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How and Why Do Consumers Choose Their Payment Methods?

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Abstract: This essay provides an overview of the literature on consumer payment behavior. It considers the state of our understanding of how and why consumers choose their payment methods and what is needed to make more headway in understanding consumer payment decisions. It closes by discussing the policy issues that require that we make progress with payments research.

Keywords: payments, means of payment, consumer choice behavior

JEL classification: D11, D12, D14, E41

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Throughout most of economic history, consumers have had few ways to make payments and few choices to make at the point of sale. The set of payment options has expanded over time. Consumers went from using only coins, to choosing between coins and bank notes, and later to choosing between currency and checks. Much later, credit cards came on the payments scene. Today, consumers' wallets often hold currency, checks, multiple credit cards, debit cards, and perhaps even stored value cards. The question "What's in your wallet?" is finally interesting.[1]

With the growth in payment options has come an interest in understanding consumers' payment decisions. Such decisions have economic consequences because all GDP is the result of transactions completed with some method of payment, and two-thirds of GDP—$8.5 trillion in the US in 2005—comes from consumer transactions. How and why do consumers choose their payment methods? That is the subject of this essay.

We actually know very little about consumer payment behavior. There are two primary reasons for this. One, not surprisingly, is that this issue is of relatively recent interest, so little research has been done on it to date. While there were always some economists within the Federal Reserve studying payments, it was not until the mid-1990s that the Fed really started encouraging payments research. This effort was prompted by innovations in payment methods that had already occurred and by future developments that were anticipated and likely to pose challenges for payment-system providers and central banks. Initially, the efforts amounted to periodic informal workshops being held within the System. These workshops brought together Fed economists thinking about payment issues and gave them a forum for presenting and discussing their research. The Cleveland Fed hosted, and a group of about six to ten economists

[1] When this essay was written, the question "What's in your wallet?" was the focus of television advertisements and a registered trademark for credit card issuer Capital One.

showed up and sat around a conference room table talking.

The other reason we know so little about consumer payment behavior is that monetary and macroeconomic research has, with few exceptions, not addressed the issue. Monetary economists generally have not seen themselves as studying payments. This is odd because monetary economists study what money is, how it becomes valued, and how its presence affects the economy. Research has found that money is valued in economies where it overcomes frictions that exist in its absence and that would prohibit or interfere with beneficial trades. Sometimes money is valued because it helps agents overcome transaction costs. Sometimes it serves as a store of value, allowing better intertemporal consumption allocations. In each case, money surely plays a role in payments.

Similarly, macroeconomists have tended to abstract from payment issues to focus on the aggregates that flow from payment decisions, namely consumption and saving, and thereby investment. Something is lost, however, when these aggregates are disassociated from the transactions that underlie them. For example, transaction costs are part of the total cost of a good. By affecting the transaction costs incurred, payment methods can affect aggregate consumption. In addition, implicit in payment decisions today are decisions about credit use. Such decisions in the aggregate can have implications for default rates on consumer debt and for future consumption growth. Clearly, payment decisions have macroeconomic implications.

Times have changed, though. The number of economists explicitly studying payments has grown considerably. In the last five years or so, several Reserve Banks started research groups dedicated to the study of payment issues. These groups aim to promote payments research by and in collaboration with academics, and to generate productive interactions among researchers and private-sector practitioners. Sponsoring conferences that bring these groups

together is one way these groups achieve their goals. No longer can attendees fit around a conference room table. Now they fill auditoriums. No longer are Fed economists the only ones present. Now they are joined by academics and practitioners.

In this essay, I will discuss how far we have come and how far we have to go in understanding how and why consumers choose their payment methods. I will also put forth what I think is needed to make more headway in understanding consumer payment decisions. And finally, I will discuss the pressing policy issues that require that we make progress with payments research. I will probably raise more questions than I answer, but that seems fitting given our state of knowledge today. Before doing all of this, I will clarify some terms and refine the question being addressed.

Payments Basics

To make progress in understanding consumer payments, it is important to be precise in the terms we use. The literature to date has generally lacked such precision.

Today's interest in consumer payments is really an interest in what I call "payment instruments." Payment instruments are tools that initiate the transfer of monetary value, though they have no value of their own. Credit cards, debit cards, and checks are the leading payment instruments today. Each, when used in exchange, generates instructions that direct the movement of deposits. The consumer gets the payment instrument back once the instructions are processed. Credit and debit cards are returned immediately after the purchase is completed at the point of sale, if they are ever even relinquished. Checks, in contrast, are typically returned to the consumer with a lag, after the check has cleared, although sometimes they are even scanned at the point of sale and retained by the consumer.

Deposits and cash differ from payment cards and checks in that they can be used to transfer monetary value directly. "Cash" refers to paper currency and metallic coins used in exchange. "Deposits" refers to claims to monetary value on the books of financial institutions, such as the funds individuals hold in their accounts with banks. In a cash transaction, the consumer initiates and completes the transfer at the point of sale simply by giving the seller currency and coins. No further movement of funds occurs. Since deposits are just bookkeeping entries, with no physical form, buyers cannot hand them to sellers. They must rely instead on payment instruments to accomplish the transfer.

Payment instruments endow the use of deposits, and thereby transactions, with various features. Credit cards, for example, direct payment with *future* deposits, allowing consumers to better smooth consumption over time. They also frequently offer cash back, or frequent flyer miles, or some other perk. Debit cards, in contrast, direct payment with *current* deposits, often more easily than could be done with checks. Stored-value cards allow payment with *past* deposits and provide anonymity in transacting. Travelers checks are an alternative to paying with cash, with a lower risk of loss. What defines each payment instrument, then, is the unique mix of features it embodies.

In recent decades, developments in consumer payments have involved the introduction of new payment instruments or improvements in the features or processing of existing payment instruments. Yet for all the progress made, the only way to transfer monetary value remains via the use of cash or deposits. Consequently, for the rest of this essay, my focus will be on a restated version of the question I started with: how and why do consumers choose which *payment instruments* to use at the point of sale. Restating the question in this way means I am not considering the use of online banking or bill paying, or the use of ATMs, or other questions

that do not directly concern a payment choice at the point of sale.

Lessons from Past Research

Considerable research has been done that relates somewhat to consumer payments. Anyone wanting to learn more about this body of work should look at the bibliography on the subject that the Federal Reserve Bank of Philadelphia has compiled (available at http://www.phil.frb.org/pcc/index.html). It is an excellent place to start.

A review of that bibliography reveals that the literature to date does a good job of answering the question "What payment instruments do consumers use?" This turns out to be a relatively easy question to answer. One approach to answering it is to survey consumers or retailers about which payment instruments are being used and to analyze that data. Alternatively, data from the point of sale or from transaction processors can be used to determine the fraction or type of payments for which various payment instruments are used. While the data to answer such questions have not always been of high quality, they are certainly improving. Electronic recordkeeping and payment processing systems yield more data, and more reliable data, than was available previously. Scanner data from retail outlets is an example. However, even with good data, whether from surveys or other sources, such research is backward looking. It tells us what payment instruments were chosen in the past and so may not be a good indicator of what will be chosen in the future.

A much more difficult question to answer is, "How and why do consumers choose which payment instruments to use?" Of the entire Federal Reserve Bank of Philadelphia bibliography, only about 5 percent of the articles appear to have anything to say on this question.

The literature that does exist is largely empirical. It generally takes payment choices to

be the result of simple, static, and at most binary decisions. That is, the focus is usually on one or two specific payment instruments and the role that one or more factors play in the decision to use those instruments. For example, you can find a study of the choice between checks and PIN-based debit cards at grocery stores (Klee 2004), or a study of how credit card use varies with the terms on the cards (Gross and Souleles 2002). Both studies are very well done. The literature has studied numerous factors that affect payment decisions, including transaction time; transaction costs (including interest costs and opportunity costs); recordkeeping features of the payment instrument; anonymity; risk of loss—monetary loss, identity theft (loss of good credit rating); value of the purchase; physical characteristics of the point of sale; type of bill (recurring or not); consumption-smoothing needs; and the availability of payment instruments.

A small share of the existing literature is theoretical. Sometimes no formal model is developed. When a model is developed, it often is partial equilibrium and suffers because it holds constant factors that are not constant in practice, such as interest rates and transaction costs, or the set of alternative payment instruments. For example, if interest rates were to rise significantly, say to 20 percent, the demand for interest-bearing stored value would likely soar.

The rest of the theoretical literature consists of general equilibrium models with optimizing agents. The standard framework for doing general-equilibrium analysis is the Arrow-Debreu model. That model, however, is not useful for studying payments. It assumes a frictionless economy with perfect information, complete markets, and no transaction costs. Agents in such economies do not need payment instruments to transact or a means for transferring value. To make the model useful for studying payments, frictions must be introduced that make transactions costly or difficult. In the face of these frictions, agents maximize expected utility subject to some constraints that incorporate the cost of transacting.

From this optimization problem, a demand for payment instruments arises to overcome the frictions. Given the model's microfoundations, it can be used to study how people respond to changes in economic policy or to payment-industry developments.

Like the empirical literature, however, the theoretical literature that incorporates frictions and generates a demand for payment instruments also misses answering the question of how or why consumers choose which payment instrument to use at the point of sale. Some papers take as given the set of payment instruments and assume the set is small, limited to one or two instruments (e.g., Schreft (1992(a), 1992(b)). Others assume that certain goods have to be bought, say, with cash, while others have to be bought with credit. In both cases, the research looks at how the mix of payment methods used in exchange varies at the margin as a function of the model's parameters. It also looks at how the effects of monetary, fiscal, or other policies are influenced by the mix. But since the payment instruments in the mix are given, it does not fully explain how or why consumers choose which payment instrument to use.

The rest of the literature on consumer payments discusses topics like default and bankruptcy, privacy issues, credit counseling, consumer protection in payments and credit, credit reporting and credit risk, and numerous supply side issues (like antitrust, networks, payment innovations, credit risk management, and securitization). The research in these areas, though valuable in its own right, gets even less directly at the basic question of how and why consumers choose their payment instruments.

The Complexity of Consumer Payment Decisions

The consumer's choice of payment instruments is much more complex than anything that the existing literature has captured. To illustrate this, I want to share a story with you.

A week after I agreed to write this essay, I was at the gas station. A young woman sped up, braked, and called out to the attendant, "Do you take checks for the car wash?" No, they did not take checks. On hearing this, she sped away. This was one of those $5 car washes that you drive into, sit for a few minutes while water and suds spray on your car, and drive out. Why would anyone think of using a check for the purchase of a $5 car-wash token? Why was a check the *only* payment instrument this woman either wanted to use or had available? She probably had a purse with her. Purses hold a multitude of things, including numerous payment instruments. I could understand her stopping the car and running into the gas station with her purse, then asking at the point of sale whether they take checks, and when told no, opting to use a debit card or cash, or possibly even a credit card. That is not what happened. She just drove off, foregoing the purchase altogether. She must have either only had a check available, or only wanted to pay by check.

A complete answer to the question of how and why consumers choose their payment instruments would help us explain this woman's behavior. Her story is an excellent example of how difficult the question really is to answer. Payment choices are not the result of simple, static, binary decisions, despite our often modeling them that way. They are instead the result of complex higher-order, multi-dimensional decisions. What does that mean?

By a higher-order decision, I mean that the actual choice of payment instrument is made from among many payment instruments. Most consumers are not faced with the choice of cash versus credit, or check versus PIN-debit, or credit card versus debit card. They choose from among a wide range of payment instruments. Additionally, for a given type of payment instrument, like a credit card, consumers may have several from which to choose. The cards and accounts can differ in terms of their costs (interest rates, fees charged) and their benefits

(frequent-flyer miles or acceptance at more locations, for example).

By a multi-dimensional decision, I mean that there are layers of decisions embedded within the choice of a payment instrument at the point of sale. The subdecisions could be made simultaneously or sequentially. I had expected to be able to disentangle the layers and clearly describe them. It turns out, though, that we really do not know enough to do that. At least I don't. So here is where I start raising more questions than I am going to answer. For clarity, I am going to describe the subdecisions as if they are made independently and in a particular order, though that might not be the way the decisions are made in practice.

At the most basic level, the consumer must decide how to divide current income and wealth between current and future consumption. This decision introduces a time dimension to the decision problem. It also makes the choice of payment instrument part of the bigger portfolio-allocation decision that a consumer faces since the consumption-saving decision depends on, among other things, the rate of return to the consumer's portfolio of assets.

The consumer also must decide whether to fund today's purchases out of current income or wealth or with borrowed funds. This decision introduces a financial-management dimension to the consumer's choice. Borrowed funds come at a cost, and must be repaid out of future income or wealth. Additionally, credit availability is limited, and borrowing for one purchase leaves less credit available for other purchases.

Another level of decision is which source of borrowed funds or which payment instrument to use. Borrowed funds could take the form of a loan from a financial institution, say a car loan or a mortgage. Or they could come via a credit card or a card-based or checkable home equity line of credit. Payment out of current resources could also be accomplished with cash; a check; a credit, debit, or stored-value card; or a travelers check.

There is one additional and necessary step: the consumer's decision of which payment instruments to acquire and carry to the point of sale. This is a technology-adoption decision since the payment instruments are technologies for transferring monetary value. The existing literature takes the adoption decision as predetermined and independent of the other payment decisions. While the decision of what payment instruments to adopt must be made in advance of other decisions, it cannot be made independently. Consumers must foresee their future payment needs at the point of sale and acquire payment instruments accordingly. For example, the tailor might accept cash or checks. Some medical offices accept cash or checks for co-pays, while others accept checks or credit cards. Sometimes at the tailor I use cash, sometimes checks, depending on the size of the purchase, but I never use cash for a co-pay for a medical checkup. Consumers who arrive at the point of sale without the requisite payment instruments will not be able to transact, so they have to anticipate the transactions they will want to make and acquire the appropriate payment instruments.

Additionally, there is option value in consumers having liquid assets and an available line of credit in the event that unforeseen transactions are desired or required. Consumers must anticipate the likelihood of such transactions and acquire the desired payment instruments in advance. For example, consumers often get pre-approved for a mortgage before buying a home. They take out a home-equity line of credit, accessed by writing a check or using a payment card, before starting a remodeling project. In these cases, the choice of the payment instrument is integral to the decision to consume. Many consumers think even farther ahead, getting and using credit cards to establish a credit history so they can ultimately buy a home or car.

The research done to date is far from capturing the intricacies of the consumer's payment decisions as just described. What if the woman in my story has a debit card, but left it at home?

What if she chose not to have a debit card, opting to carry checks with her instead? What if she finds herself at a point of sale that does not take checks? These decisions are missing from our research on consumer payment decisions. In fact, looking at the existing literature, it appears that in thinking about consumers' payment decisions we might have forgotten to think about payments.

An Agenda for Payments Research

Putting the focus of payments research on payments in my mind requires endogenizing the set of payment instruments available for use at the point of sale. This means modeling the adoption decision and incorporating it into broader models. The agenda I will describe is extremely ambitious, probably controversial, and in need of refinement. I cannot say there has been much work contributing to it. Nor can I say that I expect rapid progress on it. Long term, though, if we at least think about how we might make progress on this research agenda, we likely will end up much more knowledgeable about how consumers make payment decisions than we are today.

A starting point for such research might be to recall that payment instruments are not like other goods in that, in their most basic form, they have no intrinsic value.[2] As noted above, they are simply objects that when used in exchange endow our transactions, or use of deposits and cash, with certain characteristics. A demand for such objects would derive from a demand for those transacting characteristics.

Since it is not easy to build models that yield a demand for means of payment, a better

[2] Exceptions to this might be payment cards or checks with the image of the customer's choice on the front if the customer derives satisfaction from looking at the image or from thinking that the image creates a desired impression about the consumer in the minds of those who receive the instrument in exchange. Another exception might be credit cards that serve as identification for checking in via kiosks for airplane flights. The identification feature might make the credit card valuable even for someone who never wants to use it in exchange.

approach might be to start by thinking about the features consumers might want in their payment instruments and what costs they face in using payment instruments. Several beneficial potential features come to mind: liquidity, security (protection against the risk of theft), ability to access a credit line at the point of sale, insurance against future income shocks, anonymity, easy recordkeeping, and discipline (for example, the ability to control spending). Costs associated with the use of payment instruments include adoption costs (typically fixed costs of initially obtaining the instrument and perhaps also fixed costs of use over some period, usually a year), usage fees (such as interest charges and late fees), the risk of theft, discounts (for example, cash back, frequent-flyer miles, etc.), and again, discipline (undesired limits on spending practices, such as the need to pay in full at the end of a month).

With an idea of the attributes consumers might want from their payment instruments, we could work backwards, trying to figure out which frictions would have to exist in an economy to generate a demand for such attributes. The Lancasterian characteristics model (Lancaster 1966) has at its core the attributes of goods. That model recognizes that goods are bundles of characteristics, and derives the demand for goods from the demand for each of the embodied characteristics.

In citing Lancaster's model, I am not advocating making payment instruments or their characteristics arguments in the consumer's utility function, which is what a straight application of the model would involve. However, the idea behind the Lancasterian model perhaps could be adopted in thinking about how to introduce a demand for attributes of payment instruments. As is, the Lancasterian model itself lacks the frictions that give rise to a need for payment instruments. Frictions would need to be introduced to generate a demand for payment instruments with certain characteristics, and other steps taken to generate a supply of such

payment instruments.

Once we have a model with frictions, we can derive the demand and supply, or marginal cost, functions for the attributes a payment instrument might have. Such functions might reveal cross-elasticities of demand that make it beneficial for consumers to have certain attributes bundled together in a single payment instrument, and cross-elasticities of supply (economies of scope) that make it cheaper for producers to offer payment instruments with such bundles of attributes. We could ask why some attributes are bundled together while others are not. For example, perhaps credit cards function the way they do because the process of allowing someone to use a plastic card to have a purchase billed to an account requires time to clear and thus the provision of credit over at least some period of time. Perhaps some attributes are bundled together to make the demand for the payment instrument more sticky. Some of the beneficial features a payment instrument can embody have independent and intrinsic value, like their provision of insurance against income shocks or recordkeeping features. If such a feature is bundled with the means of transferring monetary value, then the payment instrument itself would have intrinsic value, contrary to my earlier statement. Consumers would be less likely to switch from a payment instrument with intrinsic value to an instrument with a different mix of features, even if the alternative instrument has intrinsic value as well.

Complicating any analysis of the adoption of payment instruments are network externalities in acceptance and usage. In the two-sided market for a payment instrument, the externality relevant for the decision of each side of the market exists on the other side. Merchants' willingness to accept payment instruments depends on how many consumers have adopted the instruments. Likewise, consumers' willingness to use payment instruments depends on how many merchants accept the instruments. These network externalities pose an additional

challenge for researchers trying to model consumer payment decisions, beyond the challenges already mentioned. The existing literature on network effects and two-sided markets could be useful in addressing this challenge (for example, Farrell and Saloner 1985, Katz and Shapiro 1985, Schiff 2003).

With an understanding of which set of payment instruments are demanded and supplied, we could move ahead to study the choice of which payment instrument to use at the point of sale. This would involve integrating the adoption decision into a model that includes the other stages in the consumer's optimization problem. As I warned earlier, this is an ambitious research agenda.

One would think the consumer's choice of payment instruments would vary with the consumer's income, age (because credit history and asset holdings depend in part on age), attitudes about debt, and rationality. A longer term research goal would be to move toward heterogeneous agent models and models incorporating lessons from the field of behavioral economics.

The discussion thus far has looked at the adoption of payment instruments at a point in time. Ideally, a model of the adoption decision should be able to explain the introduction of new payment instruments. New payment instruments enter the landscape, some existing payment instruments exit, and yet others remain available but are used less or in different ways. A related issue is why some changes in the use of payment instruments seem evolutionary, while others seem revolutionary. It takes a long time for many new payment instruments to catch on, but when they do it seems as though they did so overnight.

One of my favorite articles, "Learning by Doing and the Introduction of New Products," by Nancy Stokey (1988), captures the idea of evolutionary product introductions. That article

applies the Lancasterian characteristics model to consider a continuum of potentially producible products available at any time. Only some of the products are produced, however. For simplicity, products with more characteristics are viewed as better by the consumer. Stokey gives the example of products that supply light and the introduction of light bulbs. At one time candles were used primarily for lighting. Then whale oil lamps appeared, followed by gas lights and later incandescent bulbs, and then other types of bulbs. Candles are still available, but they are used to a much lesser extent and for different purposes. Today they primarily are used for decorative purposes and to provide mood lighting.

A similar evolutionary process is observed for payment instruments. In recent years, newer payment instruments have been displacing older payment instruments. Cash, for example, is now used primarily for very small purchases and to facilitate illegal activity.

As developed, Stokey's model lacks some of the features one would think necessary to apply it to payment instruments. There are no frictions that can give rise to a demand for payment instruments. It also lacks the habit persistence that seems to make consumers reluctant to switch to a newer payment instrument from an established one. The model does have spillovers in that the more past experience the economy has in producing goods, the less labor it needs today to produce them. Such spillovers are needed for the cost of better goods to fall to the point where they are eventually worth producing. Some spillovers might also be needed in the use of payments so that the more transactions that have been made with a payment instrument, the more the instrument will be demanded. Perhaps when such spillovers get large enough, we get what appears to be the sudden embracing of a new payment instrument. Research into standardization and compatibility across products within an industry (e.g., Farrell and Saloner 1985, and Katz and Shapiro 1985) could be useful in thinking about and modeling

such spillovers, as could historical experience outside the payments industry (e.g., experience regarding computer operating systems, or videotape technology).

The research agenda I have described will benefit from contributions across fields of economics. Macroeconomics, finance, monetary economics, industrial organization, behavioral economics and neuroeconomics all come into play. Collaboration among researchers working in these fields should speed progress and improve the quality of the research done. There is also a role for collaboration with researchers in other disciplines, like psychology and marketing to name a few. The consumer's decision of which payment instrument to use at the point of sale is so complex that we will need to attack it from many angles to understand it.

Implications for Policy

A final issue to address is the role for policy regarding the payment system. Economics finds a legitimate role for government in providing public goods and internalizing externalities. Both of these roles exist regarding the payment system. Ensuring the stability of the payment system, a public good, has long been a goal of public policy. And the network externalities present in the markets for payment instruments create the possibility that the variety and mix of payment instruments available to facilitate the efficient exchange of goods and services might not arise from laissez faire.

Policymakers have always faced challenges in ensuring a stable and efficient payment system. Even when consumers had only coins, or coins and currency, to make payments with, there were occasional shortages that left people without the ability to make change or conduct certain transactions. When checks became available, there was the risk that bank runs and bank failures could make deposits unavailable or cause people to lose confidence in deposits and

return to the less efficient use of cash.

In today's increasingly electronic world, the policy challenges seem more complex, much like consumers' decisions of which payment methods to use. Newer payment instruments are used in larger, more technology-driven networks. Amazing numbers of transactions are processed over these networks each day. Personal information associated with the holder of the payment instrument, information needed to settle the transaction and protect against fraud and defaults, is stored in parts of the networks. Who stores the information? Who controls the technology? How are both safeguarded? These issues should concern policymakers. The losses of personal information by third-party payment processors in 2005 have highlighted this. Could we have a loss of confidence in these networks that makes consumers afraid to make payments processed over them? Are policymakers regulating or monitoring the networks to avoid such an outcome? These issues warrant attention.

Policymakers also face the challenge of being prepared for sudden shifts in the demand for various payment instruments. For example, in the days before a hurricane is expected to hit an area, cash withdrawals rise as insurance against a loss of electricity that limits the ability to use other payment instruments. Central banks can anticipate that shift in demand. But in an economy where very little currency is used, will policymakers be sufficiently prepared for the demand for cash that might arise in the aftermath of a more major disaster? In an economy where few checks are used and processed, are we prepared to handle a major and sudden shift back to checks some day?

Looking ahead, what is a central bank's role in this new world of more rapidly evolving payment methods? Should a central bank be a regulator or a participant? Should it design the payment instruments of tomorrow, competing with the private sector? Or contribute to their

design? Will the private sector in the absence of government involvement produce the right mix of payment instruments? Will the desire to make the demand for a payment instrument stickier result in too much bundling? Or can there never be too much bundling because consumers would ultimately prefer a single payment instrument that embodies all the features offered by today's many distinct payment instruments? If that is true, and there is a single multi-featured payment instrument some day, will there be an inefficient lack of competition in its provision? Finally, how do policymakers ensure the smooth operation of the payment system through the evolution of payment instruments? The policy implications of developments regarding payment instruments give urgency to our research on payments.

Conclusion

The question of how consumers make payments and why they choose the payment methods they do has long intrigued scholars. While we are coming to know a lot more about how consumers make payments, we still know fairly little about why they choose the payment methods they do. With better data from the point of sale and better theoretical models of consumer payment decisions, future research holds the key to unlocking the answers.

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