Chapter 1
The Adoption Process of Payment Cards: An Agent-Based Approach

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ABSTRACT
The authors investigate the payment adoption rate under consumers’ and merchants’ awareness of network externalities, given two levels of interchange fees in a multi-agent card market. For the purpose of their research, in multiple instantiations of the model (scenarios) the investigated effects are analyzed over the complete process of adoption, until the market’s saturation point is achieved. Then, for each scenario, a comparison is made between two different levels of interchange fees and different degrees of consumers’ and merchants’ awareness. To this end, the authors model explicitly the interactions between consumers and merchants at the point of sale. They allow card issuers to charge consumers with fixed fees and provide net benefits from card usage, whereas acquirers can charge fixed and transactional fees to merchants.

INTRODUCTION
During the last decade, interest on studying the retail side of the payment systems has grown. The driving factor behind this study is that electronic payment methods are of ever-increasing importance for making payments. Among these instruments, payment cards—more commonly referred to as credit and debit cards—are replacing cash and check payments at a rapid rate and are competing strongly with new payment methods. In terms of relative importance, for instance in Canada and the USA payment cards are the most commonly used instruments, accounting for 68% and 58%,
The Adoption Process of Payment Cards

respectively, of all registered transactions made in 2010 (Bank for International Settlements, 2011). According to the European Central Bank (2010), in the European Union their market share is reported to be 38%, which is the highest of all payment methods available, well ahead of direct credits, direct debits, and checks.

Electronic payments have also been expanding in emerging and developing countries. For example, in Mexico, the average growth rate of transactions with non-cash payment instruments (payment cards, direct debits, checks, and electronic funds transfers) between 2002 and 2010 was 14%. That of transactions with payment cards was 26%; they totaled almost 1 billion operations in 2010 with a value of nearly 600 billions of pesos (Figure 1a). In turn, electronic funds transfers (direct credit) and direct debits have grown at positive rates also, while checks have decreased.

As a result of these dynamics, during that period bank card payments as a share of non cash retail payments increased from 22% to 46% (Figure 1b) and card payments per inhabitant per year more than duplicated from 4 to 91 (Figure 1c), still well below of what is observed at either Canada, the United States, or Europe.

Given the prominent growth in the usage of payments cards, the line of research dedicated to study the competitive nature of the payment card market has attracted considerable attention from policy makers (e.g. Vickers, 2005; Reserve Bank of Australia, 2008; Bolt & Chakravorti, 2008; Weiner, 2008). We have recently witnessed several regulatory initiatives such as the code of conduct for the credit and debit card industry in Canada. The aim of the code is to ensure that merchants are fully aware of the costs associated with accepting credit and debit card payments, including the Interchange Fee (IF). Furthermore, in order to encourage consumers to choose the lowest-cost payment option, merchants are provided with increased pricing flexibility and are able to freely choose which payment options they will accept. Another prominent example is the USA financial reform, which among other regulatory provisions, is aimed to set up a new bureau in the Federal Reserve to regulate mortgages and credit cards. In addition, the bill also includes a reduction on the fees charged on debit card transactions, including the IF that card issuers can charge to card acquirers whenever their cardholders use their cards at the merchant’s point of sales terminal set by a different acquirer. On June 29, 2011, the Federal Reserve Board issued its final rule to implement the debit card IF and routing regulation rules pursuant to the “Durbin amendment” to Dodd-Frank. Among other things, the amendment sets standards for assessing whether debit card IF received by debit card issuers are “reasonable and proportional” to the costs incurred by issuers for electronic debit transactions and a maximum permissible IF.

Let us briefly point out that both analysts and policy makers concede IFs a paramount role in the functioning of payment card systems with four parties (i.e. issuers, acquirers, cardholders, and merchants). The reason is that this transfer between issuers and acquirers, which can flow from either side to the other, impacts the prices charged to both cardholders and merchants, who are the final users of the payment instrument (Figure 2). For instance, the IF charged by issuers to acquirers sets a minimum to the merchant service fee that acquirers can charge to the establishments for accepting card operations, which in turn permits the issuer promotes the use by means of offering rewards to cardholders. In contrast, when the issuers pay acquirers the IF, cardholders may have to pay an annual fee or a fee per transaction and merchants may receive a stimulus (we will discuss this issue further in the following section).

Regulations to develop card payments have also been undertaken in Mexico (Negrin, 2005). The implementation of the Payment System Law (2002) and the Law for Transparent and Ordered Financial Services (2004) increased the central bank’s powers to oversee payment systems in general and foster electronic payment systems in