ATM Fees: Does Bank Size Matter?

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The debate on automated teller machine (ATM) fees heated up recently, when voters in San Francisco and Santa Monica approved bans on banks' charging non-customers for using their ATMs. A federal court ruling has temporarily barred the two California cities from enforcing the bans, however. Connecticut and Iowa used existing laws to ban such ATM fees, but the Connecticut Supreme Court rejected the ban in that state. The Pentagon has said it would consider a ban on ATM fees on U.S. military bases. So far, the Congress has rejected legislation that would eliminate non-customer ATM fees nationwide.

ATM networks have allowed banks to charge non-customers for withdrawing money from their ATMs since 1996, but ATM fees have been criticized repeatedly by consumer advocates and politicians and the California bans may soon be copied in New York and elsewhere. Large banks[1] have been especially targeted, because they are more likely to impose the fees and their fees tend to be higher than those charged by small institutions. Critics of ATM fees call large banks greedy. Supporters argue that the fees represent the cost of convenience, and that consumers are willing to pay for being able to withdraw money anywhere, and not just at their own institutions. Large banks' ATMs are more convenient, because they allow access to cash at more locations.

Surveys comparing ATM fees across financial institutions have shown that large banks' fees exceed those charged by small banks (Board of Governors of the Federal Reserve System 1998 and 1999; U.S. General Accounting Office 1998). However, most surveys do not control for differences in quality among banks of various sizes. ATM fees are prices charged for a service—typically a cash withdrawal. The more machines a bank has, the more convenient it is for cardholders to withdraw cash. This article analyzes differences in ATM fees among banks in order to test whether large banks impose higher ATM fees than do small banks, controlling for some quality and cost differences associated with more ATMs.

The article is organized as follows. The next section describes ATMs and the costs banks incur to operate them. Section II analyzes network externalities and their relevance for the ATM market. The following section discusses the sample used in the study. Section IV uses regression analysis to test whether larger banks charge higher ATM fees, controlling for their greater convenience and costs, and Section V concludes.

I. ATMs

Although most banks still allow cash to be withdrawn from a bank teller, ATMs have become an increasingly important way to access cash. The number of ATMs in the United States has risen steadily since the early 1970s, although exact estimates vary depending on the source. Table 1 shows American Bankers Association (ABA) statistics indicating that the number of ATMs in the U.S. reached 227,000 in 1999. Some of the growth in the number of machines, especially since 1996 when two major networks lifted their ban on ATM surcharges, has occurred in ATMs located off bank premises, in places such as airports and convenience stores. After a period of rapid increase, the number of ATM transactions increased at a

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declining rate, and the number actually dropped in 1999. The number of transactions per machine has declined every year since 1995. The recent public opposition to surcharges, combined with high rental costs for off-premise machines, has led analysts to believe that the ATM market is saturated (Keenan 1998).

ATMs have been widely recognized as a convenient way to obtain cash. With the majority of ATMs connected to regional or national networks, cardholders can withdraw cash from most institutions in the country. At the same time, banks have regarded ATMs as a way to lower their costs, as customers substitute ATM transactions for costly live teller use. To induce

Table 1
U.S. ATM Statistics

Year	Number of ATM Machines	Number of ATM Transactions (billion)	Monthly Transactions per ATM
1991	83,000	6.41	6,403
1992	87,330	7.20	6,876
1993	94,822	7.70	6,772
1994	112,755	8.45	6,367
1995	122,706	9.68	6,580
1996	139,134	10.70	6,399
1997	165,000	11.00	5,545
1998	187,000	11.20	4,973
1999	227,000	11.00	3,985

Source: American Bankers Association (http://www.aba.com).

customers to use ATMs instead of live tellers, some financial institutions impose fees for teller use or reduce monthly charges to depositors who use only ATMs (Stavins 1999). However, the cost of operating ATMs has turned out to be higher than had been originally anticipated. Humphrey (1994) found that substituting ATMs for traditional bank branches actually raises a bank's average cost. Although he also found that ATM use marginally raises banks' profits, the net benefits appear to be very small.[2] According to ABA data, it costs between $15,000 and $50,000 to deploy a single machine, and between $12,000 and $15,000 per year to maintain and operate it.

The marginal cost of an ATM transaction is believed to be lower than the cost of a teller transaction. According to Kimball and Gregor (1995), the per-transaction cost is 27¢ for ATMs, compared to $1.07 for a teller. However, some more recent estimates show that the average transaction cost has increased: A 1999 study by Dove Associates, Inc. found that the average cost of a transaction at an ATM outside a bank branch ranges from 48¢ to $1.85 (McNamee 1999), while a recent study by Gasper Corporation estimated the per-transaction ATM cost to be between 40¢ and 80¢. In addition, the overall savings are diminished because consumers use ATMs more frequently than they do tellers, withdrawing smaller amounts of cash at each transaction and thus raising the total number of

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[1] The terms "bank" and "financial institution" are used interchangeably here to denote a commercial bank or a thrift.
[2] Because the data used in Humphrey (1994) are now over 10 years old, and the costs of technology have decreased steadily over time, those results may no longer be valid.

transactions (compared to the "all teller" world). Because only a small fraction of ATM transactions bring revenues,[3] and the marginal cost of ATM deployments is increasing, banks often lose money on their ATMs (Federal Reserve System 1997).

Part of the discrepancy in cost estimates comes from the difference between the cost of ATMs located inside bank branches and those located off premises, or outside branches. ATMs placed inside bank branches are cheaper to install and operate, given the sunk costs of maintaining the space. In addition, in-branch ATMs are more likely to displace teller transactions than ATMs located outside of bank branches. It is therefore likely that banks with more in-branch ATMs have lower transaction costs, all else constant.

Most of the ATM transactions are "on-us," that is, they are carried out at the cardholder's bank's ATMs. Those transactions do not involve a network. When a cardholder uses another bank's ATM, he performs an "on-others" transaction. Besides the cardholder, three parties are involved in an on-others transaction: the cardholder's bank, which issues the card; the ATM owner (bank or non-bank), which deploys and operates the ATM; and the network, over which all on-others transactions must be routed.

The cost of an ATM transaction to a cardholder's bank is higher when the cardholder uses another bank's ATM instead of his own. For each such transaction, a cardholder's bank pays two different fees: a switch fee to the ATM network organization and an interchange fee to the bank that owns the ATM. To recover those costs, banks have been charging their cardholders a user (foreign) fee. In addition, in April 1996, two major ATM networks allowed member banks to charge non-customers surcharge fees for using their ATMs. For the first time, the bank that owns the ATM was allowed to charge customers of other banks for using its ATMs. Since then, surcharge fees imposed on ATM transactions have become increasingly common. According to a Federal Reserve survey, 78 percent of banks and 57 percent of savings associations imposed surcharges in 1998 (Board of Governors 1999). An October 1998 survey conducted by Bank Rate Monitor showed that 73 percent of banks imposed ATM surcharges on other banks' customers.

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[3] Estimates of the fraction of ATM transactions performed by non-customers, that is, the ones that may bring surcharge revenues, range from 14 percent to 25 percent.

Six months earlier the fraction was 55 percent. In contrast, banks typically do not charge their own customers for transactions at the banks' ATMs.

II. Network Externalities

Network externalities exist when the value of a good or service to a potential consumer increases with the number of users. Examples of positive direct network externalities include telephones and fax machines. When I buy a fax machine, other owners of fax machines are better off, as they can send faxes to me. Externality arises from the fact that my decision whether or not to purchase a fax machine affects other users' utility, but I do not take that external effect into account. Because those external effects are not typically taken into account by the decision-maker, the externality may cause a good or service to be under-utilized relative to the socially optimal amount. In contrast, if negative externalities are present, a good or service may be overutilized.

Previous research has found network externalities in ATMs (Saloner and Shepard 1995). Banks create an ATM network when a holder of one bank's ATM card can use his card at other member banks' machines. The value of a given ATM network to a cardholder increases with the number of locations where he can use his ATM card. Network externalities arise because when a bank joins a given ATM network, its decision affects the utility of other member banks' cardholders, who can now use their cards at more locations. Following Farrell and Saloner (1986), benefits from using an ATM card are equal to:

$$benefits = a + b(N), \qquad (1)$$

where a is a stand-alone benefit from using an ATM, $b(N)$ is a network effect, and N is network size.

Network externalities were especially important when many incompatible ATM networks existed and bank branching was limited. During the 1980s, several ATM networks merged and many banks agreed to share access to ATMs, thereby eliminating most of the compatibility issues, at least within individual metropolitan areas (McAndrews 1997). Nowadays, most cardholders can access their cash from an ATM located anywhere in the world.

Higher compatibility among the ATM networks and the increased incidence of fees have altered the nature of ATM networks. ATM networks are less constrained by compatibility, and more by fee struc-

ture. For most cardholders, a free network is limited to their bank's own ATMs, even though they can use their card to withdraw cash elsewhere. The foreign ATM fees and surcharges give an advantage to large banks with many branches where ATMs can be located. Small financial institutions worry that their customers will transfer their deposits to banks with more ATMs to avoid paying surcharges and foreign fees. To protect themselves from losing their depositors, some small banks refrain from charging foreign fees. The Board of Governors survey found that the fraction of small banks charging foreign fees declined from 1996 to 1997, although the percentage of institutions imposing surcharges rose in all size categories.

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In some areas, smaller financial institutions have established "no-surcharge" coalitions to attract customers. Customers of banks belonging to the coalitions can use ATMs that are owned by another bank in the coalition without paying surcharges. For example, several small banks in Massachusetts have formed an alliance that lets customers use an ATM of any member without paying a surcharge (Beckett 1998). For customers of a bank that belongs to a no-surcharge alliance, all of the members' ATMs constitute a network of free machines.

A cardholder's benefits from using an ATM increase with the number of his own bank's ATMs and with the number of other ATMs, but the effect of other banks' ATMs declines with foreign fees and with surcharges. The benefits become:

$$benefits = a + b_1(N_1) + b_2(N_2, f, s), \qquad (2)$$

where a is the stand-alone benefit from using an ATM; b_1 is the benefit from the cardholder's own network (that is, his bank's own ATM locations or ATMs owned by other members of a no-surcharge coalition); b_2 is the benefit from other banks' networks; N_1 is the number of ATMs in the cardholder's own network; N_2 is the number of other local banks' ATMs; f is a

foreign fee charged by the cardholder's bank for transactions at other banks' ATMs; and s is the average surcharge charged by the other banks. Both N_1 and N_2 increase the benefits, while f and s lower the benefits.

Both foreign fees and ATM surcharges provide incentives to open an account at a bank with the highest number of ATM locations. Indeed, the results presented in Stavins (1999) show that the supply of NOW account deposits decreases with foreign ATM fees. In addition, consumer surveys indicate that cardholders change their ATM habits in response to surcharges. A Faulkner and Gray (1999) survey of consumers showed that over 80 percent of respondents avoid foreign ATMs where fees are imposed, and that surcharges higher than $1 would lead to a 30 percent

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decrease in the number of on-others transactions. A PSI Global survey of 3,217 consumers in April and May 1999 found that 15 percent of respondents have limited their use of ATMs in response to surcharges. A survey of consumers in the Pulse network done by Analytica showed that 80 percent of cardholders avoided the ATMs where surcharges were imposed (Stock 1999). As a result, the number of on-others ATM transactions in 1997 was lower than in 1996, the first decline since ATMs became available (McAndrews 1998). Consumer response is likely to prevent banks from raising their ATM fees any higher, even if the fees remain legal. In the past, consumers were willing to pay for the convenience of being able to withdraw cash in many locations. As shown above, recent market research suggests that sensitivity to ATM fees has increased.

What is the "right" level of ATM fees for a bank? For a given volume of ATM transactions, an ATM owner's profit increases with ATM surcharges. At the same time, demand for foreign ATM transactions

declines with the fee. The owner sets its fee subject to the demand function it faces. Because demand is a function of the bank's ATM network size, a bank with a bigger ATM network will face a higher demand than a small bank, and thus will be able to charge higher fees without revenue loss. The bank's profit from ATM transactions is:

$$\Pi_i = f\, q_{2i} + s\, q_{3i} - C(N_1, q_{1i}, q_{2i}, q_{3i}) \qquad (3)$$

where Π_i is bank i's profit from ATM operation, f is the foreign fee, s is the surcharge, q_{1i} is the number of transactions performed by bank i's customers at its own ATMs, q_{2i} is the number of transactions performed by bank i's customers at other ATMs, q_{3i} is the number of transactions performed by non-customers at bank i's ATMs, C( ) is the cost of the bank's ATM operation, which increases with the number of the bank's ATMs, N_1, and with the volume of transactions performed at its own ATMs (by its customers or by non-customers) and by its customers at other ATMs (because of switch and interchange fees).

Because consumer benefits increase with the number of ATMs the bank owns (equation 2), the volume of transactions will be higher the more machines the bank owns, but so will the costs. Thus the profit-maximizing level of fees will depend on each bank's cost and demand functions.

III. Data

This article uses data from a survey of financial institutions conducted by Bank Rate Monitor (BRM) in May 1997. Because the data were collected approximately a year after surcharges on national networks were allowed, and before any of the recent surcharge bans were voted on, potential effects of legislation do not affect the analysis. The data were collected from 235 financial institutions—up to five banks and five thrifts in each of the 25 largest U.S. metropolitan areas. Table 2 lists the markets surveyed.

The data provide information on each institution's ATM fees, including fees that banks charge for the use of their own machines and for the use of other banks' machines, ATM surcharges, and charges for the ATM card itself, new or replacement. The survey data were merged with June 1997 data from Consolidated Reports of Condition and Income (Call Reports) to obtain statistics on each institution's assets, deposits, and number of accounts.

The number of ATMs by bank holding company

Markets Surveyed (25 Largest U.S. Metropolitan Areas)

Atlanta	Milwaukee
Baltimore	Minneapolis
Boston	New York
Chicago	Philadelphia
Cincinnati	Phoenix
Cleveland	Pittsburgh
Dallas	San Diego
Denver	San Francisco
Detroit	Seattle
Houston	St. Louis
Kansas City	Tampa
Los Angeles	Washington, DC
Miami	

was obtained from a Faulkner and Gray (1998) directory. The directory publishes the statistic for the 336 largest ATM owners, providing the variable for 64 percent of our sample. The directory provides a total number of ATMs for each bank holding company, without breaking it down by location. For example, our sample includes data on Wells Fargo's ATMs in seven different markets (Los Angeles, San Francisco, San Diego, Seattle, Denver, Phoenix, and Houston). The Faulkner and Gray directory provides only the total number of Wells Fargo's ATMs in the United States. Therefore we do not know how many of the ATMs are located in each of the markets. We test for robustness of the results using the number of branches each institution has in a given state as a proxy for the number of ATMs. The number of branches was obtained from the Federal Deposit Insurance Corporation (FDIC) 1997 Summary of Deposits. Table 3 provides summary statistics for the data in our sample.

Despite the prevalence of ATM fees, few banks charged their customers for using the bank's own machines. Out of 223 institutions that reported the statistic, only four charged for the use of own ATMs. A somewhat larger number of banks charged for the use of ATMs at the point of sale (POS): Out of 219 banks, 57 charged for POS use. Foreign fees were more common: 200 institutions (87 percent) imposed fees for the use of another bank's ATM. The most typical foreign fee was $1.00 (28 percent), followed by $1.50 (20 percent), with the average fee $1.07. The majority of institutions also charged their customers for the use of ATM cards abroad—85 percent of the sample imposed the charge, with $1.00 being the most common amount. Over 60 percent of the sampled institutions imposed ATM surcharges. The most typical amount was $1.00 (32 percent), followed by $1.50 (15 percent), with the average surcharge of $0.74, and the average surcharge among banks that imposed it $1.19. Few banks charged for supplying an original ATM card, but a large fraction imposed a fee for a replacement card once the original was lost (58 percent). Almost all the banks with transaction fees impose the fees for every transaction, although 8 percent of the sample allowed some number of free transactions before the fee applied (typically four or less per month).

The above findings are consistent with those in other studies (see Board of Governors of the Federal Reserve System 1998 and U.S. General Accounting Office 1998). The Board of Governors results show that

Table 3
Descriptive Statistics for 235 Financial Institutions

Variable	Mean	Standard Deviation	Minimum	Maximum
Own ATM fee ($)	.02	.15	0	1.5
Foreign fee ($)	1.07	.54	0	2
POS fee ($)	.13	.28	0	1.5
Abroad ATM fee ($)	1.26	.77	0	5
Surcharge ($)	.74	.69	0	5
New card fee ($)	.23	1.35	0	12
Replace card fee ($)	2.12	2.92	0	15
Number of free transactions	.31	1.13	0	6
Number of branches	453	624	1	2,335
Number of ATMs	1,803	2,429	8	7,706
ATMs/branch	3.23	4.80	.25	42.57
Assets ($000)	1.63e+07	2.70e+07	19,285	1.56e+08
Service revenues ($000)	19,445	49,373	0	324,000
Total salaries ($000)	68,101	159,576	68	1,184,000
Number of employees	5,301	11,049	8	69,983
Deposits ($000)	1.06e+07	1.83e+07	8,506	1.10e+08
Number of accounts	1,431,646	2,851,376	908	1.67e+07
1 if thrift	.349	.48	0	1

Source: Bank Rate Monitor Survey; Faulkner and Gray (1998); FDIC Call Report, June 1997; FDIC 1997 Summary of Deposits; and author's calculations.

in June 1997, 59 percent of banks operating ATMs assessed surcharges, with the average surcharge $1.13. The GAO found that in February 1998, 64 percent of banks assessed surcharges, with the average surcharge $1.00.

The financial institutions in the sample range from $19 million to $156 billion in assets, and from $8.5 million to $110 billion in deposits. They vary from a single-branch bank to one with 2,335 branches. Approximately one-third of the sample are thrifts, the rest are commercial banks.

IV. Does Bank Size Matter?

Surveys show that large financial institutions are more likely to charge ATM fees than small banks, and that the fees charged by large institutions tend to be higher. The Board of Governors survey found that, in 1997, 88.6 percent of large banks (with assets over $1 billion) charged foreign fees for cash withdrawals, compared to 75.3 percent of medium-sized (with assets from $100 million to $1 billion) and 60.5 percent of small (assets below $100 million) institutions (Board of Governors 1998).[4] The average foreign fee for an ATM withdrawal was $1.22 at large banks and $1.02 at small banks. Surcharges were more common and higher at large banks as well, with 70.6 percent of large banks and 59.2 percent of small banks imposing them. The average surcharges in 1997 were $1.28 and $1.11, respectively. According to the GAO report, 83 percent of large banks (with assets over $10 billion) and 63 percent of small banks (with assets less than $1 billion) charged ATM surcharges in 1998, with the averages $1.12 and $0.85, respectively (U.S. General Accounting Office 1998).

The Bank Rate Monitor survey confirms the differences (see Table 4). In the case of surcharges, foreign fees, and POS fees, small banks in the sample imposed the lowest charges and large banks the highest. (Medium-sized and large banks with surcharges had almost identical average surcharges.) Small and medium-sized banks also allowed more free transactions, on average, before they applied the fees, although small institutions charged more for card replacement than did medium-sized and large banks.

Table 4
ATM Fees, by Size of Bank

	Bank Assets ($billion)			
Average ATM fees	Under 1	1 to 25	Over 25	All Banks
Number of institutions	60	122	53	235
Surcharge—all banks ($)	.41	.79	.93	.74
Surcharge—banks with surcharges only ($)	.97	1.24	1.22	1.19
Foreign fee—local banks ($)	.69	1.14	1.30	1.07
Foreign fee—local banks with foreign fees only ($)	1.04	1.21	1.38	1.22
POS use ($)	.06	.13	.18	.13
Card replacement ($)	3.36	1.92	1.23	2.12
Number of free transactions in a month before charge applied	.38	.37	.08	.31

Source: Bank Rate Monitor survey and author's calculations.

Why do large banks charge higher surcharges and foreign ATM fees? One possible explanation is that larger institutions offer a higher-quality service. Consumers' benefits from using ATMs increase with the number of locations where cash can be withdrawn, as equation (2) shows. The higher surcharges levied by large banks could represent the price of the convenience of being able to use the nearest ATM regardless of its ownership.

Another explanation is that a bank's total ATM costs increase with the number of ATMs it deploys and operates. Although a typical bank does not explicitly charge its own customers for on-us transactions, that cost is reflected in interest rates the customers earn on their deposits or in other fees. To recover the interchange and switch fees, banks impose foreign fees. However, the only way a bank can recover its cost of transactions performed by non-customers directly from the users is to charge them explicit surcharge fees. Even though the bank receives an interchange fee from the user's bank, it cannot set that fee. The more ATMs a bank has, the higher are its costs and the higher the demand for its ATM transactions because of the network effects discussed above; therefore, the higher will be its surcharges. Similarly, a bank with more ATMs may charge higher foreign fees to recover its overall greater costs of ATM operation.

ATM surcharge is directly tied to convenience and service—users (cardholders) are charged directly by the service provider (ATM owner). In contrast, a

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[4] The gap between the fractions of large and small institutions that impose foreign fees or surcharges narrowed substantially in 1998 (Board of Governors 1999). However, the differences in the average fees remained almost exactly the same. We report the 1997 data to be consistent with the sample used in this study.

foreign fee is a charge for a service performed by someone else (ATM owner). Moreover, because the ATM owner does not have a long-term relationship with the user, surcharge is the only way to charge the user directly.[5] Therefore convenience and service quality should be better reflected in the case of surcharges than in the case of foreign fees. Foreign fees can be designed to provide incentives to the bank's customers to stay within its own ATM network. Because large banks tend to have larger ATM networks, they may opt to provide stronger incentives not to use their rivals' machines than do small banks.

To recover interchange and switch fees, banks impose foreign fees. However, the only way a bank can cover its cost of transactions performed by non-customers directly from the users is to charge them explicit surcharge fees.

Finally, large banks could charge higher ATM fees than do small banks because of their market power. We test a hypothesis that larger banks charge higher ATM fees either because of the greater convenience they offer, or because of their higher costs, both associated with operating a larger number of ATMs. If the differences in ATM fees are explained by differences in service quality and cost associated with more ATMs, then controlling for the number of locations where ATM cards can be used should make bank size insignificant. If larger institutions are found to charge higher ATM fees after controlling for the number of ATMs, it could be evidence that large banks have market power that allows them to charge higher fees.

As mentioned in Section I, banks with more in-branch ATMs can be expected to have lower ATM transaction costs, all else constant. Lower costs should allow those institutions to charge lower ATM surcharges. The only data that break down the total

number of ATMs into those located inside and outside bank branches come from the *American Banker* annual survey. Although the survey includes only the largest banks, it allows for a crude test of the above hypothesis. Indeed, based on a small sample of the largest banks for which we have data on inside/outside ATMs as well as their ATM fees, banks with more inside ATMs per branch charged lower surcharges.

To approximate the fraction of ATMs located off bank premises, we use a ratio of the number of ATMs to the number of branches. All else constant, the more ATMs a bank has relative to its number of branches, the higher is the bank's fraction of ATMs located off premises. Holding the number of ATMs constant, a bank with a higher fraction of off-premise ATMs is likely to have higher operating costs and offer greater convenience associated with more locations. Because the variable is specified by holding company, the number of branches used in the denominator was for each holding company as well. As a result, we have the same fraction for each institution within a holding company. At the same time, both foreign fees and ATM surcharges vary among cities owing to local competitive conditions and political environment.[6]

In our main specification, we use the number of ATMs and the number of ATMs per branch. To test for robustness, we also approximate the number of ATM locations with the number of bank branches in a given state, because the variable can be measured in each local market and exists for the full sample. Although the number of ATMs exceeds the number of branches, the two values are highly correlated (Humphrey 1994). Moreover, according to a survey conducted by the consulting firm Speer & Associates, 71 percent of ATM transactions took place at on-premises ATMs in 1998 (PRNewswire, July 19, 1999). The number of ATM locations is more likely to be underestimated for large banks than for small banks.[7] However, in our sample the two variables are highly correlated for large institutions, but not for small or medium institutions. Each bank's average wage is used to control for the bank's labor costs. Assets measure bank size.

$$\text{foreign}_i = \beta_0 + \beta_j\, x_j + \beta_1\, \text{assets}_i + \beta_2\, \text{ATM}_k$$

$$+\ \beta_3\, \text{ATMbranch}_k + \beta_4\, \text{wage}_i + \beta_5\, \text{thrift}_i + \varsigma_i, \quad (4)$$

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[5] With own customers, a bank can recover its ATM costs by changing other fees associated with the user's account.

[6] The average foreign fees in a local market range from 56¢ in Pittsburgh to $1.52 in San Francisco. The average surcharges range from 0 in Boston to $1.17 in Atlanta.

[7] According to the GAO survey, the average number of ATMs operated by large banks increased from 1997 to 1998, while it stayed the same for small and medium-sized institutions.

Table 5

Estimation of the Effects of Bank Size on Foreign ATM Fees

Dependent variable: foreign ATM fee.

	[1]	[2]	[3]	[4]	[5]
Intercept	.565**	.397	.453*	.453*	.510*
	(2.33)	(1.50)	(1.73)	(1.68)	(1.95)
Assets	$5.28e^{-9}$***	$4.00e^{-9}$**	$2.35e^{-9}$	$2.32e^{-9}$	$4.11e^{-9}$*
	(3.80)	(2.58)	(1.40)	(1.35)	(1.73)
Number of ATMs			.00004**	.00005**	
			(2.31)	(2.24)	
Number of ATMs/branch				−.0007	
				(−.09)	
Number of branches					.0003
					(.84)
Wage	.006	.017	.015	.015	.007
	(.51)	(1.18)	(1.04)	(1.02)	(.52)
Thrift (1 if thrift, 0 otherwise)	−.104	.129	.172*	.173*	−.065
	(−1.41)	(1.35)	(1.79)	(1.78)	(−.81)
Market dummy variables included?	Yes	Yes	Yes	Yes	Yes
R^2	.298	.368	.396	.393	.320
F	3.13	2.52	2.72	2.55	2.96
N	227	145	145	144	205

t-statistics in parentheses.
* statistically significant at the 10 percent level
** statistically significant at the 5 percent level
*** statistically significant at the 1 percent level

$$surcharge_i = \gamma_0 + \gamma_j x_j + \gamma_1 \; assets_i + \gamma_2 \; ATM_k$$

$$+ \; \gamma_3 \; ATMbranch_k + \gamma_4 \; wage_i + \gamma_5 \; thrift_i + \xi_i, \quad (5)$$

where $foreign_i$ is bank i's foreign ATM fee; $surcharge_i$ is bank i's ATM surcharge; x_j is a dummy variable equal to 1 for market j; $assets_i$ is bank i's assets; ATM_k is the number of bank holding company k's ATMs; $ATMbranch_k$ is the ratio of ATMs per branch for bank holding company k; $wage_i$ is the average wage at bank i, calculated as total salaries divided by the number of bank employees; and $thrift_i$ is a dummy variable equal to 1 if the institution is a thrift, 0 if it is a commercial bank.

Table 5 shows the results of estimating equation (4) using ordinary least squares. Dummy variables for each market were included to control for market-specific factors affecting the ATM fees. Column [1] shows the results of estimation using the full sample, and column [2] shows the results of the same specification when a subsample for which we have the number of ATMs is used in the regression. We estimate [2] to test whether limiting the sample to observations with the number of ATMs introduces a bias.

Although only 64 percent of the observations had the number of ATMs and were therefore used in column [2], bank size is positive and statistically significant in both regressions. Larger banks were found to charge higher foreign ATM fees, regardless of whether the full sample or a subsample is used in estimation. Because the banks for which the number of ATMs is provided tend to be large,[8] bank size has less effect on fees—the coefficient on assets is smaller in magnitude and less statistically significant in column [2].

Column [3] shows results with the number of ATMs included in the regression. Bank size is no longer significant, indicating that the difference in foreign fees between large and small banks exists mainly because of differences in convenience and cost associated with more ATMs. When the number of ATMs per branch was added to the regression (column [4]), the coefficient on bank size remained statistically insignificant and lower in magnitude than in the first two specifications. The effect of bank size on foreign ATM fees is diminished and is not statistically significant when the number of ATMs is controlled for. To test for robustness, the last column shows results of a specification where the number of branches was used instead of the number of ATMs. Here, the coefficient on bank size is greater in magnitude than in columns [3] and [4], but statistically significant only at the 10 percent level, and the specification provides a worse fit than the previous two, as indicated by a lower value of R^2.

Table 6 shows the results of estimating equation (5). In the case of surcharges, the estimated coefficient on bank size was positive and statistically significantly different from zero in all the specifications—whether the number of the bank's ATMs or the number of

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[8] The average asset size of institutions for which the number of ATMs is provided is $21.6 billion, compared to $7.5 billion for the ones without the variable.

Table 6

Estimation of the Effects of Bank Size on ATM Surcharges
Dependent variable: ATM surcharge.

	[1]	[2]	[3]	[4]	[5]
Intercept	−.050	−.045	.022	.048	−.058
	(−.15)	(−.14)	(.07)	(.15)	(−.16)
Assets	$7.13e^{-9}$***	$6.74e^{-9}$***	$4.65e^{-9}$**	$4.40e^{-9}$**	$7.29e^{-9}$**
	(3.84)	(3.55)	(2.27)	(2.11)	(2.23)
Number of ATMs			.00006**	.00006**	
			(2.43)	(2.53)	
Number of ATMs/branch				−.008	
				(−.76)	
Number of branches					.0001
					(.10)
Wage	.006	.007	.004	.005	.005
	(.34)	(.37)	(.23)	(.27)	(.30)
Thrift (1 if thrift, 0 otherwise)	−.051	−.087	−.031	−.025	−.046
	(−.51)	(−.75)	(−.27)	(−.21)	(−.41)
Market dummy variables included?	Yes	Yes	Yes	Yes	Yes
R^2	.257	.367	.398	.401	.275
F	2.41	2.45	2.67	2.57	2.23
N	216	142	142	141	194

t-statistics in parentheses.
* statistically significant at the 10 percent level
** statistically significant at the 5 percent level
*** statistically significant at the 1 percent level

branches were included in estimation. As in Table 5, columns [1] and [2] represent the same specification estimated with two different samples, column [3] shows results of a regression with the number of ATMs included, and column [4] has both the number of ATMs and the number of ATMs per branch. When both the number of ATMs and the number of ATMs per branch were included (column [4]), the estimated coefficient on bank size remained statistically significant at the 5 percent level, although lower in magnitude than in column [2], which used the same sample, but did not control for the number of ATMs.

As explained above, ATM surcharges directly reflect convenience and service quality, while foreign fees are designed in part to provide incentives to the bank's customers not to use other banks' machines. Although banks with more ATMs provide higher-quality service, and those with more off-premise ATMs have higher costs, larger banks impose higher surcharges even after those factors are taken into account.

Surprisingly, the number of ATMs per branch had no effect on foreign fees or on surcharges. The result could be caused by the fact that the variable is measured at a bank holding company level and does not vary across cities. Indeed, the actual variance in both fees across markets is substantial, even within a single holding company. For example, Norwest's foreign fees range from 75¢ to $2, and surcharges range from 0 to $1, depending on the market.

The coefficient on the number of branches was not statistically significantly different from zero, except for specifications in which bank assets were not included (not shown). Although it is cheaper for a bank to install ATMs inside its branches than off premises, the actual number of ATMs is a better measure of the value provided by each bank's network. Thrifts charged lower surcharges than did commercial banks, although the difference was not statistically significant. Bank wages were not statistically significant in any specification. Although market-specific dummy variables may control for the variation in labor costs, the coefficient on bank wages was not significant even when the market dummies were excluded. The variable depends not just on local labor costs, but also on the bank's relative product mix: A bank that specializes in corporate lending has a relatively high average wage, while a retail bank has a relatively low average wage. The variable's effect on ATM fees is ambiguous.

According to the results of specification [1], a bank with $10 billion more in assets than its neighbor would charge a foreign fee that was 5.3¢ higher (see Table 5). After controlling for the number of ATMs and the ATM/branch ratio, the estimated difference is 2.3¢ and not statistically significant. The effect of bank size on surcharges (Table 6) is more pronounced: A $10 billion difference in assets is associated with a 7.1¢ difference in ATM surcharge. After controlling for the number of ATMs and the ATM/branch ratio, the estimated difference in surcharges was 4.4¢ and still significant.

Here we define small banks as the ones with less than $1 billion in assets, medium-sized banks as those with between $1 billion and $25 billion in assets, and large banks as those with assets above $25 billion. The mean asset sizes for small, medium, and large banks in the sample are $340 million, $8 billion, and $54 billion, respectively. Controlling for the number of ATMs, medium-sized banks charge surcharges that are 3.4¢ higher than those charged by small banks, and large banks charge surcharges that are 20¢ higher than those charged by medium-sized banks (calculated as 4.4¢ for each $10 billion difference in average asset size). Note that the estimated mean difference in surcharges between large and medium banks is greater than the actual difference (see Table 4).

Not only are the surcharges assessed by large banks higher than those imposed by small and medium-sized financial institutions, but the difference is not substantially affected either by the large banks' higher costs of operating a greater number of ATMs or by the greater convenience of multiple locations they offer to non-customers.

Several of the individual market dummy variables were significant in the estimation. After controlling for all the other variables, banks in St. Louis, Baltimore, and Atlanta were found to impose the highest surcharges, while institutions in Baltimore, Detroit, and St. Louis charged the highest foreign fees.

V. Conclusion

Surveys have shown that large banks charge higher ATM surcharges and foreign fees than do small institutions. However, the difference could arise from the greater convenience of many ATMs locations that large banks offer. In addition, ATM deployment and maintenance are costly, especially for off-premise machines, and surcharges paid by non-customers provide the only way to finance ATM operations directly from users. This study has found that large banks charge higher ATM surcharges than smaller banks, even after controlling for the greater convenience and higher costs associated with deploying and operating more machines. However, the difference in foreign fees charged to a bank's own customers for using other institutions' machines was insignificant when the effect of service quality and cost associated with more ATMs was controlled for. The results confirm the common belief that larger banks charge other banks' customers more for using their services, but contradicted the conviction that large banks use their

market power to charge their own customers higher foreign ATM fees.

Automated teller machine surcharges and foreign fees encourage cardholders to use their own banks' ATMs. For given interest rates and fees on deposits, customers have strong incentives to open accounts at larger institutions that own more ATMs. Middle-tier

There are no economic reasons to ban ATM surcharges. Customers can and, for the most part, do avoid paying ATM surcharges by finding machines that do not impose them. Surcharge bans would inevitably limit consumer choice.

banks are likely to be especially strongly affected by the large banks' high surcharges, because they are typically located in markets with large banks, while the smallest community banks tend to be located in rural areas, where customers have little choice about where to deposit their money or withdraw cash.

Despite the evidence that large banks impose higher fees, there are no economic reasons to ban ATM surcharges. Customers can and, for the most part, do avoid paying ATM surcharges by finding machines that do not impose them. Surcharge bans would inevitably limit consumer choice, as they did in California, where Bank of America and Wells Fargo restricted access to ATMs to their own customers, forcing smaller bank customers to seek more remote ATMs and raising incentives to transfer their deposits to large banks altogether. Higher ATM surcharges have enabled larger financial institutions to deploy more ATMs. McAndrews (1998) shows that the number of ATMs grew faster from 1996 to 1997, after banks were allowed to impose surcharges, than in any year during the previous 15. Off-premise ATM deployment by banks, financed to some extent by the surcharges, would decline if the fees were banned. In addition, the bans may force banks to cross-subsidize their ATM operations by other services, possibly leading to distortionary pricing of other services.

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