



**Credit
Research
Center**

WORKING PAPER NO. 57

**Discounts for Cash in Retail
Gasoline Marketing**

**DISCOUNTS FOR CASH IN RETAIL
GASOLINE MARKETING**

John M. Barron

Michael E. Staten

John Umbeck*

Working Paper 57

Credit Research Center
Krannert Graduate School of Management
Purdue University

September 1991

* John M. Barron is Professor of Economics, Michael E. Staten is Director of the Credit Research Center, and John Umbeck is Professor of Economics. All authors are affiliated with the Krannert Graduate School of Management, Purdue University, West Lafayette, Indiana.

EXECUTIVE SUMMARY

WORKING PAPER 57

DISCOUNTS FOR CASH IN RETAIL GASOLINE MARKETING

John M. Barron, Michael E. Staten and John Umbeck*

Until 1982, major oil companies offered proprietary credit cards to their customers as a free (unpriced) service, in order to promote repeat sales. Events during 1982 marked a dramatic departure from the free extension of credit. Two major oil companies dropped their proprietary credit card programs. In rapid succession, most of the other majors unveiled two-tiered pricing policies, advertised as "discount-for-cash" programs. Discounts for cash reached their pinnacle in 1989, when 34 percent of U.S. gasoline outlets distinguished between cash and credit prices. Since then cash discounts have steadily faded from the marketplace.

This research paper focuses on the peculiar period in the history of gasoline credit cards during which discounts for cash were introduced, became popular, and eventually faded. Several unique data sets are used to empirically address a series of related issues. Two data sets derive from surveys of retail gasoline outlets, one conducted for Delaware in June, 1983 and the other conducted for the state of Washington in September, 1989. Data for each station include cash and credit prices, location, and station characteristics (e.g., number of hoses, convenience store, service bays). A third data set is a ten year cash/credit price series for a sample of stations in five western cities.

With these data we address the following questions:

- What factors influenced the decision to unbundle the credit service and price it separately?
- Why does the pricing take the form of a discount for cash, instead of an extra charge for credit?
- To what extent do cash customers subsidize credit customers at stations that do not price the credit transaction separately?
- What factors reversed the trend toward discounting?

The analysis concludes that the decision to separate the price of credit from the price of gasoline was driven by a rapid rise in the cost of financing accounts receivable, per gallon of gasoline sold, from 1978 to 1982. Real interest rates rose dramatically as did the real price per gallon of gasoline. Because gasoline card issuers have a lower proportion of accounts that revolve purchases (and generate finance charge revenues) relative to other retailers, they became the first to unbundle the pricing and sale of the credit transaction service on a widespread basis. The decision to offer cash discounts instead of imposing a credit surcharge was a direct result of the Cash Discount Act passed in 1981 which prohibited surcharges but substantially eased the

* John M. Barron is Professor of Economics, Michael E. Staten is Director of the Credit Research Center, and John Umbeck is Professor of Economics. All authors are affiliated with the Krannert Graduate School of Management, Purdue University, West Lafayette, Indiana.

disclosure requirements associated with offering cash discounts. However, by 1990 the discounting trend had reversed because the costs of processing credit transactions fell (due to the adoption of electronic draft capture technology at the point of sale) as did the float associated with non-revolving accounts receivable, because of the decline in real interest rates.

Two separate calculations of the subsidy of credit buyers by cash buyers were made based on purchases of self-serve, regular unleaded gasoline at stations that accept credit cards as payment. Controlling for station size and features, in 1983 cash customers in Delaware who purchased at stations that offer discounts for cash paid 1.8 cents less, on average, than if they purchased at a station that did not offer discounts. Similarly, in 1989 cash customers in the state of Washington who purchased at stations that offered discounts for cash paid 1.48 cents less, on average, than if they purchased at a station that did not offer discounts. Other tests confirm that the "savings" associated with paying cash at a discounter vs. non-discounter diminished between 1982 and 1990.

DISCOUNTS FOR CASH IN RETAIL GASOLINE MARKETING

John M. Barron, Michael E. Staten and John Umbeck

INTRODUCTION

The practice of extending credit for gasoline and auto repairs existed for 60 years as a free (unpriced) service. Major oil companies invested heavily in building and cultivating a credit cardholder base to promote brand loyalty and repeat sales. At the end of 1981 there were 109 million gasoline credit cards in circulation, representing over 60 million accounts. Annual sales volume on gasoline credit cards exceeded \$25 billion.¹

Events during 1982 marked a dramatic departure from the free extension of credit. Two major oil companies dropped their proprietary credit card programs. In rapid succession, most of the other major oil companies unveiled two-tiered pricing policies, advertised as "discount-for-cash" programs. Although the advertisement suggested that cash customers were getting a discount, the practical result of the pricing strategy was to charge credit users a few cents extra per gallon for the extra service they consumed. Not only was this a dramatic departure from the tradition of the complimentary credit card, but it also provided the first example of widespread, explicit pricing of the credit service in a major consumer product market.

Discounts for cash reached their pinnacle in 1989, when 34% of the more than 150,000 retail gasoline outlets in the U.S. offered discounts for cash payment. Thereafter, discounts for cash began to fade from the marketplace. By early 1991, after only 9 years, only two majors were still actively promoting a cash discount pricing policy. This paper focuses on the peculiar period in the history of gasoline credit cards during which discounts for cash were introduced, became popular, and eventually faded from the market. The more general question is this: What changed by 1982 to trigger the explicit pricing of the credit service, and changed again by the end of the decade to discourage it?

It helps to frame the question in the context of a general observation about pricing in markets. Some goods and services are packaged together and sold at a single price while others are unbundled and priced separately. When sold together, retailers advertise "free" services to encourage incremental sales. Many department stores wrap gifts, validate parking coupons, cheerfully accept returned merchandise, provide delivery services, offer alterations, and open charge accounts without charging the customer an explicit fee for the service provided.

The retail gasoline market provides several examples. Many stations offer free use of air hoses, bathrooms, and car vacuums to their customers at no extra charge, although it is possible to find an occasional station that levies a nominal charge for each of these services. A more significant example of bundling is the distinction between full-serve and self-serve stations. In the former case, gasoline and service are jointly sold at a single price per gallon. When service (that is, pumping the gas, checking under the hood, wiping the windows) is unbundled from the sale of gasoline, customers pump their own gasoline at a lower price. What makes gasoline marketing somewhat unique, relative to other retail outlets, is the appearance of both bundled and unbundled versions of the product at the same store. "Split" stations offer both full and self-serve islands and allow customers to choose.

¹ Many gasoline stations also accept bank credit cards, and some take travel and entertainment cards, such as American Express. These cards were used for payment on another \$1.8 billion of sales annually, in addition to the charge volume on the proprietary, company cards. Source of data for credit card holdings is a credit card industry newsletter, "Me Nilsson Report," Issue #298, December, 1982.

In the following sections we address an analogous dimension of gasoline marketing, the sale of credit services along with gasoline. Stations that advertise "same price, cash or credit" have adopted the bundled approach to pricing their services. Alternatively, stations that advertise "discount for cash (DFC)," take the unbundled approach.

Both types of pricing coexist in the retail gasoline marketplace. Their coexistence raises several questions.

1. What factors influenced the decision to unbundle the credit service and price it separately?
2. Why does the pricing take the form of a discount for cash, instead of an extra charge for credit services?
3. To what extent do cash customers subsidize credit customers at stations that do not price the credit transaction separately?
4. What factors reversed the trend toward discounting?

We will address each of these questions in the following sections. Section I describes the evolution of the gasoline credit card, up to and including the sequence of events that led to widespread discounting in the early 1980s. We discuss the economic factors that led to the decision to price credit separately, as well as legal restrictions that influenced how the charge for credit was levied. In Section II we utilize several data sets to address the subsidy issue, as well as examine the decision to discount by retail dealers. In Section III we review the recent retreat from discounting in retail gasoline markets. Section IV contains concluding remarks.

I: THE ROAD TO DISCOUNTS FOR CASH

Oil companies pioneered the concept of a national credit card. During the 1920s, as the U.S. highway system began to develop, motorists faced the prospect of refueling their cars at stations outside their own communities. Cross-country travelers either needed to carry cash or have credit facilities. Perceiving an opportunity to provide a unique and valuable service as well as a device to cultivate brand loyalty, oil companies began issuing "courtesy cards" in the early 1920s. These were about the size of today's plastic credit cards, although made of heavy paper. Cards were distributed by service station managers to their regular customers, and renewed every 3 to 6 months. Oil companies billed their customers and expected payment within 30 days of the monthly billing date.

Providing the credit service was relatively expensive; according to a 1939 survey, the incremental cost of credit over cash amounted to .85 cents per gallon, or 4.85 percent of the selling price at the time.²

But, the value of credit cards for cultivating repeat customers was well recognized. Equally important at the time was the value of a large base of cardholding customers in attracting new station owners to a company's network of retail dealers. However, over the years it was the credit cards ability to promote repeat purchases that drove the decision to offer a proprietary credit program.

In 1939 Standard Oil of Indiana launched the first mass distribution of credit cards by giving out 250,000. Other oil companies quickly copied the innovation. By the start of World War II, Mobil, Gulf and Standard Oil

² "National Petroleum News," November 1, 1939.

had a total of more than one million cards outstanding. In 1952, Standard Oil of California issued the fore-runner of today's plastic card: an embossed metal charge plate fixed to the customary heavy-paper card.

The evolution and growth of third-party credit cards (i.e., bank credit cards; travel and entertainment cards) in the late 1950s and early 1960s threatened to erode the unique advantage of a gasoline card, namely, credit for fuel purchases and repairs away from home. Oil companies recognized that the gasoline card's ability to promote brand loyalty would be seriously undermined if customers began to leave the card at home. To encourage customers to carry their cards, oil companies attempted to increase the cards' versatility by forging agreements with other merchants willing to accept the card. Gasoline cards were promoted as "travel cards," accepted at hotels, restaurants and car rental agencies. Oil companies typically charged these other merchants a fee equal to about four to five percent of the transaction amount.

However, time demonstrated that customers rarely used the gasoline cards for, purchase of other services, and merchants apparently discouraged use of gasoline cards in favor of bank cards because bank card issuers charged merchants lower fees for acceptance. By the early 1970s, the attempt to make a gasoline card more like a bank card had failed, and most acceptance agreements with other merchants were dropped.

A. Incentives to Price Credit Separately

Wealth maximizing oil companies have an incentive to provide a complimentary credit card so long as its value (in promoting brand loyalty or other benefits) exceeds the cost of providing the credit service. If the card becomes less useful for generating incremental sales, or the costs of providing the credit service rise, the incentive to offer the card as a complimentary service declines. The probability of unbundling and pricing credit- separately will rise, holding constant the transaction cost of pricing the two goods separately vs. together. If we seek to understand the emergence of cash discounting, economic theory suggests we should determine whether either was occurring by 1982.

First, consider the potential for proprietary gasoline cards to promote brand loyalty. The proliferation of bank cards eroded the uniqueness of the gasoline card, as a non-cash payment device. Figure 1 illustrates the rapid growth in cardholders from 1976 to 1985. Data from the Federal Reserve Surveys of Consumer Finances show that the percentage of households with at least one bank card rose dramatically during the same period. From 1977 to 1983, growth in the percentage of households with at least one bank card was particularly rapid for households with annual incomes of \$30,000 or more. Of course, higher income households will also be larger purchasers of gasoline, the group with whom oil companies would most like to cultivate repeat purchase behavior. The bank card offered holders two services that were formerly unique to the gasoline card: 1) the convenience of a non-cash payment device, and 2) the ability to tap a credit line for at least a 30-day billing cycle. Other things constant, the increasing availability of plastic substitutes for gasoline cards would erode the ability of the card to generate marginal sales.

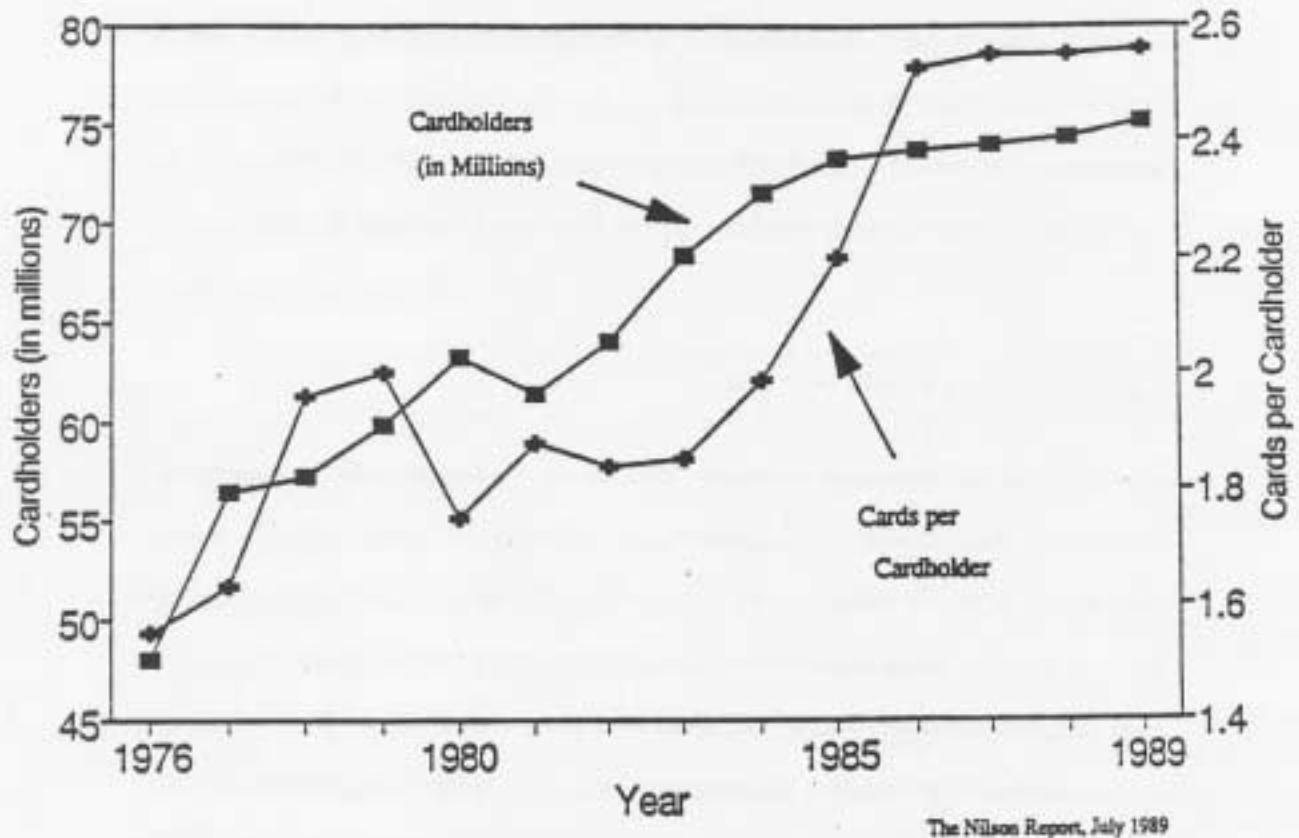
Available data suggest that household interest in gasoline cards was indeed waning. In 1977 there were 133 million gasoline cards in circulation in the U.S., (compared to 92 million bank cards.) By the start of 1982, there were only 109 million gasoline cards in circulation.³

During the same period, the cost of providing gasoline credit card services was rapidly rising. There are at least two categories of costs in a gasoline credit card program. One is the cost of providing the transaction service itself, including processing transaction data, issuing monthly billings, collecting delinquent accounts,

³ "Nilson Report," Issue #185, April, 1978, and Issue #298, December, 1982.

Figure 1

Bank Credit Card Holdings Growth in Cardholders and Cards



and providing customer service. The other category is the cost of financing the accounts receivable generated by credit card usage.

All credit card issuers experienced rapid escalation in the second category of costs during the early 1980s. After remaining at historically low levels through most of the 1970s, short-term real interest rates (as measured by rates on 6-month commercial paper, minus actual inflation) began rising rapidly in 1980, and peaked at about 7% in 1982. Short-term borrowing costs to companies with credit card receivables rose accordingly. All retailers with proprietary card programs faced the problem of how to reduce the subsidy of credit buyers by cash buyers, as the costs of credit escalated, in order to remain competitive with retailers that did not have a credit program.

However, oil companies that offered gasoline credit cards experienced a second, almost simultaneous shock. The real price of gasoline, (as measured by the ratio of the motor fuel component of the Consumer Price

Index (CPI) to the overall CPI) began climbing rapidly in 1979, peaking in 1981. The real price of gasoline in 1981 was 50% higher than the level prevailing in 1978.

Figure 2 reveals that the cost of financing the accounts receivable, per gallon of gasoline sold, increased rapidly from 1978 to 1982 for two reasons: higher interest cost per dollar purchased on credit, and a higher dollar price per gallon purchased by credit card. Consequently, the resulting higher cost of credit per gallon sold increased the economic incentives to price credit users.⁴

Three questions come to mind.

1. Why did oil companies choose to levy extra charges on credit users (unbundle the pricing of credit from the pricing of gasoline) by pricing it separately at the point of sale? Were there alternatives for pricing credit at other margins?
2. If the costs of carrying credit card receivables went up for all retailers, why did only gasoline stations choose to price credit at the point of sale?
3. Why did the point-of-sale charge to credit users take the form of a discount for cash, instead of a surcharge for credit?

The answers to these three questions are closely related. As we noted above, rising real interest rates impacted all retail credit card issuers, not just the oil companies. Direct charges to credit users could be imposed in several ways. One approach was to generate extra revenue through the monthly billing process in the form of higher finance charges on revolving balances, fees for late payments, annual fees to use the card and elimination of the interest-free grace period. A second approach was to levy a charge on credit users at the point of sale, through some form of tiered pricing. The tiered pricing could consist of either discounts for cash payment or surcharges for credit payment.

Through most of the 1970s, retailers faced a variety of legal barriers to implementing these strategies, since state rate ceilings restricted creditors' ability to hike finance charges and user fees. However, many of these restrictions were eased at the end of the decade, largely because policymakers were concerned that creditors would begin restricting access to credit due to the rising costs of funding. Indeed, "between the end of 1978 and the end of 1981, 32 states revised their laws governing interest rates on revolving accounts. At the end of 1978, five states had ceilings below 1.5 percent per month for the entire outstanding balance, and 20 more states had ceilings below 1.5% applicable to a part of the balance. By the end of 1981, just one state constrained rates to below 1.5% on any amount owed, and only nine states maintained a limit below that level on some part of the balance."⁵

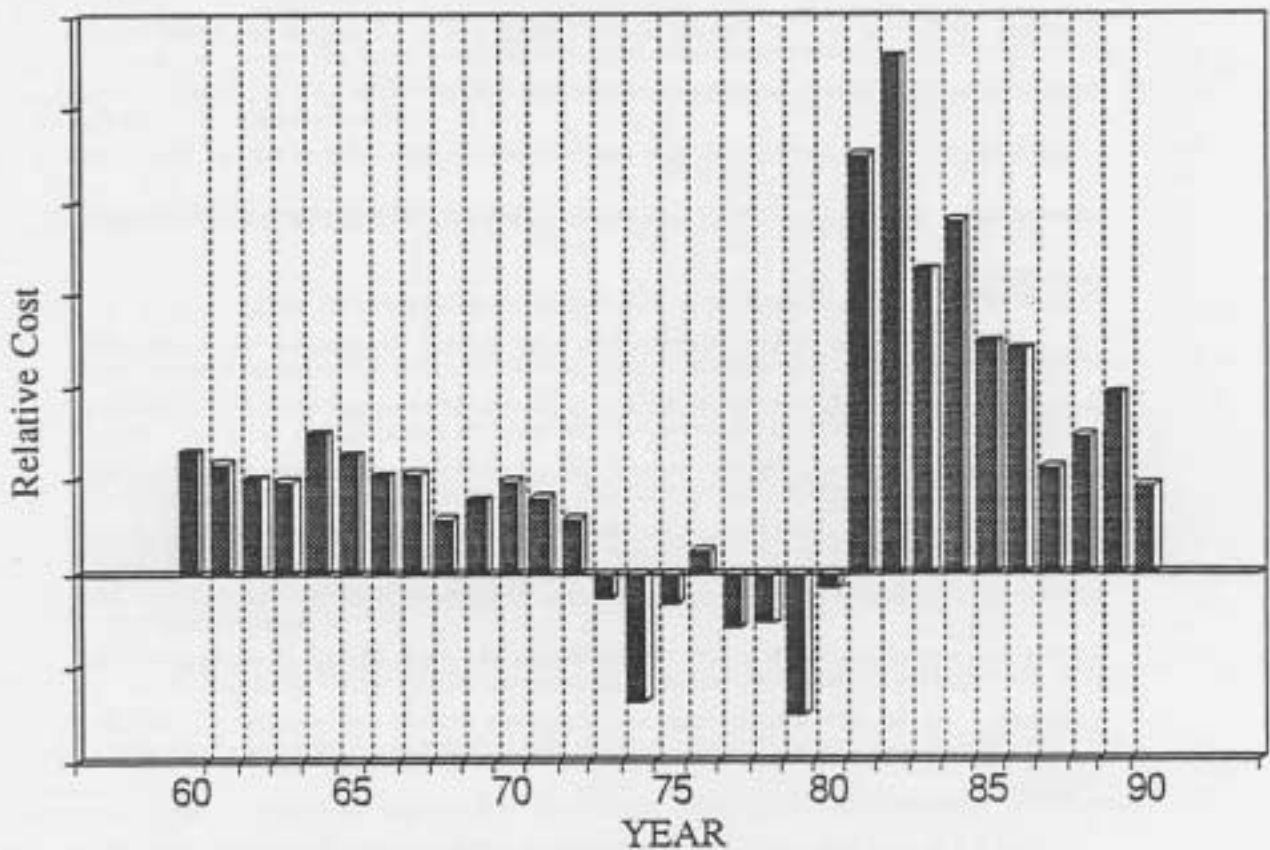
While the lifting of rate ceilings may have helped department stores and other retailers with a relatively high proportion of revolvers, oil company card issuers benefited less because far fewer of their customers revolved a balance. Most companies that issue gasoline cards allow customers to revolve balances associated with purchases of tires, batteries and repairs, but not gasoline purchases. Customers must pay the portion of their card balances associated with fuel purchases within 30 days of billing. If accounts are paid accordingly, no finance revenue accrues; customers receive the benefits of 30-60 days "float".

⁴ Note that the pressure to unbundle one or more services was not unique in the history of retail gasoline marketing. Unbundling had already taken place in the retail gasoline markets, on a large scale, when self-service gained popularity in the early 1970s.

⁵ Credit Cards in the U.S. Economy: Their Impact on Costs, Prices and Retail Sales, Board of Governors of the Federal Reserve System, July, 1983, p.72.

Figure 2

Cost of Credit Per Gallon
Real Rate Times Relative Price of Fuel



As for annual fees, bank card issuers began implementing them in the late 1970s, primarily as a means of extracting some revenue from non-revolvers. Bank cards had become so popular with consumers that even implementation of annual fees did not halt the growth in the proportion of households with at least one card (although it did reduce, for a time, the growth in the number of cards per household. See Figure 1). As bank

card holdings by households grew, an increasing number of retailers, including gasoline stations, began accepting bank cards along with their own proprietary credit cards. Neither oil companies nor other retailers attempted to charge an annual fee for their cards, fearing that consumers would keep their more versatile bank cards and close their gasoline and retail accounts in order to minimize their payment of fees.

So, in addition to experiencing a relatively larger increase in the cost of credit per unit of product sold, the oil companies had less effective means of recovering those higher costs from their cardholders through monthly billing, relative to other retailers. For both reasons, oil companies were tilted more toward implementation of a two-tiered pricing system at the point of sale.⁶

B. Cash Discounts vs. Credit Surcharge

Why did the oil companies adopt cash discounts instead of a surcharge for credit? Legislation passed in 1981 effectively dictated that a two tiered pricing system for cash and credit users must be advertised as a discount for payments by cash.⁷ The evolution of the Cash Discount Act, passed in July, 1981, provides an interesting example of a market in which Congress objected to the bundling of services for sale at a single price, for reasons other than antitrust

In the early 1970s, amidst increases in both inflation and revolving credit usage, Congress declared that proprietary credit plans offered by retailers were inflationary. This was partly a result of reports that credit card issuers were contractually preventing merchants from offering discounts to customers who paid with cash. Congressional objections to this practice appear to have been grounded less in antitrust concerns and more out of a general belief that at least some of the cost of providing credit services was built into the price of goods. Consequently, a higher proportion of credit buyers would raise the price of goods, forcing cash customers to subsidize credit customers. Of course, this situation would be aggravated by artificial limits placed on the ability of merchants to offer cash discounts.

Congress wished to encourage merchants to separate the price of goods from the price of credit, and to lower the price of goods in general. However, even retailers with their own credit programs (not bound by discounting restrictions imposed by the bank card issuers) who tried to offer discounts were blocked by the disclosure requirements of the Truth in Lending Act. Passed in 1969, the Truth in Lending Act (TILA) states that any differential between the price of a cash transaction and the price of a credit transaction is deemed a cost of credit and subject to disclosure rules. TILA effectively limited merchants' ability to give cash discounts for two reasons. First, TILA imposed a

burdensome requirement to translate the effect of the cash discount into an annual percentage rate finance charge equivalent, and to disclose it at the time of each transaction. Moreover, in states where retailers already charged at or near the interest rate ceiling, a discount offered to cash customers would effectively put retailers in violation of the usury statutes for their credit customers.

⁶ Kitch (1990) offers another, complementary explanation for why we see cash discounts less frequently for goods other than gasoline. Many retailers place a minimum purchase restriction on payment by credit card (often \$10415). The option to obtain a discount for payment with cash is only meaningful for purchases above the credit card minimum but below the amount of cash in the average consumer's pocket. Although most gasoline purchases are less than the average amount of currency carried, the same cannot be said for purchases at other retailers. So, a cash discounting strategy will appeal to a smaller segment of customers at non-gasoline retail outlets.

⁷ During the debate over the Cash Discount Act, oil companies lobbied for (but did not achieve) the ability to charge a surcharge on credit card users.

On October 28, 1974, the TILA was amended to add the Fair Credit Billing Act. In these amendments Congress attempted to lower the legal barriers to cash discounting. The 1974 amendments to TILA barred card issuers from contractually limiting or otherwise preventing their merchant members from offering cash discounts. To further ease the legal restrictions to discounting, the amendment also exempted cash discounts of up to 5% from the TILA finance charge disclosure regulations, so long as the discount was offered to all customers and the availability was clearly posted. Details regarding how to define "discount" (from what?) and implement a two-tiered pricing structure were left to the Federal Reserve Board to work out.

Congress soon discovered that promoting discounts wasn't as easy as it sounded. In response to questions from the Federal Reserve Board about legislative intent, Congress explicitly addressed the issue of discounts vs. surcharges. In February, 1976, amendments to TILA, Congress prohibited sellers from imposing surcharges upon customers who elected to pay by credit card instead of by cash or check. A discount was defined as a reduction from the "regular" price; a surcharge was an addition to the "regular" price. The amendments did not define "regular" price. The initial ban on surcharges was for 3 years (through February, 1979) and was eventually extended two more years, to 1981.

Cash discounting did not blossom following the 1976 amendments. Apparently convinced that the disclosure rules were still too cumbersome, Congress amended the TILA one more time with the Cash Discount Act, effective July 27, 1981. The Cash Discount Act removed many of the burdensome posting and disclosure requirements that had been developed by the Federal Reserve Board.⁸ It also removed the limit on the size of cash discounts (which had been 5%). Finally, it continued the ban on surcharges through February, 1984.

In 1984, the ban on surcharges expired. Congress considered but failed to pass an extension on the ban (and a separate, opposing bill which would have explicitly permitted surcharges). Currently, cash discounts continue to be regulated by the 1981 Cash Discount Act. Availability of a cash discount must be posted conspicuously, and the transactions remain exempt from TILA disclosure rules. Surcharges are not banned at the federal level, but legal obstacles remain because the Federal law addresses only discounts. It does not explicitly exempt surcharges from state rate ceilings. Moreover, by 1990 at least 13 states had passed explicit bans on surcharges.⁹ Consequently, oil companies that desired to impose a two-tiered pricing structure on their credit and cash customers found (then, as now) that a discount for cash was substantially less costly to advertise and implement than a surcharge for credit. We saw in the previous section that rising interest rates substantially raised the gain to unbundling the purchase of credit services from the purchase of gasoline, and to explicitly price both. The passage of the Cash Discount Act opened an avenue for oil companies to do just that.

But, they didn't do it right away. Consider the sequence of events following the passage of the Cash Discount Act. The first substantive change in company policies toward credit pricing was made by Texaco. In late 1981, Texaco imposed a 3% discount on its reimbursement of dealers for credit card sales, which effectively meant a 3% charge to dealers for credit card sales. However, it did not actively encourage dealers to alter their pricing at the pump by promoting a discount-for-cash program. Dealers were free to determine whether to implement tiered pricing as well as the size of the cash/credit price spread. Arco made the next public move in the spring of 1982, but Arco didn't adopt discount-for-cash either. Heralded by a national advertising campaign which depicted a giant Arco credit card being dynamited in the desert, Arco announced

⁸ The Act defined "regular" price as 1) the tag or posted price if a single price is tagged or posted, or 2) the price charged for the goods and services when payment is made by use of an open-end credit plan or credit card if no price is posted or if both cash and credit prices are posted. It did not delineate posting requirements completely. The Act states that a cash discount is permissible if "1) such discount is offered to all prospective buyers and 2) its availability is disclosed clearly and conspicuously."

⁹ The preceding account of the history of the Cash Discount Act draws heavily on Kitch (1990) and Lobel and Gelb (1981).

that it was dropping its credit card program (6 million cards outstanding) to pass along the savings to customers in the form of lower cash prices. Later in 1982, Getty Oil also dropped its proprietary card (1.2 million cards).

In rapid succession following the Arco announcement, other major oil companies announced discount-for-cash programs. Table 1 profiles the credit policies of the majors by December of 1982. In less than 9 months, almost 25 % of all retail gasoline stations had adopted a discount-for-cash pricing policy.

II. IMPACT ON THE RETAIL GASOLINE MARKET

We empirically explore three issues that arise in the context of cash discounting. The first is the impact of the discount pricing policy on gasoline credit card use. The second is a measurement of the extent to which cash buyers subsidize credit buyers at stations that don't discount. The third is an examination of the decision to discount at the retail station level.

**Table 1: Major Oil Company Fees and Cash Discounts
As of December 1982**

	<u>Processing Fee to Dealers</u>	<u>Cash Discounts</u>
Amoco	3.0%	Dealer Discretion
Ashland	3% on bank cards	Limited test (@ 4 cents)
Chevron	---	---
Citgo	2.9%	Dealer Discretion
Conoco	2.5%	Dealer Discretion (@ 3-4 cents)
Exxon	3.0%	Dealer Discretion (@ 4 cents)
Gulf	3.0%	Dealer Discretion
Mobil	3.0%	Dealer Discretion (@ 4 cents)
Phillips	3.0%	Dealer Discretion (@ 4 cents)
Shell	3% on bank cards	---
Sohio	---	Limited test (@ 3-4 cents)
Sunoco	3% on bank/T&E cards	---
Texaco	3.0%	Dealer Discretion
Union	2.5% on bank cards	---

Source: The Nilsson Report, December 1982

A. The Impact on Cash and Credit Card Sales

The onset of discounting, coupled with termination of some company credit card programs, had a major impact on gasoline card holdings by consumers. Data from the Federal Reserve Surveys of Consumer Finances show that from 1977 to 1983, the proportion of U.S. households with at least one gasoline card fell from 34% to 29%. (See Figure 3, bank and gasoline card holdings). During the same period, the proportion of households with at least one bank card rose from 38% to 43%.

Not surprisingly, the birth of discount-for-cash programs coincided with a significant drop in the proportion of gasoline sales on credit. Figure 4 displays the percentage of gasoline sales on credit cards for the industry and selected major brands from 1976 to 1988. Industry-wide, credit cards accounted for 27.7% of gasoline sales in 1981, just prior to discounting, but dropped to 23.8% of gasoline sales by the end of 1983.

Figure 4 emphasizes that customers significantly altered their choice of payment methods and brands in response to the change in pricing. Exxon introduced discounts for cash in 1982, shortly after Arco dropped its card. Exxon's sales of gasoline on a credit card dropped from 43.7 percent in 1981 to 30.8% in 1983. In

Bank Versus Gasoline Card Holdings

Percent of Families - At Least One Card

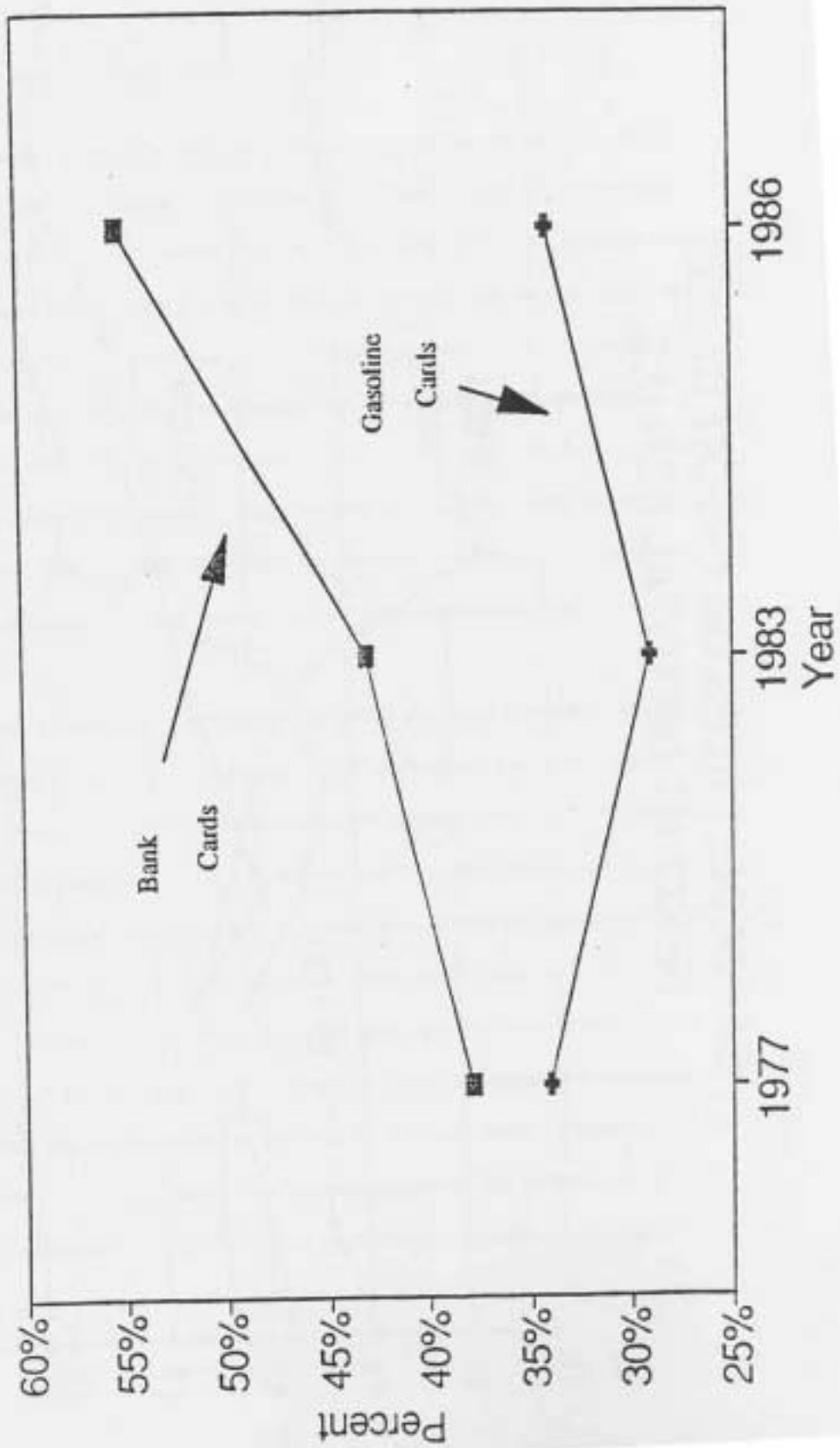
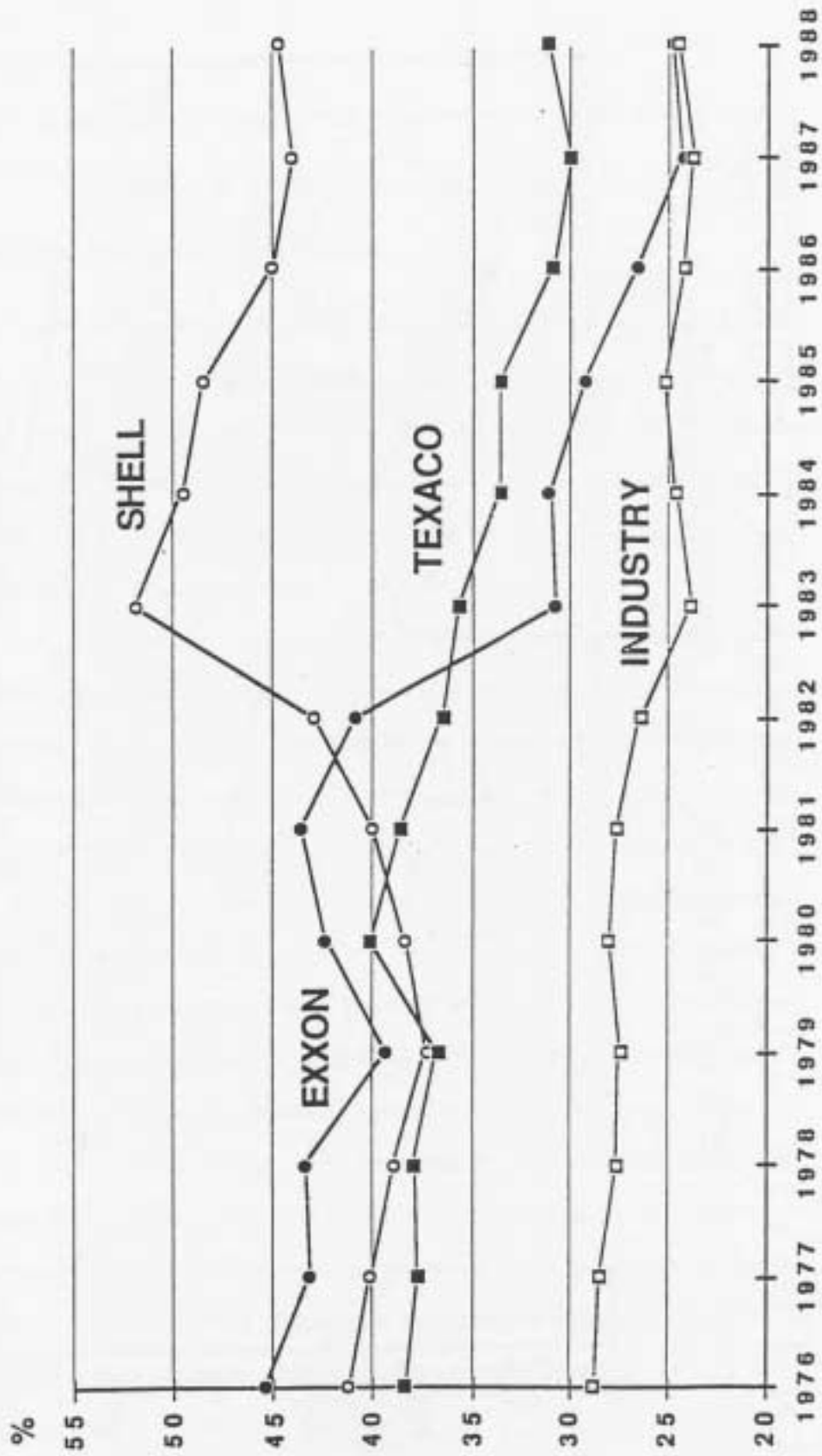


Figure 3

Figure 4

GASOLINE SALES ON CREDIT CARDS
PERCENT OF TOTAL FOR U.S.



contrast, Shell experienced an increase in credit card sales, presumably because its policy of offering the "same price, cash or credit," attracted credit card users from brands that began to offer cash discounts.¹⁰ Texaco's experience resembled Exxon's, except that the decline in credit card usage was less dramatic because Texaco did not actively encourage its dealers to discount, and fewer did. Based on Figure 4, it appears that customers correctly perceived that the cash discount had effectively hiked the relative price of using credit at discounting stations.

B. Subsidy of credit buyers by cash buyers

As described in Section L concern over the subsidy of credit buyers by cash buyers prompted federal legislation to promote explicit pricing of credit. A staff report prepared by the Board of Governors of the Federal Reserve in 1983 noted that "The fundamental thesis underlying the Cash Discount Act is that credit card transactions are more costly to retailers than cash or check transactions, and that the higher costs of credit cards are incorporated in the price of goods and services paid by all customers, resulting in a subsidy of credit buyers by cash purchasers."¹¹ Curiously, retail gasoline markets represent the only example of an industry-wide response to Congress' attempt to remove the subsidies. What was the impact? Below we provide an answer using equations estimated with two unique data sets suitable for measuring the subsidy implicit in retail gasoline prices.

One data set derives from a 1989 survey of prices and station characteristics for retail gasoline stations in the state of Washington. The Washington data were collected by Lundberg Survey, Inc. a well-known firm specializing in gasoline price data. The data set combines information from the monthly Lundberg survey of the Seattle and Spokane regions together with supplemental surveys of smaller cities located throughout the state. On September 8, 1989, approximately 750 retail outlets in 72 cities and towns were surveyed. This represents more than half of all retail gasoline outlets in the state. Restricting the sample to major brand outlets offering self-service gasoline and proprietary credit card services reduced the sample to 406 stations. For each station, a special survey was commissioned to obtain additional data concerning station size (number of full and self-serve hoses) and whether repair services or convenience store items were offered for sale.

A similar data set was obtained for gasoline stations in the state of Delaware. During a three-day period in June, 1983, data on prices and station attributes were collected by a team of graduate students directed by one of the authors, then at the University of Delaware. Of the approximately 480 stations in Delaware, there were 127 major brand outlets that offered self-service and accepted payment by the brands proprietary credit card.

In order to measure the extent of any subsidies, we estimated a series of regression equations in which the dependent variable is either the cash or credit price for self-serve unleaded gasoline at major brand gasoline stations that offer their own proprietary credit card services. The key independent variable is the station's credit pricing policy, which equals one if the station offers a cash discount, zero otherwise. In addition, the regression analysis includes as independent variables a vector of station attributes such as the number of full and self-serve pumps at the station, the presence of repair or convenience store facilities, the population density of the area (for the 1989 Washington data), and the number of stations close by (for the 1983 Delaware data).¹² These variables are introduced to proxy traffic flow under the presumption that increased traffic flow allows a station to amortize its fixed costs over more gallons, and thus charge a lower price per gallon.

¹⁰ An industry newsletter reported that Shell picked up 1.5 million new credit card accounts between April and December of 1982. See "Nilsson Report," Issue #298, December, 1982.

¹¹ "Credit Cards in the U.S. Economy," Federal Reserve System, 1983.

¹² In the survey of Delaware stations, nearby stations were defined as those visible from the surveyed station.

Tables 2 and 3 display the results of the regressions for the cash and credit price using the 1989 Washington and 1983 Delaware data sets, respectively. While these two data sets involve gasoline markets widely separate in both location and time, the results are strikingly similar. In both, the cash price was significantly lower (1.48 cents lower in Washington, 1.82 cents in Delaware) at stations offering a cash discount as compared to similar stations that did not offer a discount for cash.¹³ The credit price was significantly higher (3.38 cents in Washington, 2.37 cents in Delaware) at these same discounting stations for individuals who paid using a credit card. Note that these findings represent one of the few attempts to empirically estimate the exact extent to which cash buyers subsidize buyers using credit, controlling for station characteristics.

Among the other findings of the regression analysis on gasoline prices is that increased traffic flow is associated with lower prices. In particular, the evidence indicates that stations with greater traffic flow, as proxied by a larger number of pumps, location in a more densely populated area, or location in an area with more stations close by, tend to have lower prices.

**Table 2: Price Comparisons: Discounters Versus Non-discounters
Washington Data**

<u>Dependent Variable:</u>		<u>Cash price (in cents)</u> <u>Self-serve unleaded</u>	<u>Credit price (in cents)</u> <u>Self-serve unleaded</u>
<u>Independent Variables:</u>	<u>Mean</u>	<u>Coefficient (T-statistic)</u>	<u>Coefficient (T-statistic)</u>
Intercept	1.00	111.16 (85.86)	110.77 (84.52)
Station discounts for cash	.58	-1.48 (2.02)	3.38 (4.56)
Number of self-serve Pumps at station	10.27	-0.33 (6.00)	-0.34 (6.05)
Number of full-serve Pumps at station	2.70	.12 (.66)	.105 (.057)
Station has repair Facilities	.61	-1.69 (1.46)	-1.26 (1.07)
Station has a Convenience store	.29	4.33 (3.88)	4.58 (4.06)
Population density of area	3260.78	-0.0021 (9.07)	-0.002 (8.79)
Number of observations		406	406
Adjusted R-Square		.34	.35
Mean of dependent variable		100.68	103.47

¹³ Other regression analysis suggests that the cash prices of major brand discounters were not significantly higher than cash prices at independent stations. However, the one major that discontinued its proprietary credit card, ARCO, had cash prices significantly below both independents and other major brands.

**Table 3: Price Comparisons: Discounters Versus Non-discounters
Delaware Data**

<u>Dependent Variable:</u>		<u>Cash price (in cents) Self-serve unleaded</u>	<u>Credit price (in cents) Self-serve unleaded</u>
<u>Independent Variables:</u>	<u>Mean</u>	<u>Coefficient (T-statistic)</u>	<u>Coefficient (T-statistic)</u>
Intercept	1.00	119.20 (79.84)	119.19 (80.05)
Station discounts for cash	.44	-1.82 (2.27)	2.37 (2.98)
Number of self-serve Pumps at station	5.04	-0.38 (2.48)	-0.39 (2.54)
Number of full-serve Pumps at station	2.80	-.45 (2.09)	-.45 (2.08)
Station has repair Facilities	.68	-1.56 (1.25)	-1.45 (1.17)
Station has a Convenience store	.24	.11 (.09)	.13 (.10)
Number of other stations Visible from station	1.04	-.60 (1.96)	-.63 (2.09)
Number of observations		127	127
Adjusted R-Square		.24	.16
Mean of dependent variable		113.56	115.41

C. Decision to Discount

With the notable exception of Shell, most of the major brand companies that offered proprietary credit cards charged their dealers for the credit card transactions for at least some period during the 1980s. However, retail dealers for these majors were not required to pass on such charges in the form of differential pricing for credit and cash purchases. In fact, excluding Shell, over half did not offer cash discounts in Delaware in 1983 and one third of such dealers in Washington did not have cash discounts in 1989.

An immediate question that arises is why some retail dealers did not offer cash discounts even though cash sales are less costly. Naturally, in going to a cash discount, the dealer is able to attract additional cash buyers with lower prices. But the dealer will potentially lose credit card buyers who no longer are subsidized by cash buyers. The net impact on the dealer's profits of offering a cash discount will thus depend on the makeup of his potential customer pool - credit versus cash buyers - and the sensitivity of the two groups to price changes. Both these factors are likely to be specific to the stations locality.

Table 4 reports results of a Probit model with a dependent variable equal to one if the station offers a cash discount and the same set of independent variables as used in gasoline price regressions. For both the Washington and Delaware data sets, the sample is restricted to major branded retailers other than Shell who offer proprietary credit cards.

**Table 4: Probit Model of Discounting at Retail Level
Washington and Delaware Data**

<u>Dependent Variable:</u>		<u>Equals one if Station discounts, Washington Data Set</u>		<u>Equals one if Station discounts, Delaware Data Set</u>
<u>Independent Variables:</u>	<u>Mean</u>	<u>Coefficient (Chi-square)</u>	<u>Mean</u>	<u>Coefficient (Chi-square)</u>
Intercept	1.00	-.006 (.0005)	1.00	-0.51 (1.34)
Number of self-serve Pumps at station	9.86	.013 (1.24)	5.04	.069 (2.22)
Number of full-serve Pumps at station	2.76	-.01 (.07)	2.80	-.04 (0.42)
Station has repair Facilities	.64	.39 (2.59)	.68	.23 (.40)
Station has a Convenience store	.27	.63 (6.96)	.24	-.67 (2.81)
Population density of area	3290.6	-.00001 (.10)		---
Number of observations		343		127
Log Likelihood		-211.45		-82.13
Mean of dependent variable		.67		.44

Unfortunately, the available set of independent variables for the Washington or Delaware data sets do not offer good information on relevant local market conditions. Thus, while there are some suggestive results, there are no consistent findings linking station characteristics to the decision to discount.

We have, however, examined a third set of data that does suggest the importance of local competitors to the decision by dealers to discount. In particular, we obtained Lundberg price data for the 7 year period from 1983 to 1989 for five western cities: Los Angeles, San Francisco, Seattle, Phoenix, and Las Vegas. Our analysis is restricted to major brand stations that offer self-service and accept payment with a proprietary credit card. The sample sizes each period range from approximately 1,000 stations for the Los Angeles area and 650 stations for San Francisco to 300 for Seattle, 150 stations each period for Phoenix, and approximately 60 stations for Las Vegas. Since Lundberg collected data on both credit and cash prices at each station, we were able to identify whether a station offered a cash discount.

Recall that an important factor in the decision to discount is the reaction of credit card customers to a higher price. The extent of this reaction will likely depend on the number of alternative major brand dealers who do not discount. In this regard, recall that it was the policy of Shell during this period to not offer a cash discount. In fact, Shell explicitly advertised "same price, cash or credit". Thus, we would expect that, as the proportion of Shell dealers in an area increased, the cost of discounting in terms of lost credit card customers would rise, and less discounting would occur. Table 5 reports the results of a test of this prediction. The findings are striking: controlling for brand, a 10 percent increase in the proportion of Shell branded majors in the market reduces the proportion of non-Shell dealers who discount by 2 percent.¹⁴ This is compelling evidence that the policy of nearby competitors matters.

¹⁴ These figures are calculated as follows: given a mean proportion of .16 for Shell dealers, a ten percent increase in the proportion of Shell dealers means an increase from .16 to .176. The -.81 coefficient in Table 5 suggests such a change will reduce the proportion who discount by .81 times .016, or .013. Given the mean number discounting (excluding Shell) is .65, this is a 2 percent reduction in discounting.

Table 5: Discounting Across Brands - The Shell Effect?

Dependent Variable: Proportion of different major brand stations with proprietary card who discount in five western cities for the period 1983-89

<u>Independent Variables:</u>	<u>Mean</u>	<u>Coefficient (T-statistic)</u>
Intercept	1.00	.143
Proportion of major brand Proprietary card stations in Area that are Shell	.16	-.81 (9.53)
Proportion for Chevron (Shell excluded brand)	.172	.90 (36.88)
Proportion for Exxon (Shell excluded brand)	.167	.86 (35.39)
Proportion for Mobil (Shell excluded brand)	.158	.89 (36.05)
Proportion for Texaco (Shell excluded brand)	.172	.50 (20.82)
Proportion for Union/Unocal (Shell excluded brand)	.172	.05 (2.06)
Number of observations		203
Adjusted R-Square		.94
Mean of dependent variable		.549

Another finding emerges from the Lundberg data that also suggests the importance of local market conditions on the decision to discount. Texaco dealers, like other dealers, were charged 3% on their credit sales volume. But unlike majors such as Exxon, Amoco, and Mobil, during this period Texaco did not engage in national promotions of cash discounts. This gave individual Texaco dealers greater flexibility to tailor their credit pricing decision to local markets. Such flexibility is of little consequence if local markets conditions are similar across stations. However, this appears not to have been the case. Texaco dealers, with an increased ability to respond to local market conditions, often chose not to discount. In fact, at the end of 1989 only 36.9% of Texaco stations in the Lundberg national sample were offering discount for cash on self-serve, regular unleaded, far less than discounting frequencies of 79.1% at Mobil, 87.4% at Amoco, 87.3% at Exxon, and 92.7% at Chevron.¹⁵ Another example of how Texaco dealers responded to differences in local market conditions in their decision to discount was their choice of discounting across time. The variance in the proportion of Texaco dealers who discounted between 1983 and 1989 was greater than that of any other major brand discounter for the sample of five western cities. Further, Texaco stations exhibited a wider *variance in* the size of cash discounts: 43.5% of the Texaco discounters gave discounts greater than 4 cents per gallon, the highest proportion of any brand. The comparable figures for other majors were: Exxon, 42.5%; Chevron, 37.8%; Amoco, 33.4%; and Mobil, 30.8%.¹⁶

¹⁵ Source: "Lundberg Letter," 2/16/90.

¹⁶ Source: "Lundberg Letter," 2/16/90.

III. THE RETREAT FROM DISCOUNTING

By the summer of 1991, only two major oil companies were actively promoting discounts for cash on gasoline purchases. What factors explain the return to bundled pricing in the market? One implication from Section II was that if the cost of providing the credit service rises, so does the incentive to price it separately. Of course, if those costs fall, retail card issuers have less incentive to charge explicitly for credit.

As noted previously, there are two categories of credit card service costs; the cost of providing the transaction service, and the cost of financing the accounts receivable. Figure 2 illustrates that the real cost of financing gasoline credit card receivables has fallen since 1982. This is a product of moderate declines in the real interest rate and substantial declines in the relative price of fuel.

As for the costs of providing the transaction service, since 1985 credit card processing costs have fallen, particularly in the retail gasoline market. Much of this gain in processing efficiency is due to investment in electronic terminals at the point of sale. Simply put, electronic draft capture (EDQ) terminals transmit information to a company's credit card processing center via electrons, rather than paper, at considerably lower cost.

EDC technology reduces costs for several reasons. Instead of paper credit card slips being bundled and shipped in bulk to a processing center, computerized transaction data can be stored and transmitted daily via telephone lines. This technology saves labor costs and reduces errors. Figure 5 illustrates the tremendous growth in EDC terminals, across all retailers, from 25,000 in January, 1986 to 350,000 by January, 1989. Retail gasoline outlets comprise the largest single recipient of this new technology. The paper-based credit transaction is rapidly being abandoned.

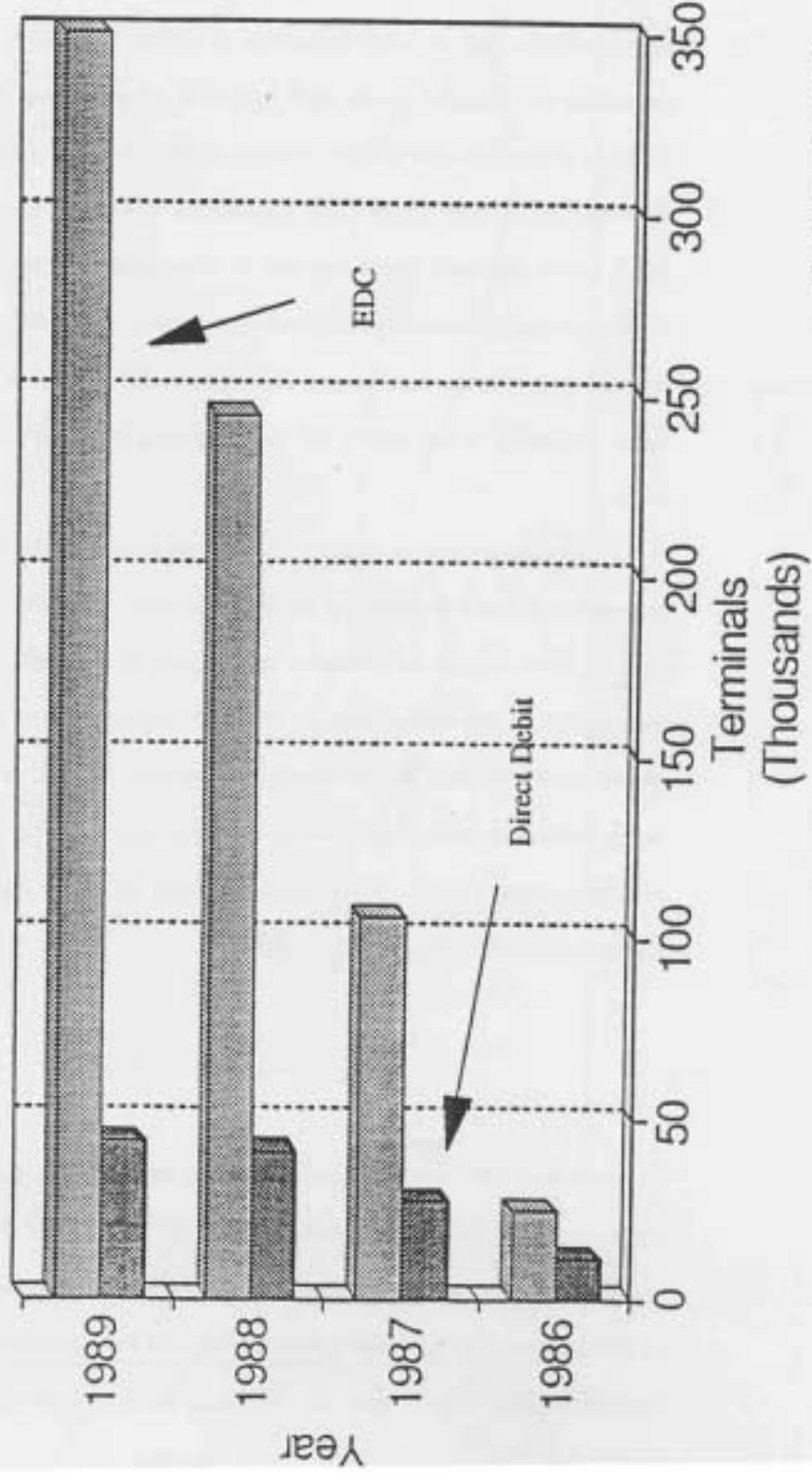
The growth and pricing of gasoline debit cards provides another clue that processing costs have fallen with the adoption of EDC technology. A debit card represents another cashless payment alternative offered to customers, but without the float it resembles a "Plastic check." Companies that introduced proprietary debit cards, like Exxon and Mobil, have not levied a charge per transaction (although some, like Mobil, have charged an annual fee). The appearance of proprietary debit cards is important for two reasons. First, it signals that financing credit card float was an important cost that oil companies wished to reduce by switching customers to an alternative plastic payment device. Conversion of credit customers to debit cards lowers the float costs, without sacrificing the branded plastic card as a tool for promoting brand loyalty. Also, the willingness to offer debit without a charge signals that the marginal cost of servicing an electronic transaction (which debit transactions almost always are) relative to cash is so small that it does not justify the cost of administering tiered pricing. Increasingly, a company's credit transactions are processed electronically, and what is true for the cost of processing debit must also be true for electronically processed credit transactions. The major difference in the cost of the two programs is associated with the float on credit cards.

Our conclusion: the number of discounters has recently declined because the costs of processing credit transactions has fallen (due to adoption of EDC terminals) and the costs of float remain low relative to the period in which discounts for cash were introduced. If this explanation for the declining proportion of discounters is true, we should be able to see it in a smaller spread between the cash price at discounters and the pump price at non-discounters as the decade progressed, even with rising credit sales at non-discounting dealers. This is precisely what we see in Figure 6, generated for four western cities, 1982-1990.

Debit Versus Draft Capture Terminals

Recent Growth

Figure 5



POS News, Feb. 1989

IV. CONCLUSIONS

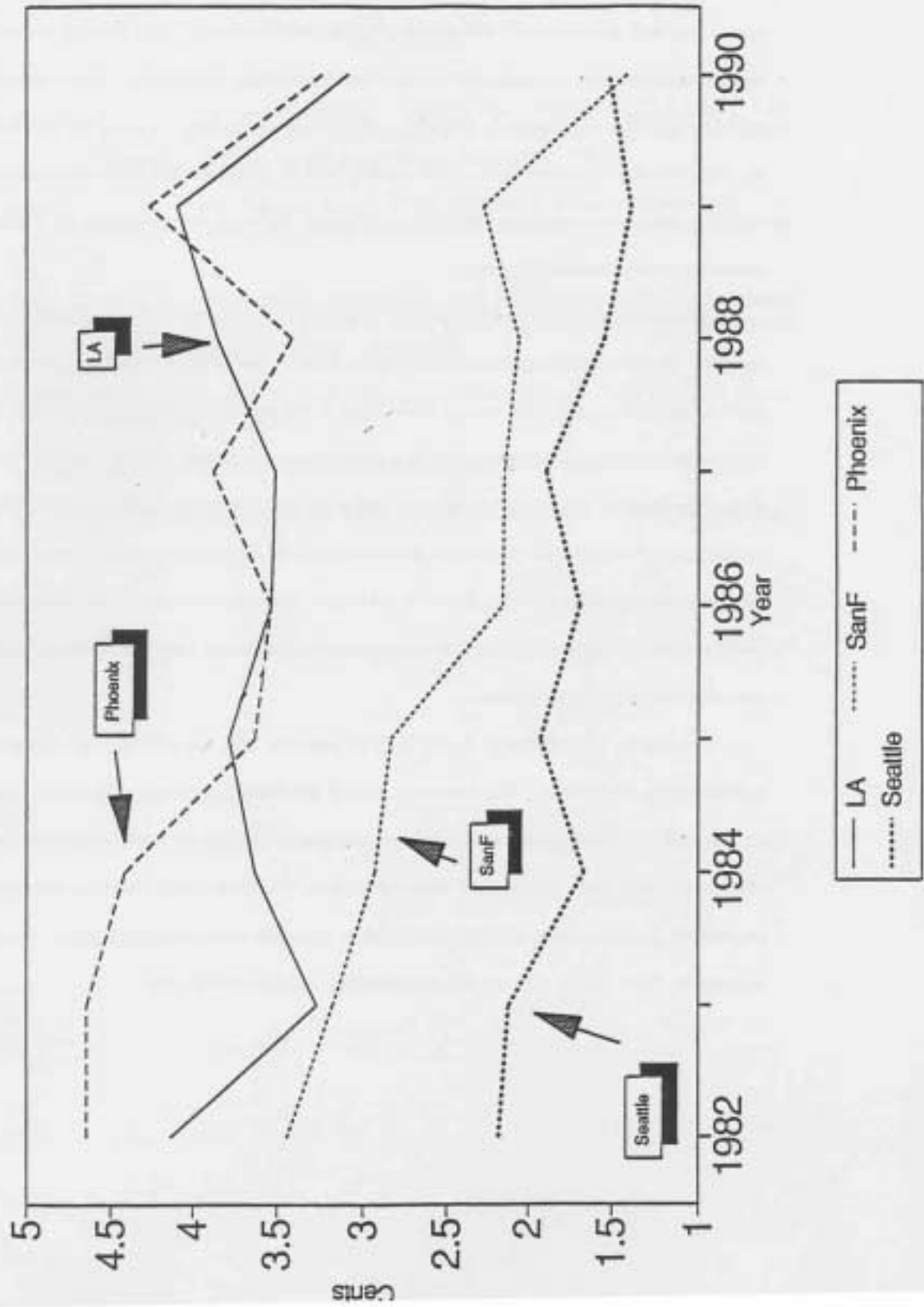
In examining the issue of bundling versus unbundling in the pricing of credit and gasoline, we have addressed several issues. We have linked the reasons for general rise and decline of DFC pricing to changes in the costs of credit, indicated the role of legislation in the emergence of discounts for cash rather than surcharges for credit, and quantified the implicit subsidy cash buyers provide credit users at stations that do not discount by comparing their prices to cash and credit prices at stations that discount holding constant station characteristics. An issue that we have less successfully addressed is the decision by individual dealers to adopt cash discounts. We have found some evidence consistent with the idea that the character of the local market, and in particular the alternatives facing credit buyers, is an important factor in explaining different cash discounting policies across identically branded stations.

Ultimately, the question of whether to price credit separately in the context of a proprietary credit card program depends upon the purpose of the card itself. In today's market, gasoline stations can extend the option of paying by credit card (bank card) to most of their customers without offering a proprietary credit card. An oil company that chooses to continue offering a proprietary card today must be doing so for another reason, presumably to create a bond between the customer and the brand name that encourages more frequent patronage. But, if this has become the primary role of the proprietary gasoline card, charging a higher price at the pump for purchases with a proprietary credit card creates conflicting incentives.

Of course, a proprietary credit card is just one tool for enticing the marginal customer into the station. We have seen that if the costs of providing the credit card service rise, fewer companies will perceive a net gain to leaving the service unpriced and other marketing strategies become more attractive. However, with costs to running a proprietary gasoline credit card program falling, we seem to be entering a period where, once again, "free" credit is an important marketing tool for most majors.

Figure 6

Savings Paying Cash at Discounters Majors Excluding ARCO



REFERENCES

- Board of Governors of the Federal Reserve System, *Credit Cards in the U.S. Economy. Their Impact on Costs, Prices and Retail Sales*, a study prepared for the U.S. Senate Committee of Banking, Housing and Urban Affairs, July, 1983.
- Ingene, Charles A. and Michael Levy, "Cash Discounts to Retail Customers: An Alternative to Credit Card Sales," *Journal of Marketing*, Vol. 46, Spring, 1982, pp 92103.
- Kitch, Edmund W., "The Framing Hypothesis: Is it Supported by Credit Card Issuer Opposition to a Surcharge on a Cash Price?" *Journal of Law, Economics, and Organization*, Vol. 6, Spring, 1990, pp 217-233.
- Lobell, Carl D., and Joseph W. Gelb, "Me Cash Discount Act," *New York Law Journal*, December 31,1981, pp 1-4.
- Mandell, Lewis, *The Credit Card Industry. A History*, Boston, Twayne Publishers, 1990.
- U.S. Senate, Committee on Banking, Housing and Urban Affairs, "Cash Discount Act," 1981.