Frictions and Welfare in Monopolistic Competition

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May 2025

We study informational financial frictions in heterogeneous firm economies with monopolistic competition. We extend the Melitz model by introducing banks that finance entrepreneurs under asymmetric information. While aggregate productivity decreases with information frictions, welfare can be maximized at intermediate levels of asymmetry due to a trade-off between productivity and product variety. Furthermore, moderate input cost distortions can improve welfare when financial frictions are severe by offsetting the resulting weak firm selection.

KEYWORDS: informational financial frictions, monopolistic competition, heterogeneous firms, product variety, welfare analysis.
JEL CLASSIFICATION: D24, D82, G21, L11, L26.

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1. Introduction

Financial frictions are conventionally viewed as impediments to efficient resource allocation. Indeed, a large body of macroeconomic research shows how collateral constraints or credit market imperfections lead to resource misallocation and lower aggregate productivity (Buera, Kaboski, and Shin 2011; Moll 2014; Midrigan and Xu 2014). Yet, in a heterogeneous firm economy with monopolistic competition, could informational asymmetries between entrepreneurs and financial intermediaries sometimes improve welfare?[1] We examine this question by introducing informational financial frictions (IFFs) into a closed Melitz (2003) economy with banks. We find that while aggregate productivity monotonically decreases with the severity of these frictions, welfare may be maximized at an intermediate level of informational asymmetry: less asymmetry improves productivity via better firm selection but reduces welfare-enhancing product variety, creating a trade-off.

In our setting, firm selection is driven by banks operating under imperfect information, and their incentives may not align with maximizing social welfare's balance between aggregate productivity and product variety. The key finding is that mitigating informational asymmetries does not guarantee welfare improvements: whereas it enhances bank screening and average equilibrium productivity, it also makes banks overly restrictive, diminishing product variety.[2] Our setting also reveals particular instances of the second-best theory: when informational frictions are severe, introducing a wedge to production input cost can improve welfare by correcting firm selection; the converse also applies. This challenges conventional policy prescriptions that typically advocate for reducing market frictions at large.

This paper. Our analysis relies on a three-stage model of firm entry with informational financial frictions. In the first stage, entrepreneurs pay an experimentation cost to learn their productivity signal, which both entrepreneurs and banks observe. In the second stage, entrepreneurs must secure financing from banks, which demand a share of future profits in return. Financial intermediaries observe only the signal, not the true productivity. In the third stage, after both entry costs are paid, true productivity is revealed, and firms decide whether to produce or exit. This structure enables a characterization of how information asymmetries affect firm selection while nesting different versions of the Melitz economy as limit cases.[3]

[1] Monopolistic competition offers an ideal setting for its inherent tension between productive efficiency and consumer welfare derived from product variety.

[2] This highlights the effects of IFFs on the entry and selection margin, a channel also identified as crucial in the macro-misallocation literature (e.g., Midrigan and Xu 2014), but here driven by a specific trade-off between productivity gains from better screening and variety losses from overly restrictive bank lending.

[3] When signals are perfectly informative, only firms that will succeed receive financing; when signals provide no information, all experimenting entrepreneurs are financed.

This framework yields two key results. First, IFFs lead to less stringent selection of firms, as banks must finance some entrepreneurs who ultimately prove less productive than anticipated. The equilibrium is characterized by two thresholds: a signal threshold below which banks refuse financing, and a productivity threshold below which financed firms exit. Second, welfare may be maximized at an intermediate level of informational friction, as the negative effect on aggregate productivity is partially offset by increased product variety.

Financial market policy. This trade-off generates a somewhat provocative implication for financial market policy: reducing informational asymmetries in financial markets may not always be optimal. This counterintuitive result stems from the monopolistic competition structure. While financial development that enhances information transmission improves firm selection and raises average productivity, it simultaneously decreases product variety. Due to this "love of variety" effect, welfare may be maximized at an intermediate level of informational asymmetry rather than when information is perfect. This finding challenges standard policy prescriptions derived from competitive equilibrium models, where improved information invariably enhances efficiency.

Input costs distortions. Perhaps more interestingly, our framework generates counterintuitive implications regarding interventions that affect input costs. We introduce an *ad valorem* wedge (e.g., a tax) on the unit cost of the production input. We show that such a wedge, by increasing firms' operating costs, leads to higher equilibrium productivity and signal thresholds. While typically viewed as inefficient, this distortion can improve welfare when IFFs are severe. The mechanism works by enhancing firm selection: higher operating costs reduce profitability, forcing the exit of the least productive firms that would otherwise survive due to poor screening under high information asymmetry. This cleansing effect, specifically targeting firms that survive inappropriately due to IFFs, can outweigh the standard efficiency losses from the cost distortion, challenging conventional policy prescriptions.

Literature. Our paper contributes to understanding how financial frictions affect firm dynamics and welfare. Macroeconomic studies (e.g., Buera, Kaboski, and Shin 2011; Moll 2014) have explored how financial frictions, often via collateral constraints, lead to misallocation. Midrigan and Xu (2014), using plant-level data, particularly highlight the quantitative importance of the entry and technology adoption margin for aggregate TFP. While they focus on empirical measurement and the overall effects of financial frictions, our paper provides a theoretical micro-foundation for how informational asymmetries between entrepreneurs and banks distort selection. This focus on initial selection differs from studies on liquidity constraints for export decisions (Manova 2013; Chaney 2016), pricing strategies (Altomonte, Favoino, and Sonno 2018), or post-entry moral hazard (Unger 2021). By explicitly modeling banks' informational problem at firm creation, we offer a distinct mechanism for how financial intermediation impacts domestic market structure and welfare, addressing an important gap. In a separate paper (Del Prato and Zacchia 2024), we apply this framework to tractably analyze how welfare responds to labor market shocks in the presence of financial frictions. While in that paper we focus on the labor market, the model can be readily adapted to other input cost shocks.

Outline. The remainder of this paper is organized as follows. Section 2 presents the model setup and characterizes the equilibrium. Section 3 analyzes welfare implications and their interaction with input cost wedges. Section 4 concludes. Technical proofs are in Appendix A.

2. The model

We develop an extension of the celebrated closed-economy framework with heterogeneous firms by Melitz (2003). Our key innovation is introducing *informational financial frictions* (IFFs) in the firm entry stage as information asymmetries between entrepreneurs and financial intermediaries. We also introduce a wedge on the unit cost of the production input to analyze the welfare implications of this market distortion. Without IFFs, a policy that would remove such a wedge has unambiguously positive welfare consequences, since the closed Melitz economy is Pareto-optimal (Dhingra and Morrow 2019). With IFFs, and depending on their quantitative extent, such a policy may decrease welfare, as the positive effects on available varieties and prices are offset by a fall in average productivity. This result highlights how the interaction between different market imperfections can generate counterintuitive policy implications.

2.1. Setup

We study a closed economy with monopolistic competition and CES preferences. The representative consumter's utility is $U^{\frac{\sigma-1}{\sigma}} = \int_{\omega\in\Omega} q(\omega)^{\frac{\sigma-1}{\sigma}} d\omega$, where Ω represents the set of varieties available in equilibrium, $q(\omega)$ is consumption of variety $\omega \in \Omega$, and $\sigma > 1$ is the elasticity of substitution. Firms supply these varieties with heterogeneous productivities $\varphi(\omega) > 0$, which we treat as exogenous. Production requires a single factor input. It involves a fixed requirement $f > 0$ (in units of the input) and variable input usage proportional to output, yielding the total input demand function $l(q) = f + q/\varphi$ for a firm producing quantity q with productivity φ. The base cost per unit of the input is normalized to unity. We incorporate potential distortions or taxes via an *ad valorem* wedge $\nu \geq 0$ on this input cost. Therefore, the effective unit input cost faced by firms is $c = 1 + \nu$. The baseline scenario assumes no such distortion ($\nu = 0$).

This economy inherits the standard properties of the monopolistic competition model by Dixit and Stiglitz (1977) as extended by Melitz (2003). In particular, each firm's optimal quantity scales with φ^{σ}, while revenues and profits scale with $\varphi^{\sigma-1}$ Hence, for any two firms with productivity φ_1 and φ_2, the ratio of their equilibrium revenues $r(\varphi)$ is $r(\varphi_1)/r(\varphi_2) = (\varphi_1/\varphi_2)^{\sigma-1}$. The productivity distribution is endogenously determined through competitive selection, but unlike in Melitz (2003), firms must secure financing from financial intermediaries ("banks") to enter the market.

The set of varieties Ω with associated productivity $\varphi(\omega)$ is endogenously determined by the interaction between *entrepreneurs* and *banks*. An entrepreneur is a pair (φ, θ), where $\theta > 0$ is an individual *signal* about the true productivity φ. These two random variables are drawn from a common knowledge joint probability distribution $Q(\varphi, \theta)$ but are initially unobserved. Banks represent a mass B of risk-neutral financial intermediaries. They provide the financing required for firm setup by converting units of the economy's single input factor for this specific purpose. Firm creation proceeds as follows.

a. A given mass of entrepreneurs decides whether to attempt setting up a firm. To do so, they must incur a one-time, sunk *experimentation cost* f_n. This reveals the signal θ, which both entrepreneurs and banks observe.
b. Firms must secure financing for f_b units of input, which only banks can provide. The true productivity φ is revealed only after both f_n and f_b are paid. Banks demand an exogenous share $b(\omega) \in (0, 1]$ of future profits $\pi(\omega)$ in exchange for f_b. The financial market is perfectly competitive, allowing entrepreneurs to access financing without frictions.
c. After paying entry costs, firms set prices and quantities, exiting if optimal profits conditional on production are negative. Operating firms remain in the market until forced to exit by an exogenous shock occurring with probability δ.

This model features IFFs because banks cannot observe entrepreneurs' true productivity during the financing stage. Existing versions of the Melitz model that incorporate financial frictions (see Manova 2013 and Chaney 2016) typically introduce liquidity constraints that firms face only when they encounter costs for entering foreign markets. In our model, IFFs instead affect entry into the domestic market,[4] that is, firm selection in the left tail of the productivity distribution.

We conduct our analysis under two key assumptions:

ASSUMPTION 1. *Signal informativeness*: if $\theta_1 > \theta_2$ are two different realizations of the signal θ, then $Q(\varphi|\theta_1) < Q(\varphi|\theta_2)$ for any $\varphi > 0$.

[4]The distinction between f_n and f_b can be interpreted as a kind of liquidity constraint: of the full Melitz entry cost f_e, entrepreneurs can only pay $f_n < f_e$ upfront; $f_b < f_e - f_n$ must instead be financed by banks.

Assumption 2. *Log-normality*: $Q(\varphi, \theta)$ is a cumulative bivariate (joint) log-normal distribution with standard log-normals as marginals. Let $\rho = \mathbb{C}\text{orr}(\log\theta, \log\varphi) \in (0,1)$.

Assumption 1 ensures signals are ordered such that higher values yield conditional productivity distributions that first-order stochastically dominate those from lower values. Thus, "lower" signals thus imply higher risk for banks.

We introduce Assumption 2 for tractability's sake; assuming standard marginals is a mere normalization. We find the assumption that φ is log-normal realistic, not dissimilar from the Pareto assumption by Chaney (2016). Note that Assumption 1 implicitly constrains ρ to non-negative values.

2.2. Analysis

Once the set of firms that have paid both entry fixed costs (f_n and f_b) is determined, firm behavior proceeds as in the Melitz model. To solve the model, we proceed recursively by analyzing how banks and entrepreneurs behave in the firm entry stage under IFFs.

Consider banks' decision regarding firm financing. Since θ is the only information that banks receive about an entrepreneur, one can write the claim they demand in exchange for f_b as $b(\theta)$. When financing an entrepreneur with signal θ, a bank's expected profit is $\widetilde{\pi}(\theta)b(\theta)/\delta - f_b$, where $\widetilde{\pi}(\theta)$ is the *unconditional* expected per-period profit that incorporates the probability of firm exit after observing φ. Perfect competition in financial markets ensures that banks earn zero expected profits in equilibrium: no equilibrium can exist where $\widetilde{\pi}(\theta)b(\theta)/\delta > f_b$ for any $\theta > 0$, as any subset of banks with mass $B' < B$ would offer a lower share $b'(\theta) < b(\theta)$ to capture all the profits from firms with signal θ. Conversely, banks would deny financing to entrepreneurs with signals where $\widetilde{\pi}(\theta)b(\theta)/\delta < f_b$, avoiding negative profits.

By Assumption 1, these considerations imply the existence of a threshold signal that makes banks indifferent between financing an entrepreneur or not when capturing all post-entry profits. This threshold is the smallest positive number $\theta^* \geq 0$ such that:

$$\frac{\widetilde{\pi}(\theta^*)}{\delta} - f_b = 0. \tag{1}$$

We conjecture that a suitable interior value of θ^* exists, which we verify later. In equilibrium, only entrepreneurs showing signals $\theta \geq \theta^*$ receive financing, with $b(\theta^*) = 1$. For any two signals $\theta_1 \geq \theta^*$ and $\theta_2 \geq \theta^*$, banks set shares that yield zero profits in expectation with the property that $b(\theta_1)/b(\theta_2) = \widetilde{\pi}(\theta_2)/\widetilde{\pi}(\theta_1)$, ensuring $\widetilde{\pi}(\theta)b(\theta) = \widetilde{\pi}(\theta^*)$ for all $\theta \geq \theta^*$.[5] We refer to equation (1) as the Arbitrage Condition (AC), as it encapsulates the trade-offs faced by banks and characterizes the equilibrium in financial markets. The AC

[5]For exposition purposes, we omit a formal specification of the Bayes-Nash equilibrium of the game, including banks' complete strategies.

captures the mechanism through which banks demand higher profit shares for financing entrepreneurs with riskier signals.

The entrepreneurs' initial entry decision follows a more straightforward logic. The expected value of generating a business idea is $v_n = \delta^{-1} \int_{\theta^*}^{\infty} \widetilde{\pi}(\theta) \, [1 - b(\theta)] \, dC(\theta)$, where $C(\theta)$ is the marginal cumulative distribution of signal θ. Given free entry into experimentation, entrepreneurs will continue to enter until the expected value equals the experimentation cost f_n. By incorporating the equilibrium conditions from the financing subgame and substituting for $b(\theta)$ we obtain the following Free Entry (FE) condition in this Melitz economy with IFFs:

$$\int_{\theta^*}^{\infty} \frac{\widetilde{\pi}(\theta)}{\delta} dC(\theta) - \left[1 - C(\theta^*)\right] f_b - f_n = 0. \tag{2}$$

This equation, together with the AC in (1), fully characterizes the economy's equilibrium. As equation (2) shows, entrepreneurs anticipate that they will bear the financing cost f_b only with probability $1 - C(\theta^*)$ conditional on receiving a signal $\theta \geq \theta^*$.

To complete the analysis, we must characterize the function $\widetilde{\pi}(\theta)$. Adapting the post-entry analysis from the Melitz model, for a given signal value θ, we have:

$$\widetilde{\pi}(\theta) = \mathbb{E}_{\varphi|\theta} \left[\pi(\varphi) | \, \theta \right] = f \left\{ \int_{\varphi^*}^{\infty} \left(\frac{\varphi}{\varphi^*} \right)^{\sigma - 1} dQ(\, \varphi | \, \theta) - \left[1 - Q(\, \varphi^* \middle| \, \theta) \right] \right\}, \tag{3}$$

where φ^* represents the productivity threshold below which firms find production unprofitable and exit in equilibrium. Equation (3) implicitly incorporates a signal-specific "Zero Profit Condition" (ZPC) analogous to that in Melitz (2003). Importantly, both the AC (1) and FE (2) conditions are implicitly functions of φ^* through equation (3). The equilibrium is fully determined by the threshold pair (θ^*, φ^*).[6]

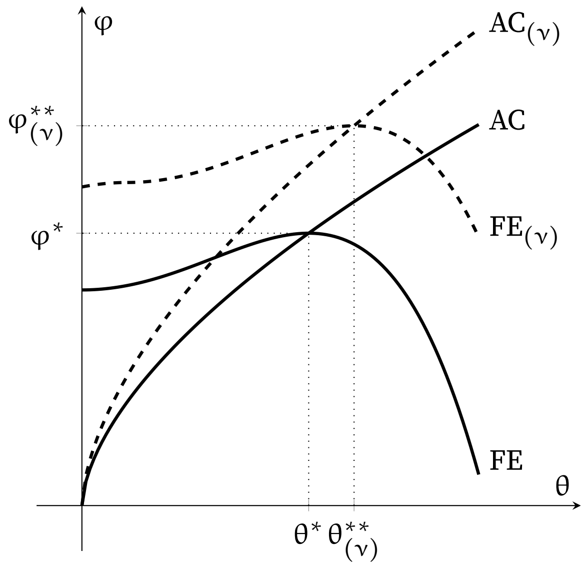
PROPOSITION 1. Under Assumptions 1-2, an equilibrium pair (θ^*, φ^*) always exists and is unique. This equilibrium is characterized by the intersection of two curves: a. the AC curve, given by $\varphi^* = A \, (\theta^*)^{\rho}$ for some constant $A > 0$; and b. a globally concave curve representing the FE condition. The intersection occurs precisely at the global maximum of the implicit function relating φ^* to θ^*, as traced out by the FE curve.

Figure 1 illustrates the equilibrium as the intersection between the two solid curves representing the AC and FE conditions. The AC curve exhibits a monotonically increasing relationship because higher signal thresholds established by banks necessarily lead to higher productivity thresholds through improved firm selection.

The FE curve displays concavity due to the interaction of competing mechanisms. As in the standard Melitz framework, higher productivity thresholds necessitate higher ex-

[6] For convenience, we prove the existence and uniqueness of the equilibrium under Assumption 2, though other joint distributions for (θ, φ) are likely to deliver a similar result.

FIGURE 1. Equilibrium of the model and comparative statics



Note: This figure illustrates the equilibrium pair (θ^*, φ^*) as the intersection between the solid lines representing the AC condition (1) and the FE condition (2). The AC curve slopes upward because higher signal thresholds lead to higher productivity through improved selection. The FE curve exhibits non-monotonic behavior: for $\theta \le \theta^*$, higher productivity and signal thresholds necessitate higher profits to incentivize entry, creating a positive relationship; for $\theta \ge \theta^*$ higher signal thresholds reduce the probability of incurring the financing cost f_b sufficiently to require a lower productivity threshold for maintaining constant incentives, resulting in a negative relationship. The dashed lines show the effects of introducing an input cost wedge $\nu > 0$: a rightward shift of the FE curve and a leftward rotation of the AC curve, leading to higher equilibrium thresholds.

pected profits to motivate entry. However, the signal threshold θ^* influences the condition through two distinct channels. First, increasing θ^* requires higher expected profits to motivate entry, as reflected in the first term on the left-hand side of equation (2). Second, it reduces the probability that entrepreneurs incur the financing cost f_b (second term), effectively lowering the productivity threshold needed to maintain constant entry incentives. At low values of θ, the first mechanism dominates, while at higher values, the second prevails.

The equilibrium occurs precisely at the maximum of the FE curve, a result of perfect competition among banks. Banks provide financing when expected benefits exceed costs and establish the threshold signal θ^* at the point where the marginal effects of the two mechanisms exactly offset each other.

Input cost wedges. We specify a distortionary wedge *ad valorem* on the unit input cost, resulting in an effective cost $c = 1+\nu$ faced by firms for their operational input requirements (both fixed f and variable q/φ). Consequently, total per-period operating costs increase proportionally with the wedge. The setup costs f_n or f_b remain unaffected. Introducing such an input cost wedge has the following implication on equilibrium, which we present as a corollary to Proposition 1.

COROLLARY 1. Introducing a wedge $\nu > 0$ to firms' input costs yields an equilibrium $\left(\theta^{**}_{(\nu)}, \varphi^{**}_{(\nu)}\right) \gg (\theta^*, \varphi^*)$ where both productivity and signal thresholds are strictly higher.

The intuition behind this is straightforward: higher input costs make it more challenging for firms to repay their fixed costs and remain in the market, leading to a more stringent selection at both stages of the entry process. In the Melitz model, this effect is interpreted as a downward rotation of the ZPC curve. In our model, the wedge induces a leftward rotation of the AC curve and a rightward shift of the FE curve. As the two curves must still intersect at the maximum of the implicit function for θ^* as traced out by the FE curve, both equilibrium thresholds increase. This is graphically represented by the two dashed curves in Figure 1.

Limit cases. We now examine two limit cases not allowed by Assumptions 1 and 2: when signals are completely uninformative ($\rho \to 0$) and when they perfectly predict productivity ($\rho \to 1$). Both can be seen as special Melitz economies with different primitives, with the productivity threshold φ^* being higher under perfect information due to sharper firm selection.

When $\rho \to 0$, signals provide no information about productivity, implying $\theta^* \to 0$. Consequently, to receive financing in equilibrium entrepreneurs must offer banks shares that, in expectation, repay them for the full setup cost f_b, accounting for the probability of exiting after true productivities are revealed. The Free Entry condition simplifies to its standard Melitz version:

$$\frac{\left(1 - Q(\varphi_0^*)\right)}{\delta}\bar{\pi}_0 - f_e = 0,$$

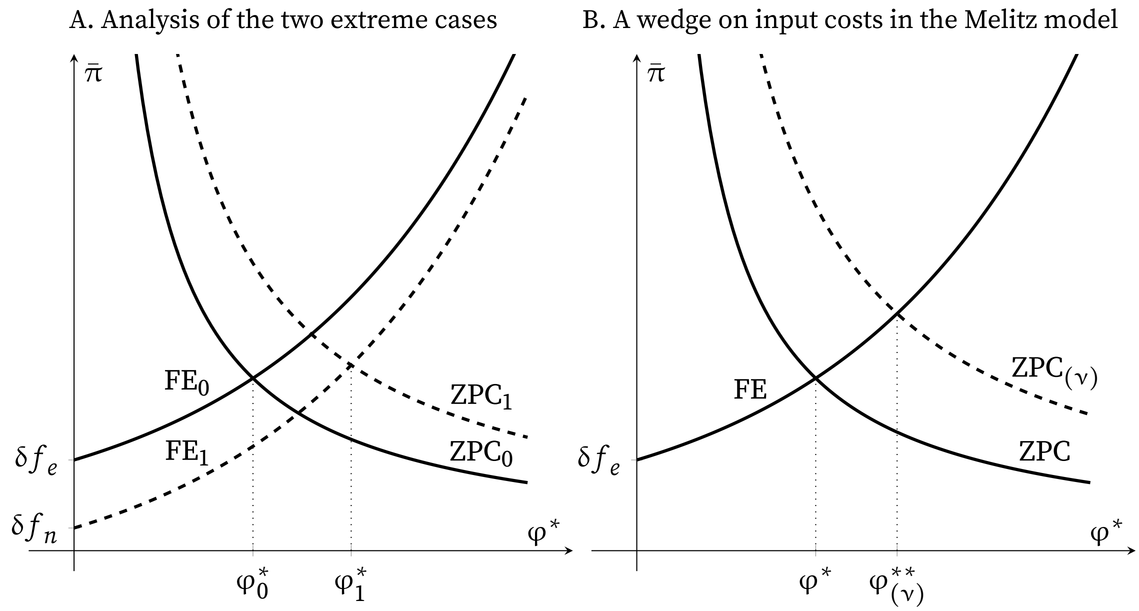
where $f_e = f_b + f_n$; $\bar{\pi}_0$ represents the expected profit conditional on surviving selection, and $Q(\varphi)$ is the marginal cumulative distribution of productivity. The corresponding ZPC is $\bar{\pi}_0 = f k(\varphi_0^*)$, where $k(\varphi^*) = [\widetilde{\varphi}(\varphi^*)/\varphi^*]^{\sigma-1} - 1$ as in the original Melitz model, with $\widetilde{\varphi}(\varphi^*)$ denoting the generalized average of order $\sigma - 1$ of surviving firms' productivity—which equals to $\widetilde{\varphi}$ in (4).

When $\rho \to 1$, signals perfectly predict survival, ensuring that all financed entrepreneurs operate in the economy. Under perfect competition, banks require entrepreneurs to repay the setup cost f_b at a rate δf_b per period, effectively increasing firms' per-period fixed costs. The Free Entry condition becomes:

$$\frac{\left(1 - Q\left(\varphi_1^*\right)\right)}{\delta}\bar{\pi}_1 - f_n = 0,$$

with the ZPC given by $\bar{\pi}_1 = \left(f + \delta f_b\right) k\left(\varphi_1^*\right)$. In this scenario, IFFs disappear and financial

FIGURE 2. Welfare analysis: graphical intuitions



Note. Panel A: analysis of the two extreme cases: $\rho \to 0$ (continuous lines) and $\rho \to 1$ (dashed lines) as Melitz economies with different primitives. Panel B: the effect of a wedge on input costs in the Melitz model; the dashed line is the new ZPC curve obtained by raising $\nu > 0$.

markets are fully efficient. One can demonstrate analytically that $\varphi_0^* < \varphi_1^*$, confirming that selection improves as signals become more informative.

The equilibria for these two extreme cases are represented in the $(\varphi^*, \bar{\pi})$ plane in Figure 2, Panel A. This illustration shows that transitioning from complete IFFs to no IFFs generates a higher productivity threshold φ^*. However, the effect on $\bar{\pi}$ (which represents the equilibrium incentives for entrepreneurial entry) depends on the specific functional forms of the FE and ZPC curves. The analysis of these limit cases also informs the productivity effects of input cost distortions, as described in 1. Consider the $\rho \to 0$ case: introducing $\nu > 0$ leaves the FE condition unchanged while transforming the ZPC to $\bar{\pi} = (1+\nu) f k(\varphi_0^*)$. This produces an outward shift of the ZPC curve, as illustrated in Panel B of Figure 2, resulting in a higher productivity threshold (from φ^* to $\varphi^{**}_{(\nu)}$). Notably, the wedge ν can potentially be calibrated to generate a productivity threshold equivalent to that of the "full information," efficient outcome achieved with $\rho = 1$.

3. Welfare

This model yields significant implications for social welfare analysis. We evaluate welfare using an approach similar to Melitz, but with two key differences. First, we account for the allocation of the total input supply (L) across three distinct activities: input used for experimentation (L_n), input converted by banks to provide setup financing (L_b), and input used for ongoing production (L_p), such that $L = L_n + L_b + L_p$. Second, we incorporate the input cost wedge. This affects the aggregate relationship between revenues (R), profits (Π), and the amount of input allocated to production (L_p). Specifically, in equilibrium the value of the input used in production equals revenues net of profits: $L_p = (R - \Pi)/(1+\nu)$.

Following Melitz (2003), social welfare is expressed as:[7]

$$\mathcal{W} = \frac{\sigma - 1}{\sigma} V^{\frac{1}{\sigma-1}} \widetilde{\varphi}, \tag{4}$$

where V represents the mass of active firms in equilibrium and $\widetilde{\varphi}$ denotes their "aggregate" productivity calculated as a generalized average of order $\sigma - 1$. The relative contributions of these two components depend on the extent of IFFs as measured by parameter ρ.

To evaluate equation (4) in steady state, we define $\mathcal{P}^*_\theta \equiv \Pr(\theta \geq \theta^*)$ and $\mathcal{P}^*_\varphi \equiv \Pr(\varphi \geq \varphi^*)$. In equilibrium, the input used for experimentation is $L_n = V_e f_n$, while financing input is $L_b = \mathcal{P}^*_\theta V_e f_b$. In steady state the mass of entering firms V_e exactly compensates exits: $\delta V = \mathcal{P}^*_\varphi V_e$. Additionally, free entry implies:

$$\mathcal{P}^*_\theta \breve{\pi} = \delta \left(\mathcal{P}^*_\theta f_b + f_n \right), \tag{5}$$

where $\breve{\pi} \equiv \int_{\theta^*}^{\infty} \widetilde{\pi}(\theta) dC(\theta)$ represents the average expected profits (including bank shares) from firm creation before signal observation. Combining these conditions yields:

$$\begin{aligned} L = L_p + L_b + L_n &= V \frac{\bar{r} - \bar{\pi}}{1+\nu} + V_e \left(\mathcal{P}^*_\theta f_b + f_n \right) \\ &= V \left(\frac{\bar{r} - \bar{\pi}}{1+\nu} + \breve{\pi} \frac{\mathcal{P}^*_\theta}{\mathcal{P}^*_\varphi} \right), \end{aligned} \tag{6}$$

where $\bar{r} = R/V$ and $\bar{\pi} = \Pi/V$ represent the average equilibrium revenues and profits, respectively.

To interpret this expression, consider the case where $\nu = 0$. For a fixed allocated input L, the equilibrium number of firms V is proportional to $\bar{\pi} - \breve{\pi}\mathcal{P}^*_\theta/\mathcal{P}^*_\varphi$, which measures the difference between expected profits conditional on passing the productivity threshold versus those conditional on passing the signal threshold. This quantity is necessarily non-negative and captures the incentives firms and banks face at the financing stage: higher values correspond to greater equilibrium entry.

In the limit cases where $\rho \to 0$ or $\rho \to 1$, we have $\bar{\pi} - \breve{\pi}\mathcal{P}^*_\theta/\mathcal{P}^*_\varphi \to 0$, as signals become moot. This observation leads to our next statement.

PROPOSITION 2. *Aggregate productivity $\widetilde{\varphi}$ monotonically increases with ρ; the equilibrium number of firms V may instead be maximized for an interior value of $\rho \in (0, 1)$.*

[7] As in the original monopolistic competition model by Dixit and Stiglitz (1977), social welfare equals the inverse of the price level.

This proposition reveals the fundamental trade-offs determining social welfare in our model. More severe IFFs (lower ρ) result in less stringent firm selection, reducing aggregate productivity $\widetilde{\varphi}$. However, excessively high values of ρ may lead to overly restrictive selection, diminishing product variety and increasing prices. This finding contrasts with Dhingra and Morrow (2019) who show that the closed Melitz economy is Pareto-optimal; in our model, $\rho = 1$ may not maximize welfare. This difference stems from our two-stage entry process, where banks' interests diverge from those of consumers, who would benefit from some "wasted" financing costs f_b if they facilitate entry of moderately productive firms.

While we cannot determine the optimal value of ρ in closed form or specify the conditions under which it takes an interior value, numerical simulations reveal that an interior welfare-maximizing ρ is more likely when f_b is high, as this increases banks' reluctance to finance new entrants.

This analysis yields an important implication: when IFFs are particularly severe (i.e., ρ is below the optimal value), introducing input cost wedges can enhance social welfare.

COROLLARY 2. The welfare-maximizing value of ρ decreases as the input cost wedge ν increases.

When ρ falls below its optimal value, increasing the wedge can shift market outcomes toward maximum welfare through two mechanisms. First, equilibrium productivity rises (following from Corollary 1). Second, higher input costs reduce firm entry. The former effect dominates at the margin because the status quo would otherwise permit excessive entry of low-productivity firms.

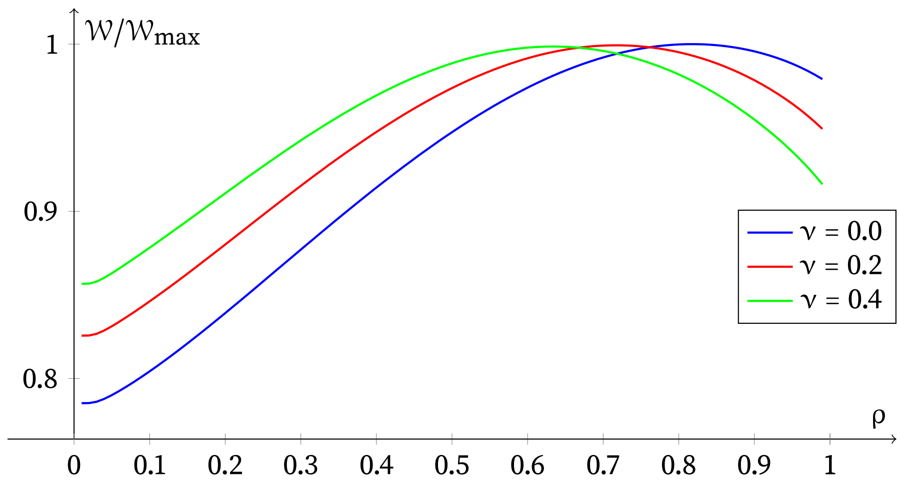
Again, we cannot produce a closed-form expression for the optimal wedge. However, numerical calculations illustrate our argument. Figure 3 shows social welfare (normalized by the maximum attainable with $\nu = 0$) as a function of ρ for three different input wedge values. These results suggest it is theoretically possible to restore the social optimum when IFFs are severe by appropriately calibrating the wedge.[8]

3.1. Welfare decomposition

To better understand the welfare implications of input cost distortions in the presence of IFFs, we derive a formal decomposition of welfare changes in response to the wedge. This decomposition allows us to isolate the distinct channels through which policy interventions affect social welfare.

[8] A symmetric implication is that when ρ exceeds its optimal value, subsidies to firms' input costs (negative values of ν) would increase welfare by encouraging entry while reducing aggregate productivity. An internally consistent model incorporating subsidies would need to specify their financing mechanism.

FIGURE 3. Social welfare as a function of input cost wedges, illustration



Note. This figure displays the social welfare ($\mathcal{W}$), calculated in the model as a function of ρ, and divided by a maximum value $\mathcal{W}_{\max}$ that can be attained for $\nu = 0$, for three different values of frictions to input costs ν as indicated in the legend. The calculations are performed under the following parametrization: $\sigma = 2$, $L = 1$, $f = 0.2$, $f_n = 0.1$, $f_b = 1$, $\delta = 0.1$.

PROPOSITION 3. *The marginal effect of the input cost wedge on welfare can be decomposed into three distinct channels:*

$$\frac{d\mathcal{W}}{d\nu} = \underbrace{\frac{\sigma-1}{\sigma} V^{\frac{1}{\sigma-1}} \frac{d\tilde{\varphi}}{d\nu}}_{\textit{Productivity channel (+)}} + \underbrace{\frac{1}{\sigma} V^{-\frac{\sigma}{\sigma-1}} \tilde{\varphi} \frac{dV_S}{d\nu}}_{\textit{Selection-variety channel (+/-)}} + \underbrace{\frac{1}{\sigma} V^{-\frac{\sigma}{\sigma-1}} \tilde{\varphi} \frac{dV_{LC}}{d\nu}}_{\textit{Direct cost channel (-)}}$$

where $\frac{d\tilde{\varphi}}{d\nu} > 0$, $\frac{dV_{LC}}{d\nu} < 0$, *and the sign of* $\frac{dV_S}{d\nu}$ *is generally ambiguous, depending on the relative impact of the wedge on signal versus productivity thresholds and conditional profits.*

Proposition 3 isolates the distinct components through which an input cost distortion affects welfare.[9]

The *productivity channel* captures welfare changes mediated by changes in the equilibrium productivity, and is unambiguously positive. As established in Corollary 1, a higher input cost wedge tightens selection by increasing the equilibrium productivity threshold. This raises the average productivity of surviving firms, enhancing welfare. Intuitively, higher operating costs weed out less efficient firms. The *direct cost channel* captures changes mediated by changes in the input cost, and is negative. The wedge directly increases the effective cost of inputs used in production. This reduces in turn firms' operating margins, making it harder to cover fixed costs and ultimately reducing the equilibrium mass of firms V, which negatively impacts welfare through reduced variety. The *selection-variety channel* captures the indirect effect of the wedge on the firm mass that operates via changes

[9] See Appendix A.5 for its derivation and a formal discussion of its components.

in the selection thresholds (θ^* and φ^*) and the associated entry incentives reflected in expected profits conditional on the signal. Its sign is ambiguous, as it depends on the relative sensitivities of signal-based versus productivity-based selection to the cost wedge.

The overall impact of the input cost wedge on welfare depends on the relative strength of these competing channels. When informational frictions are severe, the baseline selection is weak. In this scenario, the positive welfare gains from improved efficiency via the productivity channel can potentially dominate the negative impacts on variety from the direct cost channel and the selection-variety channel.

4. Conclusions

This paper examines how informational asymmetries between entrepreneurs and financial intermediaries affect welfare in a heterogeneous firm economy with monopolistic competition. By extending the Melitz (2003) model to introduce such frictions, we obtain two main results. First, IFFs create a dual threshold mechanism for market entry—based on both observed signals and actual productivity—which relaxes firm selection compared to perfect information environments. Second, welfare may be maximized at an intermediate level of informational friction, as the negative effect on aggregate productivity is partially offset by increased product variety.

These findings challenge the conventional view that reducing financial frictions and input cost distortions uniformly enhances welfare. Our model shows that when multiple market imperfections interact, policies targeting one distortion in isolation may exacerbate inefficiencies elsewhere, potentially reducing overall welfare.

Future research should extend this analysis to firms' export decisions, where similar informational frictions may influence trade patterns and welfare. It should also explore the interaction between financial frictions, input cost distortions, and endogenous productivity investments.

A. Additional model analysis

A.1. Analysis of Proposition 1

To facilitate our analysis, we establish the auxiliary notation:

$$\begin{aligned} h &= \log\theta \\ p &= \log\varphi \\ \nu &= -\log\theta \\ \nu' &= -\log\theta + \rho(\sigma-1) \\ z &= \frac{\log\varphi - \rho\log\theta}{\sqrt{1-\rho^2}} \end{aligned}$$

Asterisks denote transformations at threshold values (e.g., $h^* = \log\theta^*$). Define $z^*(h) = (p^* - \rho h)/\sqrt{1-\rho^2}$. Additionally, let $\phi(x)$ be the standard normal PDF and $\Phi(x)$ its cumulative distribution, both evaluated at x. We denote $\Phi_\rho(x, y)$ the cumulative bivariate normal distribution with standard normal marginals and correlation parameter ρ, evaluated at (x, y).

Expression (3) can be elaborated as a function of any real h:

$$\begin{aligned} \frac{\widetilde{\pi}\left(e^h\right)}{f} &= \int_{p^*}^{\infty} \frac{e^{(\sigma-1)(p-p^*)}}{\sqrt{1-\rho^2}} \phi\left(\frac{p-\rho h}{\sqrt{1-\rho^2}}\right) dp - \left[1 - \Phi\left(\frac{p^*-\rho h}{\sqrt{1-\rho^2}}\right)\right] \\ &= \int_{z^*(h)}^{\infty} e^{(\sigma-1)\left(\sqrt{1-\rho^2}z+\rho h-p^*\right)} \phi(z)\, dz - \left[1-\Phi\left(z^*(h)\right)\right] \\ &= e^{(\sigma-1)(\rho h-p^*)+\frac{1}{2}(\sigma-1)^2(1-\rho^2)} \int_{z^*(h)}^{\infty} \phi\left(z-(\sigma-1)\sqrt{1-\rho^2}\right) dz - \Phi\left(-z^*(h)\right) \\ &= e^{(\sigma-1)(\rho h-p^*)+\frac{1}{2}(\sigma-1)^2(1-\rho^2)} \Phi\left(\frac{\rho h - p^* + (\sigma-1)\left(1-\rho^2\right)}{\sqrt{1-\rho^2}}\right) - \Phi\left(\frac{\rho h - p^*}{\sqrt{1-\rho^2}}\right). \end{aligned}$$

Therefore, the AC (1) reads:

$$e^{(\sigma-1)(\rho h^*-p^*)+\frac{1}{2}(\sigma-1)^2(1-\rho^2)} \Phi\left(\frac{\rho h^* - p^* + (\sigma-1)\left(1-\rho^2\right)}{\sqrt{1-\rho^2}}\right) - \Phi\left(\frac{\rho h^* - p^*}{\sqrt{1-\rho^2}}\right) - \frac{\delta f_b}{f} = 0,$$

with an associated implicit function $p^* = \rho h^* + a$ where $a = \log A$, as follows from setting the total differential to zero. Substituting into the right-hand side of AC yields a decreasing function of a that crosses zero if $\delta f_b / f > 0$. Therefore, a (and hence A) is unique, and it is both decreasing in f_b and increasing in f.

For the FE condition, the expected joint profit $\breve{\pi} \equiv \int_{\theta^*}^{\infty} \widetilde{\pi}(\theta) dC(\theta)$ can be expressed as a function of (h^*, p^*):

$$\begin{aligned}
\breve{\pi}\left(h^*, p^*\right) &= \int_{h^*}^{\infty} \widetilde{\pi}\left(e^h\right) \phi(h) dh \\
&= f \int_{h^*}^{\infty} e^{(\sigma-1)(\rho h - p^*) + \frac{1}{2}(\sigma-1)^2(1-\rho^2)} \Phi\left(\frac{\rho h - p^* + (\sigma-1)\left(1-\rho^2\right)}{\sqrt{1-\rho^2}}\right) \phi(h) dh \\
&\quad - f \int_{h^*}^{\infty} \Phi\left(\frac{\rho h - p^*}{\sqrt{1-\rho^2}}\right) \phi(h) dh \\
&= f e^{\frac{1}{2}(\sigma-1)^2 - (\sigma-1)p^*} \int_{-\infty}^{-h^* + \rho(\sigma-1)} \Phi\left(\frac{-\rho v' - p^* + (\sigma-1)}{\sqrt{1-\rho^2}}\right) \phi\left(v'\right) dv' \\
&\quad - f \int_{-\infty}^{-h^*} \Phi\left(\frac{-\rho v - p^*}{\sqrt{1-\rho^2}}\right) \phi\left(v\right) dv \\
&= f\left[e^{\frac{1}{2}(\sigma-1)^2 - (\sigma-1)p^*} \Phi_\rho\left(-p^* + \sigma - 1, -h^* + \rho\left(\sigma-1\right)\right) - \Phi_\rho\left(-p^*, -h^*\right)\right],
\end{aligned}$$

where the last line follows from the analysis of the standard normal cumulative distribution's moments as in Owen (1980). Thus, write the FE condition as follows:

$$\begin{aligned}
\mathcal{H}\left(p^*, h^*\right) = e^{\frac{1}{2}(\sigma-1)^2 - (\sigma-1)p^*} \Phi_\rho\left(-p^* + \sigma - 1, -h^* + \rho\left(\sigma-1\right)\right) - \\
- \Phi_\rho\left(-p^*, -h^*\right) - \frac{\delta f_b}{f} \Phi\left(-h^*\right) - \frac{\delta f_n}{f} = 0.
\end{aligned}$$

The derivative of the above with respect to the log-productivity threshold p^* is, following some manipulation, shown to be always negative:

$$\frac{\partial \mathcal{H}\left(p^*, h^*\right)}{\partial p^*} = -\left(\sigma-1\right) e^{\frac{1}{2}(\sigma-1)^2 - (\sigma-1)p^*} \Phi_\rho\left(-p^* + \sigma - 1, -h^* + \rho\left(\sigma-1\right)\right) < 0.$$

Moreover, the derivative with respect to the log-signal threshold h^* is shown to be:

$$\begin{aligned}
\frac{\partial \mathcal{H}\left(p^*, h^*\right)}{\partial h^*} = -\Bigg[e^{(\sigma-1)(\rho h^* - p^*) + \frac{1}{2}(\sigma-1)^2(1-\rho^2)} \Phi\left(\frac{\rho h^* - p^* + (\sigma-1)\left(1-\rho^2\right)}{\sqrt{1-\rho^2}}\right) - \\
- \Phi\left(\frac{\rho h^* - p^*}{\sqrt{1-\rho^2}}\right) - \frac{\delta f_b}{f}\Bigg] \phi\left(h^*\right),
\end{aligned}$$

which is not a monotone function of h^*. Furthermore, the line $p^* = \rho h^* + a$ can intersect the FE-based implicit function of p^* in h^* only at its stationary point, since a is uniquely determined. A single stationary point guarantees a unique intersection, and thus a unique equilibrium.

A.2. Analysis of Corollary 1

This is straightforward: a (and thus A) is increasing in f; at the same time, $\partial\mathcal{H}(p^*, h^*; f)/\partial f = \delta\left[f_b\Phi(-h^*) + f_n\right]f^{-2} > 0$. Consequently, as the effective fixed cost of production shifts from f to $f(1+\nu)$, the AC and FE curves also shift according to the pattern depicted in Figure 1. As the two curves must meet at the maximum of the FE-based implicit function of p^* over h^*, both thresholds are higher in the new equilibrium.

A.3. Analysis of Proposition 2

The proof consists of two parts.

First, we show that $\widetilde{\varphi}$ monotonically increases with ρ. Since $\widetilde{\varphi}$ depends on ρ only through φ^*, and $\widetilde{\varphi}$ increases in φ^*, it suffices to demonstrate that φ^* increases monotonically with ρ. This follows from the equilibrium conditions in Proposition 1, applying comparative static analysis similar to that used in the proof of Corollary 1.

Second, we show that the equilibrium mass of firms V may be maximized at an intermediate value of $\rho \in (0,1)$. The equilibrium mass of firms V is determined by the input market clearing condition combined with steady-state entry dynamics (6):

$$V = L\left(\frac{\bar{r} - \bar{\pi}}{1+\nu} + \breve{\pi}\frac{\mathcal{P}^*_\theta}{\mathcal{P}^*_\varphi}\right)^{-1}$$

Let the denominator be $D(\rho)$. Substituting for $\bar{\pi} = \bar{r}/\sigma - f(1+\nu)$, using condition (5), and noting that both are implicit functions of ρ in equilibrium gives

$$D(\rho) = \underbrace{\left(\frac{\bar{r}(\rho)(1-1/\sigma)}{1+\nu} + f\right)}_{D_1(\rho)} + \underbrace{\delta\left(f_b\frac{\mathcal{P}^*_\theta(\rho)}{\mathcal{P}^*_\varphi(\rho)} + f_n\frac{1}{\mathcal{P}^*_\varphi(\rho)}\right)}_{D_2(\rho)}$$

We analyze the monotonicity of each term with respect to ρ.

For $D_1(\rho)$, note that the average revenue $\bar{r}(\rho)$ is strictly increasing in $\varphi^*(\rho)$, and $\varphi^*(\rho)$ is strictly increasing in ρ. Therefore, $\bar{r}(\rho)$ is strictly increasing in ρ. Since f, σ, and $(1+\nu)$ are positive constants, $D_1(\rho)$ is strictly increasing in ρ. This reflects higher average input requirements per firm due to stricter selection.

For $D_2(\rho)$, note that $P^*_\varphi(\rho)$ represents the probability that a funded firm turns out to be productive enough to survive. Better information ρ leads to better conditional predictions ($dP^*_\varphi/d\rho > 0$), so the term $1/P^*_\varphi(\rho)$ is strictly decreasing. At the same time, as ρ increases, $P^*_\theta(\rho)$ (the probability of passing the initial signal threshold) decreases due to more stringent bank selection, causing the ratio $P^*_\theta(\rho)/P^*_\varphi(\rho)$ to decrease. Since δ, f_b, f_n are positive constants, both terms contribute to $D_2(\rho)$ being strictly decreasing in ρ. This reflects lower average entry costs driven by enhanced overall firm selection, as fewer funded firms fail unexpectedly and initial screening tightens.

The denominator $D(\rho) = D_1(\rho) + D_2(\rho)$ is therefore the sum of a strictly increasing function (D_1) and a strictly decreasing function (D_2). The overall shape of $D(\rho)$ depends on the relative magnitudes of the derivatives $dD_1/d\rho > 0$ and $dD_2/d\rho < 0$. The term $D(\rho)$ is non-monotonic if $|dD_2/d\rho| > |dD_1/d\rho|$ for $\rho \to 0$, and $|dD_1/d\rho| > |dD_2/d\rho|$ for $\rho \to 1$ (or vice-versa). Although a formal proof is analytically intractable, we can provide an economic rationale for the non-monotonic behavior of $D(\rho)$. For low values of ρ, an improvement in information quality significantly increases the probability of firm survival $\mathcal{P}^*_\varphi$ without substantially raising the productivity threshold φ^*, causing $D(\rho)$ to initially decrease. As ρ continues to increase and $\mathcal{P}^*_\varphi$ approaches 1, φ^* continues to rise due to sharper selection. This increases the average firm size and revenues $\bar{r}$ through selection in the productivity distribution's tail, eventually causing $D(\rho)$ to increase. Such a U-shaped $D(\rho)$ would imply that $V(\rho) = L/D(\rho)$ is inverse U-shaped, achieving a maximum at an interior value $\rho^* \in (0, 1)$.

A.4. Analysis of Corollary 2

We sketch a heuristic argument motivated by our prior analysis. Assume $\nu^* = 0$ and interior ρ^* maximizes welfare. For small $\nu > 0$, $\widetilde{\varphi}$ rises (per Corollary 1) and V falls, lowering welfare. Thus, reducing ρ slightly below ρ^* leads to lower $\widetilde{\varphi}$ and higher V and offsets both effects, improving welfare. But if the decrease in IFFs is large enough ($\rho \ll \rho^*$), the fall in $\widetilde{\varphi}$ dominates, as average productivity in particular decreases. Hence, if interior ρ^* exists, it decreases monotonically in ν.

A.5. Analysis of Proposition 3

Derivation. Differentiate the welfare in (4):

$$\frac{d\mathcal{W}}{d\nu} = \frac{\sigma - 1}{\sigma} V^{\frac{1}{\sigma-1}} \frac{d\tilde{\varphi}}{d\nu} + \frac{1}{\sigma} V^{-\frac{\sigma}{\sigma-1}} \tilde{\varphi} \frac{dV}{d\nu}$$

From (6), we can express V as

$$V = \frac{L}{\frac{\bar{r}-\bar{\pi}}{1+\nu} + \breve{\pi}\frac{\mathcal{P}^*_\theta}{\mathcal{P}^*_\varphi}}$$

and we can define a direct input cost term $A(\nu) \equiv \frac{\bar{r}-\bar{\pi}}{1+\nu}$ and a selection threshold term $B \equiv \breve{\pi}\frac{\mathcal{P}^*_\theta}{\mathcal{P}^*_\varphi}$.

Differentiating V with respect to ν:

$$\frac{dV}{d\nu} = -\frac{L}{(A(\nu)+B(\nu))^2}\left(\frac{dA(\nu)}{d\nu} + \frac{dB(\nu)}{d\nu}\right)$$

Since $\frac{L}{(A(\nu)+B(\nu))} = V$, we can rewrite this as:

$$\frac{dV}{d\nu} = \underbrace{-\frac{V}{A(\nu)+B(\nu)}\frac{dA(\nu)}{d\nu}}_{\frac{dV_{\mathrm{LC}}}{d\nu}} \underbrace{-\frac{V}{A(\nu)+B(\nu)}\frac{dB(\nu)}{d\nu}}_{\frac{dV_{\mathrm{S}}}{d\nu}}$$

In particular, we have, for the input cost component:

$$\frac{dA(\nu)}{d\nu} = \frac{d}{d\nu}\frac{\bar{r}-\bar{\pi}}{1+\nu} = \frac{(1+\nu)\frac{d(\bar{r}-\bar{\pi})}{d\nu} - (\bar{r}-\bar{\pi})}{(1+\nu)^2}$$

and for the selection component:

$$\frac{dB(\nu)}{d\nu} = \frac{d}{d\nu}\breve{\pi}\frac{\mathcal{P}_\theta^*}{\mathcal{P}_\varphi^*} = \frac{d\breve{\pi}}{d\nu}\frac{\mathcal{P}_\theta^*}{\mathcal{P}_\varphi^*} + \breve{\pi}\frac{d}{d\nu}\frac{\mathcal{P}_\theta^*}{\mathcal{P}_\varphi^*}$$

Finally, substituting back into the welfare differentiation:

$$\frac{d\mathcal{W}}{d\nu} = \underbrace{\frac{\sigma-1}{\sigma}V^{\frac{1}{\sigma-1}}\frac{d\tilde{\varphi}}{d\nu}}_{\text{Productivity channel}} + \underbrace{\frac{1}{\sigma}V^{-\frac{\sigma}{\sigma-1}}\tilde{\varphi}\frac{dV_{\mathrm{S}}}{d\nu}}_{\text{Variety channel}} + \underbrace{\frac{1}{\sigma}V^{-\frac{\sigma}{\sigma-1}}\tilde{\varphi}\frac{dV_{\mathrm{LC}}}{d\nu}}_{\text{Direct cost channel}}$$

Extended discussion. The *productivity channel* reflects how the wedge affects welfare via changes in average productivity $\tilde{\varphi}$. From Corollary 1, a higher wedge raises the productivity threshold, so $\frac{d\tilde{\varphi}}{d\nu} > 0$. Since $\sigma > 1$, this improves welfare: costlier inputs force out less productive firms, raising average productivity.

The *selection-variety channel* captures how the wedge affects welfare via firm mass. It reads as $\frac{dV_{\mathrm{S}}}{d\nu} = -\frac{V}{A(\nu)+B(\nu)}\frac{dB(\nu)}{d\nu}$ and $B(\nu) = \breve{\pi}\frac{\mathcal{P}_\theta^*}{\mathcal{P}_\varphi^*}$. In particular, the derivative of the selection component is:

$$\frac{dB(\nu)}{d\nu} = \frac{d\breve{\pi}}{d\nu}\frac{\mathcal{P}_\theta^*}{\mathcal{P}_\varphi^*} + \breve{\pi}\frac{d}{d\nu}\frac{\mathcal{P}_\theta^*}{\mathcal{P}_\varphi^*}$$

Since $\frac{d\breve{\pi}}{d\nu} < 0$ and both thresholds increase in ν (Corollary 1), $\mathcal{P}_\theta^*$ and $\mathcal{P}_\varphi^*$ fall, but the sign of their ratio's derivative is ambiguous. Hence, the overall effect on $B(\nu)$ is unclear, as it depends on the relative sensitivities to ν of the two components. However, for low ρ, the drop in $\breve{\pi}$ dominates, making the channel likely negative through reduced variety.

The *direct cost channel* captures how higher input costs reduce firm profitability and thus firm mass:

$$\frac{dV_{\text{LC}}}{d\nu} = -\frac{V}{A(\nu) + B(\nu)} \frac{dA(\nu)}{d\nu}, \quad A(\nu) = \frac{\bar{r} - \bar{\pi}}{1 + \nu}$$

Differentiating gives:

$$\frac{dA}{d\nu} = \frac{(1 + \nu)\frac{d(\bar{r}-\bar{\pi})}{d\nu} - (\bar{r} - \bar{\pi})}{(1 + \nu)^2}$$

This combines a mechanical cost increase (denominator term) and firms' scale adjustment (numerator term). Since $\frac{dA}{d\nu} < 0$, the effect on welfare is negative: higher costs reduce firm entry and variety.

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