Consumer Payment Choice: Measurement Topics

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I. Introduction

What are the determinants of consumer choice over payment mechanisms? The answer to this question is important for a variety of reasons. Every government has the responsibility of supporting an efficient and effective payment system. Doing so is an explicit mandate of the Federal Reserve Bank in the United States. In addition, nothing is more central to private sector commerce than collecting payment. D'Silva (2009) claims the U.S. payment system collects $280 billion, about 2 percent of U.S. GDP. Thus, it is crucially important to know *how* consumers choose to pay.

This issue is complex because consumers come from a very heterogeneous set of financial situations, cultural values and individual prior beliefs, and these interact with payment choice in a number of ways. This question is particularly challenging because consumers now have a very wide set of options for making payments. Current research has focused on standard options at the retail cashier—cash, check, credit and debit—and I will do so as well. However, the true breadth of choices is remarkable. Contactless technology can be embedded not only in a traditional card, but also in a key chain, a mobile telephone or an automobile. New services allow person-to-person transfers via the cell phone network. Some retailers accept such transfers as payment too. On the Internet, cash use is practically nonexistent and instead we find specialized Internet systems such as PayPal. Outside of the retail context, consumers may pay bills via recurring automated clearinghouse (ACH) payments or other electronic means. New systems are not unusual, for instance, based on text messaging or even biometric data (fingerprints). As these systems typically make use of existing debit or credit networks, we can even debate whether they constitute separate payment options in the first place.

As a result, research in this area must address a complicated set of issues. That has certainly not kept researchers from trying though. Research about how consumers make payment choices has formed a small cottage industry in itself, both in academia and the private sector.

The goal of this paper is to review the output from this research. I start by discussing some existing theories of how consumers make payment choices. The main focus of the paper is on empirics. I review existing data sets, both those that are publicly and privately available. These naturally form the backbone of the existing empirical results on payment choice. Then I describe some results about consumer attitudes towards payment choices drawn from survey data. In the next section, I review existing regression analyses of these issues that try to estimate causal effects. These tend to be academic studies, and I focus on providing an overview of existing methods and common results across the studies, so-called "meta-results." Finally, I review what I see as some of the limitations of these existing studies, and to some extent, limitations in the questions that we have tried to ask so far.

Overall, I find strong evidence for demographic characteristics, such as age, in determining payment choice, which is probably best thought of in the context of general technology adoption rather than as something special to payments. More specific to the payments world, consumers respond to pecuniary charges, such as interest payments and rewards programs. They regard convenience and time issues as very important in choice although it is hard to verify that in a regression framework. Security is perhaps of only limited importance among the established payment mechanisms, although it probably plays a big role in the acceptance of new technologies. Consumers use only a single credit card at a time but may simultaneously use debit and credit. I conclude that it is hard to find evidence for behavioral theories, and it will be difficult to do so in the future. Although they may be important, we must find examples where they make different predictions from what traditional incentives do, and I am not optimistic for this, in part because of data issues.

II. Theory of Consumer Motivations

In this section, I discuss various incentives that might play a role in consumer payment choice. I do not try to provide any measurement in this section, but rather lay out the issues that we will look for in empirical work. I begin by discussing explicit costs that might affect these choices. These can be thought of as "classical" incentives, that is, a fully rational consumer should take these into account. However, as we will see, these issues seem to only go so far in explaining observed consumer behavior. Researchers have put forward a number of proposals for ideas based on how "behavioral" or "bounded rationality" theory might explain decision making. I give an overview of some of these proposals next.

First, using a new payments mechanism is akin to a form of technology adoption. We have a great deal of research on the types of people who adopt new technologies, for instance in consumer electronics. They tend to be young, wealthy and educated, and we will see similar patterns in payments.

The explicit determinants of payment choice begin with pecuniary costs. Cash and check typically bear no explicit costs at payment time, although withdrawing money from an ATM machine often bears a cost and banks typically charge for checks as well. Also, consumers who overdraw their account can face relatively large fees. Credit cards allow consumers to delay payment on their product for up to 30 days, and collect interest during that time (sometimes referred to as the "float").[1] Also, many credit cards come with rewards programs that allow consumers to capture some benefits from card usage. However, many credit cards require annual fees. More importantly, consumers who are not paying off their balance in full every month face high interest rate charges that begin at the time of purchase, and so they bear costs even if they plan on contributing the full cost of the item towards their credit card bill. Fees for late or missed payments are also common. Debit cards typically bear no explicit costs at the time of usage, although again, overdraft bears fees. Recently, debit cards have begun rewards programs as well. One estimate places the value of debit rewards at about 0.25 cents per dollar, whereas credit card rewards are close to 1 cent per dollar. In contrast, prepaid debit cards do not earn rewards but do charge fees, both an initiation fee and a per-use fee. Recurring ACH payments are typically free. Individual electronic payments can sometimes face fees, either from the consumer's bank or the payee. Obopay is a software application that allows person-to-person transfers using the cellular telephone network or the Internet. Obopay charges the sender a fee.

Even with this dizzying array of fees, pecuniary incentives to pick one payment type over another are often not very large. Even a full year of credit card rewards may not add up to very much for the average consumer, and if the consumer rationally expects to get one late fee in a year, the benefits of a rewards program can look very small. In practice, consumers consider a suite of issues with no direct pecuniary impact as well. Clearly, consumers consider convenience and speed highly. Cash is perceived as quick for some transactions (usually small ones) and slow for other (large) ones. Check is the slowest option at a cash register but is often considered the easiest for paying a bill. Credit and debit are fast, and authentication times have fallen over time. Signature-based systems (credit, check and some debit) require the consumer to use a pen, which some people find burdensome (such as those with children). Personal Identification Number (PIN) debit requires the consumer to recall a PIN. In addition to speed, many consumers express concerns about security. It is not clear that their concerns are warranted, but it is nonetheless an important issue. Portability is high for plastic cards, although is perhaps even higher for some contactless devices. But contactless devices fare the worst in terms of merchant acceptance. Many retailers accept plastic payment methods, although cash and checks are often the only options for in-home contractors and service people.

Even with these concerns, the difference between payment types is not striking. Timing issues are measured in matters of seconds and the security differences are not overwhelming. Hence, there is scope for consumers to weight a number of issues that fall outside the scope of traditional economics. For these reasons, payment choice has been fertile ground for the burgeoning field of behavior economics and the economics of bounded rationality. Here, I briefly review some of these ideas, although I do not aim to be comprehensive.

The issue most commonly associated with credit cards is that they promote overspending because consumers cannot limit their current spending even though they will eventually have to pay back the sums. Hence, debit offers a method of self-restraint. Moreover, consumers bring preconceived notions about payment devices for reasons that fall outside of economics. For instance, they may attach a negative stigma (or even a religious objection) to using credit, which leads them to avoid credit cards. Similarly, many consumers feel that credit should only be used for certain types of items, such as large, luxury items that are infrequently purchased. Hence, they may prefer to pay for grocery bills out of current holdings (using debit for instance) but access consumer credit for a trip or new television. This may also contribute to their approach to record-keeping, as standard payments show up on one account statement and special expenditures show up on another.

Prelec (2009) provides a potential explanation for this behavior. He argues that the act of payment exacts a cost on the utility of consumption beyond the pecuniary cost. For instance, a consumer may report enjoying a free meal more than the identical meal for a cost. Hence, debit (or more generally pre-payment) is preferable to credit for perishable goods since it gets the payment out of the way. There is also disutility associated with payment. In particular, consumers want payment to feel like an investment in future benefits. A consumer who must pay for a meal a month after a meal gets disutility, and anticipates this disutility in advance. In contrast, a durable good which provides continuing flow utility is more naturally associated with installment payments, where it feels to the consumer as if payment is "covered" by future utility flows.

A complementary but alternative theory relies on mental accounting. For one discussion of this idea, see Thaler (1999). This theory argues that consumers place payments in different "mental accounts" and they value payments based on which account the payments fit into. Thus, explicit payment costs that the consumer feels are easily avoidable may confer very negative utility. Thus, a consumer is willing to go to great lengths to avoid a dollar fee for withdrawing cash from an ATM. Small payments that feel "decoupled" from the expenditure may not be tracked at all and thus the consumer does not respond to them. For instance, consumers may not account for the cost of purchasing check books in deciding on payment choice. As suggested above, mental accounting may correlate with financial accounts, so that a consumer prefers to place expenditures in debit and credit accounts based on the expenditure's associated mental account. These sorts of issues are highly complicated to test for empirically, but we will see a few results that speak to them in some sense.

III. Data Sets

In this section, I discuss some of the data sets that have been constructed for studying consumer payment choice. These are all surveys of individual households. I do not try to be comprehensive, although I mention a large number of research options. I focus on U.S. data sets almost exclusively. Only a few are publicly available.

Data sets can be usefully divided up by the way in which they are collected.

A. Cross-Sectional Surveys

The most common type of data in this field are cross-sectional surveys completed by phone, Internet or mail, or by a visit from an enumerator. Surely, the most important data set up to now has been the Survey of Consumer Finance (SCF). Administered by the Federal Reserve, the SCF is a triennial survey of the financial situation of U.S. families. It asks several questions about how many cards the household has, whether the household uses debit or credit cards, and whether the household pays off its credit bill each month or revolves credit. For the SCF, an enumerator visits the household and completes the survey during a lengthy interview, and this takes place for more than 4,000 families. Active since 1983, the SCF is viewed as very reliable, but is limited in its usefulness for these purposes because it aims to cover a wide variety of financial topics and therefore has only a limited coverage of payment-choice issues. The SCF data is freely available.

Thus, the SCF still leaves room for a series of proprietary data collection companies to provide useful survey data on payment choice. Ohio State University administers the *Consumer Finance Monthly*, which is ongoing since 2005. This data set uses random-digit dialing and computer-assisted telephone interviewing to survey a nationally representative sample on household financial issues, particularly on credit card adoption and use. Dove Consulting, a division of Hitachi Consulting, has administered five payment surveys by Internet since 1999. The surveys focus on preferred payment choice in different situations, for instance by type of store and purchase size. The last survey, in 2008, had 3,308 respondents. Global Concepts has administered a series of surveys titled Consumer Payment Strategies, for instance separate surveys on bill pay and point-of-sale choices in 2005 and 2006. The two years together generate about 3,500 respondents for each topic, who complete the survey over the telephone. For more than 10 years, Phoenix Marking International has administered annual surveys called the Consumer Payments and Usage Preference Study, first by mail and more recently by Internet, generating about 5,000 respondents over the last several years. Synergistics Research conducted two Payments Habits surveys, in 2004 and 2007, which covered general payment issues. The firm has also conducted a number of specialized surveys. For instance, since 2001, it has produced separate surveys on debit card use, credit card use, prepaid card use, online banking, mobile banking and micropayments. Administered by telephone, mail and Internet, the survey sizes range from about 1,000 respondents to almost 5,000 in one case. First Data also administers a similar survey.

B. Panel Surveys

All of the studies mentioned so far face the drawback that survey respondents change entirely from one study to the next, even for repeated surveys such as the SCF. Many of the questions that we are interested in require us to observe a household over time if, for instance, we want to track when a household first adopts a new payment instrument and increases usage, or how changing financial circumstances cause a household to change from one payment instrument to another. Thus, panel studies are particularly valuable.

A new entrant into this area promises to be an important participant in the future. The Consumer Payments Research Center at the Federal Reserve Bank of Boston has begun administering the Survey of Consumer Payment Choice (SCPC), joint with the RAND Corporation. The SCPC uses the RAND American Life Panel, a set of 1,500 households that are frequently surveyed on a variety of topics. The respondents complete Internet surveys, with special provisions for households without Internet access. RAND has response rates that are typically around 80 percent of panelists. Several preliminary surveys have been administered, but the first installment of what will be an annual survey was administered in 2008, and, in fact, the results have not been made public as of the time of this writing. Summary tables should be released shortly, and the underlying data are meant to become publicly available in the spring of 2010. The SCPC focuses on adoption and usage of different payment instruments in retail and billing environments, as well as cash holdings and online banking.

C. Panel Surveys of Transactions

One drawback common to all of the data sets discussed so far is that they are annual surveys at best, and usually ask consumers to evaluate their "usual" or "preferred" behavior. If consumers have trouble in recalling their behavior, the results will be biased. Also, we might be interested in behavior that is difficult to capture in this sort of survey, such as details on which situations a consumer chooses credit or debit. For these purposes, it would be preferable to have data at the level of the transaction. Naturally, such data is very costly to collect and maintain. However, I know of two sources for this type of data.

One source is the Payment System Panel Survey, collected by Visa. In this survey, households fill out a monthly diary for one out of every three months (once per quarter) of every retail transaction that they make. They record the type of merchant and, in particular, exactly which payment instrument they used, for instance, distinguishing which card they used if they hold multiple payment cards. The diaries are supplemented with an annual survey of demographics, attitudes, and payment options (for instance, which cards the consumer holds and the cards' features). The survey tracks about 3,000 households at any one time. Although turnover is reasonably high (the median length in the survey is less than one year), a number of households have been in the study for a very long time. The survey has been ongoing since 1994.

With the Visa panel, one might worry that consumers who are not sufficiently diligent about their diary might introduce bias. An alternative approach relies on passive collection of electronic data. Lightspeed Research maintains a large panel of consumers that participate in a variety of studies. In their payments survey, consumers provide Lightspeed with financial account information and in particular, information necessary to log into the account over the Internet. Lightspeed then "scrapes" information on consumer behavior on a daily basis, including transactions, account standings and the terms of the account. The data is supplemented with annual surveys on card holdings, attitudes and other issues. This data set has been collected since 2006. Stango and Zinman (2009) report that 917 households register all of their financial accounts (savings, checking and credit cards). Surely, such data provides a remarkably complete overview of household financial behavior. One important drawback however, relative to the Visa panel, is that we cannot observe cash transactions beyond the ATM withdrawals.

D. Other Sources

While my previous discussion covers a number of data sets that have been specifically designed to cover general payment choice, a number of other data sets have been utilized in approaching this topic. I discuss results below, but a brief list is helpful. Amromin, Jankowski and Porter (2007) obtain data on electronic versus cash payment at tollbooths from the Illinois highway authority. Klee (2008) uses data from a grocery chain's loyalty card program to learn about payment choice. Similarly, Fusaro (2008) obtains data on a bank's checking accounts. These "passive collection" strategies are attractive, but each brings limitations on what we can learn. They do bring up another interesting possibility: the use of scanner data. Currently, a number of large-scale "scanner" data sets are in use to study retail purchasing behavior, particularly at grocery stores. For example, see Bronnenberg, Kruger and Mela (2008). Relative to loyalty-program data, these data sets cover multiple retailers and, perhaps more importantly, are supplemented with household survey data so that the research learns demographics and, potentially, card holdings. To my knowledge, such data sets do not currently collect payment usage, but it certainly appears to be an interesting avenue to explore.

There is also useful data being collected outside of the United States. Just as an example, Deutsche Bundesbank perfomed a survey with 2,272 respondents in the spring of 2008, which included a computer-assisted personal interview and a payments diary (Deutsche Bundesbank, 2009). Payment instrument choice in some foreign countries involves not only the options we have discussed so far but also the choice of currency. The OeNB Euro Survey addresses this issue in European countries outside of the Euro-zone (Dvorsky, Scheiber and Stix, 2008). Interestingly, academics in France appear to have conducted their own diary of survey payment choice over an 8-day period for 1,392 people (David and François, 2009). Guseva (2008) studies the creation of the credit market in post-Soviet Russia.

IV. Attitudes

Even if we observe an empirical regularity, like consumers switching from cash to credit for large purchases, it will always be difficult to know why they made this choice. Perhaps there is something about the costliness of carrying large amounts of cash, or perhaps this is part of a mental accounting scheme where the consumer prefers all large payments to appear on a distinct bill. One way to get at this issue is to simply ask consumers. Many of the surveys mentioned above include a component that asks consumers their views on payment choice. In this section, I mention a few interesting results, which give us a frame of reference before we turn to the regression results.

I have access to a few of the data sets mentioned above, and so my results are based on them. The Dove survey asks consumers to agree or disagree with the statement that a payment option is "easy to use." Among respondents, 90 percent agree for credit cards, 84 percent for cash, 77 percent for PIN debit, 76 percent for signature debit, and less than 35 percent agree for checks. Interestingly, 90 percent of respondents call credit cards "convenient," whereas 74 percent and 78 percent agree with this for signature and PIN debit, and 72 percent for cash. Therefore, there is a set of people who regard credit cards as more convenient than debit and it is not just because they don't like entering their PIN. Perhaps they regard credit as more convenient because they don't have to consider their bank account balance with every use.

The most strongly agreed-upon statements for checks are "control," 56 percent, and "helps budget," 46 percent. Getting only half the population to agree to the statement is obviously not very strong. This must play a role in the decline of check use. Just as interestingly, these issues are not the top reasons given for debit or cash use. Hence, a theory of debit card usage based on personal restraint might be of limited importance. Similarly, it is hard to see clear evidence in favor of mental accounting theories. However, statements like "easy to use" or "convenient" might be related to behavioral or restraint issues.

First Data asks consumers who indicate they prefer a payment choice why they do so. For instance, among debit users, they ask PIN debit users why they prefer PIN, and signature debit users why they prefer signature debit. I list the top three reasons in Table 1. Strikingly, both users believe that their choice is more secure. It is hard to distinguish the difference between "Convenient," "Easier" and "Faster," but while PIN debit clearly scores higher in this category, it appears that a sizeable set of households disagree on this issue as well. A perhaps disturbingly sizeable group picks signature debit because they don't know their PIN number.

Payment size is an important determinant of payment choice. First Data asks consumers their preferred payment choice by size of payment, and Table 2 reveals striking differences.

Table 1
Why Do You Prefer Your Chosen Type of Debit Card?

	Why Signature?		Why PIN?	
1	Security	39%	Security	44%
2	Don't know PIN	12%	Easier	28%
3	Convenient	11%	Faster	25%

Source: First Data

Table 2
For a Given Size of Expenditure, What is Your Preferred Payment Choice?

	Cash	Debit	Credit Card
Under $10	71%	18%	7%
$10–25	45%	36%	13%
$25–50	21%	47%	20%
>$50	10%	43%	30%

Source: First Data

Table 3
For a Given Retail Type, What is Your Preferred Payment Choice?

	Cash	Credit Card	PIN debit	Signature debit
Department Store	15%	41%	22%	17%
Grocery Store	21%	24%	32%	16%
Gas	24%	37%	18%	19%
Fast Food	66%	11%	7%	16%

Source: Dove Consulting

The decrease in the use of cash is striking, and is presumably related to security, costs of ATM withdrawals and holding cash, convenience costs of handling large sums at a register, and perhaps issues of mental accounting. David and François (2009) use diary data from France to show that the average size for cash transactions is €10.8, whereas for debit transactions, it is €51.3 (credit card penetration is extremely low in France).

Dove data gets at a similar issue by asking consumers their preferred payment choice by type of retailer. A few results appear in Table 3. Again, the change for cash is striking but may have multiple explanations. The outsized importance of PIN debit at grocery stores is also interesting.

Table 4
Explanations for Debit Use Among Users, and Non-Use Among Non-Users

	Debit use	Debit non-use
Time	14.1	5.5
Convenience	88.1	8.3
Money	11.7	21.1
Restraint	5.8	5.5
Tracking	10.2	40.4
Security	3.9	7.3
Other	3.0	35.8

Source: Borzekowski, Kiser and Ahmed (2008)

Borzekowski, Kiser and Ahmed (2008) take a very interesting approach to this topic. The special module of the Michigan Survey of Consumers asks an open-ended question: Consumers who use debit are asked why they do so. Consumers who do not are asked why not. The authors then coded the answers themselves according to sets of keywords associated with issues like "convenience" and "security." They report in Table 4 (non-exclusive) explanations for why consumers do or do not favor debit.

Again, we see, at best, very limited support for behavioral explanations for debit use. The overwhelming majority of debit users cite convenience, not restraint or tracking. In fact, "Tracking" is the most highly cited explanation for *non-use*, substantially higher than the "Money" category (40.4 percent to 21.1 percent), which includes rewards. The authors note that convenience may incorporate some sentiment that would be classified as behavioral.

Interestingly, merchant acceptance is never cited as an explanation for non-use. This is striking because Ching and Hayashi (2008) report in Dove data that consumers (wrongly) believe that many stores that accept credit cards do not accept debit cards. An extreme example appears for department stores: They show that 90 percent of respondents believe that department stores accept credit cards but only 65 percent believe that department stores accept debit cards.

Overall, up to this point, we see a strong role for convenience and transaction size in determining payment choice.

V. Empirical Results

In this section, I focus on results from regression analysis in existing studies. Regression analysis allows the researcher to control for multiple explanatory variables simultaneously. For instance, if we observe that credit card use is correlated with both income and education, but we know that income and gender are themselves correlated with each other, regression analysis allows us to separate

the effects of income and education on choice. To the extent that we correctly control for all relevant explanatory variables and we do not believe that choice itself affects the variable we are considering, we can even interpret the regression analysis as revealing the *causal* effect of the variable on the choice.

A. Age

The result that demographic variables predict payment choice is robust across many studies. These results are only tangentially related to the issues of payment choice that I raised above. Instead, they have a great deal in common with results we have about technology adoption in other contexts, such as consumer electronics. For instance, age is an important determinant of payment choice. Schuh and Stavins (2009) use an early version of the SPCP to find that someone over 65 is 18 percent more likely to use a credit card and 35 percent less likely to use a debit card than someone who is age 35-44. Note that this calculation controls for other observable features, such as income. Borzekowski, Kiser and Ahmed (2008) find a similar result in the special module of the Michigan Survey of Consumers, and Stavins (2001) finds this result in the SCF.[2]

B. Education

Interestingly, results on education are much less robust, with some studies finding a relationship between education and credit use, and others not. There is often a stronger relationship in simple correlations than in more comprehensive regression analysis. Schuh and Stavins (2009) find no effect of education overall and a hump-shaped effect for men, but Stavins (2001) finds a strong positive effect of education on all plastic payment types in the SCF, and Borzekowski, Kiser and Ahmed (2008) do so as well in the Michigan Survey.

C. Income

Income is a strong predictor. For instance, Schuh and Stavins (2009) find that higher income people are more likely to use credit and debit, although the effect is bigger for debit in the SCPC. Stavins (2001) finds the same result in the SCF, as do Borzekowski, Kiser and Ahmed (2008) in the Michigan Survey. In a somewhat similar result, Hayashi and Klee (2003) use the Dove data set to show that consumers who use the Internet are more likely to use debit and online bill payment, further suggesting the similarities between payment choice and technology adoption.

D. Costs

More germane to our discussion is the role of pecuniary costs in determining choice. Here, we have fairly strong and consistent evidence in favor of a strong consumer response. In particular, Zinman (2009) uses the SCF to show that consumers who are revolving credit (that is, carrying a balance from month to month) are more likely to use debit. Because revolvers bear a substantially larger cost of credit card use, that suggests that pecuniary incentives play a large role. This is particularly striking because one would expect revolvers to be particularly cash

constrained, and hence more in need of their line of consumer credit. Sprenger and Stavins (2008) extend this result in the SCF to show that while debit use increases, revolvers do not also increase check and cash usage. Hence, we see that debit and credit use are very close substitutes.

Fusaro (2008) has data on checking accounts from a bank. Thus, he cannot see credit card expenditures. However, he can see checks written to credit card companies, and he uses clever rules to label people as credit card revolvers, such as people who pay the same amount towards their credit card for several months in a row. With this sort of technique, he also shows that revolvers are more likely to use debit than non-revolvers.

E. Rewards

More difficult to verify is consumers' response to reward behavior. Ching and Hayashi (2008) study this issue in the Dove survey. They find a strong correlation between the respondent's favorite payment choice (as indicated on the survey) and whether the payment has a rewards program. This relationship holds up even after controlling for consumer attitudes towards the payment type; for instance, whether they believe the instrument is convenient, safe, widely accepted, etc. These extra controls mitigate possible endogeneity problems. For example, we might worry that high spenders both choose credit and get rewards and so the statistical relationship does not indicate a causal effect. However, we can control for whether a person is a high spender (at least in part) by controlling for respondent attitudes, which also appear in the survey. In simulations based on their empirical results, the authors find that removing awards on credit cards only causes about 3 percent of consumers to switch away from credit card use (which is a substantially larger percentage of credit card users) and those consumers substitute evenly towards debit and credit. Interestingly, they find that removing rewards on both credit and debit still leads to an overall increase in debit use since many marginal credit users would switch to debit.

F. Payment Size

Payment size is an important determinant of payment choice. Using scanner data from a grocery chain's loyalty program, Klee (2008) finds that a $10 increase is associated with an 8 percent decrease in the probability of using cash. Interestingly, she finds a U-shaped relationship between debit and credit, where credit dominates debit for low- and high-dollar amounts. Klee speculates that low-payment sizes indicate low-income households that need their credit line, whereas high amounts indicate high-income people who are sensitive to the time cost of holding money. David and François (2009) also find an important role for payment size. Neither study uses household fixed effects, so their results may be partly explained by households that both use plastic and buy large amounts, but they do control for demographic variables in several ways.

G. Time at the Checkout

The effect of time at the checkout is very difficult to parse out empirically. Even if one had transaction-level data, time essentially does not vary across transactions. Borzekowski and Kiser (2006) use average times at the checkout for different payment types (based on scanner data used in Klee, 2008) and then regress consumers' favorite payment type (as reported in the Michigan Survey) with transaction times. They find that checkout time is important. Klee (2006) confirms this result using scanner data from grocery stores. David and François (2009) find a similar result in France. However, these results must be regarded with caution because transaction times are constant for each payment type. With so little variation in the variable of interest, standard errors should be very large. See Donald and Lang (2007) for an interpretation of the clustering issues here. But although I am skeptical of the regression results we have on this issue, the surveys of consumers' attitudes (that I discussed in Section 4) are overwhelmingly supportive of the important role for time at the checkout. Note that time at the checkout is measured in seconds. Evans and Schmalensee (2009) speculate that time at the checkout for plastic payments are so low now that new technologies are unlikely to succeed just by reducing this time.

H. Single-Homing

One issue of particular interest is the concept of "single-homing," that is, whether consumers hold or use a single card, or whether they hold and use multiple cards of different types (called multihoming). This issue is particularly important because if consumers are single-homing, it implies that payment card providers have market power over merchants because the payment card provider effectively has a monopoly over access to those consumers. The merchant must either come to an agreement with the card provider or forgo sales to those consumers. For more on these topics, see Armstrong (2006) and Rochet and Tirole (2006).

In Rysman (2007), I use Visa's PSPs to study the extent of single-homing among credit and charge card networks, that is, the extent to which households held or used cards from one network or mulitple networks, where networks are Visa, MasterCard, American Express and Discover.[3] The results turned out to be somewhat complex. In terms of card holdings, most households hold cards from multiple networks. Only 36 percent of the households say they hold cards from just one of the networks (almost always Visa or MasterCard). Hence, holdings can be characterized by multihoming.

However, the results are very different when we look at usage. I found that in 75 percent of household-months, the households put 88 percent or more of their spending on a single card (again, this was just among credit cards). The median household put all of their spending on a single card. The results are even stronger at the level of the network, with 75 percent of household-months putting more than 97 percent of their spending on a single network. Overall, there appears to be strong single-homing for usage, although most consumers maintain the ability

to switch networks if they have to. Exactly what sort of price difference would be required to induce that switch remains a topic for further study.

These results are in part supported, and in some ways contradicted, in Snyder and Zinman (2007). They use the SCF, which has some questions that touch on these issues although they do not address them as directly as we might like. Their results are similar to mine on the issue of ownership: They find that most households hold multiple credit cards, although they cannot tell whether the cards are from multiple networks. More interestingly, Snyder and Zinman show that more than 50 percent of households own both a debit card and charge/credit card. However, Snyder and Zinman differ from me on multihoming with usage, although to be clear, they look at multihoming across credit and debit, not among card networks. They find that among households that use plastic payments regularly, perhaps 70 percent or more use both credit and debit. Interestingly, Hyytinen and Takalo (2008) show little evidence of consumers multihoming across debit and credit in Finnish survey data.

I. Merchant Acceptance

Merchant acceptance must be important to consumers at some level. If no merchants accepted a payment mechanism, surely no consumers would want to adopt it. However, how important are observed levels of merchant acceptance for existing payment mechanisms in determining payment choice? This is difficult to say becuase data on merchant acceptance is hard to come by. In Rysman (2007), I obtained records by zip code of which merchants transacted over the Visa network. A relatively small number of non-Visa transactions (MasterCard, American Express, Discover) also appear on the Visa network, and so I could infer zip codes where there were relatively more or less merchants transacting in each network. I found a statistically significant correlation between the networks that consumers use and the number of merchants accepting the network (i.e., the number appearing in a month), suggesting that acceptance was important for network choice. This result is consistent with the existence of a positive feedback loop in the payment market, which is important for theories of network effects and two-sided markets. See Armstrong (2006), Rochet and Tirole (2006), and Rysman (2009).

J. Security

There is almost no regression evidence on issues of security. Ching and Hayashi (2008) include whether consumers believe that a payment type is safe as an explanatory variable, and it turns out to be insignificant. They speculate that consumers perceive all payment types in their analysis as equivalently safe. They also recognize the potential endogeneity in this regression—in fact, they include safety in part to control for this endogeneity in other variables rather than to study the role of safety directly.

K. Behavioral Explanations

Given the list of results above, especially the strong evidence on pecuniary

effects, what is the scope for behavioral issues in explaining payments? I believe that it is unlikely that we will find strong evidence in favor of behavioral theories in explaining observed payment choices. To be clear, there is strong evidence that behavioral explanations matter in laboratory settings. For instance, Prelec (2009) reports that when asked whether to pay in installments before or after receiving a good, the same consumers differ based on the type of product. For example, they prefer to pay for a vacation ahead of time and a washing machine after receiving it, even when the expenditure size is exactly the same. It seems likely that consumers carry these sorts of preferences "into the field" and hence, behavioral theories play a role in explaining choices. Furthermore, it seems unlikely that we can find evidence that definitively rejects behavioral theory. In part, this reflects that such theory is very flexible.

Even if we cannot reject behavioral theory, can we find evidence in its favor in the kind of regression analysis that I describe here? The strongest evidence would be if we can find predictions from behavioral analysis that contradict predictions from traditional incentives and verify them in data. I can see three dimensions on which to search, all of which I believe are unlikely to turn up such evidence.

First, we can look at households that put some transactions on credit and some on debit. We might be able to use one of the transaction data sets to observe the same household (or similar households) facing the same price for goods of different types. If they were to pay for one type with credit and one type with debit, we would have strong evidence for behavioral theory. But note that even in a very large panel data set with a great deal of transaction data, we may have relatively few observations of the kind of large expenditures that would identify this issue. Furthermore, if we believe that consumers largely single-home on one plastic payment type (recall that Rysman, 2007, and Zinman, 2009, present potentially conflicting evidence on this), it is even more unlikely that we will see much evidence of this behavior.

Second, if single-homing within plastic choices is prevalent, we might turn to behavioral theories to explain when consumers choose cash or plastic. However, the dominant empirical fact here seems to be payment size. There might well be a behavioral element to this phenomenon, but separating it from the traditional explanations (the security, costs and record-keeping issues in transacting in cash all the time) suggests that this will be hard to identify.

Third, it might be more fruitful to look for a role for behavioral theories in broader choices rather than transaction-by-transaction. For instance, if we believe that households single-home, we might ask why they ever choose to do so on debit. Behavioral explanations are often invoked to explain the popularity of debit, as several pecuniary issues point in favor of credit. However, not all do so. Zinman (2009) reports in the SCF that only 28 percent of debit users lack any observable reason to pick debit—that is, they own a credit card and have no outstanding balance. Even among those people, Zinman suggests that explicit time costs play

a role—a consumer may want to get cash back at the same time as purchasing a product, or may not want to deal with paying a credit card bill (which a consumer may rationally predict can lead to fees). Surveys of attitudes cite "convenience" much more than "tracking" or "budgeting" to explain debit use (which again, does not necessarily reject behavior theory, but neither does it support it).

L. Switching

Finally, I wish to point out one drawback that plagues almost the entire literature up to now. All of the papers focus on cross-sectional relationships and, as such, focus on the current set of choices that consumers make. While papers try to control for various characteristics in a cross-sectional approach, we still worry about further heterogeneity causing these results. For many of the issues of interest, it would be more interesting to look at why households switch payment choice. It would be particularly compelling if a paper could use household fixed effects, which focuses our attention on households that switch payment types. Such a focus would be useful for parsing out both traditional and behavioral explanations for choice. However, this approach is particularly difficult as households rarely switch their favored payment mechanism. I can personally attest to this; even in the long and rich Visa panel, I found that including household fixed effects eliminated most of my results, although they were robust to household random effects (as discussed in Rysman, 2007).

With this thought in mind, I bring up my last paper to discuss, which presents striking evidence of households switching in response to pecuniary incentives. Amromin, Jankowski and Porter (2007) study toll payments when the Illinois State Toll Highway Authority doubled the toll at most locations from 40 cents to 80 cents for cash users, but left it at 40 cents for I-PASS users, a program that uses RFID transponders to allow cars to deduct payment electronically "on the fly." The price change was announced in August 2004, and went into effect on January 1, 2005, and they observe the total number of accounts by zip code just before the announcement and a month after implementation. The effect of the program was dramatic. Up to the announcement, the program had been in place for 6 years and had attracted 1.2 million users. Over the next four months, the program jumped to 1.75 million users, a 45 percent increase. The share of toll paid via I-PASS practically doubled, from 40 percent to 70 percent. The authors guess that by the end, practically every regular user of the tollway adopted the I-PASS. The paper uses careful evaluation of commuting costs and demographic data on different zip codes, along with the timing of adoptions, to argue that high-income areas responded strongly to the associated advertising surge, whereas lower-income areas responded primarily to the price change. However, it is difficult to separate because the advertising mentioned the price change.

What can we learn from this example? Perhaps we should not extrapolate from this example to other payment situations at which larger stakes are present. However, it seems striking that for 40 cents a payment, consumers switched. I suspect this

point is broadly applicable. Put a small surcharge that is clearly, immediately and explicitly tied to a payment mechanism, and people will quickly switch away. Other incentives, including behavioral ones, are unlikely to mitigate this effect very much.

VI. Conclusion

This paper reviews the literature on the determinants of payment choice, with an emphasis on the empirics. I briefly discussed these determinants in theory, moving from explicit pecuniary issues to more subtle behavioral ones. I reviewed several existing data sets that have been used to study these issues. I presented some interesting results on consumer attitudes, focusing on the important role of convenience in the survey data. Then I reviewed existing results from regression data.

I find strong support for age and income in determining payment types, but mixed evidence on education. Explicit pecuniary costs also matter, and there is evidence that consumers respond to rewards programs. Survey questions suggest that time at the checkout matters, but this is difficult to identify econometrically. Similarly, there is no evidence that security matters, but this is also hard to look for empirically. Among credit cards, consumers focus their spending on a single card or network, but may use both credit and debit cards simultaneously. Merchant acceptance plays an important role, even in current market conditions. Behavioral theories of payment choice are clearly important in laboratory settings, but their role in real world settings is unclear. Although it is very hard to reject behavioral explanations, we have little evidence strongly in their favor.

Endnotes

[1]Results from Stango and Zinman (2009) suggest that the float is very small for most consumers. However, Fusaro (2008) points out that if floating a bill allows a consumer to avoid overdraft or a payday loan, the benefit is much higher than indicated by the interest rate on a savings account.

[2]This result is not uniform. David and François (2009) do not find a significant coefficient on age in their French data set.

[3]For the purposes of this literature review, it might be more interesting to have studied single-homing between debit and credit. However, I was particularly interested in single-homing within credit cards because, theoretically, the extent of single-homing affects the interchange fee, and interchange fees are especially controversial for credit cards.

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Consumer Payment Choice: Measurement Topics
Commentary

Kylie Smith

I feel very privileged to be able to discuss this detailed review that Marc Rysman has just given us.

In my comments today, I want to draw on some Australian data to hopefully illustrate some of the points Marc has talked about in his paper. And I also want to use these data to give you some insight into where there currently has not been much data available elsewhere. I then want to turn my attention to the role of costs and prices. As Marc has just shown with the tollway example, these can be very important in consumer payment choice.

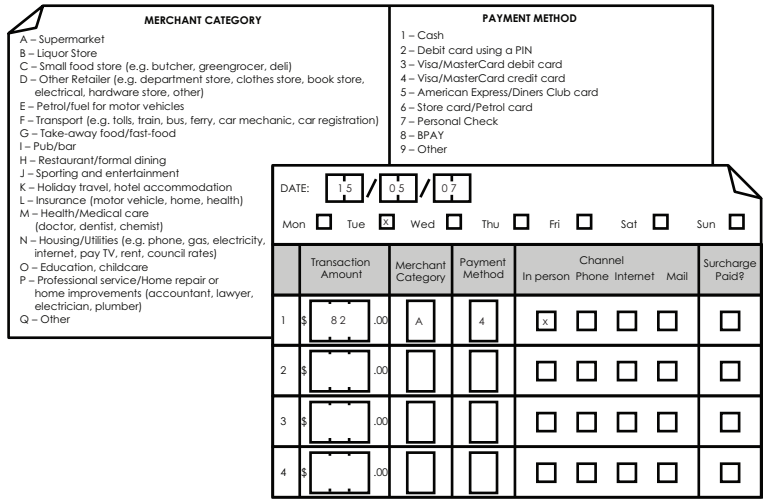
The general sense I get from reading Marc's paper is that the current literature seems to be going down a path of focusing on behavioral-type factors. It is saying we cannot get a good handle on consumer payment choice because these behavioral factors are important, but they are difficult to measure. But I still think there is a lot to be done on cost and prices, which are also difficult to measure because they do not tend to vary much over time or across consumers or payment instruments. Hence, what I want to do in this discussion is build upon the toll example Marc gave by giving you some Australian examples to show significant price changes do matter.

I will start off with a few brief comments on data to give you some insight into the type of data we have collected in Australia.

In 2007, the Reserve Bank of Australia (RBA) conducted two extensive studies. One was on consumer payment use and the other was on costs.

For the consumer payment use study, the approach we took was to do a diary study of individuals. Sample diary pages are shown in Figure 1. For this study, consumers reported details of each transaction they made over a two-week period. We have found this to be a neat way to capture consumer behavior.

Figure 1
Example Diary Page



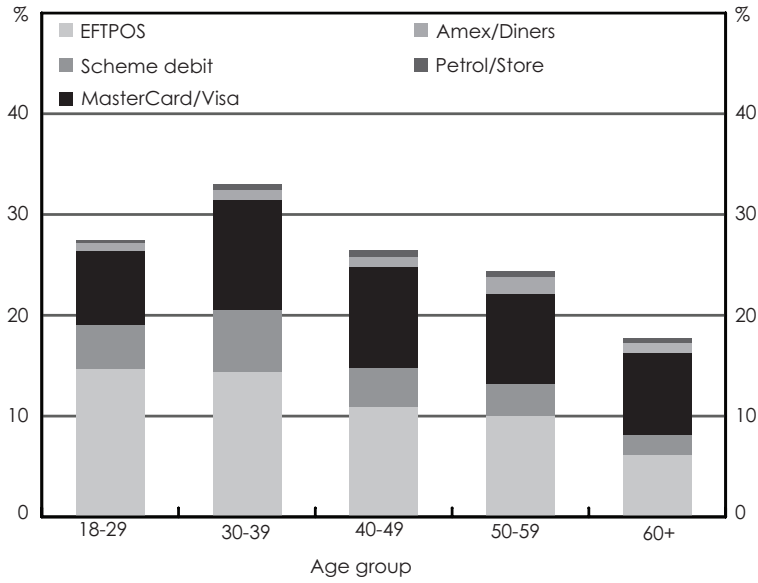
As Marc mentioned, most other studies tend to use surveys that ask consumers questions like "What is your most frequently used payment method?" But, we have found that with transaction-level data, you can use information on, for example, the transaction size or the merchant category to give insight into why consumers might choose different payment instruments in different payment situations. Hence, you do not need to rely on more general behavioral-type variables, such as whether a consumer *typically* used a particular payment instrument because they *perceived* it to be quick or convenient.[1] Yet these are the types of variables a lot of the literature now is trying to incorporate into empirical work.

Just a brief remark on cost studies. Collecting data on costs is a lot more difficult than collecting data on consumer payment use. The reason for this is, if you want to get a detailed picture of costs, you need to ask each participant in the payments system what those costs are. The importance of obtaining cost data though is that it can also tell you important information about consumer behavior. For example, in our cost study we collected data on tender time from merchants. This can probably provide more specific information on consumer behavior than asking the consumer the more general question, "Do you value this payment instrument because of the speed of the transaction?"

That is all I wanted to say on data. Now I will walk through a couple of charts which provide an overview of payment behavior in Australia.

Chart 1 is the use of cards by age. We find age does play a role in explaining consumer payment choice. In Australia, consistent with other studies, we find debit cards are used most by the youngest age groups with use tending to decline with age.

Chart 1
Use of Cards by Age Group



Source: Roy Morgan Research

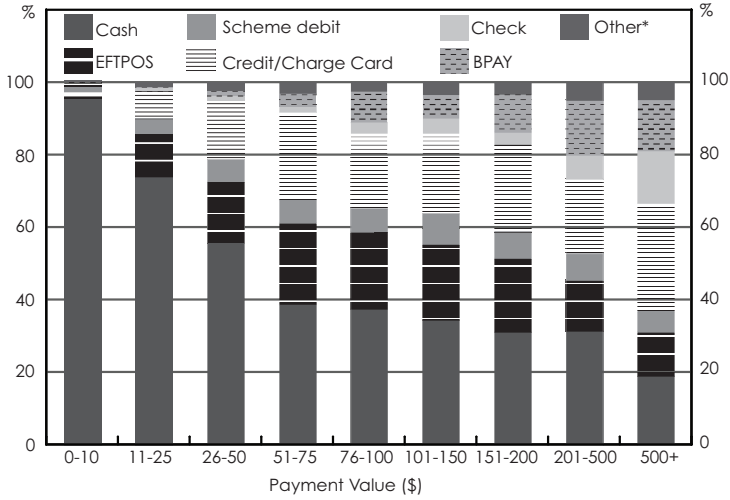
Chart 2 is the share of payments by transaction value. We also find transaction value to have a strong effect on payment instrument use. For example, cash is by far the most commonly used payment method for low-value payments, accounting for almost all transactions under $10. Card payments are used extensively across all but very low payments, and checks are mostly reserved for high-value payments.

So, the main purpose of showing these two graphs is to point out that payment behavior in Australia is not too different from the results being found overseas.

I want to hopefully add to Marc's discussion by giving you some examples of variables that have not received much attention in the literature, yet can give some useful insights into consumer payment behavior.

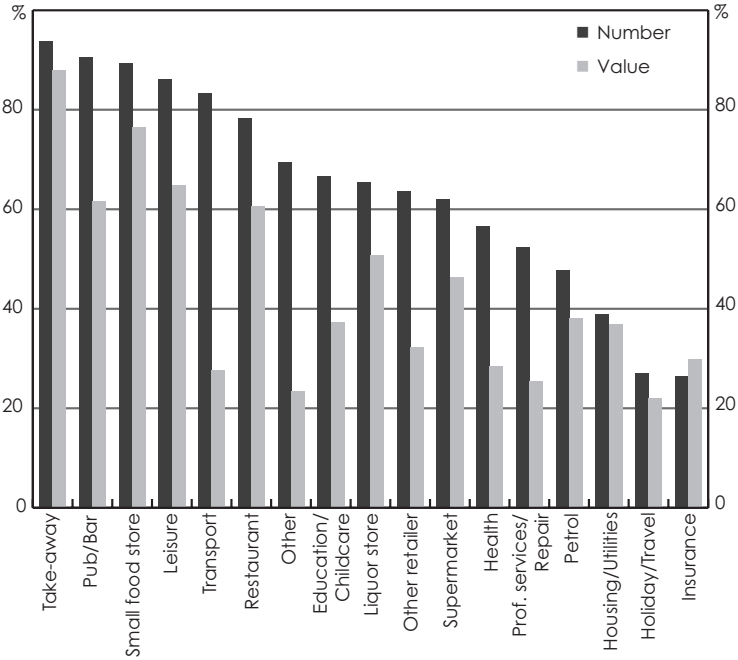
The first is merchant category. Chart 3 shows cash is more likely to be used than other payment instruments in merchants such as take-away stores or pubs and bars. Although the graph only shows raw data, even in our empirical analysis—controlling for factors such as transaction size—we still find a high probability of cash use for these merchants. And, here we are likely to be picking up some behavioral effects: the effect of consumers' desire for quick transaction times at these quite busy merchants. You cannot imagine someone typically waiting around in a take-away store or a pub to sign for their credit card when they have a queue of customers behind them.

Chart 2
Share of Payments
Percent of number of payments



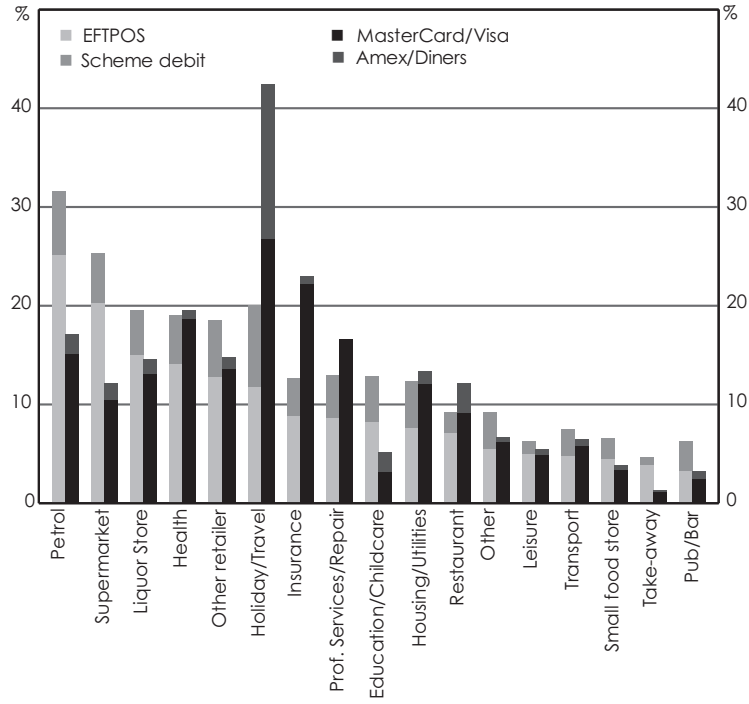
*Includes petrol/store cards and "other" payment methods
Source: Roy Morgan Research

Chart 3
Cash Use Across Merchant Categories
Percent of payments



Source: Roy Morgan Research

Chart 4
Card Use Across Merchant Categories
Percent of number of payments



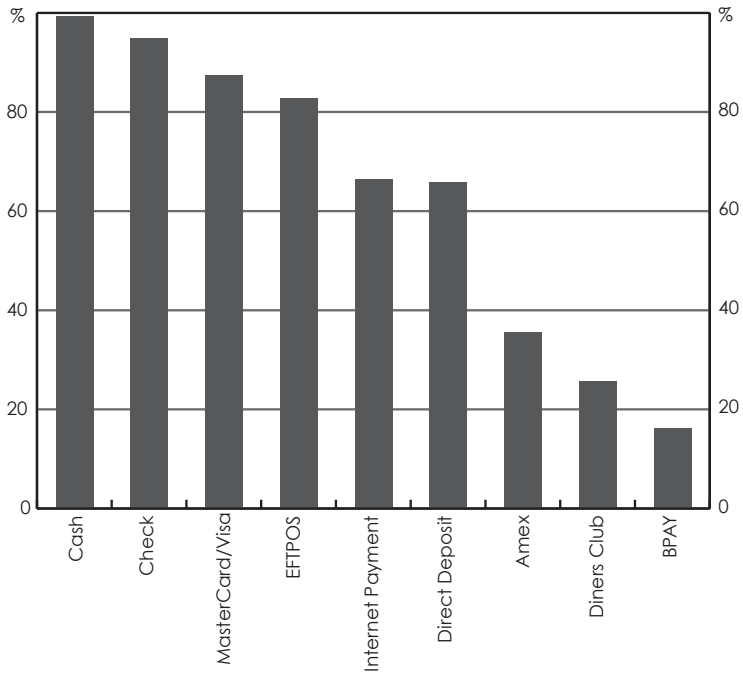
Source: Roy Morgan Research

Chart 4 shows a different type of behavioral effect. We find debit cards are more likely to be used than other payment instruments in merchants like petrol stations and supermarkets. Marc talked about some of the mental accounting theories: consumers might have a desire to consume or purchase certain items out of current income. But we also know in Australia that some petrol stations and supermarkets tend to offer cash-out facilities. So, the behavioral effect we are likely to be picking up here is that consumers value the fact that debit cards save time; they do not need to make a special trip to the ATM to make a cash withdrawal.

Another variable that does not receive that much attention in the literature is merchant acceptance. Admittedly, data on this are quite difficult to obtain. We collected some data on merchant acceptance from small businesses as part of our use study. And from this we find the reason cash is probably used most extensively for small-value transactions in Australia is because it is accepted almost universally. As Chart 5 shows, cash is accepted by almost all small businesses, but not as many accept credit cards or EFTPOS (our domestic debit card system).

Having talked about consumer behavior and some alternatives to subjective preference-type variables, I now want to talk about consumer costs. Marc

Chart 5
Payment Methods Accepted by Small Businesses
Percent of respondents



Source: RBA Small Business Survey

mentioned costs briefly, but I want to highlight their importance because we have observed some interesting consumer responses to costs in Australia. Again, information on costs can also be used to demonstrate some of the behavioral theories Marc has talked about.

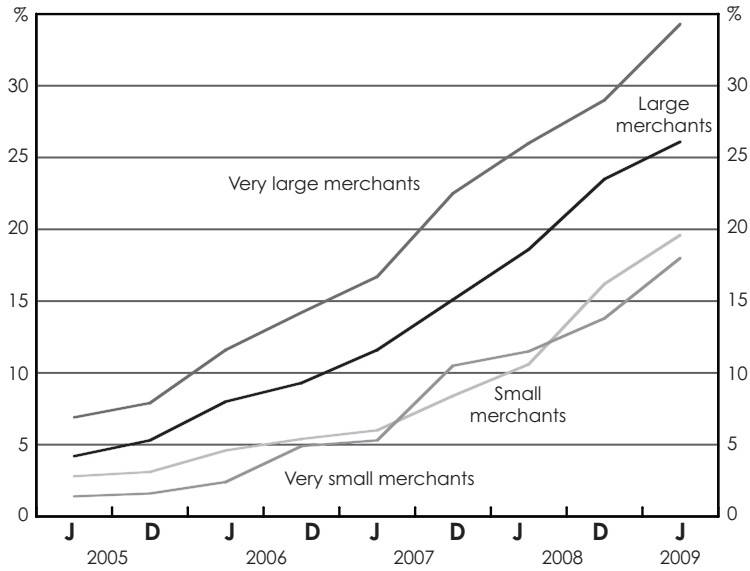
I'll start by looking at time costs. In Table 1, I've included data from our cost study showing the various time costs to a consumer of making a payment. Tender time is a particularly important consideration because it makes up such a large component of these costs. And, we can use these data to observe consumer behavior, though we would also need to consider interactions with merchant categories. For example, tender time might matter to consumers for purchases made at supermarkets, but maybe not at other merchants such as the corner store because they can catch up with the local small-business operator.

Moving on to explicit costs: the fees and charges consumers might face. I mentioned at the start there is some difficulty in capturing price effects empirically because prices do not tend to vary. But in Australia there have been some changes to the price structure—either pricing or the pricing regime—of various payments instruments, and the evidence suggests that these changes do seem to matter for consumer payment behavior.

Table 1
Consumer Time—Point-of-Sale Payments
Seconds per transaction

	Credit card	EFTPOS	Cash	Check
Tender time	45	35	20	90
ATM withdrawal time	—	—	9-16	—
Statement reconcilliation	5	5	1	5
Bill payment	13	—	—	—
Total	**63**	**40**	**30-37**	**95**

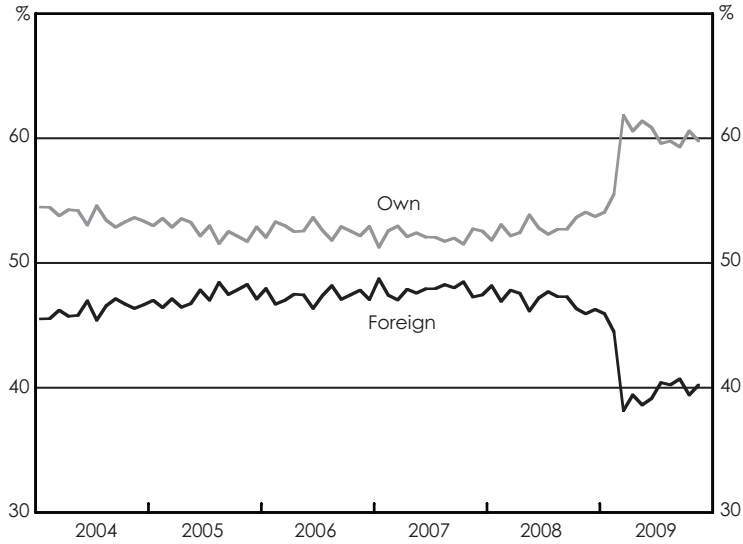
Chart 6
Merchants Surcharging Credit Cards*
Percent of surveyed merchants



* Very large merchants are those with annual turnover greater than $340 million, large merchants $20 million to $340 million, small merchants $5 million to $20 million, and very small merchants $1 million to $5 million.
Source: East & Partners Pty Ltd.

The first example is merchant surcharging. At the start of 2003, the RBA introduced a standard requiring the removal of scheme rules that prevented merchants from surcharging for credit card transactions. Chart 6 shows that while there was a slow uptake of surcharging by merchants, currently around a third of very large merchants impose a surcharge. In terms of the consumer response, we received some confidential data from one of the schemes that showed when a surcharge is imposed on one particular type of card, or if it is higher on a particular type of card, use of that card declines dramatically.

Chart 7
Composition of ATM Withdrawals
Percent of total withdrawals



Source: RBA

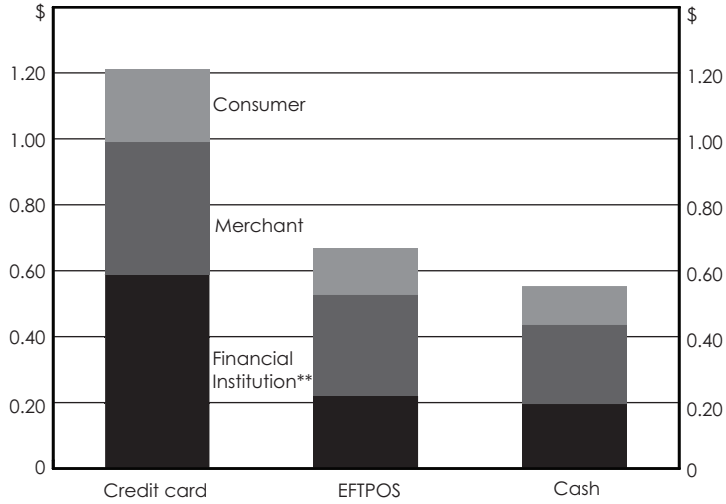
Chart 7 shows a second example of costs where noticeable effect on payment behavior was observed with the recent reforms to the ATM system in Australia. In March 2009, we introduced reforms that increased the transparency of prices to consumers. Prior to the reforms, consumers were charged what was called a foreign fee from their bank if they made a transaction at a foreign ATM—that is, an ATM owned by another bank. This fee was not transparent; it appeared on the customer's account statement at the end of the month.

In contrast, since the reforms, the ATM owner now charges the consumer directly—in place of the foreign fee—with the charge showing up on the ATM screen at the time the withdrawal is made.

The interesting thing about this change in the regime, though, is that prices to consumers have remained virtually unchanged. Before the reforms, the foreign fee was about $2, and now the direct charge is also generally around $2. The only thing that has changed is the transparency of the price. However, changing the way the price was displayed to consumers changed their behavior immediately. The graph shows that the share of foreign transactions consumers make—that is, transactions at ATMs not owned by their own bank—fell immediately in March when the reforms were introduced. And it has remained virtually unchanged at this lower share since.

To sum up on costs, the purpose of showing these examples was to demonstrate that costs do play a big role in explaining consumer payment behavior and can also give some insight into behavioral/preference effects.

Chart 8
Total Payment Costs*
Percent average transaction for each payment method



* Resource costs excluding account overhead costs
**Including costs of currency production for cash

I will finish now by making a brief comment on a point Marc made during the introduction of his paper. He stated that understanding the determinants of consumer choice is important because every government has a responsibility for an efficient and effective payments system. I do agree with this statement, but consumer choices are only one part of efficiency. Another important part is the costs of those payment instruments to society as a whole. Chart 8 demonstrates the extent to which costs can vary across various payment instruments. And what we found to be important when we looked at efficiency during our reforms over the past seven years was whether or not these costs were broadly reflected in the relative prices that consumers face.

To wrap up, I agree that further research on behavioral theories and consumer payment choice is an interesting topic, but I still think there is more work to be done on examining the role of costs in explaining payment choice. There have been a few studies, as Marc pointed out, but there are also difficulties in finding effects of costs empirically because there is often little variation in prices.

Hopefully, by showing a couple of examples from Australia (and building upon the toll example that Marc pointed out), we can see that price changes can result in some interesting consumer payment behavior, and importantly, we can even use these kinds of responses to inform us about those behavioral/preference effects that might otherwise be difficult to measure.

Endnote

[1]To define, I group all qualitative-type variables into the category of behavioral or preference variables.

General Discussion
Session 2

Mr. Weiner: Thank you, Marc and Kylie. Marc, I will give you a chance to react to comments Kylie made.

Mr. Rysman: I agree with everything she said. I certainly think costs are important too, although I left it out of my paper.

Mr. Hunt: I was intrigued by Kylie's chart on the surcharging. Have you done any research on whether this variation in surcharging has led to consumer-sorting across merchants?

Ms. Smith: I am sorry. Could you clarify consumer-sorting?

Mr. Hunt: Once you change the price structure, you may change the kinds of customers you attract. So, is there any way you can measure that effect?

Ms. Smith: Unfortunately we are trying to get a lot more detailed information on surcharging in Australia at the moment because it has become an important issue. We haven't been able to look at that in too much detail. There was a study done by the Netherlands Bank. One of the coauthors is here—Wilko Bolt. They found consumers may, when faced with a surcharge, go to a different store. Their number was about 5 percent. They indicated if they faced a surcharge, they might actually go to a different merchant. But that is all the evidence I know of.

Mr. Gove: Just a comment on the surcharging in the Australian environment in addition to Kylie's chart there. It shows between 20 and 30 percent of merchants surcharging. That should not be confused with the percent of transactions that are being surcharged, which is about 5 percent according to Reserve Bank estimates.

The other thing that is important to realize about surcharging—I am just saying this because there seems to be a lot of misinformation about surcharging in Australia—is they may only be surcharging on one card type. It may only be

American Express. It is not surcharging on all cards necessarily. Those sorts of issues need to be kept in mind when evaluating the impact of surcharging in Australia.

Mr. Weiner: I think the surcharging issue obviously is very important and very timely right now. I don't want to put anyone on the spot, but the Dutch have some studies on this, as does the Bank of Mexico. I know Jose is with us. Any comments from either the Dutch or the Mexicans on your experience?

Mr. Bolt: In Holland, we use only cash or debit cards at the point of sale. We don't use credit cards. One in five merchants in the Netherlands—predominantly small merchants—surcharge debit cards. They do that in a specific way. They do it only for payments below €10. So below €10, if you want to use your debit card, you pay sometimes four times the fee the merchant pays. So, if the merchant pays a 5-cent flat fee for every debit card transaction, he charges 23 cents, on average, for a payment below €10. That was actually a normal situation.

The Dutch then say, "Well, I am not going to pay that if I buy something for €9.90 and then you have to pay a 23-cent extra fee."

So, what they do is use cash or they go to another merchant that doesn't surcharge. In the end what happens with regard to all this is, if you would stop surcharging, the debit card volume for those small payments would rise enormously. Then you can realize economies of scale. Promising in some sense lower debit card fees ultimately, so actually what we are now advocating at the central bank is that we have a public campaign that merchants should in some sense stop surcharging and say to consumers on a national channel on television, "You should use your debit card also for small payments."

What we have now seen in 2009 is the number of transactions by debit cards for under €10 has increased by 20 percent. Dutch people are using the debit card also for small payments, and merchants are reacting by stopping surcharging. In the end, they actually expect and banks somehow also agree to that. Of course, this is a difficult area to discuss. Yet to come are lower payment fees over time, actually decreasing the 5 cents to even lower, because the volume gets bigger and bigger and you can realize economies of scale there. That is what happens in Holland.

I have a question for Kylie on the surcharging. Do you know what types of merchants surcharge and the different rates, how much or to what extent they surcharge? Do they extend the full payment fee they face, or do they absorb some of those costs and pass on some of those costs to the consumers? Does that differ across types of merchants?

Ms. Smith: We do have some data on this. We obtain data from a consulting firm that surveys a group of merchants, and we also collect our own quarterly data from acquirers on merchant service fee income. It does seem roughly that the surcharge is in line with the merchant service fee.

Mr. Hayes: A comment on the comment, and then I also have a question for Kylie, if I can.

The comment is, in the United States clearly there is no surcharging on debit card payments. You are prohibited from saying you can't take a card for a transaction of less than x amount. We see small-value payments are the fastest growing category of debit payments in the United States. Fully 25 percent of all debit card transactions are for less than $10 here, and it is growing very, very quickly, even without this idea of lower pricing. So, it seems the value proposition has been quite strong, and it represents a big part of the market.

My question concerns your last chart. I want to try to understand the basis for the numbers. The three colored bars are meant to be financial institution cost, merchant cost, and consumer cost in each of the three payment forms. What is somewhat puzzling is when I look at the EFTPOS number, the merchant cost appears to be a bit higher than the cash cost, for example. My understanding is that with EFTPOS, the merchants are receiving typically 4 or 5 cents per transaction in revenue by the issuer and typically have fairly low processing costs. So, I am just puzzled by why that cost would be higher than what you show here for cash. So, maybe I am misreading this or there are other things embedded within these numbers.

Ms. Smith: Yes, you're right. Those three bars are the costs broken down into financial institution, merchant, and consumer. On the EFTPOS versus cash, the component there for the merchant will be the "tender times": merchants with high turnover provided data on tender times from time-and-motion studies. Cash is about 20 to 25 seconds to make a transaction, whereas EFTPOS is about 35 to 40 seconds. That is the main driver there. All the other costs are actually lower than for cash.

Mr. Negrin: On the Mexican experience of merchant surcharging, there is not really actual surcharging. What you can do is have discounts if you pay with cash, let's say. What has been happening since the interchange fees have gone down and the discount rates have come down somewhat is more merchants that used to take cards used to charge more if you paid with credit cards. That has changed quite a bit. On the other hand, larger merchants are distinguishing between paying with debit or with credit.

I have a question for Marc about education not being relevant on your regressions. Do you have an explanation for that? It seems very strange because it is highly correlated with income, and if you have high income, you would have expected that. On the PIN use for which you had strange results, can it be related to the fact of having several debit cards or several credit cards?

Mr. Rysman: The education one is tricky. I guess I don't have a good answer for you about that. People who run regressions on the *Survey of Consumer Finances* that the Fed runs, seem to find that education matters. But, for instance, we have

early results from the *Survey of Consumer Payment Choice*, the new survey the Boston Fed is running that is really focused on payments. And there the result is ambiguous for education. Scott, would you agree with that? There, the result depends on how you run the regression. I don't have a great explanation, but I think, as the new versions of this dataset come out, maybe we can resolve what is going on.

The surprising result on PIN debit is the one questioning which one is easy to use. There "credit card" is ranked ahead of "signature" and "PIN" debit. I am not sure either. The difference of about 15 points means 15 percent of the people are saying credit cards are easy to use, but they are not saying that debit cards are easy to use. It is not that they can't remember their PIN number because they are saying it for both signature and PIN debit. It is not that many people, so I am not sure how big it is if we take it in terms of statistical significance.

One of the things that jumps to my mind is that with debit, you have to know how much money is in your account, and with credit, you are not running up against your limit, at least you don't have to think about how much money is in the account today. Especially if someone is maintaining separate checking and savings accounts, Are they going to move money from the savings account to cover payments as they come in? They don't have to think about that when they are using their credit card. They just have to move it in on the day they send off their credit card payment. So, that is my best guess for what is happening there.

That is the issue with these sorts of studies. You never get enough information. You always want to know why. That is one of the reasons I like that essay format, where you read the essays and see what you can learn from them.

Ms. Smith: If I may add a comment on the education and income-type variables from our empirical analysis, we find these kinds of variables might have strong explanatory power in terms of whether a consumer holds a credit card or not, but then it drops out of the use regressions once you control for credit card holding. You get very few demographics that end up left in your use regressions.

Mr. Weiner: If I can ask a quick question that is kind of related as far as determinants, I find one of the biggest puzzles—and you highlighted it, Marc—is the lack of concern over security. It doesn't seem like consumers rank it that high. Any more insight on that or thoughts on what's happening there?

Mr. Rysman: People trust the Fed to protect them, I guess.

Mr. Eckert: Perhaps it's because the consumer protection laws, either private or public, effectively push that cost away from the consumer to the issuer and/or the merchant. Therefore, the embedded cost of worrying about security is nonexistent to the consumer, so why should they care?

Then, the second thing as a follow-up on the debit side, our own observational research on why signature debit is seen as less convenient or less easy to use

than PIN is because it still runs on credit rails, so the customer has to know either to hit "credit" when they are making a debit payment (which is kind of confusing) or opt out by hitting "cancel." So, it actually is less convenient for them. What is counteracted often by issuers is they offer rewards on a signature debit as opposed to PIN.

Mr. Cook: Josh, you know I couldn't let this one go. Whenever we talk about PIN, I am pretty shocked by this. I personally don't think it is an issue of consumers thinking the Fed is going to protect them; I think it is a misconception they have been told. It is kind of a George Costanza scenario, "it is not a lie if you believe it."

Here is my debit card, for example. I will trade it with anybody in this room. I have used this example before. You heard me in Chicago use this example. If you took my PIN debit card, you cannot use it. But anyone who has a scheme bug on their card, I can use your card (United States only; it is unique in Europe). The fact is that fraud is associated with it.

So, think about this for a second. Even if your fraudulent charges are waived and you are reimbursed for those, what about when your mortgage payment bounced? Who covered that late payment? Who covered that late payment for your utility bill, for example? All those other fees that go along with it, did the Fed step in and protect you there? Did your bank reimburse you for those? I don't think so. Did Visa stand in or did MasterCard give you all the reimbursement for all your late fees? No, they didn't.

When you talk about less convenience for signature-based cards, think about coming into one of our stores. If you return a piece of merchandise that you bought with a signature debit card, what is the timing of you getting reimbursed for that? It is three to four to five days later before we can get credit back to your account. You use a PIN debit card, I'll give you cash back. Those are the kind of things that make it a less-efficient product. It is fraud-prone. I'll leave it at that.

Mr. Taylor: Debit holds are a big issue within our industry because when you buy gasoline, the bank is going to put a hold against your DDA up to $75, $100, $150. It is really up to the bank. To Wal-Mart's point, that debit hold is not cleared in real time. What happens, if you are close to your DDA limit, you are down to balance $0, if you have checks presented over the next three or four days, even though the retailer has issued a finalization within five minutes of holding up that handle, that $150 is still being held. Then the whole cascade of fees comes down. Consumers are generally scared to death of the $37 overdraft fees and all the fees that come down. That is why you are seeing Congress act on overdraft fees in this case

Mr. Duncan: I wanted to comment on Marc's questioning of the Illinois toll situation, where there was a change of 40 cents. If you have pricing transparency, you can make massive changes in consumer behavior, as that example showed.

Until relatively recently, a number of banks were surcharging 50 cents to a consumer who entered a PIN. That might explain some of the same kind of behavior we saw with consumers shifting to a signature debit card.

Mr. Rysman: I think that's right. Transparency and the saliency of the charge in that case were really striking in a way that not all fees are. It's one of the reasons why the result that people with revolving credit switch away from credit cards to debit is so striking. That is not salient. I am surprised that many people get that it is going to cost them money. But it is a strong result in a couple of different studies. I agree with your point. The saliency and the immediacy of the fee and the transparency play a role in people responding to it.