A **Guide** to the **ATM** and **Debit Card** Industry

2006 Update

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FEDERAL RESERVE BANK OF KANSAS CITY

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1 Introduction

It has been three years since we published *A Guide to the ATM and Debit Card Industry*. Those three years represent a very dynamic time in the industry with a number of important developments. Some trends and patterns have persisted or accelerated, while others have peaked or reversed. Still others have emerged for the first time. The purpose of this *2006 Update* is to document these trends and patterns by updating the data we presented in the original book and to discuss their implications for the current and future state of the industry.

The most important development is that the two segments of the industry, ATM and debit, are in some sense going in opposite directions. The ATM industry has matured and is relatively stagnant, with major players jockeying for position, searching for and adopting different business strategies, and adjusting to the maturation of the industry. The debit card industry, in contrast, is expanding rapidly, with new players, new partnerships, new products, and new markets. The challenge in the debit card industry is not how to cope with a maturing industry but, rather, how to preserve and enhance position and not be left behind.

In the first part of this *Update*, we highlight and discuss some of the most important changes in the ATM and debit card industry. For both the ATM and debit sides of the industry, we recap and analyze changes in activity levels, industry structure, and industry pricing. We then offer some thoughts on what might lie ahead, including a discussion of fraud and data security. In the second part of this *Update*, we present updated versions of the 23 charts and 11 tables from the original book, adding the three or four years of additional data that have since become available.

2 The ATM and Debit Card Industry: An Essay

Developments in the ATM market

Industry recap

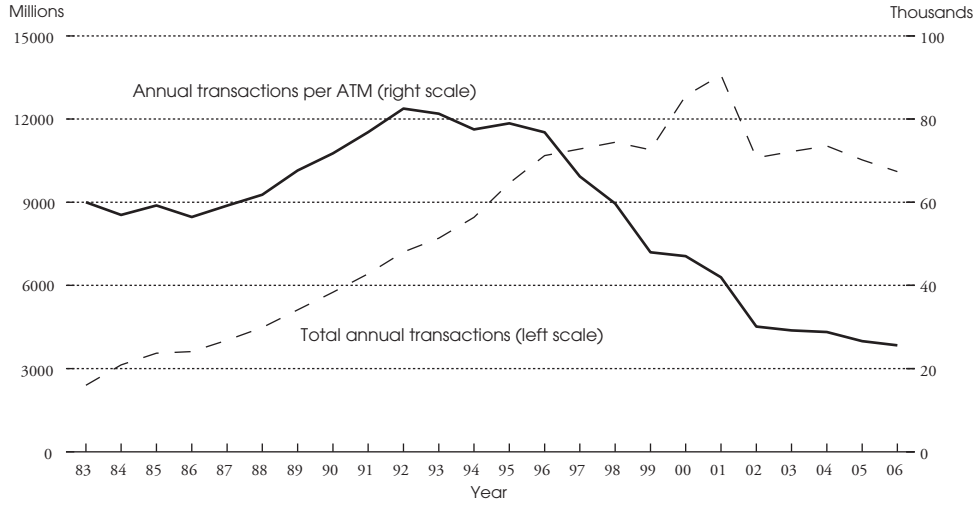
The ATM industry appears to have reached a saturation point. The total number of ATM transactions peaked around 2000 and generally has been declining since (Figure 1).[1] The average number of transactions per ATM peaked several years earlier (1992).

In 2006, for the first time since at least 1983, the total number of ATM terminals declined from the previous year.[2] On-premise ATM deployment has held steady for six years. In contrast, in 2006 off-premise deployment fell. The pullback of ATM deployment, however, has not been sufficient to stop the trend toward lower transactions per ATM.

The number of ATM networks continues to decline, from 127 in 1984 to 40 in 2002 to 25 in 2006.[3] One would expect this decline to have led to a further concentration of ATM transaction and switch volume, and there is an upward trend to concentration up to 2002, but not after. Recent stabilization of industry concentration is consistent with a lack of mergers or acquisitions among the top networks in the last few years, although this conclusion is tentative because of a change in how network transactions are measured.[4, 5]

The top regional network continues to be Star.[6] However, from 2003 to 2006 Star's ATM market share declined from 31.0 percent to 23.7 percent, while the share for Visa's Plus network increased from 12.0 percent to 20.8 percent.[7] Plus is the second-largest ATM network, with NYCE, Co-op, and Pulse rounding out the top five. Despite changes in market shares of the top two networks, the overall standing of networks relative to one

Figure 1: *ATM Transactions*



Notes: Total annual transactions include bank on-us and in-network transactions. Data prior to 2002 include some gateway transactions, and therefore they are likely overstated compared to 2002 and after.

Source: *EFT Network Data Book* (various years).

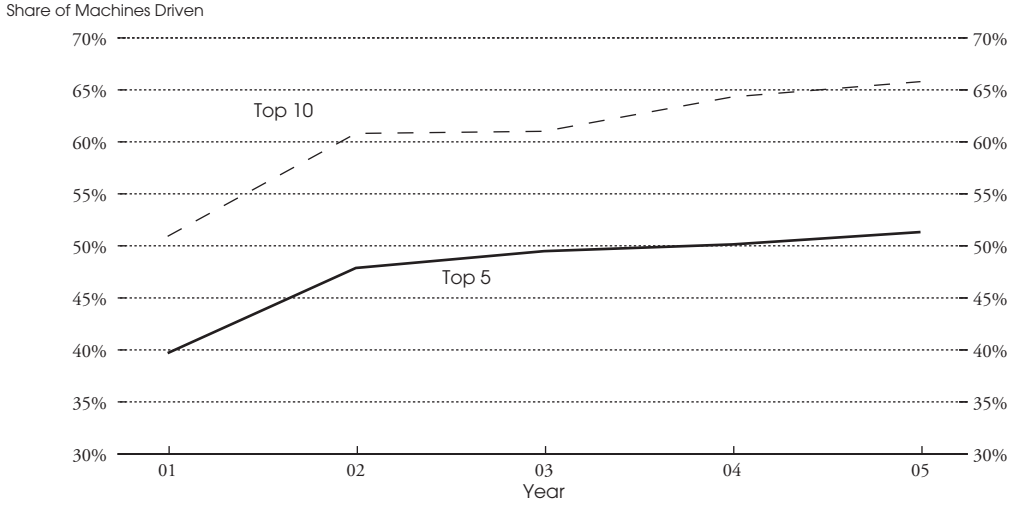
another (under current methodology) has been fairly stable: The ranking of the top six networks in 2006 is the same as that in 2002.[8]

At 99.9 percent and 97.2 percent, respectively, Plus and MasterCard's Cirrus network have retained their exceptionally high coverage ratio (the number of ATMs in the specified network as a percentage of all installed ATMs).[9] Star has increased its coverage steadily in recent years, to just below 74 percent, and remains in third place. Pulse and NYCE have increased their coverage dramatically in the last several years. From 2002 to 2006, the coverage ratio for Pulse increased from 26 percent to 63 percent and that for NYCE increased from 22 percent to 70 percent. Pulse's increase can be attributed to gains in network membership and NYCE's to agreements with ATM independent sales organizations (ISOs).[10]

One of the most interesting long-run trends in the ownership structure among large regional networks is the emergence of nonbank and single-bank forms of ownership at the expense of bank joint ventures.[11, 12] Another development is the acquisition of networks by large payment processing organizations. Fiserv (a nonbank), Elan (a subsidiary of U.S. Bank), and Metavante (a subsidiary of Marshall and Isley) have each recently acquired networks.[13]

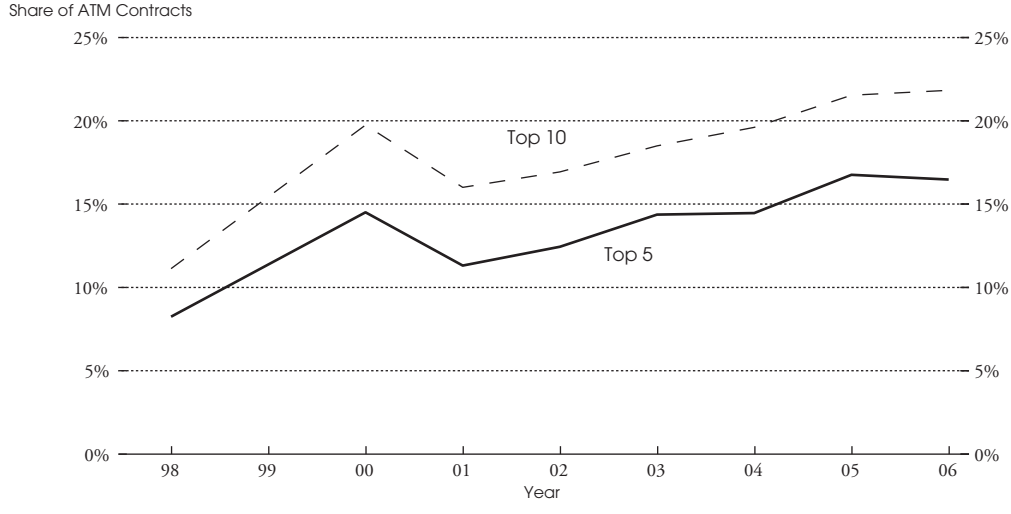
Available data show growing concentration among ATM drivers and ISOs over the last several years. For example, the top five firms now drive over 50 percent of terminals (Figure 2). Concentration among ISOs, as measured by the share of ATM management contracts, is more diffuse than ATM driving, but it also shows a rising trend (Figure 3). These data are consistent with recent developments in the ATM manufacturing, servicing, and operating industry. In 2004, there were three larger ISO acquisitions: Cardtronics

Figure 2: *Concentration among ATM Drivers*



Source: *ATM & Debit News* (various issues).

Figure 3: *Concentration among ATM ISOs*



Source: *EFT Network Data Book* (various years).

purchased 12,000 ATMs from E*Trade, 7-Eleven bought 5,483 ATMs from American Express, and TRM acquired 17,000 ATMs from eFunds.[14] In early 2005, NCR purchased ATM maker Tidel Engineering, and in the ATM driving market, Elan purchased Genpass, making Elan the third-largest driver.[15] More recently, in the ATM servicing arena, Efmark and Bantek West are merging, and Cardtronics purchased Allpoint.[16]

In our 2003 book we noted that ownership of ATM terminals was becoming less concentrated, while the general ATM industry was becoming more concentrated. Now, ownership concentration of ATM terminals has stopped declining and may be rising a bit.[17] The decline over the period from 1998 to 2002 largely reflected the rapid expansion of off-premise ATM terminals by ISOs. As noted above, that expansion has slowed considerably. The slight increase in concentration since has resulted from at least two factors. First, there has been some consolidation among ATM ISOs. Second, the largest financial institutions continue to expand their ATM fleets, perhaps in conjunction with building branches. Consolidation in banking also has had some effect, particularly the 2004 merger between Bank One and JPMorgan Chase.

Turning now to developments in pricing in the industry, there have been few changes in wholesale pricing and continued increases in some retail ATM fees. Perhaps more interesting are changes in the structure of pricing.

Per-transaction wholesale ATM fees (switch fees and interchange fees) have shown little change since 2002, suggesting the industry has reached a wholesale pricing equilibrium.[18, 19] However, most major networks now have tiered switch fee structures, which are typically based on transaction volume. Thus, while published fees have been stable, there likely has been some change in revenue per transaction after accounting for tiered pricing. Interchange fees also vary, although the variation is not based on volume. Interchange fees are sometimes determined by whether a transaction is at an on- or off-premise ATM. Nonbank off-premise ATM owners, for example, face lower interchange fees on the Plus network and receive higher interchange fees on the Co-op, NYCE, Star, and possibly other networks, compared with other ATM owners. Interchange fees also can be tied to geographic zones of a network, such as Pulse setting a higher interchange fee for former TYME participants than for other participants.[20]

The Federal Reserve Board's annual survey of bank fees was discontinued after 2002, preventing an update of our original table on retail ATM fees.[21] Instead, Figure 4 lists recent estimates of ATM foreign fees and surcharges from available industry sources. It suggests that, on average, foreign fees are higher in 2006 than in 2001, but the rates may have stabilized recently. Differences in samples and methods make it difficult to generalize about the trend in surcharges, but it seems fair to say that average surcharges are as high in 2006 as they have ever been.[22]

Discussion

As the ATM industry enters a mature phase, two related issues are key to recent developments and the industry's future. First, surcharging has had a major impact on recent developments and, thus, is influencing the industry's structure. Second, the decline in

Figure 4: *Estimates of ATM Foreign Fees and Surcharges, 2001-2006*

Fee	ATM Location	Data Source	2001	2002	2003	2004	2005	2006
Foreign fee	All	Federal Reserve[1]	$1.17	$1.14	n.a.	n.a.	n.a.	n.a.
		Bankrate.com[2]	$1.20	$1.22	$1.31	$1.28	$1.37	$1.29
Surcharge	All	Federal Reserve[1]	$1.32	$1.36	n.a.	n.a.	n.a.	n.a.
		Bankrate.com[2]	$1.36	$1.40	$1.38	$1.32	$1.40	$1.60
	On-premise	Dove Consulting[3]	$1.45	n.a.	$1.57	n.a.	n.a.	$1.74
	Off-premise	Dove Consulting[3]	$1.48	n.a.	$1.65	n.a.	n.a.	$1.79

Notes: Data sources are (1) Board of Governors of the Federal Reserve System, 2002; (2) McBride, 2005, 2006; and (3) Hayes and others, 2002, 2004, and D'Ambrosio and others, 2006.

Bankrate.com's data prior to 2005 are from the chart shown in McBride, 2006.

The sample size varies by survey: The Federal Reserve's samples included about 620 banks and savings associations; Bankrate.com surveyed the largest banks and thrifts in each of the 25 largest markets nationally; Dove's samples are 127 (Hayes and others, 2002), 134 (Hayes and others, 2004), and 161 deployers (D'Ambrosio and others, 2006), which include banks, credit unions, and ATM ISOs.

n.a. = not available.

transactions per ATM and the recent slowdown in total ATM transactions are influencing the various strategies that industry participants are pursuing.

The early effects of surcharging fit nicely with what an economic model of the ATM market would predict. Soon after Visa and MasterCard allowed surcharging in 1996, there was a strong supply response that increased the number of ATM terminals, especially in off-premise locations.[23] While there were protests against surcharging at the time, the fact that many ATMs were installed and used suggests there was an unsatisfied demand for ATM services. ATM transactions grew even though the price of the service rose, likely because convenience increased as the geographic dispersion of ATMs rose.[24, 25]

The expanded reach of ATMs from 1996 to 2000 brought increased revenue to ATM owners. But, as the ATM market became more saturated, the demand side of the market began to assert itself as surcharges became more of an issue to consumers. This was reflected in a change in their use of ATM services. Consumer surveys document that ATM customers shifted their usage toward ATMs owned by their financial institution, increased their use of debit and credit cards instead of cash, and obtained cash back during PIN debit transactions.[26] One result of the consumer response to surcharging was that financial institutions experienced a decline in the percentage of foreign transactions at both on- and off-premise ATMs and an associated decline in surcharge and interchange fee revenue.[27]

This changing consumer behavior triggered a second supply-side response. New ATM deployment has slowed considerably in the period after 2002 as many ATM owners have trimmed their ATM portfolios.[28] Perhaps the surest sign of a saturated market is evidence that revenue per ATM has fallen.[29]

In combination, these demand and supply responses to surcharging, while initially boosting profitability of ATMs, have in the long run likely harmed profitability among

owners, especially ISOs. They also have put stress on other industry participants such as networks, ATM drivers, and ATM manufacturers.

The industry has begun to recognize the negative impact that high surcharges can have on transaction volume, and as a result, the strategies of various industry participants are in a state of flux. We complete this discussion by outlining some of the ways industry participants are reorienting their approach to the ATM business.

One approach some ATM ISOs, such as eFunds, E*Trade, and American Express, have taken is simply to exit the market. A second approach is to find ways to increase traffic at ATMs. One method is to form surcharge-free alliances such as that created by the Allpoint network. Cardtronics, whose ATMs had been the largest portion of the Allpoint network, has affirmed the strategy by purchasing Allpoint.[30] ISOs also can take this route directly by waiving surcharges, as the Sheetz convenience store chain has done, hoping that increased transaction volume and cross-sales of store merchandise will more than make up the loss of surcharge revenue.[31] An alternative method is to partner with a financial institution and brand the ATM with the name of the financial institution, as 7-Eleven has done with Citigroup.[32] The agreement enables Citigroup to expand market presence and services to customers, while 7-Eleven gains a large customer base with more incentive to visit its ATMs.

Theoretically, the best strategy for the largest financial institutions with extensive fleets of ATMs may be to establish a high surcharge, and evidence suggests a positive relation between surcharges and size of financial institutions.[33] Large financial institutions may give up some foreign transactions as a result but are willing to do so because surcharging provides incentives for consumers to become customers of the bank and take advantage of the bank's many ATMs.[34]

For mid-tier and smaller banks, we observe a variety of strategic approaches. RBC Centura Bank, for example, does not surcharge while Washington Mutual has recently imposed surcharges.[35] Most banks surcharge noncustomers, but, evidence suggests that some have moved toward selective surcharges.[36] While there are many different forms of surcharge-free alliances, their fundamental aim is to increase traffic at ATMs while at the same time increasing services to customers, which helps counter the advantages of large financial institutions.[37] A similar arrangement is agent-bank and partnership relationships among financial institutions that allow customers to use each other's ATMs without surcharging.[38] Finally, financial institutions frequently search for new services to add to ATMs, and the latest trend is to add imaging capability. This has been appealing to banks of all sizes with the hope of attracting customers to use ATMs to deposit checks or cash.[39]

Sluggish overall transaction volume and the decline in foreign transaction volume reflecting consumer reaction to surcharging and bank mergers all have hurt ATM network switch fee revenue. Networks have followed several strategies to recover lost revenues. Co-op and MoneyPass formed surcharge-free networks, where no members can surcharge. Star, NYCE, Pulse, Cirrus, and Plus allow selective surcharge-free alliances, where members can choose whether to join or not. MasterCard has an agreement that allows its prepaid and debit card issuers to offer surcharge-free use of thousands of Cardtronics ATMs.[40] Some networks have increased the number of ATMs in the

network to boost ATM volume, such as NYCE's agreements with ISOs and Pulse adding to its membership.

For networks, an alternative to expanding usage is to take market share from other networks. Pulse has opened ATMs in its network to holders of Discover cards, which may pull some transactions from other networks.[41] Plus has gained market share, largely at the expense of Star, by inducing many financial institutions to select Plus as a preferred network.[42] Finally, some regional networks—such as Co-op, NYCE, and Star—set higher interchange fees paid to ATM ISOs, encouraging them to keep the network's mark on their ATMs and possibly enhancing the network's overall transaction volume.

Forming a backdrop to these short-term adjustments to declining transactions are longer-term trends in network ownership. The falloff in bank joint venture ownership may be explained by the industry's life cycle and by disadvantages that bank joint ventures might have. One, when an industry is in its infant stage, vertical integration is common as it was in the ATM industry for banks. But, as the industry matures, new specialized firms, such as nonbank processors and processors controlled by a bank, may appear.[43] Two, as more members join a network, it may become more challenging to coordinate decision making.[44] And, three, research has shown that industry instability can reduce the life of joint ventures, suggesting consolidation within the banking industry may have contributed to the demise of networks formed as joint ventures.[45] Nonbank and single-bank forms of ownership may not face these challenges, potentially contributing to their rising importance among the largest ATM networks.

The acquisition of networks by payment processors may be tied to economies of scope and improved security. Economies of scope allow combined processor/network enterprises to avoid transaction costs required when interacting with several suppliers.[46] It also can allow bundling of services that result in a lower price compared with purchasing the services from separate companies.[47] Finally, combined processor/network enterprises have control over many interrelated segments of the payment supply chain and may be able to more easily coordinate the implementation of security controls.

Developments in the debit card market

Industry recap

By most measures—including the total number of debit transactions, the number of debit cards issued, the average number of transactions per card, and the number of point of sale (POS) terminals—the debit industry has experienced robust growth.

Both PIN (online) and signature (offline) debit are growing rapidly: The annual growth rates of PIN and signature debit during the 2002-06 period were 25 percent and 19 percent, respectively (Figure 5).[48] Consumer studies confirm this growth. Surveys conducted by Dove Consulting show that consumers have markedly increased their PIN and signature debit use at the POS since 1999, partially displacing the use of cash and checks.[49] The report also estimates that the debit share of consumer transactions at the POS is now close to 33 percent, up from 21 percent in 1999.

The number of merchant outlets that accept PIN debit also has grown steadily, as has the number of merchant outlets that accept signature debit (Figure 6). Currently, signature debit has a 3-to-1 lead in merchant outlets over PIN debit. However, most large merchants accept PIN debit, which is one reason why the current lead in transaction volume for signature over PIN debit is only 1.6-to-1.

Signature debit obtained its lead in merchant acceptance for two reasons. First, signature debit had an early advantage because it is processed on the Visa and MasterCard credit card networks. Credit card acceptance was well established prior to 1990, and both networks had an "honor all cards" rule that required merchants that accepted Visa or MasterCard credit cards to also accept their debit cards. As a result, by 1995, signature debit acceptance was much higher than PIN debit acceptance. Second, Visa and MasterCard both have made considerable investments in developing and promoting signature debit.

As shown by its steady increase in merchant acceptance, PIN debit networks also have worked to develop their markets. But research has shown that growth in merchant acceptance of PIN debit is uneven over retail sectors, with convenience and department stores showing the fastest growth since 2000.[50] It is likely that the retail sectors with the highest benefit-cost ratio for adopting PIN debit have been the leaders.

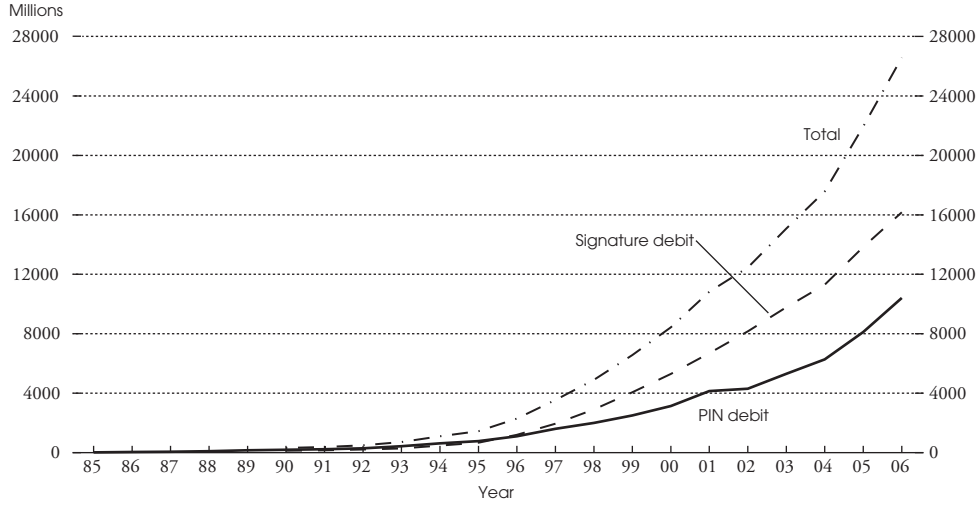
There has been noticeable movement in the market shares of PIN and signature debit in recent years (Figure 7). From 1995 to 2002, signature debit gained significant market share at the expense of PIN debit. But, since 2002, PIN debit's market share has increased. Whether this signals a comeback for PIN debit is an intriguing question that we revisit in the discussion below.

The overall structure of the debit industry continues to evolve but is showing some nascent signs of stabilizing. The number of PIN debit networks declined from 23 in 2002 to 14 in 2006.[51] While hardly a sure sign of stability, the number of networks, after declining each year from 1996 to 2004, was the same in 2004 and 2006. Concentration also has been unchanged since 2002 despite the fact that the number of networks declined.[52] This may be a more reliable indicator of stability and reflects the facts that no major networks exited the market and no major mergers occurred. However, as a result of changes in the methodology for how networks report transactions, more time and data are needed to confirm industry stability.[53]

There have been some major changes in PIN debit market share among the top networks, with Visa's Interlink gaining largely at the expense of Star. Loss of Star's market share has been particularly dramatic—its share in 2002 was 57.3 percent, but it has fallen by almost half since then.[54] In contrast, Interlink's share has grown from 14.4 percent in 2002 to 39.5 percent in 2006. After being in second place for many years, in 2005 Interlink became the largest PIN debit network.

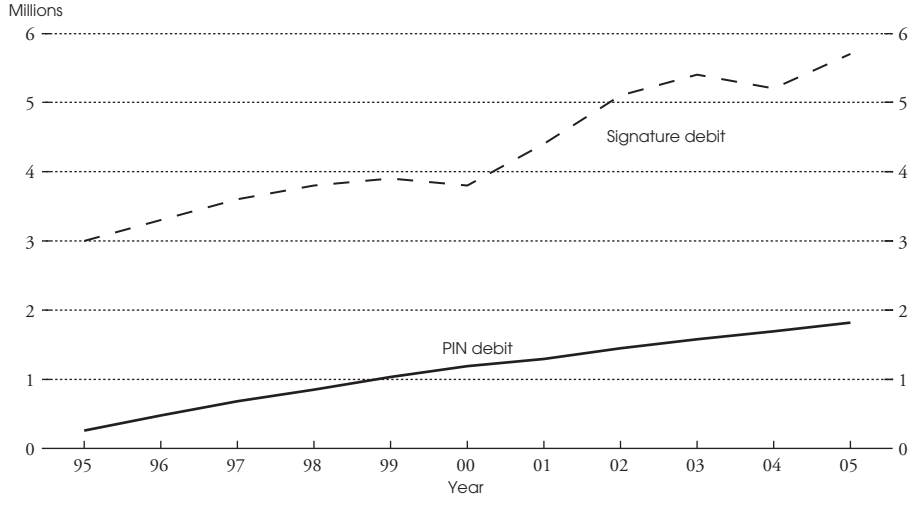
Despite Interlink's gain in market share, overall concentration in the PIN network industry has been stable in recent years.[55] Similarly, the market for debit card issuing has shown stability, with concentration among top issuers unchanged since 2002.[56]

Figure 5: *Debit Transactions*



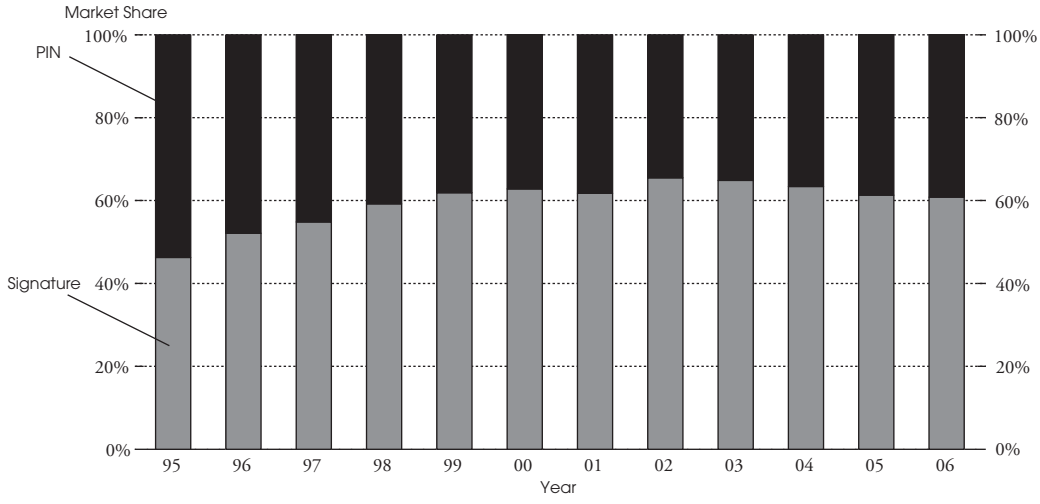
Source: *EFT Network Data Book* (various years).

Figure 6: *Merchant Acceptance of Debit Cards*



Source: *Nilson Report* (various issues).

Figure 7: *Market Share for PIN and Signature Debit*



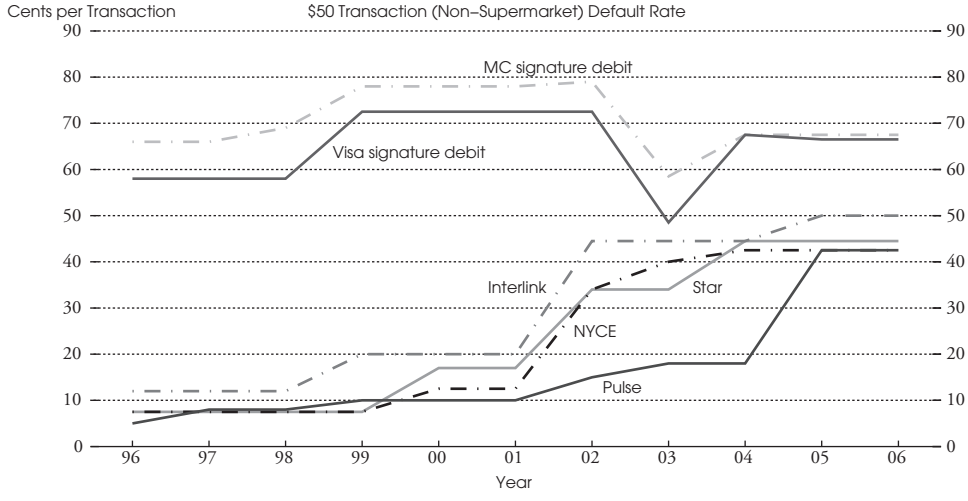
Source: *EFT Network Data Book* (various years).

There also have been some developments in wholesale pricing of debit transactions. Similar to ATM pricing, switch fees for debit transactions recently have been steady, although Star has raised the switch fee paid by issuers.[57] In contrast with ATM pricing, however, interchange fees for PIN debit have increased recently.[58] Interlink has been the market leader, dramatically raising its interchange fee in 2002. Most of the PIN debit networks since have raised their interchange fees, although more gradually in most instances. After setting an interchange rate that was below market for many years, MasterCard's Maestro raised its rate dramatically in 2003, to now be among the highest. Pulse also lagged the market for some time but more than doubled its non-supermarket interchange fee in 2005 to make its fee among the highest in the industry.

The gap between signature and PIN debit interchange fees has narrowed since 2001. Figure 8 shows the interchange fees for the top four PIN debit networks and for the two signature debit networks. As can be seen, partial convergence has been the result of a slight decline in interchange fees for signature debit and a large increase for PIN debit. Convergence is not complete, however, with signature debit interchange fees remaining higher than PIN debit interchange fees.

Since our last report, wholesale pricing has become more complex. Volume discounts for switch fees are common. Both signature and PIN debit networks now provide discounted interchange rates to large volume retailers.[59] In addition, special interchange fees for retail segments have moved beyond supermarkets. MasterCard and Visa have been particularly aggressive in pricing for quick-service restaurants.

Figure 8: *Debit Card Interchange Fees*



Note: In August 2003, MasterCard and Visa changed their rates, as set forth in the so-called Wal-Mart settlement. The restriction on interchange fees ended on January 1, 2004.

Sources: *American Banker* (various issues); *Credit Card Management* (April 1999); *EFT Network Data Book* (various years); *The Green Sheet* (various issues).

Because of structured pricing, the consequences of partial convergence of interchange fees are different for various merchants and card issuers. The interchange fees shown in Figure 8 are default rates most relevant to smaller merchants. These merchants have thus benefited from the small decrease in signature debit fees but are paying more for PIN debit. Larger merchants with sufficient transaction volume get discounts according to a tiered interchange fee schedule, and the largest merchants negotiate discounts. Without specific information on criteria that qualify for discounts or on negotiated fees, we cannot say to what extent the convergence has affected these merchants. For card issuers, volume discounts mean that the average revenue they receive from PIN and signature interchange is less than the default rates would suggest. But without information on the degree of discounting across signature and PIN debit, we cannot say whether the convergence seen in Figure 8 is paralleled in average issuer revenue across signature and PIN debit.[60]

Additional information now is available on retail pricing of debit transactions. The Federal Reserve Board conducted a study on PIN fees in 2004.[61] It found that 14 percent of surveyed depository institutions charged a PIN fee. Among larger depository institutions, 24 percent imposed a PIN fee. There also was considerable regional variation in PIN fees, with Northeast institutions most likely to impose a PIN fee and those in the West least likely. The fees range from $0.1 to $2, with an average fee of about $0.75. The study also surveyed households, with 13 percent of respondents reporting that their depository institutions charged PIN fees and a smaller portion reporting a charge for signature debit as well.[62]

Debit card rewards appear to be gaining in popularity, although they primarily target signature debit. Dove Consulting reports that 13 percent of respondents to a consumer survey received rewards on either PIN, signature, or both in 2005, up from 8 percent in 2003.[63] Among those receiving debit rewards, 50 percent are for only signature debit, 11 percent are for only PIN debit, and 39 percent are for both. In a separate study of debit card issuers, Dove reports that 36 percent of issuers (primarily large banks) offer rewards programs, and an additional 23 percent are actively considering offering one.[64] Of the issuers with rewards programs, 71 percent offer rewards on only signature debit, and 29 percent offer rewards for both PIN and signature debit.

Discussion

Two themes underlie developments in the debit card industry over the past three years. The first is the exceptionally strong growth of the industry, growth that continued from earlier years and is showing no sign of slowing in the near future. This growth is apparent in virtually all measures: overall transaction volume, PIN debit transaction volume, signature debit transaction volume, average number of transactions per card, number of PIN debit POS terminals (PIN pads), and number of cards. The second is the dramatic developments in the competitive environments in which regional and national PIN and signature debit card networks find themselves. These developments, in turn, have been influenced by important court rulings and lawsuits.

Debit is the fastest-growing retail payments type in the United States, posting double-digit annual growth of 21 percent from 2002 to 2006. According to Bank for International Settlements figures, debit's share of noncash transactions has increased from 17 percent in 2002 to 23 percent in 2004.[65] Why is the industry experiencing such growth?

On the demand side of the market, consumer perceptions about debit cards have become increasingly positive. One study shows consumer comfort levels and perception of speed for debit cards rose during the period from 1999 to 2005.[66] Increased comfort and convenience have contributed to a substitution of debit for cash and checks at the POS. This source of growth will continue into the future for several reasons. First, many POS transactions are still conducted with cash and checks, leaving room for more substitution by debit. Second, demographics favor debit because it tends to be favored by younger consumers.[67] Third, consumers respond to the incentives of rewards programs for debit cards, and these programs are increasingly available.[68]

Consumers also can more easily find merchants who accept debit. More merchant locations have PIN pads, for example, in part because the costs of installing PIN pads have declined.[69] They also find it easier to use debit for online transactions. More Internet merchants accept signature debit (without a signature), and some online billers accept PIN debit (without a PIN).

On the supply side of the market, banks largely prefer debit transactions over cash and checks, and make a concerted effort to issue debit cards to their customers. Some large banks now report 80 percent or more of their checking account customers as holding debit cards.[70] Adoption of technology that allows instant issuance of debit cards reflects this push.[71] Some analysts believe payroll cards may provide further growth to debit transactions because they have become more viable with a recent revision to the Federal Reserve's Regulation E.[72]

Because of the difference in interchange revenue between signature and PIN debit, some banks have pushed signature debit by offering signature rewards or imposing PIN fees. Discover's decision to expand into signature debit was likely motivated in part by the attractiveness of higher interchange fees to potential card issuers.[73] Other banks promote both types of debit transactions, recognizing that PIN debit still saves costs compared with checks.[74] With the interchange fee difference narrowing to some extent, banks may have less reason to favor one form of debit over the other. They may get behind both forms of debit and push for continuing the upward trend in transactions per debit card.

Networks also are promoting debit. Visa, for example, offers the Visa Extras program to issuers who wish to provide incentives to their signature debit card holders. One of the most important ways networks support debit growth is by developing new markets. They help develop new merchant categories, such as quick-service restaurants. Visa, for example, targets cash-heavy businesses by waiving signature requirements for qualified transactions under $25 and reducing interchange fees for consumer transactions under $15.[75] Networks also are targeting e-commerce payments. MasterCard has teamed with PayPal to develop a "virtual debit" application for online payments. Similarly, PIN debit networks have begun to offer PIN-less debit, which for purposes of risk control are limited to billers in certain industries such as utilities, telecommunications, education, and insurance. Star's PIN-less transaction volume was 8.9 million in 2003 and increased by 190 percent in 2004 and by another 53 percent in the first quarter of 2006.[76]

The second theme underlying recent developments in the debit industry is the tremendous amount of network competition in the industry. Our original book discussed three competitive battlegrounds within debit card networks: (1) competition among regional PIN debit networks, (2) competition between regional and national PIN debit networks, and (3) competition between PIN and signature debit networks.

All three remain very much in play today, and the economics of the industry make it likely that they will continue into the foreseeable future. The basic product of electronic funds transfer networks is information, and the underlying economics of information goods tends to push the market toward a "winner takes all" outcome.[77] The debit card industry is a declining cost technology, so that each network has an incentive to become as large as possible. In addition, similar to any network good, there is interdependence among supply and demand in payments. Consumers are more likely to choose a partic-

ular payment type if it is widely accepted, and merchants are more likely to accept a particular payment type if it is used by many consumers. As a result, payment brands that are first to market have an advantage, and there is intense competition to bring clients into the network.

As an example of this competition among regional networks, Pulse has gained market share relative to Star and NYCE, in part by adding to its membership.[78] But recently, JPMorgan Chase decided to reissue its debit cards in a manner that would shift transactions away from the Pulse and toward Star and Interlink.[79] In fact, this type of competition has been evident for some years and has made the term "regional network" something of a misnomer. The big three EFT networks—Star, NYCE, and Pulse—used to have well-defined regional territories but now have broad national coverage.[80]

Arguably, a bigger story is the intense competition between the large regional networks and the national PIN debit networks, especially Visa's Interlink. Regionals as a group—and Star in particular—have lost considerable market share to Interlink. Interlink's share is now 39.4 percent, a doubling in just three years. Star's market share, meanwhile, has declined from 50 percent to 29 percent. Several large issuers, such as Bank of America, Wells Fargo, JPMorgan Chase, and Wachovia, have moved from Star to Interlink. This shift is attributable in part to Interlink's sharp hike in interchange fees. But Visa also may be recognizing the value of size in its EFT operations. It has placed emphasis on going after the largest issuers by using interchange fees as well as other tools, such as no-mark cards (just the Visa brand and no Interlink mark) if banks do not join other networks.[81] According to a few reports, Visa also has made large payments to members for switching to Interlink.[82] Knowing that they need to maintain transaction volume, other networks have countered these tactics by offering deals to bring in members, even to smaller banks.[83]

There has been a good deal of activity on the PIN-versus-signature-debit battleground as well. Some is a result of the dynamics associated with consumer and merchant preferences as well as the continued efforts for both forms of debit to develop new markets. But much also has to do with the fallout of the May 2003 settlement of the class action lawsuit brought by Wal-Mart, Sears, and other retailers against Visa and MasterCard. The settlement required the card associations to pay $3 billion in damages, reduce signature debit interchange fees by one-third for a period of five months, and conspicuously mark cards so that merchants could identify debit cards. The settlement had the potential for helping PIN debit by giving merchants that accept Visa or MasterCard credit cards the option of refusing their signature debit cards.

Other than the $3 billion payment for damages, many merchants would argue that the promised benefits of the settlement for merchants have proved elusive. PIN debit's share of total debit transactions has crept up a bit in last couple of years but signature still accounts for 61 percent of transactions. PIN lags despite tending to be favored by consumers and merchants. Surveys have shown that more consumers prefer PIN to signature debit, at least since 2001.[84] Both consumers and merchants like the fact that for most transactions PIN debit is more secure than signature (see "Data security and fraud," p. 20). Merchants and some online billers also prefer PIN debit because it is a less-costly

form of payment. Some merchants actively engage in efforts to steer customers toward PIN debit: According to a recent survey of retailers, 33 percent of respondents attempted to steer customers toward preferred payment methods.[85] In light of PIN debit's advantages, some wonder why steering is not used more often.[86]

Signature debit has maintained its lead for a number of reasons, however. Issuers have an incentive to promote signature debit because of its greater profitability. One pricing strategy is to impose PIN fees on consumers to make signature debit relatively less expensive. Another strategy is to offer more lucrative reward programs for signature debit.[87, 88]

Both PIN and signature networks are developing new markets, such as online payments. Visa has been successful in getting signature debit holders to use its cards for online transactions. In the first quarter of 2005, it announced that for the first time its signature debit cards were used more often for online purchases than its credit cards.[89] PIN debit has seen some success with PIN-less debit for online payments, but it has been limited to bill payment for a select group of billers.[90] Recent news reports identify Fiserv and its Accel/Exchange network as continuing to expand the use of PIN debit for online retail transactions.[91]

One way networks compete, of course, is via pricing, especially via interchange fees. Interchange fees have been the focus of much attention recently. In the United States, merchants have identified interchange fees as one of the fastest-growing business expenses.[92] This reflects the general rise in interchange rates as well as the increased use of credit and debit cards relative to cash and checks. As noted above, in the last few years, signature debit interchange fees have been relatively stable while PIN debit interchange fees have moved sharply higher.

Although the 2003 settlement gave merchants the option to reject signature debit, most merchants choose not to do so. First, many merchants accept signature but not PIN debit, so rejecting signature debit would mean not accepting debit at all.[93] Second, competitive pressures and customer service make it difficult for merchants to reject payment cards.[94] The experience of Walgreens drugstore chain illustrates the difficulty of eliminating a payment alternative. It decided to stop accepting the American Express credit card in December 2004 but a month later reversed its decision.[95] Third, signature debit is still cheaper for merchants than a credit card payment.

The 2003 settlement has not resolved the dispute between merchants and card issuers. From the point of view of many merchants, the outcome has not been satisfactory—signature interchange fees fell somewhat, but PIN interchange fees rose substantially and the option to reject certain types of payments has not been seen as a viable alternative.

Merchants have continued to seek relief through lobbying efforts and litigation. For example, at a Senate Judiciary Committee hearing on July 19, 2006, merchants and networks presented their points of view.[96] And as of June 2006, at least 50 lawsuits have been filed against the card associations, alleging violations of federal antitrust statutes and involving thousands of merchants.[97] In part, these lawsuits reflect merchant frustration with the costs of processing payments, but they also may reflect the introduction of

complex structures and rules that apply to interchange fees. The current merchant lobbying efforts and lawsuits highlight the diversity of merchants—large and small—who face entirely different environments with respect to interchange fees and other arrangements for payment processing.[98] It is difficult to predict whether these efforts will resolve the dispute.[99]

Networks compete not just on price, principally interchange fees, but in other ways as well. For example, they make routing agreements and bundle service offerings (such as network switching and transaction processing). Continuing the "battleground" analogy, these moves could be interpreted as "offensive," that is, business practices aimed at customer retention.

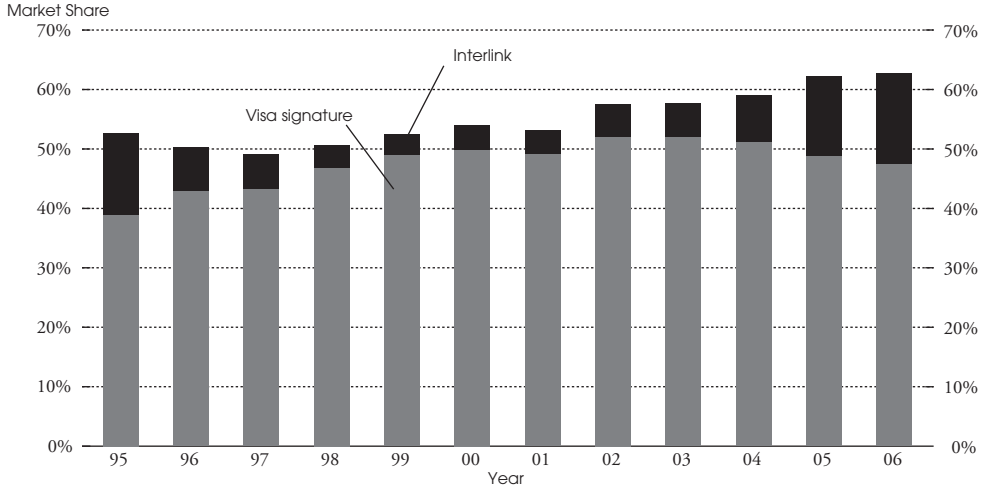
But networks also have made some moves that could be interpreted as "defensive," such as keeping signature interchange fees relatively level and, in the case of MasterCard and Visa, making organizational changes. After raising interchange fees every year since 1997, Visa announced in March 2006 that it would hold its fees steady.[100] MasterCard kept debit card interchange fees unchanged in 2006. Visa also has altered the way it sets interchange fees in a manner some feel would insulate it from allegations of price fixing. It added eight independent members to its Board of Directors and created a committee consisting of three or more independent directors who would determine interchange, reimbursement, transactions, and service fees.[101] MasterCard changed from an association to a publicly traded company, possibly expecting that it would deflect charges of inappropriate price collusion.[102] Similar considerations may have been partially behind Visa's recent announcement to convert its U.S. operations to a publicly held company.[103]

This discussion of the third competitive battleground implicitly assumes that PIN and signature debit are distinct products. But some observers would argue that their functions are so similar that it is reasonable to view them as part of a single debit payment market.[104] Viewed this way, Visa has a large and growing market share. As can be seen in Figure 9, Visa's market share in the combined debit market hovered around 50 percent from 1995 to 2001, but increased to over 60 percent in 2005. Much of Visa's recent gain is in PIN debit.

While much of the recent competitive activity has involved networks, there also have been developments in competition among processors and among issuers.[105] One of the most significant is that First Data and Visa have been involved in litigation over transaction routing. First Data had been routing some Visa transactions from merchant acquirers directly to card issuers and bypassing Visa's network. In a settlement, announced in July 2006, First Data agreed that it will not route "internally" and Visa will provide First Data financial support to pursue mutual business opportunities and cost cutting.[106, 107]

To complete this section, we note that the debit card industry faces a challenge from another payment industry, the Automated Clearing House (ACH) system, which is developing a number of payment options that could substitute for debit.[108] The National Automated Clearing House Association (NACHA), for example, is working to develop

Figure 9: *Visa Combined Market Share of Signature and PIN Debit*



Source: *EFT Network Data Book* (various years).

a new, safer online ACH payment product. A consumer who uses this payment option at an online merchant/biller Web site would be redirected to their bank's Web site for payment authorization. Such a system has the advantage of keeping the account information between the consumer and the bank.[109] The consumer's bank would authenticate the consumer and guarantee payment to the merchant, for which it would be compensated by a fee paid by the merchant.[110] A pilot is expected to begin in early 2007.[111]

Several companies also are working on developing methods for initiating an ACH payment at the POS. Debitman (Tempo, as of late 2006)—an ACH-based card payment mechanism that enables participating retailers to become card issuers—may be the best known of these companies, and it has entered into agreements lately that could help it gain market acceptance. It has reached agreements with a number of retailers including Wal-Mart, Burger King, Best Buy, Shell, Walgreens, and others, to accept the card.[112] Payment processors that support Debitman include Fifth Third, RBS Lynk, and Chase Paymentech. In May 2006, Debitman allied with HSBC Retail Services, an issuer of private label credit cards, to issue cards on behalf of merchants and provide card program support and fulfillment services.[113]

There are other programs to create ACH debit cards as well. First Data is testing an ACH debit card with the Stop and Shop grocery chain.[114] Binghamton Giant Markets has had an ACH payment program since 1989 and will switch to Debitman to enable customers to use the card at other merchants.[115] Biometric payment provider Pay-by-Touch includes an ACH option in its system.[116] FastLane Secure Payments enables consumers to use driver's licenses to initiate POS payments that are settled on the ACH system.[117] And a number of online retailers use e-check systems to allow consumers to make an ACH payment.[118]

A look ahead

Recap

This review has shown that the ATM side of the industry is retrenching while the debit side of the industry is flourishing. There are many reasons for this divergence, but they are related. Because it has become much easier to use payment alternatives, such as debit and credit cards, today's consumers do not need as much cash.[119] There is some irony in the fact that at the same time that new opportunities for ATM revenue were on the rise because of surcharging, the debit card industry was in the midst of a takeoff and card industry promotion was heavy. In other words, just when banks were hoping that the primary service offered by ATMs—dispensing cash—might generate significant revenue, they were heavily pushing one of the most successful cash substitutes we have seen.[120]

This last section considers an important issue that affects the outlook for both ATMs and debit: data security and fraud. It then provides some comments on other key future developments and concludes with some thoughts on policy considerations.

Data security and fraud

Data security and fraud are a cloud that hangs over the ATM and debit industry amid heightened public, industry, and government awareness and concern. Data security and fraud span both the ATM and debit industries because a compromise of a debit card's data can enable a criminal to exploit either the ATM or the debit function for fraudulent purposes. We discuss data security and fraud in this section because continued compromises of debit card data could undermine public confidence in both ATMs and debit cards.

First, the bad news. Probably the most disturbing recent data breach relevant to the ATM and debit industry involves access to debit card numbers and associated PIN numbers. In February 2006, criminals reportedly obtained debit card numbers and PINs through a U.S. retailer, recreated debit cards, and made illicit ATM withdrawals in a number of countries, including the United Kingdom, Canada, and Russia.[121] At least 200,000 debit card numbers are thought compromised, and at least 20 financial institutions reissued debit cards for their customers.[122] Perpetrators may have had access to decryption keys, which would be a serious compromise of the system to protect PINs, but this has not been confirmed by official sources.[123]

Through most of this year it could be assumed this was an isolated incident, which provided some comfort that the exploit may not be easily reproduced. But in August 2006 a second PIN breach was reported that had similar characteristics to the first except it involved a different U.S. retailer.[124] The report said that 150 consumers informed police that $170,000 had been stolen from their accounts. Needless to say, it would be a serious blow to PIN debit cards if the methods used in these breaches are difficult to counter and they become widely known.

These PIN breaches come in the context of a rise in data breaches more generally. The year 2005 has been identified as the worst year for breaches of data security.[125] And fraud has been identified as the primary reason for a 2005 surge in chargebacks on several networks.[126, 127]

There has been concern that the U.S. ATM and debit industry will become more inviting as a target when other countries beef up security by adopting chip cards. Recent experience with computer chip debit cards in the United Kingdom suggests that criminals will shift their efforts toward points of security weakness.[128] The one area where UK fraud increased was in card-not-present transactions, suggesting that the chip-and-PIN technology made it harder to commit fraud in card-present transactions, pushing it to card-not-present transactions. Given that chip-and-PIN cards are being adopted in a number of other countries, this lends credibility to the notion that the United States will become an increasingly attractive target for ATM and debit fraud.

But there is good news. PIN debit traditionally has been regarded as safer than signature debit, and three recent studies show that PIN debit has less fraud than signature debit.[129] In the first study, the fraud loss was 5.1 basis points for signature debit and 1.2 basis points for PIN debit.[130, 131] A second study's estimates were 4.21 basis points for signature debit and 0.29 basis points for PIN debit.[132] The third study again confirms that PIN debit has less fraud than signature debit, although the difference is not as pronounced at 2.6 basis points for signature debit and 2.2 basis points for PIN debit.[133]

The United States may well be able to fight fraud by improving security systems for magnetic stripe cards. For example, security features that NCR is introducing to its ATMs can help foil exploits such as card skimming and clandestine observation of ATM customers.[134] And many banks and merchants do not apply all of the security features available to them for ATM and POS transaction, which if applied would help deter fraud.[135] Moreover, the recent UK experience with chip-and-PIN cards shows that the cards can significantly reduce card fraud.[136] While there are concerns that a shift from magnetic stripe to chip cards would be expensive, at least there is a solution available that could considerably strengthen debit card security.[137]

The actual cost of data breaches may not be as high as might be feared. In a sample of 500,000 breached identities, ID Analytics found just 1 in 1,000 were misused.[138] Javelin Research estimates that the number of adult victims of identity fraud in the United States fell from 10.1 million to 8.9 million between 2003 and 2005.[139]

Finally, the industry is responding to improve data security and antifraud systems. Visa, MasterCard, and other payment card networks have developed data security standards and are in the midst of the process of gaining compliance to those standards.[140] The process of securing the payments system requires some degree of cooperation among industry participants and there are signs of collaboration. For example, First Data and several large banks formed a joint venture to collaborate on security measures.[141]

While industry cooperative efforts are a positive step, it leaves out an important element in securing any payment system: consumer behavior. Consumers ultimately determine which payment method to use. Their decision is based on many factors, including risk of fraud, consumer protections, price, and convenience. The incentive structure they face could lead them to choose a less-secure payment method. For example, they may choose a riskier payment instrument because it has a rewards program and/or has a zero-liability consumer protection. In fact, some consumer advisers are discouraging the use of PIN debit or any form of debit because they are riskier than credit cards.[142] While this may be true from the consumer point of view, it is not necessarily true for society as a whole.

The future

It seems likely there will be further shakeout in the ATM industry in light of the saturated and possibly overbuilt market. The extent of the shakeout will depend upon deployers finding a profitable mix of functionality, pricing, and location. But, unless significant changes are made, some difficult adjustments are likely on the horizon, if only because the ATM industry faces a strong head wind: a shift of retail payments away from cash.

Will ISOs or banks do better at making necessary adjustments? Banks place heavy emphasis on the ATM as a delivery channel for financial services, and because few bank customers use other functions, most banks view ATMs as cash dispensers.[143] But pinning hopes on ATMs as substitutes for tellers in the face of a declining demand for cash seems a tenuous cause for optimism. Some banks hope to change consumer perceptions of ATMs by adding new functionality. One function attracting a lot of recent attention is imaging capability, which would improve the ATMs attractiveness for taking deposits.[144] Because check usage also is declining, banks may consider alternative functions as well. For example, the ATM could be used to initiate ACH transactions for person-to-person or bill payments, as can be done at ATMs in other countries.[145] They also could instantly issue stored-value cards. If successful, ATMs may better live up to their promise of redirecting customers away from tellers as well as generating added revenue for banks.

The current slowdown in transactions has stressed many ISOs, which often deploy ATMs as cash dispensers. On the other hand, ISOs often can be innovative by exploring nonfinancial services dispensed through ATMs. They appear more willing to view an ATM like a vending machine, providing opportunities to sell many items, with cash access being one of a number of features. According to one estimate, 67 percent of kiosk-style ATMs are installed in retailer locations and only three percent at banks.[146] 7-Eleven, in particular, has developed a multifunction ATM that reportedly has had some success. The U.S. Postal Service and Cardtronics have shown interest in these types of ATMs as well.[147]

Debit's current trajectory is likely to persist, which will make it an even more important payment type in the future. Continued debit growth will come in part from substitution of debit for cash. According to one estimate, 63 percent of retail transactions are made

with cash, so there is considerable room for growth for both PIN and signature debit.[148] The critical question, of course, is how will the industry evolve? Much will depend on the answer to two additional questions.

First, will the industry find a way to end the conflict between merchants and card issuers/networks? Merchants are seeking change via three avenues: litigation, legislation, and regulation. Past litigation has not ended the conflict. Settlement of the so-called Wal-Mart suit in 2003 did not prevent a wave of new antitrust lawsuits filed in 2006 by merchants against the card associations and issuers. Those suits are still outstanding. In the legislative arena, hearings have been held on interchange fees, most recently by the Senate Judiciary Committee.[149] To date, however, no legislation has come to pass. And merchant groups also have called for regulatory action, citing steps taken by regulators in other parts of the world, including Australia and the European Union. But, thus far, regulatory initiatives have not been forthcoming.

Voluntary action may hold some promise. For example, as previously noted, Visa has reorganized its interchange rate setting procedure in a fashion that, it claims, will grant more merchant representation. MasterCard has become a public institution, and Visa USA has announced plans to do so as well. Both Visa and MasterCard have disclosed or have promised more disclosure of interchange fee rates and operating rules. And, recently, there has been a "leveling off" of interchange fees. Only time will tell whether these will be enough to diffuse the conflict.

Second, what will happen in the PIN and signature debit rivalry? A number of factors, including pricing, costs, profits, security, and product innovation, will greatly influence the future. We envision four possible scenarios.

In the first, both PIN and signature debit maintain differentiated products, and both continue to grow with small shifts in their market shares. Merchants who are capable of accepting PIN debit will continue to prefer PIN debit in order to take advantage of lower cost and better security. Some consumers will prefer one type of debit to the other because each maintains differences in security, consumer protection, rewards, and fees.

In the second scenario, PIN and signature debit functions and features converge in a way that makes them essentially indistinguishable to consumers. Visa and MasterCard, for example, currently allow signature-less debit at many locations, and in the future, contactless cards will encourage signature-less debit. Some PIN debit networks already allow PIN-less debit online, and a change in network rules could allow these transactions in other low-risk situations. A convergence between the two forms of debit in acceptance, consumer protection, security, fees, and reward programs would tend to make consumers indifferent between the two on these features.

If PIN and signature debit were no longer differentiated from the consumer's point of view, then attraction to merchants and cost-effectiveness would help determine whether one had a market advantage over the other. Security features could make both forms of debit equal in the eyes of merchants. If so, then the price to the merchant for each type

of debit may be tied to cost-effectiveness and prices charged by networks, which will largely be determined by market leadership and scale of production. This would lead to a market structure with a few large networks.

A third scenario has PIN debit networks making use of price, convenience, and risk advantages to slowly gain on signature debit. PIN debit has many market advantages to exploit, such as lower risk and cost efficiency. Most large merchants already have installed PIN pads, and expansion to smaller merchants may be helped by recent ISO offers of free PIN pads to merchants, helping close the gap between signature and PIN debit acceptance.[150] Innovation among PIN card issuers and networks can further increase the attractiveness of the product.[151] There are efforts to make PIN debit more useful for online purchases, such as those by Fiserv and its Accel/Exchange network. PIN networks also are experimenting with adjustments to pricing to help enter new markets.[152]

Under this scenario, a further narrowing of the difference between PIN and signature interchange fees would help remove the bias of issuers toward signature debit, and they would be more willing to put efforts toward product development in PIN debit. Some consumer protections on PIN debit would need to be enhanced so that consumers are indifferent on these features relative to signature debit.

In the fourth scenario, networks enhance their signature debit products and gain market share. Signature debit networks keep their interchange fee high relative to PIN debit, providing issuers more funds to support their reward and other promotion programs. Better consumer protections make consumers choose signature over PIN debit. Issuers further influence consumer incentives by embracing PIN fees and imposing transaction caps on PIN debit that are lower than those for signature debit. Merchant attempts at steering customers toward PIN debit fail because they cannot give consumers sufficient incentive to overcome the pricing and consumer protection advantages of signature debit. PIN debit networks lose transaction volume, forcing their unit costs to rise, which limits their ability to innovate and develop their products.

Though each has some plausibility, which of these scenarios is most likely to play out is hard to predict because there are numerous conditions that must be met for each outcome to occur. From society's point of view, it would be best for the market to lead to a payments system with the most desirable set of characteristics in terms of efficiency, safety, and accessibility, and combinations of payment alternatives may best serve this goal.

Finally, a wild card for both PIN and signature debit is whether ACH alternatives for retail payments become increasingly viable. These schemes face an uphill battle because of issues such as control of risk and the classic chicken-and-egg problem of introducing a network product to a market. But, as outlined above, there is a good deal of effort in developing ACH products useful for POS and other retail transactions. Moreover, in the absence of some solution to the current conflict between merchants and the credit card networks, there will be considerable interest among merchants for cost-effective payment alternatives.

Policy considerations

The U.S. retail payments system is in the midst of a fundamental transformation, from paper-based transactions to electronic-based transactions. This shift—and the rising predominance of debit card transactions in particular—raises a number of important policy issues. These issues can be grouped under the general categories of safety, efficiency, and accessibility.

The payment card industry is largely self-regulated. This raises the question, Is the current supervisory framework adequate to ensure that the industry is safe and secure? Are major participants in the industry subject to appropriate incentives? Merchants face some incentives—they can incur penalties, either through pricing, chargebacks, or licensing agreements. Financial institutions face some incentives as well. But are they sufficient? And consumers face only limited incentives in light of zero-liability provisions for signature and minimal-liability provisions for PIN debit. In addition, recently developed applications, such as contactless, signature-less, and PIN-less products, potentially raise safety issues.

The debit card industry also has become more concentrated in recent years, especially if the "market" is defined as combined signature plus PIN. Does this increased concentration warrant greater regulatory scrutiny? Is the debit card market sufficiently competitive and efficient?

A number of issues arise in this context. Vertical integration—where a single firm performs activities throughout the payments process—has seemingly advanced in recent years. What are the incentives behind this strategy—to realize economies of scale and scope, to create market power, or to reduce the market power of competitors? From a competition policy standpoint, simply encouraging competition by limiting firm size or reach may not be advisable in light of economies of scale, economies of scope, and the two-sided nature of many payments markets. In what competitive environment—monopoly, duopoly, oligopoly, or perfect competition—is the industry most efficient?

Another efficiency issue intersects with safety issues. Cooperation among competitors is becoming more prevalent as the industry attempts to combat data security and fraud problems. While clearly beneficial, is there a line past which such cooperation has a negative impact on competition? More generally, increased security requirements likely make payment card transactions more costly. What is the appropriate balance between security (safety) and costs (efficiency)?

A third set of policy questions center around access issues. Many consumers, especially the unbanked and underbanked, recently have gained access to electronic payments via EBT, payroll-card, and stored-value card products. Some of these products have only limited consumer-protection and fee- and rule-disclosure provisions, however. Is access being gained, in some sense, at the cost of reduced security? On the merchant side, smaller merchants in particular have seen their interchange fees rise in recent years, making access to payment cards more expensive. And although alternatives, such as ACH-based products, are beginning to appear, an overwhelming amount of electronic transactions are still conducted via debit and credit cards. As transactions become even more electronic, will small merchants' costs of processing

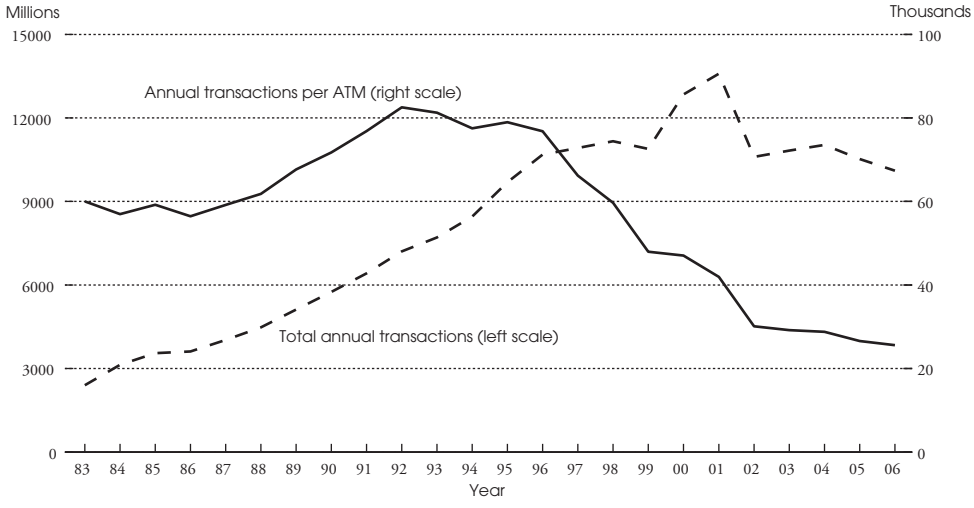
payments continue to rise? Might costs increase to the point where some merchants simply cannot accept payment cards?

Answers to these questions are not easy. The ATM and debit card industry is inherently complex. Moreover, the industry is currently going through a highly volatile, dynamic period. Conditions are changing rapidly, seemingly daily. Policymakers and industry participants alike need to stay informed and be prepared to make solid, sound decisions.

3 The ATM and Debit Card Industry: Statistical Update

Charts

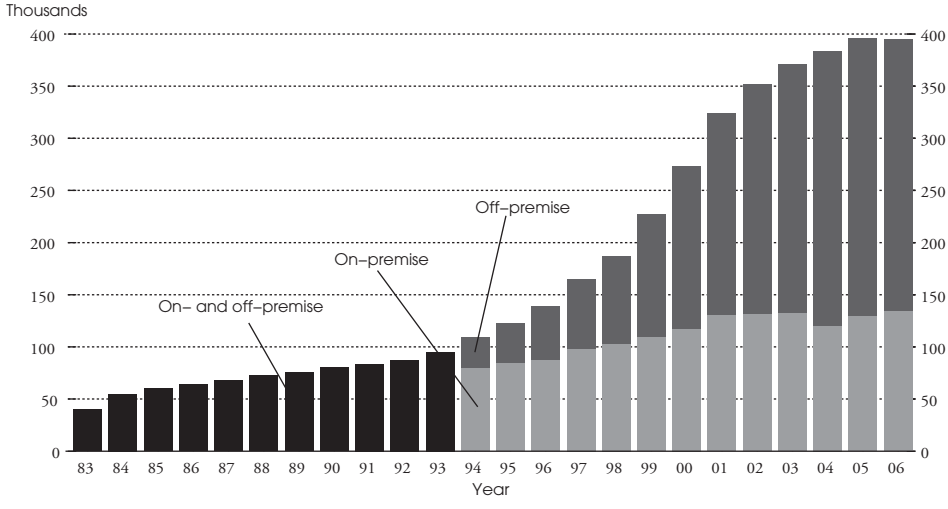
Chart 1: *ATM Transactions*



Note: Total annual transactions include bank on-us and in-network transactions. Data prior to 2002 include some gateway transactions, and therefore they are likely overstated compared to 2002 and after.

Source: *EFT Network Data Book* (various years).

Chart 2: *ATM Terminals*



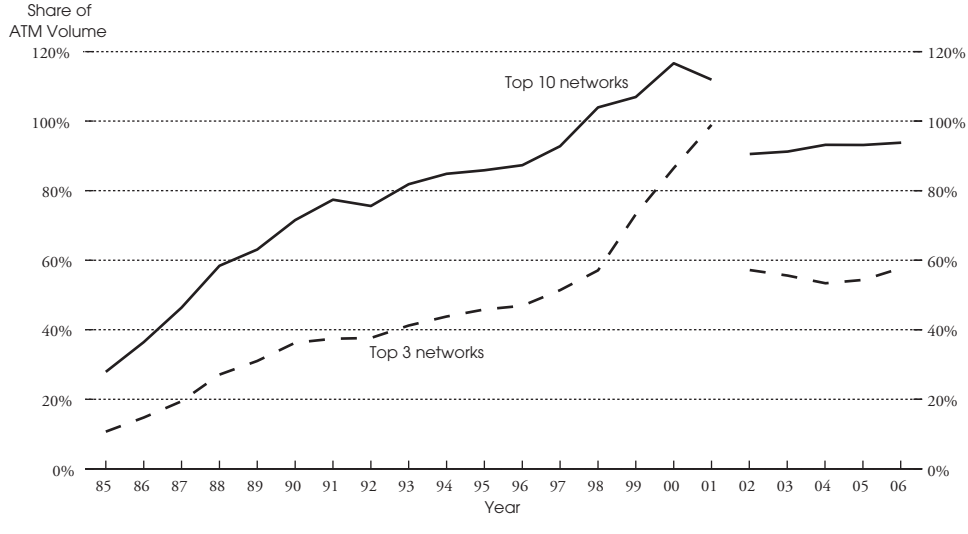
Source: *EFT Network Data Book* (various years).

Chart 3: *Number of Shared ATM Networks*

Note: The authors count the number of networks each year based on various data sources. Included networks are the ones that authors can identify the name of the networks, and therefore the numbers in this chart, especially in the 1980s, are possibly smaller than the actual numbers.

Sources: Co-op Network; *EFT Network Data Book* (various years); Star Systems; others (various years).

Chart 4: *Concentration of ATM Transaction Volume*

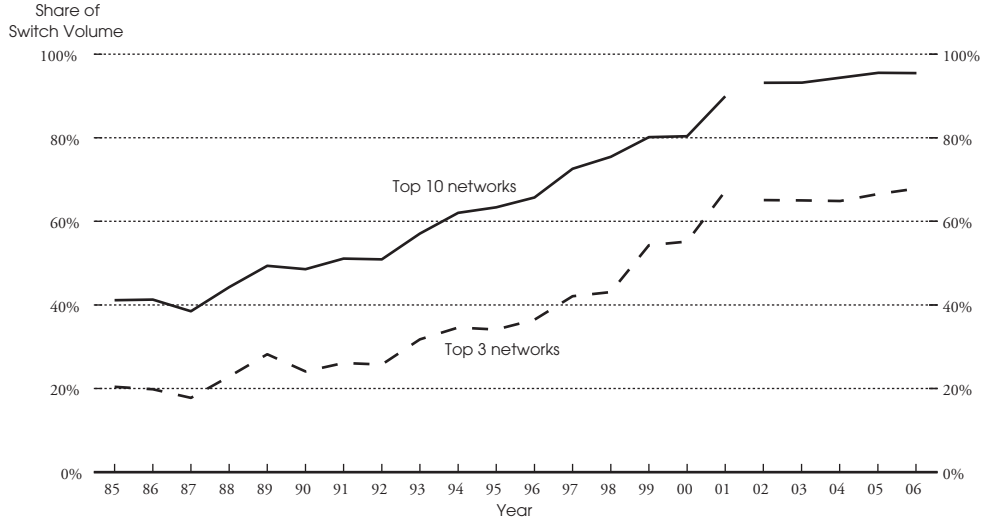


Notes: For data prior to 2002, transaction volume for individual networks includes in-network, gateway, and bank on-us transactions. Market share calculations are based on total ATM transactions that are defined to include all in-network transactions and bank on-us transactions. Because a single transaction is possibly counted as an in-network transaction for one network and as a gateway transaction for other(s), market shares for a group of networks may be inflated and sometimes above 100 percent. The level of market share for a group of networks is probably less meaningful than the trend in market share.

For 2002 and after, transaction volume for individual networks includes in-network transactions. Market share calculations are based on the sum of in-network transactions for the complete list of individual networks. Market shares are slightly inflated because data for a few networks are unavailable and as a consequence the sum of in-network transactions are slightly understated.

Source: *EFT Network Data Book* (various years).

Chart 5: *Concentration of EFT Switch Volume*

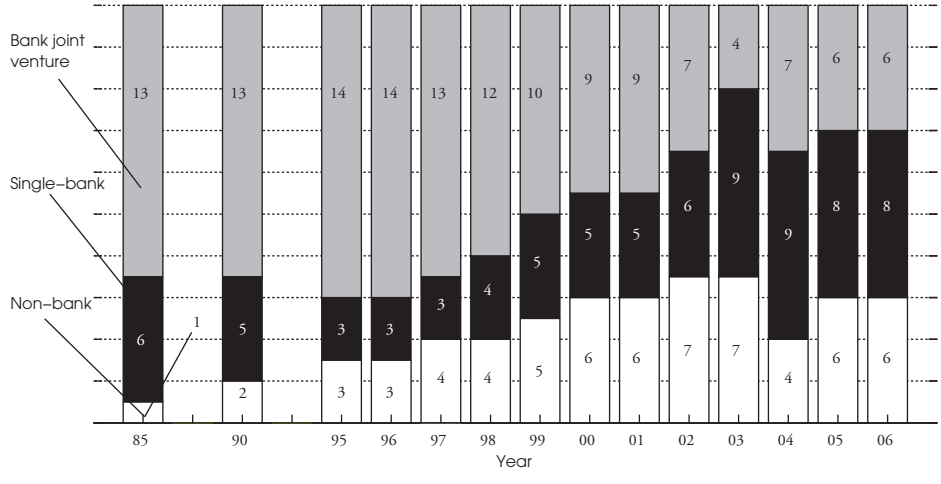


Notes: For data prior to 2002, switch volume for individual networks includes in-network and gateway transactions for ATM and POS transactions. Market share calculations are based on the sum of switch volume for the complete list of individual networks. The level of market share for a group of networks is probably less meaningful than the trend in market share.

For 2002 and after, switch volume for individual networks includes in-network transactions for ATM and POS transactions. Market share calculations are based on the sum of switch volume for the complete list of individual networks. Market share is slightly inflated because data for a few networks is unavailable and as a consequence the sum of switch volume is slightly understated.

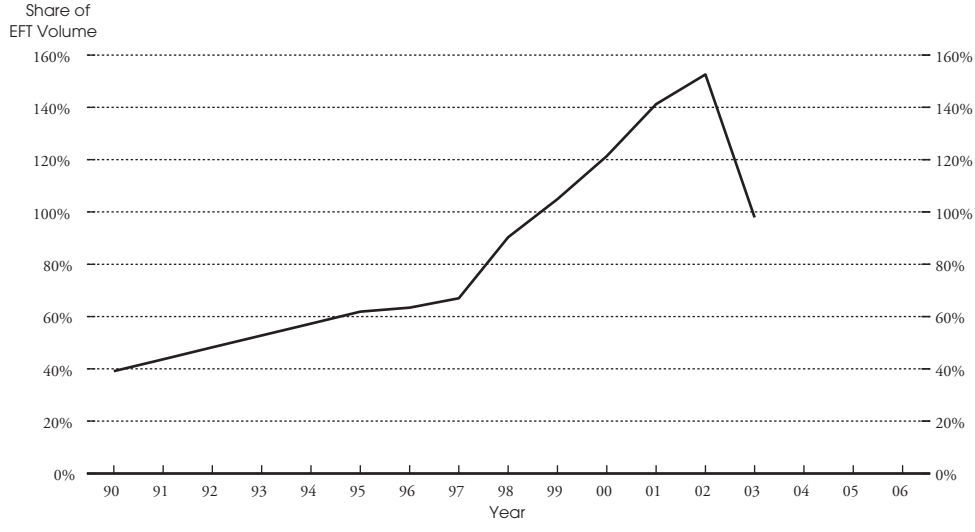
Source: *EFT Network Data Book* (various years).

Chart 6: *Ownership Structure of Top 20 Regional ATM Networks*



Source: *EFT Network Data Book* (various years).

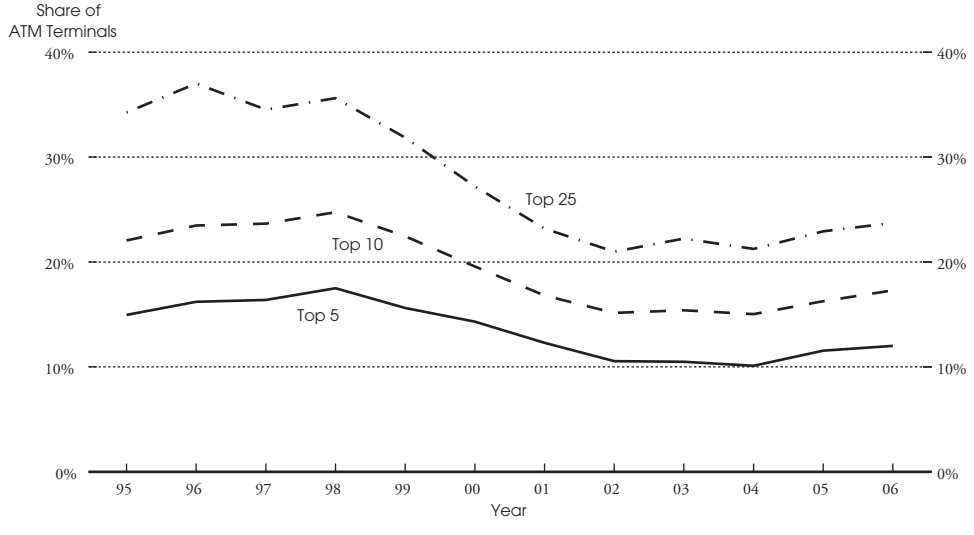
Chart 7: *Concentration of EFT Transactions among the Top Five Processors*



Note: Transaction volume for individual processors can double count a portion of total volume because the same transaction may be sent over two or more processors. As a result, market shares for a group of processors may be inflated and sometimes above 100 percent. The level of market share for a group of processors is probably less meaningful than the trend in market share.

Source: *Card Industry Directory* (various years).

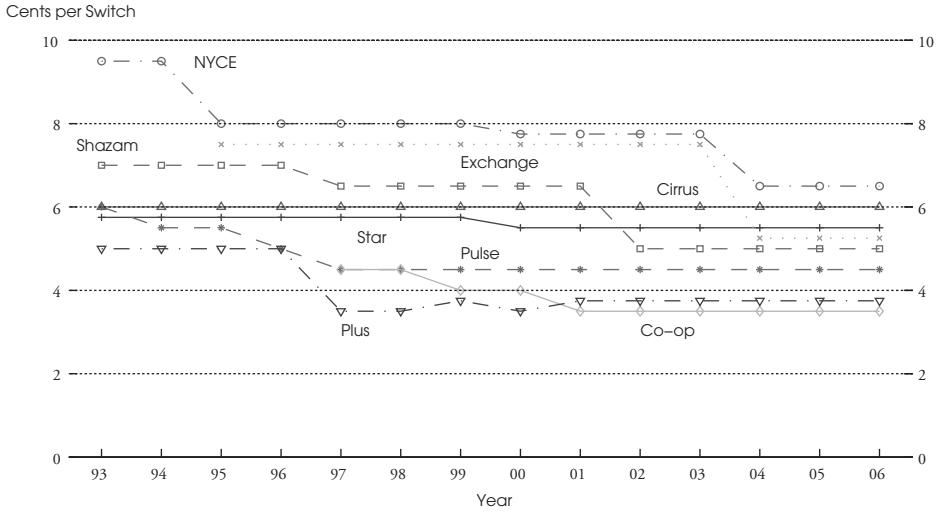
Chart 8: *Ownership Concentration of ATM Terminals*



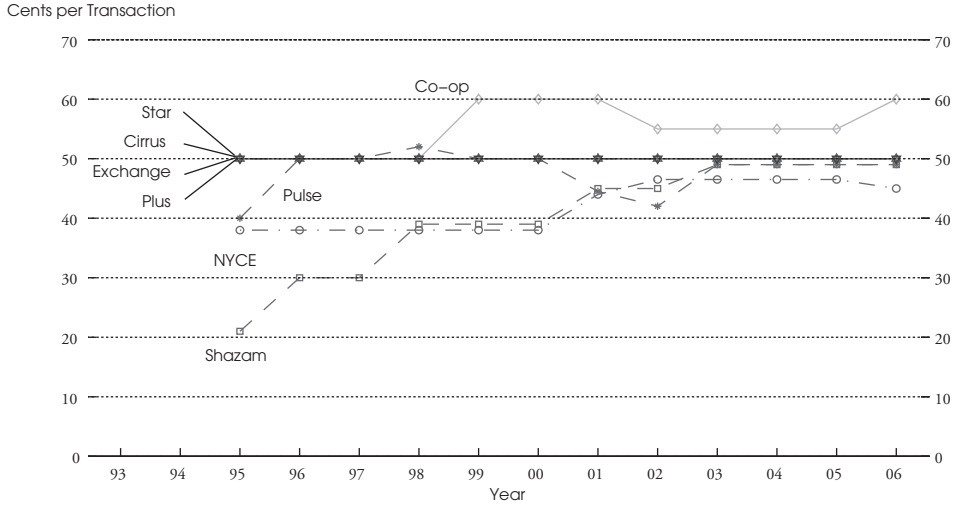
Source: *EFT Network Data Book* (various years).

Chart 9: *Trends in Wholesale ATM Fees - Selected Networks*

A: Switch fees

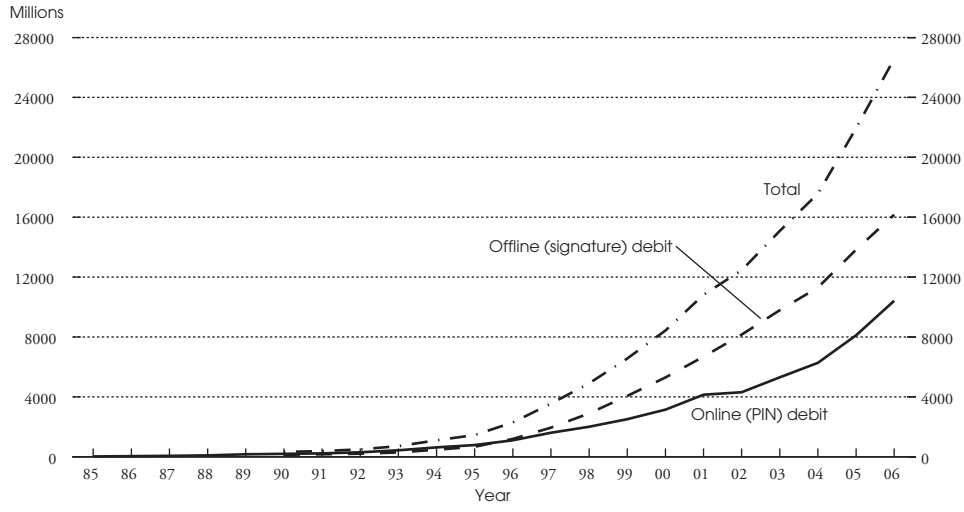


B: Interchange fees for withdrawals



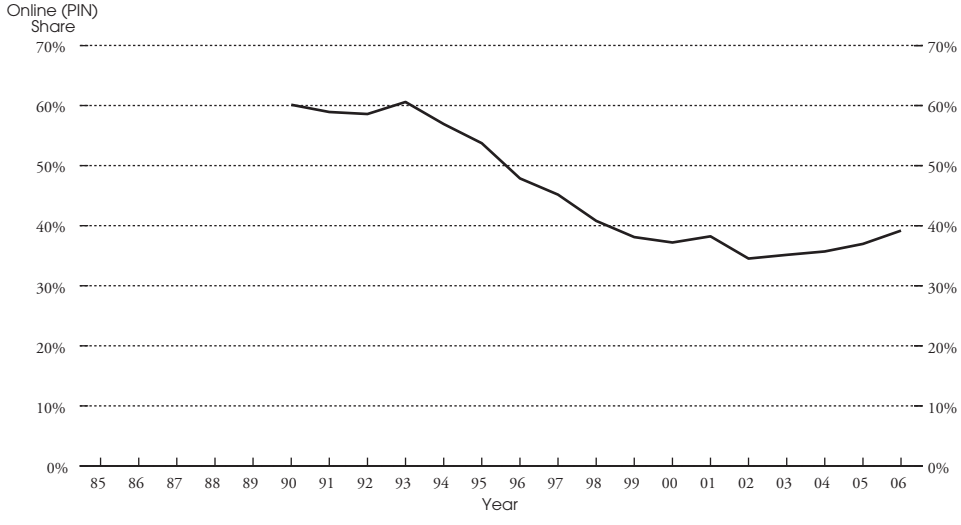
Sources: *Debit Card Directory* (various years); *EFT Network Data Book* (various years).

Chart 10: *Debit Transactions*



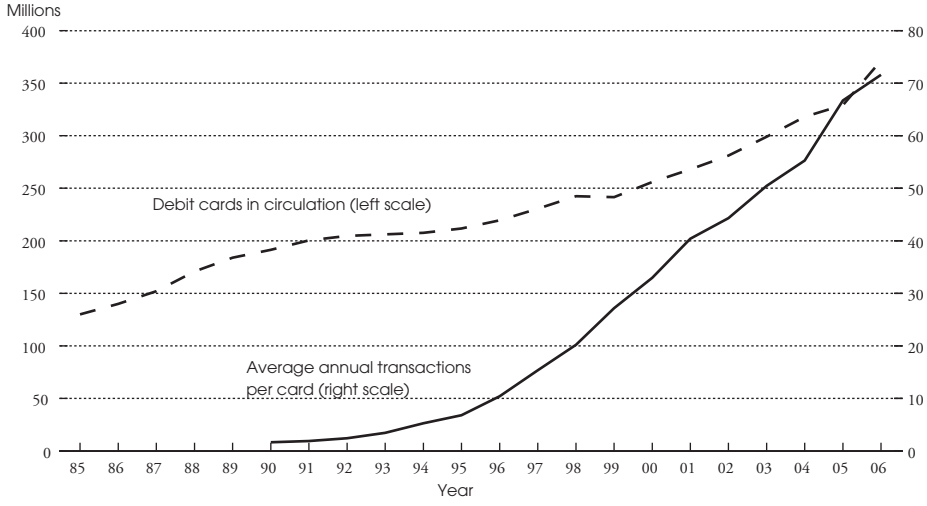
Source: *EFT Network Data Book* (various years).

Chart 11: *Online (PIN) Debit Share of Total Debit*



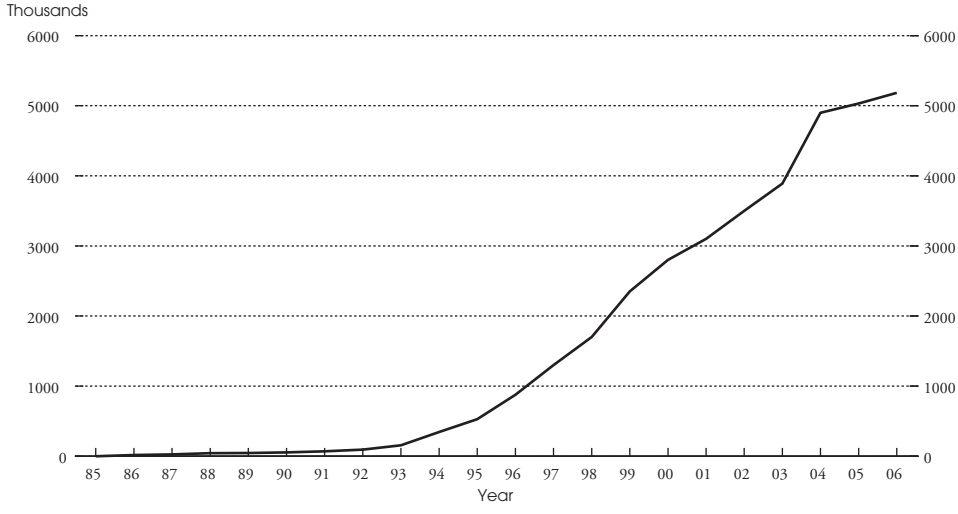
Source: *EFT Network Data Book* (various years).

Chart 12: *Cards with a Debit Function*



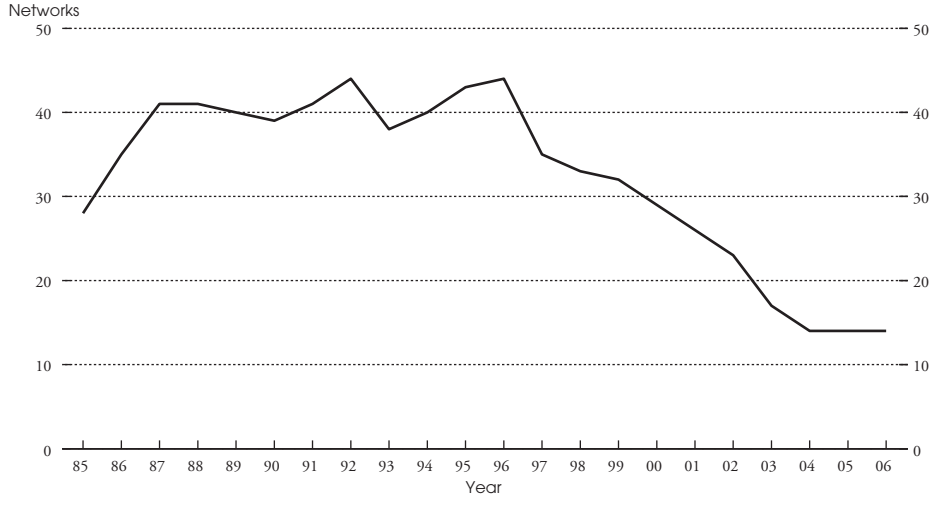
Source: *EFT Network Data Book* (various years).

Chart 13: *Online (PIN) Debit Terminals*



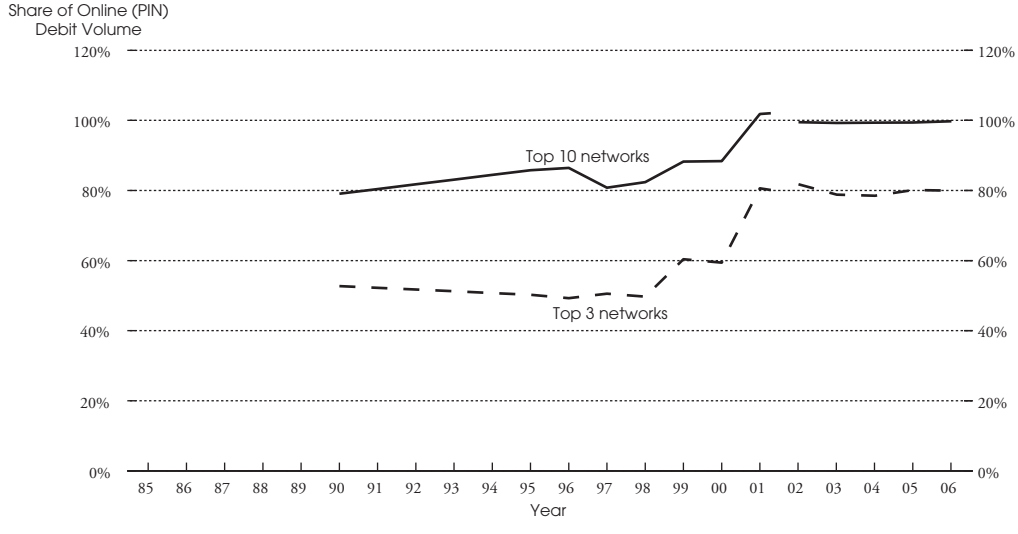
Source: *EFT Network Data Book* (various years).

Chart 14: *Number of Online (PIN) Debit Networks*



Source: *EFT Network Data Book* (various years).

Chart 15: *Concentration of Online (PIN) Debit Transaction Volume*



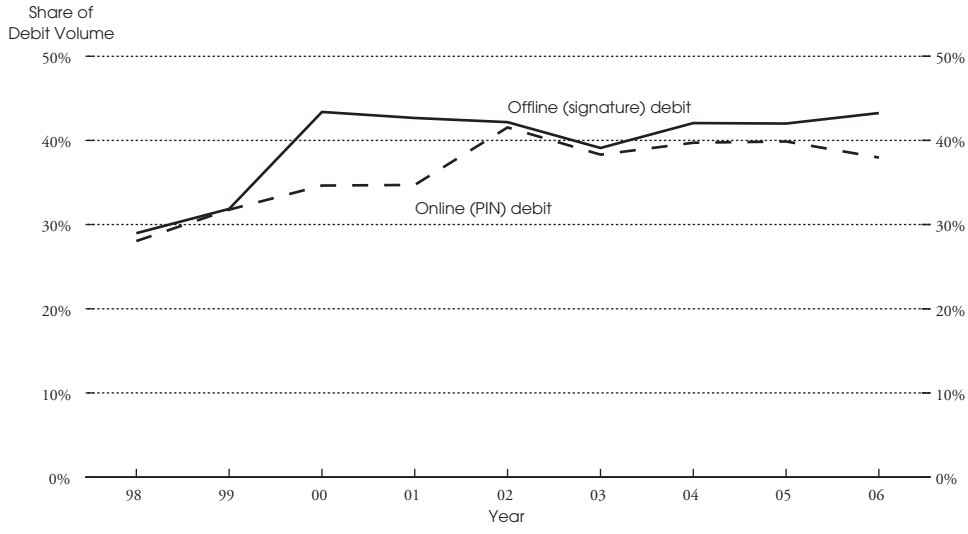
Notes: For data prior to 2002, transaction volume for individual networks includes in-network and gateway transactions. Market share calculations are based on total online (PIN) debit transactions as shown in Chart 10. Because a single transaction is possibly counted as an in-network transaction for one network and as a gateway transaction for other(s), market shares for a group of networks may be inflated and sometimes above 100 percent. The level of market share for a group of networks is probably less meaningful than the trend in market share.

For 2002 and after, transaction volume for individual networks includes in-network transactions. Market share calculations are based on the sum of in-network transactions for the complete list of individual networks.

Data are shown for 1990 and after. While data for calculations of market share are available for earlier years, we believe the results are not reliable.

Source: *EFT Network Data Book* (various years).

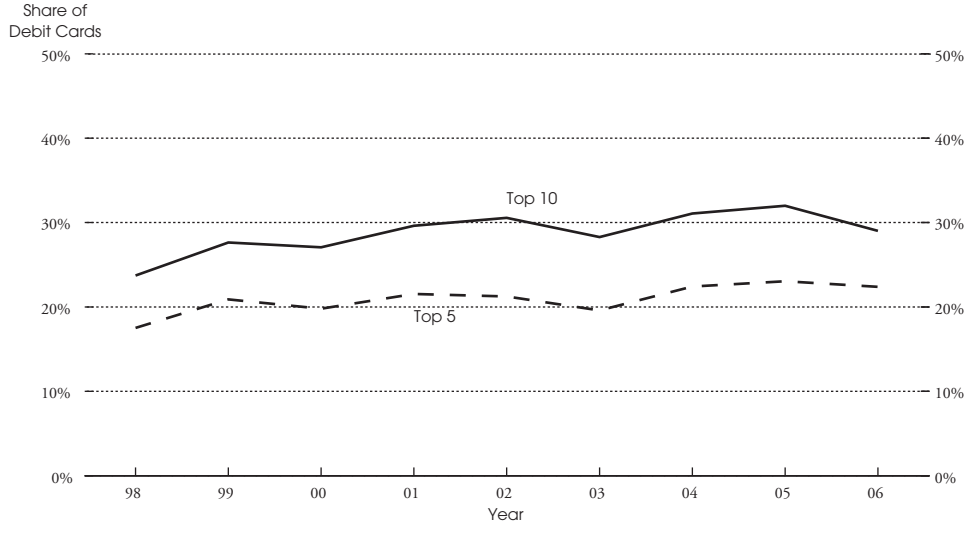
Chart 16: *Concentration of Debit Card Transactions among the Top 10 Debit Card Issuers*



Note: "Top 10" issuers in terms of number of transactions by its cardholders.

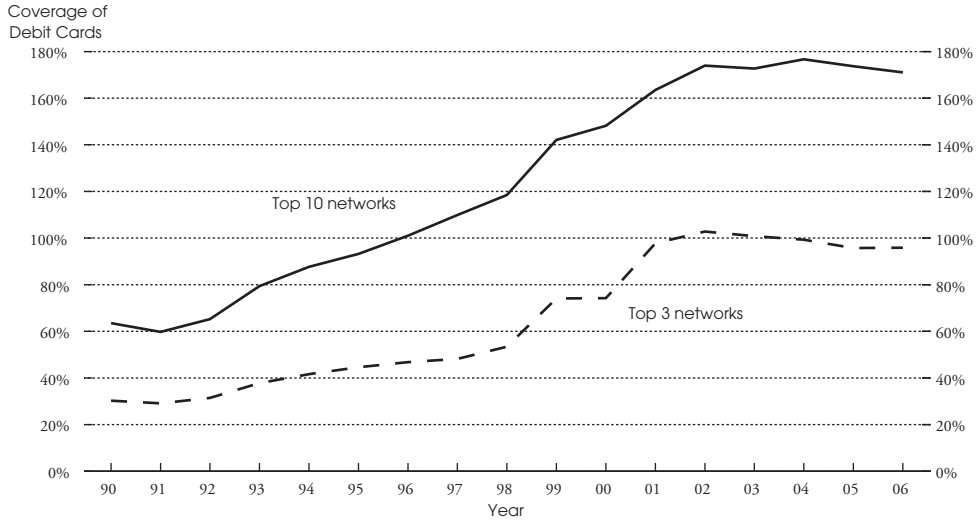
Source: *EFT Network Data Book* (various years).

Chart 17: *Concentration of Debit Cards in Circulation among the Top Debit Card Issuers*



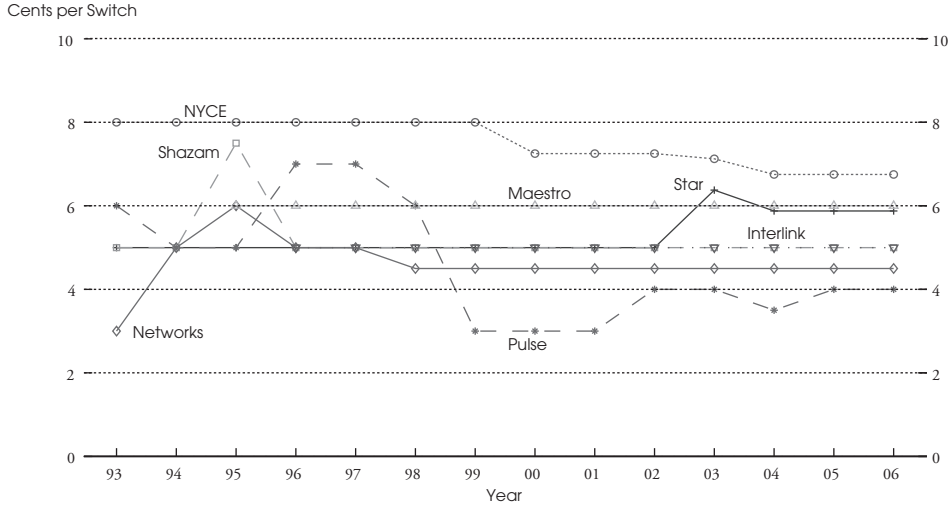
Source: *EFT Network Data Book* (various years).

Chart 18: *Online (PIN) Debit Card Coverage among the Top EFT Networks*



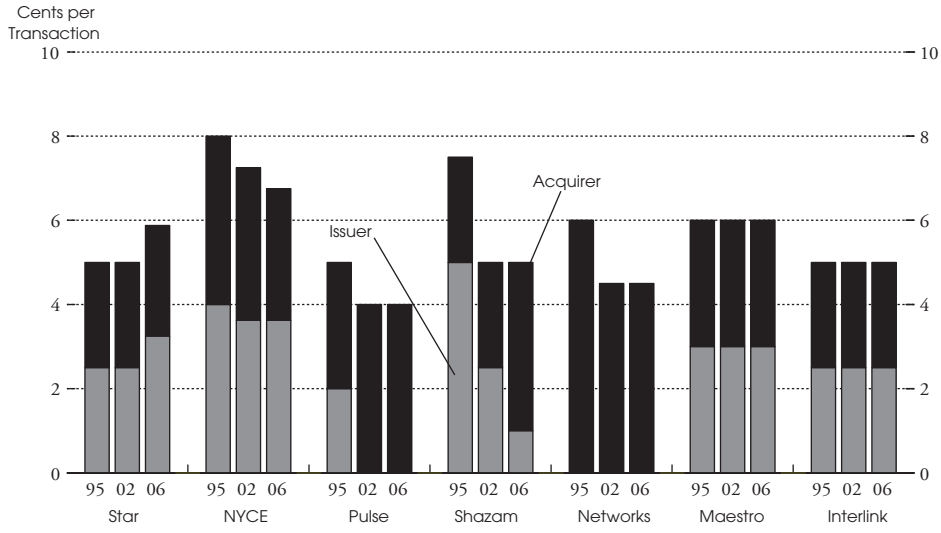
Source: *EFT Network Data Book* (various years).

Chart 19: *Trends in Switch Fees for Online (PIN) Debit Transactions*



Sources: *Debit Card Directory* (various years); *EFT Network Data Book* (various years).

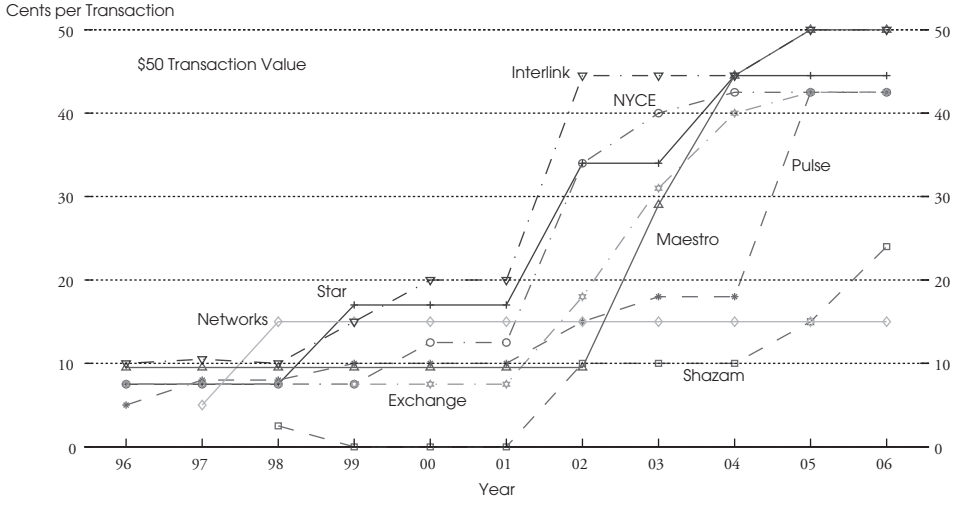
Chart 20: *Acquirer and Card Issuer Responsibility for Online (PIN) Debit Switch Fees 1995, 2002 and 2006*



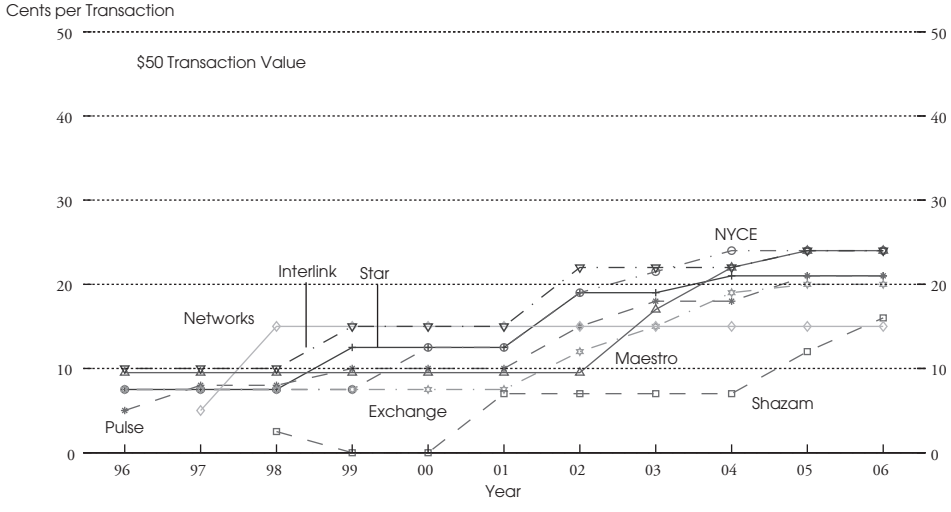
Sources: *Debit Card Directory 1997 Edition; EFT Network Data Book 2003 and 2007 Editions.*

Chart 21: *Online (PIN) Debit Interchange Revenue to Card-Issuing Bank*

A: Non-supermarket transactions



B: Supermarket transactions



Sources: *Debit Card Directory* (various years); *EFT Network Data Book* (various years).

Tables

Table 1: *Top 10 ATM Networks by Number of Transactions*

A: 2002 ranking

(Monthly transactions)

ATM Networks	1985	1990	1995	2000	2001	2002
Star	3,781,051	61,586,816	146,647,389	507,192,813	630,000,000	785,000,000
NYCE	6,700,000	63,759,707	115,097,672	255,650,000	302,553,000	317,680,650
Pulse	11,053,249	32,145,344	59,355,448	156,912,399	187,003,492	277,477,478
Plus - Visa	n.a.	8,400,000	15,000,000	37,525,000	51,195,000	58,697,000
Jeanie	n.a.	1,645,000	6,966,218	23,198,225	21,221,542	20,822,293
MoneyMaker	1,567,000	4,415,000	8,276,077	14,803,376	28,014,400	29,743,000
Co-op Network	n.a.	1,645,000	6,966,218	23,198,225	21,221,542	20,822,293
Presto	1,870,481	4,388,276	6,500,000	7,600,000	8,000,000	9,812,000
Shazam	4,225,000	7,379,056	11,132,907	9,508,084	9,723,167	9,437,242
ACCEL/Exchange	4,700,000	18,200,000	25,000,000	47,000,000	7,000,000	8,585,500

Notes: Networks are ranked by monthly transaction volume in 2002. Transaction volume for individual networks includes in-network, bank on-us, and gateway transaction. Data for Cirrus (MasterCard) are unavailable for years listed in this table. It was in the top 10 in 1990 and 1998, the most recent years for which Cirrus data were reported. It would likely rank in the top 10 in 2002.

n.a. = not available or no data

Source: *EFT Network Data Book* (various years).

B: 2006 ranking

(Monthly transactions)

ATM Networks	2002	2003	2004	2005	2006
Star	78,148,000	88,080,500	79,543,800	68,729,000	66,226,600
Plus - Visa	48,619,507	34,018,000	38,264,000	43,000,000	58,000,000
NYCE	30,025,000	35,871,000	36,005,500	38,508,600	36,890,000
Co-op Network	29,107,486	29,085,740	31,315,569	32,806,446	33,915,374
Pulse	22,057,866	23,427,150	26,096,729	26,596,000	27,100,000
Jeanie	13,158,000	14,405,000	21,276,275	20,638,000	20,844,380
AFFN	5,200,000	10,000,000	11,000,000	6,000,000	6,400,000
ACCEL/Exchange	3,103,000	1,978,000	3,561,000	4,435,000	4,596,000
Networks	3,700,000	4,000,000	4,120,000	4,326,000	4,300,000
Shazam	8,125,082	9,036,594	9,462,904	3,576,379	3,554,295

Notes: Networks are ranked by monthly in-network transaction volume in 2006.

Data for Cirrus (MasterCard) are unavailable for years listed in this table. It would likely rank in the top 10 in 2006.

Source: *EFT Network Data Book* (various years).

Table 2: *Top 10 ATM Networks by Share of Total ATM Transactions*

A: 2002 ranking

(Monthly transactions)

ATM Networks	1985	1990	1995	2000	2001	2002
Star	1.3%	12.9%	18.2%	47.4%	55.7%	88.9%
NYCE	2.3%	13.3%	14.3%	23.9%	26.7%	36.0%
Pulse	3.7%	6.7%	7.4%	14.7%	16.5%	31.4%
Plus - Visa	n.a.	1.8%	1.9%	3.5%	4.5%	6.6%
Jeanie	n.a.	0.3%	0.9%	2.2%	1.9%	2.4%
MoneyMaker	0.5%	0.9%	1.0%	1.4%	2.5%	3.4%
Co-op Network	n.a.	0.3%	0.9%	2.2%	1.9%	2.4%
Presto	0.6%	0.9%	0.8%	0.7%	0.7%	1.1%
Shazam	1.4%	1.5%	1.4%	0.9%	0.9%	1.1%
ACCEL/Exchange	1.6%	3.8%	3.1%	4.4%	0.6%	1.0%

Notes: Networks are ranked by market share in 2002. Transaction volume for individual networks includes in-network, bank on-us, and gateway transactions. Market share calculations are based on total ATM transactions that are defined to include all in-network transactions and bank on-us transactions. Gateway transactions can double count a portion of ATM volume because the same transaction may be sent over two or more networks and as a consequence market share may be overstated in some cases.

Data for Cirrus (MasterCard) are unavailable for years listed in this table. It was in the top 10 in 1990 and 1998, the most recent years for which Cirrus data were reported. It would likely rank in the top 10 in 2002.

n.a. = not available or no data

Source: *EFT Network Data Book* (various years).

B: 2006 ranking

(Monthly transactions)

ATM Networks	2002	2003	2004	2005	2006
Star	28.5%	31.0%	27.6%	25.4%	23.7%
Plus - Visa	17.7%	12.0%	13.3%	15.9%	20.8%
NYCE	10.9%	12.6%	12.5%	14.3%	13.2%
Co-op Network	10.6%	10.2%	10.9%	12.1%	12.1%
Pulse	8.0%	8.2%	9.1%	9.8%	9.7%
Jeanie	4.8%	5.1%	7.4%	7.6%	7.5%
AFFN	1.9%	3.5%	3.8%	2.2%	2.3%
ACCEL/Exchange	1.1%	0.7%	1.2%	1.6%	1.6%
Networks	1.3%	1.4%	1.4%	1.6%	1.5%
Shazam	3.0%	3.2%	3.3%	1.3%	1.3%

Notes: Networks are ranked by market share in 2006. Transaction volume for individual networks includes in-network transactions. Market share calculations are based on the sum of in-network transactions for the complete list of individual networks. Market shares are slightly inflated because a data for a few networks are unavailable and as a consequence the sum of in-network transactions is slightly understated.

Data for Cirrus (MasterCard) are unavailable for years listed in this table. It would likely rank in the top 10 in 2006.

Source: *EFT Network Data Book* (various years).

Table 3: *Top National and Regional Networks by Number of ATM Terminals*

A: Number of ATMs in network

National ATM Networks	**1985**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Plus - Visa	5,617	25,000	99,801	242,000	298,981	309,695	365,506	354,334	389,000	394,500
Cirrus - MasterCard	8,119	31,726	104,000	189,000	210,000	325,000	355,000	371,000	383,000	384,000
Regional EFT Networks	**1985**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Star	1,064	10,851	20,751	115,000	180,000	224,000	244,000	264,000	276,000	291,000
NYCE	1,110	9,504	16,638	35,000	44,000	77,000	104,600	151,800	191,000	275,000
Pulse	3,451	5,110	9,500	46,299	76,563	92,000	200,412	251,884	250,000	250,000
ACCEL/Exchange	1,030	2,960	3,796	8,430	25,000	27,500	32,000	53,000	73,000	100,000
Credit Union 24	n.a.	126	2,751	6,500	7,200	7,250	13,500	15,100	50,000	93,849
Co-op Network	n.a.	155	1,003	3,720	4,615	11,472	15,425	17,772	19,690	25,321
MoneyMaker	835	1,015	3,902	15,796	20,080	23,955	27,878	31,500	23,507	24,000
Shazam	678	1,142	2,169	4,680	5,528	5,926	7,079	8,499	9,408	10,457
Fastbank	326	481	1,156	542	534	551	3,350	7,500	9,379	9,500
Instant Cash	367	812	1,797	3,300	3,920	8,300	8,052	7,843	8,135	8,200
Total ATMs	**60,000**	**80,156**	**122,706**	**273,000**	**324,000**	**352,000**	**371,000**	**383,000**	**396,000**	**395,000**

B: Direct coverage of the U.S. ATM network

National ATM Networks	**1985**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Plus - Visa	9.4%	31.2%	81.3%	88.6%	92.3%	88.0%	98.5%	92.5%	98.2%	99.9%
Cirrus - MasterCard	13.5%	39.6%	84.8%	69.2%	64.8%	92.3%	95.7%	96.9%	96.7%	97.2%
Regional EFT Networks	**1985**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Star	1.8%	13.5%	16.9%	42.1%	55.6%	63.6%	65.8%	68.9%	69.7%	73.7%
NYCE	1.9%	11.9%	13.6%	12.8%	13.6%	21.9%	28.2%	39.6%	48.2%	69.6%
Pulse	5.8%	6.4%	7.7%	17.0%	23.6%	26.1%	54.0%	65.8%	63.1%	63.3%
ACCEL/Exchange	1.7%	3.7%	3.1%	3.1%	7.7%	7.8%	8.6%	13.8%	18.4%	25.3%
Credit Union 24	n.a.	0.2%	2.2%	2.4%	2.2%	2.1%	3.6%	3.9%	12.6%	23.8%
Co-op Network	n.a.	0.2%	0.8%	1.4%	1.4%	3.3%	4.2%	4.6%	5.0%	6.4%
MoneyMaker	1.4%	1.3%	3.2%	5.8%	6.2%	6.8%	7.5%	8.2%	5.9%	6.1%
Shazam	1.1%	1.4%	1.8%	1.7%	1.7%	1.7%	1.9%	2.2%	2.4%	2.6%
Fastbank	0.5%	0.6%	0.9%	0.2%	0.2%	0.2%	0.9%	2.0%	2.4%	2.4%
Instant Cash	0.6%	1.0%	1.5%	1.2%	1.2%	2.4%	2.2%	2.0%	2.1%	2.1%

Notes: Networks are ranked by the number of terminals in their network in 2006. Direct coverage is the number of terminals in the national or regional network divided by total ATM terminals.

n.a. = not available or no data

Source: *EFT Network Data Book* (various years).

Table 4: *Types of ATM Fees of Depository Institutions*

Category	Frequency	Fee	Set by	Description
Retail	Periodic	Annual	Cardholder bank	Paid by cardholders to his/her bank for ATM services.
		Card	Cardholder bank	Paid by cardholder to his/her bank upon issuance of an ATM card.
	Per transaction	Foreign	Cardholder bank	Paid by cardholder to his/her bank for a transaction on an ATM not owned by the bank.
		Surcharge	ATM owner	Paid by cardholder to ATM owner. Typcally not charged if ATM is owned by cardholder's bank.
		On-us	Cardholder bank	Paid by cardholder to his/her bank for an ATM withdrawal on an ATM owned by the bank.
Wholesale	Periodic	Membership	Network	Paid by financial institution to network upon initial membership.
		Monthly/ Annually	Network	Paid by financial institution to network on periodic basis, often tied to sales volume of card program.
	Per transaction	Switch	Network	Paid by cardholder's bank to network for routing transaction information.
		Interchange	Network	Paid by cardholder's bank to ATM owner for deploying and maintaining ATM.

Table 5: *Retail ATM Fees of Depository Institutions*

	1995	1996	1997	1998	1999	2000	2001	2002
Percent offering ATM services	79.6	72.9	79.4	86.5	87.3	88.8	90.9	93.4
Percent charging								
Annual fee	18.9	13.4	16.7	15.1	17.4	13.1	10.7	10.3
Card fee	8.2	10	6.2	5.4	8	5.9	3.5	4
On-us fee	9.6	6.8	7.4	6.4	6.4	6.2	3.6	2.7
Foreign fee	85.3	79.8	67	74.5	72.3	72.7	78.5	69
Surcharge	n.a.	44.8	60.1	77.9	82.9	75.4	88.5	89.4
Average charge								
Annual fee	$13.07	$7.94	$11.51	$13.12	$7.90	$10.79	$10.35	$11.65
Card fee	$5.29	$4.89	$3.88	$4.56	$4.58	$6.23	$4.51	$6.39
On-us fee	$0.61	$0.59	$0.65	$0.68	$0.54	$0.71	$0.81	$0.56
Foreign fee	$1.03	$1.10	$1.06	$1.10	$1.17	$1.16	$1.17	$1.14
Surcharge	n.a.	$1.19	$1.14	$1.20	$1.26	$1.26	$1.32	$1.36

Notes: The sample design for 2000, 2001 and 2002 was somewhat different than that for earlier years.

n.a. = not available or no data

Definitions: Annual fees are charged to deposit customers who choose to use ATM services.
Card fees are charged upon issuance of a card.
On-us fees are for withdrawals from ATMs owned by the cardholder's financial institution.
Foreign fees are for transactions that are on ATM terminals that are not owned by the cardholder's financial institution.
Surcharges are levied on ATM users by the owner of the machine. Typically there is no surcharge if the ATM is owned by the cardholder's financial institution.

Source: Board of Governors of Federal Reserve System (1996 to 2003 reports).

Table 6: *Top 10 EFT Networks by Number of Online (PIN) Debit Transactions*

A: 2002 rank

EFT Networks	1995	1998	1999	2000	2001	2002
Star	9,919,576	40,253,249	88,092,838	101,566,095	177,270,000	235,164,000
Interlink (Visa)	16,500,000	15,300,000	18,488,623	28,599,510	32,388,807	59,038,154
NYCE	3,555,548	11,100,000	15,600,000	22,800,000	35,400,000	43,624,000
Pulse	3,079,624	10,403,370	15,422,917	18,123,757	23,267,096	41,833,522
Co-op Network	1,632,072	5,300,000	6,175,200	9,206,649	11,417,384	15,101,581
Jeanie	732,000	1,117,000	2,356,801	6,400,000	8,378,000	12,155,000
ACCEL/Exchange	2,386,089	10,117,072	10,782,206	11,000,000	11,000,000	11,500,000
Presto	2,000,000	2,500,000	1,488,709	3,100,000	3,600,000	4,415,400
Credit Union 24	n.a.	450,000	470,000	2,000,000	2,504,000	3,900,000
Shazam	837,961	1,267,660	1,488,709	2,395,942	3,268,011	3,516,986

Note: Networks are ranked by monthly transaction volume in 2002. Transaction volume for individual networks includes in-network and gateway transactsion.

n.a. = not available or no data

Source: *EFT Network Data Book* (various years).

B: 2006 rank

EFT Networks	2002	2003	2004	2005	2006
Interlink (Visa)	59,038,154	69,619,116	113,513,650	238,620,435	330,833,280
Star	235,164,000	210,461,600	243,954,000	224,982,300	244,014,300
Pulse	41,364,813	44,207,200	64,787,110	85,583,000	95,900,000
NYCE	39,061,000	49,423,000	57,378,300	64,465,200	81,226,152
ACCEL/Exchange	12,900,000	16,045,000	17,254,000	25,844,000	34,752,000
Credit Union 24	3,900,000	5,278,945	8,599,466	11,586,597	13,861,112
Shazam	3,160,065	4,536,394	6,264,746	9,106,093	11,555,221
AFFN	8,500,000	9,000,000	13,000,000	9,000,000	9,600,000
Presto	4,000,000	5,298,000	5,000,000	6,170,000	7,774,200
Jeanie	1,164,000	992,000	4,723,844	5,829,000	7,344,540

Note: Networks are ranked by monthly in-network transaction volume in 2006.

Source: *EFT Network Data Book* (various years).

Table 7: *Top 10 EFT Networks by Share of Online (PIN) Debit Transactions*

A: 2002 rank

EFT Networks	1995	1998	1999	2000	2001	2002
Star	15.4%	26.8%	43.5%	39.2%	58.3%	55.8%
Interlink (Visa)	25.5%	10.2%	9.1%	11.0%	10.7%	14.0%
NYCE	5.5%	7.4%	7.7%	8.8%	11.6%	10.3%
Pulse	4.8%	6.9%	7.6%	7.0%	7.7%	9.9%
Co-op Network	2.5%	3.5%	3.1%	3.6%	3.8%	3.6%
Jeanie	1.1%	0.7%	1.2%	2.5%	2.8%	2.9%
ACCEL/Exchange	3.7%	6.7%	5.3%	4.2%	3.6%	2.7%
Presto	3.1%	1.7%	0.7%	1.2%	1.2%	1.0%
Credit Union 24	n.a.	0.3%	0.2%	0.8%	0.8%	0.9%
Shazam	1.3%	0.8%	0.7%	0.9%	1.1%	0.8%

Note: Networks are ranked by market share in 2002. Transaction volume for individual networks includes in-network and gateway transactsion. Market share calculations are bassed on total online (PIN) debit transactions. Gateway transactions can double count a portion of total volume because the same transaction may be sent over two or more networks and as a consequence market share may be overstated in some cases.

n.a. = not available or no data

Source: *EFT Network Data Book* (various years).

B: 2006 rank

EFT Networks	2002	2003	2004	2005	2006
Interlink (Visa)	14.4%	16.6%	21.1%	34.8%	39.4%
Star	57.3%	50.3%	45.4%	32.8%	29.1%
Pulse	10.1%	10.6%	12.0%	12.5%	11.4%
NYCE	9.5%	11.8%	10.7%	9.4%	9.7%
ACCEL/Exchange	3.1%	3.8%	3.2%	3.8%	4.1%
Credit Union 24	1.0%	1.3%	1.6%	1.7%	1.7%
Shazam	0.8%	1.1%	1.2%	1.3%	1.4%
AFFN	2.1%	2.2%	2.4%	1.3%	1.1%
Presto	1.0%	1.3%	0.9%	0.9%	0.9%
Jeanie	0.3%	0.2%	0.9%	0.9%	0.9%

Note: Networks are ranked by market share in 2006. Transaction volume for individual networks includes in-network transactions. Market share calculations are based on the sum of in-network transactions for the complete list of individual networks.

Source: *EFT Network Data Book* (various years).

Table 8: *Top 10 Online Debit Networks by Number of Cards*

A: Number of cards in network (thousands)

EFT Networks	1990	1995	2000	2001	2002	2003	2004	2005	2006
Star	20,330	32,480	80,000	124,000	127,010	127,400	138,800	134,000	141,000
Interlink (Visa)	12,000	30,000	50,000	60,000	63,000	70,000	87,000	91,000	123,100
AFFN	n.a.	n.a.	60,000	78,000	82,000	84,000	86,000	89,000	92,000
Pulse	8,500	13,000	40,000	60,000	80,000	90,000	90,000	90,000	90,000
NYCE	16,513	28,500	45,100	48,000	52,100	55,000	57,400	59,100	74,600
Maestro (MC)	n.a.	13,300	34,900	38,000	40,000	38,000	40,000	40,000	40,000
Co-op Network	631	2,900	7,400	8,600	11,200	19,623	22,275	23,474	24,098
Instant Cash	1,336	3,500	4,600	5,030	17,000	16,116	15,260	18,061	18,800
ACCEL/Exchange	4,800	7,379	12,600	8,000	8,000	6,271	11,456	15,070	17,200
Credit Union 24	1,300	1,800	6,000	7,000	7,100	10,000	10,000	12,000	14,200

B: Coverage of the U.S. online (PIN) debit network

EFT Networks	1990	1995	2000	2001	2002	2003	2004	2005	2006
Star	10.6%	15.3%	31.3%	46.3%	45.2%	42.6%	43.6%	40.7%	38.0%
Interlink (Visa)	6.3%	14.2%	19.5%	22.4%	22.4%	23.4%	27.4%	27.7%	33.1%
AFFN	n.a.	n.a.	23.4%	29.1%	29.2%	28.1%	27.0%	27.0%	24.8%
Pulse	4.4%	6.1%	15.6%	22.4%	28.5%	30.1%	28.3%	27.3%	24.2%
NYCE	8.6%	13.5%	17.6%	17.9%	18.5%	18.4%	18.1%	18.0%	20.1%
Maestro (MC)	n.a.	6.3%	13.6%	14.2%	14.2%	12.7%	12.6%	12.2%	10.8%
Co-op Network	0.3%	1.4%	2.9%	3.2%	4.0%	6.6%	7.0%	7.1%	6.5%
Instant Cash	0.7%	1.7%	1.8%	1.9%	6.0%	5.4%	4.8%	5.5%	5.1%
ACCEL/Exchange	2.5%	3.5%	4.9%	3.0%	2.8%	2.1%	3.6%	4.6%	4.6%
Credit Union 24	0.7%	0.9%	2.3%	2.6%	2.5%	3.3%	3.1%	3.6%	3.8%

Note: Networks are ranked by the number of online (PIN) debit cards in 2006. Coverage is the number of cards in the network divided by total online (PIN) debit cards.

n.a. = not available or no data

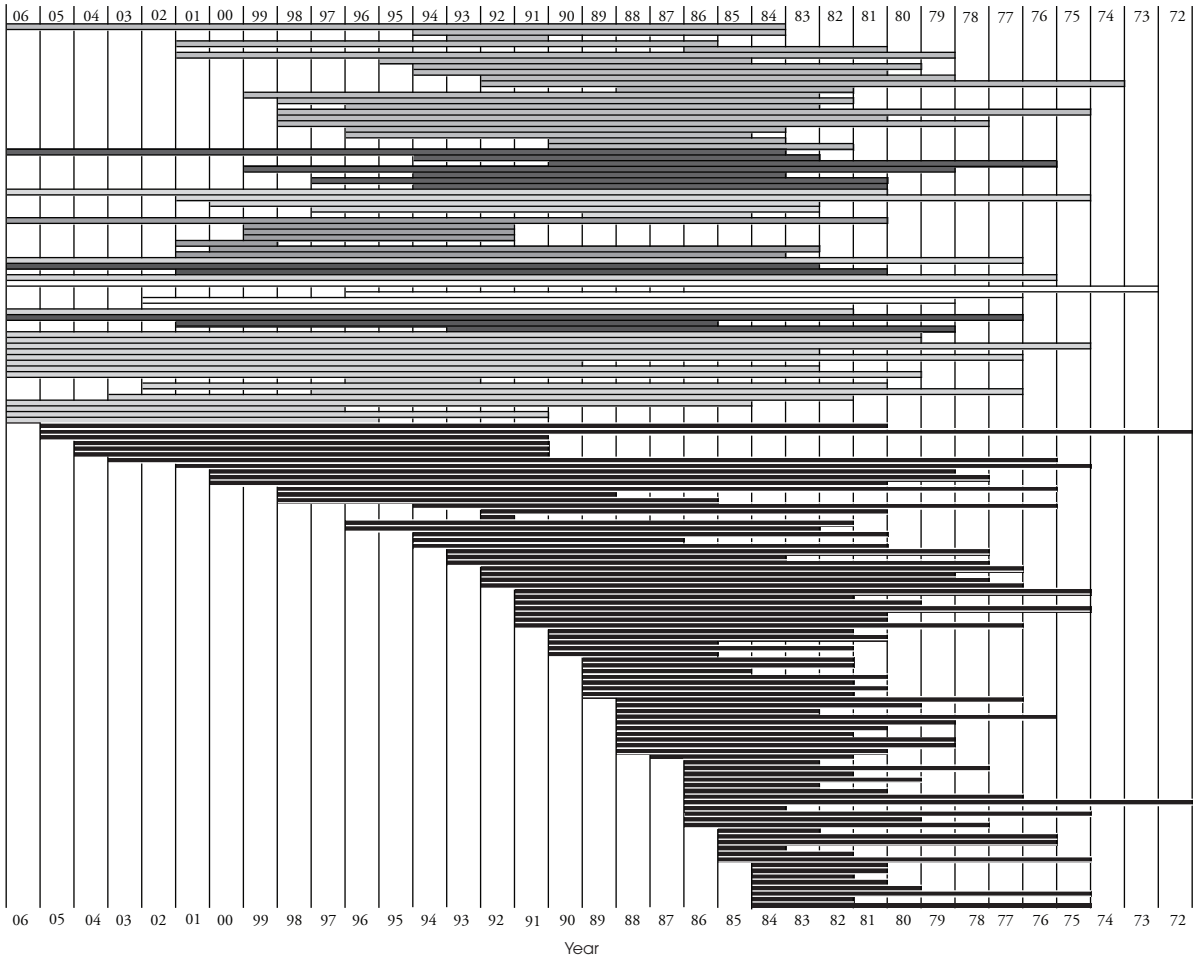
Source: *EFT Network Data Book* (various years).

Table 9: *Types of Debit Card Fees*

Category	Frequency	Fee	Set by	Description
Retail	Periodic	Card	Cardholder bank	Paid by cardholder to his/her bank upon issuance of a debit card.
	Per transaction	PIN	Cardholder bank	Paid by cardholder to his/her bank for an online debit transaction.
		Rewards	Cardholder bank	Paid by bank to cardholder for an offline debit transaction.
Wholesale	Periodic	Membership	Network	Paid by financial institution to network upon initial membership.
		Monthly/ Annually	Network	Paid by financial institution to network on periodic basis, often tied to sales volume of card program.
	Per transaction	Discount	Merchant acquirer	Paid by mercant to acquirer.
		Switch	Network	Paid by cardholder's bank and acquirer to network for routing transaction information.
		Interchange	Network	Paid by acquirer to cardholder's bank.

Appendix Charts

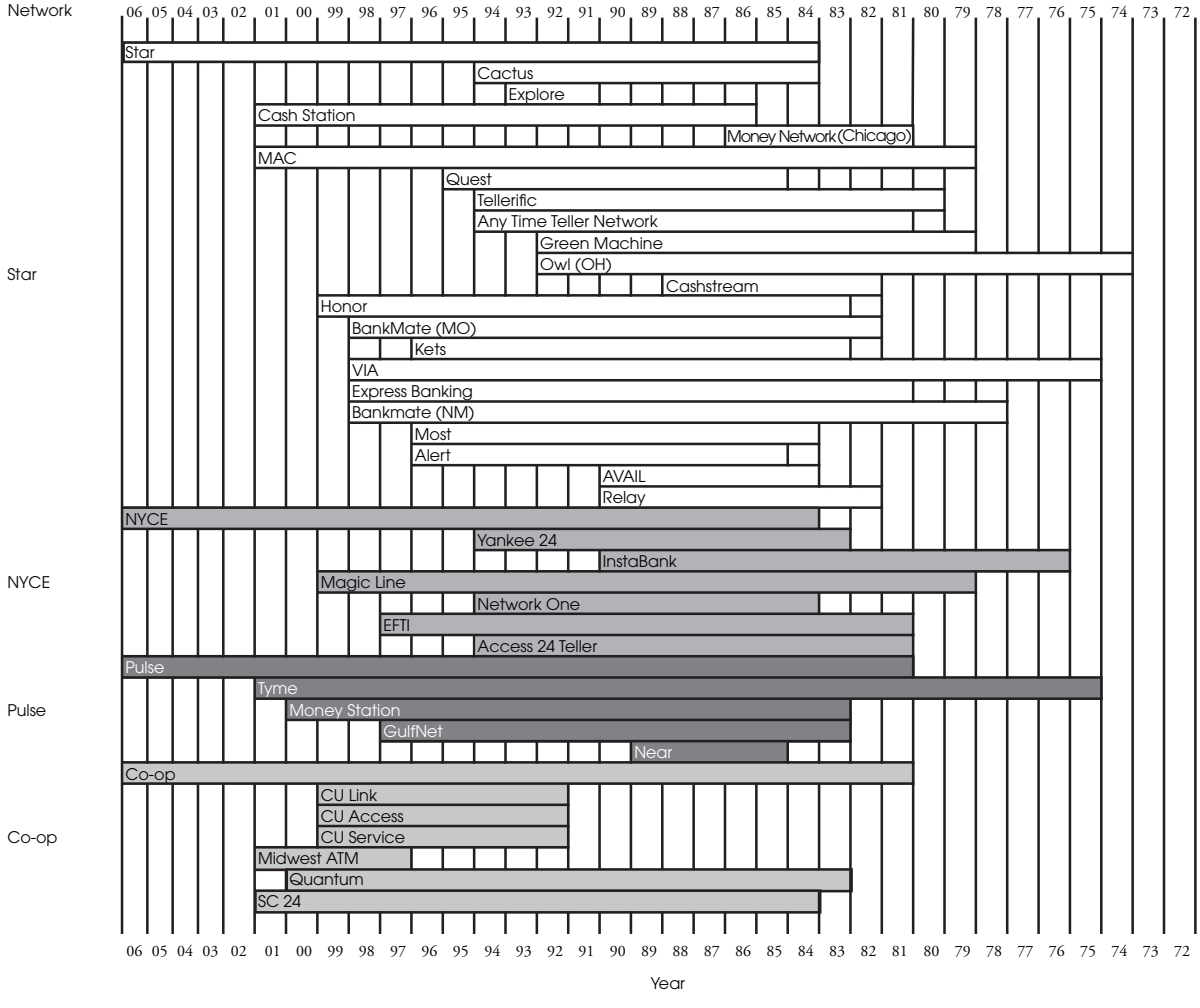
Chart A1: *Timeline of Regional EFT Networks*



Note: See Chart A2 for details of existing networks as of September 2006.

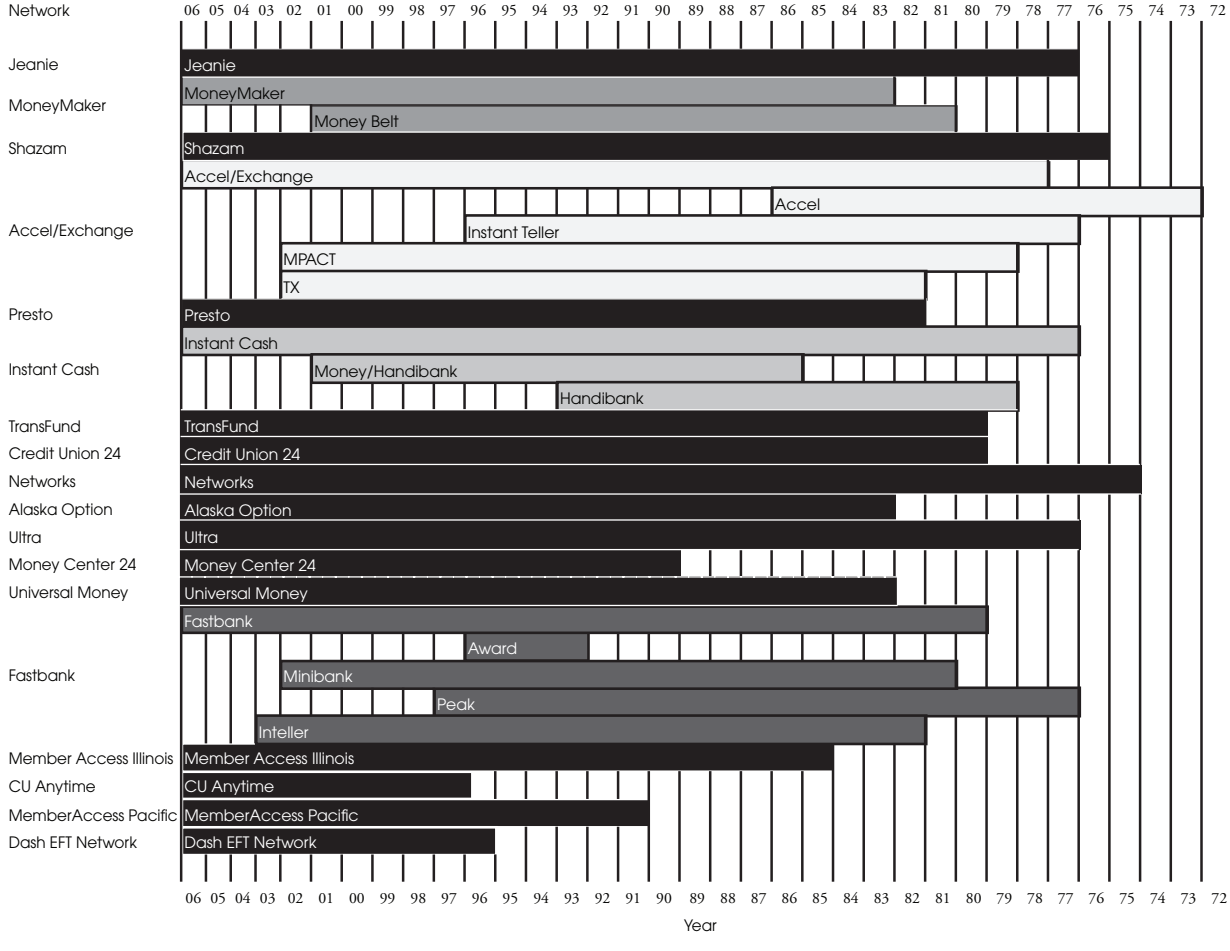
Sources: Co-op Network; CUNA; *Card Industry Directory; Debit Card Directory; EFT Network Data Book;* Star Systems; and others (various years).

Chart A2: *Timeline of Selected Regional EFT Networks*



Note: See continuation of Chart A2 on next page.

Chart A2 (cont.): *Timeline of Selected Regional EFT Networks*



Endnotes

[1] Reproduced from Chart 1, p.28.
[2] See Chart 2, p. 28.
[3] See Chart 3, p. 29.
[4] See Chart 4, p. 29.
[5] Until 2002, networks reported in-network, bank on-us, and gateway transactions all in a single number. The reporting method changed in 2002. Since then, networks have reported in-network and gateway transactions as separate data. Bank on-us transactions have not been reported. A network's in-network transaction is defined as the transaction which is switched directly to the card issuer (or its processor) by the network. A network's gateway transaction is defined as the transaction which is switched to another network by the network. A single transaction is, therefore, possibly counted as an in-network transaction for one network and as a gateway transaction for the other. Market shares for a group of networks, prior to 2002, are the group of networks' in-network, bank on-us, and gateway transaction volume divided by the total transaction volume. Market shares for a group of networks, 2002 and after, are the group of networks' in-network transaction volume divided by the sum of all networks' in-network transaction volume. Excluding bank on-us transactions for 2002 and after is appropriate because no network performs switching for those transactions. Excluding gateway transactions complicates interpretation of market share and may mask some trends. However, including gateway transactions creates another problem: Some networks likely have reported their gateway transactions including transactions they acquired as acquirer processors not as networks.
[6] See Table 1, p. 40.
[7] See Table 2, p. 41.
[8] One of the biggest changes that occurred when the method for reporting network transactions changed in 2002 was a large increase in the market share for Plus. This is seen in Table 1, p. 40, and Table 2, p. 41, where data for both methods are reported. Reported volumes for each network declined under the new method because bank on-us and gateway transactions were excluded, leaving in-network transactions. Plus's market share increased from 6.6 percent under the previous method to 17.7 percent under the new method, and its rank rose from fourth to second. There is some suspicion that Plus's transaction volume includes both in-network and gateway volume.
[9] See Table 3, p. 42.
[10] On August 28, 2006 Pulse's Web site reported 4,200 members, while in March 2001 Pulse reported 2,888 members (Credit Card Management, 2001, p. 391). See also "2 Networks Show ATM Volume Gain," *ATM & Debit News*, January 16, 2003; pp. 1, 3; "WRG Services Joins NYCE Network," *ATMmarketplace.com*, October 19, 2000, available at *www.atmmarketplace.com/research.htm?article_id=4919&pavilion=50&step=story*; and "XtraCash Joins NYCE Network," *ATMmarketplace.com*, May 1, 2002, available at *www.atmmarketplace.com/research.htm?article_id=12356&pavilion=50&step=story.*
[11] See Chart 6, p. 30.
[12] The bank joint venture appeared to make a slight comeback in 2004, but in fact the new additions of this form of ownership to the top 20 was due to consolidation of three top-20 networks, which in turn allowed some smaller, joint venture networks to appear on the top-20 list. Changes in the number of ATM networks owned by nonbanks since 2002 have been a result of mergers and acquisitions. Four events caused changes in the nonbank group since 2002. First, in 2002 EDS sold three separate networks to Fiserv, who in turn consolidated them into one network in 2004. Second, in 2003, First Data acquired Concord EFS, which gave First Data control of Star. First Data, which owned a majority interest in NYCE, subsequently sold NYCE to Metavante. In these transactions, Star remained under the control of a nonbank but control of NYCE changed from nonbank to bank. Third, the status of MoneyMaker changed from nonbank to single-bank ownership when Elan, a subsidiary of U.S. Bank, bought it from Genpass in 2004. Fourth, also in 2004, Pulse was acquired by Discover Financial Services, changing its status from a bank joint venture to nonbank ownership.
[13] "Integrated Platforms Moving Up Banks' Agendas," *ePaynews*, August 18, 2004, available at *www.epaynews.com/index.cgi?survey=&keywords=metavante&optional=&subject=&location=&ref=keyword&f=view&id=10928385626222215212&block=.*
[14] Breitkopf, 2004.
[15] "NCR Makes Low-Cost ATM Bid in Tidel Buy," *ATM & Debit News*, January 5, 2005, p. 1; "Consolidation Continues among ATM Drivers," *ATM & Debit News*, July 14, 2005, pp.1-2.
[16] "Efmark, Bantek Merger Adds a Third Major Player to ATM Servicing Market," *ATM & Debit News*, January 19, 2006, pp. 1-2; "Cardtronics Buys Allpoint to Expand Revenue Stream Beyond Surcharging," *ATM & Debit News*, February 2, 2006, pp. 1-2.
[17] See Chart 8, p. 31.
[18] A switch fee is paid to a network for transmitting information related to an ATM or debit card transaction. This interchange fee is a payment from the cardholder's bank to the owner of the ATM. The interchange fee compensates the owner for the cost of ATM operation.
[19] See Chart 9, p. 32.

[20] The MAC network had different interchange fees for on- and off-premise ATM transactions in the western portion of Ohio in 1997. NYCE and Co-op have had differential interchange fees since 2000. See the tables on ATM network fees in various issues of *ATM & Debit News*.

[21] See Table 5, p. 43.

[22] Different methods make comparison across studies tenuous, but within each the average surcharge is either stable or rising. A recent report from Dove Consulting estimates the average ATM surcharge in 2006 at $1.75 (Hayes and Stanton, 2006).

[23] Some regional networks allowed surcharging prior to 1996.

[24] The total price of ATM services would need to combine any fees (surcharges and foreign fees) with the cost of time it takes to travel to the ATM. The increased ATM density would reduce travel costs, offsetting fee payments.

[25] Knittel and Stango, 2004 show that surcharging likely increases consumer welfare in markets with higher population density. Gowrisankaran and Krainer, 2005 show that surcharging reduces consumer welfare in the rural Minnesota and Iowa counties located near the two states' boundary.

[26] In a consumer survey conducted in 2000, only 21.3 percent of respondents reported no change in their ATM usage, while the rest actively avoided surcharges, primarily by using their own bank's ATMs but also seeking surcharge-free ATMs or not using ATMs (Dove Consulting and Analytica, 2000). Similar results were found in a 2006 study (Star Systems, 2006, Table 15). A 2001 consumer survey found 27.8 percent of respondents use ATMs less because they are getting more cash back at the POS (Pulse EFT Association, 2001). More recently, a study of consumer payments usage found that from 2004 to 2005 consumers reduced their ATM usage, both at their own financial institution's ATMs and at foreign ATMs and that since 2001 consumer use of cash back at the POS has increased (Star Systems, 2006, Table 2).

[27] A 2004 ATM deployment study shows a decline of the percentage of foreign transactions at ATMs from 1998 to 2003 (Hayes and others, 2004, Figure 1.7).

[28] Starting in 2004, ATM shipments to financial institutions increased, largely because of Check 21 and regulatory requirements (such as triple-DES encryption and audio capability for the blind). Nonbank off-premise deployers, however, have been reluctant to invest in these new ATMs. See, for example, "Survey: ATM Shipments Slower Than in 2004," *ATM & Debit News*, April 6, 2006, pp. 1-2.

[29] Hayes and others, 2004, Figure 1.17, shows a decline from 2001 to 2003 for both on- and off-premise ATMs. Economists would argue that the price of the service has risen so much the market has reached the elastic portion of the demand curve, where an increase in price generates a large fall in quantity demanded of ATM services, causing revenue to fall.

[30] "Cardtronics Buys Allpoint to Expand Revenue Stream Beyond Surcharging," *ATM & Debit News*, February 2, 2006, pp. 1-2.

[31] "Sheetz Convenience Stores 'Forgives' ATM Fees for More Traffic," *ATM & Debit News*, March 16, 2006, p. 1.

[32] Lindenmayer, 2006b.

[33] Hayes and others, 2004, p. 18.

[34] Hannan and others, 2003 reviewed theoretical studies on surcharging and confirm this strategy in an empirical study but only to the extent it attracts customers who have recently moved to the market. Other empirical evidence shows the market share of larger financial institutions increases with surcharging but that of smaller financial institutions decreases with surcharging; see Hannan, 2005 and Ishii, 2004.

[35] "Surcharge-Free ATMs Are Part of RBC's U.S. Strategy," *ATM & Debit News*, April 15, 2004, pp. 1-2; "WAMU Throws in the Towel Over ATM Surcharging," *ATM & Debit News*, November 17, 2005, pp. 1-2.

[36] Compare Hayes and others, 2004, p. 17, to D'Ambrosio and others, 2006, p. 160.

[37] Keenan, 2004 provides a description of various surcharge-free programs.

[38] "Agent-Bank Market Competition Grows as More Firms Offer Free ATM Access," *ATM & Debit News*, July 1, 2004, pp. 1, 4.

[39] Breitkopf, 2006b, 2006c; Quittner, 2006a.

[40] "MasterCard, Cardtronics Jump into Surcharge-Free ATM Deal for Issuers," *ATM & Debit News*, September 29, 2005, pp. 1-2.

[41] Breitkopf, 2006d.

[42] "Visa's Plus Now Surpasses NYCE in ATM Volume," *ATM & Debit News*, July 1, 2004, pp. 1-2; Breitkopf, 2005.

[43] Stigler, 1951.

[44] See, for example, Oxley, 1997 and Williamson, 2002.

[45] Kogut, 1989.

[46] Carlton and Perloff, 1999, p. 379.

[47] Economides and Salop, 1992.

[48] Reproduced from Chart 10, p. 33.

[49] Dove Consulting, 2005a, p. 56.

[50] Abbey and Kostenko, 2006.

[51] See Chart 14, p. 35.

[52] See Chart 15, p. 35.
[53] The change in methodology (outlined in endnote 5) also makes it difficult to compare concentration prior to 2002 and after.
[54] See Table 7, p. 45.
[55] See Chart 15, p. 35.
[56] See Chart 17, p. 36.
[57] See Charts 19 and 20, pp. 37-38.
[58] See Chart 21, p. 39.
[59] "More EFT Networks are Switching to Tiered Interchange Rate Systems," *ATM & Debit News*, May 15, 2003, p. 3.
[60] Industry estimates suggest that average revenue to card issuers for signature debit is at least twice that of PIN debit. Even if we had a time series of information on average revenue it would be difficult to interpret whether there has been convergence because the estimates are affected by the mix of industries where debit transactions arise and this mix has changed over time.
[61] Board of Governors of the Federal Reserve System, 2004.
[62] Another study shows slightly different results: Thirty-two percent of issuers charge a fee for PIN transactions to at least a portion of their customer base and the average fee is $0.47 (Dove Consulting, 2005b). Dove's sample consisted of 48 depository institutions while the Federal Reserve's study included 839 institutions.
[63] Dove Consulting, 2005a.
[64] Dove Consulting, 2005b.
[65] Bank for International Settlements, 2006.
[66] Dove Consulting, 2005a, p. 65.
[67] Dove Consulting, 2005a, shows that younger consumers are more likely to have a debit card (p. 50) and tend to use debit more often (p. 53).
[68] TNS Financial Services, 2006 shows that 36 percent of debit card users consider a rewards debit card to be an important part of their banking relationship. Fifty-seven percent of households that have both a rewards debit card and a rewards credit card are likely to use the debit card with rewards over the credit card with rewards.
[69] "Why More Merchants are Adopting PIN Debit," *Digital Transactions News*, April 8, 2004, available at *www.digitaltransactions.net/newsstory.cfm?newsid=221*.
[70] Dove Consulting, 2005a, p 157.
[71] Lindenmayer, 2006c.
[72] Daly, 2006a.
[73] Enrich, 2006.
[74] "Issuers Are Facing a Quick-Changing Debit Card Market," *ATM & Debit News*, November 6, 2004, pp. 1-2.
[75] "More and More Consumers Use Visa to Make Small Purchases," *Business Wire*, August 8, 2006.
[76] "Star Pilots Recurring PIN-less Payments, Explores Real-Time Web Debit," *Digital Transactions News*, April 28, 2005, available at *www.digitaltransactions.net/newsstory.cfm?newsid=569*.
[77] Shapiro and Varian, 1999, p. 177.
[78] "2 Networks Show ATM Volume Gain," *ATM & Debit News*, January 16, 2003, pp. 1, 3.
[79] Breitkopf, 2006j.
[80] Paul Tomasofsky of the Two Sparrows consulting firm is quoted as saying, "There's no longer regional EFT networks...they're national networks." Breitkopf, 2006j.
[81] "More Star Defections to Interlink Coming, Says TowerGroup," *Digital Transactions News*, October 28, 2003, available at *www.digitaltransactions.net/newsstory.cfm?newsid=77*.
[82] "Interlink Replaces Star as Top PIN POS Network," *ATM & Debit News*, September 1, 2005, pp. 1, 4; Constantine and others, 2005, p. 173.
[83] Breitkopf, 2006c.
[84] Star Systems, 2006, p. 119; Dove Consulting, 2005a, p. 169.
[85] Association for Financial Professionals, 2005, p. 5.
[86] DePalma, 2005.
[87] A commonly used rewards program, Visa Extras, provides rewards on signature but not on PIN debit.
[88] Quittner, 2006b; Lindenmayer, 2006a; Chu, 2006.
[89] "Debit Volume Exceeds Credit Visa Says," *Bank Systems & Technology*, August 2, 2005.
[90] Perhaps in recognition of the success of PIN-less debit, Visa recently issued a new rule that requires online bill payments to "give consumers the clear opportunity to choose to use their Visa (signature debit) cards" and if consumers do so, to route those payments through VisaNet. See "How PIN-less Debit Conversions Prompted a New Visa Rule," *Digital Transactions News*, March 4, 2005, available at *www.digitaltransactions.net/newsstory.cfm?newsid=521*.
[91] "Another Try to Make PIN-debit a Player in Web-based Transactions," *ATM & Debit News*, July 6, 2006; Oehlsen, 2006b.
[92] "Senate Panel Gets Various Views on Payment Card Interchange Fees," *BNA Banking Daily*, July 20, 2006.
[93] For example, in the rapidly growing online retail industry, where it is an advantage to offer as many payment options as practical, PIN debit is not an option while signature debit is.

[94] Hayashi, 2006.
[95] "Walgreens Decides to Keep Taking Amex Cards After Cutting New Deal," *Digital Transactions News*, January 14, 2005, available at *www.digitaltransactions.net/newsstory.cfm?newsid=476*; "AmEx: Walgreens Changed Its Mind Without Pricing Concessions," *Digital Transactions News*, January 25, 2005, available at *www.digitaltransactions.net/newsstory.cfm?newsid=489*.
[96] "Senate Panel Gets Various Views on Payment Card Interchange Fees," *BNA Banking Daily*, July 20, 2006.
[97] Merchant Payment Coalition Web site (*www.waytoohigh.com*), "Status of Interchange Fees," accessed August 31, 2006.
[98] Large and small issuers also face different environments.
[99] Interchange fees have been the subject of government oversight in other countries, such as Australia, EU, and Spain. Interestingly, despite the negative impact of Australian interchange fee regulation on issuer revenue, there remains much interest among card issuers in the Australian payments market ("A Rate Crunch in Australia," *American Banker*, June 29, 2006).
[100] Breitkopf, 2006b.
[101] Breitkopf and Jalili, 2006; Breitkopf and Lindenmayer, 2006.
[102] Grover, 2006.
[103] Berryand and Breitkopf, 2006.
[104] U.S. Department of Justice, 2003, p. 25.
[105] There have been some interesting developments among credit card processors, most notably the movement of credit card processing by large credit card issuers from outsourcers such as First Data and TSYS to in-house processing (Lowe, 2006; Sisk, 2006). We have not seen indications that this also is happening in the ATM and debit card industry but would not be surprised if the logic of "insourcing" is being similarly considered.
[106] "End of First Data Net Saga Sets Up FDC to Get Payments from Visa," *Digital Transactions News*, July 5, 2006, available at *www.digitaltransactions.net/newsstory.cfm?newsid=1009*.
[107] Some industry observers' think this ends First Data's ambitions to create a bypass network. See "Has Time Passed First Data Net By?" *Digital Transactions*, July 2006, p. 30.
[108] Although in some industry observers' view the ACH system lacks the type of strong authentication and authorization mechanisms of PIN and signature debit, other observers think that risk management technology and services can control risk. See Oehlsen, 2006a.
[109] "NACHA Takes a Page From PayPal's Playbook," *Bank Systems & Technology*, March 21, 2006.
[110] "NACHA Starts Drive to Sign Up Participants for Web-Payment Pilot," *Digital Transactions News*, October 28, 2006, available at *www.digitaltransactions.net/newsstory.cfm?newsid=882*. ACH is currently processed without an interchange fee.
[111] See the pilot's Web site at *www.paymentspilot.nacha.org/index.html#*.
[112] "Wal-Mart Moves to Accept Debitman," *Cards International*, January 6, 2006, p. 3; Bezard, 2004.
[113] Breitkopf, 2006e.
[114] "Ahold Subsidiary Tests ACH Card Payment Alternative with First Data," *Cards International*, March 15, 2006.
[115] Oehlson, 2006a.
[116] Lucas, 2006a.
[117] "A Startup Readies a Payments Network Based on Driver's Licenses," *Digital Transactions News*, July 5, 2006, available at *www.digitaltransactions.net/newsstory.cfm?newsid=824*.
[118] Lieber, 2005.
[119] Talcott, 2004.
[120] Other countries also have experienced this ATM-for-debit substitution; see Bolt and Humphrey, 2006.
[121] Wolfe and Lindenmayer, 2006.
[122] "As Bankers Reissue Debit Cards, Experts Warn of More Compromises," *Digital Transactions News*, March 8, 2006, available at *www.digitaltransactions.net/newsstory.cfm?newsid=877*; "Damage Control after the Big Debit Hack," *Digital Transactions*, April 2006, p. 8.
[123] Clearly the perpetrators accessed PINs but an alternative to decryption is a brute force method where software sends magnetic stripe information to a POS terminal to test every possible combination until the correct PIN code is found; see Wolfe and Lindenmayer, 2006.
[124] Sullivan, 2006b.
[125] Swartz, 2005.
[126] Breitkopf, 2006a.
[127] Studies suggest that most dollar losses due to debit fraud are at ATMs. See Dove Consulting, 2005b, p. 76.
[128] Batchelor, 2006.
[129] Signature debit fraud losses may be somewhat inflated because it is more widely used for purchases on the Internet than PIN debit. On the other hand, if a PIN debit system was designed effectively it could be made to be more secure for Internet purchases compared with signature debit, and so current fraud rate comparisons may be valid.
[130] Star Systems, 2005.
[131] The fraud loss is measured by dividing the total value of fraud loss divided by the total value of purchase transactions.
[132] Pulse EFT Association, 2005, p. 77.
[133] Lubasi, 2005, p. 3.

[134] Breitkopf, 2006i.
[135] Daly, 2006b, p. 28.
[136] "Chip Cuts Fraud Losses," *Electronic Payments International*, March 22, 2006, pp. 12-13.
[137] "Chip Cards to Cost Billions: Retailers Worry Costs Could Outweigh Benefits," *CanadianPress*, April 16, 2006.
[138] Cook, 2006.
[139] "New Research Shows Identity Fraud Growth Is Contained and Consumers Have More Control Than They Think," *BBB Online*, January 31, 2006, available at *www.bbbonline.org/IDtheft/safetyQuiz.asp*.
[140] McKinley, 2006; Sidel, 2006.
[141] "US Banks Collaborate on Data Security," *Cards International*, June 13, 2006; Breitkopf, 2006f.
[142] Sullivan, 2006a, 2006b.
[143] In 2003, an estimated 78 percent of ATM transactions were cash withdrawals (Hayes and others, 2004, p.7).
[144] Quittner, 2006a; Breitkopf, 2006g, 2006h.
[145] For example, in Japan most ATMs are capable of taking deposits, paying bills, and making transfers between accounts as well as person-to-person.
[146] Lucas, 2006b.
[147] "Speer: Function Eclipses Fees in ATM Programs," *ATM & Debit News*, January 12, 2006, pp. 1-2; "Cardtronics Expands Its Horizons," *Electronic Payments International*, March 22, 2006, p. 10.
[148] Ledford, 2006, slide 6.
[149] Kaper, 2006.
[150] Hoffman, 2006.
[151] For example, the Star network is exploring recurring PIN-less debit payments and real-time Web debit; see "Star Pilots Recurring PIN-less Payments, Explores Real-Time Web Debit," *Digital Transactions News*, April 28, 2005, available at *www.digitaltransactions.net/newsstory.cfm?newsid=569*.
[152] "Star Gets Set to Slash Interchange for Small-Ticket Sales," *Digital Transactions News*, February 24, 2005, available at *www.digitaltransactions.net/newsstory.cfm?newsid=514*.

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