

From Cash to Buy-Now-Pay-Later

Impacts of platform-provided credit on market efficiency

Han Han¹ Bo Hu² Makoto Watanabe³

¹Peking University

²Fudan University

³KIER, Kyoto University

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Introduction

- The **Dual Roles** of e-commerce platforms
 - ▷ **Brokerage**: match buyers and sellers
 - ▷ **Credit Provision**: provide consumers credit for purchases
- Credit provision in real world: **Buy-Now-Pay-Later** (BNPL) services provided by, e.g., Amazon, Alibaba, JD.com, Shopee, etc.
- 'Buy now, pay later': (EU 2023 Consumer Credit Directive)
 - ▷ creditor grants credit to a consumer for the exclusive purpose of purchasing goods or services provided by a supplier ...
 - ▷ new digital financial tools that let consumers make purchases and pay them off over time, are often granted free of interest.

amazon pay

Shop with Amazon Pay >

Amazon Pay for business >

Sign in >

Business Registration

BUY NOW AND PAY OVER TIME WITH
PROMOTIONAL FINANCING

Shop beyond Amazon.com with your Amazon Store Card

Here's one more reason to love the Amazon Store Card. You can use your card to make purchases beyond Amazon.com using Amazon Pay. And you have the option to choose 0% APR financing with 6 equal monthly payments on qualifying Amazon Pay purchases*.

Not an Amazon Store Card or Prime Store Card member?

[Learn more about the card](#)

Amazon Pay purchases made using your Amazon Store Card and Prime Store Card are not eligible to earn reward points.





Shop with Amazon Pay >

Amazon Pay for business >

Sign in >

Business Registration



BUY NOW, PAY OVER TIME

Buy what you need now and pay at your own pace — with no hidden fees

More shoppers than ever are looking for an option to pay over time. And now, with Amazon Pay and Affirm, you can get exactly what you want while making budget-friendly payments.



- Regulatory frameworks on BNPL:
 - EU: Revised European Consumer Credit Directive (Oct 23)
 - US: Proposal by Consumer Financial Protection Bureau (Nov 23)
 - UK: Treasury's Legislative Proposal (Feb 23)
 - ...

▷ They do not distinguish **standalone BNPL** and **platform BNPL**.
- Research Questions:
 - ▷ Why do some sellers adopt credit while others do not?
 - ▷ To whom would the platform find it profitable to provide credit?
 - ▷ What are the potential distortions? How to regulate?
- We examine the **equilibrium**, **distortions**, and **regulations** of a dual-role monopolist platform (brokerage + credit)

Literature

Coexistence of money and credit

- Dong and Huangfu (2021), Wang, Wright and Liu (2020), Andolfatto, Berentsen and Martin (2019), Lotz and Zhang (2016), Gu, Mattesini and Wright (2016), Ferraris and Watanabe (2012), Nosal and Rocheteau (2011), Sanches and Williamson (2010), Telyukova and Wright (2008), Berentsen, Camera and Waller (2007), Chiu and Wong (2022)

Hybrid or dual-mode of platforms

- Tirole and Bisceglia (2023), Madsen and Vellodi (2023), Gautier, Hu and Watanabe (2023), Etro (2023), Shopova (2023), Hagiü, Teh and Wright (2022), Anderson and Bedre-Defolie (2022), Kang and Muir (2022), Padilla, Perkins and Piccolo (2022), Zennyö (2022)

1. The Microfoundation of Payment

Unit mass of sellers:

- Each produces a unique and indivisible good
- Differ in **quality** $\xi \sim G(\xi)$, $\xi \in [\underline{\xi}, \bar{\xi}]$, ξ is publicly observable.
- Entry cost κ^s (or sellers' irreversible production costs).

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Buyers:

- Unit mass of potential buyers for each good; unit demand.
- At ξ -seller: with prob. ξ , a buyer draws $u \sim F(u)$, $u \in [\underline{u}, \bar{u}]$, $\underline{u} \geq 0$; otherwise, $u = 0$.
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Trade:

- No search frictions.
- Sellers set a uniform price, choose accepted payment methods.

Payment methods

- Pay by **Money**
 - buyers need to hold fiat money in advance
 - money-holding costs, e.g., nominal interest rate $i > 0$
- Pay by **Credit**
 - sellers need to adopt a credit tech, pay a proportional cost $\omega \in (0, 1)$
 - no default, no credit limit

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Timing

1. A seller firstly draws ξ , decide to join market or not. If join, he produces the goods at cost κ^s , chooses price p , and accepted payment method.
2. Buyers observe ξ , p , payment methods. With prob. ξ they draw u , and decide to purchase or not.

Seller's profit maximizing problem

- Under credit payment

$$\max_p (1 - \omega)\xi p Q(p), \quad \text{s.t.} \quad \xi \mathbb{E}[u - p | u \geq p] \geq \kappa^b.$$

- Under monetary payment

$$\max_p \xi p Q(p), \quad \text{s.t.} \quad \xi \mathbb{E}[u - p | u \geq p] - ip \geq \kappa^b.$$

where $Q(p) = \Pr[u \geq p]$.

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Lemma. Suppose κ^b is sufficiently large (so that buyers' PC is binding).

Let $p_c(\xi)$ be the credit price, and $p_m(\xi)$ be the monetary price. Then:

- ▷ $p_c(\xi) > p_m(\xi)$, and both increase in ξ ;
- ▷ $p_m(\xi)/p_c(\xi)$ increases in ξ .

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- ▷ $p_c(\xi) > p_m(\xi)$, and both increase in ξ ;
- ▷ $p_m(\xi)/p_c(\xi)$ increases in ξ .
- ▷ revenues $R_c(\xi) \equiv \xi p_c Q(p_c)$, $R_m(\xi) \equiv \xi p_m Q(p_m)$ increase in ξ .

Seller's credit adoption

- A seller opts for credit if

$$(1 - \omega)R_c(\xi) - R_m(\xi) \geq 0.$$

- For small money-holding costs, $\Delta p = p_c - p_m$ tends to be small.

$$\begin{aligned} (1 - \omega)R_c(\xi) - R_m(\xi) &= R_c(\xi) \left(\frac{R_c(\xi) - R_m(\xi)}{R_c(\xi)} - \omega \right) \\ &= R_c(\xi) \left(\frac{\Delta p}{p_c} \underbrace{(1 - \varepsilon_D(\xi))}_{\text{revenue price elasticity}} - \omega \right) \end{aligned}$$

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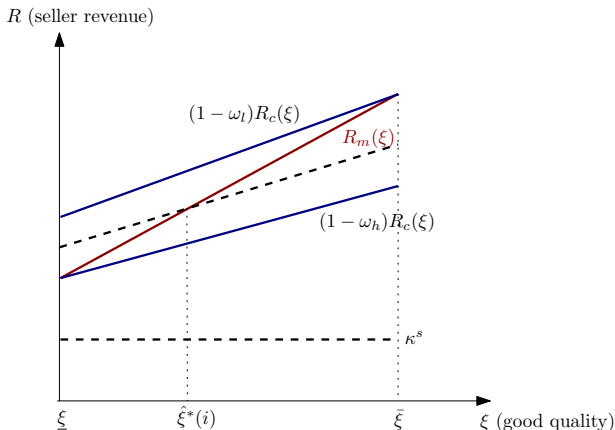
where $\Delta p = p_c - p_m$, $\varepsilon_D(\xi)$ is the (absolute) demand elasticity.

Lemma. Suppose price elasticity rises with price (Marshall's second law of demand), then $\varepsilon_D(\xi)$ rises in ξ . Sellers with lower ξ are more likely to adopt credit.

Constrained social optimal credit adoption

The credit adoption threshold $\hat{\xi}^* = \bar{\xi}$ if $\omega \leq \omega_l$; $\hat{\xi}^* = \underline{\xi}$ if $\omega \geq \omega_h$, and satisfies

$$\frac{R_c(\hat{\xi}^*) - R_m(\hat{\xi}^*)}{R_c(\hat{\xi}^*)} = \omega \text{ if } \omega \in (\omega_l, \omega_h).$$



2. The Platform Economy

A monopolist platform

- Suppose the market outlined above is operated by a platform.
 - ▷ transaction fee is proportional $t \in [0, 1]$ (on sellers' revenue)
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 - ▷ sellers always accept cash
 - ▷ sellers can accept credit through the platform's credit services
 - ▷ credit usage fee is proportional: $f \geq 0$
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 - ▷ cost of credit technologies for the platform: $\omega > 0$
- Timing: the platform announces (t, f) first.
- Solution concept: subgame perfection.

Equilibrium

Sellers' best responses:

- Join platform $\iff \max\{(1-t)R_m(\xi), (1-t-f)R_c(\xi)\} \geq \kappa^s \Rightarrow \xi_I$
- Opt for credit $\iff (1-t-f)R_c(\xi) \geq (1-t)R_m(\xi) \Rightarrow \hat{\xi}$

▷ rewrite the credit adoption condition

$$\frac{R_c(\xi) - R_m(\xi)}{R_c(\xi)} > \frac{f}{1-t}.$$

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To derive the platform's optimal strategy, we divide its strategy space:

- **Money Entry:** ξ_I -seller opt for money payment (pure monetary payment)
- **Credit Entry:** ξ_I -seller opt for credit payment (hybrid payment or pure credit)

Platform's Problem under Money Entry

$$\Pi_m = \max_{(t, f) \in \mathbb{T}} \int_{\xi_l}^{\bar{\xi}} t R_m(\xi) dG(\xi), \text{ s.t. } (1 - t)R_m(\xi_l) = \kappa^s.$$

▷ Inserting t , the platform faces the trade-off t and ξ_l

$$\max_{\xi_l \in [\underline{\xi}, \bar{\xi}]} \int_{\xi_l}^{\bar{\xi}} \underbrace{\left(1 - \frac{\kappa^s}{R_m(\xi_l)}\right)}_{\equiv t} R_m(\xi) dG(\xi)$$

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Platform's Problem under Credit entry

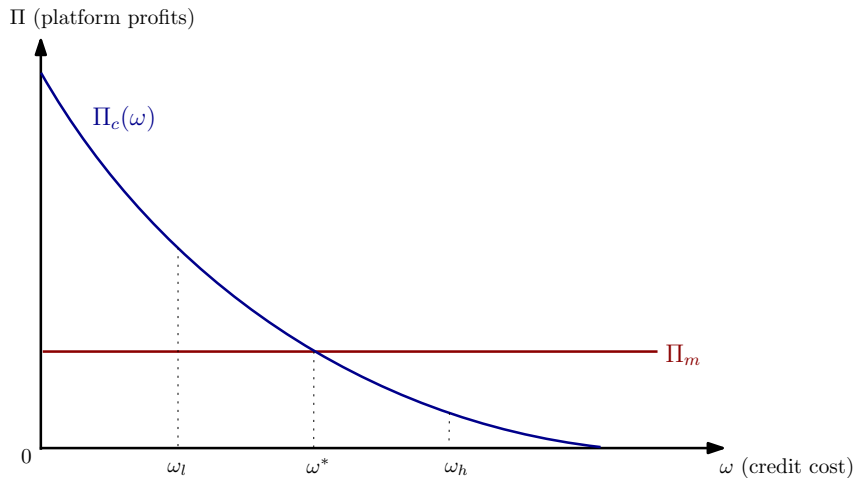
$$\Pi_c(\omega) = \max_{(t,f) \in \mathbb{T}} \left\{ \int_{\xi_l}^{\hat{\xi}} (t+f-\omega) R_c(\xi) dG(\xi) + \int_{\hat{\xi}}^{\bar{\xi}} t R_m(\xi) dG(\xi) \right\}$$

$$\text{s.t. } (1-t-f)R_c(\xi_l) = \kappa^s, \text{ and } \frac{R_c(\hat{\xi}) - R_m(\hat{\xi})}{R_c(\hat{\xi})} = \frac{f}{1-t}$$

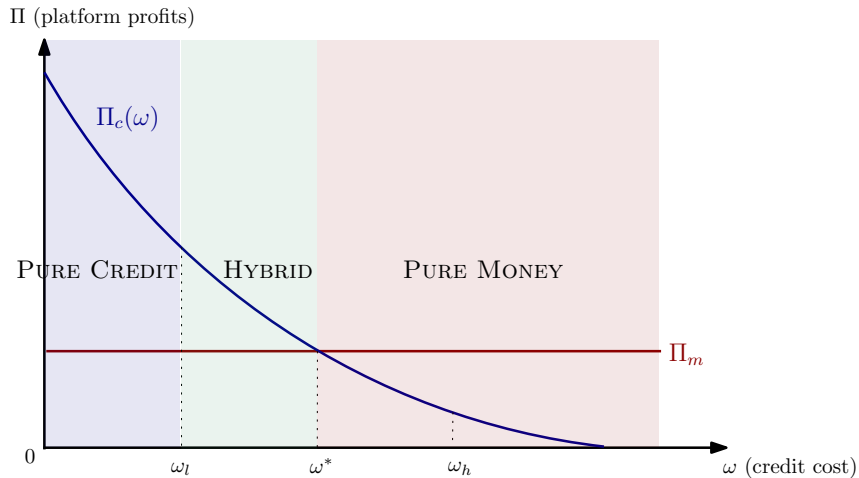
▷ lower $t+f$ leads to lower ξ_l ;

▷ given $t+f$, raising f (decreasing t) leads to lower $\hat{\xi}$ (smaller credit sector and larger money sector)

Platform profit-maximization

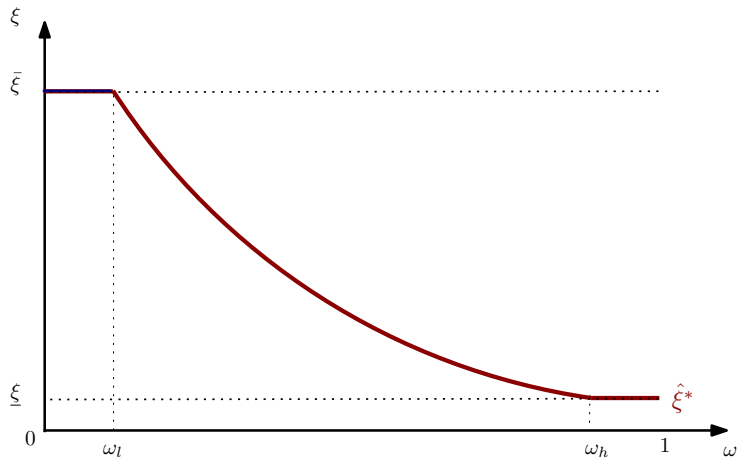


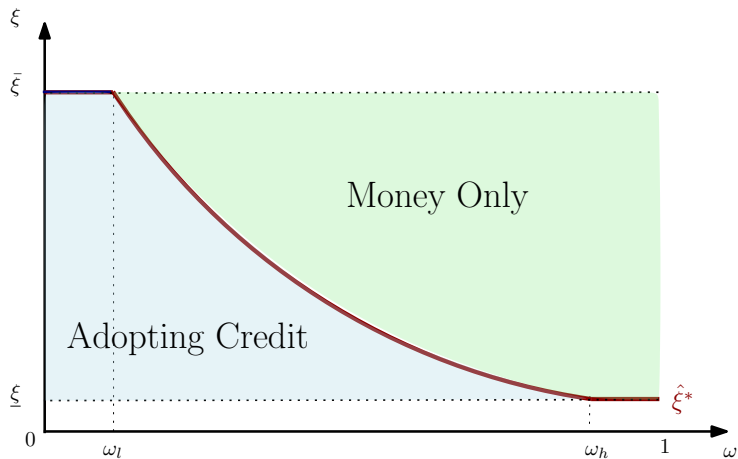
Payment mode

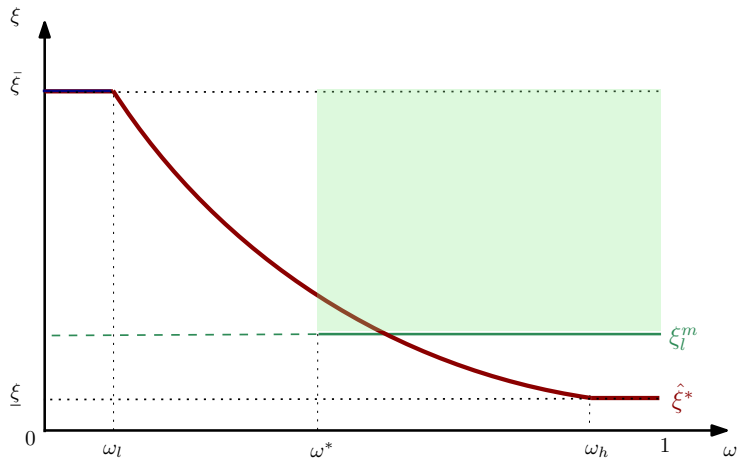


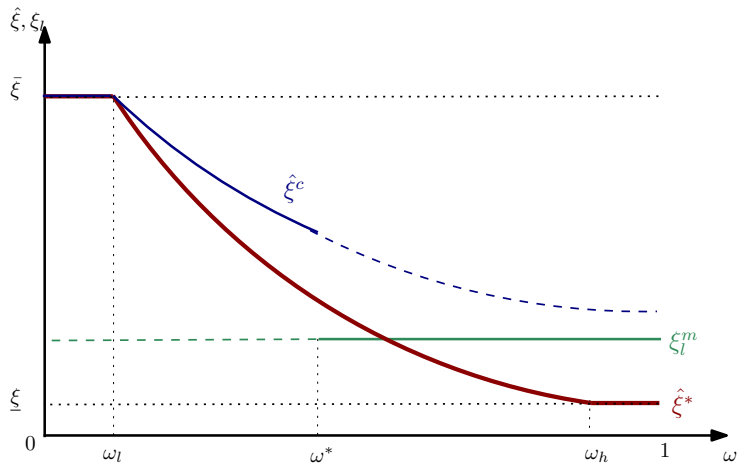
3. Distortions

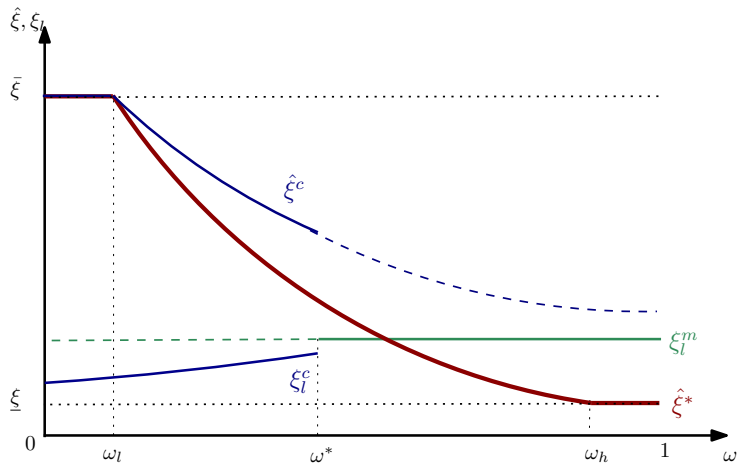


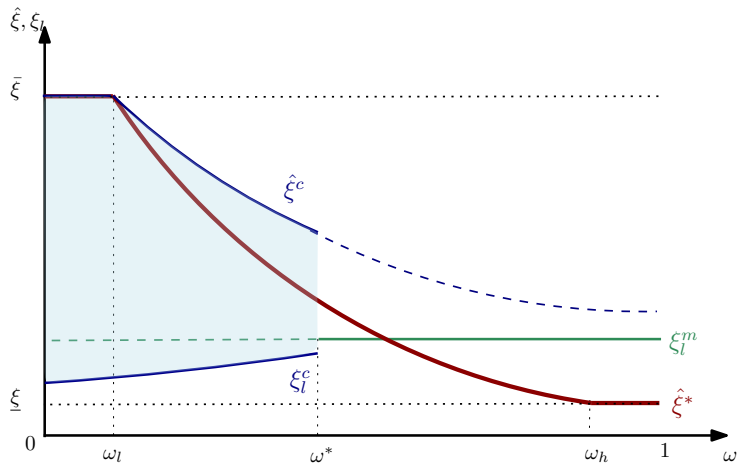












4. Regulations

Caps in real-world

Article 31

Measures to limit borrowing rates, annual percentage rates of charge or total costs of credit to the consumer

1. Member States shall introduce measures to effectively prevent abuse and to ensure that consumers cannot be charged with excessively high borrowing rates, annual percentage rates of charge or total costs of credit to the consumer, such as caps.
2. Member States may adopt prohibitions or limitations regarding specific charges or fees applied by creditors on their territory.
3. By 20 November 2027, the Commission shall make the measures introduced by Member States in accordance with paragraph 1 publicly available. Member States shall report to the Commission on those measures by 20 November 2026.
4. By 20 November 2029 the European Banking Authority shall publish a report on the implementation of the measures referred to in paragraph 1. That report shall include an assessment of the measures put in place in Member States, including methodologies to establish caps where relevant, and of their effectiveness in limiting the excessively high borrowing rates, annual percentage rates of charge or total costs of credit to the consumer, and shall include a best practice approach for establishing such measures.

Jointly regulate (t, f)

- Suppose $\omega \in (\omega_l, \omega_h)$. Efficient participation and credit adoption can be achieved with

$$t + f \leq 1 - \frac{\kappa^s}{R_c(\underline{\xi})}, \text{ and } \frac{f}{1-t} = \omega;$$

which leads to

$$t \leq 1 - \frac{1}{1-\omega} \frac{\kappa^s}{R_c(\underline{\xi})}, \text{ and } f = (1-t)\omega$$

- Cap transaction fee t
- Credit fee $f \propto \omega$ and applies only on the non-taxed revenue

Regulate f or t Separately

Cap f (Credit Usage Fee)

- Capping $f = (1 - t)\omega$
 - ▷ the platform sets t too high, leading to that credit oversupply
- Capping $f = \omega$ (spin credit provision off the platform)
 - ▷ leading to that credit undersupply

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Cap t (Transaction Fee)

- f pins down both lb ξ_l and ub $\hat{\xi}$: $f \uparrow \Rightarrow \xi_l \uparrow$ and $\hat{\xi} \downarrow$
 - ▷ Help to correct inefficient credit provision

5. Discussions

Buyers may default

- If a seller adopts platform credit, with prob. λ , buyer will not pay later.
- The effective cost of credit changes: $\omega \rightarrow \omega + \lambda$.
- When λ is high, platform ceases to provide credit: under-supply of credit;
- When λ is low, platform adopts credit entry: over/undersupply of credit.

Takeaways

- A microfoundation of payment: money versus credit
- The monopolist platform may provide too much and too little credit compared to the planner's solution
- To ensure efficient credit provision, brokerage and credit provision should be jointly regulated with $f = (1 - t)\omega$ and t capped.

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