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# The value of credit card benefits

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**Abstract**

Banks offer various economic incentives to customers to pay with their credit card rather than cash. Still, many individuals either elect to pay with cash or are unable to acquire credit cards. What benefits do these people lose by paying in cash rather than credit card? This paper demonstrates two opportunity costs associated with cash payments—frequent flier miles and payment float. Under most scenarios, the opportunity cost of cash payments versus benefit accruing credit cards is large. For example, individuals or businesses charging $5,000 each month can realize a present value opportunity cost of more than $19,000 over a five-year horizon. The results help banks optimize their offerings and individuals optimize their payment patterns. 

*JEL classification:* L83; G2

*Keywords:* Credit cards; Frequent flier miles

## 1. Introduction

Credit card use has increased dramatically over the past 40 years. Between 1989 and 2006, credit card use increased by a factor of 29 times (Garcia, Lardner, and Zeldin, 2008). In 2004, about 75% of U.S. families had credit cards and about 58% carried a balance on their card (Bucks, Kennickell, and Moore, 2006). This phenomenon is not limited to the United States as studies confirm a worldwide effect (see Abdul-Muhmin, 2007; Bolt and Humphrey, 2007; Goyal, 2008). Increasing credit and debit card use impacts the global economy. For example Amromin and Chakravorti (2009) find greater debit card use decreases demand for small

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denomination currency and coins used to make change. One factor influencing credit card use is the incentive benefits derived when using the card (e.g., frequent flier miles or cash back bonuses). Because these benefits have real economic value, individuals should consider the tradeoffs when selecting a payment method.

In 2006, Visa and Mastercard's transaction volume approached 6.5 trillion dollars. These transactions include 4.3 trillion (66.8%) for purchases and 2.2 trillion (33.2%) for cash (e.g., ATMs). The United States and Europe account for about 44% and 31% of total volume, respectively (HSN, 2007). Vertis (2007) estimates 48% of credit card purchases accumulate points to purchase merchandise or airline tickets. More than one-third of consumers choose credit cards based on reward maximization (Lipsman, 2007). Not surprisingly, nonbenefit generating credit card usage declined from 38% to 31% between 2003 and 2007 (Platon, 2007; also see www.creditcards.com).

Frequent flyer program's impact on air travel is well established in the literature. These programs' influence airline choice (Toh and Hu, 1988) and route choice (Morrison, Winston, Bailey, and Kahn, 1989). Chin (2002) finds people typically join about two frequent flier programs; however, they tend to favor one program when making travel plans. While the free trips are strong incentives to customers, frequent flier programs also boost a carrier's business by 20–35% (Stephenson and Fox, 1987).

Despite credit card prevalence in transactions, surprisingly little academic research examines the costs and benefits associated with reward cards. This paper examines the opportunity costs associated with cash versus credit card payment methods. Specifically, frequent flier benefits and the gain associated with the cash float are the two benefits calculated. While other benefits associated with credit card usage exist, including purchase protections and loss protection, this research examines only frequent flier benefits and float. The results suggest significant opportunity costs exist when consumers use cash rather than credit cards.

This research has implications to many stakeholders groups. In particular, consumers, corporate, and regulator perspectives are germane. For consumers, what are the potential benefits derived by purchasing goods and services with reward cards? The corporate perspective examines business expense issues related to credit card issuance. Should businesses or employees be entitled to rewards incurred by company-related travel? Finally, given prevalence of incentive card activity purchases, do government regulators need to follow a new course of actions?

## 2. Literature review

This section presents the relevant literature in three areas: consumer rewards, corporate related, and policy related.

### *2.1. Consumer rewards*

High interest debt is a high-profile issue associated with credit card use. Stories about people carrying high-interest credit card debt are commonplace. Comparing credit card to

debit card purchases, King and King (2005) conclude credit cards are not viewed as substitutes for debit cards, even when consumers do not use the credit function of credit cards. King and King (2005) argue that people fear credit debt and continue to use debit cards despite certain advantages associated with credit card use. Such consumers are risk averse and the potential high finance charges likely deter them from making credit purchases. There exists a body of literature supporting the idea that credit cards serve as spending stimuli (Feinberg, 1986). This literature suggests an alternate explanation of debit card use: that they provide an element of self control that individuals otherwise lack.

At the other end of the spectrum, risk takers gain from benefits associated with card use through the accumulation of frequent flier miles, payment float, arbitrage opportunities, purchase risk reduction and other services provided by the credit card (Goyal, 2008). A low interest rate credit card cash advance deposited into an FDIC insured bank account potentially leads to substantial arbitrage profits (see Jalbert, Stewart, and Jalbert 2008). These findings may explain some increases in recent credit card use. Jalbert et al. (2008) specifically noted that frequent flier miles or other benefit programs are not part of their arbitrage profit calculations. The current research provides additional insights on frequent flier rewards, potential profitability in credit card arbitrage.

Bolt and Chakravorti (2008) and Chakravorti and To (2007) propose models to explain interactions between consumers, merchants and card issuers. Recent works in this line incorporate the affects of the credit acquisition element of credit card use on these relationships (Chakravorti and Emmons, 2003; Chakravorti and To, 2007). While informative, this research line does not incorporate credit card rewards.

Consumers tend to have specific behavior patterns when using credit cards. Although consumers typically hold several cards, they often use only one credit card (Rysman, 2007). Consumers select a single card to achieve the necessary reward miles most expeditiously. Rysman (2007) also finds a correlation between a specific card's regional network acceptance and consumer selection. By measuring the value of award miles, consumers can determine the cost of switching cards, or spreading card use across several networks. Consumers desiring to switch cards can time the switch to assure just enough miles are accumulated to earn an award. This strategy reduces mileage loss. Banks tracking customers' mile balances can identify likely card change levels. Promotional campaigns to prevent this switching behavior could be launched.

Several papers examine frequent flier mileage optimization methods. Examining cost savings by using frequent flier mileage for business travel, optimization depends on the competitive market (rural vs. metropolitan), employees' travel patterns, and carrier availability to specific destinations (Suzuki and Walter, 2001; Suzuki, 2002). Optimal redemption strategies depend on various combinations of these factors, and the projected cost savings associated with each method. Suzuki (2003) examines three different frequent flier program types based on how travelers accumulate miles toward free trips. Sometimes total miles traveled results in a free flight; other programs require a specific number of trips. While insightful, Suzuki only examined flight miles as a source of frequent flier miles. Many award programs provide other methods to earn free trips. The analysis also is limited to business use of frequent flier miles. The current study extends this research by examining the value of

miles earned by credit cards purchases. This analysis method is relevant for both businesses and individual consumers.

### 2.2. Corporate related literature

Dowling and Uncles (1997) examines whether customer loyalty programs work and conclude obtaining customer loyalty is difficult. The primary challenge is a program's appeal to rational rather than hedonic needs. Customer decisions are based on financial rewards. Before engaging in a customer loyalty program, managers should compare long-term program costs to the expected benefits. A successful loyalty program must enhance the overall value-proposition (see Dowling and Uncles, 1997). Indeed, Steffes, Murthi, and Rao (2008) find customer loyalty is not different for reward card and nonreward card customers.

In business situations, ethical concerns arise concerning who owns the awards. Who should benefit from miles an individual uses when on business trips, the employer or the employee? The literature provides mixed reviews on the ethics of benefit redemptions (e.g., Arneson, Fleenor and Toh, 1997; Deane, 1998; Dunfee and Black, 1996; Stephenson and Bender, 1996). The overall consensus suggests that each case is different. The individual's specific details are important to determine ethical usage of business earned frequent flier miles for personal use.

For benefits earned from business travel, firms must devise policies and procedures to enforce appropriate use. How much effort should be spent tracking employees' mileage? Firms should limit the resources utilized to develop and enforce these rules because monitoring may be more expensive than the lost resources because of unethical behavior. This paper provides guidelines for managers to estimate the potential expropriated value by unethical employees so that appropriate monitoring levels can be implemented.

### 2.3. Policy related literature

Several theories explain the observed increased use of credit cards. Some authors suggest credit card use relates to consumption smoothing (Britto and Hartley, 1995; Bird, 1996; Carroll and Samwick, 1995). Consumption smoothing allows individuals to enjoy constant consumption levels even though their income levels are not constant. Credit cards supplement spending during low-income periods; consumers pay debt off during high income periods. Two additional propositions are proposed for increases in credit card usage—frequent flier mile value and cash float benefits.

Several papers examine demographic characteristics of credit card applicants, approvals and users. Some authors argue discrimination exists in credit card issuance. Cohen-Cole (2008) find access to credit cards, both credit limit and card numbers, has a negative relationship to a neighborhood's minority racial composition. Since purchasing a house requires a good credit history, which is primary obtained through credit card usage, significant differences exist between home ownership and race. The current research provides an estimation of direct opportunity costs associated with any existing credit card discrimination. Secondary costs also are associated with failure or inability to use credit cards (e.g., a lower

credit rating). This discrimination screens out classes of people that could most benefit by responsible credit usage.

The present paper extends the literature on several fronts. This research also is valuable to tourism authorities trying to promote their locations. Similar to credit cards, many hotels offer loyalty programs, some tied to credit cards and frequent flier programs. The promotional tools help tourism managers and destinations better develop their own loyalty programs as well as estimate program costs and benefits. Airlines can compare the opportunity cost estimates to benefits achieved from a frequent flier program to determine whether they should implement frequent flier programs. Because most airline companies offer frequent traveler incentives, the decision typically surrounds the program's structure rather than the actual implementation decision. The following models will help airlines optimize the characteristics and features of their programs.

## 3. Modeling the value of credit card benefits

This section models the benefits relating to using credit cards. Specifically, the focus is on airline frequent flier program benefits. This analysis is applicable to other benefit programs such as hotel award programs, cash back rewards, and other credit card incentive programs. First, the motivations individuals have to paying with credit cards need to be addressed. Next, factors impacting credit cards' benefits will be identified. The third section develops equations to determine the net present value of credit card benefits. Finally, analyses examining gains from using frequent flier miles, money floats, and combined gains from advantages both frequent flier miles and float are demonstrated.

### *3.1. Motives for paying with credit cards*

Consumers' credit card rewards represent a method for cardholders to transfer part of the purchase cost to the retailer. Credit card companies prohibit retailers from charging different prices for goods purchased with cash or with a credit card. Given the consumer purchase price is the same regardless of payment method, the buyer is indifferent between purchasing with cash versus credit card—all else equal. The one-price policy creates a catch-22 situation for retailers. Failure to accept credit card payments puts the retailer at a competitive disadvantage; however, retailers must pay a transaction fee to the credit card companies. To compensate for the transaction payment, goods and services have higher markups. This one-price policy is debated in the literature. Some authors refer to this as the Reverse-Robin-Hood theory (see Levitin, 2008). The theory states that poorer individuals unable to acquire a credit cards must pay with cash or some other means. These transactions subsidize wealthy individuals who are able to use credit cards. While the credit card holders pay the same price for goods and services, they are rewarded in other ways.

As noted earlier, consumers realize a number of benefits when using a credit card. This research examines two benefits. First, the consumer gains a time value of money advantage. When a cash payment is made, funds are expended immediately. When a credit card is used, funds are not expended immediately. Rather, the consumer expends the funds when the credit

card bills him or her for the charges. Timing differences between the two payment methods are commonly between 30 and 60 days. Moreover, the credit card companies generally do not charge the consumer interest until after the first due date on the credit card bill. Using the credit card as opposed to cash, the consumer gains a time value of money advantage.

Second, consumers realize any extra benefits associated with using the credit card. These benefits include frequent flier miles, loyalty points, cash rebates, warranty extensions, consumer protection from bad transactions, and individual credit score development or improvement. Any value the consumer derives from these benefits is an additional enticement to use credit cards. To demonstrate these benefits, this paper calculates frequent flier awards and money float values.

### *3.2. Factors affecting the value of credit card benefits*

A credit card benefit's value depends on several factors. First, the speed with which the frequent flier miles are earned. This function is influenced by at least four variables: mileage bonuses for signing up for the card, mileage bonuses accruing at annual card renewals, cardholder purchase volume, and the number of miles earned for each purchase dollar. The benefit value also depends on the number of miles required to earn a free trip, how the benefit is calculated, the free trip's dollar value, and availability of seats (trip timing). Offsetting the benefits is the cost of obtaining those benefits, including annual fees associated with holding the credit card. The discount rate applied to the cash flows also impacts the benefit's value because there is a difference between the timing of costs and benefits.

The time required to earn frequent flier miles affects the value of the benefit. As noted above, consumers earn frequent flier miles in at least four different ways. Typically, cardholders receive a large bonus mile incentive when obtaining a new card. These bonuses often range from 20,000 to 25,000 miles. A 25,000-mile bonus may be sufficient to earn one domestic round-trip ticket. Second, frequent flier awards are based upon purchase volume. Cardholders receive mileage points based on the purchases charged on the credit card. For example, one mile is earned for each dollar of credit card purchase. Special promotions allow cardholders to receive bonus miles in some cases (e.g., two miles for each dollar of purchases). Some card programs award additional bonus miles when purchases exceed a predetermined annual purchase threshold. Cardholders also are rewarded for their loyalty by receiving bonus miles when they pay their annual renewal fee—typically 2,500 miles. Finally, some incentive programs allow cardholders to earn frequent flier miles for taking a cash advance against the credit card. These cash advances often require payment of additional fees. Jalbert, Stewart, and Jalbert (2008) provide a full discussion of cash advance fees, interest rates charged on these transactions, and the ability to earn arbitrage profits. Some credit card programs limit the number of frequent flier miles earnable in any one year while others allow the individual to earn unlimited miles.

One difficulty associated with determining the value of credit card benefits is that redemption for an airline trip requires the accumulation of many miles. Domestic U.S. trips can be purchased for as little as 25,000 miles. Some international trips can be purchased for as little as 35,000 miles. For example, 35,000 miles is enough for travel from Hawaii to Costa Rica on most airlines. An individual earning 1,200 frequent flier miles per year needs 20

years to save reward mileage to receive the trip award. On the other hand, an individual that earns 50,000 miles per year earns two domestic tickets per year. Award mileage also depends on the timing of their use. Some individuals use the miles as soon as they are earned; other individuals hold the miles in their account for extended periods of time. The earlier that an individual uses his/her miles the higher the present value of the mileage benefit.

Frequent flier program benefits depend on the exchange value of the trip or other goods received in exchange. This tradeoff depends on the travel plans of the individual cardholder. To provide some perspective on this issue, consider exchanging miles for long-range, intermediate-range, and short-range flights. An example of a long-range reward is traveling from Hawaii to Central America. Most airlines require 35,000 miles for this round-trip itinerary. This trip's cash price is about $1,100 USD. In this case the cash value per mile redeemed is about $0.03 (35,000/$1,100). An intermediate mileage example is traveling from New York to Dallas. This trip commonly requires 25,000 award miles. The trip's cash price is commonly about $340. In this case, the redemption value per mile is about $0.01. Finally, a short-range trip example is from Pittsburgh to Philadelphia. This trip commonly requires 25,000 miles and has a cash price of about $150. Here the cash redemption value is only $0.006 per mile.

Surprisingly, Internal Revenue Service (IRS) rules indicate frequent flier miles received from business activities and redeemed for personal use are not taxable in most cases. When the program allows cardholders to convert their miles to cash, the IRS rules the cash is taxable income for the recipient. While data regarding earned miles redeemed for cash is not available, most miles likely are redeemed for flights and other services given the tax free benefit.

Frequent flier award mile values also depend on the individual's discount rate. While credit card annual fees are paid up front, rewards accrue at some future time. The discount rate applied to those future benefits reduces the credit card benefit's present value. The cost of holding credit cards offset the benefits received. Airline credit cards usually charge an annual fee of about $80 for holding the card and other fees may apply. The annual fee reduces the net value of benefits received. The upfront costs of airline award cards may result in a negative net benefit if the cardholder earns miles slowly.

### *3.3. The value of frequent flier miles*

Consider a credit card offering a 25,000 mile sign-up bonus. The card has an $80 annual fee, and offers 2,500 frequent flier miles for each annual fee payment. The card also offers one frequent flier mile for each dollar of purchases charged on the card. This card has no limit on the miles earned. The cardholder applies a ten percentage discount rate to all cash flows. The traveler wishes to book a trip having regular cash value of $1,100 and requiring the redemption of 35,000 miles and producing about $.03 in benefits for each mile redeemed. Miles are redeemed immediately upon accumulating the 35,000 threshold. This cardholder has a five-year horizon. Any miles remaining in the account after the five-year period are redeemed for a benefit at the same $.03 per mile rate when redeemed for travel.

First, the frequent flier mile balance is computed. Defining the initial bonus as *IB*, the dollars of purchases in month *i*, *as* $P_i$, the number of miles earned for each dollar of purchases

as $MR$, the number of annual renewal miles earned at month $i$ to be $RM_i$, the number of miles used in month $i$ to be $MU$, and $N$ to be the number of months the individual plans to hold the credit card, the frequent flier mileage balance at month $i$, $FB_i$, is:

$$FB_i = IB + \sum_{i=1}^{N} P_i * MR + \sum_{i=1}^{N} RM_i - \sum_{i=1}^{N} MU_i \tag{1}$$

Applying Eq. (1) to the 13th month shows the following results.

$$FB_i = 25000 + (2000 * 1 * 13) + 2500 - 35{,}000 = 18{,}500$$

Defining the frequent flier level required before the miles are used as $UL$, the miles used in month $i$, $MU_i$ are calculated as follows:

$$MU_i = \begin{matrix} UL & if\ FB \geq UL, \\ 0 & if\ FB < UL. \end{matrix} \tag{2}$$

In this example, $MU_i$ equals 35,000 in months 6, 23, 38, and 54. In all other months, $MU_i$ equals zero. To demonstrate the calculations, Eq. (2) is applied to the 6th month.

$$MU_6 = \begin{matrix} 35{,}000 & if\ (25{,}000 + 2000 * 1 * 6) \geq 35{,}000 \\ 0 & if\ (25{,}000 + 2000 * 1 * 6) < 35{,}000 \end{matrix} = 35{,}000$$

Defining $i$ to be any integer, the computations necessary to compute $rm_i$, are as follows:

$$RM_i = \begin{matrix} RM & if \left(\dfrac{i-1}{12}\right) = 1 \\ 0 & if \left(\dfrac{i-1}{12}\right) \neq 1 \end{matrix} \tag{3}$$

$RM_i$ equals 2,500 in months 13, 25, 37, and 49. In all other months $RM_i = 0$. Completing these calculations for the 13th month produces the following result.

$$RM_{12} = \begin{matrix} 2{,}500 & if \left(\dfrac{13-1}{12}\right) = 1 \\ 0 & if \left(\dfrac{13-1}{12}\right) \neq 1 \end{matrix} = 2{,}500$$

Next the credit card's benefit value are computed. The benefit's value received at time i, $BV_i$, is:

$$BV_i = \begin{matrix} BV & if\ FB_i \geq UL \\ 0 & if\ FB_i < UL \end{matrix} \tag{4}$$

The calculations are completed as follows for month 6:

$$BV_i = \begin{matrix} \$1{,}100 & if\ (25{,}000 + 2{,}000 * 1 * 6) \geq 35{,}000 \\ 0 & if\ (25{,}000 + (2{,}000 * 1 * 6) < 35{,}000 \end{matrix} = \$1{,}100$$

Denoting the discount rate of the cardholder as $dr_i$, the benefit's present value is:

$$PVBV_0 = \sum_{i=1}^{n} \frac{BV_i}{(1+DR)^i} + \frac{\left(\frac{BV * FB_N}{UL}\right)}{(1+DR)^N} \tag{5}$$

Eq. 5 second term prorates any remaining mileage balances in the account at the end of the analysis horizon. When not enough miles are available to purchase a ticket at the end of the horizon, they are exchanged for a small reward (e.g., a consumer product) at their cash equivalent value. The present benefit value's computation through month 60 is:

$$PVBV_0 = \frac{\$1{,}000}{\left(1+\frac{0.10}{12}\right)^6} + \frac{\$1{,}100}{\left(1+\frac{0.10}{12}\right)^{25}} + \frac{\$1{,}100}{\left(1+\frac{0.10}{12}\right)^{38}} + \frac{1{,}000}{\left(1+\frac{0.10}{12}\right)^{54}}$$

$$+ \frac{\left(\frac{\$1{,}100 * 15{,}000}{35{,}00}\right)}{\left(1+\frac{0.01}{12}\right)^{60}} = 3747.14$$

Finally, the cost's present value associated with holding the card, $PVC_0$ is computed by discounting the annual fees in month i, $AF_i$ at the cardholder's discount rate as follows:

$$PVC_0 = \sum_{i=1}^{N} \frac{AF_i}{(1+DR)^i} \tag{6}$$

The cost's present value is computed at the end of the 60th month as follows:

$$PFV_0 = \frac{\$80}{\left(1+\frac{0.10}{12}\right)^1} + \frac{\$80}{\left(1+\frac{0.10}{12}\right)^{13}} + \frac{\$80}{\left(1+\frac{0.10}{12}\right)^{25}} + \frac{\$80}{\left(1+\frac{0.10}{12}\right)^{37}}$$

$$+ \frac{\$80}{\left(1+\frac{0.10}{12}\right)^{49}} = \$328.29$$

Finally, the present value gain associated with credit card use, the difference between the present value of the benefits and the present value of the costs, is:

$$PVG_0 = PVBV_0 - PVC_0 \tag{7}$$

In this example, the calculations are:

$$PVG_0 = \$3{,}747.14 - \$328.29 = \$3{,}418.85$$

This example shows an individual paying with cash, as opposed to using credit cards, gives up $3,418.85 in present value benefits. Consumers transfer $3,418.85 of the purchase cost to the merchant by paying with credit card. This example shows a wealth transfer because U.S. merchants charge the same price regardless of whether the customer pays with cash or by credit card. In some countries, merchants charge a different price depending on the method of payment. Cardholders should compare the added fee charged by the merchant for using a credit card to the benefits received from card use.

To demonstrate this benefit further, consider an individual who accumulates $2,000 in purchases each month. These items can be purchased by either charge card or cash. The individual faces the decision of which payment method to use. If a credit card is used, the card will have the following characteristics: A 25,000 frequent flier miles bonus is offered to sign up. An $80 USD annual fee is assessed, but the cardholder receives a 2,500 mile bonus with annual renewal payment. The present value gain is calculated from using a credit card for the purchases, $PVG_0$, for variable combinations that affect the decision. The credit card does not limit the miles earned in a year. Panels A1 and A2 of Table 1, report on a scenario where the consumer redeems 35,000 frequent flier miles for a trip valued at $1,100. Panels B and C, consider redeeming 25,000 frequent flier miles to earn a $340 and $150 trip, respectively. The left side panels labeled A1, B1, and C1, report the results when $1 of purchases earns one mile. The right side panels labeled A2, B2, and C2, report the results when $1 of purchases earns two miles. Each cells' results are calculated by varying the discount rate the buyer applies to the cash flows and the purchase dollars made each month.

Table 2 shows the calculations when bonus miles are not awarded at the outset of the agreement. Calculations in Table 2 are relevant for an individual holding a card and assessing the desirability of retaining the card. This scenario results in a significant present value decline. Nevertheless, the present value gain continues to be positive under most scenarios.

### *3.4. The value of float*

A second credit card benefit use is a legal float (King and King, 2005). Funds are expended immediately if a purchase is made with cash. Credit card purchases allow a time period between purchase and payment. Credit card charges are aggregated monthly and the bank sends the user a bill for the combined charges. The cardholder has a short time period after the billing to make payment. The combined difference between billing and payment ranges from a few days to nearly 60 days. During the intervening days, the individual can deposit the funds in an FDIC insured money market account to realize a guaranteed return. These benefits are additional to those realized from frequent flyer miles.

Legal float value is calculated as the float's present value over a five year analysis period (see King and King, 2005). Defining $F$ as the number of float months, the present value of the float, $PVF_0$, is calculated as:

$$PVF_0 = \sum_{i=0}^{N} = \frac{P_i}{(1 + DR)^i} - \sum_{i=0}^{N} \frac{P_{i+F}}{(1 + DR)^{i+F}} \tag{8}$$

Table 1 Present value gain from using credit cards, 25,000 bonus miles

Panel A1: Redemption frequency 35,000 miles, $1,100 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 888.57 | 724.76 | 588.81 | 381.77 |
| 250 | 1,171.43 | 993.92 | 844.75 | 615.46 |
| 500 | 1,642.86 | 1,402.47 | 1,207.99 | 918.97 |
| 1,000 | 2,585.71 | 2,236.98 | 1,949.14 | 1,510.77 |
| 2,000 | 4,471.43 | 3,896.52 | 3,418.85 | 2,685.51 |
| 3,000 | 5,257.14 | 4,691.36 | 4,207.20 | 3,432.34 |
| 4,000 | 8,242.86 | 7,206.83 | 6,341.27 | 5,001.79 |
| 5,000 | 10,128.57 | 8,882.03 | 7,837.80 | 6,215.86 |
| 10,000 | 19,557.14 | 17,177.61 | 15,178.23 | 12,059.48 |

Panel A2: Redemption frequency 35,000 miles, $1,100 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 1,077.14 | 919.75 | 787.45 | 580.49 |
| 250 | 1,642.86 | 1,402.47 | 1,207.99 | 918.97 |
| 500 | 2,985.71 | 2,236.98 | 1,949.14 | 1,510.77 |
| 1,000 | 4,471.43 | 3,896.52 | 3,418.86 | 2,685.51 |
| 2,000 | 8,242.86 | 7,206.83 | 6,341.27 | 5,001.79 |
| 3,000 | 10,914.29 | 10,034.19 | 8,618.84 | 6,951.04 |
| 4,000 | 15,785.71 | 14,208.70 | 12,220.65 | 9,687.72 |
| 5,000 | 19,557.14 | 17,177.61 | 15,178.23 | 12,059.48 |
| 10,000 | 38,414.29 | 33,760.01 | 29,842.45 | 23,716.81 |

Panel B1: Redemption frequency 25,000 miles, $340 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/Mo Purch. | 0% | 5% | 10% | 20% |
| 100 | 157.60 | 145.33 | 138.37 | 134.53 |
| 250 | 280.00 | 240.71 | 212.76 | 179.83 |
| 500 | 484.00 | 425.04 | 378.14 | 310.91 |
| 1,000 | 892.00 | 778.59 | 686.03 | 547.66 |
| 2,000 | 1,708.00 | 1,493.22 | 1,315.30 | 1,043.23 |
| 3,000 | 2,524.00 | 2,212.66 | 1,952.82 | 1,551.31 |
| 4,000 | 3,340.00 | 2,928.58 | 2,584.45 | 2,050.99 |
| 5,000 | 4,156.00 | 3,650.82 | 3,227.41 | 2,569.24 |
| 10,000 | 7,896.00 | 6,975.45 | 6,196.59 | 4,969.99 |

Panel B2: Redemption frequency 25,000 miles, $340 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/Mo Purch. | 0% | 5% | 10% | 20% |
| 100 | 239.20 | 208.92 | 187.97 | 164.79 |
| 250 | 484.00 | 425.04 | 378.14 | 310.91 |
| 500 | 892.00 | 778.59 | 686.03 | 547.66 |
| 1,000 | 1,708.00 | 1,493.22 | 1315.3 | 1,043.23 |
| 2,000 | 3,340.00 | 2,928.58 | 2,584.45 | 2,050.99 |
| 3,000 | 4,972.00 | 4,364.07 | 3,854.05 | 3,060.12 |
| 4,000 | 6,264.00 | 5,537.10 | 4,921.28 | 3,949.65 |
| 5,000 | 7,896.00 | 6,975.45 | 6,196.59 | 4,969.99 |
| 10,000 | 16,056.00 | 14,152.22 | 12,544.39 | 10,018.54 |

Panel C1: Redemption frequency 25,000 miles, $150 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/Mo Purch. | 0% | 5% | 10% | 20% |
| 100 | −154.00 | −137.84 | −122.41 | −94.40 |
| 250 | −100.00 | −95.77 | −89.59 | −74.37 |
| 500 | −10.00 | −14.44 | −16.63 | −16.59 |
| 1,000 | 170.00 | 141.53 | 119.2 | 87.87 |
| 2,000 | 530.00 | 456.81 | 396.82 | 306.50 |
| 3,000 | 890.00 | 774.21 | 678.08 | 530.65 |
| 4,000 | 1,250.00 | 1,090.06 | 956.75 | 751.10 |
| 5,000 | 1,610.00 | 1,408.69 | 1,240.40 | 979.74 |
| 10,000 | 3,260.00 | 2,875.44 | 2,550.34 | 2,038.89 |

Panel C2: Redemption frequency 25,000 miles, $150 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/Mo Purch. | 0% | 5% | 10% | 20% |
| 100 | −118.00 | −109.79 | −100.53 | −81.05 |
| 250 | −10.00 | −14.44 | −16.63 | −16.59 |
| 500 | 170.00 | 141.53 | 119.20 | 87.87 |
| 1,000 | 530.00 | 456.81 | 396.82 | 306.50 |
| 2,000 | 1,250.00 | 1,090.36 | 956.75 | 751.10 |
| 3,000 | 1,970.00 | 1,723.36 | 1,516.86 | 1,196.30 |
| 4,000 | 2,540.00 | 2,240.87 | 1,987.70 | 1,588.74 |
| 5,000 | 3,260.00 | 2,875.44 | 2,550.34 | 2,038.89 |
| 10,000 | 6,860.00 | 6,041.67 | 5,350.84 | 4,266.18 |

This table shows the present value gain associated with the use of credit cards. In this table, the gain considers only the value of frequent flier miles. The analysis assumes an $80 annual fee associated with the card and 2,500 renewal frequent flier miles associated with each renewal. The analysis also assumes a 25,000 frequent flier mile bonus associated with opening the credit card account. In this scenario, no limit is placed on frequent flier miles that can be earned in any year. The figure in each cell is the present value difference between the benefits received from using the card and the costs associated with holding the card.

Table 2 Present value gain from using credit cards, no initial bonus miles

Panel A1: Redemption frequency 35,000 miles, $1,100 value, 1 mile/$

| Purch/mo purch. | Discount rate 0% | 5% | 10% | 20% |
|---|---|---|---|---|
| 100 | 102.86 | 30.42 | −22.66 | −88.61 |
| 250 | 385.71 | 250.83 | 149.26 | 16.31 |
| 500 | 857.14 | 650.85 | 487.64 | 256.62 |
| 1,000 | 1,800.00 | 1,462.69 | 1,190.76 | 791.84 |
| 2,000 | 3,685.71 | 3,120.00 | 2,652.61 | 1,941.66 |
| 3,000 | 5,571.43 | 4,774.60 | 4,111.88 | 3,093.78 |
| 4,000 | 6,757.14 | 5,584.94 | 4,926.50 | 3,878.87 |
| 5,000 | 9,342.86 | 8,100.85 | 7,062.08 | 5,452.65 |
| 10,000 | 17,671.43 | 15,531.10 | 13,719.19 | 10,863.93 |

Panel A2: Redemption frequency 35,000 miles, $1,100 value, 2 mile/$

| Purch/mo purch. | Discount rate 0% | 5% | 10% | 20% |
|---|---|---|---|---|
| 100 | 291.43 | 177.36 | 91.95 | −18.66 |
| 250 | 857.14 | 650.85 | 487.64 | 256.62 |
| 500 | 1,800.00 | 1,462.69 | 1,190.76 | 791.84 |
| 1,000 | 3,685.71 | 3,120.00 | 2,652.61 | 1,941.66 |
| 2,000 | 6,357.14 | 5,584.94 | 4,926.50 | 3,878.87 |
| 3,000 | 11,228.57 | 9,751.71 | 8,515.24 | 6,596.89 |
| 4,000 | 15,000.00 | 13,070.06 | 11,451.80 | 8,935.08 |
| 5,000 | 17,671.43 | 15,531.10 | 13,719.19 | 10,863.93 |
| 10,000 | 36,528.57 | 32,121.74 | 28,398.26 | 22,545.62 |

Panel B1: Redemption frequency 25,000 miles, $340 value, 1 mile/$

| Purch/mo purch. | Discount rate 0% | 5% | 10% | 20% |
|---|---|---|---|---|
| 100 | −182.40 | −191.85 | −196.03 | −194.42 |
| 250 | −60.00 | −96.48 | −121.64 | −149.02 |
| 500 | 144.00 | 87.86 | 43.74 | −18.04 |
| 1,000 | 552.00 | 441.40 | 351.62 | 218.72 |
| 2,000 | 1,368.00 | 1,156.03 | 980.89 | 714.29 |
| 3,000 | 2,184.00 | 1,875.48 | 1,618.41 | 1222.37 |
| 4,000 | 3,000.00 | 2,591.40 | 2,250.05 | 1722.04 |
| 5,000 | 3,816.00 | 3,313.63 | 2,893.01 | 2240.29 |
| 10,000 | 7,556.00 | 6,638.26 | 5,862.19 | 4641.04 |

Panel B2: Redemption frequency 25,000 miles, $340 value, 2 mile/$

| Purch/mo purch. | Discount rate 0% | 5% | 10% | 20% |
|---|---|---|---|---|
| 100 | −100.80 | −128.27 | −146.44 | −164.15 |
| 250 | 144.00 | 87.86 | 43.74 | −18.04 |
| 500 | 552.00 | 441.40 | 351.62 | 218.72 |
| 1,000 | 1,368.00 | 1,156.03 | 980.89 | 714.29 |
| 2,000 | 3,000.00 | 2,591.40 | 2,250.05 | 1,722.04 |
| 3,000 | 4,632.00 | 4,026.89 | 3,519.65 | 2,731.18 |
| 4,000 | 5,924.00 | 5,199.91 | 4,586.88 | 3,620.71 |
| 5,000 | 7,556.00 | 6,638.26 | 5,862.19 | 4,641.04 |
| 10,000 | 15,716.00 | 13,815.04 | 12,209.99 | 9,689.56 |

Panel C1: Redemption frequency 25,000 miles, $150 value, 1 mile/$

| Purch/mo purch. | Discount rate 0% | 5% | 10% | 20% |
|---|---|---|---|---|
| 100 | −304.00 | −286.60 | −269.94 | −239.52 |
| 250 | −250.00 | −244.53 | −237.12 | −219.49 |
| 500 | −160.00 | −163.20 | −164.16 | −161.71 |
| 1,000 | 20.00 | −7.23 | −28.33 | −57.26 |
| 2,000 | 380.00 | 208.05 | 249.29 | 161.38 |
| 3,000 | 740.00 | 625.45 | 530.55 | 385.53 |
| 4,000 | 1,100.00 | 941.30 | 809.21 | 605.97 |
| 5,000 | 1,460.00 | 1,259.93 | 1,092.87 | 834.61 |
| 10,000 | 3,110.00 | 2,726.68 | 2,402.81 | 1,893.77 |

Panel C2: Redemption frequency 25,000 miles, $150 value, 2 mile/$

| Purch/mo purch. | Discount rate 0% | 5% | 10% | 20% |
|---|---|---|---|---|
| 100 | −268.00 | −258.55 | −248.06 | −226.17 |
| 250 | −160.00 | −163.20 | −164.16 | −161.71 |
| 500 | 20.00 | −7.23 | −28.33 | −57.26 |
| 1,000 | 380.00 | 308.05 | 249.29 | 161.38 |
| 2,000 | 1,100.00 | 941.30 | 809.21 | 605.97 |
| 3,000 | 1,820.00 | 1,574.61 | 1,369.33 | 1,051.18 |
| 4,000 | 2,390.00 | 2,092.12 | 1,840.17 | 1,443.62 |
| 5,000 | 3,110.00 | 2,726.68 | 2,402.81 | 1,893.77 |
| 10,000 | 6,710.00 | 5,892.91 | 5,203.30 | 4,121.06 |

This table shows the present value gain associated with the use of credit cards. In this table, the gain considers only the value of frequent flier miles. The analysis assumes an $80 annual fee associated with the card and 2,500 renewal frequent flier miles associated with each renewal. The analysis also assumes there is no frequent flier mile bonus associated with opening the credit card account. The analysis assumes no limit is placed on the frequent flier miles that can be earned in any year. The figure in each cell is the present value difference between the benefits received from using the card and the costs associated with holding the card.

Table 3 Value of float associated with credit card use

| Panel A: 30 days float | | | | |
|---|---|---|---|---|
| | Discount rate | | | |
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 0 | 21.99 | 38.9 | 61.88 |
| 250 | 0 | 54.97 | 97.24 | 154.69 |
| 500 | 0 | 109.94 | 194.49 | 309.38 |
| 1,000 | 0 | 219.88 | 388.97 | 618.76 |
| 2,000 | 0 | 439.76 | 777.84 | 1,237.53 |
| 3,000 | 0 | 359.64 | 1,166.91 | 1,856.29 |
| 4,000 | 0 | 879.51 | 1,555.88 | 2,475.05 |
| 5,000 | 0 | 1,099.39 | 1,944.85 | 3,093.82 |
| 10,000 | 0 | 2,198.78 | 3,889.70 | 6,187.63 |
| Panel B: 60 days float | | | | |
| | Discount rate | | | |
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 0 | 43.88 | 77.47 | 122.74 |
| 250 | 0 | 109.71 | 193.68 | 306.85 |
| 500 | 0 | 219.42 | 387.36 | 613.69 |
| 1,000 | 0 | 438.85 | 774.73 | 1,227.38 |
| 2,000 | 0 | 877.69 | 1,549.45 | 2,454.77 |
| 3,000 | 0 | 1,316.53 | 2,324.18 | 3,682.15 |
| 4,000 | 0 | 1,755.38 | 3,098.90 | 4,909.53 |
| 5,000 | 0 | 2,194.22 | 3,873.63 | 6,136.92 |
| 10,000 | 0 | 4,388.45 | 7,747.25 | 12,273.83 |

This table shows the value of float associated with the use of credit cards. Panel A assumes a 30-day difference between purchase and payment of the credit card bill. Panel B assumes a 60-day difference between purchase and credit card bill payment.

To demonstrate these calculations, consider an individual that purchases $2,000 of goods each month. The individual applies a 10% discount rate to all cash flows. Through careful purchase management, the individual experiences one month of float between purchases and payments. The computations for the first two months are as follows.

$$PVF_0 = \frac{2{,}000}{\left(1+\frac{.10}{12}\right)^0} + \frac{2{,}000}{\left(1+\frac{.10}{12}\right)^1} - \frac{2{,}000}{\left(1+\frac{.10}{12}\right)^1} - \frac{2{,}000}{\left(1+\frac{.10}{12}\right)^2} = \$32.92$$

Over the two month period, this individual gains a $32.92 present value advantage by paying with credit card rather than with cash. In Table 3, the computations are completed for a five-year holding period and various combinations of monthly purchases and discount rates. The results show present value differences over a five year holding period. These differences can be substantial. For example, an individual using a credit card for $10,000 monthly purchases and a 20% discount rate has a present value of $12,273.

### 3.5. Combined value of frequent flier miles and float

Finally, consider the combined effects of frequent flier miles and float. The following equation calculates these effects.

$$TG_0 = PVG_0 + PVF_0 \tag{9}$$

This analysis assumes 30-day float values that approximates what most individuals experience in the marketplace. Tables 4 and 5 present the results for the 25,000 bonus miles and no bonus miles examples, respectively. The first column of each panel corresponds exactly to the corresponding first column of Tables 1 and 2. This result is no accident because a zero discount rate results in no float gain. However, other cases show a gain in present value.

As expected, the present values in Tables 1 and 2 show inverse relationships between discount rate and present value. On the other hand, a positive relationship exists between the discount rate and gain from float. Tables 4 and 5 show the present values continue to decline as the discount rate increases. This relationship suggests that interest on float is less than the present value loss related to discounting the benefits received from frequent flier miles.

## 4. Concluding comments

The results suggest substantial benefits for using credit cards offing frequent flyer awards. Under an array of scenarios, the analyses confirm present value benefits to using the cards for purchases. An added cash float benefit creates even more benefit to using credit cards. One word of caution is that these assumptions hold true only if the cardholder pays off the entire monthly balances. Consumers that delay payment receive the added benefit of credit, and must pay the relevant cost on the form on interest and other fees. Separate analyses are required to determine how delayed payment affects benefit values.

The results indicate the value of credit card benefits is substantial. Over a five year time period, an individual who purchases 2,000 per month and applies a 10% discount rate to cash flows gains as much as $6,341 in present value. When the gain from float is considered the present value gain increases to $7,119. This methodology is generalizable to other benefit programs; however, they might produce substantially different results.

These financial incentives are sufficient to motivate most individuals to take the necessary actions to realize the benefits. Paying for purchases with credit cards appears to be more rational than using cash. The present value gain is negative only when individuals make low purchase amounts. Other individuals may not be enticed by the travel reward, but realize positive utility by sharing the rewards with other family members.

Individuals using cash rather than credit cards to control their spending are using a costly budgeting method. Other budgeting methods, such as prepaying a credit card, might produce the same result while preserving the benefits associated with using credit cards. For example, some individuals cannot obtain credit cards because of credit history problems or economic disadvantage (e.g., unemployment). Credit discrimination tactics present in the market do indeed have significant economic outcomes. Future research might examine the role of other

Table 4 Present value gain from using credit cards, 25,000 bonus miles

Panel A1: Redemption frequency 35,000 miles, $1,100 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 888.57 | 746.75 | 627.71 | 443.65 |
| 250 | 1,171.43 | 1,048.89 | 941.99 | 770.15 |
| 500 | 1,642.86 | 1,512.41 | 1,402.48 | 1,228.35 |
| 1,000 | 2,585.71 | 2,456.86 | 2,338.11 | 2,129.53 |
| 2,000 | 4,471.43 | 4,336.28 | 4,196.69 | 3,923.04 |
| 3,000 | 5,257.14 | 5,051.00 | 5,374.11 | 5,288.63 |
| 4,000 | 8,242.86 | 8,086.34 | 7,897.15 | 7,476.84 |
| 5,000 | 10,128.57 | 9,981.42 | 9,782.65 | 9,309.68 |
| 10,000 | 19,557.14 | 19,376.39 | 19,067.93 | 18,247.11 |

Panel A2: Redemption frequency 35,000 miles, $1,100 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 1077.14 | 941.74 | 826.35 | 642.37 |
| 250 | 1,642.86 | 1,457.44 | 1,305.23 | 1,073.66 |
| 500 | 2,985.71 | 2,346.92 | 2,143.63 | 1,820.15 |
| 1,000 | 4,471.43 | 4,116.40 | 3,807.83 | 3,304.27 |
| 2,000 | 8,242.86 | 7,646.59 | 7,119.11 | 6,239.32 |
| 3,000 | 10,914.29 | 10,393.83 | 9,785.75 | 8,807.33 |
| 4,000 | 15,785.71 | 15,088.21 | 13,776.53 | 12,162.77 |
| 5,000 | 19,557.14 | 18,277.00 | 17,123.08 | 15,153.30 |
| 10,000 | 38,414.29 | 35,958.79 | 33,732.15 | 29,904.44 |

Panel B1: Redemption frequency 25,000 miles, $340 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 157.60 | 167.32 | 177.27 | 196.41 |
| 250 | 280.00 | 295.68 | 310.00 | 334.52 |
| 500 | 484.00 | 534.98 | 572.63 | 620.29 |
| 1,000 | 892.00 | 998.47 | 1,075.00 | 1,166.42 |
| 2,000 | 1,708.00 | 1,932.98 | 2,093.14 | 2,280.76 |
| 3,000 | 2,524.00 | 2,572.30 | 3,119.73 | 3,407.60 |
| 4,000 | 3,340.00 | 3,808.09 | 4,140.33 | 4,526.04 |
| 5,000 | 4,156.00 | 4,750.21 | 5,172.26 | 5,663.06 |
| 10,000 | 7,896.00 | 9,174.23 | 10,086.29 | 11,157.62 |

Panel B2: Redemption frequency 25,000 miles, $340 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 239.20 | 230.91 | 226.87 | 226.67 |
| 250 | 484.00 | 480.01 | 475.38 | 465.60 |
| 500 | 892.00 | 888.53 | 880.52 | 857.04 |
| 1,000 | 1,708.00 | 1,713.10 | 1,704.27 | 1,661.99 |
| 2,000 | 3,340.00 | 3,368.34 | 3,362.29 | 3,288.52 |
| 3,000 | 4,972.00 | 4,723.71 | 5,020.96 | 4,916.41 |
| 4,000 | 6,264.00 | 6,416.61 | 6,477.16 | 6,424.70 |
| 5,000 | 7,896.00 | 8,074.84 | 8,141.44 | 8,063.81 |
| 10,000 | 16,056.00 | 16,351.00 | 16,434.09 | 16,206.17 |

Panel C1: Redemption frequency 25,000 miles, $150 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/Mo Purch. | 0% | 5% | 10% | 20% |
| 100 | −154.00 | −115.85 | −83.51 | −32.52 |
| 250 | −100.00 | −40.80 | 7.65 | 80.32 |
| 500 | −10.00 | 95.50 | 177.86 | 292.79 |
| 1,000 | 170.00 | 361.41 | 508.17 | 706.63 |
| 2,000 | 530.00 | 896.57 | 1,174.66 | 1,544.03 |
| 3,000 | 890.00 | 1,133.85 | 1,844.99 | 2,386.94 |
| 4,000 | 1,250.00 | 1,969.57 | 2,512.63 | 3,226.15 |
| 5,000 | 1,610.00 | 2,508.08 | 3,185.25 | 4,073.56 |
| 10,000 | 3,260.00 | 5,074.22 | 6,440.04 | 8,226.52 |

Panel C2: Redemption frequency 25,000 miles, $150 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/Mo Purch. | 0% | 5% | 10% | 20% |
| 100 | −118.00 | −87.80 | −61.63 | −19.17 |
| 250 | −10.00 | 40.53 | 80.61 | 138.10 |
| 500 | 170.00 | 251.47 | 313.69 | 397.25 |
| 1,000 | 530.00 | 676.69 | 785.79 | 925.26 |
| 2,000 | 1,250.00 | 1,530.12 | 1,734.59 | 1,988.63 |
| 3,000 | 1,970.00 | 2,083.00 | 2,683.77 | 3,052.59 |
| 4,000 | 2,540.00 | 3,120.38 | 3,543.58 | 4,063.79 |
| 5,000 | 3,260.00 | 3,974.83 | 4,495.19 | 5,132.71 |
| 10,000 | 6,860.00 | 8,240.45 | 9,240.54 | 10,453.81 |

This table shows the present value gain associated with the use of credit cards. Both the value of frequent flier miles obtained from credit card use and the gain from 30 days of float on purchases incorporated. The analysis assumes an $80 annual fee associated with the card and 2,500 renewal frequent flier miles associated with each renewal. The 25,000 frequent flier mile bonus for the new credit card and unlimited annual mileage are assumed. The figure in each cell is the present value difference between the benefits received from using the card and the costs associated with holding the card.

Table 5 Present value gain from using credit cards, no initial bonus miles

Panel A1: Redemption frequency 35,000 miles, $1,100 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 102.86 | 52.41 | 16.24 | −26.73 |
| 250 | 385.71 | 305.80 | 246.50 | 171.00 |
| 500 | 857.14 | 760.79 | 682.13 | 566.00 |
| 1,000 | 1,800.00 | 1,682.57 | 1,579.73 | 1,410.60 |
| 2,000 | 3,685.71 | 3,559.76 | 3,430.45 | 3,179.19 |
| 3,000 | 5,571.43 | 5,134.24 | 5,278.79 | 4,950.07 |
| 4,000 | 6,757.14 | 6,464.45 | 6,482.38 | 6,353.92 |
| 5,000 | 9,342.86 | 9,200.24 | 9,006.93 | 8,546.47 |
| 10,000 | 17,671.43 | 17,729.88 | 17,608.89 | 17,051.56 |

Panel A2: Redemption frequency 35,000 miles, $1,100 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | 291.43 | 199.35 | 130.85 | 43.22 |
| 250 | 857.14 | 705.82 | 584.88 | 411.31 |
| 500 | 1,800.00 | 1,572.63 | 1,385.25 | 1,101.22 |
| 1,000 | 3,685.71 | 3,339.88 | 3,041.58 | 2,560.42 |
| 2,000 | 6,357.14 | 6,024.70 | 5,704.34 | 5,116.40 |
| 3,000 | 11,228.57 | 10,111.35 | 9,682.15 | 8,453.18 |
| 4,000 | 15,000.00 | 13,949.57 | 13,007.68 | 11,410.13 |
| 5,000 | 17,671.43 | 16,630.49 | 15,664.04 | 13,957.75 |
| 10,000 | 36,528.57 | 34,320.52 | 32,287.96 | 28,733.25 |

Panel B1: Redemption frequency 25,000 miles, $340 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | −182.40 | −169.86 | −157.13 | −132.54 |
| 250 | −60.00 | −41.51 | −24.40 | 5.67 |
| 500 | 144.00 | 197.80 | 238.23 | 291.34 |
| 1,000 | 552.00 | 661.28 | 740.59 | 837.48 |
| 2,000 | 1,368.00 | 1,595.79 | 1,758.73 | 1,951.82 |
| 3,000 | 2,184.00 | 2,235.12 | 2,785.32 | 3,078.66 |
| 4,000 | 3,000.00 | 3,470.91 | 3,805.93 | 4,197.09 |
| 5,000 | 3,816.00 | 4,413.02 | 4,837.86 | 5,334.11 |
| 10,000 | 7,556.00 | 8,837.04 | 9,751.89 | 10,828.67 |

Panel B2: Redemption frequency 25,000 miles, $340 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | −100.80 | −106.28 | −107.54 | −102.27 |
| 250 | 144.00 | 142.83 | 140.98 | 136.65 |
| 500 | 552.00 | 551.34 | 546.11 | 528.10 |
| 1,000 | 1,368.00 | 1,375.91 | 1,369.86 | 1,333.05 |
| 2,000 | 3,000.00 | 3,031.16 | 3,027.89 | 2,959.57 |
| 3,000 | 4,632.00 | 4,386.53 | 4,686.56 | 4,587.47 |
| 4,000 | 5,924.00 | 6,079.42 | 6,142.76 | 6,095.76 |
| 5,000 | 7,556.00 | 7,737.65 | 7,807.04 | 7,734.86 |
| 10,000 | 15,716.00 | 16,013.82 | 16,099.69 | 15,877.19 |

Panel C1: Redemption frequency 25,000 miles, $150 value, 1 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | −304.00 | −264.61 | −231.04 | −177.64 |
| 250 | −250.00 | −189.56 | −139.88 | −64.80 |
| 500 | −160.00 | −53.26 | 30.33 | 147.67 |
| 1,000 | 20.00 | 212.65 | 360.64 | 561.50 |
| 2,000 | 380.00 | 647.81 | 1,027.13 | 1,398.91 |
| 3,000 | 740.00 | 985.09 | 1,697.46 | 2,241.82 |
| 4,000 | 1,100.00 | 1,820.81 | 2,365.09 | 3,081.02 |
| 5,000 | 1,460.00 | 2,359.32 | 3,037.72 | 3,928.43 |
| 10,000 | 3,110.00 | 4,925.46 | 6,292.51 | 8,081.40 |

Panel C2: Redemption frequency 25,000 miles, $150 value, 2 mile/$

| | Discount rate | | | |
|---|---|---|---|---|
| Purch/mo purch. | 0% | 5% | 10% | 20% |
| 100 | −268.00 | −236.56 | −209.16 | −164.29 |
| 250 | −160.00 | −108.23 | −66.92 | −7.02 |
| 500 | 20.00 | 102.71 | 166.16 | 252.12 |
| 1,000 | 380.00 | 527.93 | 638.26 | 780.14 |
| 2,000 | 1,100.00 | 1,381.06 | 1,587.05 | 1,843.50 |
| 3,000 | 1,820.00 | 1,934.25 | 2,536.24 | 2,907.47 |
| 4,000 | 2,390.00 | 2,971.63 | 3,396.05 | 3,918.67 |
| 5,000 | 3,110.00 | 3,826.07 | 4,347.66 | 4,987.59 |
| 10,000 | 6,710.00 | 8,091.69 | 9,093.00 | 10,308.69 |

This table shows the present value gain associated with credit cards use. In this table, the gain considers both the value of frequent flier miles earned from credit card use and the gain from 30 days of float on purchases. The analysis assumes an $80 annual fee associated with the card and 2,500 renewal frequent flier miles associated with each renewal. The analysis also assumes no frequent flier mile bonus associated with opening the credit card account. The analysis assumes there is no limit on the number of frequent flier miles that can be earned in any year. The figure in each cell is the present value difference between the benefits received from using the card and the costs associated with holding the card.

benefits associate with credit card use including purchase protections and loss protections. Future research might also incorporate additional costs of card use, including those associated with card misuse.

## References


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