



A theory of credit cards[☆]

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Abstract

A two-period model is constructed to study the interactions among consumers, merchants, and a card issuer. The model yields the following results. First, if the issuer's cost of funds is not too high and the merchant's profit margin is sufficiently high, in every equilibrium of our model the issuer extends credit to qualified consumers, merchants accept credit cards and consumers face a positive probability of default. Second, the issuer's ability to charge higher merchant discount fees depends on the number of customers gained when credit cards are accepted. Thus, credit cards exhibit characteristics of network goods. Third, each merchant faces a prisoner's dilemma where each independently chooses to accept credit cards, however all merchants' two-period profits are reduced because of intertemporal business stealing across industries.

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Today, credit cards serve as an indispensable credit and payment instrument in the United States. In 2003, there were 18.3 billion credit card transactions accounting for \$1.71 trillion (Committee on Payment and Settlement Systems, 2005). The popularity of credit cards continues

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to grow as evidenced by a greater proportion of merchants that accept them and of consumers that carry them. Using a dynamic model, we explore the costs and benefits of credit cards to consumers, merchants and the credit card network. In this article, we provide answers to the following questions. Why do merchants accept credit cards even though credit cards are the most costly payment instrument to process? What conditions are necessary for a credit card equilibrium to exist? Does the market for credit cards exhibit network effects? Does the decision of a merchant to accept credit cards affect profits of other merchants?

Consumers find credit cards convenient for making purchases by accessing lines of credit that they may choose to pay off at the end of the billing cycle or pay over a longer period of time. Around 30% to 40% of consumers pay off their balances in full every month, such consumers are known as convenience users. In the United States, issuers seldom impose per-transaction fees and often waive annual membership fees.¹ Furthermore, issuers may provide incentives such as frequent-use awards, dispute resolution services, extended warranties and low-price guarantees to promote usage. While revolvers usually receive the same benefits as convenience users, they are usually charged for these card enhancements as part of finance charges on their borrowings.

Merchants also benefit from accepting credit cards. Merchants benefit from sales to illiquid consumers who would otherwise not be able to make purchases. By participating in a credit card network, merchants generally receive funds within 48 h. Credit cards provide relatively secure transactions for non-face-to-face transactions as evidenced by the overwhelming use of credit cards for online transactions. Furthermore, merchants not accepting credit cards may lose business to other merchants that do.

However, credit cards are the most expensive payment instrument to accept. According to the [Food Marketing Institute \(2000\)](#), credit cards on average cost supermarkets 72¢ per transaction compared to 34¢ for PIN-based debit cards and 36¢ for checks.² A significant portion of the cost is due to the merchant discount, the fee that each merchant pays to its financial institution for each transaction. In the United States, merchant discounts generally range from 1.25% to 3% of each transaction amount and are bilaterally negotiated between merchants and their financial institutions.

We construct a two-period, three-agent model to investigate these questions. Unlike the previous literature, we focus on the costs and benefits of purchases made with credit to both consumers and merchants. Much of the literature to date focuses on the determination of the interchange fee, the fee that the merchant's financial institution pays the consumer's financial institution, in a one-period model and ignores the intertemporal aspects of credit cards.³ With the exception of [Chakravorti and Emmons \(2003\)](#), we present the only model that studies the costs and benefits of extending credit to consumers. First, rather than taking a reduced form approach where the costs and benefits of credit cards are exogenously assigned functional forms, we specify a model which endogenously yields costs and benefits to the involved parties. Second, we use a dynamic setting in which there are intertemporal tradeoffs for all of the parties involved. Surprisingly, this aspect of credit cards is largely ignored by theoretical models to date. Using this approach, we identify an intertemporal externality that merchants impose on one another because their credit acceptance decision has no (or little) impact on their own future earnings.

¹ According to a Federal Reserve Survey, 63% of issuers did not charge an annual fee ([Board of Governors of the Federal Reserve System, 2000](#)). Issuers are more likely to impose annual fees if their cards are loaded with additional enhancements.

² PIN-based debit cards use PINs to authorize transactions whereas signature-based debit cards use signatures.

³ For theoretical models that consider the effects of regulating interchange fees, see [Gans and King \(2003a\)](#), [Rochet and Tirole \(2002\)](#), [Schmalensee \(2002\)](#), and [Wright \(2004\)](#).

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