

Do U.S. Consumers Really Benefit from Payment Card Rewards?

By Fumiko Hayashi

Payment card rewards programs have become increasingly popular in the United States. Nearly all large credit card issuers offer rewards to customers for using their cards, as do more than a third of depository institutions for using debit cards. Recent surveys suggest that many consumers now receive rewards.¹ And rewards are becoming more generous and diversified, ranging from 5 percent cash-back bonuses for gasoline purchases, to free airline miles, to gifts to charity.

But do consumers really benefit from rewards? In the United States, rewards are paid for primarily by the fees charged to merchants, and merchants may pass on the fees to consumers as higher retail prices. Further, some regulators and analysts claim that rewards may send consumers distorted price signals, which in turn may lead consumers to choose payment methods that are less efficient to society.

Card networks and merchants have taken opposing sides in the rewards debate. Card networks claim their fee structures, including rewards, are crucial to achieving the right balance between merchant acceptance and consumer usage of their cards. Rewards can also reduce the total costs to society by inducing more consumers to switch from

Fumiko Hayashi is a senior economist at the Federal Reserve Bank of Kansas City. This article is on the bank's website at www.KansasCityFed.org.

costly payment methods, such as checks, to less costly payment cards. Merchants benefit as well, they claim, because rewards card users make higher-value transactions than other consumers. Finally, more generous rewards are even more beneficial to consumers because they receive more as they make more card transactions.

Merchants, on the other hand, claim they pay for the rewards through their fees to card issuers. They argue that competitive pressures and customer expectations prevent them from rejecting cards even though the fees outweigh their benefits. They reject the idea that accepting rewards cards is profitable despite the higher fees. Instead, they argue that customers with rewards cards spend more than those without rewards cards simply because their incomes are higher—not because they receive more rewards. Finally, they argue that more generous rewards actually harm consumers, because higher fees to merchants lead to higher prices for goods and services.

Who ultimately pays for rewards programs is not completely clear.

It is difficult to prove that consumers use payment cards more often or spend more because of rewards. Whether rewards are beneficial to consumers or to society depends on various factors, including who ultimately pays for rewards and how rewards affect consumer behavior.

This article seeks to provide insight into these issues by considering whether current rewards programs benefit consumers and society. The first section provides an overview of U.S. payment card rewards programs, including fee structures and potential roles of rewards. The second section explores whether rewards programs are “efficient” and “welfare-enhancing.” **While definitive answers await further data, the analysis in this article suggests that the currently provided payment card rewards programs, especially credit card rewards programs, are not likely to be efficient. Further, rewards may potentially be too generous, lowering overall consumer welfare.**

I. INDUSTRY BACKGROUND

This section provides some background on the U.S. payment card industry and its rewards programs. First, it briefly describes how payment card rewards programs have evolved and how prevalent they are. Next, it shows the relationship between the rewards and other fees, such

as interchange fees and merchant discount fees. Finally, it discusses the roles of rewards cards.

Payment card rewards in the United States

Credit card rewards have more than 25 years of history in the United States. In 1984, Diners Club first introduced a rewards program that offered airline miles to cardholding customers. In the 1990s, rewards programs became more diversified. For example, Discover started offering a cash-back bonus based on purchase volume. Other types of rewards that emerged in the decade ranged from discounts on products sold by co-branded or affiliates of card issuers to rewards point donations to charities, alumni associations, and environmental groups.

As competition for cardholders intensified, issuers made their rewards programs more generous. Today, 3 to 5 percent cash-back bonuses are common on purchases at certain types of retailers. Historically, American Express, Diners Club, and Discover have offered the most generous rewards, but recently MasterCard's World card and Visa's Signature card have joined them.

Debit card rewards are relatively new. In the United States, consumers authorize their debit card transactions in one of two ways: with PIN debit authorization, where the consumer types a personal identification number at the point of sale; and with signature debit authorization, where the consumer signs a receipt. A typical U.S. debit card can carry out both PIN and signature debit transactions, but consumers are more likely to receive rewards using their signature.² Rewards are less generous for debit cards than credit cards. According to industry experts, credit card rewards are typically about 1 percent of the purchase value, compared to about 0.25 percent for typical debit card rewards.^{3,4}

While the growth of rewards programs has been rapid, many analysts believe less than half of U.S. consumers have a rewards card or actively participate in a rewards program. Estimates of rewards participation rates, however, vary widely. One study suggested about 70 percent of consumers with at least one general purpose credit card have a rewards credit card (Visa USA). Another study estimated that about one-third of consumers who hold both credit and debit cards hold a rewards card.⁵ Still another study suggested that more than 40 percent of rewards cardholders are passive participants at best (Aite Group). According to the

2004 Survey of Consumer Finance, about 90 percent of U.S. households have at least one payment card, about 72 percent have a credit card, about 76 percent have a debit card, and about 58 percent have both credit and debit cards.

Relationship between rewards and merchant fees

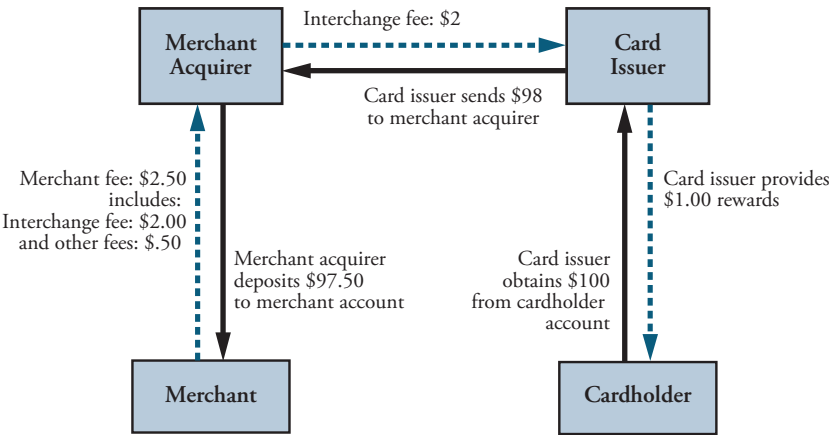
It is even less clear who ultimately pays for rewards programs. In the United States, each card issuer typically runs its own rewards programs and has multiple revenue sources, including fees paid by merchants. This subsection explains fee structures, fee levels, and the relationship between rewards and merchant fees.

Card issuers typically have several potential revenue sources to pay for rewards. Sources include interest from cardholders with a positive credit card balance, fees to cardholders (such as annual fees, penalty fees, and cash advance fees), and merchant fees (such as interchange fees and merchant discount fees for American Express, Diners Club and Discover). Issuers can tap any of these sources to finance rewards, but experts suggest they rely mainly on merchant fees.

Payment card schemes generally take one of two principal forms. One is a four-party scheme comprising cardholders, merchants, card issuers, and merchant acquirers.⁶ Card issuers and merchant acquirers are members of a payment card network, such as MasterCard or Visa, or a regional debit card network, such as Star, NYCE, or Pulse. The card network sets the rates for the *interchange fee*, which is typically paid by the merchant acquirer to the card issuer.⁷ The merchant pays a *merchant fee* to the merchant acquirer, who sets the merchant fee. Typically, the merchant acquirer passes through the entire interchange fee to the merchant in the merchant fee.⁸ The cardholder receives rewards from, or pays *cardholder fees* to, the card issuer, who sets the level of the rewards and cardholder fees.⁹

The other form is a three-party scheme, which comprises cardholders, merchants, and a card network, such as American Express or Discover. In contrast to the four-party schemes, there is no explicit interchange fee because the card network acts as both card issuer and merchant acquirer. The merchant pays a merchant fee to the card network and the cardholder receives rewards from, or pays a cardholder

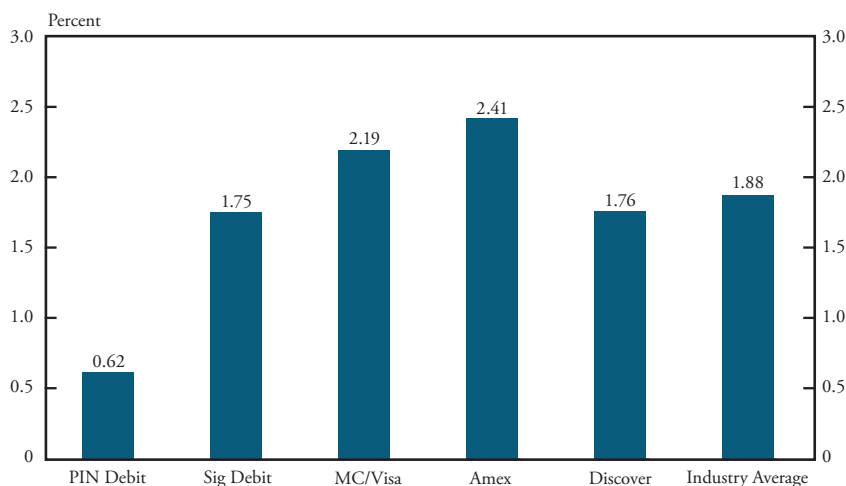
Figure 1
PAYMENT AND FEE FLOWS IN FOUR-PARTY SCHEME
CARD NETWORKS



fee to, the network. The network sets the rates for merchant fees and cardholder fees and the levels for rewards.

Figure 1 shows the flow of payments and fees in a four-party scheme network. When the card issuer obtains funds from the cardholder account—\$100 in this example—it provides rewards to the cardholder, say 1 percent of the purchase value, or \$1. The card issuer retains a portion of the funds as an interchange fee. In this example, the interchange fee rate is 2 percent of the purchase value, or \$2. The card issuer then sends \$98 to the merchant acquirer, who charges the merchant a processing fee plus other fees of \$.50, in addition to the interchange fee. The merchant acquirer then deposits \$97.50 to the merchant account.

The actual levels of fees vary by transaction. Merchant fees significantly vary by scheme and card type. The fees for credit card transactions are the highest, followed by the fees for signature-debit card transactions. The fees for PIN-debit card transactions are the lowest. Among merchant fees for credit cards, American Express has the highest and Discover has the lowest (Chart 1).

*Chart 1***AVERAGE MERCHANT FEE RATES**

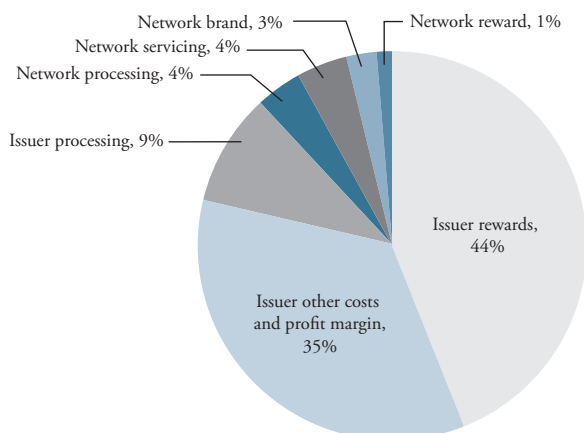
Source: Nilson Report

A major portion of a merchant fee goes to the card issuer. For example, in a four-party scheme, the interchange fee is estimated to be 70-80 percent of the merchant fee.¹⁰ According to one study, 45 percent of interchange fees are used for rewards programs (Chart 2) (Dowson and Hugener).¹¹ The variation in card issuers' fee revenues from merchants may explain the variation in the levels of rewards (along with the different values of credit card and debit card rewards).

While rewards and merchant fees are related, it is not clear how closely. Over the past several years in the United States, we have observed increasingly more generous rewards as well as rising interchange and merchant fees. But this does not necessarily imply that rewards have caused merchant fees to rise. Merchant fees depend not only on rewards but also on the costs of handling a card transaction by the card issuer or the acquirer, as well as their profit margins. Rewards can be financed by different sources, including reducing the card issuer's profit margin. Therefore, higher merchant fees do not necessarily imply more generous rewards, and vice versa.

Chart 2

ESTIMATED COMPONENTS OF INTERCHANGE FEES

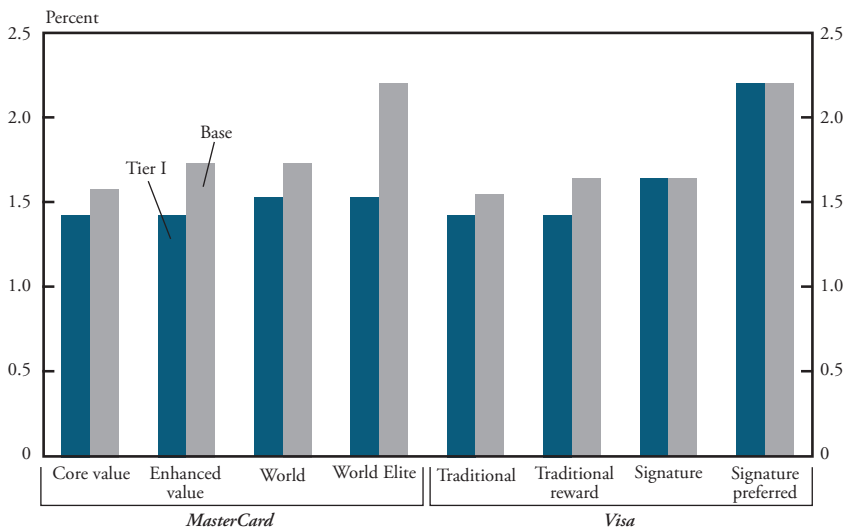


Source: Diamond Management & Technology Consultants, Inc.

Still, in some cases a close positive relationship between rewards and interchange fees (and merchant fees) is evident. In 2005, MasterCard and Visa introduced new credit card categories that charge higher interchange fees to merchants and provide more generous rewards to card users. Both MasterCard and Visa now offer four credit card categories. MasterCard's Core Value and Visa's Traditional cards provide the least generous rewards (or no rewards), while MasterCard's World Elite and Visa's Signature Preferred cards provide the most generous rewards. Chart 3 shows the 2007 interchange fee rates for MasterCard and Visa at retail stores. Tier I includes the rates for retail stores that generate the highest number or value of transactions, while Base includes the rates for retail stores that generate the least. Regardless of their transaction volume, merchants consistently pay higher interchange fees for cards with more generous rewards.

Before these new categories were introduced, each merchant paid one common interchange fee rate for MasterCard's or Visa's credit cards.¹² The interchange fee rate for MasterCard's Core Value or Visa's Traditional cards—the lowest among the rates for the new categories—

Chart 3
MASTERCARD AND VISA CREDIT CARD INTERCHANGE
FEE RATES AT RETAIL STORES



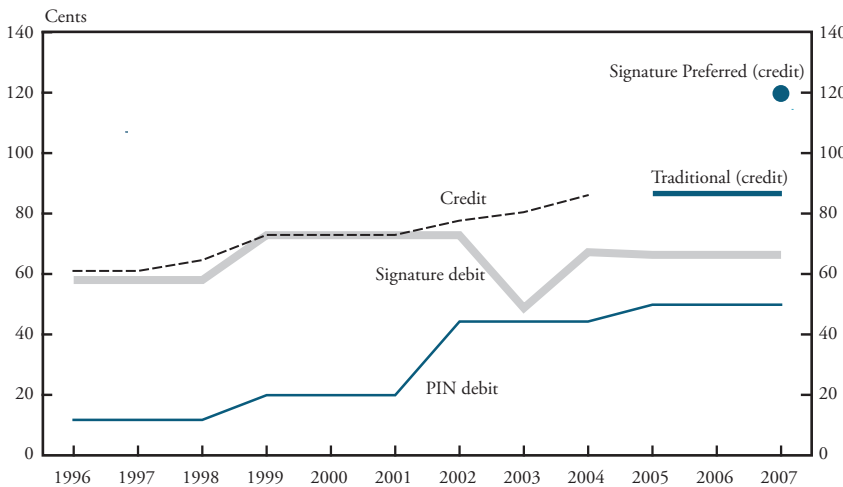
Sources: MasterCard International; Visa USA

was set at the same level as this common interchange fee rate, and the rates for the other categories were set higher (Chart 4). This could imply that the issuer’s costs and profit margin from interchange fees have not changed.

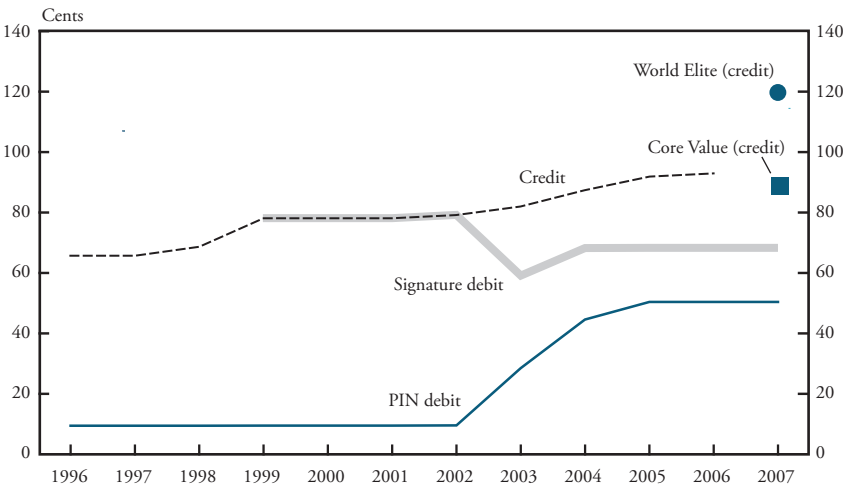
Roles of payment card rewards

Payment card rewards likely play different roles, depending on the maturity of the payment card industry. When the industry is in its infant stage, rewards can be used to induce consumers to adopt the cards. Rewards may also help consumers learn the various features of the card. When the industry matures, rewards may still induce consumers to switch to payment cards from other means of payment, such as cash and checks. If rewards are set appropriately, then rewards may positively affect consumers, merchants, and the payments system as a whole—but, if not, rewards may potentially harm them.

Chart 4
PANEL A: INTERCHANGE FEES FOR A \$50 TRANSACTION
AT A SMALLEST RETAIL STORE–VISA



PANEL B: INTERCHANGE FEES FOR A \$50 TRANSACTION
AT A SMALLEST RETAIL STORE – MASTERCARD



Sources: American Banker; EFT Data Book; MasterCard International; Visa USA

New payment card networks face a typical chicken-and-egg problem—the benefits to consumers from holding a card depend on how many merchants accept the card, and vice versa. Once a card network reaches a certain threshold of consumers and merchants, the benefits no longer depend on the number of consumers and merchants. Rewards to consumers can help achieve such a threshold, or critical mass. As more consumers join the card network, more merchants join to serve them.

Rewards can also help introduce consumers to the various features of the card. When payment cards were new, many consumers were not fully aware of their benefits—such as transaction speed, convenience, security, record-keeping ease, and float.¹³ Consumers who were unfamiliar with a card were likely to undervalue its benefits and may have chosen another payment method, such as cash or checks. But with rewards as an incentive, many consumers soon learned the value of payment cards. Once the benefits of the cards became clear, some consumers may have kept using them even without receiving rewards.

Payment card rewards may also play a role even after the industry matures and consumers become aware of the benefits of using a card. In the payment market, consumers choose a payment method from a set of payment methods the merchant accepts. While the consumer's choice of method affects the merchant's benefits and costs, the consumer does not consider these factors when choosing a payment method. Rewards, however, can be set to reflect the merchant's benefits and costs. Thus, they can influence a consumer to choose a method that provides a benefit to the merchant.

Suppose a consumer does not receive rewards and is indifferent to using a payment card or cash. Suppose also the payment card transaction costs the merchant less than a cash transaction. Both parties would be better off if the merchant provided rewards reflecting the cost differential between the two transactions. Consumers are more likely to use payment cards due to rewards, and merchants can save the costs of handling transactions even after they pay for rewards. Merchants may even lower their prices for final goods and services, further benefiting consumers. With rewards set appropriately, both merchants and consumers would be better off. The costs associated with the payments

system as a whole would also likely be less because the transaction costs for everyone involved would be less.

If, on the other hand, rewards do not reflect merchant's costs and benefits, they may induce consumers to use payment methods that are more costly to merchants. It is possible that more generous rewards lead to higher merchant fees, making payment cards more costly to merchants than alternative payment methods. If this happens, merchants may set higher retail prices. If the costs of handling a card transaction increase as the transaction value increases, generous rewards to some consumers may come with a higher price to society.

II. ARE CURRENT REWARDS BENEFICIAL IN THE UNITED STATES?

As discussed in the last section, payment card rewards may have both positive and negative effects. But what are the net effects of rewards programs on society and consumers? This section considers whether payments made using the current fee structure, including rewards, enhance welfare, compared with payments made without rewards or without payment cards. The first subsection considers this from the view point of society as a whole, and the second subsection from the point of view of consumers alone.

Is the current fee structure beneficial to society as a whole?

Economics literature typically uses efficiency as the criterion for answering questions of benefits to society. Efficiency is defined as producing the greatest total social value using the least possible social cost. This subsection considers the most efficient fee structure for payment cards. Using the most efficient fee structure as the standard for comparison, the analysis considers whether the current fee structure is more efficient than a system that does not offer rewards or use payment cards.

Efficiency is usually measured by social welfare, which aggregates the welfare of all parties involved in the market. Each party's welfare is measured in monetary terms. For example, a supplier's welfare is equivalent to the supplier's profit. A consumer's welfare is the difference between the total amount the consumer is willing to pay and the total amount the consumer actually pays. In the payment card market, the parties are consumers, merchants, and payment service providers, such as acquirers,

card issuers, and card networks. Because payment cards substitute for alternative payment methods, such as cash and checks, consumers who use those payment methods and the payment service providers of those methods are also considered. Thus, the most efficient payment card fee structure maximizes the aggregate welfare of all these parties.

This analysis first considers the most efficient fee structure in the presence of so-called usage externalities. An externality is the effect of one agent's action on the benefits or costs of another agent whose benefits or costs are not taken into account when an economic decision is made. In the payment card industry, two types of externalities exist. One is membership externality, which is equivalent to the chicken-and-egg problem discussed in the previous section. The other is usage externality. Typically, consumers determine the payment method, and their private incentives for using a particular method do not necessarily reflect the merchant's benefits or costs. As a result, the usage externality arises from the consumer's decision. The U.S. payment card industry is mature and has reached its critical mass; thus, the chicken-and-egg problem is no longer a concern. The usage externality still exists, however, even after the industry matures.

Several theoretical studies have examined the most efficient fee structure. Rochet and Tirole (2002) took into account the usage externality. In their model, consumers use cards when their transactional benefit exceeds the cardholder fee. A card offers consumers several transactional benefits, including a lower cost than other payment methods, such as cash and checks. A card transaction may also reduce the time spent at the cashier and eliminate the time and cost of obtaining cash from an ATM or bank teller. In addition, a card transaction may enhance security, simplify recordkeeping, and so on. A consumer's transactional benefit from a card is assumed to vary by consumer. Some consumers' transactional benefit from a card could be negative, which means they receive less benefit from a card than alternative payment methods. In the model, such consumers do not use the card unless they receive rewards.

In contrast, a merchant's transactional benefit from a card is assumed to be common across merchants. Their transactional benefit includes lower handling costs compared to other payment methods and more efficient internal operations. The Rochet and Tirole model assumes that

merchants accept the cards even when the merchant fee exceeds their transactional benefit. Merchants often claim that competitive pressures and customer expectations may prevent them from rejecting cards. If they reject cards, they may lose customers to their rivals. Card networks claim that card transactions may bring merchants other benefits than transactional benefit. For example, accepting the cards may increase sales by inducing some consumers to switch from merchants who do not accept the cards or to purchase more goods or services.

Rochet and Tirole found that when merchants are not allowed to set different prices according to the payment methods chosen by their customers, the most efficient cardholder fee depends on two elements. The first element is the payment card service providers' joint net cost of handling a card transaction. The net cost includes the real resources required by the acquirer, the card network, and the card issuer, as well as the payment service providers' opportunity cost of giving up the profit from a transaction made using another payment method. The second element is the merchant's transactional benefit from a card transaction.¹⁴ The most efficient cardholder fee is the difference between these two elements. When the payment service providers' joint net cost exceeds the merchant's transaction benefit, the most efficient cardholder fee is positive. When the payment service providers' net joint cost is less than the merchant's transaction benefit, the most efficient cardholder fee is negative—in other words, a reward. Thus, providing payment card rewards can maximize efficiency only when the merchant's transactional benefit exceeds the payment service providers' joint net cost of a card transaction.

Hayashi (2008a) considered the most efficient fee structure under more realistic assumptions. Specifically, the analysis relaxed two assumptions in Rochet and Tirole's model. The first assumption concerned a consumer's demand for goods. Rochet and Tirole assumed that consumers purchase a fixed number of goods and services and thus make a fixed number of transactions, regardless of product price. Hayashi assumed that the number of transactions may vary by product price. The second assumption concerned the costs, fees, and benefits of a given payment method. Rochet and Tirole assumed that the costs, fees, and benefits of a given payment method are fixed regardless of the dollar

amount of the transaction. Hayashi's model allowed them to increase as the dollar amount of the transaction increase.

Hayashi found that the most efficient cardholder fee derived by Rochet and Tirole still generally holds the most efficient. Hayashi further showed that two other conditions must generally be met to maximize social welfare. These conditions concern merchant fees and retail prices. To achieve the highest social welfare without making either merchants or payment service providers earn negative profits, 1) card networks (or their member acquirers) should set the merchant fee at the merchant transactional benefit, and 2) merchants should set retail prices at their marginal costs. And, as before, the cardholder fee should be set at the most efficient level determined by the Rochet and Tirole model.

One can try to quantify the most efficient cardholder fees by using information on the costs and benefits of each payment method. A few studies estimate the costs and benefits for various payment methods in the United States. Food Marketing Institute (FMI) (1998) estimated supermarket and grocery store costs of various payment methods in 1997. Garcia-Swartz and others (2006 a and b) estimated the costs and benefits for consumers and financial institutions. These studies are not ideal for calculating the most efficient cardholder fees, especially because the information on merchant costs is dated.¹⁵ Nevertheless, they provide a benchmark because there are no other comprehensive cost studies in the United States.¹⁶

Table 1 shows the most efficient cardholder fee for a credit card and a debit card transaction.^{17,18} The table assumes several hypothetical economies: In each of the economies only two payment options are available. For example, in one economy two options are credit cards and cash and in another economy they are debit cards and check. Each column represents one economy. The two payment options are credit cards and either cash (column 1), check (column 2), or debit card (column 3); and debit cards and either cash (column 4), check (column 5), or credit card (column 6).¹⁹ The table shows the most efficient cardholder fees for the two different transaction values used in FMI and Garcia-Swartz and others: an \$11.52 transaction and a \$54.24 transaction.

The table yields the following results: When the two payment options are credit cards and cash (column 1), the most efficient credit cardholder fee is 14.8 cents for a \$11.52 transaction and -6.1 cents for

Table 1

THE MOST EFFICIENT CARDHOLDER FEES IN THE UNITED STATES

(unit: cent)

Payment method		Credit			Debit		
Case		(1)	(2)	(3)	(4)	(5)	(6)
Alternative method		Cash	Check	Debit	Cash	Check	Credit
Transaction value	\$11.52	14.8	9.8	17.9	9.9	4.9	-15.2
per transaction	\$54.24	-6.1	23.0	25.6	-18.7	10.4	-62.6

a \$54.24 transaction (that is, the most efficient credit card reward is 6.1 cents). When the two payment options are debit cards and checks (column 5), the most efficient debit cardholder fee is 4.9 cents for a \$11.52 transaction and 10.4 cents for a \$54.24 transaction. When the two payment options are credit cards and debit cards, the most efficient cardholder fee can be calculated in two ways. One way is to calculate the most efficient credit cardholder fee, given the actual cardholder fee of debit card (column 3). The other way is to calculate the most efficient debit cardholder fee, given the actual cardholder fee of credit card (column 6). According to Garcia-Swartz and others, the debit cardholder fee is 13 cents for both transaction values.²⁰ Given that fee, the most efficient credit cardholder fee is 17.9 cents for an \$11.52 transaction and 25.6 cents for a \$54.24 transaction (column 3). Garcia-Swartz and others reported that the credit cardholder fees are -10.3 cents (reward) for an \$11.52 transaction and -50 cents (reward) for a \$54.24 transaction. Given those fees, the most efficient debit cardholder fees are both negative—that is, rewards of 15.2 cents and 62.6 cents, respectively (column 6).

There are three main findings in Table 1. First, providing rewards on credit cards and debit cards is likely efficient for large-value cash transactions but likely inefficient for small-value cash transactions (columns 1 and 4).²¹ Most cash transactions are likely to be small. In fact, according to FMI, the average cash transaction is \$11.52. Second, when checks are the other payment choice, providing rewards on either credit or debit card is not likely to maximize social welfare (columns 2 and 5). Third, current credit card rewards are too generous relative to current

debit cardholder fees. Indeed, the results indicate that credit card transactions should carry fees, not rewards (column 3).²²

It should be noted that the fees in Table 1 are potentially overestimated if merchants' transactional costs of cash or checks are underestimated or if banks' card processing costs are overestimated.²³ As mentioned, the merchant cost information is based on 1997 data, and the costs studies mainly gathered information from supermarkets and grocery stores. More recent and comprehensive costs studies are required to more accurately quantify the efficient cardholder fees. As a result of new cost studies, offering rewards on credit and debit cards to substitute for cash and check transactions might possibly become justifiable from the social welfare point of view. However, it is very unlikely that providing credit card rewards to substitute for debit card transactions becomes justifiable, because new information will likely adjust merchants' transactional benefits of credit cards and debit cards in the same direction, and it will also likely adjust banks' processing costs of these cards in the same direction.

Table 1 suggests that in most cases providing rewards is not efficient and thus reducing the rewards level to zero would enhance social welfare. However, as argued above, more updated and comprehensive cost studies might reverse the results—providing rewards to substitute cards for cash and checks may become the most efficient. If this is the case, the current level of rewards may or may not enhance social welfare compared with zero rewards. The answer depends on how far the most efficient level of rewards is to the current level of rewards and to zero rewards. If the former is the closer, then the current level of rewards is likely to enhance social welfare. Otherwise, the opposite is likely to be true.

If the current level of rewards is too high, then that level may not only offer less social welfare than zero rewards, but it may also potentially offer less social welfare than making transactions without payment cards at all. Rewards that exceed a certain level unlikely play a role of reducing the total costs to society. All remaining paper-based transactions may be made either because payment card transactions are infeasible or because consumers may not qualify for payment cards (or bank accounts).²⁴ Further, additional rewards may potentially increase total costs of transactions. According to available cost studies, real re-

sources of handling a card transaction, especially a credit card transaction, increase as the dollar amount of the transaction increases. A higher level of rewards may raise the merchant fees and ultimately raise retail prices, which may increase the value of the transaction. Thus, a higher level of rewards may require more real resources to society. If this additional resource cost is substantial, then social welfare with very generous rewards may potentially be lower than social welfare without cards at all (Hayashi 2008b).

Is the current fee structure beneficial to consumers?

Is the current fee structure welfare enhancing to consumers? Rewards may affect each individual consumer's welfare differently. For instance, rewards may make card-using consumers better off but cash-using consumers worse off. This subsection considers how the currently provided rewards affect welfares of different types of consumers and the welfare of consumers as a whole.

Rewards levels that enhance social welfare do not necessarily enhance consumer welfare. Consumer welfare is influenced not only by rewards levels but also by prices for goods and services. The influence of retail prices on consumer welfare is likely to be more significant than that on overall social welfare. For example, given current rewards levels, higher retail prices lower consumer welfare but not necessarily social welfare, because they may raise profits for merchants' or payment card service providers, offsetting the consumer welfare losses. Consumer welfare may potentially be higher with less generous rewards accompanied by lower retail prices than with the most efficient level of rewards accompanied by higher retail prices.

Reward levels and retail prices affect the welfare of each individual consumer differently. Although typical U.S. consumers use payment cards as well as cash and checks, some consumers use payment cards more exclusively, while others use cash or checks more exclusively. If more generous rewards imply higher prices for all consumers regardless of their payment methods, then they may make consumers who tend to use cash and checks worse off. At the same time, more generous rewards may make consumers who tend to use rewards payment cards better off, indifferent, or in some cases worse off.

Evaluating the effects of rewards on consumer welfare, therefore, requires knowing how the level of rewards affects retail prices. It is possible that rewards levels do not affect retail prices, but such cases are rather limited. First, if rewards are fully financed by card issuers giving up their profit margins, then rewards do not affect merchant fees or, in turn, retail prices. Second, even if rewards are at least partly financed by merchant fees, monopoly merchants who absorb all consumer surpluses from some of their customers may not increase their retail prices. If doing so, they would lose some customers, although their mark-ups from the other customers might increase (Hayashi 2006). In either case, since the retail prices do not vary by rewards level, consumers who tend to use cash and checks are unlikely to be affected, while consumers who tend to use payment cards may be better off with a higher level of rewards. In most cases, however, higher levels of rewards may imply higher retail prices, as long as the merchant fee exceeds the merchant's transactional benefit from a card transaction.²⁵ To what degree the rewards levels and retail prices are correlated is difficult to measure empirically.²⁶ Even theoretically, there is no one-to-one relationship between the level of rewards and retail prices.

Some theoretical studies assume that, although rewards levels affect merchant fees, they do not affect the retail prices faced by consumers who do not use cards. This is possible either if merchants set different prices according to the payment methods or if each merchant serves either card-using consumers only or non-card-using consumers only. In these cases, rewards do not affect consumers who use cash and checks. Also, rewards may have little effects on the welfare of consumers who use cards, because these card users pay higher retail prices to finance rewards they receive.

In reality, however, most U.S. merchants serve both types of consumers and charge them the same prices. To reflect this reality, from this point on the analysis assumes that retail prices are common across all consumers.

Consumers who use cash and checks exclusively would be worse off with any rewards levels that are higher than the most efficient rewards level. They would also be worse off than in an economy without cards, as long as the retail prices are higher (which occurs when merchants pay a merchant fee that is higher than their transactional benefit).

Both retail prices and levels of rewards affect the welfare of card-using consumers. The net effect of rewards on the welfare of card-using consumers depends on their transactional benefit from cards. For some card-using consumers, a card transaction gives them negative transactional benefit, and thus they do not use cards without receiving rewards. These marginal card users, who use cards only when they receive rewards, are likely to be worse off due to rewards because rewards may not be sufficient to cover their negative transactional benefit and their welfare loss through higher retail prices. In contrast, consumers whose transactional benefit from a card is positive—consumers who use cards even without receiving rewards—are likely to be better off because rewards and their transactional benefit from a card may be enough to offset the price increase. In some cases, however, even these consumers may become worse off. When resource costs of handling a card transaction is proportional to the transaction value, a higher level of rewards requires more resources, and those costs may further raise retail prices. As a result, rewards may not be sufficient to offset the effect of higher retail prices on the welfare of some card-using consumers even if their transactional benefit from cards is positive.

How the levels of rewards affect consumer welfare on net depends on various factors. For example, knowing how rewards levels affect merchant fees and thus retail prices is critical to consider the effects of rewards on the welfare of each individual consumer, and thus on the welfare of consumers as a whole. As discussed above, rewards may affect differently those consumers who use cash and checks more exclusively, compared to those who use cards more exclusively. Rewards also affect differently the various consumers who use cards: consumers who use cards even without rewards and consumers who use cards only when they receive rewards. As a result, knowing the shares of those consumers—what percentage of consumers use cash and checks exclusively, what percentage of consumers use cards with rewards, and what percentage of consumers use cards without rewards—is important when considering consumer welfare on net.

The definitive answers of whether the current rewards levels are welfare-enhancing for consumers await further data. However, the analysis using available empirical evidence suggests the following. If the current level of rewards is higher than the most efficient level, then it may

not be welfare-enhancing for consumers on net, unless the rewards are made possible by the card service providers or the merchants giving up their profit margins. If the current rewards are too generous, consumer welfare on net may potentially be lower than in an economy without payment cards. As mentioned before, rewards that are too generous may require more real resources, and these extra costs might exceed the resource costs that are necessary to handle a cash or check transaction. Because it is very unlikely that card issuers set the reward levels that would make the card service providers as a whole earn negative profits, these extra costs may be shared between merchants and consumers.

III. CONCLUDING REMARKS

This article considered whether currently provided payment card rewards are on net beneficial to U.S. consumers. To this end, the first section provided background on the U.S. payment card industry, including the prevalence of reward card programs, the relationship between rewards and other fees, such as interchange fees and merchant discount fees, and the roles of rewards cards. In the second section, the article first examined the most efficient rewards levels focusing on the role of rewards in internalizing the usage externality of payment cards and then discussed whether the current levels of rewards are welfare-enhancing from the social welfare point of view as well as from the consumer welfare point of view.

Available empirical evidence and existing theoretical models suggest that current U.S. payment card rewards programs are likely inefficient. That is, social welfare is likely to be lower with currently provided rewards than without rewards. Similarly, consumer welfare is likely to be lower unless rewards are accompanied by the card service providers or the merchants giving up their profit margins. Further, both social welfare and consumer welfare may potentially be lower than in an economy without payment cards at all. To obtain definitive answers, more comprehensive data-gathering and further theoretical developments are required.

APPENDIX

A. Computation of the most efficient cardholder fees in the United States

As discussed in Section II, the most efficient cardholder fees depend on two elements. One is the payment card service providers' joint net cost of handling a card transaction. The other is the merchant's transactional benefit from a card transaction. Tables below summarize the payment service providers' costs and fee revenues and the merchant costs shown in Garcia-Swartz and others (2006 a and b).

Table A1

COSTS, FEE REVENUES, AND PROFIT FOR PAYMENT SERVICE PROVIDERS

(unit: cent)

	Cash	Check	Credit	Debit
<i>A \$11.52 transaction</i>				
Resource costs	6.7	15.0	28.0	27.0
Cardholder fees	3.0	4.0	-10.3	13.0
Merchant fees	0.4	16.0	42.0	41.0
Profit	-3.3	5.0	3.7	27.0
<i>A \$54.24 transaction</i>				
Resource costs	32.3	15.0	41.0	35.0
Cardholder fees	3.0	4.0	-50.0	13.0
Merchant fees	2.0	16.0	101.0	41.0
Profit	-27.3	5.0	10.0	19.0

Table A2

MERCHANT COSTS

(unit: cent)

	Cash	Check	Credit	Debit
<i>A \$11.52 transaction</i>				
Fees	0.4	16.0	42.0	41.0
Resource & other	30.5	28.2	21.0	17.1
Total	30.9	44.2	63.0	58.1
<i>A \$54.24 transaction</i>				
Fees	2.0	16.0	101.0	41.0
Resource & other	41.8	31.0	24.0	17.4
Total	43.8	47.0	125.0	58.4

These tables help calculate the most efficient cardholder fee of credit and debit cards. For example, the most efficient credit cardholder fee when the alternative payment method is check is computed in the following way: First, the net cost of a credit card transaction for payment service providers as a whole is the resource costs of a credit card transaction plus the opportunity costs of giving up the profits from a check transaction. For a \$11.52 transaction, these are 28 cents and 5 cents, respectively. Thus, the net cost of a \$11.54 credit card transaction for the payment service providers is 33 cents ($=28 \text{ cents} + 5 \text{ cents}$). Second, the merchant transactional benefit from a credit card versus a check is cost reduction. A \$11.54 credit card transaction requires the merchants pay 21 cents in resource costs, which is a 7.2 cents resources cost savings because a \$11.54 check transaction costs merchants 28.2 cents. The merchants can also save the cost of paying fees for processing a check transaction, which is 16 cents. Thus, their transactional benefit from a credit card transaction is 23.2 cents ($=7.2 \text{ cents} + 16 \text{ cents}$). The most efficient cardholder fee for a \$11.54 credit card transaction when check is the alternative payment method is therefore 9.8 cents ($=33 \text{ cents} - 23.2 \text{ cents}$).

Table A1, and thus, the most efficient cardholder fees in Table 1, exclude seigniorage—the net revenue derived from the issuing of currency for central banks. Seigniorage is estimated at about 7 cents and 33 cents, respectively, for a \$11.52 transaction and for a \$54.24 transaction. Therefore, if included, the payment service providers' profit from a cash transaction becomes positive: 3.7 cents for a \$11.52 transaction and 5.7 cents for a \$54.24 transaction. As a result, the most efficient credit cardholder fees, given that credit card and cash are the two payment methods, become positive: 21.8 cents for a \$11.52 transaction and 26.9 cents for a \$54.24 transaction. Similarly, the most efficient debit cardholder fees, given that debit card and cash are the two payment methods, become positive: 16.9 cents for a \$11.52 transaction and 14.3 cents for a \$54.24 transaction.

B. The most efficient cardholder fees in Australia

For comparison, tables below show the most efficient cardholder fees; merchant costs; and costs, fee revenues, and profits for payment service providers in Australia. The source of information is Simes and others (2006). The numbers in parentheses indicate seigniorage is included.

Table B1

MOST EFFICIENT CARDHOLDER FEES IN AUSTRALIA

(unit: AU cent)

Payment method		Credit			Debit		
Alternative method		Cash	Check	Debit	Cash	Check	Credit
Transaction value	AU\$10	-1 (5)	-47	15	-16 (-10)	-62	-17
per transaction	AU\$50	-14 (16)	-40	23	-37 (-7)	-63	-34

Table B2

COSTS, FEE REVENUES, AND PROFIT FOR PAYMENT SERVICE PROVIDERS IN AUSTRALIA

(unit: AU cent)

	Cash	Check	Credit	Debit
An AU\$10 transaction				
Resource costs	5	16	16	6
Cardholder fees	0	0	-2	0
Merchant fees	1	8	12	12
Profit	-4 (2)	-8	-6	6
An AU\$50 transaction				
Resource costs	15	16	24	6
Cardholder fees	0	0	-11	0
Merchant fees	1	8	46	12
Profit	-14 (16)	-8	11	6

Table B3

MERCHANT COSTS IN AUSTRALIA

(unit: AU cent)

	Cash	Check	Credit	Debit
An AU\$10 transaction				
Fees	1	8	12	12
Resource & other	38	73	26	21
Total	39	81	38	33
An AU\$50 transaction				
Fees	1	8	46	12
Resource & other	49	74	26	21
Total	50	82	72	33

ENDNOTES

¹Those surveys are Dove consulting and American Bankers Association (2005) and Visa USA (2006).

²According to a 2007 study by Dove Consulting, 37 percent of depository institutions surveyed offered debit card rewards in 2006. Among them, 63 percent offered rewards for signature debit transactions only and the rest of them offered rewards for both PIN and signature debit transactions.

³This comparison was made by Tony Hayes at the “Consumer Behavior and Payment Choice” conference at the Federal Reserve Bank of Boston in 2006. See page 23 of Carten and others.

⁴The Government Accountability Office (2008) reported that federal government entities receive at least 8 basis points of their spending on the cards from the issuers.

⁵The 2005/2006 Study of Consumer Payment Preference.

⁶A merchant acquirer is an entity that performs a variety of merchant-related payment activities, including processing card transactions for merchants.

⁷There are some exceptions. In the early 1990s, interchange fees of some PIN-debit card networks in the United States flowed from issuer to acquirer. In Australia, PIN debit (EFTPOS) card interchange fees flow from issuer to acquirer.

⁸A merchant fee includes other fees, such as acquirer processing fees, which go to acquirers, and association dues and switch fees, which go to card networks.

⁹A cardholder fee refers to per transaction fee charged to the cardholder.

¹⁰Interchange fee variation can be seen in Chart 4.

¹¹American Express’s costs of marketing, promotion, rewards, and card member services account for 53 percent of merchant fee revenue in 2007. If American Express spent similar amounts to Visa and MasterCard for marketing and promotion (\$1 billion), then rewards costs account for 47 percent; if American Express spent twice as much as Visa and MasterCard, then rewards costs account for 40 percent.

¹²Interchange fee rates for consumer credit cards and for commercial credit cards have been different.

¹³Payment float occurs due to the time lag between the time the payment is initiated and the time the fund is actually transferred. For example, there is a time lag between the time a consumer writes a check at a merchant and the time the fund is taken from the consumer’s bank account. Consumers may earn extra interest due to this time lag, but merchants may lose interest income due to this time lag.

¹⁴It should be emphasized that the merchant’s transactional benefit does not include the merchant’s other benefits, such as incremental sales, noted in the previous paragraph.

¹⁵Another downside is inconsistent results with the other studies. For example, Star Cost Studies (2006, 2007) estimated that debit card issuers’ costs for PIN-debit and signature-debit were quite different, while Garcia-Swartz and others (2006 a and b) estimated that they were somewhat similar.

¹⁶Comprehensive cost studies were conducted in other countries, such as Australia, Belgium, Netherlands, Norway, and Sweden.

¹⁷See appendix for the detailed calculation method.

¹⁸The most efficient cardholder fees presented here ignore the credit function of credit cards because its effect on the most efficient credit cardholder fee is unclear. However, some studies suggest that the most efficient credit cardholder fee (rewards level) that takes into account credit function is likely to be higher (lower) than the most efficient debit cardholder fee (rewards level) (Bolt and Chakravorti).

¹⁹Columns 3 and 6 are the same hypothetical economy, but these two are shown separately for the most efficient credit cardholder fees and the most efficient debit cardholder fee, given the other type of cards' cardholder fee.

²⁰The actual cardholder fees are shown in Table A1 in the appendix.

²¹If seigniorage of cash is viewed as a joint revenue to the payment service providers, then providing rewards to substitute large value cash transaction is likely inefficient. See appendix for more detail.

²²In reality, however, not just two payment methods but several payment methods are used. In the case of multiple alternative payment methods, the most efficient cardholder fees would be the weighted average of the most efficient cardholder fees, shown in Table 1. The weight should be based on the share of each payment method.

²³A similar cost study in Australia suggested that merchant transactional costs of checks are much higher and payment service providers' processing costs of a credit/debit card transaction are lower in Australia than in the United States (Simes and others). See appendix.

²⁴Ching and Hayashi showed by using a consumer survey in the United States that removing rewards on credit and debit cards today would cause only a small percentage of consumers to switch from credit/debit cards to paper-based transactions.

²⁵If the merchant fee is lower than the merchant's transactional benefit, then a higher level of rewards does not necessarily imply higher retail prices. The higher the level of rewards, the more consumers use cards. Although the merchants pay a higher merchant fee, they may save more costs as more consumers use cards. If this cost saving is greater than the merchant fee increase, then the higher rewards may reduce the retail prices. According to the available cost studies, however, it is very unlikely that the merchant fee is lower than the merchant transactional benefit.

²⁶It is difficult to empirically examine how the fees paid by merchants affect the prices charged by the merchants, because the relationship depends on various factors. However, according to a merchant cost study, a merchant's per transaction cost for a credit card transaction is higher than for a cash, check, or a debit card transaction due to the fees charged for a credit card transaction. Since most merchants set the same price for their customers regardless of their payment methods, the higher cost of a credit card transaction for the merchants is likely to be passed on to all of their customers as higher prices.

REFERENCES

- Aite Group, LLC. 2008. "The State of Rewards: The Consumer Voice."
- Bergman, Mats, Gabriela Guibourg and Bjorn Segendorf. 2007. "The Costs of Paying—Private and Social Costs of Cash and Card Payments," Sveriges Riksbank Working Paper No 212.
- Bolt, Wilko and Sujit Chakravorti. 2008. "Consumer Choice and Merchant Acceptance of Payment Media," mimeo.
- Bradford, Terri and Fumiko Hayashi. 2008. "Developments in Interchange Fees in the United States and Abroad," *Payments System Research Briefing*, Federal Reserve Bank of Kansas City, April.
- Brits, Hans and Carlo Winder. 2005. "Payments are No Free Lunch," *De Nederlandsche Bank Occasional Studies*, 3(2).
- Carten, Margaret, Dan Littman, Scott Schuh, and Joanna Stavins. (2007). "Consumer Behavior and Payment Choice: 2006 Conference Summary," Federal Reserve Bank of Boston *Public Policy Discussion Paper*, No. 07-4.
- Chakravorti, Sujit and William Emmons. 2003. "Who Pays for Credit Cards?" *Journal of Consumer Affairs*. 27(2): 208-230.
- Chakravorti, Sujit and Ted To. 2007. "A Theory of Credit Cards," *International Journal of Industrial Organization*. 25(3): 583-595.
- Ching, Andrew and Fumiko Hayashi. 2008. "Payment Card Rewards Programs and Consumer Payment Choice," under review.
- Dove Consulting. 2007. *2007 Debit Issuer Study*.
- Dove Consulting and American Bankers Association. 2005. *The 2005/2006 Study of Consumer Payment Preferences*.
- Dowson, Amy and Carl Hugener. 2006. "A New Business Model for Card Payments," Diamond Management & Technology Consultants, Inc.
- Edgar, Dunn and Company. 2006, 2007. *Payment Dynamics Preferred Payments Study*.
- Financial Insights. 2005, 2007. *Consumer Payments Survey*.
- Food Marketing Institute. 1998. *EPS Costs: A Retailer's Guide to Electronic Payment Systems Costs*.
- Garcia-Swartz, Daniel, Robert Hahn, and Anne Layne-Farrar. 2006a. "The Move Toward a Cashless Society: A Closer Look at Payment Instrument Economics," *Review of Network Economics*. 5(2): 175-197.
- Garcia-Swartz, Daniel, Robert Hahn, and Anne Layne-Farrar. 2006b. "The Move Toward a Cashless Society: Calculating the Costs and Benefits," *Review of Network Economics*. 5(2): 199-228.
- Government Accountability Office. 2008. "Credit and Debit Cards. Federal Entities Are Taking Actions to Limit Their Interchange Fees, but Additional Revenue Collection Cost Savings May Exist," GAO-08-558.
- Green, Jeffrey. 2007. "Exclusive Bankcard Profitability 2007," *Cards & Payments*, 20(5):26-28.
- Hayashi, Fumiko. 2006. "A Puzzle of Card Payment Pricing: Why Are Merchants Still Accepting Card Payments?" *Review of Network Economics*, 5 (1): 144-174.

- Hayashi, Fumiko. 2008a. "The Economics of Payment Card Fee Structure: What is the Optimal Balance between Merchant Fee and Payment Card Rewards?" Federal Reserve Bank of Kansas City Research Working Paper 08-06.
- Hayashi, Fumiko. 2008b. "The Economics of Payment Card Fee Structure: What Drives Payment Card Rewards?" Federal Reserve Bank of Kansas City Research Working Paper 08-07.
- Humphrey, David, Magnus Willeson, Goran Bergendahl, and Ted Lindlom. 2006. "Benefits from a Changing Payment Technology in European Banking," *Journal of Banking and Finance*, 30 (6): 1631-1652.
- National Bank of Belgium. 2006. "Costs, advantages and drawbacks of the various means of payment," *Economic Review*, June: 41-47.
- Reserve Bank of Australia. 2007. *Payment Costs in Australia: A Study of the Costs of Payments Methods*.
- Reserve Bank of Australia. 2008. *Reform of Australia's Payments System. Preliminary Conclusions of the 2007/08 Review*.
- Rochet, Jean-Charles and Jean Tirole. 2002. "Cooperation among Competitors: Some Economics of Payment Card Associations," *Rand Journal of Economics*, 33(4): 549-570.
- Rochet, Jean-Charles and Jean Tirole. 2006. "Two-Sided Markets: A Progress Report," *Rand Journal of Economics*, 37(3): 645-667.
- Simes, Ric, Annette Lancy, and Ian Harper. 2006. "Costs and Benefits of Alternative Payments Instruments in Australia," Melbourne Business School Working Paper No 8.
- Simon, John. 2005. "Payment Systems are Different: Shouldn't Their Regulation Be Too?" *Review of Network Economics*, 4(4): 364-383.
- Star Network. 2006, 2007. *POS Debit Issuer Cost Study*.
- Visa USA. 2006. *Visa Payment Panel Study*.
- Wang, Zhu. 2008. "Market Structure and Credit Card Pricing: What Drives the Interchange?" Federal Reserve Bank of Kansas City Payment System Research Working Paper.
- Wright, Julian. 2003 "Optimal Card Payment Systems," *European Economic Review*, 47: 587-612.
- Wright, Julian. 2004. "The Determinant of Optimal Interchange Fees in Payment Systems," *Journal of Industrial Economics*, 52: 1-26.