profit-loss function, $|\pi_{pp,i}|$—that is, the profit loss resulting from mispricing—is proportional to the firm's market share: a given percentage pricing error affects a larger base of sales. We refer to this mechanism as the size channel. Note that firms' sales shares $s(z_i)$ are proportional to their output shares Y_i/Y.

A firm's $|\pi_{pp,i}|$ is increasing in its (local) price elasticity of demand, ϵ_i. Intuitively, when demand is highly elastic, a small price increase leads to a large decline in quantity demanded, so profits are more sensitive to deviations from the optimum.

The term $|\pi_{pp,i}|$ is also increasing in the firm's super-elasticity, η_i. Super-elasticity measures how the elasticity of demand changes as the firm's relative price or quantity changes; it therefore captures the curvature of demand beyond the constant-elasticity case. Even if two goods have the same elasticity at the optimum, they may differ in how elasticity changes when the firm moves away from its optimal price. When η_i is high, a deviation from the optimal price moves the firm more quickly into a region in which demand becomes more elastic, so consumers substitute away more strongly than under isoelastic demand. As a result, profits decline more sharply when the firm misprices. In this sense, super-elasticity captures how rapidly mispricing pushes the firm into a region where demand becomes substantially more sensitive.

Lemma 1 is useful because it separates a pure scale effect from demand-shape effects. The market-share term implies that pricing mistakes matter more for large firms simply because they apply to more sales. The elasticity and super-elasticity terms imply that the same pricing mistake can nevertheless be more or less costly depending on the shape of demand around the firm's operating point. More broadly, the lemma provides a decomposition that can simplify related models: once firm size, elasticity, and super-elasticity

are known, the curvature of mispricing losses follows immediately. In our setting, this decomposition forms the basis for the size and IO channels that follow.

Our general expression for $|\pi_{pp,i}|$ encompasses both the case of homogeneous firms under a CES aggregator and the case of heterogeneous firms under a CES aggregator.

In the case of homogeneous firms with a CES aggregator,

$$|\pi_{pp,i}| = \epsilon - 1.$$

In the case of heterogeneous firms with CES demand,

$$|\pi_{pp,i}| = s(z_i)(\epsilon - 1).$$

3.2 Heterogeneous Incentives to Acquire Information

A central theme of the paper is how firms of different sizes differ in their information-acquisition decisions. Lemma 1 shows that these incentives depend on firm size, demand elasticity, and super-elasticity. We now characterize how those objects vary with firm size. To do so, it is useful to introduce three Marshallian laws of demand.

Marshallian Laws of Demand. We assume that the demand system satisfies the following three laws. Their role is to provide economically interpretable monotonicity conditions linking a firm's location on its demand curve to its size, markup, and pass-through. In particular, they let us move from the general expression in Lemma 1 to sign predictions about how the determinants of information acquisition vary across firms.

Definition 1 (Marshallian Laws of Demand)**.** *We say that the demand system satisfies the Marshallian laws of demand if the following three conditions hold for all i.*

First law:

$$\frac{\partial s(z_i)}{\partial z_i} < 0. \tag{3.2}$$

Second law:

$$\frac{\partial \log \epsilon_i}{\partial \log z_i} > 0 \quad \Leftrightarrow \quad \frac{\partial \log \mu_i}{\partial \log z_i} < 0, \tag{3.3}$$

where $\mu_i \equiv \frac{\epsilon_i}{\epsilon_i - 1}$ denotes the desired markup.

Third law:

$$\frac{\partial}{\partial z_i}\left(\frac{\partial \log \mu_i}{\partial \log z_i}\right) > 0. \tag{3.4}$$

The first law states that a firm's market share is decreasing in its relative price. In words, firms that charge lower prices relative to the aggregate price level sell more and therefore command larger market shares. Since larger firms in our framework are associated with lower values of z_i, the first law provides the basic mapping from relative prices to firm size.

The second law states that the elasticity of demand is increasing in relative price. Equivalently, desired markups are decreasing in relative price. Because larger firms have lower z_i, this condition implies that larger firms face lower demand elasticities and therefore choose higher desired markups. Intuitively, firms charging relatively low prices operate in regions of the demand curve where consumers are less price-sensitive, allowing them to sustain higher markups.

The third law states that the sensitivity of desired markups to relative prices is itself increasing in z_i. Since larger firms have lower z_i, this implies that desired markups respond more strongly to changes in relative prices for larger firms. Equivalently, when marginal cost changes induce adjustments in relative prices, larger firms adjust markups more aggressively.

This property is directly related to pass-through. Recall that

$$\rho_i = \frac{1}{1 - \frac{\partial \log \mu_i}{\partial \log z_i}}.$$

Under the third law,

$$\frac{\partial \rho_i}{\partial z_i} > 0, \tag{3.5}$$

so larger firms, which have lower z_i, exhibit lower pass-through. The intuition is that, because desired markups of larger firms are more responsive to changes in relative prices, these firms absorb a larger fraction of marginal-cost shocks through markup adjustment rather than passing them through one-for-one into prices.

Heterogeneous Incentives to Acquire Information. We next link the Marshallian laws of demand to the determinants of firms' incentives to acquire information. The key objects are the parameters governing the curvature of the profit-loss function, $|\pi_{pp,i}|$, and pass-through.

The logic is straightforward. Lemma 1 identifies the objects that determine the value of information. The Marshallian laws then describe how those objects covary with firm size. Combining the two yields a decomposition of heterogeneous attention into a positive force arising from scale and a set of offsetting demand-side forces stemming from market power and strategic complementarities.

We begin by relating firm size to the underlying demand objects. Since larger firms are associated with lower relative prices z_i, the second law implies that they face lower demand elasticities and therefore charge higher desired markups. The third law implies that larger firms also exhibit lower pass-through. By contrast, the relationship between firm size and super-elasticity is, in general, ambiguous: the third law tends to make desired markups more responsive to relative prices for larger firms, whereas the second law tends to reduce super-elasticity through the lower elasticity those firms face.[8] The following lemma summarizes these implications.

Lemma 2 (Laws of Demand and Firm Heterogeneity)**.** *More productive firms have lower relative prices z_i and are therefore larger. Under the Marshallian laws of demand:*

1. *if the second law of demand holds, larger firms have lower demand elasticities ϵ_i;*
2. *if the third law of demand holds, larger firms have lower pass-through ρ_i;*
3. *the relationship between firm size and super-elasticity, $\eta_i = \frac{z_i \epsilon_i'}{\epsilon_i}$, is in general ambiguous.*

Lemma 2 is useful because it maps firm size into the primitives governing pricing behavior. Combined with Lemma 1, it yields a decomposition of the forces shaping firms' information-acquisition decisions.

To see the decomposition most clearly, note that information is more valuable when the firm's price target is both more important and more shock-sensitive. Importance is governed by the curvature term $|\pi_{pp,i}|$, which is higher when a pricing mistake is more

[8] Note that super-elasticity can be written as

$$\eta_i = \frac{z_i \epsilon_i'}{\epsilon_i} = -\frac{\partial \log \mu_i}{\partial \log z_i}(\epsilon_i - 1).$$

costly. Shock-sensitivity is governed by pass-through, since lower pass-through means the desired price reacts less to the aggregate nominal disturbance. Firm size matters for both margins, but not in the same direction.

The first force is the *size channel*. Larger firms have larger market shares, so a given pricing mistake applies to a larger volume of sales and therefore generates a larger profit loss. This force raises the value of information for larger firms.

The second force is the *elasticity channel*. Under the second law of demand, larger firms face lower demand elasticities. Lower elasticity makes profits less sensitive to pricing errors, which reduces the incentive to acquire information.

The third force is the *super-elasticity channel*. Since the relationship between firm size and super-elasticity is generally ambiguous, this channel may either strengthen or weaken the incentive of larger firms to acquire information, depending on how η_i varies with z_i.

The fourth force is the *pass-through channel*. When pass-through is lower, the firm's profit-maximizing price responds less to aggregate demand shocks. In that case, tracking aggregate conditions becomes less valuable, which lowers the incentive to acquire information about those shocks.[9]

The next proposition summarizes these channels. Importantly, Proposition 1 is a decomposition result rather than a full comparative-static result. In the general environment, the four channels need not point in the same direction, so the overall size–attention relationship remains ambiguous at this level of generality. This is why the parametric analysis in Section 4 is needed.

Proposition 1 (Channels)**.** *The following channels determine how information acquisition varies with firm size:*

1. *a positive size channel through market share $s(z_i)$;*
2. *a negative elasticity channel through demand elasticity ϵ_i;*
3. *an ambiguous super-elasticity channel through η_i;*
4. *a negative pass-through channel through ρ_i.*

Hereafter, we refer to the elasticity, super-elasticity, and pass-through channels collectively as the *IO channels*, since they arise from the structure of demand and markup determination rather than from firm scale per se.

[9] It is straightforward to show that the response of firms' equilibrium prices to q is proportional to ρ_i.

4 Model Predictions and Implications for Monetary Policy

Proposition 1 identifies the channels through which large firms may acquire either more or less information than small firms. These results are derived in a general environment, without imposing a specific functional form on demand, so their net effect is ambiguous. To determine which firms acquire more information overall, this section specializes the model to the Kimball aggregator proposed by Klenow and Willis (2016).

The section has three parts. We first show how the Kimball demand system maps the primitive parameters (ϵ, η) into firm-level elasticities, super-elasticities, and pass-through. We then use that mapping to characterize the equilibrium relationship between firm size and information acquisition. Finally, we derive the implications of that endogenous attention profile for the heterogeneous real effects and supply-side effects of monetary policy.

4.1 Setting: Parametric Demand System

By imposing a parametric functional form on the demand aggregator, we are able to characterize pass-through ρ_i and the curvature of the profit-loss function $|\pi_{pp,i}|$ directly in terms of the model's deep parameters. This added structure enables a full characterization of the model's predictions.

Demand System. We adopt the Kimball demand aggregator in the form used by Klenow and Willis (2016), which allows for a flexible departure from CES demand:

$$G(Y_i/Y) = 1 + (\epsilon - 1)\exp\left(\frac{1}{\eta}\right)\eta^{\frac{\epsilon}{\eta}-1}\left[\Gamma\left(\frac{\epsilon}{\eta}, \frac{1}{\eta}\right) - \Gamma\left(\frac{\epsilon}{\eta}, \frac{(Y_i/Y)^{\eta/\epsilon}}{\eta}\right)\right], \tag{4.1}$$

where $\Gamma(\cdot,\cdot)$ denotes the incomplete gamma function, ϵ is the elasticity of substitution evaluated at $\bar{Y}_i/\bar{Y} = 1$—that is, for the average-sized firm in the steady state—and η parameterizes the deviation from the standard CES utility function. The parameter η is also the super-elasticity in the symmetric economy, evaluated at $\bar{Y}_i/\bar{Y} = 1$. This aggregator nests the CES case as a special case when $\eta = 0$. More generally, a higher value of η strengthens strategic complementarities in pricing and, by increasing the sensitivity of demand elasticity to relative prices, generates greater cross-sectional dispersion in demand elasticities across firms.

To simplify notation, define the choke price as $\bar{P}_c \equiv \frac{\epsilon-1}{\epsilon}\exp\left(\frac{1}{\eta}\right)P$, above which demand falls to zero.

The household's optimal expenditure-allocation problem then implies the following demand curve:

$$\frac{Y_i}{Y} = \left(-\eta \log\left(\frac{P_i}{\bar{P}_c}\right)\right)^{\frac{\epsilon}{\eta}}.$$

This expression makes clear why Kimball demand is useful in the present context. A firm's position on the demand curve directly determines both its size and the local demand conditions it faces. As a result, once the firm-size distribution is given, the demand system immediately pins down the cross-sectional distributions of elasticities, super-elasticities, and pass-through.

Pricing Equation. The firm's pricing equation takes the same form as in the general case:

$$p_i^{\diamond} = \rho_i q + (1-\rho_i)p, \tag{4.2}$$

with the advantage that we can now explicitly characterize pass-through ρ_i:

$$\rho_i = \frac{\eta \log\left(\frac{\bar{P}_i}{\bar{P}_c}\right) + \epsilon}{\eta \log\left(\frac{\bar{P}_i}{\bar{P}_c}\right) + (\epsilon+\eta)}.$$

Pass-through ρ_i is decreasing in the super-elasticity parameter η and increasing in the ratio ϵ/η: higher curvature strengthens strategic complementarities in price setting and reduces the sensitivity of desired prices to marginal cost.

The aggregate price indices are defined as in the general case in (2.16), with explicit expressions for $\widetilde{s}_i$ and $\widetilde{\epsilon}_i$.[10] When $\eta = 0$ and there is no firm heterogeneity, the model reduces to the benchmark case in which aggregate price indices coincide, so that $p = p^Y = \int \hat{p}_i \, di$.

[10] Specifically, $\widetilde{s}_i = \dfrac{\exp\left(\frac{1}{\eta}-\frac{1}{\eta}\left(\frac{\bar{Y}_i}{\bar{Y}}\right)^{\frac{\eta}{\epsilon}}\right)\frac{\bar{Y}_i}{\bar{Y}}}{\int \exp\left(\frac{1}{\eta}-\frac{1}{\eta}\left(\frac{\bar{Y}_i}{\bar{Y}}\right)^{\frac{\eta}{\epsilon}}\right)\frac{\bar{Y}_i}{\bar{Y}}di}$ and $\widetilde{\epsilon}_i = \dfrac{\left(\frac{\bar{Y}_i}{\bar{Y}}\right)^{\frac{\epsilon-\eta}{\epsilon}}\exp\left(\frac{1}{\eta}-\frac{1}{\eta}\left(\frac{\bar{Y}_i}{\bar{Y}}\right)^{\frac{\eta}{\epsilon}}\right)}{\int\left(\frac{\bar{Y}_i}{\bar{Y}}\right)^{\frac{\epsilon-\eta}{\epsilon}}\exp\left(\frac{1}{\eta}-\frac{1}{\eta}\left(\frac{\bar{Y}_i}{\bar{Y}}\right)^{\frac{\eta}{\epsilon}}\right)di}$.

Curvature of the Profit-Loss Function. The expression for the curvature of the profit-loss function derived in the general case, stated in Lemma 1, remains valid:

$$|\pi_{pp,i}| = s(z_i)\left[\epsilon_i - 1 + \eta_i\right].$$

Under the demand aggregator in (4.1), both elasticity and super-elasticity admit closed-form expressions:

$$\epsilon_i = \epsilon\left(\frac{\bar{Y}_i}{\bar{Y}}\right)^{-\eta/\epsilon}, \qquad \eta_i = \eta\left(\frac{\bar{Y}_i}{\bar{Y}}\right)^{-\eta/\epsilon}.$$

Two implications of these expressions are worth emphasizing. First, under this Kimball demand specification, the relative importance of super-elasticity and elasticity at the firm level is constant and pinned down by the parameter ratio:

$$\frac{\eta_i}{\epsilon_i} = \frac{\eta}{\epsilon}.$$

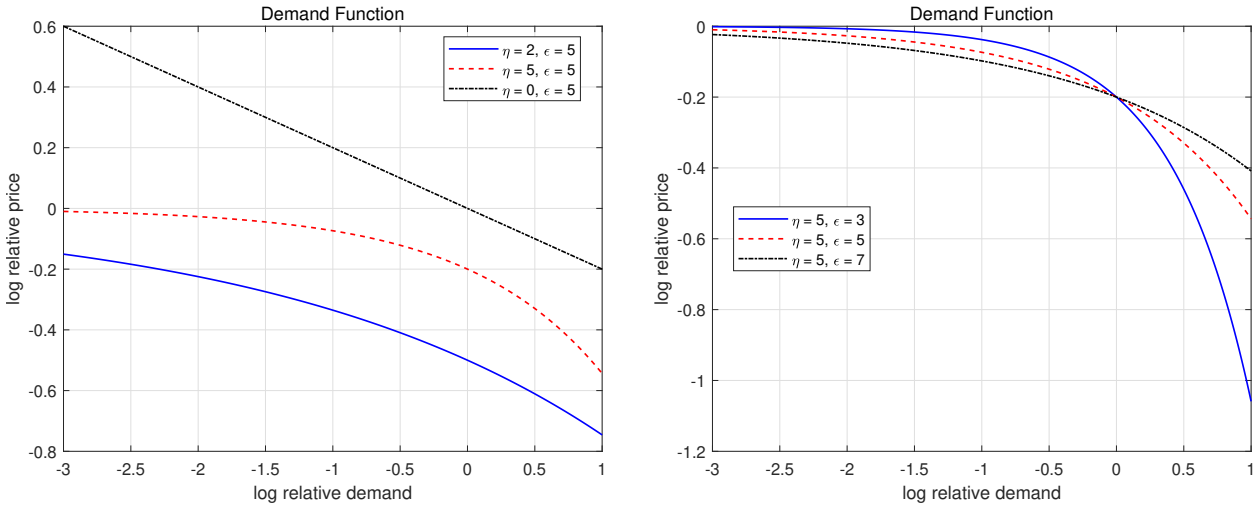
Second, under this Kimball parametric specification, the curvature of the profit-loss function can be expressed directly in terms of firm size and the deep parameters of the demand system. In particular, for a given firm-size distribution and given values of η and ϵ, the Kimball aggregator directly implies the cross-sectional distributions of ϵ_i and η_i.[11]

4.2 Who Acquires More Information and When

Section 3 developed the mechanisms through which firm size affects attention in the general model. We now combine these mechanisms within a parametric Kimball environment and characterize the equilibrium relationship between firm size and information acquisition.

The logic is simple. The size channel still pushes larger firms toward acquiring more information because they have more sales at risk. What changes under Kimball demand is that the IO channels can now be signed and their strength can be summarized by η/ϵ. The question is whether the attenuation in desired-price sensitivity created by elasticity, super-elasticity, and pass-through is weak enough that scale dominates, or strong enough

[11] A caveat of the parametric Kimball aggregator is that the economically meaningful restriction $\epsilon_i > 1$ places a constraint on the joint specification of the firm-size distribution and the parameters η and ϵ. In particular, the model does not admit parameterizations that generate firms with $\epsilon_i \leq 1$, since such firms would imply non-positive or ill-defined desired markups.



(a) Demand function with varying η

(b) Demand function with varying ϵ

Figure 1: Kimball curvature and cross-sectional heterogeneity

Note: The figure illustrates how the Kimball parameters alter the shape of demand. The comparison highlights that η/ϵ governs how strongly firm-level elasticities and super-elasticities diverge across firms located at different points on the demand curve.

that it overturns the scale effect.

Lemma 3 (Demand Curvature and Cross-Sectional Heterogeneity)**.** *Under Kimball demand, the ratio η/ε governs the strength of cross-sectional heterogeneity induced by demand curvature: for a given dispersion in firm size, larger values of η/ε imply greater dispersion in (log) demand elasticity and super-elasticity across firms.*

Proof: See Appendix **??**.

Lemma 3 isolates the key comparative static in the Kimball environment: a higher curvature amplification parameter η/ε makes demand conditions diverge more strongly across firms of different sizes. Figure 1 visualizes this mapping. Each curve should be read as a demand curve, with firms of different size corresponding to different locations on the horizontal axis. Moving along the x-axis therefore means moving across firms that occupy different points on the same demand schedule, and the relevant demand elasticity is the local slope of the curve, that is, the slope of the tangent at that point.

This interpretation is useful for understanding the role of the Kimball parameters. In the CES benchmark with $\eta = 0$, demand elasticity is constant, so firms of different size face the same local slope everywhere on the curve. Once $\eta > 0$, elasticity becomes size-dependent: small and large firms lie on different parts of the demand curve and therefore face different elasticities. The left panel shows that raising η increases not only

the variation in elasticity across firms, but also its dispersion. In particular, the difference between the slope at the left and right sides of the red curve is much larger than for the blue curve, so a higher η makes elasticities spread out more strongly across small and large firms. The right panel shows that varying ϵ also changes how fast slopes differ across points on the demand curve, and therefore also affects the dispersion of firm-level elasticities. Taken together, the two panels show why the ratio η/ϵ is the natural summary statistic for how strongly demand curvature amplifies cross-sectional heterogeneity.

This lemma connects Proposition 1 to the equilibrium relationship between firm size and attention.

Proposition 1 showed that information acquisition is determined by a tug-of-war between a positive size channel and negative IO channels through elasticity, super-elasticity, and pass-through. Lemma 3 implies that raising η/ϵ magnifies the cross-sectional variation in those IO objects. As demand curvature rises, the attenuation of desired-price sensitivity becomes progressively stronger for larger firms, so the IO channels first offset and eventually dominate the size channel. Proposition 2 summarizes the resulting three regimes.

Proposition 2 (Heterogeneous Information Acquisition)**.** *The relationship between firm size and information acquisition depends on the magnitude of η relative to ϵ:*

1. *If $\eta = 0$, that is, under CES demand, larger firms acquire more information.*
2. *If $0 < \eta < \epsilon$, the relationship between firm size and information acquisition is hump-shaped.*
3. *If $\eta \geq \epsilon$, larger firms acquire less information.*

Proof: See Appendix **??**.

Proposition 2 translates the geometry in Figure 1 into the equilibrium size–attention relationship. Under CES demand ($\eta = 0$), the IO channels disappear: elasticities are constant across firms, pass-through is constant, and the only force that matters is the scale effect that larger firms have more sales at risk. Hence larger firms acquire more information. When $0 < \eta < \epsilon$, Kimball curvature creates a countervailing force because larger firms face lower pass-through and different local demand conditions, which reduces the responsiveness of desired prices to aggregate shocks. For small firms the scale effect still dominates, but for sufficiently large firms the attenuation coming from

elasticity, super-elasticity, and pass-through becomes strong enough to offset it, producing a hump-shaped profile. When $\eta \geq \epsilon$, these curvature-driven IO channels dominate throughout the size distribution, so the value of information declines monotonically with firm size and larger firms acquire less information.

For the rest of the paper, Proposition 2 is the key organizing result. It says that the cross-sectional allocation of attention is not an independent primitive: it is itself an equilibrium outcome pinned down by demand curvature. Once this point is established, the remaining monetary-policy results can be read as implications of which attention regime the economy is in.

4.3 Implications for Monetary Policy

We now turn to the model's implications for monetary policy, focusing on two questions. First, how do monetary policy shocks affect firms differentially, that is, what are the distributional effects across firms? Second, what are the aggregate supply-side consequences of these heterogeneous responses? Proposition 2 implies that larger firms may acquire either more or less information than smaller firms, depending on the magnitude of η relative to ϵ. We therefore organize the analysis by considering these parameter regimes.

The common structure behind both implications is that monetary shocks matter through heterogeneous price adjustment. Some firms adjust prices less because their desired price is intrinsically less responsive to shocks; others adjust less because they choose to be less informed. The first force is about pass-through, the second about information acquisition. The interaction between the two determines both the cross-sectional distribution of real effects and the aggregate reallocation consequences.

Implication 1: Heterogeneous Real Effects of Monetary Policy. The model implies that monetary policy has heterogeneous real effects across firms. Two margins generate this heterogeneity. The first is a *real-rigidity* margin: firms differ in their partial-equilibrium pass-through, ρ_i, and therefore in the sensitivity of desired prices to aggregate nominal-demand shocks. The second is a *nominal-rigidity* margin: firms differ in the amount of information they acquire, κ_i, which endogenously generates differences in price flexibility. Together, these two margins determine how much of a monetary shock is reflected in prices and how much is reflected in quantities.

The real-rigidity margin is unambiguous. Larger firms have lower partial-equilibrium pass-through. Holding information acquisition fixed, they therefore adjust prices less in

response to aggregate nominal-demand shocks, so a larger share of the adjustment occurs through quantities. Through this channel alone, firms' output responses to monetary policy shocks are increasing in firm size.

The nominal-rigidity margin depends on endogenous information acquisition. Firms that acquire more information track aggregate conditions more closely and adjust prices more aggressively, while firms that acquire less information do the opposite. The direction of this channel therefore depends on the size–information relationship characterized in Proposition 2. If larger firms acquire less information, they are more nominally rigid and their output responses are increasing in firm size. If larger firms acquire more information, they are more flexible and their output responses are decreasing in firm size.

The following proposition summarizes these two channels.

Proposition 3 (Heterogeneous Real Effects of Monetary Policy)**.** *Aggregate nominal-demand shocks generate heterogeneous price and output responses across firms through two channels:*

1. *a pass-through channel, operating through heterogeneous partial-equilibrium pass-through* ρ_i*;*

2. *a nominal-rigidity channel, operating through heterogeneous information choices* κ_i*.*

Moreover:

(i) through the pass-through channel, firms' output responses are increasing in firm size;

(ii) through the nominal-rigidity channel, firms' output responses are increasing in firm size if $\eta \geq \epsilon$*, and decreasing in firm size if* $\eta < \epsilon$*.*

Proposition 3 separates two conceptually distinct sources of cross-sectional heterogeneity in the transmission of monetary policy. The pass-through channel always operates in the same direction: lower pass-through shifts more of the adjustment toward the quantity margin for larger firms. By contrast, the nominal-rigidity channel may either reinforce or offset this force, depending on whether larger firms choose to be less or more attentive to aggregate conditions.

This distinction is important for interpretation. Observing that large firms adjust prices less in response to monetary shocks does not, by itself, reveal whether they are less informed or simply have lower desired pass-through. The model predicts that both forces can matter, but that only the attention channel changes sign across parameter regimes.

A useful benchmark is the case in which firms differ in pass-through but not in nominal rigidity. In that case, the cross-sectional pattern of real responses is pinned down entirely by heterogeneous pass-through.

Corollary 1 (No Heterogeneous Nominal Rigidity)**.** *If firms differ in pass-through but not in nominal rigidity, then firms' output responses to monetary policy shocks are increasing in firm size.*

Corollary 1 follows immediately from the fact that larger firms have lower pass-through. In the absence of endogenous differences in information acquisition, this alone implies that monetary policy reallocates adjustment toward the quantity margin of larger firms.

This counterfactual prediction highlights the importance of endogenous information choice. The empirical literature finds that small and young firms tend to respond more strongly to monetary policy shocks than large firms (Gertler and Gilchrist 1994, Cloyne et al. 2023, Gnewuch and Zhang 2025). This evidence is inconsistent with the benchmark model summarized in Corollary 1. The next corollary shows how endogenous information acquisition can reconcile the model with these findings.

Once nominal rigidity is allowed to vary endogenously across firms, the ranking of output responses can become non-monotone. For sufficiently small values of η, larger firms acquire more information and therefore become more flexible in price setting. In that region, the nominal-rigidity channel works against the pass-through channel and may overturn it. For sufficiently large values of η, by contrast, larger firms acquire less information and therefore become more rigid, so the two channels operate in the same direction.

Corollary 2 (Endogenous Nominal Rigidity)**.** *When nominal rigidity is heterogeneous because of endogenous information acquisition, there exists a $\bar{\eta} > 0$ such that, if $\eta \leq \bar{\eta}$, firms' output responses to monetary policy shocks are decreasing in firm size. Moreover, if $\eta \geq \epsilon$, firms' output responses to monetary policy shocks are increasing in firm size.*

Proof: See Appendix **??**.

Corollary 2 identifies Kimball curvature as the key determinant of which force dominates. For sufficiently small values of η, larger firms acquire more information and therefore adjust prices more flexibly. In that region, the nominal-rigidity channel offsets—and may dominate—the lower-pass-through channel, so monetary policy has weaker real effects on larger firms. By contrast, when $\eta \geq \epsilon$, larger firms acquire less information and

therefore become more rigid on the nominal side. In that case, the two channels reinforce each other, and firms' output responses are increasing in firm size.

Taking stock, the cross-sectional incidence of monetary policy depends not only on firms' pass-through behavior, but also on the information structure underlying price adjustment. When larger firms are more attentive, monetary policy reallocates adjustment toward smaller firms. When larger firms are less attentive, the opposite pattern emerges. The model therefore links the heterogeneous real effects of monetary policy to deep demand-side parameters that jointly govern markup adjustment and firms' incentives to acquire information.

Implication 2: Supply-Side Effects of Monetary Policy. The model also implies that monetary policy affects aggregate supply, not only aggregate demand. The reason is that firms differ in both pass-through and nominal rigidity. Following an aggregate nominal-demand shock, these differences generate heterogeneous price adjustments across firms, which in turn alter relative prices and reallocate demand across producers. When the firms that expand relatively more are those with relatively low markups, allocative efficiency improves and measured TFP rises; when the opposite occurs, allocative efficiency deteriorates and measured TFP falls. Monetary policy therefore has a supply-side effect through endogenous reallocation. Importantly, the *sign* of this effect depends on the endogenous relationship between firm size and information acquisition.

To state this result compactly, it is useful to introduce weighted expectations and covariances. For any variable $x_i > 0$, define the x-weighted expectation of z_i by

$$\mathbb{E}_x[z_i] \equiv \frac{\int_0^1 z_i x_i \, di}{\int_0^1 x_i \, di}.$$

Similarly, define the x-weighted covariance between z_i and y_i by

$$\mathrm{Cov}_x(z_i, y_i) \equiv \mathbb{E}_x[z_i y_i] - \mathbb{E}_x[z_i]\mathbb{E}_x[y_i].$$

The operator $\mathbb{E}_x$ implements a change of measure that assigns greater weight to firm types with larger values of x_i. We define the sales-weighted harmonic average of markups, referred to as the *aggregate markup*, as

$$\bar{\mu} \equiv \mathbb{E}_u[\mu_i^{-1}]^{-1}.$$

The next proposition shows that the TFP response can be decomposed into a pass-through reallocation channel and an information-acquisition reallocation channel.

Proposition 4 (Supply-Side Effects of Monetary Policy)**.** *Fix a distribution of firms' Kalman gains* $\{K_i\}_{i\in[0,1]}$*. Following an aggregate nominal-demand shock, the induced response of TFP is*

$$\underbrace{\varsigma_\rho \operatorname{Cov}_{uK}(\epsilon_i, \rho_i)}_{\text{pass-through reallocation channel}} + \underbrace{\varsigma_K \operatorname{Cov}_u(\epsilon_i, K_i)}_{\text{information-acquisition reallocation channel}},$$

where $\varsigma_\rho \geq 0$ *and* $\varsigma_K \geq 0$ *are given by*

$$\varsigma_\rho \equiv \frac{\bar{\mu}\, \mathbb{E}_u[K_i]\, \mathbb{E}_u[1-K_i]}{\mathbb{E}_u([K_i\rho_i + (1-K_i)]\epsilon_i)}, \qquad \varsigma_K \equiv \frac{\bar{\mu}\, \mathbb{E}_{uK}[\rho_i]}{\mathbb{E}_u([K_i\rho_i + (1-K_i)]\epsilon_i)}.$$

Proposition 4 isolates two distinct sources of supply-side reallocation. The first term,

$$\varsigma_\rho \operatorname{Cov}_{uK}(\epsilon_i, \rho_i),$$

captures reallocation generated by heterogeneous pass-through. When firms with higher demand elasticities also have higher pass-through, aggregate nominal-demand shocks move relative prices in a way that shifts expenditure toward lower-markup firms, thereby raising TFP.

The second term,

$$\varsigma_K \operatorname{Cov}_u(\epsilon_i, K_i),$$

captures reallocation generated by endogenous heterogeneity in information acquisition.[12] Firms with higher Kalman gains adjust prices more strongly to aggregate conditions. If those firms also face higher demand elasticities, monetary policy again reallocates demand toward lower-markup firms and raises TFP. If, instead, more attentive firms face lower elasticities, this channel works in the opposite direction.

The sign of the overall supply-side effect therefore depends on the joint distribution of elasticities, pass-through, and attention across firms. The first covariance term reflects heterogeneous pass-through; the second is the new force generated by endogenous information acquisition. The latter is the key object through which the Kimball parameter η shapes the aggregate supply consequences of monetary policy.

[12] Here $\mathbb{E}_{uK}[z_i] \equiv \frac{\int_0^1 z_i u_i K_i\, di}{\int_0^1 u_i K_i\, di}$ and $\operatorname{Cov}_{uK}(z_i, y_i) \equiv \mathbb{E}_{uK}[z_i y_i] - \mathbb{E}_{uK}[z_i]\mathbb{E}_{uK}[y_i]$.

The main takeaway is that demand curvature matters for aggregate supply not only because it changes markups and pass-through directly, but also because it changes which firms choose to track aggregate conditions closely. In that sense, the information structure is part of the economy's supply side. The quantitative section will show that this extra channel is large enough to alter both the distribution of real effects across firms and the productivity consequences of monetary policy.

The following corollary summarizes the implications of the Kimball parameterization.

Corollary 3 (Kimball Curvature and the Supply Channel)**.** *Under the Kimball demand system:*

1. *for sufficiently large values of η, both $\mathrm{Cov}_{uK}(\epsilon_i, \rho_i)$ and $\mathrm{Cov}_u(\epsilon_i, K_i)$ are positive, so the supply-side effect of an expansionary monetary policy shock is positive;*

2. *for sufficiently small values of η, the term $\mathrm{Cov}_u(\epsilon_i, K_i)$ is negative, offsetting the positive supply-side effect arising from $\mathrm{Cov}_{uK}(\epsilon_i, \rho_i)$.*

Corollary 3 clarifies the role of Kimball curvature. When η is large, larger firms have both lower pass-through and lower attention. Because those firms also face lower demand elasticities, the cross-sectional patterns in ρ_i and K_i are aligned with the cross-sectional pattern in ϵ_i. Both covariance terms are therefore positive, and an expansionary monetary shock improves allocative efficiency by shifting demand toward lower-markup firms. In this case, monetary policy generates not only a demand-side expansion but also a positive supply-side effect through reallocation.

When η is small, the pass-through channel remains positive, but the information-acquisition channel changes sign. Larger firms then acquire more information, so the correlation between elasticity and attention becomes negative. As a result, the second covariance term offsets the first. Monetary policy still affects allocation, but the endogenous information margin dampens the improvement in allocative efficiency and may even overturn it. Section 5.1 provides a quantitative calibration of the model and quantifies the relative importance of these two forces.

More broadly, this result shows that endogenous information acquisition matters not only for the heterogeneous real effects of monetary policy across firms, but also for its aggregate consequences. By shaping which firms adjust prices most strongly, the information structure determines whether monetary policy reallocates demand toward relatively efficient producers or away from them. The aggregate supply effects of monetary policy

therefore depend on the same deep demand-side forces that govern firms' incentives to acquire information.

5 Quantitative and Empirical Evidence

This section has two goals. First, it asks whether the two theoretical regimes characterized above remain quantitatively distinct once the model is disciplined by standard micro evidence. Second, it confronts the model's central cross-sectional prediction with firm-level data. The key empirical object throughout is the relationship between firm size and attention to aggregate conditions.

5.1 Quantitative Analysis

Calibration Strategy. We do not attempt a full structural estimation. Instead, we use a parsimonious calibration to answer two quantitative questions: how important is endogenous heterogeneity in attention for monetary transmission, and which of the model's two curvature regimes is more empirically relevant?

The calibration has two components. The first governs the attention cost function. Following Paciello and Wiederholt (2014), we assume that the cost of information acquisition is exponential:

$$f(\kappa_i) = 2^{2\kappa_i}.$$

We choose the cost parameter τ so that the *average* Kalman gain in the endogenous-information equilibrium is 0.5, consistent with the empirical evidence in Coibion and Gorodnichenko (2015).

The second component governs the demand system and the firm-size distribution. The Kimball parameters ϵ and η determine the cross-section of elasticities and pass-through, while the size distribution determines the strength of the size channel. We discipline the cross-sectional distribution of U.S. establishment size using the U.S. Census Bureau's Business Dynamics Statistics (BDS). In particular, we target the establishment-level employment distribution and map it into the model-implied distribution of sales shares. Figure 6 plots the resulting cumulative sales share.

A central difficulty is that the relevant demand-curvature objects remain hard to measure. Firm-level elasticities and super-elasticities are notoriously difficult to estimate, and

their exact values remain unsettled in the empirical literature. As Beck and Lein (2020) emphasize, existing estimates display substantial dispersion, and the macro literature typically addresses this issue by considering alternative values of the curvature parameters (Klenow and Willis, 2016; Eichenbaum and Fisher, 2007; Gopinath and Itskhoki, 2010). Following that tradition, we do not force the calibration to select a single preferred region ex ante. Instead, we study two benchmark regimes, one low-curvature and one high-curvature. This approach is especially useful here because Proposition 2 shows that the model's qualitative predictions differ across these regions.

Specifically, we set $\epsilon = 5$ and consider a lower-curvature benchmark, $\eta = 0.5\epsilon$, and a higher-curvature benchmark, $\eta = \epsilon$. The lower-curvature benchmark lies close to the range emphasized by Beck and Lein (2020),[13] and is consistent with papers that favor relatively modest curvature, such as Bergin and Feenstra (2001) and Beck and Lein (2020). The higher-curvature benchmark places the economy in the $\eta \geq \epsilon$ region highlighted by Proposition 2. We view this calibration as equally well motivated: a large macro literature has worked with stronger curvature or stronger strategic complementarities, for example Klenow and Willis (2016), Eichenbaum and Fisher (2007), Chari et al. (2000), and Smets and Wouters (2007). See also the discussion in Beck and Lein (2020). Comparing the two calibrations is therefore not a robustness exercise around a preferred benchmark; it is a way to evaluate the model in the two empirically and quantitatively relevant regions considered in the literature.

Lower-Curvature Benchmark. We begin with the lower-curvature benchmark, $\eta = 0.5\epsilon$. Figure 2 reports firms' responses to a one-time aggregate-demand shock. The solid (red) lines correspond to the model with *endogenous* information acquisition. The dashed (blue) lines report a counterfactual economy in which Kalman gains are *exogenously* fixed at 0.5 for all firms. This counterfactual preserves the average amount of information in the economy while shutting down cross-sectional heterogeneity in nominal rigidity.

The top-left panel shows the key quantitative object: attention is hump-shaped in firm size. Among small and medium-sized firms, information acquisition rises with size because the size channel dominates. For sufficiently large firms, attention falls because the elasticity and pass-through channels become more important. By construction, the

[13] Beck and Lein (2020) show, using micro data, that the median elasticity is 3.20 and the median superelasticity is 1.93, while the corresponding means are 4.81 and 1.59, respectively. The 10th and 90th percentiles are 1.41 and 11.21 for elasticity, and 0.05 and 2.23 for superelasticity. They conclude that empirically plausible values are roughly in the range of 3 to 5 for ϵ and 1 to 2 for η.

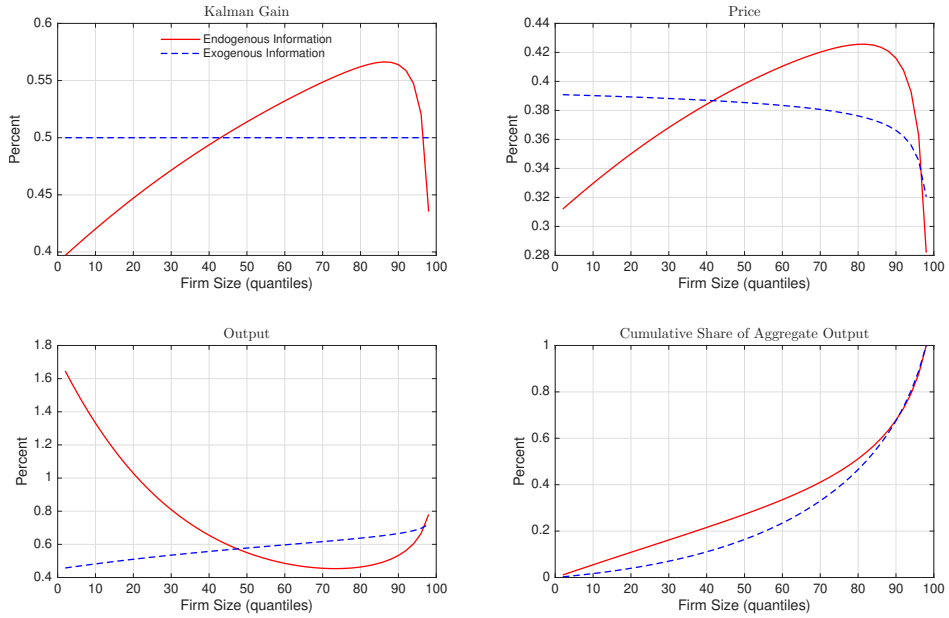


Figure 2: Firms' Responses to an Aggregate-Demand Shock: Low-Curvature

Note: Solid (red) lines correspond to the lower-curvature benchmark with endogenous information acquisition. Dashed (blue) lines correspond to the fixed-information comparison in which all firms' Kalman gains are set to 0.5.

fixed-information counterfactual removes this pattern entirely.

The remaining panels show how this endogenous allocation of attention reshapes monetary transmission. In the lower-curvature benchmark, the nominal-rigidity channel works against the pass-through channel: larger firms tend to acquire more information and therefore adjust prices more aggressively, even though their desired pass-through is lower. This mechanism is visible in the top-right panel. With endogenous information, the price response is increasing in firm size over most of the distribution. In the fixed-information counterfactual, price responses are flatter and decline with size because the only remaining source of heterogeneity is pass-through.

The bottom-left panel gives the corresponding output responses. With endogenous information, output responses decline sharply with firm size: smaller firms adjust prices less and therefore absorb more of the shock through quantities, while larger firms adjust prices more and have weaker real responses. In the fixed-information counterfactual, the ranking flips. Once Kalman gains are fixed at 0.5, larger firms adjust prices less because of their lower pass-through, so their quantity responses become larger. The comparison shows that the declining output response in the lower-curvature benchmark is driven by endogenous heterogeneity in nominal rigidity rather than by pass-through alone.

The bottom-right panel shows how these firm-level responses aggregate. Under endogenous information, small and medium-sized firms contribute disproportionately to the aggregate real effects. The bottom 50% of the size distribution accounts for about 27% of the aggregate output response, compared with about 19% of aggregate sales (see Figure 6). That is, firms in the bottom 50% account for roughly 50% more of demand-shock-induced output volatility than their sales share would suggest. In the fixed-information counterfactual, the cumulative contribution shifts toward larger firms. The lower-curvature benchmark therefore implies that endogenous attention reallocates the incidence of monetary policy toward smaller firms.

To isolate which primitives generate the lower-curvature benchmark, Figure 3 progressively activates the model's four channels. We begin from a homogeneous benchmark with identical firms. We then allow heterogeneity in elasticity, next add heterogeneity in superelasticity, then add heterogeneity in pass-through, and finally restore the size channel to obtain the full model. In each specification, we recalibrate the information cost parameter so that the average Kalman gain remains 0.5. The exercise therefore isolates *who* acquires information, rather than changing the economy's average level of attention.

The decomposition shows that elasticity, superelasticity, and pass-through all push in the same direction: taken together, they make attention decreasing in firm size, flatten price adjustment among the largest firms, and shift the real effects of monetary policy toward them. Restoring the size channel overturns these forces over most of the distribution. The Kalman-gain profile becomes hump-shaped, price responses rise with firm size for most firms, and output responses become decreasing in firm size. Quantitatively, the size channel is therefore not a small correction. In the lower-curvature region, it is the force that reverses the cross-sectional ranking implied by the other channels and generates the benchmark pattern in Figure 2. Without the size channel, the model places little weight on small firms in the aggregate output response.

Higher-Curvature Benchmark. Figure 4 repeats the same exercise for the higher-curvature benchmark, $\eta = \epsilon$. This parameterization lies in the regime with $\eta \geq \epsilon$. In that region, the IO channels are strong enough that larger firms acquire less information throughout the size distribution.

The contrast with Figure 2 is sharp. The top-left panel shows that attention is now monotonically decreasing in firm size. As a result, larger firms track aggregate conditions less closely and adjust prices less aggressively, as shown in the top-right panel. The

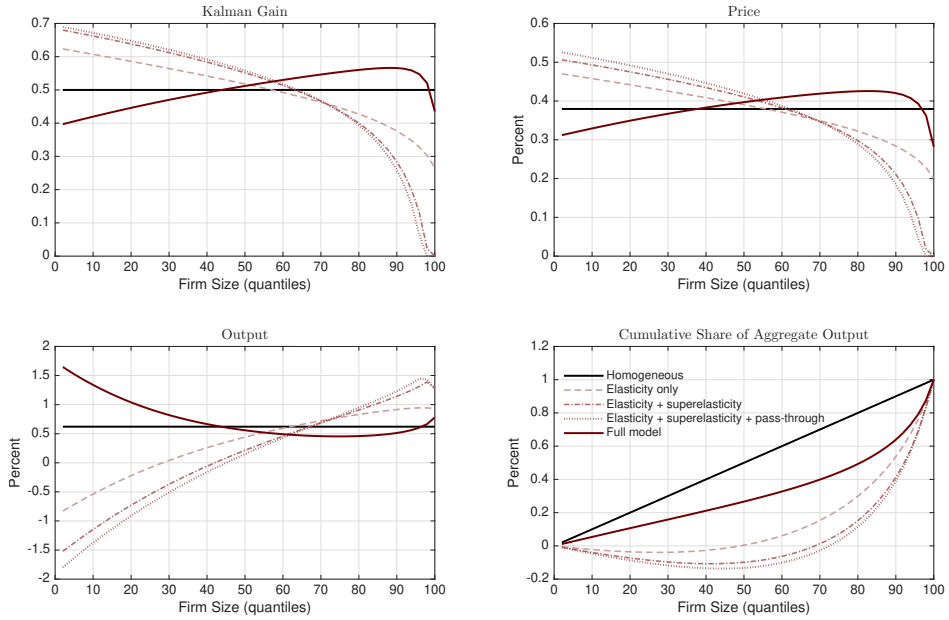


Figure 3: Progressive Decomposition of the Low-Curvature Benchmark

Note: The figure reports a sequence of counterfactuals under the lower-curvature calibration, $\eta = 0.5\epsilon$, with $\epsilon = 5$. The black line is a homogeneous benchmark. The red lines progressively add heterogeneity in elasticity, superelasticity, pass-through, and finally the size channel. In every specification, the information cost parameter is recalibrated so that the average Kalman gain is 0.5.

sign of the nominal-rigidity channel has therefore reversed relative to the lower-curvature benchmark.

This reversal has strong quantity consequences. The bottom-left panel shows that small firms' output falls in response to an expansionary aggregate-demand shock, whereas large firms' output rises.[14] Unlike in the lower-curvature benchmark, where monetary policy has larger real effects on small firms and the output response remains positive for most of the distribution, the high-curvature benchmark implies much stronger reallocation across firms. The bottom-right panel shows that the cumulative contribution of small firms to aggregate output is initially negative and turns positive only further up the size distribution.

The comparison between Figures 2 and 4 sends an important message. Moving from $\eta = 0.5\epsilon$ to $\eta = \epsilon$ changes the sign of the size–attention gradient and, with it, the cross-sectional pattern of price and quantity adjustment. This is not a minor change in magnitude; it is a change in economic regime. For that reason, both benchmarks are informa-

[14] Although aggregate demand increases, small firms may contract because they adjust prices more aggressively than large firms. The induced rise in their relative prices shifts demand away from them, and this expenditure-switching effect can dominate the direct expansionary effect of monetary policy.

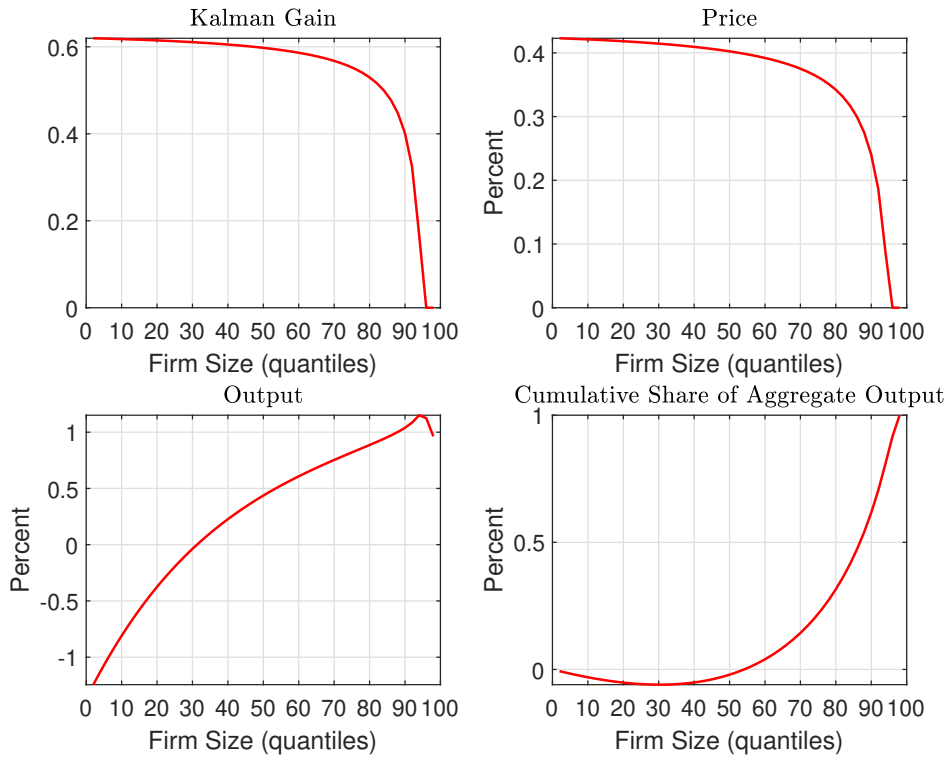


Figure 4: Firms' Responses to an Aggregate-Demand Shock: High-Curvature

Note: This figure reports firms' responses to an aggregate-demand shock under the higher-curvature benchmark, $\eta = \epsilon$, with $\epsilon = 5$.

tive. The lower-curvature benchmark is closer to some micro estimates, while the higher-curvature benchmark remains well within the range entertained in the macro literature.

Supply-Side Effects. We now turn to the model's supply-side effects. As emphasized in Section 4, a nominal-demand expansion can change measured productivity because heterogeneous price adjustment distorts the cross-sectional allocation in the short run. In the present model, these movements arise from endogenous nominal rigidity: firms' information choices shape the dispersion of relative prices and markups after a monetary shock and therefore the degree of misallocation that feeds into measured TFP.

Table 1 reports the impact response of TFP (in percent) to a 1% increase in nominal demand under two benchmark calibrations, together with benchmark-specific counterfactuals. In the lower-curvature case, $\eta = 0.5\epsilon$, TFP rises by 0.001% on impact. Under a counterfactual that suppresses the hump-shape and forces Kalman gains to continue rising with firm size, TFP falls by 0.013%. In the higher-curvature case, $\eta = \epsilon$, TFP rises by 0.150% in the benchmark and by 0.083% under fixed information. The table shows that

Table 1: Supply-Side Effects of Monetary Policy: Impact Response of TFP (%)

	TFP impact response (%)	
	Calibration	**Response**
Lower-curvature benchmark	$\eta = 0.5\epsilon$	0.001
Continued-rise counterfactual	$\eta = 0.5\epsilon$, post-peak K_i keeps rising	-0.013
Higher-curvature benchmark	$\eta = \epsilon$	0.150
Fixed-information comparison	$\eta = \epsilon$, $K_i = 0.5\ \forall i$	0.083

Notes: The table reports the impact response of measured TFP (in percent) to a 1% increase in nominal demand. All rows set $\epsilon = 5$. The first and third rows report the two benchmark endogenous-information calibrations discussed in the text. The second row replaces the hump-shaped Kalman-gain profile in the low-curvature calibration with a counterfactual profile that continues to rise with firm size after the peak. The fourth row fixes firms' Kalman gains at 0.5 while keeping the high-curvature benchmark demand curvature unchanged. Negative values indicate a decline in measured TFP following an expansionary nominal-demand shock.

the supply-side effects of monetary policy depend not only on demand curvature, but also on the shape of the endogenous attention profile within a given curvature region.

The benchmark-specific counterfactuals show that endogenous attention is quantitatively important in both regimes, but in different ways. Under $\eta = 0.5\epsilon$, replacing the hump-shaped profile with one in which Kalman gains continue rising with firm size changes the TFP response from 0.001% to -0.013%. The downturn in attention among the largest firms is therefore quantitatively important: without it, the model would imply a contractionary supply-side effect. Under $\eta = \epsilon$, fixing Kalman gains at 0.5 leaves the TFP response positive but reduces it substantially, from 0.150% to 0.083%. In the lower-curvature benchmark, the sign of the TFP response depends on the shape of the attention profile. In the higher-curvature benchmark, the response remains positive, but endogenous heterogeneity materially amplifies it.

To summarize, endogenous information acquisition is not merely a minor amplification mechanism. In the lower-curvature region, the hump-shaped allocation of attention is central for the sign of the TFP response. In the higher-curvature region, endogenous heterogeneity materially strengthens a positive supply-side effect.

5.2 Empirical Evidence

The quantitative analysis above delivers two sharply different qualitative predictions. In the lower-curvature benchmark, attention is hump-shaped in firm size. In the higher-

curvature benchmark, it is decreasing. The empirical evidence in this subsection is therefore useful not because it identifies the full structural model, but because it helps determine which qualitative regime better matches the data.

Using firm-level textual data from annual Form 10-K filings, we document a robust inverted-U-shaped relationship between firm size and attention to macroeconomic conditions. This pattern aligns more naturally with the lower-curvature benchmark, although we do not treat it as decisive evidence that $\eta < \epsilon$ must hold in the population.

Measurement. We proxy firm-level attention to macroeconomic conditions using textual information from annual Form 10-K filings, following Song and Stern (2022) and Flynn and Sastry (2024). The frequency of topic-specific keywords serves as a reduced-form measure of the emphasis firms place on a given macroeconomic topic in their disclosures. This is not a structural estimate of κ_i, but it is informative if topics that firms monitor more closely are also discussed more intensively in mandatory filings. To construct the word counts, we follow the textual-analysis procedure of Loughran and McDonald (2011), which removes stop words and standardizes the text using a predefined dictionary. We use the same set of macroeconomic topics and keyword classifications as Song and Stern (2022).

For each firm i, year t, and topic j, attention is defined as

$$\hat{\kappa}^j_{i,t} = \frac{\text{Total Topic Words}^j_{i,t}}{\text{Total Words}_{i,t}}. \tag{5.1}$$

Normalizing by total words removes mechanical differences in filing length. Among the available topics, "general economic conditions" is the closest empirical counterpart to the aggregate nominal environment in the model, while the remaining topics provide a broader robustness check.

Unconditional Evidence We begin with the topic closest to the model. Figure 5 plots average attention to general economic conditions across firm size deciles, where firms are sorted by assets within each year. The pattern is clearly hump-shaped: attention rises with firm size among smaller firms, peaks at intermediate deciles, and then declines for the largest firms.

Figure 8 extends the exercise to a broader set of macroeconomic topics, including output, employment, consumption, investment, inflation, housing, and oil. For nearly

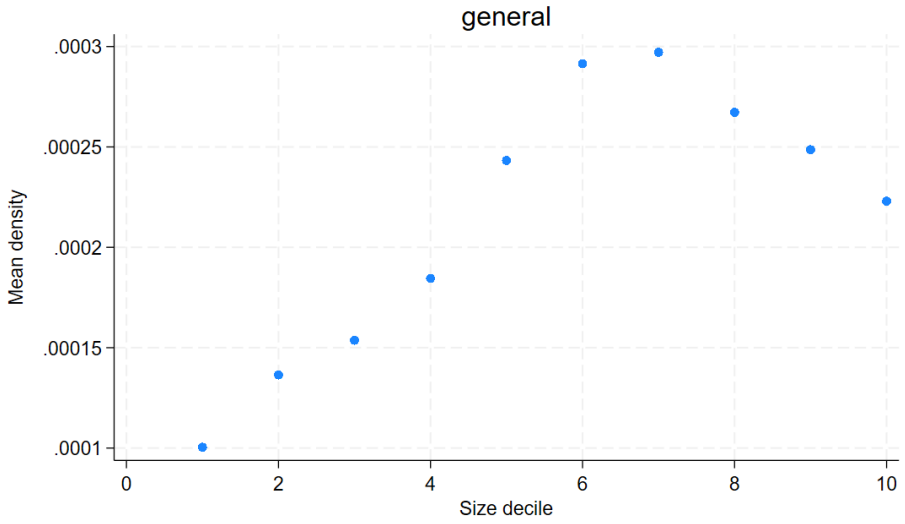


Figure 5: Firm Attention to General Macroeconomic Conditions by Size Decile

Note: The figure reports average firm-level attention to general macroeconomic conditions across firm size deciles.

all topics, the relationship between firm size and attention is again inverted-U-shaped. The main exception is oil-related attention, which increases monotonically with firm size. Overall, the unconditional evidence rules out a simple monotone-increasing size–attention relationship and is more consistent with the lower-curvature benchmark than with the higher-curvature benchmark.

Regression Evidence. To test whether this concavity survives conditioning on broad differences across industries and topics, we estimate the following pooled specification across topics:

$$\kappa_{i,t}^{j} = \alpha + \beta_1 \text{Size}_{i,t} + \beta_2 \text{Size}_{i,t}^2 + \gamma' \mathbf{X}_{i,t} + FE + \varepsilon_{i,t}^{j}. \tag{5.2}$$

Here, $\kappa_{i,t}^{j}$ denotes firm i's attention to topic j in year t, and $\mathbf{X}_{i,t}$ is a vector of firm-level controls, including book leverage, firm age, and filing length. The coefficients of interest are β_1 and β_2. The theory implies a positive linear term and a negative quadratic term, so the sign of β_2 is the key empirical object.

Table 2 reports the results. Column (1) includes 2-digit industry fixed effects. Column (2) adds topic fixed effects, and Column (3) further includes industry-by-topic fixed effects, making the comparison increasingly demanding. Across all three specifications, the coefficient on firm size is positive and statistically significant, while the coefficient on firm size squared is negative and statistically significant. The evidence therefore consis-

Table 2: Firm Size and Attention to Macroeconomic Conditions

	Dependent variable: Attention		
	(1)	(2)	(3)
Firm characteristics			
Size	123.3***	123.3***	123.3***
	(30.8)	(30.8)	(30.8)
Size^2	-9.0***	-9.0***	-9.0***
	(2.4)	(2.4)	(2.4)
Constant	644.0**	644.0**	644.0**
	(237.0)	(237.0)	(237.0)
Fixed effects			
Industry FE (2-digit)	Yes	Yes	Yes
Topic FE	No	Yes	Yes
Industry $\times$ Topic FE	No	No	Yes
Observations	1,143,243	1,143,243	1,143,243
R^2	0.014	0.130	0.162

Notes: Robust standard errors are in parentheses and are clustered by fiscal year and industry.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

tently points to a concave relationship between firm size and attention to macroeconomic conditions.

Taken together, the quantitative and empirical exercises point in the same direction. The data do not identify η directly, and the empirical literature still leaves substantial uncertainty about the relevant curvature region. Our evidence is more naturally consistent with the lower-curvature case because the estimated size–attention relationship is hump-shaped rather than decreasing. At the same time, the higher-curvature benchmark remains useful as a disciplined alternative regime, both because it is consistent with a long macro tradition of stronger curvature and because the theory predicts genuinely different transmission properties there.

6 Discussion and Additional Results

This section collects additional discussion and extensions that clarify the scope of the baseline results. We first explain how the preference specification and the treatment of aggregate dynamics help isolate the paper's main mechanism. We then show how the

logic extends to idiosyncratic shocks, where the key distinction is whether uncertainty enters firms' pricing problems through marginal cost or through residual demand.

6.1 Discussion

Log-Linear Preferences. The log-linear preference specification, $U(Y, L) = \log Y - L$, is useful primarily because it removes an additional *macro* strategic complementarity of the type emphasized by Adam (2007). This simplification lets us characterize the results cleanly in terms of demand-curvature regions, as in the propositions above.

Quantitatively, we show that extending preferences to the CRRA specification, $U(Y, L) = \frac{Y^{1-\sigma}}{1-\sigma} - \frac{L^{1+\varphi}}{1+\varphi}$, leaves the lower-curvature results in Section 5 qualitatively unchanged; see Figure 7. In the lower-curvature CRRA calibration, firms below the median size collectively account for about 42% of the aggregate output response, compared with about 27% in the baseline log-linear calibration.

Persistent Shocks The paper's results continue to hold if aggregate demand is persistent but lagged demand is publicly observed. Suppose

$$q_t = \rho_q q_{t-1} + \epsilon_t^q,$$

and firms know q_{t-1} when they set prices. Then the only payoff-relevant uncertainty is the innovation ϵ_t^q. Firms can therefore be viewed as choosing how much attention to devote to a signal of the form $s_{i,t} = \epsilon_t^q + e_{i,t}$, or equivalently to a signal about q_t net of its known component $\rho_q q_{t-1}$. All of the paper's theoretical results go through unchanged after replacing the i.i.d. shock q with the innovation ϵ_t^q: the unknown aggregate state remains one-dimensional and Gaussian, the loss function remains quadratic, and the cross-sectional determinants of attention remain $|\pi_{pp,i}|$ and ρ_i. For the same reason, the quantitative *impact* effects of an unexpected monetary expansion are unchanged once the innovation is normalized to generate the same impact change in nominal demand. Treating lagged aggregate conditions as public information is standard in the incomplete-information literature; see, for example, Nimark (2008), Lorenzoni (2010), Melosi (2016), and Ou et al. (2021).

The difficult case is the one in which past shocks are themselves not observed. Then the scalar-state reduction breaks down. Because current demand is persistent, firms' pricing decisions depend on beliefs about past shocks, and those beliefs must be updated

from the full history of signals. As Afrouzi and Yang (2021) makes clear, one can approximate this problem by truncating the state to a vector of lagged innovations, but as the truncation length grows, the payoff-relevant state converges to the entire history of past shocks. In a heterogeneous-firm environment, this is compounded by the need to track the cross-sectional distribution of beliefs associated with each element of that history. The aggregate state therefore becomes infinite-dimensional along both the shock-history and cross-sectional dimensions. That tractability concern is the main reason we abstract from unknown past shocks in the body of the paper. Nevertheless, the mechanism we emphasize should carry over.

6.2 Attention to Idiosyncratic Shocks

This subsection asks whether the paper's central mechanism is specific to aggregate nominal shocks or extends more broadly to firm-specific uncertainty. The answer depends on how the shock enters the firm's pricing problem. For idiosyncratic supply shocks, the same forces that govern attention to aggregate shocks remain in place, so the comparative statics are unchanged. For idiosyncratic demand shocks, by contrast, the pass-through channel reverses sign because the shock shifts the firm's residual demand rather than its marginal cost. That distinction generates qualitatively different attention profiles.

6.2.1 Idiosyncratic Supply Shocks

We begin with idiosyncratic supply shocks ν_i, interpreted as firm-specific productivity disturbances. Firm i's productivity depends on its type a_i, which is common knowledge, and an idiosyncratic component ν_i, which is not directly observed. Before setting its price, the firm chooses how precisely to learn ν_i from a noisy signal. Because there is a continuum of firms within each type, these shocks wash out in the aggregate. Firm i therefore treats aggregate conditions as given and faces only firm-specific uncertainty.

In the presence of idiosyncratic supply shocks, firms' desired prices satisfy

$$p_i^{\diamond} = \rho_i(q - \nu_i) + (1 - \rho_i)p, \tag{6.1}$$

which has the same structure as in the baseline model: the shock enters desired prices through the pass-through coefficient ρ_i.

The next two propositions characterize the forces governing firms' attention choices in this environment.

Proposition 5 (Idiosyncratic Supply Shocks: Channels)**.** *The following channels determine how information acquisition about idiosyncratic supply shocks varies with firm size:*

1. *a positive size channel through market share* $s(z_i)$*;*
2. *a negative elasticity channel through demand elasticity* ϵ_i*;*
3. *an ambiguous superelasticity channel through* η_i*;*
4. *a negative pass-through channel through* ρ_i*.*

Relative to the aggregate-shock benchmark, no new qualitative force appears. The size, elasticity, superelasticity, and pass-through channels are exactly the same because an idiosyncratic cost shock changes desired prices through the same object, ρ_i. The only difference is that firm i does not internalize any aggregate effect of its pricing decision, since its idiosyncratic shock does not move the aggregate state.

Proposition 6 (Idiosyncratic Supply Shocks: Information Acquisition)**.** *In the case of idiosyncratic supply shocks, the relationship between firm size and information acquisition depends on the magnitude of* η *relative to* ϵ*:*

1. *If* $\eta = 0$*, that is, under CES demand, larger firms acquire more information.*
2. *If* $0 < \eta < \epsilon$*, the relationship between firm size and information acquisition is hump-shaped.*
3. *If* $\eta \geq \epsilon$*, larger firms acquire less information.*

Thus the extension to idiosyncratic supply shocks mainly confirms that the paper's core mechanism is not tied to aggregate uncertainty per se. Once a shock affects desired prices through marginal cost, the shape of the size–attention relationship is governed by the same demand-side forces as in the main model.

Proof: See Appendix **??**.

6.2.2 Idiosyncratic Demand Shocks

We next consider idiosyncratic demand shocks. These shocks are introduced through variety-specific demand shifters in consumers' preferences, following Lorenzoni (2009)

and Aruoba et al. (2024). In particular, the aggregate consumption bundle Y is defined implicitly by

$$\int_0^1 G\left(\frac{e^{n_i} Y_i}{Y}\right) di = 1, \tag{6.2}$$

where $n_i \sim \mathcal{N}(0, \sigma_{n,i}^2)$ is a firm-specific demand shifter. As before, firms do not observe n_i directly and instead choose the precision of a noisy signal before pricing.

In the presence of idiosyncratic demand shocks, firms' desired prices satisfy

$$p_i^\diamond = \rho_i q + (1 - \rho_i)(p + n_i). \tag{6.3}$$

The key difference from aggregate-demand and idiosyncratic-supply shocks is immediate: the demand shifter loads on desired prices with coefficient $(1 - \rho_i)$ rather than ρ_i.

This reversal is economically important. When a shock operates through marginal cost, lower pass-through means that desired prices move less, so the value of information falls. When the shock instead shifts firm i's residual demand, lower pass-through means competitors' prices respond less, and the firm experiences a larger change in *relative* demand at given aggregate prices. In that case, strategic complementarities increase rather than reduce the sensitivity of the firm's desired price to the shock.

Equivalently, conditional on an idiosyncratic demand shock of a given size, lower pass-through magnifies the desired markup adjustment and therefore raises the value of learning the shock. Proposition 7 formalizes this sign reversal in the pass-through channel.

Proposition 7 (Idiosyncratic Demand Shocks: Channels)**.** *The following channels determine how information acquisition about idiosyncratic demand shocks varies with firm size:*

1. *a positive size channel through market share $s(z_i)$;*
2. *a negative elasticity channel through demand elasticity ϵ_i;*
3. *an ambiguous superelasticity channel through η_i;*
4. *a positive pass-through channel through ρ_i.*

The first three channels are unchanged. The only difference is the pass-through channel, and it goes in the opposite direction: because idiosyncratic demand shocks shift residual demand, firms with lower ρ_i have desired prices that are more sensitive to n_i through

the loading $(1-\rho_i)$ in (6.3). This raises, rather than lowers, the marginal value of information for larger firms.

Proposition 8 characterizes how firms' attention to idiosyncratic demand shocks varies with firm size. In this environment, the size–attention relationship extends beyond the monotone or hump-shaped patterns that arise under aggregate shocks and depends sharply on demand curvature. Under CES demand ($\eta = 0$), attention is independent of firm size. For weak curvature ($0 < \eta < \eta^\star$), attention increases monotonically with firm size. For intermediate curvature ($\eta^\star < \eta < \epsilon$), attention is non-monotonic with two turning points: it increases for small firms, decreases over an intermediate range, and increases again for sufficiently large firms. Finally, when curvature is strong ($\eta \geq \epsilon$), attention becomes U-shaped in firm size, so both small and very large firms acquire relatively more information.

The reason is that idiosyncratic demand shocks add a force that favors attention by large firms rather than working against it. When curvature is weak or moderate, that force is strong enough to dominate the elasticity channel, yielding increasing or N-shaped attention profiles. Only when curvature is sufficiently strong does the flattening of demand overcome the reversed pass-through channel, so that attention eventually declines among the largest firms.

Proposition 8 (Idiosyncratic Demand Shocks: Information Acquisition)**.** *In the case of idiosyncratic demand shocks, the relationship between firm size and information acquisition depends on the magnitude of η relative to ϵ. Let $\eta^\star \equiv \frac{4}{5}\epsilon$:*

1. *If $\eta = 0$, that is, under CES demand, firms' attention is independent of firm size.*
2. *If $0 < \eta < \eta^\star$, firms' attention increases with firm size.*
3. *If $\eta^\star < \eta < \epsilon$, firms' attention is N-shaped in firm size, increasing for small firms, decreasing over an intermediate range, and increasing again for sufficiently large firms.*
4. *If $\eta \geq \epsilon$, firms' attention is U-shaped in firm size.*

Proof: See Appendix **??**.

Taken together, Propositions 6 and 8 clarify the scope of the paper's mechanism. When a firm's private shock affects desired prices through marginal cost, the same forces emphasized in the main model remain in place, so the size–attention relationship mirrors the aggregate-shock case. When the private shock instead shifts residual demand, the

pass-through channel reverses sign, and firm size can become positively associated with attention over a broad range of curvature values. The mapping from firm size to attention therefore depends not only on the demand system, but also on how the underlying uncertainty enters the pricing problem.

7 Conclusion

This paper studies how heterogeneous firms endogenously acquire information about aggregate nominal conditions and how the resulting allocation of attention shapes monetary transmission. We develop a rational-inattention model with heterogeneous firms, variable demand elasticities, and endogenous pass-through, in which firm size affects the value of information through multiple channels. The main implication is simple: larger firms need not be more attentive. Although they have more sales at risk, they also face lower demand elasticities and lower desired pass-through, which reduce the sensitivity of desired prices to nominal shocks. Which force dominates depends on demand curvature.

This observation matters for both positive and normative analysis. On the positive side, endogenous attention changes which firms drive the real effects of monetary policy. In the calibration favored by our empirical evidence, attention is hump-shaped in firm size, small and medium-sized firms account for a disproportionate share of the aggregate real response, and shutting down heterogeneity in information acquisition reverses the cross-sectional ranking of output responses. On the normative side, the same allocation of attention shapes the supply-side effects of monetary policy by altering the dispersion of relative prices and markups. In our preferred calibration, an expansionary nominal shock slightly raises measured TFP on impact. Under a counterfactual in which Kalman gains continue to rise with firm size, the same shock lowers measured TFP.

The empirical evidence is consistent with the model's central mechanism. Using textual analysis of firms' Form 10-K filings, we document a robust hump-shaped relationship between firm size and attention to macroeconomic conditions. This pattern aligns more naturally with the lower-curvature regime of the model and helps discipline the quantitative analysis.

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A Additional Figures and Tables

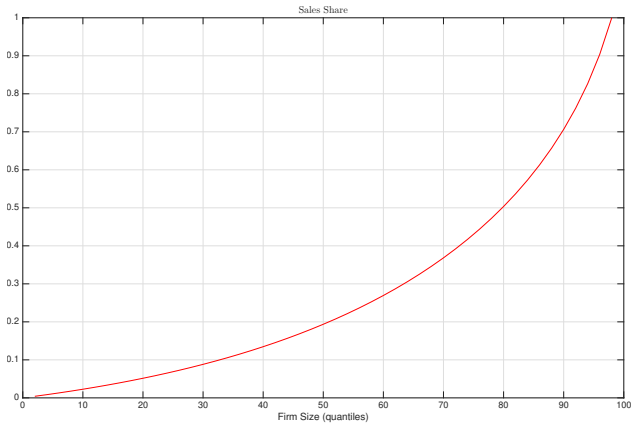


Figure 6: Calibrated Firm Size Distribution: Cumulative Sales Share

Note: The figure plots the cumulative sales share implied by the calibrated model firm-size distribution. The calibration targets the U.S. establishment-level employment distribution from the U.S. Census Bureau's Business Dynamics Statistics (BDS), which is used as an input to pin down the cross-sectional distribution of firm size and, hence, sales shares. Authors' calculations.

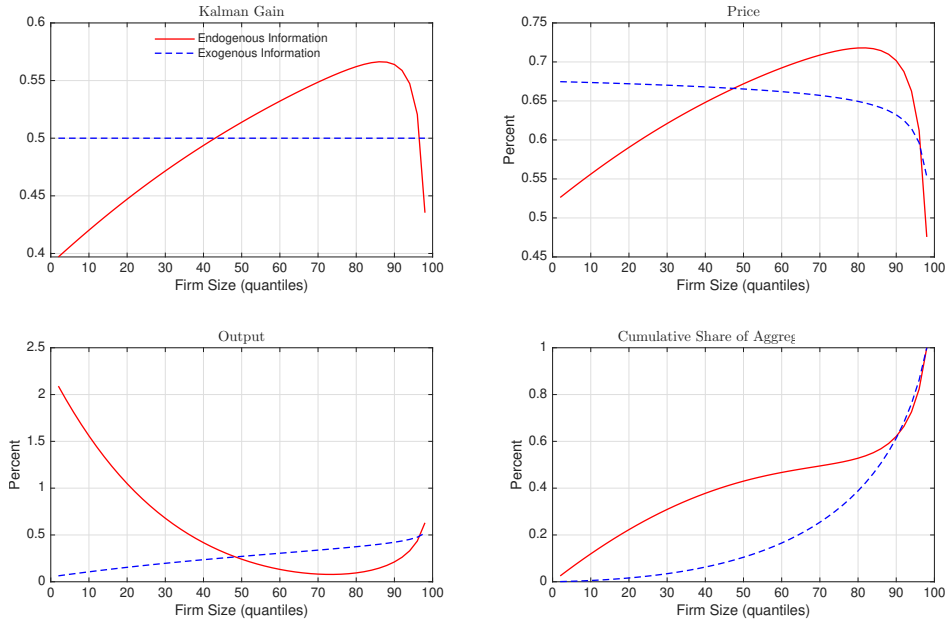


Figure 7: Firms' Responses to an Aggregate-Demand Shock (CRRA): Low-Curvature

Note: This figure uses the lower-curvature CRRA calibration, $\eta = 0.5\epsilon$ with $\epsilon = 5$. We calibrate $\sigma = 2$ and $\varphi = 1$. Solid (red) lines correspond to the benchmark with endogenous information acquisition. Dashed (blue) lines correspond to the fixed-information comparison in which all firms' Kalman gains are set to 0.5.

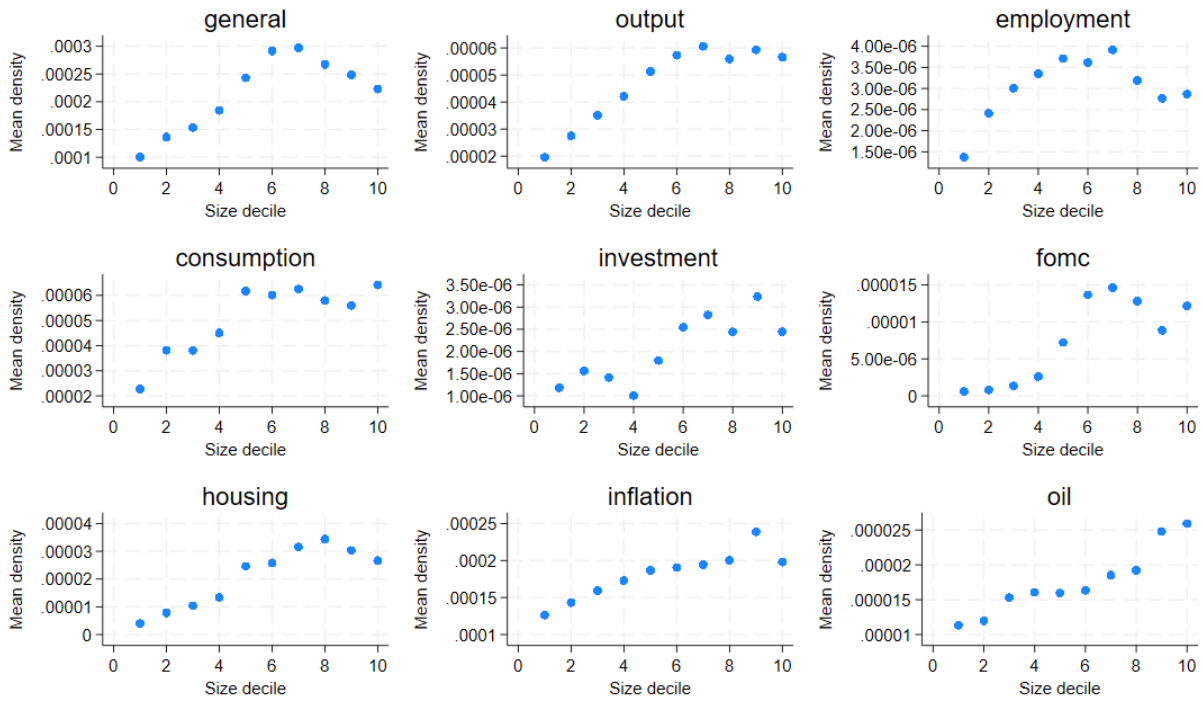


Figure 8: Firm Attention to Macroeconomic Topics by Size Decile

Note: The figure reports average firm-level attention to various macroeconomic topics across firm size deciles.