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How Shopping Platforms Play a Role in the Credit Card Industry

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ABSTRACT

We develop a four-party model involving banks, merchants, consumers, and platform firms to explain why large shopping malls can offer interest-free installment services to consumers. Using a collaboration between an online shopping platform firm and multiple banks to issue co-branded credit cards as a natural experiment, we find that consumers' spending on the platform fulfills the requirements for merchants and banks to choose a four-way model. This study highlights the pivotal role of platform firms in the credit card market.

KEYWORDS

Credit card; Platform enterprise; Interest-free installment; Consumption

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1. Introduction

In the credit card industry, an intriguing phenomenon emerges when consumers use their credit cards for shopping. When making purchases at large malls or on Internet platforms, consumers typically have the opportunity to access interest-free installment loans spanning 6 to 24 months. In contrast, buying from individual merchants using credit cards usually offers just a one-month interest-free period. This disparity in interest-free options begs the question of why such a discrepancy exists and what implications it may have for consumers and the credit card industry as a whole.[1]

Building upon the research of Armstrong (2006) and Rochet and Tirole (2008), we introduce a four-party business model involving merchants, consumers, banks, and platform firms. Comparing it to a three-party model without platform firms, we identify conditions where including platform firms benefits the other three parties. Finally, we validated our model using a natural experiment by a large shopping platform.

The contribution of this paper is twofold. Firstly, it incorporates the common practice of platforms collaborating with banks to offer interest-free installments into Rochet and Tirole's (2008) platform enterprise framework. Secondly, it extends existing research on the factors influencing credit card holders' overdraft behavior (Lee and Huang, 2011; Gul et al., 2023). Specifically, it suggests that platform-provided interest-free installments encourage overdraft behavior among credit card holders, and offers implications for how banks can transition cardholders from being transactors to revolvers.

2. Model

2.1. Model Setup

Let T_i (i=0,1,2) denotes the timing, consumers use a credit card to purchase a product or service at T_0 and must repay the debt either at T_1 or T_2.[2] We suppose that there is a "continuum" (a non-atomic finite-measure space) of investors, where $Pr(T_1)$ and $Pr(T_2)$ represent the proportions of consumers who choose to repay at T_1 and T_2, respectively. And, of course, these proportions must sum to 1 ($Pr(T_1)+Pr(T_2)=1$). Consumers typically enjoy an interest-free period, such as one month. Therefore, if repayment occurs at T_1, no interest is charged, but at T_2, the bank applies an interest rate of r_c. Figure 1 illustrates this conventional credit card consumption mode.[3]

In the four-party model shown in Figure 2, the platform serves as a hub for integrating information and services from various businesses. This convenience makes consumers more inclined to choose platform-affiliated merchants. Recognizing the benefits of joining the platform, these merchants offer a discount, denoted as α, for purchases made through the platform. Specifically, at T_0, consumers acquire goods through the platform using a bank-granted credit line of $P^{4\text{-party}}$. The platform, in turn, borrows $\alpha P^{4\text{-party}}$ in cash from the bank to pay the merchant. At T_2, consumers repay the principal amount, $P^{4\text{-party}}$, to the platform. Subsequently, the platform pays $\alpha P^{4\text{-party}}(1 + r_p)$ to the bank.[4]

2.2. Solutions

Consumers. The consumers naturally prefer the four-party model because it only requires repayment of $P^{4\text{-party}}$ at T_2, while the three-party model involves an expected repayment of $(1+ r_c \times Pr(T_2))P^{3\text{-party}}$.

[1] Relevant information can be found in *the 2018 Credit Card Industry Report*, jointly published by 51 Credit Cards and Sina.
[2] Here repayment at T_1 corresponds to the interest-free account period in practice, and repayment at T_2 corresponds to the installment repayment in practice.
[3] In our analysis, we assume a discount rate of 0 for computational simplicity, but this doesn't impact the validity of our conclusions.
[4] Because the platform's cash flow comes entirely from consumers, the platform can only repay to the bank after the consumer has repaid to the platform.

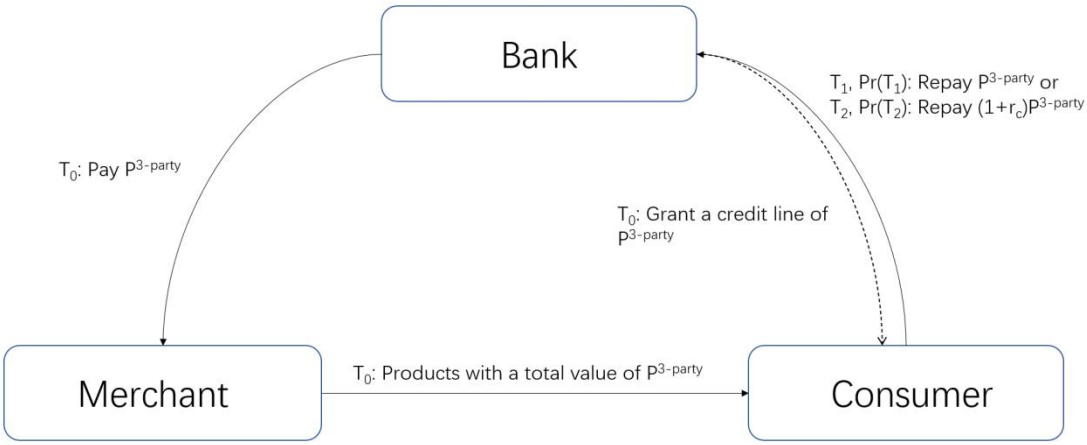


Figure 1. Three-party transaction model.

In this figure, T_0, T_1, and T_2 represent different timings. $P^{3\text{-party}}$ is the total value of the product or service, while $Pr(T_1)$ and $Pr(T_2)$ represent the proportions of consumers who choose to repay at T_1 and T_2, respectively. The interest rate, r_c, applies between T_1 and T_2, while no interest accrues between T_0 and T_1.

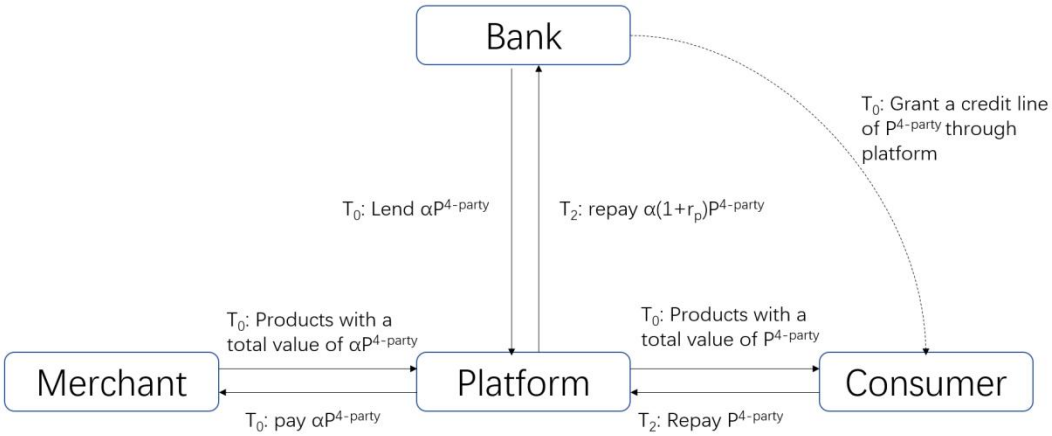


Figure 2. Four-party transaction model.

In this figure, T_0, T_1, and T_2 represent different timings. $P^{4\text{-party}}$ is the price of the product or service, α represents the discount rate that merchants offer to platform enterprises in exchange for increased sales. The interest rate, r_p, applies between T_1 and T_2, while no interest accrues between T_0 and T_1.

Banks. Banks face a trade-off. In the three-party model, a bank's profit is contingent on consumer repayment timing (0 or $r_c P^{3\text{-party}}$), whereas the four-party model guarantees a fixed profit ($\alpha r_p P^{4\text{-party}}$). Banks charge the platform a lower interest rate ($r_p < r_c$) due to its ability to integrate various credit consumption sources. Let's denote these profits as,

$$BankProfit^{3-party} = Pr(T_2) \times r_c \times P^{3-party} \tag{1}$$

and,

$$BankProfit^{4-party} = \alpha \times r_p \times P^{4-party} \tag{2}$$

It can be seen that banks' adoption of the four-party model depends on the fraction of consumers who repay at T_2, the discount rate α, and the interest rates r_c and r_p.

Platform enterprises. Platform enterprises enter the market only if there is a positive profit. In the four-party model, this profit is quantified as,

$$PlatformProfit^{4-party} = P^{4-party} - \alpha \times P^{4-party} \times (1 + r_p) \tag{3}$$

Merchants. Merchants also encounter a significant trade-off in their decision-making. In the three-party model, merchants sell fewer products or services to individual consumers but at higher prices. On the other hand, in the four-party model, they sell a larger volume of products or services to platforms but at lower prices. Consequently, the profits of merchants are given by,

$$MerchantProfit^{3-party} = (1 - c) \times P^{3-party} \tag{4}$$

and,

$$MerchantProfit^{4-party} = (\alpha - c) \times P^{4-party} \tag{5}$$

Here c is the cost multiplier, for a production amount of P, the associated cost is determined as $c \times P$.

Formulas (1) - (5) provide insights into the costs and profits of participants within both the three-party and four-party models. The performance of the four-party model compared to the three-party model hinges on various model parameters. For the four-party model to outperform the three-party model, all parties involved must either reduce their costs or increase their profits. To gain a deeper understanding of these dynamics, we conduct simulation analyses in the subsequent section.

3. Simulations

Next, we analyze how profits for both merchants and banks are affected by total consumer expenditure across various models. Simultaneously, we explore conditions for the successful operation of the 4-party market and the improvement of participants' welfare. We exclude the impact of total consumer expenditure on platform profits, since the key determinants for platform engagement are the discount rate (α) and interest rate (r_p), as illustrated in Equation (3). Provided that $\alpha < 1/(1 + r_p)$, the platform always makes the optimal choice of participating in the 4-party market.

To start our simulation, we draw inspiration from the internal data of a large Internet shopping platform (see Internet Appendix IA-1). We then set the relevant parameters as follows: $r_c = 0.12$, $r_p = 0.06$, $c = 0.3$, $Pr(T_1) = 0.94$, $Pr(T_2) = 0.06$, $\alpha = 0.8$ ($<1/(1+ r_p) \approx 0.94$).

Figure 3 plots the relationship between merchant profits and consumer expenditures across different models, with the corresponding calculation formulas in equations (4) and (5). In this graph, dash-dotted lines represent outcomes for the 3-party model, while solid lines represent those for the 4-party model. As consumer expenditures increase, merchant profits rise in both the 3-party and 4-party markets, while merchant profits in the 3-party market show a steeper growth rate. For example, at a consumer expenditure of 6 (point A on the graph), merchant profits reach 4.2 (point B) in the 3-party market and 3 in the 4-party market. To incentivize merchants to choose the 4-party market, they would need to match or exceed their profits in the 3-party market, which is 4.2 (point C). To sustain such profit levels, consumer spending in the 4-party market should be no less than 8.4 (point D). Therefore, for consumer spending at level 6 in the 3-party market, consumer spending in the 4-party market must match at least 8.4 for merchants to consider participation.

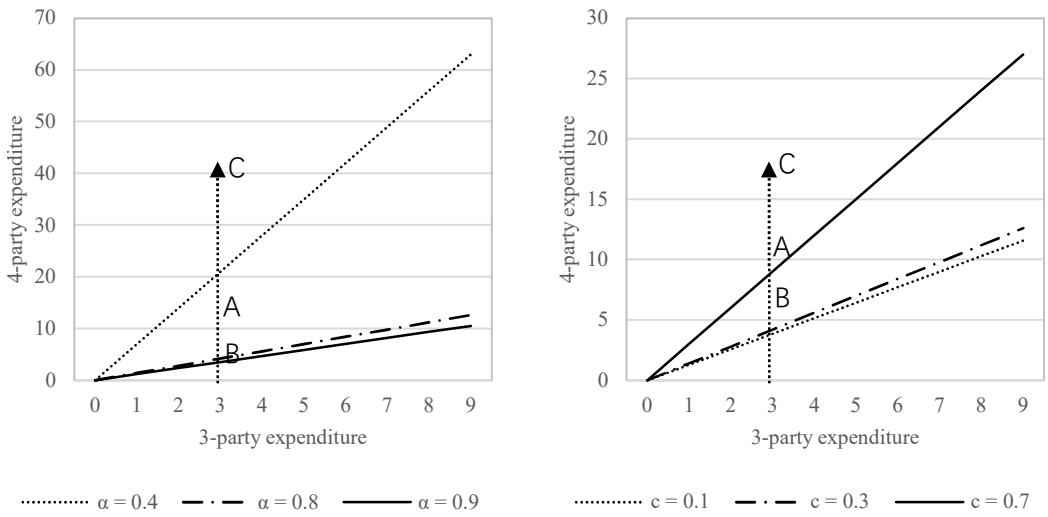
Figure 3. Merchant's profits from consumer expenditure.

This figure illustrates how merchant's profits change with consumer expenditures under different models, using equations (4) and (5). The dash-dotted line represents the profit-expenditure relationship in the 3-party model, while the solid line shows the results in the 4-party model. All parameters are set as follows: $r_c = 0.12$, $r_p = 0.06$, $c = 0.3$, $Pr(T_1) = 0.94$, $Pr(T_2) = 0.06$, and $\alpha = 0.8$.

Figure 4 illustrates pairs of consumer expenditures that make merchants indifferent between 3-party and 4-party markets. This indifference depends on two parameters: the discount rate α (Panel A) and the cost multiplier c (Panel B). Typically, consumer expenditures in the 4-party market need to exceed those in the 3-party market, and the extent of this difference depends on the model parameter values. For instance, with a discount rate of 0.4, expenditures in the 3-party market at 6 require 42 in the 4-party market (Panel A, point C) for merchant indifference. However, with a discount rate of 0.9, 7 units of expenditure in the 4-party market is sufficient (Panel A, point B). This discrepancy arises because a lower discount rate α implies that merchants in the 4-party market must offer products at a lower price to the platform. To maintain their profits in the 4-party market, despite the reduced pricing, they need higher sales, which necessitates greater consumer expenditures in the 4-party market. Conversely, if the cost multiplier c is lower, merchants can achieve indifference between the 3-party and 4-party markets even with lower consumer expenditures in the latter. This observation becomes evident when comparing points B and C in Panel B.

The analytical approach employed by merchants can be readily adapted to address the problems of banks. For brevity, we won't delve into the details. Figures 5 and 6 present the relationship between bank profits and consumer expenditures, along with the indifferent consumer expenditures for banks. Unlike merchants, banks only need relatively lower consumer expenditures in the 4-party market to achieve indifference with the 3-party market. Furthermore, A crucial factor influencing a bank's indifferent expenditures lies in the proportion of consumers making credit card repayments at time T_2, denoted as $Pr(T_2)$. Examining Panel B of Figure 6, we can observe that when $Pr(T_2)$ is low, indicating a preference for repayment during T_1 (the interest-free period), the bank's profits

decrease in the 3-party market. In contrast, within the 4-party market, the bank consistently receives interest income from the platform with certainty, as demonstrated in equation (2). This leads banks to favor the 4-party market even with lower consumer expenditures.



Panel A: Different discount rate α Panel B: Different cost multiplier c

Figure 4. Merchant's indifferent expenditure pair.

This figure illustrates the consumer expenditure levels at which merchant is indifferent between the 3-party and 4-party models. The horizontal axis represents consumer expenditure in the 3-party model, while the vertical axis represents it in the 4-party model. Panel A shows indifference expenditure pairs for three different discount rate values: α=0.4 (dotted line), α=0.8 (dash-dotted line), and α=0.9 (solid line), with a fixed cost multiplier of c=0.3. Panel B displays indifference expenditure pairs for three different cost multiplier values: c=0.1 (dotted line), c=0.3 (dash-dotted line), and c=0.7 (solid line), while maintaining a discount rate of α=0.8. The remaining parameters are set as follows: $r_c = 0.12$, $r_p = 0.06$, $Pr(T_1) = 0.94$, and $Pr(T_2) = 0.06$.

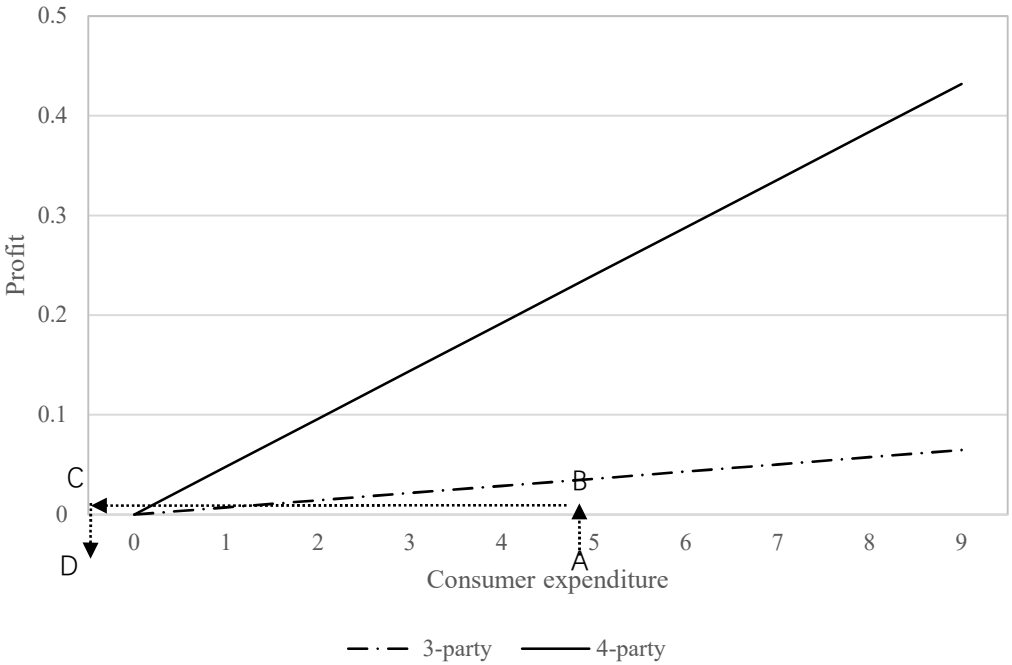
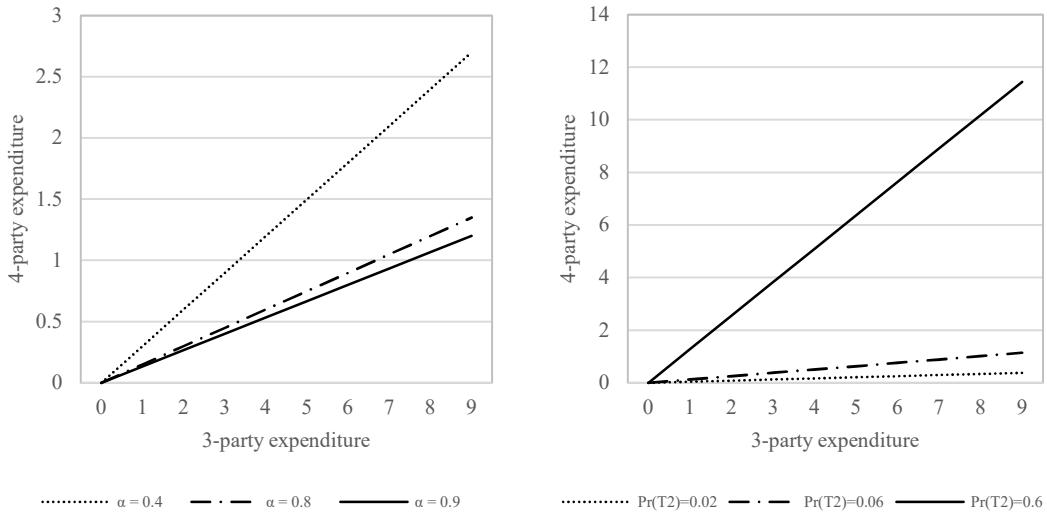


Figure 5. Bank's profits from consumer expenditure

This figure illustrates how a bank's profits change with consumer expenditures under different models, using equations (1) and (2). The dash-dotted line represents the profit-expenditure relationship in the 3-party model, while the solid line shows the results in the 4-party model. All parameters are set to $r_c = 0.12$, $r_p = 0.06$, $c = 0.3$, $Pr(T_1) = 0.94$, $Pr(T_2) = 0.06$, and $\alpha = 0.8$.



Panel A: Different discount rate α Panel B: Different proportion parameter $Pr(T_2)$

Figure 6. Bank's indifferent expenditure pair

This figure illustrates the consumer expenditure levels at which bank is indifferent between the 3-party and 4-party models. The horizontal axis represents consumer expenditure in the 3-party model, while the vertical axis represents it in the 4-party model. Panel A shows indifference expenditure pairs for three different discount rate values: α=0.4 (dotted line), α=0.8 (dash-dotted line), and α=0.9 (solid line), with a fixed proportion parameter of $Pr(T_2)$=0.06. Panel B displays indifference expenditure pairs for three different proportion parameter values: $Pr(T_2)$=0.02 (dotted line), $Pr(T_2)$=0.06 (dash-dotted line), and $Pr(T_2)$=0.6 (solid line), while maintaining a discount rate of α=0.8. The remaining parameters are set as follows: $r_c = 0.12$, $r_p = 0.06$, and $c = 0.3$.

To summarize, for both merchant and bank, achieving indifference in consumer expenditures between the 3-party and 4-party markets involves distinct considerations. Merchants prefer the 4-party market when it entails higher consumer expenditures, especially when the discount rate (α) is low and the cost multiplier (c) is high. Meanwhile, banks prefer the 4-party market in scenarios with a high discount rate and a low proportion of consumers making repayments at T_2 ($Pr(T_2)$). Ultimately, a thriving 4-party market relies on high consumer expenditures.

4. Empirical Examination

We use the issuance of co-branded credit cards between several banks and an Internet shopping platform that focuses on wedding services as an experiment. When consumers make purchases on the Internet shopping platform using the co-branded card, they can use 12 months of free installment credit, which is not available with regular credit cards. During the promotional period from November to December 2017, more than 20,000 couples expecting to get married within a year applied for the co-branded card, and due to the platform's financial situation, only 5,024 applicants were ultimately issued a co-branded credit card, while 10,018 applicants were issued a regular credit card. The banks only decide whether an applicant's credit card application is approved, and whether an applicant receives a co-branded card or a regular card depends only on the order in which the applications are

submitted. This gives us an excellent framework for testing whether consumer expenditures on the platform satisfy the conditions given above without worrying too much about endogeneity.

In 2018, 3,537 (70.4%) couples who were issued a co-branded card purchased wedding supplies on the platform, while 6,902 (68.9%) couples who were issued a regular card had records of spending on wedding supplies. We examine whether consumers' expenditures under the 4-party model satisfy the requirements of the model based on data within the platform with marital expenditure data from these 10,439 couples.

The results given in Table 1 show that the amount of consumer spending on the platform satisfies the requirements for getting merchants and banks to join the 4-party model, both in terms of total spending in the marriage as well as in terms of spending on each of the subcomponents. Through this unique experiment, we verify that in practice consumers spend in the 4-party model in a way that satisfies the conditions for merchants and banks to move from the 3-party model to the 4-party model.

Table 1. Data Calibration

Panel A gives data on the parameters within the Internet shopping platform and calculates the conditions that need to be met for merchants and banks to participate in the four-party model and for consumers to spend amounts on the 4-party model based on the relevant parameters. Panel B gives the mean value of each wedding purchase on the platform for the 3,537 couples who received a co-branded card and the mean value of each wedding purchase for the 6,902 couples who used a regular card, respectively.

Panel A: Requirements for Merchants and Banks to Choose the 4-party Model

Variable:	r_c	r_p	$Pr(T_1)$	$Pr(T_2)$	α	c
Data	12%	6%	94%	6%	0.8	0.3
Merchants	$\frac{P^{4-party}}{P^{3-party}} > \frac{1-c}{a-c} = 1.4$					
Banks	$\frac{P^{4-party}}{P^{3-party}} > \frac{Pr(T_2) \times r_c}{\alpha \times r_p} = 0.15$					

Panel B: Couple's Expenditures

	Average Wedding Consumption in the 4-Party Model	Average Wedding Consumption in the 3-Party Model	Multiple
Wedding Hotel	11,179	5,537	2.02
Jewelry	15,285	8,097	1.89
Wedding Dresses & Videography	15,827	3,819	4.14
Wedding Planning	3,633	1,868	1.94
Total	45,924	19,321	2.37

5. Conclusion

Our study establishes a four-party model involving merchants, consumers, banks, and shopping platforms to explain the reasons behind shopping platforms' willingness to provide interest-free installment loans to consumers. This research underscores the pivotal role of platform firms in the consumer credit card market, as they contribute to the stimulation of consumption and an increase in interest income for banks.

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Conflict of interest

The author claims that the manuscript is completely original. The author also declares no conflict of interest.

Internet Appendix for "How Banks and Consumers Benefit from Interest-free Installment Loans by Platforms"

IA-1. Case Study

Jiangsu Ocean Data Processing Co., Ltd. (Hereafter J company for short) was established in 1990. Initially, J company specialized in bill data processing for banks, serving prominent institutions like China Construction Bank, Bank of China, and Bank of Communications, holding nearly two-thirds of the credit card data processing market share. In 2018, the company diversified its operations, collaborating with major banks such as the China Construction Bank, Bank of China, and Industrial and Commercial Bank of China to introduce interest-free installment consumer loans. Furthermore, J company leveraged its extensive big data resources to expand into financial integration services.

J company initially entered the platform services sector by offering wedding-related services. Traditionally, consumers seeking wedding services had to purchase items like wedding photography, wedding dresses, wedding planning, and book venues separately from various merchants. J company introduced a one-stop platform where consumers could access these services based on their specific needs and even offered interest-free installment credit. Through this approach, J company effectively transformed consumers' consumption needs into credit demand, converting previously unproductive bank credit into interest-generating credit. In 2018, J company took its one-stop marriage service platform online, launching the Feng Go app. The expansion of its product offerings now includes jewelry, cosmetics, luxury goods, beverages, insurance, and other high-end products.

Exhibit 1. Display of Feng Go App

Based on internal data from J company, banks offer a loan interest rate of approximately 6% to the platform, whereas individual cardholders face a higher rate of around 12%. Merchants on the platform provide an average discount of 20%, resulting in a notable 30% growth in sales through platform channels, despite a modest 10% decrease in offline sales. The cost of goods for these merchants amounts to roughly 30% of the initial price. A 51

credit card report reveals that 94% of consumers opt to repay their loans at T_1, while 6% choose T_2 for repayment. Considering these insights, it becomes apparent that the four-party transaction model can be successfully implemented in the real world. With an average per-customer transaction of 3,000 yuan, the platform can generate a profit of 456 yuan per transaction.

Table IA1. Checking Formulas Using J Company's Data.

Variable	r_c	r_p	$Pr(T_1)$	$Pr(T_2)$	α	c
Data	12%	6%	94%	6%	0.8	0.3P

References

Albuquerque, B. (2019). Household heterogeneity and consumption dynamics in the presence of borrowing and liquidity constraints. *Applied Economics Letters*, 26(6), 454-459. http://dx.doi.org/10.1080/13504851.2018.1486974

Armstrong, M. (2006). Competition in two-sided markets. *The RAND Journal of Economics*, 37(3), 668-691.

Gul, S., Hacihasanoglu, Y. S., Kazdal, A., & Yilmaz, M. H. (2023). COVID-19 pandemic, vaccination, and household expenditures: regional evidence from Turkish credit card data. *Applied Economics Letters*, 1-4. http://dx.doi.org/10.1080/13504851.2022.2161983

Lee, Y. H., & Huang, Y. L. (2011). Do you have credit cards? The expansion of the credit card market in Taiwan. *Applied Economics Letters*, 18(17), 1639-1644. http://dx.doi.org/10.1080/13504851.2011.556586

Rochet, J. C., & Tirole, J. (2008). Tying in two-sided markets and the honor-all-cards rule. *International Journal of Industrial Organization*, 26(6), 1333-1347. https://doi.org/10.1016/j.ijindorg.2008.01.002

Zhang, Y., & Hua Wan, G. (2004). Liquidity constraint, uncertainty and household consumption in China. *Applied Economics*, 36(19), 2221-2229. http://dx.doi.org/10.1080/0003684042000266991