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Unrealistic optimism in consumer credit card adoption

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Abstract

In this paper, we study consumer credit card adoption behavior when individuals are overly optimistic about their future usage of the card. We hypothesized that the more prone consumers are to unrealistic optimism, regarding their future borrowing behavior, the more likely they are to prefer credit cards with features that are sub-optimal in light of their actual borrowing behavior. The two empirical studies we conducted to test these hypotheses have provided supporting evidence. Our findings offer an alternative explanation to the long debated puzzle on the stickiness of credit card interest rate, and have important implications for public policy makers.

JEL classification: G2

PsycINFO classification: 3920

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1. Introduction

In many continuously provided services such as financial services, insurance, health care, wireless phone plans, etc., marketers often use versioning strategies to attract more customers by providing similar types of service but with variations in certain features. The buyers' choice of these offerings often depends on customers' expectations on how likely they are going to use or benefit from those provided features. A better understanding on consumers' expected usage level of service attributes plays an important role in helping marketers to understand consumers' service purchase decisions and to design more effective targeting strategies.

Consumer satisfaction with the service and subsequent usage are influenced by the individual's judgment on both the current payment and usage level and the normative expectations (Bolton & Lemon, 1999). In many service purchase situations, some consumers may form a distorted view on their future expected usage level of service attributes or expected benefits derived from usage, that is, many tend to underestimate their future usage behavior. In this paper, we study how such systematic judgment error, the *unrealistic optimism* (also called *wishful thinking*) regarding the future usage, impacts consumer decisions on consumer credit card adoption.

Imagine two consumers with the following behavior. Alice intends to pay off credit card balance in due time, but ends up always keeping a large amount of balance in reality. Bob has the same debt paying intention as Alice, but only keeps a very small amount of balance in his cards. Two levels of questions arise from the example we lay out above. *On the micro level*, would Alice and Bob have different card adoption behavior? How sensitive are they to major credit card features such as APR (annual percentage rate) and annual fee when making card adoption decisions? If their responses to card attributes are different, how can credit card marketers make use of this difference to their benefit? *On the macro level*, what are the implications for public policy makers if consumers like Alice end up making sub-optimal decisions in their credit card adoption? Would this micro level consumer behavior have anything to do with the rigidity of credit interest rates in comparison with those for most consumer loans? In this paper, we address the aforementioned issues by exploring the link between one such systematic judgment error, the *unrealistic optimism,* and the sensitivity of consumers to APR and credit card fees.

For credit card users, APR is irrelevant if the balance is actually repaid every month. However, at time of making a decision whether to adopt a credit card, the decision is driven by a customer's *belief* that this will happen, not the actual outcome. Ceteris paribus, the higher the degree of *unrealistic optimism*, the stronger the *belief* that balances will be paid off each month, the less the sensitivity to APR. We thus hypothesized that the more prone consumers are to unrealistic optimism, regarding their future borrowing behavior, the more likely they are to prefer credit cards with features that are sub-optimal in light of their actual borrowing behavior. In other words, the more prone consumers are to unrealistic optimism, the less sensitive they will be to APR and the more sensitive they will be to annual fee when adopting a credit card. In the previous example, Alice is more unrealistically optimistic about her debt paying ability than Bob is, and hence Alice is more likely to underestimate her future usage on a credit card with lower APR. On the other hand, Alice will be more sensitive to fee since she is less likely to make a trade off between APR and fee by taking on a higher fee for a lower APR.

We conducted two independent studies to test our hypotheses. In the first study, we analyzed data from consumers obtained from a survey of credit card adoption and usage conducted by a credit card company in the United States. Respondents reported their debt-paying intentions and outstanding balances on each of their wallet cards. We determined the degree of unrealistic optimism based on the discrepancy between individual's reported debt-paying intention and the individual's actual outstanding balance. In the second study, we collected conjoint data from credit card users, using a generalized measure of unrealistic optimism and also including card features that were not included in the first study. We found support for our hypotheses in both studies.

Our empirical findings help explain why some consumers consistently prefer credit cards with features that are not in their best interest and have important implications to public policy making. For credit card issuers, the primary source of profit is the high interest that borrowers pay on their outstanding balances.[3] Ausubel (1991) posits that consumers who do not intend to borrow on their credit cards but end up doing so are in fact the most desirable consumers for banks. These are the consumers who systematically adopt credit cards with APR above the competitive rates, yet systematically end up with high outstanding balances. Calem and Mester (1995) have also found that the very same consumers are also less willing to search for credit cards that offer better features than are those consumers with a more realistic view of their future borrowing. This makes these consumers even more desirable targets to credit card issuers. Thus, because banks are interested in attracting and retaining consumers with a high level of unrealistic optimism, they are likely to offer credit cards with features that attract these consumers. This leads to a macro level question to the public policy makers: whether this kind of bank practice should be considered as consumer abuse? If so, what approaches are needed to protect consumers if market competition is exploiting such systematic consumer judgment error?

In what follows, we first provide a brief literature review on unrealistic optimism and lay out our two hypotheses. We then describe an economic model of credit card adoption decisions that we use to test our hypothesis in Section 3. Section 4 describes empirical results from a survey of credit card adoption and usage, where unrealistic optimism is measured by combining information on individual's reported debt-paying intention and his/her actual outstanding balance. We describe a conjoint study in Section 5 that uses an alternative measure to test for the effect of unrealistic optimism on credit card preferences. Section 6 offers some concluding remarks.

2. Literature review and hypotheses

In general, unrealistic optimism is the tendency to be overly optimistic about one's self worth or about one's future fate or future behavior (Price, 2000; Raghubir & Menon, 1998). Unrealistic optimism has been widely shown to affect people's beliefs in a variety of contexts (see Taylor & Brown, 1988, for an overview). People's desires tend to distort their beliefs by biasing their information processing towards the desired state. This means that people tend to selectively attend to information that corresponds with their desires and to distort their interpretation of information into the desired direction (Kunda, 1990).

[3] About 90 million Americans carry monthly credit card debt. The average credit card debt in the US increased from $3646 per household in 1993 to $9205 per household in 2003. As an anonymous referee pointed out, this usage of credit card as loan schemes is an US phenomenon, and may not be applicable to many other countries.

One reason that people's desires may distort their beliefs about themselves and about their future is to maintain self-esteem. Individuals with a high level of unrealistic optimism tend to believe that they have a lot of desirable characteristics and are free from undesirable ones. For example, they tend to believe that they are more intelligent (Wylie, 1979), less prejudiced (Fields & Schuman, 1976), more fair-minded (Messick, Bloom, Boldizar, & Samulson, 1985) and more skillful in things like driving (Svenson, 1981) than others. Also, the more prone individuals are to unrealistic optimism, the more inflated expectations they are likely to have of their performance (Metcalfe, 1998). Unrealistic optimism has also been demonstrated in predicting future outcomes. For example, football fans tend to overestimate the chance that their favored teams will win (Buckley & Sniezek, 1992). In addition, people may have an overly optimistic view about how they would cope with stress, disease, or other unpleasant things (e.g., Hassinger, Semenchuk, & O'Brien, 1999; Lewis, 1999).

Unrealistic optimism may also be the explanation for why consumers are prone to underestimate how often they end up borrowing on their credit cards. Because consumers tend to dislike debts (Prelec & Loewenstein, 1998), they may distort their estimate of how often they end up borrowing on their credit cards to be consistent with their desire of not to borrow. The more prone individuals are to distort their estimates of their future behavior with their desires, the more likely they are to prefer cards with features that correspond with their desires about their future borrowings, despite contradictions with their actual behavior. Consumers with a high degree of unrealistic optimism will substantially underestimate how often they end up borrowing on their credit cards and thus will be less sensitive to the interest rates (APR) on future borrowings than those consumers who are more realistic about their future borrowing. Based on the above, we hypothesize that

> H1: Consumers with a higher degree of unrealistic optimism will have a weaker preference for low APR relative to individuals with a lower degree of unrealistic optimism.

Although individuals with a high level of unrealistic optimism will be less sensitive to APR, they will be more sensitive to the fee than those with a lower level of unrealistic optimism. Those who are less prone to unrealistic optimism, and thus have a more realistic assessment of their future behavior, are more likely to consider both fee and APR when adopting a credit card and thus are able to make trade-offs between the two. For example, if taking on a higher fee means that they can avoid a higher APR, they may make such a tradeoff. Unrealistically optimistic consumers, on the other hand, who mainly attend to the credit card fee will be less likely to make such a trade-off, taking on a higher fee for a lower APR. Thus, consumers with a higher level of unrealistic optimism will show a higher sensitivity to fee than consumers with a lower level of unrealistic optimism who consider both fee and APR when making a decision about adopting a credit card. Thus we hypothesize that

> H2: Consumers with a higher degree of unrealistic optimism will have a stronger preference for low fee relative to individuals with a lower degree of unrealistic optimism.

If our hypotheses are supported, i.e., the degree of unrealistic optimism indeed reduces people's sensitivity to APR while increasing people's sensitivity to annual fee, then we predict that consumers who tend to be more prone to wishful thinking are more likely to

adopt cards that are not in their best interest and/or end up keeping balance in their account though not intending to borrow. In fact, these people who are more unrealistically optimistic about their future may be a good target for credit card issuers and marketers since they may adopt cards with APR above competitive rates yet end up with high outstanding balances.

3. Credit card adoption models

A credit card provides two basic functions. First, it is more convenient for people to carry a card than a large sum of cash. Second, and more importantly, a credit card allows card-holders to borrow money at some future cost that can be used to smooth their consumption over time. By getting access to this financial resource, people need not wait until their future income arrives to make a current purchase. Assuming an individual allocates his/her total financial resources into consumption over two periods, utility maximization subject to financial resource constraint will yield an indirect utility function. Further assume that the indirect utility function takes the form of a linear combination of card attributes (such as APR, annual fee) and the interaction terms between card features and demographics.

A consumer will accept a card with higher indirect utility relative to other cards in his or her wallet. In our study, we assume that a person will accept an offer if the difference between the indirect utility from the new offer and the indirect utility from a summary of card features in the wallet exceeds some threshold value.

If we allow the error term (η) to follow a standard normal distribution, then this becomes a traditional binary probit model where:

$$Pr(\text{a card is added}, y = 1) = Pr(V^* + \eta > \delta) = Pr(\eta > \delta - V^*) \tag{1}$$

$$Pr(\text{no card is added}, y = 0) = 1 - Pr(\eta > \delta - V^*) \tag{2}$$

For the jth card offered to the hth respondent, the model can be written as:

$$V^*_{hj} = \left(X^{\text{new}}_{hj} - X^{\text{wallet}}_{hj}\right)'\beta + \left[\left(X^{\text{new}}_{hj} - X^{\text{wallet}}_{hj}\right)' \otimes Z'_h\right]\phi \tag{3}$$

$$\delta_{hj} = Z'_h\alpha \tag{4}$$

where $h = 1, \ldots, H$ (H is the total number of respondents); $j = 1, \ldots, J_h$ (J_h is the total number of observations from the hth respondent); vector X_{hj} contains credit card features, such as fee and APR; vector Z_h contains the individual demographic variables such as age, income, education, gender, and a dummy variable indicating whether the respondent uses the credit card for convenience or as a source of revolving debt; and α, β and ϕ are parameter vectors associated with consumer demographic profiles, card features, and the interaction between card features and consumer demographic profiles, respectively.

The aggregate model described above ignores the panel structure of the data and treats all observations as if they come from the same respondent. In contrast, the hierarchical Bayes (HB) random-effects model can effectively capture consumer-preference heterogeneity. In our HB model, attribute sensitivity is modeled using a random-effects element (β_h), which is further explained by an intercept (ϕ) the person's demographic profile (Z_h) and some unobserved heterogeneity (λ_h). ϕ measures the average consumer attribute sensitivities for

the baseline group when Z_h are coded as dummy variables. The threshold value δ_{hj} captures the main effect of demographics (α). The HB model thus can be written as:

$$V^*_{hj} = \left(X^{\text{new}}_{hj} - X^{\text{wallet}}_{hj}\right)' \beta_h, \tag{5}$$

$$\delta_{hj} = Z'_h \alpha, \tag{6}$$

$$\beta_h = \phi + \Gamma Z_h + \lambda_h, \tag{7}$$

$$\lambda_h \sim M\text{Normal}(0, D), \tag{8}$$

where D is the variance-covariance matrix of λ_h, or the unobserved heterogeneity. The model can be estimated using standard MCMC methods (see Allenby & Ginter, 1995).

4. Study 1: A survey of credit card adoption

Data were obtained from a survey of credit card usage for multiple consecutive time periods in the 1990's conducted by a credit card company in the United States. Respondents were asked to record attributes of their current portfolio of credit cards, including APR, annual fees, and other attributes. Respondents also reported their usage rates and balance on each of their credit cards and revolving status (whether the person usually intends to revolve the balance or pays off immediately). Socio-demographic data, including respondents' age, gender, income, and education were also collected. We define our baseline group as a female who is younger than 35, with annual income lower than $75 000, with an education level lower than college, and intending to pay off outstanding balance in due time.

When a new offer was accepted, the person specifically listed when the card was added and the features associated with it. This provided us information about people's adoption behavior. We also needed to determine the card features of those offers that were not accepted by respondents. We imputed this information by using the mean feature values of those cards that have been adopted by others. More specifically, because we knew the distribution of card features for new cards adopted in each period, we simply used mean values of these features to impute new card information for a person who does not accept a card offer during that same period.[4] Based on the fact that there is a high frequency of credit card offers in current marketplace, we further assumed that people make a card adoption decision every quarter. The assumptions utilized here are necessary in analyzing people's card adoption behavior, though more accurate inferences could be made if respondents also recorded the features of the cards that ended up being rejected. Unfortunately, this information was not available.

X^{new} contains the attributes of the offered card on which we have information. X^{wallet} is measured as containing the best value across the wallet cards for each card feature. For example, Person h has 5 active cards in his wallet and among these five cards, the best APR is 5.75% and the lowest annual fee is $0. In this case, $X^{\text{wallet}} = (5.75\%, \$0)$, although these attributes might not necessarily belong to one specific card. This is a reasonable assumption for people who basically want a card that is good in all features. Furthermore, the fact that only a very small proportion of credit card offers are accepted indicates that consumers are selective in acquiring additional credit cards in the current marketplace.

[4] We also tried the median value of cards that have been adopted by others to impute the features of the non-adopted offers. Since our findings are robust to this alternative measure, the results are not reported.

Credit limit might be an important card attribute associated with future benefit that could affect consumer card adoption decision for both convenience seekers and credit revolvers; however, many values for this variable were missing in the survey. Including it in the model would significantly reduce our sample size; therefore, we omitted it. The total number of respondents in our sample was 271, and the total number of observations was 1804. The variable definitions and sample statistics are listed in Appendix A.

4.1. Model selection

In both models, the probability of adopting a card was modeled as a function of not just the card attributes, but also the demographic variables and the interaction terms between card attributes and demographic variables. Model construction and predictions were made in two different ways: within- and across-individual prediction. This was made possible by dividing the estimation sample and testing the sample in corresponding ways. To generate within-individual prediction, one observation was randomly drawn from each respondent with 3 or more observations to form the testing sample, and the remaining observations were pooled together to estimate model parameters. Thus, the estimation sample consisted of 1551 observations, and the testing sample was 253 observations for within-individual modeling and forecasting. The cross-individual prediction was generated differently in that all observations from a randomly-drawn group of respondents was used as the testing sample, and all observations from the remaining respondents were used to estimate the model parameters. We had 1321 observations for model estimation and 483 in the testing sample for cross-individual prediction.

The within- and across-individual forecast performance comparison of alternative models shows that HB is significantly better than the probit model for both in and out of sample.[5] The in- and out-of-sample mean absolute errors and root mean square errors of HB are just fractions of those of the probit. Our model comparison exercise shows the importance of capturing both the observed and unobserved consumer heterogeneity in model specification. Therefore, we will make statistical inferences based on the estimates from HB model.

4.2. Statistical inferences

To gain some insights in the card adoption behavior of the respondents surveyed in our sample, we report the estimated coefficients and their corresponding significance of the HB model in Table 1.[6] As suggested by the HB model, annual fee was the card feature that significantly predicts card adoption behavior (−1.1453) for the baseline group. The higher the fee for the new offer, or the lower the average fee for the portfolio of cards in wallet, the less likely the card was to be added. We failed to find a significant relationship between APR and card adoption propensity[7] for the baseline group. Our finding is consistent with

[5] Results are omitted due to space limitation.

[6] The results are based on actual transactors (who indicate they intend to be transactors and do not have outstanding balance on their credit cards) and actual revolvers (who indicate they intend to be revolvers and do have outstanding balance on their credit cards).

[7] We also estimated a dynamic model where X also includes past card adoption behavior, but failed to find significant coefficients and its interaction with other variables.

Table 1
Parameter estimates from HB model in study 1

	Constant	Age	Income	Education	Revolve	Gender
α	0.1095	−0.7941[a]	0.9670[a]	−0.1824	1.2498[a]	0.2665
	(0.3490)	(0.2377)	(0.3798)	(0.1808)	(0.2384)	(0.1706)
	APR	Fee				
ϕ	0.0664	−1.1453[a]				
	(0.2552)	(0.3612)				
		Age	Income	Education	Revolve	Gender
Γ	APR	0.0386	−0.1978	−0.1634	−0.3441[a]	0.0159
		(0.1551)	(0.2214)	(0.1353)	(0.1702)	(0.1412)
	Fee	−0.0562	−0.4068	−0.0467	−0.0510	−0.0941
		(0.2491)	(0.2616)	(0.2178)	(0.2647)	(0.1765)

Numbers in parentheses are posterior standard deviations.
[a] Indicates that 0 lies outside of the 95% highest posterior density interval of the estimate.

previous work in showing nonresponsiveness to additional rate cuts in the credit card market (e.g., Calem & Mester, 1995) for a certain group of customers.

Observed consumer heterogeneity (demographics) was found to significantly influence credit card adoption. For example, people older than 35 were less likely to add a card than younger respondents (−0.7941). This could be because older people are more financially established and therefore less dependent on credit borrowing. Our findings also suggest that *ceteris paribus*, a revolver who usually carries along balances is more likely to add a card than a transactor who usually pays off balances right away (1.2498).

The Γ matrix reflects how demographic profiles influence card attribute sensitivity, or who tends to focus more on instant costs or future benefits. Revolvers (people who intend to revolve balance) are found to be more sensitive to APR compared with transactors (people who intend to pay off balance in due time), thus are more forward-looking. That is, a credit card with low APR (keeping other card features constant) will provide more utility to revolvers compared to transactors. The reason for this is that there is a motivation for revolvers to switch to cards with lower APR to lower the interest payment.

4.3. Hypothesis testing

Hypothesis 1 and hypothesis 2 suggest that people with a higher degree of unrealistic optimism will have a weaker preference for low APR and a stronger preference for a low fee relative to those with a lower degree of unrealistic optimism because they tend to underestimate how often they borrow on their credit cards.

We constructed the degree of unrealistic optimism in the following way. One nice feature about this dataset is that we not only have people's reported debt paying behavior (intension to revolve outstanding balance or pay off in due time) but also have people's actual debt paying behavior (their actual balance in their account). *One indicator of the presence of unrealistic optimism is that some individuals who stated that they usually intend to pay off balances in due time turned out to keep an outstanding balance in their credit cards within certain time periods*. Therefore, combining information on reported debt-paying intention and the individual's actual outstanding balance, we created a dummy variable

Table 2
Parameter estimates from HB model on non-revolvers in study 1

	Constant	Age	Income	Education	Wishful thinking	Gender
α	−3.9513[a]	−2.0373[a]	−4.5245[a]	−4.7834[a]	2.2280	1.6855
	(1.5179)	(1.4990)	(1.4990)	(0.9309)	(1.5974)	(1.1126)
	APR	Fee				
ϕ	−0.4401	−1.4759[a]				
	(1.4760)	(0.6222)				
		Age	Income	Education	Wishful thinking	Gender
Γ	APR	−1.7522	0.4971	−1.6098	0.4188[a]	1.0689
		(1.5220)	(1.2178)	(1.0884)	(0.1395)	(1.1230)
	Fee	0.6428	1.6332	−0.3789	−1.8075[a]	−0.0517
		(0.8601)	(1.0649)	(0.6314)	(0.6479)	(0.0824)

Numbers in parentheses are posterior standard deviations.
[a] Indicates that 0 lies outside of the 95% highest posterior density interval of the estimate.

(d_{it}) for each individual at each time period, which takes on value 1 if the balance is above the cross-sectional sample mean at time t. This variable separates the observations with higher degree of unrealistic optimism from those with lower degree. Then a measurement of the degree of unrealistic optimism for each individual was created by taking an average of d_{it} across time periods ($d_{i.} = \sum_{t=1}^{T_i} d_{it}/T_i$).[8] We created a subset of our sample only including those individuals who categorized themselves as transactors (who intend to pay off credit card balances in due time). A detailed description of the sample statistics for this subset is given in the lower table contained in Appendix A.

We estimated the HB model by using the non-revolver sample subset. Posterior mean and standard deviation for the model parameters are listed in Table 2. We found a strong positive interaction between unrealistic optimism and APR preference (0.4188), which suggests that 1% reduction of APR will bring 0.4188 extra utilities to individuals with a lower degree of unrealistic optimism. This supports H1 that the more unrealistically optimistic an individual is, the weaker his or her preference for a card with lower APR compared with those with a lower degree of unrealistic optimism.

As predicted by H2, the degree of unrealistic optimism is negatively correlated with sensitivity to fee (−1.8075). In other words, the higher the degree of unrealistic optimism, the higher the sensitivity to fee. That is, a reduction in fee of one dollar will bring 1.8075 extra utilities to individuals with a higher degree of unrealistic optimism. It is also worth noting that the degree of unrealistic optimism was the only personal background variable that predicted sensitivity to credit card features, which reflects the importance of including such a cognitive variable into the analysis.

4.4. Discussion

To summarize Study 1, using a credit card survey dataset and implementing a model derived from two-period utility maximization, we tested two hypotheses and found strong

[8] Another way to construct the degree of unrealistic optimism is to use the average balance across time periods for each non-revolver. This specification does not change the result patterns.

support for both. First, people higher in unrealistic optimism have a weaker preference for a low APR. Second, people higher in unrealistic optimism are more sensitive to annual fee than those who are less subject to unrealistic optimism. These findings show that people who are more subject to unrealistic optimism will be more prone to select cards that do not serve their interests.

5. Study 2: A conjoint experiment on credit card feature preferences

We conducted a second study to incorporate the following extensions. First, we used an alternative, more general measure for unrealistic optimism, which allowed us to test whether this more general measure would lead to similar results. Second, we incorporated additional credit features that we could not test for in Study 1 due to the lack of information in the survey. We wanted to test whether the behavior pattern that we found in Study 1 remains the same when additional important credit card features are considered.

Conjoint analysis and a paper and pencil survey were used for data collection. Data were collected from 75 adults who were taking evening classes at a university in the west coast of the US. On average participants were 30 years old, 42% were male, and 31% having an annual income higher than $50 000.

First respondents were asked about their credit card using habits, including whether they used credit cards in the past and whether they currently own credit cards. Subjects were also asked whether they tend to pay off their credit cards' balance fully or partially. All the respondents reported to have credit card usage experience and currently own credit cards. Around 80% of the sample stated that they tend to pay-off their account balance fully or partially.

Next, respondents were presented with twelve pairs of credit card options. Features of the credit cards varied on three attributes, including the annual percentage rate, annual fee and credit card limit. Each attribute had three levels as described in Appendix B. Respondents were asked to make twelve choices, choosing one from each pair wise credit card options that they would prefer to adopt in comparison to the other option.

Next, we also measured each individual's degree of generalized wishful thinking using a 5-point scale developed by Vitaliano, Carr, Maiuro, and Becker (1985). The scale consists of eight questions on people's reaction to a stressful and seemingly hopeless situation, ranging from "Hoped a miracle would happen" to "Wished the situation would go away or somehow be finished".[9] We completed a factor analysis on the scale, and the measurement scores on the eight questions loaded nicely on one single factor. A reliability analysis was also conducted to ensure the reliability of the measure ($\alpha = 0.81$). Therefore, we used an average across the scores for the eight questions to form an index of unrealistic optimism for each individual. The in-sample average of this summary unrealistic optimism index is 3.05 with a standard deviation of 0.91.

5.1. Model selection

We used a Bayesian method to analyze the data (similar to the one we described in our model section). Table 3 reports the parameter estimates for the main effects of individual

[9] See Vitaliano et al. (1985) for a detailed description of the measurement scale of wishful thinking.

Table 3
Parameter estimates from HB model in study 2

	Constant	Gender	Age	Income	Wishful thinking	
α	−0.2501	1.4495	−0.1415	−0.7459	1.1169	
	(3.9574)	(0.7512)	(0.1003)	(1.0782)	(0.7600)	
	APR (18%)	APR (20%)	Fee ($20)	Fee ($50)	Limit ($4000)	Limit ($6000)
ϕ	−1.2949	−4.1450[a]	−1.4910[a]	−7.1400[a]	0.4286	4.1318[a]
	(1.3736)	(2.0091)	(0.6949)	(2.5127)	(0.3983)	(1.6355)
		Gender	Age	Income	Wishful thinking	
Γ	APR (18%)	0.3091	0.0030	1.9558	0.6956	
		(0.2132)	(0.0324)	(2.0229)	(0.4485)	
	APR (20%)	−0.0237	−0.0613	2.0290[a]	0.8960[a]	
		(0.0857)	(0.0419)	(1.0019)	(0.3625)	
	Fee ($20)	0.8525	−0.2325	0.2688	−0.6920	
		(1.1680)	(0.1731)	(1.4127)	(1.0120)	
	Fee ($50)	2.5443[a]	0.3164[a]	2.9233[a]	−1.2588[a]	
		(1.2546)	(0.1505)	(0.8584)	(0.5955)	
	Limit ($4000)	1.4800	0.0170	0.3109	−0.7270	
		(1.9330)	(0.1583)	(2.0177)	(0.6911)	
	Limit ($6000)	2.1159	−0.5888[a]	0.8914	−0.5830	
		(3.1747)	(0.2603)	(0.5335)	(0.3181)	

Numbers in parentheses are posterior standard deviations.
[a] Indicates that 0 lies outside of the 95% highest posterior density interval of the estimate.

background variables, main effects of credit card features, and interaction effects between the two.

5.2. Statistical inferences

In the model, both the main effects of card features (ϕ) and interaction effects between features and individual background variables including the unrealistic optimism were of interest. As shown in the table, APR was not significant in level 1 (18%) but was significant in level 2 (20%) relative to the baseline (16%). A 20% interest rate decreased the card choice likelihood compared with a card with 16% APR. As expected, annual fee significantly influenced people's card choices in both levels relative to the baseline ($0). The higher the annual fee, the lower the likelihood of card choice. For credit limit, there is a significantly positive impact in choice probability for level 2 ($6000).

The Γ matrix showed some interesting patterns for the interaction between unrealistic optimism and individual card-feature preferences. The results showed that unrealistic optimism positively correlated with preference for 20% APR (0.8960), supporting H1 that a stronger wishful thinker is less sensitive to APR reduction. As hypothesized, unrealistic optimism negatively interacted with preference for $50 fee (−1.2588), which suggests that people subject to a higher degree of unrealistic optimism are more sensitive to fee reduction compared to people with a lower degree of unrealistic optimism, supporting our second hypothesis.

5.3. Discussion

In summary, in this follow-up study, we found support for the tendency of some individuals to be overly optimistic, which affected people's credit card preferences as predicted. These results suggest that unrealistic optimism may be indeed responsible for the unrealistic estimates of borrowing that some people display in their credit card adopting decisions.

6. Conclusion and future research

Understanding how consumer's mental budgeting regarding usage influences purchase decisions is important for marketers of financial services. Consumers' choice of service plans often depends on their expected future usage of and benefit from certain service attributes. In this paper, we study consumer credit card adoption behavior when individuals are overly optimistic about their future credit card balances.

We show that unrealistic optimism may be one of the psychological explanations that some consumers prefer credit cards with features that are not in their best interest, which has long been a puzzle for both researchers and credit card marketers. We showed in two studies that consumers whose high level of unrealistic optimism leads them to underestimate their future borrowing will be less sensitive to APR and more sensitive to fee than consumers with lower unrealistic optimism. The bad news to consumers who are prone to unrealistic optimism is that the bias itself makes it difficult to develop a more realistic view for future borrowing. Unrealistic, self-serving optimism often leads people to reinterpret or deny facts that are contrary to their beliefs. For example, Babad (1995) found that political science students who received accurate information about previous election results in Israel did not make better predictions for future election results than did average voters who did not have such knowledge. Despite receiving accurate information about past election results that could have been used as a basis for predicting the outcome of the next election, the predictions of political science students were just as distorted by their desired outcomes as were the predictions of the average voters.

The persistence of unrealistic optimism in consumer choices may explain the persistence of some consumers in preferring credit cards with higher APR than we would expect, assuming a competitive market in comparison to interest rates of other types of loans. Due to the persistence of unrealistic optimism, it is unlikely that market competition itself is able to correct for this bias; thus, alternative solutions are needed. For credit card issuers, the primary source of profit is the high interest that borrowers pay on their outstanding balances. A good target would be those consumers who systematically adopt credit cards with APR above the competitive rates, yet systematically end up with high outstanding balances. Thus, because banks are interested in attracting and retaining consumers with a high level of unrealistic optimism, they are likely to offer credit cards with features that attract these consumers. These features include low fees but not low APRs.

It is not likely that market competition will change this situation and cause banks to lower the APR of their credit cards. Lowering APR would simply lead to less profit while making little difference in the ability to attract consumers with higher level of unrealistic optimism. Because credit card issuers are interested in turning the unrealistic optimism of consumers to their advantage, we suggest that alternative approaches are needed to protect consumers.

Our study may also shed some lights on a long debated puzzle in economics about the rigidity of credit card interest rates (APR) in comparison with interest rates for most consumer loans (e.g., Brito & Peter, 1995; Canner & Luckett, 1992; Cargill & Wendel, 1996; Pozdena, 1991). In one broadly accepted view, this could be explained by rational consumer behavior. It is perfectly rational for consumers to be less sensitive to APR if they place higher priority on other credit card features (like service quality and transaction convenience) than to APR (Cargill & Wendel, 1996). In another view, the rigidity of the credit card interest rates is the product of the "irrationality" of some consumers, namely those who "do not intend to borrow on their [credit card] accounts but find themselves doing so anyway" (Ausubel, 1991, p. 70). We believe that this latter view has some merits, yet it remains less widely accepted than the former one because the psychological mechanism that may lead to such a behavior is not well understood and because there is little systematic empirical support for this view (e.g., Ausubel based his argument mainly on anecdotal evidence). Our paper fills this gap by proposing that unrealistic optimism may be the psychology behind this consumer "irrationality" and also by providing empirical support for this view.

Although this study produced some interesting findings of the links between unrealistic optimism and consumer preferences for certain credit card features, the study is not without limitations. A major limitation of this study is that it only investigated one of the possible psychological mechanisms that may lead to systematic judgment errors in predicting future behavior. Alternative psychological mechanisms that may lead to similar judgment errors include, for example, a tendency to construe the future in such a way that some consumers do not fully take into account the future "pains" of paying interest on their debt (Liberman & Trope, 1998), or people simply discount the cost that will occur in the future while focusing more on the benefits they enjoy now (Laibson, 1997). Other possible explanations are consumers may just gradually adapt to the cost of their debt as time goes by (Gourville & Soman, 1998), or "being overly optimistic" has utility that is worth the price to be paid for with high APR.[10] None of these alternatives, however, explain our finding of why those consumers with a high level of unrealistic optimism showed the predicted suboptimal preferences in credit card selection. Thus, although unrealistic optimism may not be the only explanation for why some consumers are less sensitive to APR and overly sensitive to fees, our data suggest that it is at least one of the explanations.

A particularly interesting area for future research is to investigate how long it usually takes for a wishful thinking credit card user to realize that he or she is not using the right card and consequently decides to reduce the usage of that card and/or drop it. This would allow us to study if market competition itself can correct for the non-optimal behavior due to wishful thinking.

For public policy purposes, future research can also study the credit worthiness of the consumers with unrealistic optimism. If these consumers are more likely to default on their credit card payments, then higher APR may be considered as compensation to credit card companies for bearing higher default risk by lending to subprime consumers. If the wishful thinkers are not more likely to default compared to other consumers, then it is likely that they are abused by the credit card issuers, and some public policy may be necessary to correct the situation. We cannot explore these issues due to the data constraint and we leave them for future research.

[10] We thank an anonymous referee for suggesting this to us.

Appendix A. Attributes and sample statistics for the data used in study 1

Variable	Sample mean (sample standard deviation[a])
Sample statistics (revolvers + transactors)	
Choice (1 = a card is adopted)	0.32
APR^{new}–APR^{wallet} (%)	2.01 (4.49)
Fee^{new}–Fee^{wallet} ($)	2.73 (10.45)
Age (1 = age > 35)	0.77
Income (1 = annual income > 75 K)	0.12
Education (1 = some college or college graduate)	0.40
Revolve (1 = the person indicates he/she is a revolver)	0.80
Gender (1 = male)	0.52
The number of respondents in sample = 271	
The number of observations in sample = 1804	
Sample statistics (Non-revolvers)	
Choice (1 = a card is adopted)	0.21
APR^{new}–APR^{wallet} (%)	1.64 (4.41)
Fee^{new}–Fee^{wallet} ($)	2.35 (10.07)
Age (1 = age > 35)	0.84
Income (1 = annual income > 75 K)	0.28
Education (1 = some college or college graduate)	0.53
Unrealistic optimism (1 = balance > mean, time average)	0.58 (0.42)
Gender (1 = male)	0.61
The number of respondents in sample = 54	
The number of observations in sample = 368	

[a] Only for continuous variables.

Appendix B. Attributes and sample statistics for the conjoint experiment in study 2

Attributes	Levels
Annual percentage rate	1. 16% (baseline) 2. 18% 3. 20%
Annual fee	1. $0 (baseline) 2. $20 3. $50
Credit limit	1. $2000 (baseline) 2. $4000 3. $6000

(*continued on next page*)

Appendix B (*continued*)

Variable	Sample mean (sample standard deviation[a])
Sample statistics	
Gender (1 = male)	0.42
Age (1 = age > 35)	30.02 (5.15)
Income (1 = annual income > 50 K)	0.31
Unrealistic optimism (Vitaliano instrument)	3.05 (0.91)

The number of respondents in sample = 75. The number of observations in sample = 900.
[a] Only for continuous variables.

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