BRIDGING THE GAP? FINTECH AND FINANCIAL INCLUSION

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Abstract

The rise of FinTech lenders offers an opportunity to promote financial access but may disrupt banks' banking efforts. This paper presents a banking model where an incumbent bank specializes in certain niche markets. When a FinTech lender enters, competition intensifies, reducing the bank's gains from serving some of its niches. Although FinTech lending can help serve certain unattended niches, the bank may abandon others, creating an ambiguous impact on financial inclusion. Financial inclusion may even decline when the FinTech lender is less efficient at serving new niches and better able to compete with the bank for its customers.

Keywords: FinTech, financial inclusion, soft information, regulatory arbitrage, economic growth.

JEL classification: G21, G23, G28.

Resumen

La expansión de la industria *FinTech* ofrece la posibilidad de ampliar el acceso al crédito a través del uso de tecnologías alternativas, sin embargo, podría afectar a los incentivos de la banca tradicional para promover la bancarización. Este documento desarrolla un modelo de competencia bancaria donde un banco ya establecido se especializa en la atención de ciertos nichos del mercado de crédito. Tras la entrada de un intermediario *FinTech,* la competencia se incrementa, reduciendo así la rentabilidad del banco en atender algunos de sus nichos. A pesar de que la *FinTech* podría acceder a nichos previamente no atendidos, también podría hacer que el banco deje de atender otros, creando así un efecto indeterminado sobre la inclusión financiera. Esta podría incluso disminuir si la *FinTech* fuera menos capaz de atender nuevos nichos y se encontrara en una mejor posición de poder competir con el banco por sus clientes.

Palabras clave: Empresas *FinTech,* inclusión financiera, asimetrías de información, arbitraje regulatorio, crecimiento económico.

Códigos JEL: G21, G23, G28.

1 Introduction

Increasing access to finance for small and medium enterprises (SMEs) can foster economic growth as these firms are a crucial engine for job creation (Ayyagari et al., 2011). However, SMEs face more difficulties gaining access to finance due to severe informational problems (Beck and Demirguc-Kunt, 2006). One way traditional banks can overcome these problems is by establishing lending relationships, enabling lenders to gather information from more opaque borrowers (Sharpe, 1990; Petersen and Rajan, 1994). The recent and rapid growth of FinTech, financial service providers that use technology extensively (Collevecchio et al., 2024), offers an opportunity to enhance SMEs' access to credit through digital technological advancements (Jagtiani and Lemieux, 2018; Hodula, 2023). Yet, by increasing competition for existing clients, their entry may lower incentives for soft information discovery, which is crucial for SMEs' access to credit. Furthermore, due to their higher processing efficiency of hard information, FinTechs pose a challenge to banks.[1] As a result, banks may avoid serving some segments due to the anticipated competition, which could lead to the possible financial exclusion of SMEs.

This paper studies the impact of a FinTech's entry on financial inclusion through the lens of a banking model. In particular, we show the implications for financial inclusion are uncertain and depend on 1) how traditional banks initially serve the credit market and 2) FinTech's features, such as its competitiveness, defined as the capacity to draw borrowers away from banks, and its efficiency in serving unattended borrowers.

In the model, a screening cost is paid to serve a niche market due to an adverse selection problem. An incumbent bank has a cost advantage in serving opaque niches, whereas a FinTech entrant is better at banking less opaque niches. The FinTech caters to niches the bank avoids due to its disadvantage in screening costs, thus potentially increasing financial inclusion. Nonetheless, it competes with the bank in more opaque niches. The bank anticipates this competition, and as lending relationship rents fall, it is discouraged from supplying some niches, thus potentially lowering financial inclusion. The overall impact on access to finance is determined by which of these two effects dominates.

This paper contributes to the ongoing debate surrounding FinTech's impact on SMES' financial inclusion. While some authors document that FinTech improves SMEs' access to credit (Sheng, 2021; Barkley and Schweitzer, 2021), others show that FinTech is not a driver of small businesses' financial inclusion (Eça et al., 2022). Our paper rationalizes these mixed findings by introducing a

[1] Soft information refers to difficult-to-quantify information, whereas hard information can be easily expressed in numbers (Fasano and Cappa, 2022).

stylized banking competition model illustrating the conditions when FinTech's entry can broaden or narrow access to finance and how FinTech's growth factors, such as regulatory arbitrage (Irani et al., 2020; de Roure et al., 2021) or better technology and processes (Buchak et al., 2018; Fuster et al., 2019), affect SMEs' financial inclusion. Our model has implications not only for theory but also for practice. It aids regulators and stakeholders in identifying the key factors and appropriate tools to affect small businesses' access to credit.[2] Our analysis leads to several policy recommendations and outlines avenues for future research.

2 Model

In this section, we present a stylized model of banking competition. The analysis is based on two crucial features of FinTech lending: (i) the ability to reach borrowers less likely to be served by traditional lenders (Barkley and Schweitzer, 2021), and (ii) the capacity to compete for creditworthy clients with access to bank credit (Eça et al., 2022), discouraging traditional lenders from serving them in the first place. The net effect of FinTech on credit access will depend on the new borrowers served by FinTech and the ones no longer served by the traditional lenders.

Consider an economy with two dates ($t = 1, 2$), thus two lending rounds, and a credit market that can be divided into a continuum of niche markets according to an opaqueness index $m \in [0, 1]$. Lower values of m correspond to higher opaqueness. As explained next, an incumbent bank specializes in serving more opaque niches due to its advantage in processing soft information. In contrast, a FinTech lender serves less opaque niches due to its advantage in processing hard information. Moreover, before any lending round happens, the entry of a FinTech lender is announced for the second lending round.

2.1 Entrepreneurs

Each niche market m is populated by a mass $f(m)$ of penniless entrepreneurs that live for two dates, where $f(\cdot)$ is a pdf over the support $[0, 1]$.[3] At any date, each entrepreneur has access to a project that requires a unit investment and matures at the end of the period. The project yields a stochastic payoff x, which is independent and identically distributed according to

$$x = \begin{cases} X, & \text{with probability } \tilde{p}, \\ 0, & \text{with probability } 1 - \tilde{p}, \end{cases}$$

[2] According to the World Bank, almost 70% of SMEs do not use external financing from financial institutions.

[3] For simplicity of notation, we use "market m" to denote the niche market with opaqueness index equal to m.

The project's output cannot be stored, so it can not generate collateral for the next lending round.

Every market m has two unobservable types of entrepreneurs that differ in their ability to run their projects. A project managed by a high-ability entrepreneur has a probability of success p, which is higher than the probability $p - \delta$ of a project run by a low-ability entrepreneur. All entrepreneurs have a reservation utility $\underline{u}$, and the fractions of high- and low-ability types in each niche market are γ and $1 - \gamma$, respectively.

An adverse selection problem may deter the financing of projects belonging to high-ability entrepreneurs. In particular, projects managed by entrepreneurs with high ability have positive one-period NPV, that is,

$$pX - 1 > \underline{u}, \tag{1}$$

where the interest rate of fully insured deposits is normalized to zero, and their supply is perfectly elastic at such a rate. On the contrary, low-ability entrepreneurs' projects have negative one-period NPV, such that if types are unobservable, no niche market will be served. That is,

$$\hat{p}X - 1 < \underline{u}, \tag{2}$$

where $\hat{p} = p - (1 - \gamma) \times \delta$ is the average probability of success.

Only financial intermediaries can finance entrepreneurs' projects. Moreover, they do it by offering one-period loan contracts.

2.2 Financial intermediaries

An incumbent specialized financial intermediary can help to overcome the adverse selection problem. In particular, the *incumbent* can observe the entrepreneur's type by paying a screening cost $m \times \phi_I$ when serving the entrepreneur for the first time. Thus, the incumbent is better at screening niche markets with a low value of m; i.e., more opaqueness. The incumbent can be seen as a traditional bank that is better at soft information processing (Liberti and Petersen, 2018).

Rents from lending relationships help to compensate for the screening cost incurred by the incumbent. In particular, interacting with the borrower in more than one lending round allows the incumbent to extract more rents and cover the initial investment of banking a niche market. In this way, second-round rents can turn into profitable niche markets in which the incumbent lost in the first lending round due to high screening costs. Furthermore, as in Padilla and Pagano (2000), it is assumed that default is forgiven.[4]

[4] Each investment project is run as a separate limited liability company, and the entrepreneur cannot be disqualified after bankruptcy.

Before all lending decisions happen on date 1, the entry of a new financial intermediary on date 2 is announced. Contrary to the incumbent, the *entrant* has an advantage in banking niche markets with high index m; i.e., less opaque. The entrant can be seen as a FinTech lender that relies on processing hard information by leveraging big data approaches (Balyuk et al., 2022). In particular, the entrant pays a screening cost $(1-m)\times\phi_E$ from attending a niche market m. Thus, the parameter ϕ_E measures *the FinTech's efficiency at serving new niches.*

The entrant observes the type of entrepreneurs with previous access to credit (i.e., screened at date 1 by the incumbent), and it can reach the incumbent's clients at a cost $(1-m)\times\kappa$. Thus, the incumbent will face competition at date 2 over the niche markets attended at date 1, reducing date 2 rents extracted from them. The parameter κ can be seen as *the FinTech's degree of competitiveness.* For instance, if the services offered by the bank to SMEs are difficult to substitute, the bank will be in a better position to retain its customers (Nguyen, 2019), in which case κ will be higher. Similarly, as FinTechs do not necessarily have access to credit registers, competition for banks' borrowers becomes harder, raising κ. On the contrary, as documented by Buchak et al. (2018), lower regulatory costs for FinTechs relative to banks' facilitate reaching banks clients, i.e., a low value of κ.

2.3 Solving the model

The problem is solved by backward induction. First, competition outcomes at date 2 are determined. Next, the incumbent decides which niche markets to serve at date 1.

2.3.a Events at date 2

Let m_I^* be the marginal niche the incumbent serves at date 1. That is, niches with index $m \leq m_I^*$ received funding in the first lending round, leaving $1-m_I^*$ niche markets unattended. Among unattended niches, the entrant decides which to serve on date 2. On the other hand, the incumbent and the entrant compete in prices for the bancarized clients in niches $m \leq m_I^*$.

The following proposition characterizes the equilibrium outcome at date 2.

Proposition 1. *The incumbent bank will serve niches $m \leq m_I^*$ at date 2; whereas the FinTech entrant will serve niches $m \geq m_E^*$, where $m_E^* = 1 - \frac{1}{\phi_E}\times(pX-1-\underline{u})$. The number of newly served niches is decreasing in ϕ_E. Moreover, the incumbent bank and the FinTech entrant will offer, respectively, date-2 interest rates*

$$R_{I,2}(m) = \frac{1+\kappa\times(1-m)}{p},\ \textit{for } m \leq m_I^* \quad \textit{and} \quad R_{E,2}(m) = \begin{cases} \frac{1+\kappa\times(1-m)}{p}, & \textit{for } m \leq m_I^*, \\ X - \underline{u}/p, & \textit{for } m \geq m_E^*. \end{cases}$$

Proposition 1 states the new served niche markets after the entry of the new intermediary. As the entrant has an advantage in banking niches with high index m, it will serve unattended niches in which the one-period revenue covers the funding and screening costs. Moreover, as such niches are far from the incumbent's expertise, the entrant will not face competition, allowing the charge of an interest rate that makes the entrepreneur indifferent between taking the contract or not.[5]

The incumbent will retain its customers; i.e., no switching happens on equilibrium. However, competition decreases the interest rate that the incumbent can charge to its clients at date 2. For instance, offering a very high rate can result in losing the client, as the entrant could offer a lower interest rate. Consequently, the incumbent will charge the lowest interest rate the entrant can provide without incurring a loss. Because the entrant cannot reach a bank's client at a zero cost, $\kappa > 0$, the incumbent can price the loan at a price higher than its fair value $\frac{1}{p}$; see Proposition 1. Hence, the incumbent's date-2 profit in a niche m is equal to

$$\pi_{I,2}(m) \equiv p \times R_{I,2}(m) - 1 = \kappa \times (1 - m). \tag{3}$$

Note that the rents captured by the incumbent depend on its advantage at serving a niche m. If such an advantage dissipates (i.e., $\kappa = 0$), competition will eliminate rents at date 2.

2.3.b Events at date 1

At date 1, the incumbent decides on the niche markets that it will serve. When doing that, it considers whether the rents extracted from entrepreneurs over the life of the lending relationship compensate for the screening cost $\phi_I \times m$ incurred to overcome the adverse selection problem. Recall that if no screening is done, banking a niche market m is unprofitable due to the presence of low-ability entrepreneurs; see condition (2).

The following proposition states the niche markets served by the incumbent.

Proposition 2. *If $\phi_I > \underline{\phi}$, the incumbent bank will serve niche markets with index $m \leq m_I^* < 1$, where $m_I^* = \frac{1}{\phi_I + \kappa} \times (pX - 1 - \underline{u} + \kappa)$. The number of niches the bank serves is decreasing in κ. Moreover, the bank will charge a gross interest rate equal to $R_{I,1}(m) = X - \frac{u}{p}$, for $m \leq m^*$.*

Proposition 2 indicates that some niches of the credit market will not have access to finance due to prohibitive screening costs at date 1; i.e., $\phi_I > \underline{\phi}$. In particular, the rents the incumbent can extract from the lending relationship are insufficient to compensate for the screening cost in niches far from the incumbent's expertise. Moreover, as competition intensifies with the entry of

[5] The bank's incentives for investing in unattended niche markets are even lower at date 2, as no potential rents from engaging in a second lending round can be extracted.

the new intermediary, the incumbent will extract fewer rents at date 2, resulting in serving fewer niches, i.e., m_I^* decays. Finally, because there is no competition on date 1, the incumbent charges a gross interest rate that captures entrepreneurs' surplus on date 1.

3 Analysis on access to finance

In this section, we analyze the effect of FinTech entry on financial inclusion. On the one hand, the FinTech entrant can help financial inclusion by banking unattended niches (*efficiency effect*). As pointed out in Proposition 1, the number of newly served niches depends on FinTech's efficiency, represented by the parameter ϕ_E. On the other hand, the FinTech entrant increases competition, which may discourage the incumbent bank from serving some niches (*competition effect*). As noted in Proposition 2, the number of initially served niches by the incumbent bank depends on FinTech's competitiveness, represented by the parameter κ. The net effect on financial inclusion will depend on which effect predominates.

The effect of the FinTech's entry is illustrated in Figure 1. First, FinTech promotes the bancarization of high m-index niches, i.e., niches m_E^* to 1 in panel (b). The positive efficiency effect is larger if the FinTech is more efficient at serving these niches (i.e., a low value of ϕ_E); see panel (c). On the contrary, if ϕ_E is higher, FinTech is less efficient, serving fewer new niches. Second, after FinTech's entry, the incumbent stops serving some previously attended niches due to more competition from FinTech. The negative competition effect is represented by the niches m_I^* to m_I^0 that the bank abandons after the FinTech's entry. The magnitude of the competition effect will depend on the degree of competitiveness of the FinTech. In panel (e), the effect is small, as the FinTech is less capable of reaching the bank's clients (i.e., a high value of κ), whereas, in panel (f), the effect is larger, due to more competition (i.e., a low value of κ). The final effect on financial inclusion will depend on the mass of entrepreneurs in abandoned and newly served niches, which depends on the density function $f(m)$.

Figure 2 illustrates the effect of initial financial inclusion by considering the case where the abandoned and newly served niches are equal. The final impact on financial inclusion will depend on how entrepreneurs are distributed among the niches. In panel (a), we consider a situation where initial financial inclusion is high, as most served entrepreneurs lie within the bank's expertise (niches with a low index m). On the contrary, panel (b) depicts a situation where initial financial inclusion is lower due to fewer entrepreneurs in the bank's expertise area. Despite serving the same number of niches in both cases, the entry of the FinTech fosters financial inclusion in panel (a) compared to panel (b), as the newly served niches contain more entrepreneurs than the abandoned niches by

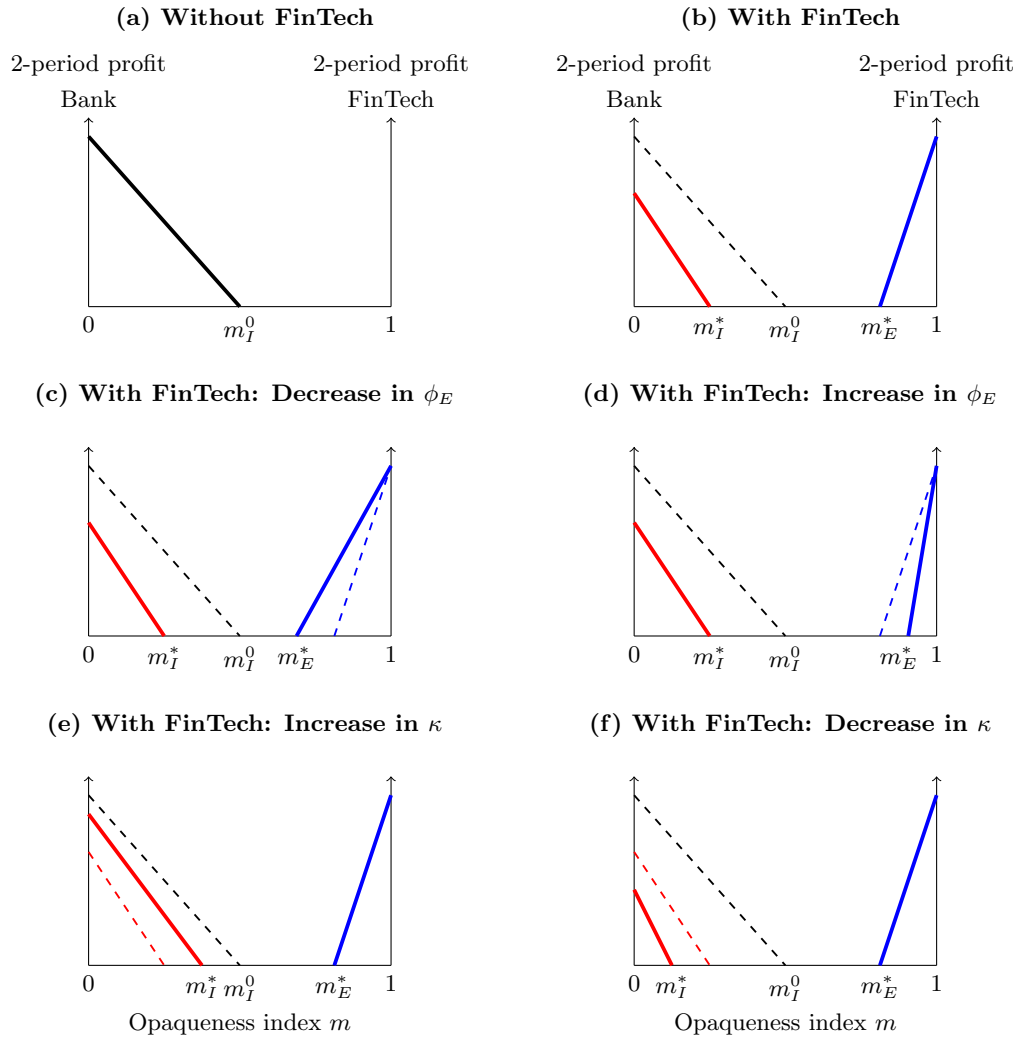

Figure 1: Effect on attended niches of FinTech's efficiency (ϕ_E) and competitiveness (κ)

The figure illustrates the effect of a FinTech's entry on served niches. The lines represent the incumbent's and FinTech's profit from attending a niche market m. Panel (a) depicts a situation in which no entry occurs. In such a case, the incumbent serves niches from 0 to m_I^0 (when profits become zero). The black dashed line represents this case in the rest of the panels. Panel (b) illustrates a situation where a FinTech enters the market. In such a case, the bank serves niches from 0 to m_I^* (when profits become zero), and the FinTech serves niches from m_E^* (when profits become zero) to 1. The *competition* and *efficiency* effects are represented by the niches the bank abandons (from m_I^0 to m_I^*) and the unattended niches the FinTech starts serving (from m_E^* to 1), respectively. The blue and red dashed lines in the rest of the panels coincide with the solid blue and red lines in panel (b). Panel (c) describes a situation of a more efficient FinTech but equally competitive relative to panel (b). In such a case, more newly attended niches are served. Panel (d) describes the same situation as panel (c) but for a less efficient FinTech. In such a case, fewer new niches are served. Panel (e) shows a situation in which the FinTech is less competitive but equally efficient relative to panel (b). In such a situation, banks abandon fewer niches. Panel (f) shows the same situation as panel (e), but now the FinTech is more competitive. In such a situation, more niches are abandoned.

the incumbent. Thus, if initial financial inclusion is low, the entry of the FinTech is more likely to foster financial access. The final effect will also be a function of the abandoned and newly served niches, which depend on the FinTech's features (see Figure 1).

Particularly, the overall change in access to finance after the FinTech's entry, Δ, is equal to

$$\Delta = \gamma \times \Bigg(\underbrace{\int_{m_E^*}^{1} f(m)\mathrm{d}(m)}_{\text{Efficiency effect}} - \underbrace{\Big(\int_{0}^{m_I^0} f(m)\mathrm{d}(m) - \int_{0}^{m_I^*} f(m)\mathrm{d}(m) \Big)}_{\text{Competition effect}} \Bigg), \tag{4}$$

where the first term represents the mass of new high-ability entrepreneurs attended by the entrant. The second term represents the mass of high-ability entrepreneurs the incumbent stopped serving after the FinTech's entry, which is the difference between the mass of high-ability entrepreneurs served by the incumbent in the absence and the presence of the FinTech, respectively.

Figure A.1 in the Appendix shows how financial inclusion varies among all these dimensions for a parametrization of the model, chosen solely to illustrate our main findings. As shown, gains (losses) in financial inclusion are more likely when initial financial inclusion is low (high), FinTech is more (less) efficient, and FinTech is less (more) competitive.

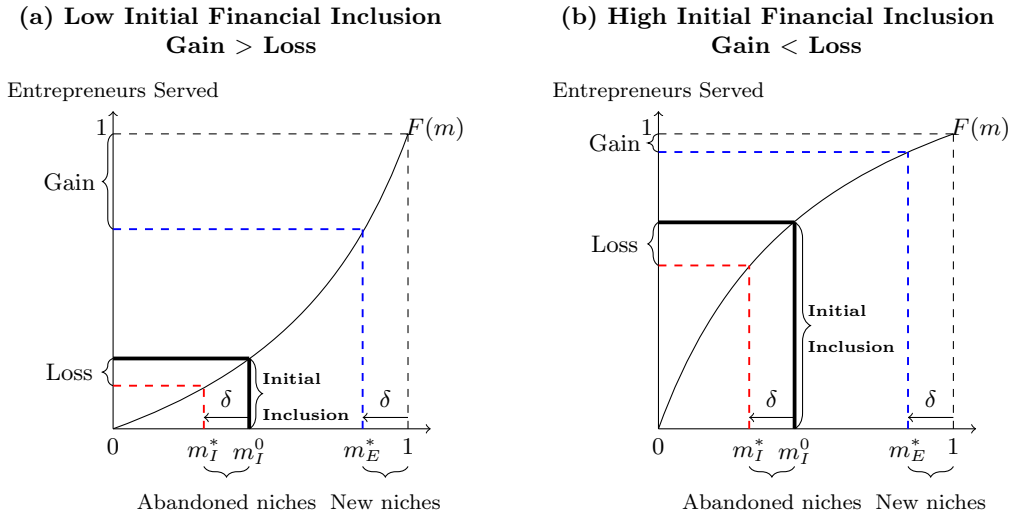

Figure 2: Effect on financial inclusion of the initial financial inclusion level

The figure shows how financial inclusion changes when we assume that the niches the bank abandons are equal to the niches the FinTech serves. $F(\cdot)$ is the cumulative distribution function of f and measures the fraction of entrepreneurs served. The black solid line represents the financial inclusion without FinTech's entry. The dashed red line depicts the niches (from 0 to m_I^*) and entrepreneurs ($F(m_I^*)$) the bank serves after the FinTech's entry. The blue line shows the niches (from m_E^* to 1) and entrepreneurs ($1 - F(m_E^*)$) the FinTech serves after it enters the market. Panel (a) depicts a situation with lower initial financial inclusion than panel (b). In particular, despite serving the same niches (from 0 to m_I^0), the bank initially serves fewer entrepreneurs in panel (a) than (b) because a smaller mass of entrepreneurs is located in niches within the bank's expertise. Panel (a) then shows that after FinTech's entry, financial inclusion increases because the newly served niches contain more entrepreneurs than those abandoned by the bank. Conversely, in Panel (b), financial inclusion falls as the bank abandons a larger mass of entrepreneurs compared to those newly served by FinTech.

4 Conclusions and policy discussion

Our findings have the following policy implications. First, given the crucial role of soft-information discovery for the financial inclusion of SMEs (Petersen and Rajan, 1994) and its positive effect on firm performance (Allen et al., 2019), measures that reduce the return of information discovery should be carefully analyzed. Unless an adequate remuneration policy can be established for soft information, information-sharing policies should preferably focus on hard information rather than soft information. Yet, regulators should also be cautious when fostering the disclosure of hard information as its effects on the credit provision of SMEs are mixed (Sutherland, 2018).

Second, introducing mechanisms to measure, monitor, and, if needed, foster soft-information discovery can be beneficial. Our analysis suggests that lowering the incentives of soft-information discovery could cause the financial exclusion of soft-information-intensive SMEs. A regulator wishing to enhance financial inclusion may find monitoring an indicator that summarizes soft-information discovery in credit markets useful.

Third, given the regulation advantage that FinTechs gained in the aftermath of the Great Financial Crisis (Buchak et al., 2018; Irani et al., 2020), a regulatory action that levels the field between banks and FinTechs, in line with the recommendations by Vives (2019), may be important to analyze. However, it must be considered that bank regulation could decrease bank funding costs by reducing bank risk-taking, not necessarily resulting in a loss of competitiveness.

Fourth, given that FinTechs do not necessarily increase the overall financial inclusion in credit markets (Buchak et al., 2018; Fuster et al., 2019) and may even be detrimental to this objective (Fuster et al., 2022), entry regulation should consider FinTechs' efficiency and competitiveness and the initial level of financial inclusion. This recommendation aligns with the ongoing debate on the need for regulatory action on financial technology-intensive lenders and its impact on social welfare (Vives, 2019; Vives and Ye, 2022). However, in reality, other dimensions, apart from only financial inclusion, should be considered when analyzing the specific conditions of particular countries.

Our paper's framework offers some directions for future research testing its empirical implications. One possible research question is whether traditional banks scale back their lending in local markets where FinTech has a competitive edge. Empirical evidence on this would highlight the role of the competition effect on financial inclusion. Another complementary question is whether Fintech's entry leads to a surplus of new firms in affected markets. Findings along this line would support the view that the efficiency effect outweighs the competition effect, thus suggesting that FinTechs, with their better technology and processes, effectively cater to new niche markets. Finally, re-examining the effect of competition on access to credit in the "FinTech Era" can be part of a future research agenda.[6]

While financial inclusion is a crucial aspect of economic development, it is essential to consider other dimensions when assessing the impact of FinTech's entry. For instance, prudential regulation aims to safeguard financial stability; thus, a comprehensive welfare analysis should also consider the benefits of bank regulation in preventing systemic crises. Furthermore, our analysis abstracts from other positive effects of increasing bank competition. In particular, firms with current access to credit may benefit from FinTech's entry since they can enjoy better contractual terms, such as lower

[6] Previous to the surge of FinTech, many works analyzed the effect of more competition on access to bank credit. As references, see Petersen and Rajan (1995), di Patti and Dell'Ariccia (2004), or Love and Pería (2015).

interest rates or more credit, potentially expanding aggregate output. Yet, excessive competition could also have some undesired outcomes, such as borrower overindebtedness.

Besides, other specificities of credit markets not currently modeled in our stylized setup can help lessen the effect of the competition channel. For instance, long-term contracts can help protect banks' investments in establishing lending relationships, reducing Fintech's impact on financial inclusion. Bank's access to cheaper funds—due to their implicit and explicit guarantees—gives them a competitive edge vis-a-vis FinTech. Prudential regulation can reduce funding costs by making banks less willing to engage in risky activities, not necessarily leading to a loss in competitiveness. Further, given our static setup, we are leaving out the possibility of some FinTech learning dynamics that could revert some of the adverse effects on access to credit over the medium term. Finally, we do not study banks' technological investments as a response to FinTech's entry, which could expand the bank's customer base due to better screening and monitoring technologies. All of these features can be incorporated into our model as part of future developments.

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A Finance inclusion gain/losses: An illustrative example

Figure A.1 shows how financial inclusion varies following the entry of the FinTech across all the analyzed dimensions. Panel (a) illustrates a credit market with a high initial financial inclusion (most borrowers located in low-m niches), whereas panel (b) depicts a scenario with a low initial financial inclusion (thicker tails for high-m niches). When financial inclusion is initially high, the FinTech's entry can disrupt the bank's incentive to engage in lending relationships, making access to finance less inclusive. As shown in panel (a) of Figure A.1, this is especially severe when κ is low, and ϕ_E is high, as competition leads the bank to withdraw from specific niches, and the FinTech's ability to broad access to finance does not compensate for the loss. In contrast, if traditional banks serve only a small portion of the credit market, the gains in financial inclusion can be significant; see panel (b) of Figure A.1. This is because the entrepreneurs served by the entrant significantly outweigh those that the bank stops serving.

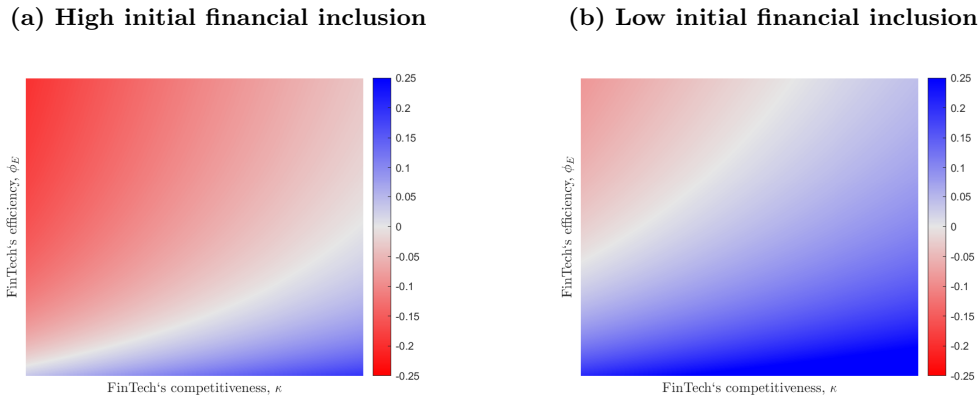

Figure A.1: Effect on Financial Inclusion of FinTech's Entry

For the sole illustration of the solution, the following parametrization was chosen: $X = 1.2$, $p = 1$, $\underline{u} = 0$, $\phi_I = 1$, $f \sim \text{Beta}(a, b)$. Panel (a) considers a case where the incumbent bank initially serves a large portion of the credit market. In particular, the parameters of the beta function are equal to $a = 1$ and $b = 1.35$. Thus, most borrowers will be in niche markets where the incumbent bank has larger expertise (low values of m). Panel (b) considers a case where the incumbent bank initially serves a few niche markets. By choosing $a = 1$ and $b = 0.95$, fewer borrowers will be located in niche markets where the monopoly bank has a comparative advantage (low values of m). For each case, the figure depicts how access to finance changes after the entry of a FinTech (Δ in equation 4) for different values of the FinTech's efficiency ϕ_E and degree of competitiveness κ. A red point indicates less financial inclusion ($\Delta < 0$), and a blue point indicates more financial inclusion ($\Delta > 0$).

B Proofs

Proof of Proposition 1

Consider the entrant's decision to serve an unattended niche. For a niche $m > m_I^*$, the entrant will serve it if it can make profits after paying the screening cost, that is,

$$\max_{R_{2,E}(m)} p \times R_{2,E}(m) - 1 - \phi_E \times (1 - m) \geq 0, \quad \text{subject to } p \times (X - R_{2,E}(m)) \geq \underline{u}.$$

The entrant does not face competition for niches $m > m_I^*$. Note that if the incumbent does not initially serve a niche, it will not serve it at date 2 as no rents from a second lending round will be available. Thus, the entrant can charge an interest rate that allows it to keep the project's surplus; i.e., $R_{2,E}(m) = X - \frac{u}{p}$. As a consequence, the entrant serves a niche m if

$$p \times X - 1 - \underline{u} - \phi_E \times (1 - m) \geq 0,$$

which delivers threshold $m_E^* = 1 - \frac{1}{\phi_E} \times (pX - 1 - \underline{u})$. Hence, new niches $m \geq m_E^*$ are being served by the entrant at date 2 and charged an interest rate $R_{2,E}^*(m) = X - \frac{u}{p}$.

On the other hand, the incumbent competes with the entrant for its clients in niches $m \leq m_I^*$. In this scenario, the incumbent does not need to pay the screening cost, but it faces the possibility of losing clients due to better interest rates offered by the entrant. Thus, for every niche $m \leq m_I^*$, both lenders compete in prices, decreasing interest rates until equilibrium interest rates make the entrant break even due to its cost disadvantage. That is, $R_{2,I}^*(m) = R_{2,E}^*(m)$, such that

$$p \times R_{2,E}^*(m) - 1 - \kappa \times (1 - m) = 0 \quad \Rightarrow R_{2,E}^*(m) = \frac{1 + \kappa \times (1 - m)}{p} \text{ for } m \leq m_I^*.$$

Note that if the cost of reaching the bank's client is sufficiently low, that is,

$$\kappa < p \times X - \underline{u} - 1,$$

the borrower's participation constraint will be satisfied at the equilibrium interest rates. Thus, part of the project's surplus is kept by bancarized borrowers at date 2, even in niches with less competition at date 2 (low values of m).

Proof of Proposition 2

Note that the date-2 profit of banking a niche m at date 1 is

$$p \times R_{2,I}^* - 1 = \kappa \times (1 - m) > 0.$$

Hence, when considering to serve a niche m at date 1, the incumbent considers rents over the entire life of the lending relationship.

In particular, the lender will serve a niche m if

$$\max_{R_{1,I}(m)} (p \times R_{1,I}(m) - 1) + \kappa \times (1 - m) - \phi_I \times m \geq 0, \quad \text{subject to } p \times (X - R_{1,I}(m)) \geq \underline{u},$$

that is, if the profit over the two periods of the lending relationship compensates for the screening cost $\phi_I \times m$. Because the incumbent enjoys monopoly power at date 1, it sets $R_{1,I}(m)$ so the

borrower is left with her outside option. Hence, the marginal niche m_I^* served by the incumbent is determined by

$$p \times X - 1 - \underline{u} + \kappa \times (1 - m_I^*) - \phi_I \times m_I^* = 0 \quad \Rightarrow m_I^* = \frac{p \times X - 1 - \underline{u} + \kappa}{\phi_I + \kappa},$$

such that niches $m \leq m_I^*$ are served from date 1 and charged $R_{1,I}^*(m) = X - \frac{\underline{u}}{p}$ at date 1. Moreover, if the screening cost is sufficiently large, not all niches are served at date 1; that is,

$$\underline{\phi} \equiv p \times X - 1 - \underline{u} < \phi_I.$$

Furthermore, if the screening cost of the entrant is sufficiently large, there will still be unserved niches after its entry, that is,

$$m_I^* < m_E^* \Longleftrightarrow \frac{(\phi_I + \kappa)(p \times X - 1 - \underline{u})}{\phi_I - (p \times X - 1 - \underline{u})} < \phi_E.$$

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