
Acknowledgments

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Plastic Cards

It was necessary to reconceive, in the most fundamental sense, the nature of bank, money, and credit card; even beyond that to the essential elements of each and how they might change in a microelectronics environment. Several conclusions emerged: First: Money had become nothing but guaranteed, alphanumeric data recorded in valueless paper and metal. It would eventually become guaranteed data in the form of arranged electronics and photons which would move around the world at the speed of light.

—Dee Hock, former CEO of Visa

Look in your wallet. If you are like most Americans, you have at least one thin plastic card that you use to pay for things at many merchants. Take out one of those cards. The card you picked is about $3\frac{3}{8}$ " long by $2\frac{1}{8}$ " wide, weighs about a fifth of an ounce, has a magnetic stripe on the back, and has your name and a thirteen- to sixteen-digit account number embossed on the front. It is called a "payment card." Yours is one of more than 865 million payment cards in the hands of U.S. consumers in 2002. Once cardboard, now plastic, the card itself may become an anachronism. The digits—with their link to you—are what matters. How they are stored and transmitted is a detail.

If you have only one payment card in your wallet, it is probably a debit card. It will have the logos for several EFT networks, such as STAR, on the back and it may have a logo for MasterCard or Visa on the front. When you pay with this card, the funds are automatically deducted from your checking account.

Do you have a credit card as well? This will have the logo for American Express, Discover, MasterCard, or Visa on the front; if it is a MasterCard or Visa card, it will also typically have the name of the

bank that issued you the card—Bank of America, for example—on the front. When you pay with a credit card, your purchase will appear on your next monthly statement. You can pay in full or finance your purchase over time. Perhaps you have a charge card—such as the American Express Corporate card. Your purchase will appear on your next statement, but you must pay in full and cannot finance your purchase over time.

Increasingly, you may have the option of receiving your salary on a prepaid card, which you can use to withdraw cash from an Automated Teller Machine (ATM) as well as pay for goods at retailers—an attractive option if your family is among the 13 percent of the U.S. population that doesn't have a checking account.

All told, in 2002, U.S. households used their 865 million debit, credit, and charge cards to pay for \$1.7 trillion worth of goods and services. Around the world, 1.8 billion general-purpose payment cards were used to pay for \$2.7 trillion worth of goods and services that year. (We adjust all dollar values in this book so they reflect purchasing power in 2002.)

Many U.S. wallets are bulging with other cards. You may have cards that allow you to pay at particular retailers—a Circuit City or Bloomingdale's card. While such store cards are numerous—there were 547 million in 2002—U.S. households only used them for \$128 billion in purchases, or about one-thirteenth of what they put on the debit, credit, and charge cards that could be used at many merchants. You may also have a prepaid card—preloaded with money—that allows you to buy at a particular store such as Starbucks or to make long-distance phone calls (these types of cards are sometimes referred to as stored-value cards). In this book, we concentrate on general-purpose payment cards, which you can use at many different merchants.

You carry payment cards because you expect that many merchants will take one of your cards for payment. But they don't have to. In fact, unlike cash and checks, merchants *cannot* take your card for payment unless they have entered into an agreement with an agent of the same card logo that appears on your card. If you have an American Express card, you cannot use it unless the merchant has a contract with American Express. In 2002, out of the 5.3 million merchant locations that took MasterCard and Visa cards, about 2 million did not take American Express. And

while “No Card Is More Accepted” than MasterCard—as its advertising says—you cannot use it, or Visa for that matter, at a Neiman Marcus store.

Merchants must pay a portion of each purchase made with a payment card to the firm that processes their card transactions. Yet most retailers have chosen to accept payment cards. And those who take one brand of card usually take many brands of cards. They don’t have the bulky-wallet problem: although they may post many decals displaying the logos of the cards they accept, they can use the same equipment to handle many different kinds of cards and can often find a business that will process all of their card transactions for them. Merchants take cards because they know that customers have these cards and want to use them. Cards that few customers carry may not be worth the bother; the JCB card that is mainly carried by Japanese visitors to the United States, for instance, is commonly accepted in high-end stores in tourist destinations frequented by Japanese visitors, but has much less acceptance elsewhere.

That brings us to a fundamental feature of payment cards. Just as you cannot dance the tango without a partner, a payment card needs both consumers and merchants. This is what economists call a “two-sided platform market.” Businesses in such markets need to get two distinct groups of consumers on board the platform. A frivolous example is the singles scene. Any business that involves getting men and women together has to get both groups of customers. A more serious example is operating systems for computers. Successful developers of operating systems, such as the Palm OS for handheld devices, go to great lengths to get both software application developers and users on board. Users want an operating system that supports lots of good applications, and software developers want to write applications for operating systems with lots of users.

And just as a nightclub with few women attracts few men (and vice versa), a card brand with few merchants attracts few cardholders (and vice versa). The strategies used to establish payment card systems, the economics of pricing payment cards, the business and operational problems faced by participants in the card business, and the business ecosystems that characterize this vast industry all turn on the two-sided nature of payment cards.

So does the evolution of payment cards since their birth in 1950. Early that year, Frank McNamara gave some cards to a few hundred people in Manhattan and talked some local restaurants into paying his company 7 percent of the meal tab billed to the Diners Club card. He got a small platform started. But the payment card industry did not experience a big bang. Rather, from these small beginnings, the industry has expanded slowly over time. Part of the story involves new card platforms coming into the business; Diners Club was followed by Carte Blanche, American Express, and BankAmericard within the decade. But more of the story is how these card platforms have nurtured the two sides of the market over time—with customers gradually attracting merchants gradually attracting customers. What might have looked like tidal waves at the time—Bank of America flooding its customers in California with cards or Sears offering most of its store cardholders a Discover Card—now appear as ripples in the ocean.

Much has happened in the last thirty years to make plastic ubiquitous. In 1970, a bit less than a generation after the industry's Manhattan birth, only 16 percent of households had payment cards, and we estimate that at most, 20 percent of retailers accepted them. With few households with cards and few places to use them, the average spending on plastic per household (across all households) was only a little more than \$47 per month (about 1.5 percent of the average monthly household income). Today, most large retailers, supermarkets, and mail-order firms take plastic, along with a rapidly increasing number of fast-food restaurants, health-care providers and other businesses. And payment cards are the main currency for Internet transactions. Almost everything on Amazon.com and eBay is bought with digits taken from a payment card, either directly or through an intermediary such as PayPal that allows individuals to take credit cards. Most consumers make at least some purchases with a plastic card. And in 2002, the most recent year for which we have data, on average households charged \$1,280 per month on payment cards (about 25 percent of their average monthly household income).

Indeed, payment cards have become a global common currency. For example, you can use your Visa credit or debit card in three hundred countries and territories at more than twenty-one million merchants. And many card systems in other countries have affiliations with

MasterCard or Visa so that travelers from those countries can use their credit or debit cards in the United States.

Still, more than fifty years after the payment card industry was born, 69 percent of payments made by U.S. households are made with cash or checks. Dee Hock's "guaranteed data" have a long way to go.

Although cash and checks may not be toppled for generations, if ever, payment cards have nonetheless wrought a revolution. Humankind has seen only four major innovations in the most routine aspect of economic life—how we transact with one another: the switch from barter to coin around 700 BCE; the introduction of checks by the Venetians in the twelfth century; the shift to paper money in the seventeenth century; and now the payment card. Let's be clear again, though—it is not the card, it is the digits, and as we will see, when it comes to the electronic transfer of funds, plastic cards are not the only game in town.

The industry behind this revolution, the subject of this book, is quite extraordinary. To see why, think about what has to happen for you to be able to buy a pair of shoes at the nearby mall using a payment card. You must have a card. Someone had to issue you that card, and in the course of doing so, may have worked with other companies that helped it determine whether you were a good prospect. It hired another company to manufacture your card, and it has probably lined up someone else to send you statements and collect your money.

To let you buy your shoes with plastic, the local store has to accept the card you have. That store has to have signed a contract that enables it to accept the card you present and ensures that it will be reimbursed for (most of) the price of your shoes. One business may sign the local store up and take care of everything, from installing the terminal equipment, to processing transactions, to settling up accounts. Alternatively, one business may sign the merchant up, and another may take care of the details after that. The business that installs equipment and processes the transactions works with other firms: manufacturers of card-processing equipment for sure, and perhaps other companies to assist in the processing and accounting work.

The card systems are the hubs in a vast interconnected network of businesses and consumers. After you present your card to a merchant, the clerk swipes the card through an electronic terminal near the cash

register. Within seconds, the terminal connects to a computer miles away and verifies the willingness of the entity that issued your card to pay for your purchase. Over the course of a year, these computers process twenty-four billion transactions in the United States between the millions of merchants who take payment cards and the hundreds of millions of consumers who use payment cards. It is a tour de force.

This feat is all the more extraordinary because the computers have so many masters to please. Suppose you used your MasterCard credit card. MasterCard is an association of financial institutions—some issue cards, some service merchants, and some do both. The system has to transfer money to the merchant from the member that signed up the merchant. It has to transfer money from the member that issued the card to the member that signed up the merchant. The member that issued the card must obtain all the information necessary to bill the cardholder. And all along the way, the system works to collect and distribute various fees among the parties that have participated in each transaction.

How this complicated coordination takes place, and how the institutions developed to accomplish all this, is a story of how solutions to complex organizational and technological problems emerge and evolve in markets. And it is a story of how those solutions can deviate sharply from the look of competition in other industries, while nonetheless effectively delivering to consumers the benefits of intense competition.

Indeed, it is hard to find an industry that, on the surface, fits as poorly as this one does into the boxes that economists have developed for classifying industries. We have already seen one difference. This is a two-sided platform industry. Economists have shown that many of the usual rules of thumb do not apply in this case. Prices, benefits, and costs do not track each other as closely as they do in traditional industries. For instance, almost every card system loads the costs of conducting transactions on the merchant. The other distinguishing feature is the mixture of competition and collaboration among some members of the industry. MasterCard and Visa—two brands that account for 72 percent of all U.S. payment card transactions—are associations of financial institutions. Members *cooperate* in a few key areas that generate efficiencies for consumers and merchants—particularly in the design and operation of the vast computer networks that now enable transactions around the world to be completed in just a few seconds, as well as in advertising

and some aspects of product development. Members *compete* along almost every other dimension—such as interest rates, fees, service, and innovative card offerings. This is called “co-opetition.”

The payment card is inherently a two-sided industry. It is not necessarily a co-opetitive one. Over fifteen years after McNamara got restaurants and diners on board his platform, the payment card industry was dominated by large national firms: what we call the “go-it-alones.” American Express was the leader, having surpassed Diners Club in the early 1960s. Both competed with Carte Blanche, which had been started by the Hiltons of the hotels. MasterCard was born in 1966 as a cooperative of banks that did not want to align with the existing systems. The Visa cooperative was born in 1970, after a franchise system established by Bank of America in 1966 collapsed. Co-opetition resulted: a vast landscape of competition surrounding tiny cooperative organizations. MasterCard’s transaction volume per employee is more than twenty-nine times that of American Express.

Now ubiquitous and intimately part of our lives, payment cards have a fascinating past, present, and future—all determined, more so than in many industries, by the intersection of economics, business, law, technology, and public policy.

Ever wonder why your credit card bill comes from Delaware? You need look no further than the U.S. Supreme Court’s 1978 *Marquette* decision, which allowed credit card issuers to get around state interest rate caps by issuing the cards in states without interest rate caps to consumers in states with interest rate caps. Delaware rolled out the welcome mat for credit card issuers, and jobs that New Yorkers might have filled went to Delawareans instead.

If you have spent time in France, you may be curious why most of the locals enter numbers into the terminal at the point of sale while you are asked to sign. It isn’t a secret society. Most French have so-called smart cards that have a personal identification number (PIN) securely stored on a chip. The card device honors the card if the PIN that cardholders type in matches the PIN on the chip—no need to call the central computer to see if the card has been stolen. But it isn’t that the French made a technological advance U.S. card companies couldn’t make. Telephone connections are less expensive and more reliable in the United States than in France, so there was no business case for using smart card

technology, which is more expensive than magnetic stripes, in the States. That may change as smart cards become cheaper and the technology becomes useful for services besides fraud control.

You might also consider how the card businesses make money. You pay little or nothing, at least not directly, for having a payment card that you can use to buy things. Your debit card comes with your checking account, and there are few additional charges for it. You may pay an annual fee for your charge card, but you get the benefit of the float on your purchases between the time you purchase and the time you pay; perhaps you also get other rewards, like airline miles. It is unlikely that you pay an annual fee for your credit card, and like charge cards, you get the benefit of the float and perhaps freebies from hotel discounts to free insurance. (Of course, if you have a credit card and decide to finance your purchases, you will pay finance charges. But transactions financed on payment cards account for only about 15 percent of the dollar volume of purchases.) This is a typical two-sided market—no different than Adobe giving away its reader software and charging companies for the production software, Microsoft charging developers little for its tools and making its money from computer purchasers, or your local television station showing you endless *Friends* reruns for free while making its money from advertisers.

And returning to Europe, the following is curious. Card associations—many affiliated with MasterCard and Visa—started in continental Europe shortly after they began in the United States. Yet different kinds of cards succeeded on each side of the Atlantic. Credit cards surged in the States; debit cards were available from the beginning, but they didn't take off. Debit cards grew rapidly in France, Germany, Portugal, Norway, and Sweden. Some convergence has taken place in the last decade, credit cards are still uncommon in Europe, but debit cards have blossomed in the States. Culture? Institutions? Technology? Historical accident? We touch on this puzzle, but we do not claim to solve it.

The Star

The star of our story is the plastic card you pulled out a few minutes ago. At least since the famous line in *The Graduate*, plastic has connoted

all that is superficial and temporary in modern society. So it is a good idea to give our star an image makeover. It is really a peripheral device that gives you access to a vast global computer network. From the front, the card has some interesting features. Your account number is embossed at the bottom and identifies the card. Visa cards start with a “4,” MasterCard with a “5,” and Discover Cards with a “6.” A “3” indicates a travel and entertainment (T&E) system, with a “37” for American Express, and a “38” for Diners Club and Carte Blanche. The remaining digits on the card identify additional details, such as the bank that issued your card and your account.

But it is the magnetic stripe (or magstripe) on the card’s back that really makes it useful. That stripe holds most of the key information on your card account: your name, account number, expiration date, card type, and perhaps other details as well. That information gets sent from your merchant’s terminal over telephone lines to a computer.

Magstripe is a quite efficient, but not terribly smart technology. Smart cards can be brighter. The French version mentioned earlier is not at the head of the class: it just holds the same information as the magnetic stripe in a more secure way—it is much more difficult to read the information off a smart card. But it is possible to download data and software onto the chip and create a card that does much more creative things. There are operating systems and applications for these cards just as for other chip-based devices. For now in the United States, smart cards are a technology—albeit a potentially powerful one—in search of an application that consumers want.

Star Performance

How does a payment card work in practice? The answer varies a bit according to the specific card. Let’s focus on the most popular brand of card—Visa—and one issued by one of Visa’s largest members—Bank of America. Figure 1.1 shows some of the important elements. Suppose you go to Best Buy to purchase a new MP3 player and you swipe your Visa card issued by Bank of America (the “issuer”) through a card reader. The card reader takes data off the magnetic stripe on the back of the card. It combines this data with information about the merchant and the dollar value of the purchase to create an electronic message. It then dials the

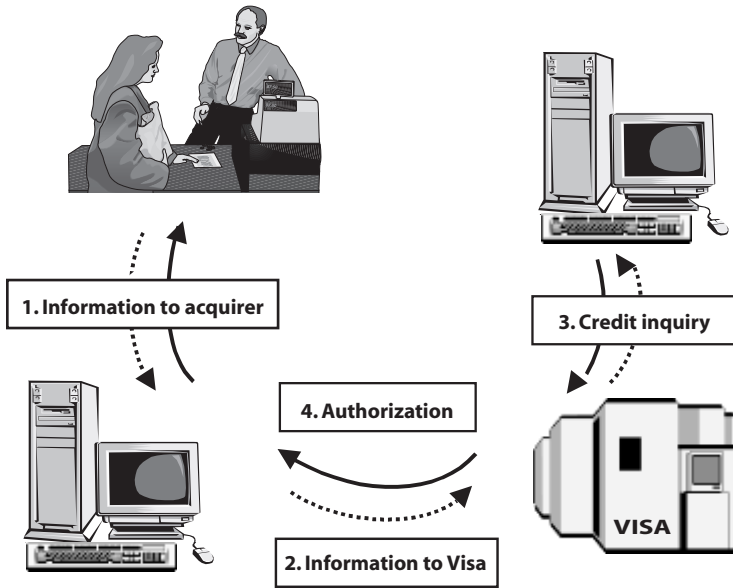


Figure 1.1
How do payment cards work?
Source: Visa U.S.A.

telephone number of a computer maintained by Best Buy's "acquirer" (the bank that handles its Visa transactions). Once connected, a message is sent to the acquirer's computer. This computer reads the message and figures out that you have used a Visa card. It dials up Visa's computer system (there are actually two that work in parallel just in case one of them goes down). After reading the message, Visa's computer knows to check with Bank of America's computer to see whether you have enough money on your credit line to cover the purchase. If you do, Bank of America's computer will send a message back to Visa's computer authorizing the transaction. Visa relays the message back to Best Buy's acquirer, which then sends a message back to the terminal at the store. The terminal prints out the receipt that you sign. Because the entire transaction was captured electronically, the main purpose of the receipt is to help resolve disputes when cards are stolen and signatures are forged. This authorization process usually takes just a few seconds.

Best Buy then automatically submits a request for payment to its acquirer, which in turn, sends it on to Visa's computer. The Visa com-

puter passes on the request to Bank of America's computer, which posts the transaction to your account. Visa's computer consolidates this transaction with all the other Visa transactions and settles accounts among banks. For this purchase, Bank of America pays the acquirer, which then pays Best Buy. This process is typically completed within two to three days from the time you made your purchase. The Best Buy store receives about 98 percent of the amount charged for your MP3 player. The remaining 2 percent difference is called the "merchant discount," which is the fee paid to the acquirer for providing its services. The acquirer, in turn, pays about 1.7 percent of the purchase amount to the issuer, in this case Bank of America. That 1.7 percent "interchange fee" is set by Visa; MasterCard has a similar fee.

This process is the same whether you used a Visa credit or debit card until almost the end. With a credit card, the issuer compiles information on your charges over the course of the billing cycle (usually thirty days) and sends you a statement. The issuer expects full or partial payment typically within twenty-five days of the end of the billing cycle. With a debit card, the issuer simply deducts the charges from your checking account—generally within a day or two of the purchase. Your monthly checking account statement will then contain your debit card purchases as well as other account activity.

When you've used your debit card, you might have noticed that debit transactions can be authorized with a PIN or a signature. When you sign, you're making a signature debit transaction, which goes through either Visa or MasterCard, as just described. When you enter a PIN, you're making a PIN debit transaction, which goes through one of the EFT networks, such as STAR, NYCE, or Pulse. (EFT networks started out as ATM networks, later adding debit functionality for retail purchases.) Of course, you can enter a PIN only at a business that has installed a PIN pad, although some EFT systems have started to allow some insurance companies and other businesses to accept PIN debit transactions without requiring PIN authorization. Somewhat confusingly, at many businesses with PIN pads, you have to choose the credit rather than the debit button to make a signature debit transaction. (PIN debit and signature debit are also referred to in the industry as online and off-line debit, respectively. We don't use those terms since PIN and signature debit transactions are all processed electronically—or online, in common parlance.)

Banks that issue debit cards can enable their customers to use these cards with a signature (through agreements with MasterCard and Visa) and a PIN (through agreements with one or more EFT networks). Almost all debit cards can be used with a PIN, but only about 70 percent can be used with a signature. A Visa or MasterCard logo on the front tells you the card can be used for signature debit, while the EFT logos on the back tell you which EFT networks your card works on.

Some of the intricacies of the card transaction described above arose because issuers such as Bank of America are each a single node in a network of thousands of issuers and acquirers; they do not operate their own independent card system. If you had presented an American Express card or Discover Card, a few things would have happened differently. The merchant might have a direct line to American Express, especially if it is a larger merchant. In that case, the message created by swiping the card through the reader goes directly to American Express's computer for authorization, and the computer sends the response right back to the merchant. American Express takes on the role of both merchant acquirer and issuer here, thereby cutting two steps out of the message relay process described earlier. If the merchant does not have a direct line to American Express, the message goes to the merchant's processor, which then transmits the message to American Express, thereby cutting one step out of the process. Surprisingly, with the use of fast computers and reliable telecommunications networks, there is no perceptible difference between the speeds at which American Express, Discover, Visa, and MasterCard process transactions.

The Main Characters

American Express, Discover, MasterCard, and Visa are the major "brands" of signature-based payment cards—and together they account for 90 percent of all purchase volume on general-purpose payment cards. You can recognize them from their distinct logos. The four brands are also the major operators of payment card "systems." Each system consists of a distinct set of computers and rules for processing transactions, seeking verification, getting approval, transferring funds, and capturing billing information. The new kids on the block are the EFT networks.

These systems are the result of the merger and reorganization of banks' ATM-only networks. They account for the remaining 10 percent of purchases made with payment cards, but their share is growing. The largest of these new kids, the STAR system, itself accounts for 5 percent and is now slightly larger than Discover.

American Express is the oldest character here. It started in 1850 as an express company—sort of a cross between bicycle couriers and United Parcel Service. It introduced its first hit product, the travelers cheque, in 1891. Its first charge card, the American Express Green Card, was launched in 1958. In the late 1980s, it started a credit card, Optima. Initially a case study in poor product planning, Optima developed into a solid product by the mid-1990s. Its most recent hit, introduced in 1999, is the American Express Blue Card. This was the first significant U.S. smart card—the first general-purpose payment card with a computer chip on the card. Relying on the image of the chip, Blue was advertised as a “high-tech” card “custom designed for the 21st century consumer.” In reality, however, Blue offered no tangible benefits unless used with a special chip reader, the card also had a traditional magnetic stripe on the back. Nevertheless, whether it was the card's high-tech imagery or attractive pricing, there were 2.2 million Blue Cards in the hands of U.S. consumers just over a year after its launch.

Discover is the teenager in this group. Sears, Roebuck and Co. introduced the Discover Card in 1985. This orange-on-black card became one of the greatest business success stories of the 1980s—helped by Sears's seventy-plus years of experience with a store card and its decision to offer the card to twenty-five million creditworthy Sears cardholders. By 1991, the Discover Card was accepted by more merchants than the American Express card. In 1993, Sears spun off its investment and credit arm into Dean Witter, Discover and Co., which later merged with Morgan Stanley, and the card continued to prosper. Though its growth slowed substantially after its initial success, Discover was still the fifth-largest issuer of credit cards in the United States in 2002. (Sears is no longer even in the store card business: it sold its card operations to Citigroup in 2003.)

Visa is the biggest of the players. Almost half of the general-purpose payment cards in the United States have the blue, white, and gold Visa logo on the lower right-hand corner, and almost all the merchants that

take payment cards take Visa cards. Visa started in 1966 as the BankAmericard franchise system, although its origins date back to Bank of America's go-it-alone card program started in California in 1958.

MasterCard was started at the same time as Visa. Cards with the orange-and-red MasterCard balls are second only to Visa cards in abundance. In 1978, Visa overtook MasterCard with respect to the number of cards issued. MasterCard reversed its relative decline in 1992, after embracing novel card programs run by nonfinancial giants like AT&T. Then, in the late 1990s, MasterCard persuaded several banks—most notably Citigroup, which is the second-largest credit and charge card issuer in the United States—to shift their issuance toward MasterCard. As a result, MasterCard has made a big comeback in credit cards, nosing out Visa for the lead in terms of the number of cards and volume of outstanding balances in 2002, although it still trailed slightly in terms of the volume of credit card purchases. Beginning in the mid-1990s, however, Visa has built a big lead in signature debit cards.

STAR, by far the largest of the EFT networks, is a young character just coming onstage. It was started as an ATM system in 1984 and added debit capabilities two years later, although debit volume was unimportant until well into the 1990s. Through a wave of mergers and acquisitions in the late 1990s and early 2000s, a number of EFT systems including STAR, MAC, HONOR, and Cash Station became a single system operating under the STAR brand and owned by Concord EFS. Concord provides a range of processing services to merchants and financial institutions in addition to operating STAR. First Data Corporation (FDC), a “supporting player” discussed below that may be increasing in prominence, now owns STAR, following the merger between FDC and Concord in February 2004.

Other Members of the Cast

Although American Express, Discover, MasterCard, and Visa are the main characters in our story, the real action takes place in the constant competitive struggle for the consumer and the merchant. American Express and Discover are in the fray. MasterCard and Visa are too, but primarily through their members, who compete with each other as well

as with American Express and Discover. And STAR is also in the mix, but its story is complicated and will thus be saved for later.

Let's look at a snapshot of the industry in 2002. Table 1.1 shows the top ten credit and charge card issuers, ranked by transaction volume in 2002. These issuers accounted for almost 80 percent of the total volume. Go-it-alones American Express and Discover were the first- and fifth-largest issuers respectively. The other eight issuers were members of the co-opetitives. Consider, for example, Citigroup, MBNA, and Bank of America.

Citigroup was the second-largest issuer with 14 percent and the largest of the co-opetitive issuers. In 2002, it had forty-five million MasterCard and thirty million Visa credit cards in circulation in the United States. It shifted allegiance toward MasterCard from Visa in 1998. (In addition to being a MasterCard and Visa issuer, Citigroup also owns two other card systems: Diners Club and Carte Blanche. As figure 1.2 shows, in 2002, relatively few Diners Club cards were issued or used in the United States; Carte Blanche was too small to plot.) Citibank, part of Citigroup, was the third-largest commercial bank in the United States with assets of

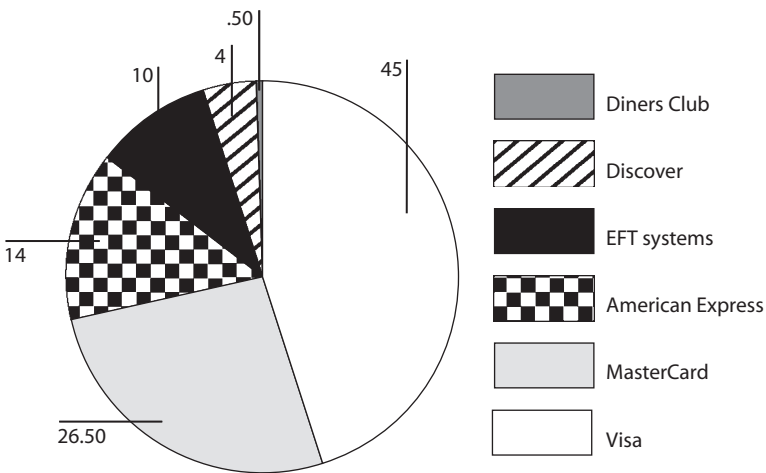


Figure 1.2
 System share of U.S. general-purpose card purchase volume, 2002 (%)
 Source: *The Nilson Report* (various 2003 issues).

Table 1.1

Top ten credit and charge card issuers, ranked by gross volume, 2002

Issuer	Volume (\$ billions)	Share of industry volume (%)
1 American Express	234	16
2 Citigroup	204	14
3 Bank One	155	11
4 MBNA America	131	9
5 Discover	94	7
6 J. P. Morgan Chase	87	6
7 Bank of America	62	4
8 Capital One Financial	61	4
9 U.S. Bancorp	45	3
10 Household	37	3
<i>Total (top ten)</i>	<i>1,110</i>	<i>78</i>
<i>Total (all issuers)</i>	<i>1,432</i>	<i>100</i>

Note: Numbers may not add up to totals due to rounding.

Source: *The Nilson Report* (various 2003 issues).

more than \$515 billion in early 2003. Like most MasterCard and Visa members, it provides checking account services to consumers along with many other depository and lending services. Payment cards accounted for about 20 percent of Citigroup's overall profits in 2002—almost as much as its retail banking operations.

MBNA was fourth-largest issuer, with 9 percent of credit and charge card volume. It was the second-largest issuer of MasterCards (twenty-seven million) and the fourth-largest issuer of Visa cards (twenty-five million). MBNA is an example of a “monoline” bank, one that is in business almost exclusively to issue payment cards. Started in 1981, it had \$79 billion of outstanding credit card balances, but only \$12 billion of ordinary consumer loans at the end of 2002. Many monolines have grown significantly in recent years. For instance, MBNA's share of credit and charge card volume increased from 4.7 percent in 1995 to 9.2 percent in 2002.

Bank of America, one of the credit card pioneers and currently the seventh-largest credit and charge card issuer, is now the leading debit

card issuer in the United States. It has twenty-one million debit cards, with seventeen million of those offering signature debit functionality on the Visa system. Its prominence is partly a function of being the second-largest commercial bank in the nation. But it is also a result of Bank of America's decision in 1994 to make a big push in debit generally and its decision to issue debit cards to 90 percent of its checking account customers, rather than the 70 percent that is more typical in the industry. Bank of America also offers its customers the choice of debit cards with frequent flyer miles from U.S. Airways, Alaska Airlines, or AmericaWest.

Most of the 20 percent of credit and charge card volume not accounted for by the issuers listed in table 1.1 comes from banks that have local or regional card programs. For example, Virginia Credit Union in Indiana had the hundredth-largest credit and charge card program in 2002. But its cardholders had only \$140.8 million in gross credit card volume, amounting to one-hundredth of 1 percent of the total industry credit and charge card volume. The large issuers compete with these smaller ones to get into your wallet and to be used by you to pay.

The go-it-alones act as their own issuers. They control the acquiring process, but they also rely on third-party firms to help. The co-opetitives have divorced issuing from acquiring; these are two separate business activities that are coordinated only through their common connection to the hubs. They have also allowed third parties—firms that aren't members of the co-opetitives—to do much of the work related to signing up merchants and processing their transactions. Many banks that sign up merchants and maintain relationships with them use third parties to do most of the back-office work. Table 1.2 shows the top ten merchant acquirers based on transaction volume in 2002. These acquirers accounted for 78 percent of the volume in 2002. Six of these acquirers are banks that belong to the co-opetitives including Chase, the largest acquirer. Four of these acquirers are third parties that have an affiliation with a co-opetitive member but essentially do all of the work. Two of the top ten acquirers have joint ventures with FDC. American Express does a substantial portion of its own acquiring through its Centurion Bank subsidiary, which ranks as the fifth-largest acquirer. (American Express is formally the acquirer on all of its transactions, but in some cases relies on third-party processors to do a large portion of the work.)

Table 1.2

Top ten general-purpose card acquirers, ranked by charge volume, 2002

Acquirer	Volume (\$ billions)	Share of industry volume (%)
1 Chase Merchant Services	224	13
2 NPC	176	10
3 Paymentech	149	9
4 Concord EFS	146	9
5 Centurion Bank (American Express) ¹	138	8
6 First Data	130	8
7 Fifth Third Bank	110	6
8 Nova Information Systems	110	6
9 BA Merchant Services	71	4
10 Global Payments	68	4
<i>Total (top ten)</i>	<i>1,321</i>	<i>78</i>
<i>Total (all acquirers)²</i>	<i>1,692</i>	<i>100</i>

Notes: Numbers may not add up to totals due to rounding.

1. Acquired volume for Centurion Bank is an estimate.

2. Comprised of total industry bankcard volume (estimated by eighty-eight acquirers), total industry PIN debit volume, and total purchase volume for American Express, Diners Club, and Discover.

Source: *The Nilson Report* (various 2003 issues).

Behind the Stage

The payment card systems and co-opetitive issuers have found that there are important roles that others perform better. Signing up merchants; manufacturing, selling, and servicing card-reading terminals for merchants; switching transactions from the terminals to the correct card system; and doing much of the processing that results in the cardholder's receiving a bill are "backroom" roles that are now filled to varying degrees by third parties. These third parties include independent sales organizations (ISOs) that acquirers—including the go-it-alones on occasion—use to sign up merchants. (Even though many merchants already take cards, more than twenty-four thousand new merchants come into existence every year.) The third parties also include cardholder processors that do much of the backroom work for issuers, accounting for the

processing on over 70 percent of cardholder accounts. Many of the cardholder processors are the same firms that process for merchants, as discussed above.

FDC has emerged as a significant player in the card business by piecing together many parts of the back room through acquisitions and by expanding in each of the major segments. It is the largest cardholder processor, sending out monthly statements to cardholders and collecting money from them; it processes 33 percent of all U.S. cardholder accounts. In addition to acting as a de facto acquirer for some merchants, as we just discussed, it is also the largest merchant processor—processing at least 32 percent of all merchant transaction volume. Many of these transactions result from the joint ventures that it has with banks—twenty-four as of 2003. And, as we mentioned above, it also owns STAR, by far the largest EFT system.

The Foreign Cast

Although the major characters described above play on a global stage, there are noteworthy regional differences.

The systems themselves differ outside the United States. MasterCard (which merged with Europay, a European bankcard association, in 2002) operates as a centralized global entity. Visa, on the other hand, has relatively autonomous regional organizations, each with its own board of directors. Visa U.S.A., Visa Europe, and other regional organizations belong to Visa International. Visa International functions for the benefit of its members, much as Visa U.S.A. does in the United States. American Express has a somewhat different business model outside the United States: in addition to issuing some cards on its own, it has franchised its card or entered into alliances with local banks that also issue its cards. Events discussed below may bring this model to the States. Discover has not gotten a foothold overseas, while Diners Club, which operates a small charge card program in the United States, has some successful national franchises overseas.

Even though the JCB card originated in Japan, consumers there use mainly cash and checks. Payment cards are used for less than 10 percent of consumer spending in Japan. This is probably in part because

Japanese credit cards are more cumbersome to use. Japanese cardholders have to tell the clerk whether they want their payment debited directly from their checking account or they want to finance the purchase. Not surprisingly, few individuals want to disclose publicly that they don't have the cash on hand to pay for something. Moreover, any credit that is extended has to be paid back on a prearranged schedule—for example, perhaps 10 percent of the amount each month.

Some other industrialized countries have their own bankcard associations such as *Cartes Bancaires* in France and *Bankcard* in Australia. Bank members also have affiliations with MasterCard or Visa so that their international cards are accepted by MasterCard or Visa merchants outside their countries, and so travelers can use their MasterCard or Visa cards within those countries; some systems also offer domestic versions that can only be used within the home country.

Additionally, there are credit card brands known elsewhere around the world that remain almost entirely invisible in the United States. JCB International, for example, is the second-largest card in Japan (after Visa) and the fourth-largest international card brand, with 10.4 million merchant locations, mostly in the Far East, and \$35 billion in purchase volume in 2002. In the United States, however, only about 500,000 merchants currently accept the JCB card, while Visa and MasterCard are accepted at approximately five million outlets. (This may change, though, as JCB has recently reached an agreement to cooperate with American Express on merchant acceptance globally.)

The emerging economies are interesting as well. China and India, each with more than a billion people, are potentially huge but currently undeveloped card markets. China is ahead of India in this regard, with about 270 million cards issued. The vast majority of these are debit cards issued by four large domestic state-owned banks. The card acceptance technology is relatively immature—no single card reader can handle both the cards from the domestic banks as well as Visa and MasterCard cards. India has a minuscule six million payment cards issued. The lack of an existing infrastructure in countries such as China and India does offer one potential advantage. As industry commentators have noted, these nations can “leapfrog” more developed countries in their choice of technology. Unencumbered by past investments in card terminals and

cards, card systems in both China and India are exploring the possibility of moving rapidly to smart cards rather than using magnetic stripe technology.

The Thirteen Acts

The star, main characters, and other actors will make repeated appearances in the following chapters. Here is a brief synopsis of the action.

“From Seashells to Electrons” (chapter 2) discusses payment cards as the fourth in a sequence of major innovations in how people pay for things, following the development of metallic coins in ancient times, the creation of checks in the Middle Ages, and the spread of paper money during modern times. Payment cards have resulted in the increasing use of digitally represented and electronically transferred money.

Although technological change in computers and reductions in communications costs made this revolution inevitable, it started in the United States at a time when the country had a highly fragmented banking system and a populace heavily dependent on paper checks. These factors have shaped the evolution of the payment card industry in the United States and influenced its evolution elsewhere.

“More Than Money” (chapter 3) traces how a few hundred cards for charging restaurant meals in New York spawned millions of cards for paying for and financing the purchase of goods and services around the world. The combination of payment and financing services on credit cards, along with other key innovations, resulted in the rapid growth in the number of merchants who took the cards and the number of consumers who used them.

Indeed, as we show in “From Gourmets to the Masses” (chapter 4), payment cards have spread through society and have benefited consumers from almost all walks of life. Only the wealthy had payment cards in the early 1950s; only the poor lack payment cards today. With the spread of payment cards, people can better coordinate their income and expense, smooth income and consumption over their lifetime, and even more easily start and finance a small business. (Of course, just as some people eat and drink too much at restaurants or drive too fast, some people take on more debt than they should.)

Merchants have benefited as well. Payment cards make buying easier for their consumers. Store owners and customers like payment cards because they are fast and because customers want to be able to use them. “From Sardi’s to Saks.com” (chapter 5) looks at the growth of payment cards from the merchant side. It explains why merchants take cards, and it documents the growth and spread of merchant acceptance of payment cards over time.

“It Takes Two to Tango” (chapter 6) and “Co-opetition and the Payment Card Ecosystem” (chapter 7) are our economist’s version of an intermission. Instead of champagne, we serve up some of the interesting economic characteristics of payment cards. Chief among these is the chicken-and-egg problem. No consumer wants a payment card if merchants won’t accept it. No merchant wants to take payment cards if consumers do not carry them. This problem and the fact that the payment card industry has to cater constantly to merchants and consumers have wide-ranging economic implications. Chapter 6 explains that the payment card industry is one of many industries that face this two-sided problem and describes the economics of multisided platform industries. Chapter 7 examines the unique mixture of cooperation and competition that has characterized this industry since the mid-1960s. Through co-opetition, a minuscule amount of cooperation enables a massive amount of competition. We discuss why Visa and MasterCard, whose members compete with each other, have fared well in competition with American Express and Discover, which are unified firms with, in principle, much simpler decision-making processes.

The blood, guts, and gore come next, with three chapters that focus on competitive strife in various facets of the payment card industry. “System Wars” (chapter 8) explains how the card systems have competed with each other in two grand wars. American Express’s war with MasterCard and Visa looked as though it was going to end in defeat for American Express in the late 1980s. But American Express fought its way back in the 1990s. The other war, between MasterCard and Visa, is less public because these systems have the same members, but it is no less serious than that with American Express. Visa had American Express and MasterCard on the ropes in the late 1980s, and the war between the two commonly owned associations continues in the early 2000s. The