A theoretical examination of cash-back credit cards and their effect on consumer spending

Noah MacDonald[a],*, Brent Evans[b]

[a]*Department of Economics, Georgia College & State University, 415 Atkinson Hall, CBX 014, Milledgeville, GA 31061, USA*
[b]*Department of Economics, Georgia College & State University, 415 Atkinson Hall, CBX 014, Milledgeville, GA 31061, USA*

Abstract

The role of cash-back credit cards in personal financial strategies is highly debated. For example, Dave Ramsey (Ramsey, 2019) urges consumers to avoid even the most lucrative cash-back cards, while others argue that these cards offer significant savings. Herein, we construct models to analyze the use of cash-back cards by rational consumers, demonstrating that cash-back cards increase spending (and, thus, reduce savings) for some consumers. While prior research focuses on behavioral issues related to credit cards, our research is the first to show that some consumers will *rationally* increase spending when using a cash-back credit card in lieu of cash. © 2020 Academy of Financial Services. All rights reserved.

Keywords: Credit card; Personal finance; Cash back; Retirement planning; Churning

1. Introduction

Credit card usage in the United States is at an all-time high. In 2018, U.S. consumers amassed $3.67 trillion in credit card spending, a 9.7% annual increase (Nilson Report, 2019). Not surprisingly, credit card debt is also rising; the average U.S. household carries an average revolving credit card debt of $3,453.[1] Clearly, credit cards play a significant role in the economy. Within this market, rewards-based credit cards are becoming increasingly popular. Rewards credit cards offer special incentives to credit card users for initial and continued card use. Often, these cards provide "cash back" or frequent flier miles to a credit card

* Corresponding author. Tel.: +1-678-502-0677; fax: +1-478-445-5249.
E-mail: noah.matthew.macdonald@gmail.com (Noah MacDonald)

user. Today, about 57% of U.S. citizens hold at least one "rewards" credit card (Creditcards. com, 2018) with cash-back cards cited as the most popular and most heavily utilized form of rewards cards (TSYS, 2018, p. 23). Despite the prominence and relevance of cash-back credit cards, the subject has drawn surprisingly little attention from academic researchers.

In this article, we construct and analyze simple (but novel) graphical models to consider how rational consumers respond to the incentives offered by cash-back credit cards. Our analyses consider the two styles of rewards that are typical to cash-back credit cards: minimum spend bonuses and per-dollar rewards. Minimum spend bonuses provide consumers with a large, one-time bonus for reaching a "minimum spend" level within a given period of time. For example, the popular Chase Sapphire Preferred Card currently offers users 60,000 points (worth $600 or more) for spending $4,000 with the card in the first three months of card ownership. While not all rewards cards offer a minimum spend bonus, they almost always provide a per-dollar reward incentive. The aforementioned Chase Sapphire Preferred card, for example, gives consumers a minimum of one percent cash-back on every dollar spent when using the card.

By considering typical demand curves of hypothetical, rational consumers, we show that the use of cash-back credit cards will not affect all consumers equally. Specifically, consumers with very inelastic demand curves will generally reduce overall expenditures (once rewards are incorporated) with a rewards credit card, relative to cash or checks. In contrast, someone with a very elastic demand curve would greatly enhance spending when using a cash-back card in lieu of cash. Beyond these general findings, we find that minimum spend limits may lead to interesting consumption choices for consumers whose spending levels are typically less than the minimum spend threshold offered by the card. In aggregate, our theoretical findings suggest that the connection between the use of cash-back credit cards and one's savings rate varies greatly across consumers.

The implications from the theoretical models included herein are not trivial. If cash-back credit cards increase spending levels for some consumers, the growing popularity of such cards could lead to an overall reduction in savings rates in the United States, spurring short-term economic growth, but delaying retirement for many. If this is indeed occurring, the burden of savings may fall more heavily on government programs such as social security. While we do not claim that our theoretical model could possibly prove this is occurring, our research will hopefully encourage others to consider the role of credit cards in determining consumption and savings decisions. While enhanced spending from credit card usage has been linked to increased consumer borrowing and money mismanagement, our simple analyses show that increased spending could merely be the result of consumers rationally responding to the incentives provided by rewards cards.

2. The logistics of rewards credit cards

The credit cards rewards sphere is surprisingly complicated. Virtually all credit cards seem to have their own associated rules regarding spending and redemptions. First, let us consider a relatively simple credit card, the Citi Double Cash Card. The Citi Double Cash Card effectively offers a two percent cash-back benefit on all purchases (Citi, 2019). For example, if you make a $100 purchase with this credit card, you would effectively only pay

$98 after the cash-back rewards is attributed to your account. While there are many simple cards like the Citi Double Cash Card, the most highly-coveted rewards credit cards offer a minimum spend bonus (MSB). An MSB allows consumers to receive a significant reward if they reach a given spending threshold within a given period of time. For example, the Wells Fargo Cash Wise Card offers a $200 cash bonus if the user makes at least $1,000 in purchases within the first three months in addition to a standard 1.5% cash-back benefit on all purchases. This is a rather lucrative offer. A user that spends $2,000 on the card earns a standard 1.5% return on all purchases ($2,000*1.5% = $30) in addition to a $200 cash return. Thus, this consumer is able to spend $1,770 to buy $2,000 worth of goods—an 11.5% cost reduction. The MSB is what leads the most savvy credit card users to apply for several credit cards in a given year, reaching the MSB on multiple cards to maximize benefits.[2] This practice of "credit card churning" has become so popular that many credit card issuers have implemented rules to slow such activities; for example, Chase often denies applications for new credit cards for individuals that have applied for five or more credit cards in the last 24 months (Kerr, 2019). Nonetheless, credit card churning is a popular hobby. For example, the message board website, Reddit.com, has a forum dedicated solely to the practice of churning (Reddit.com/r/churning), which currently has 210,000 members.

The aforementioned credit cards are both of the "cash-back" variant. While such cards are certainly popular, many credit card enthusiasts are primarily interested in travel-based rewards cards. For example, consider the AAdvantage Aviator Red World Elite Mastercard, which (despite its lengthy title) offers a straightforward method for attaining free flights. The card provides 50,000 in AAdvantage (American Airlines) miles after the cardholder pays the $99 annual fee and makes at least one purchase, which will likely cover two or more round-trip flights anywhere in the United States (Barclays, 2019). In addition to this MSB, the card also offers two AAdvantage miles per dollar spent on American Airline purchases and one AAdvantage mile per dollar spent on any other purchases. Other cards, such as the Chase Sapphire Reserve (CSR) offer ancillary benefits like auto-rental insurance, trip cancelation insurance for travel, and zero fees when used abroad, in addition to a lucrative MSB and "points-back" on all purchases (Chase, 2020).[3] These points can be converted to cash, but typically have more value when redeemed for travel. While travel cards are an important fixture of the credit card industry, the value of the points and perks offered by these travel cards is difficult to quantify in dollar terms.[4]

Travel rewards cards are certainly popular, but cash-back credit cards still hold the greater share of the rewards card market. About 80% of consumers primarily use a credit card that provides cash-back redemptions, while only 33% primarily use a card that allows for travel rewards (TSYS, 2018, p. 24).[5] Given the prominence and comparatively straightforward nature of cash-back credit cards, our forthcoming analysis focuses solely on cash-back rewards cards.

3. Credit cards and personal financial planning

It would be unfair to discuss the potential value to be gained from cash-back credit cards without first discussing a significant challenge that millions of credit card users face—debt. The connection between credit card use and debt may seem obvious; credit cards give

consumers, who may desire to spend more than they earn, an easy and practical way to borrow money. However, it appears that this connection is actually quite complex. Research suggests that credit card usage tends to increase consumer spending, even for those that do not use credit cards as an avenue for borrowing. In other words, credit cards are not borrowing vehicles for many consumers, but *still* lead consumers to increase their household consumption. There are many potential reasons for this effect. For example, Soman (2003) finds that consumers using credit cards are more likely to purchase frivolous or "unnecessary" items than consumers using cash. Soll, Keeney, and Larrick (2013) suggest that credit card transactions tend to be less memorable to consumers, leading consumers to increase spending. No one can be certain why credit card usage tends to spur consumer spending, but it does appear that there is a strong behavioral component. For example, Chatterjee and Rose (2012) find that consumers using credit cards seem to focus more on the benefit (and less on the cost) of a purchased item, relative to consumers using cash. Thus, it is not a surprise that consumers will spend far more when paying with a credit card. Perhaps the most notorious example of this spending bump is reported in Prelec and Simester (2001), who show that consumers roughly double their willingness to pay for highly sought-after sporting event tickets when credit cards are the only accepted payment option.

Given that credit cards tend to increase consumer spending, it is not surprising that some consumers find themselves, unexpectedly, in substantial debt. Wilcox, Block, and Eisenstein (2011) find that consumers with typically high self-control actually increase spending if they "carry a balance" on their credit card. The authors liken this effect to a smoker that is trying to quit; once a smoker falls off the wagon and has one cigarette, the smoker will likely feel that she has failed to maintain control and will likely smoke many cigarettes after breaking through the self-control threshold. Such an effect—individuals abandoning a goal after failure—has been well-documented in psychology research (e.g., Cochran and Tesser, 1996). Research shows that the connection between credit card usage and debt appears to be a function of age and education ability (Lopes, 2008), which further illustrates the complexity of credit cards as a viable option for consumers seeking to plan for retirement.

For the United States as a whole, revolving credit card debt reached $444 billion in 2019, indicating that an average U.S. household carries $3,453 in such debt (Isa, 2019; U.S. Census Bureau, Total Households, 2020). That being said, it is important to emphasize that credit card indebtedness is a condition that affects the *minority* of credit card users. Surveys conducted by the Federal Reserve in five periods between 2004 and 2016 show that 56.2% to 64.0% of credit card users do not "carry a balance" (Bricker et al., 2017). Thus, for most users, credit cards are used for the convenience they provide or perhaps for some other reason, such as to seek credit card rewards. Nonetheless, given that consumers label rewards as the most important feature when choosing a credit card (TSYS, 2018, p. 23), there is an inherent indirect connection between credit card debt and rewards that has yet to be formally studied, theoretically or empirically.

In the personal finance space, credit card usage is a highly debated topic. One of the leading personal finance gurus, Dave Ramsey, urges consumers to completely avoid credit cards. Ramsey cites aforementioned research that suggests that credit card users spend more money than those utilizing cash. He argues that credit card use will cause consumers to unintentionally go into debt. Perhaps, this fear of debt explains why many consumers choose to use

debit cards as their primary payment method (King & King, 2005, 2011). Not surprisingly, Ramsey does not believe that cash-back credit cards are as lucrative as they initially appear. He writes:

> The concept is two things. One is—and I've got a friend who makes a lot of money, and he uses his AmEx for *everything* and gets the cash back and gets the travel points and all that stuff—but I even watch this guy who's very educated and pretty sophisticated in the handling of his money, and I watch him purchase things for $100 to get the $3 kickback. I always kind of cock my head sideways and go, "You just did that." The motivation on the $100 spend was the $3 kick. That's just *wrong*, you know? What that tells us is it's motivating people to do things that they wouldn't normally do because somewhere in the back of their head, they feel like they're getting rich off this 3% kickback. (Ramsey, 2019)

In Ramsey's view, the benefits of a cash-back card are miniscule compared with the potential costs of credit card debt.

Given the tremendous size of Dave Ramsey's audience—he has sold over 11 million book copies and hosts a nationally syndicated radio show—it is not surprising that his position on credit cards is the source of substantial scrutiny. Responses from the credit card rewards community range from bemusement to complete outrage. JT Genter, a writer for the thepointsguy.com offers a more nuanced response:

> Dave Ramsey's argument not to use credit cards is both right and wrong. He's right that those that can't control their spending absolutely shouldn't get or use credit cards. However, his argument is wrong for those who pay their balance in full and utilize the rewards. (Genter, 2018)

Ultimately, there is no academic that could possibly settle this debate. Researchers (e.g., Soman, 2003 and Soll et al., 2013) have found clear evidence that credit card usage is linked with higher spending. However, it is undeniably true that cash back credit cards *could* serve to reduce the effective cost of transactions for a responsible user.

4. Prior research related to credit card rewards

Research regarding credit card rewards and consumer spending choices is surprisingly sparse; indeed, the lack of research in this arena was a primary motivator for the current research. That being said, there are some tangentially related manuscripts that consider credit card rewards and their impacts.

Perhaps the most substantial work regarding credit card rewards is a 2009 paper by Fumiko Hayashi. Hayashi considers macroeconomic and long-run effects of the continuing expansion of credit card rewards. While it is clear that consumers can potentially benefit from seeking credit card rewards, Hayashi projects that the benefits to a consumer will dissipate over time. Her position is based on the various fees that are imposed on merchants that accept credit card payments.[6] While all credit and debit card transactions reduce the effective price received by a merchant (after paying fees), rewards credit cards typically impose the highest fees. For example, interchange fees for a Visa Signature Preferred rewards credit card are approximately 0.3 percentage points higher than the fees for traditional Visa credit cards (Visa, 2019). Thus, businesses earn more revenue, net of credit card fees, on a

traditional credit card than they do when processing a rewards card. Hayashi suggests that firms will be forced to raise prices to account for expanding merchant fees related to rewards cards, eventually eroding the effective savings that consumers enjoy from using said cards. While we do not claim to refute Hayashi's findings, we show that consumers would *still* receive benefits from using rewards cards, relative to cash or traditional credit cards, even if her projection comes to fruition.

A 2010 article from Jalbert, Stewart, and Martin is also of significant interest to the current research. The authors consider the benefits of using credit cards relative to cash, and attempt to reconcile the choice that many consumers make to ignore the value from rewards cards and retain their use of traditional payment methods. Their analysis focuses on two specific benefits that credit cards provide. First, they discuss the specific benefits afforded by rewards credit cards; in particular, they emphasize the rewards cards that provide frequent flyer miles. Second, they consider a characteristic that all credit cards provide; when using a credit card, consumers can essentially borrow money to purchase an item today and not actually pay for the item for several weeks. This so called "payment float" allows consumers to borrow funds at zero percentage interest for a short period of time. In effect, a consumer could invest the money that is newly available because of payment float to take advantage of the zero percentage interest offered by a card.

While the duration of payment float and the speed of rewards-earning differs among cards, Jalbert et al. (2010) attempt to quantify the benefits from using a rewards card relative to cash or checks. They report that consumers can generate substantial monetary benefits. For example, an individual with $2,000 in monthly expenses and a discount rate of 10% could expect to reduce the net present value of five years of spending by $7,119 when using a rewards card in lieu of cash.[7] The authors conclude the paper by pondering why so many consumers eschew rewards credit cards. While credit card use has been linked to increased spending (e.g., Soman, 2003), the authors wonder if the substantial benefits from using rewards cards may dwarf the potential costs of frivolous spending.

Ricaldi et al. (2013) provide a potential response to Jalbert et al. (2010). They suggest that many consumers lack the financial literacy to understand or properly evaluate the merits of rewards credit cards. The authors argue that informed consumers should always prefer rewards credit cards, relative to other credit cards and suggest that credit card firms provide both offerings as a way to segment the market of consumers between the price-sensitive, sophisticated users that will always opt for rewards credit cards and the, perhaps, "naïve" consumers who select cards for nonfinancial or superficial reasons (p. 13). This conclusion is based on their finding that those with low financial literacy were far less likely to use rewards credit cards, even after controlling for other important characteristics such as credit score. The findings from their research suggests that the prevalence and quality of financial education will play a role in shaping the credit card market in future generations.

While aforementioned research indicates that credit card rewards are lucrative and, yet, underutilized, rewards are nonetheless an important aspect of payment choices made by consumers. For consumers who hold both debit and credit cards, removing rewards increases the frequency of noncard payments by almost four percent (Ching & Hayashi, 2010). Furthermore, it appears that consumers are somewhat sensitive to the magnitude of rewards; as rewards become more lucrative, consumers are more likely to use rewards credit cards

instead of other payment methods (Carten et al., 2007). Given that rewards cards are already heavily utilized and younger consumers are more apt to use credit cards relative to prior generations, it appears that rewards cards will continue to gain relevance in the coming years. We hope that the theoretical models constructed herein will further the literature on this meaningful subject area.

5. Theory and models

Using cost and demand curves, we aim to construct models that clearly illustrate the consumption choices made by consumers implementing a cash-back rewards card. To do so, we use actual credit card reward systems that are currently available in the United States. These models allow us to consider how a rational consumer's spending and savings would be affected (if at all) when the consumer switches from cash to a cash-back rewards card. To simplify our analyses, we must first construct assumptions. Then, we consider the consumption choices made by several representative consumers, each with their own unique demand curves.

5.1. Assumptions

In the following section, we consider how an individual that traditionally uses cash as a payment method would alter consumption habits (if at all) when a rewards credit card suddenly becomes available. Both the plausibility of using a rewards credit card (after all, many do not qualify for credit cards) and the spending choices that an individual would make are clearly unique to a given individual. To simplify, we consider representative consumers that are bounded by the following assumptions.

1. Consumers may use cash or a cash-back credit card for all purchases.
2. Consumers always pay their credit card balance in full; thus, the interest rate that a card offers is inconsequential.
3. Consumers are indifferent among payment methods and expenditures will not vary across payment methods, ceteris paribus.
4. Attaining a credit card is costless and credit cards charge no annual fee.
5. Credit cards only offer cash-back rewards and provide no other perks.
6. Consumers maximize utility, which is measured by consumer surplus.
7. Consumers have a discount rate of zero.
8. Consumers have a price-elasticity of demand that is neither perfectly elastic nor perfectly inelastic.

Each of these assumptions is crucial to developing a feasible model that is generalizable to all consumers. Assumption 1 allows consumers to freely choose whether to use cash or a cash-back credit card for all purchases; thus, there is never a situation where a consumer is forced to use a given payment method.[8] Assumptions 2, 3, and 4 simplify the consumption choice made by consumers. If consumers do not use credit cards as a source of borrowing, are indifferent among payment options, and can freely choose to use any credit card, their payment choice will be based on the incentives (or lack-thereof) specific to a given credit

card. We assume that rewards cards only offer cash-back rewards (Assumption 5), ignoring the complex world of travel rewards. Because cash-back is by far the most common rewards redemption method (TSYS, 2018, p. 24), this assumption effectively matches reality for many consumers.

Assumption 6 provides the numerical framework for our analyses. Consumer surplus, essentially, measures the value of a transaction to a consumer. For example, if a consumer is willing to spend $100 for an item, but said item only costs $70, we can infer that the consumer earned $30 worth of "consumer surplus" from the transaction. We assume that consumer utility is perfectly represented by consumer surplus and that consumers all wish to maximize consumer surplus.

Credit cards offer consumers the benefit of providing a "payment float." As fully described earlier in the article, one can defer the cash payment of an item into the future by using a credit card. Considering the time value of a money, a consumer is likely to gain positive utility from taking advantage of payment float. This is not the only time-value consideration for credit cards. Credit card rewards are often paid in the future; that is, if an individual earns cash-back from a rewards card, it may be weeks before these funds become available to the consumer. To simplify our analysis, we include Assumption 7, which states that consumers have no discount rate; thus, they value money equally across all time periods.

Finally, Assumption 8 assumes that consumers possess "normal" downward-sloping demand curves. This assumption allows us to apply the "law of demand" in our analyses—when prices drop, consumption rises.

Collectively, these assumptions simplify our analysis to allow for enhanced clarity, but it is important to note that our assumptions do not necessarily reflect reality. For example, many of the most lucrative credit cards enforce an annual fee and offer significant ancillary benefits, such as access to airport lounges. While such complexities stray beyond the scope of our current research, we hope to incorporate these concepts in future endeavors.

5.2. Consumption with a simple cash-back card

Given the assumptions described, we attempt to model the consumption choices for several consumers that are choosing between cash and a cash-back rewards credit card. We consider two different credit cards. The first credit card has a simple cash-back system, where the consumer earns a flat two percent cash-back on all purchases. The second card includes both an MSB and a cash-back component. Given that rational consumers consider relevant marginal benefits and costs when determining their consumption levels, we attempt to determine the efficient consumption choice for representative consumers.

Fig. 1 models a consumer choosing between consumption with cash or a simple cash-back rewards credit card. For our purposes, we use the Citi Double Cash Card, which offers consumers a flat two percent cash-back on all purchases. This card is ideal for our analyses because of the simplicity of its rewards program and its lack of an annual fee, consistent with Assumption 4. In the absence of credit card rewards, the marginal cost (MC) of $1 of goods purchased remains constant at $1, as shown by the "Marginal Cost w/o CC" curve. For this consumer, buying items that amount to $1,000 in "gross expenditure" will cost

Effective Cost of $1 of Goods

A

C

$1 — Marginal Cost w/o CC

B

$0.98 — Marginal Cost w/ CC
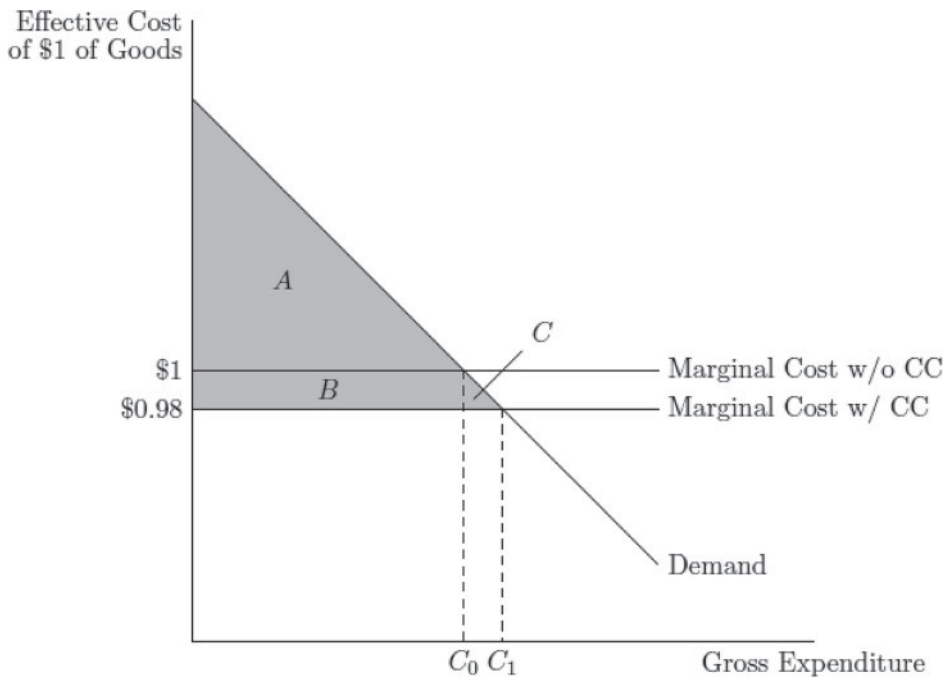
Demand

C_0 C_1 Gross Expenditure

Fig. 1. Consumption using a simple cash-back credit card.

exactly $1,000, ignoring sales tax.[9] In our model, the marginal benefit (MB) gained from each additional unit of goods as measured by gross expenditure diminishes as consumption increases. This is consistent with the law of diminishing marginal utility. Marginal benefit is represented by the demand curve. Given a consumer's MB and MC curves, there is some optimal consumption quantity, C_0, such that MB = MC. At this level of consumption, the consumer has consumed all goods for which the MB $\geq$ MC and is not consuming any goods in which the MB < MC; the consumer has maximized utility. Area "A" represents the consumer surplus earned by this consumer.

The cost structure described above changes with the advent of cash-back credit cards. As a result of the two percent cash-back reward, the marginal cost of $1 of goods reduces to an "effective cost" of $0.98. Because the marginal cost of $1 of goods purchased decreases, the optimal quantity consumed also increases from C_0 to C_1. This results in changes to consumer surplus as well. Consumer surplus increases to include areas "B" and "C"; each of these areas has its own unique interpretation. Area B results from the items that the consumer would purchase with cash *or* with the two percent cash-back credit card. However, with the card, she effectively reduces the marginal cost from $1.00 to $0.98 for each dollar of "gross expenditure." While area B indicates a utility-improvement for the consumer, it is not a result of the consumer changing behavior; she is merely enjoying a cost reduction. On the contrary, area C is a result of the *new* consumption that a consumer chooses to make since all items are now, effectively, two percent cheaper. The benefit received (Area C) is determined by consumers' price elasticity of demand. Consumers with more elastic demand curves are more responsive to price changes, and are also very responsive to credit card rewards, which effectively lowers the price of consumption.
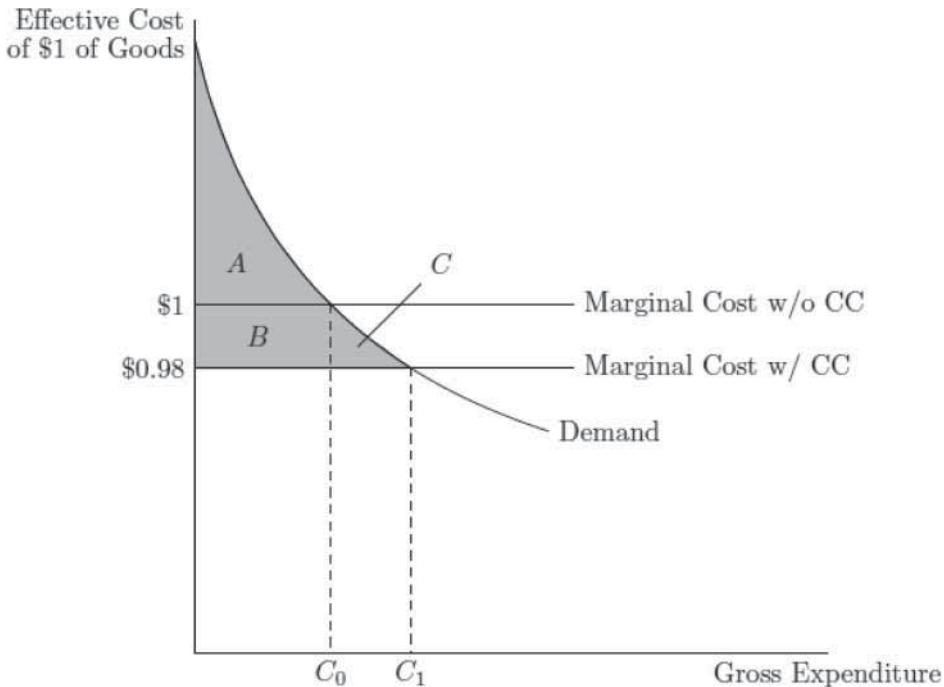
Fig. 2. Consumption using a simple cash-back credit card (unit elastic demand).

To further explore the changes in consumption made by a consumer, let's consider three representative cases. Each of these cases considers how consumer spending would change as a result of the two percent cash-back card with varying levels of demand elasticity. Fig. 2 shows how a consumer with a unit elastic demand curve would react to a two percent unlimited cash-back rewards card. If monthly consumption using cash, C_0, is $10,000, then their post-reward consumption, C_1, would increase to $10,204.08.[10] After the two percent cashback redemption, their effective spending remains constant at $10,000. Thus, consumers with unit elastic demand curves effectively spend the same amount of money with cash and with a credit card, but they are able to consume more goods and services with the cash-back credit card. For these consumers, utilization of the Citi Double Cash Card would have a net neutral effect on their savings rate, while enabling increased consumption.

Now, let us consider the case of a consumer with an elastic demand curve. Fig. 3 shows a consumer with an initial consumption level of $10,000/month, but a price elasticity of demand of two. Given this relatively flat demand curve, this consumer would actually spend *more* money (even after cash-back redemptions) with the introduction of rewards opportunities. Specifically, with a price elasticity of two, this consumer would spend $10,412.37 buying goods and services, effectively spending $10,204.12 after receiving the two percent cash-back. Because this consumer increases their spending by a greater percentage than the effective price decreases, they are effectively spending more money after rewards implementation. Thus, the use of this two percent cash-back card will reduce consumer saving for an individual with elastic demand. That being said, it is important to recognize that the additional consumption still raises consumer surplus and utility.
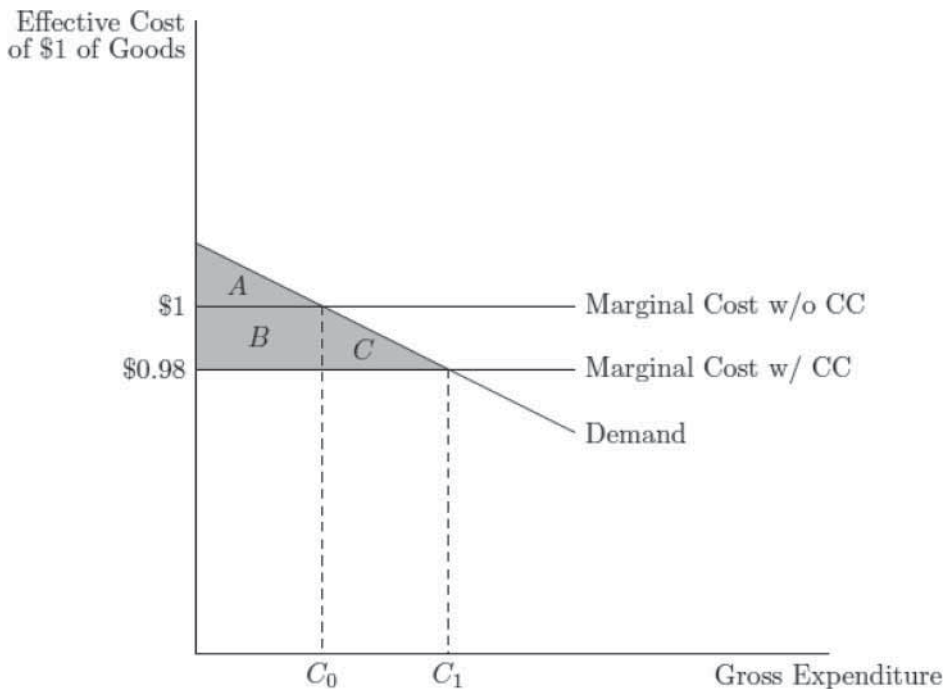
Fig. 3. Consumption using a simple cash-back credit card (elastic demand).

Finally, let us consider a consumer with an inelastic demand curve. Fig. 4 shows a consumer with a price elasticity of demand of 0.5. If this consumer spends $10,000/month with cash, her consumption rises to $10,101.52. After the two percent cash-back reward, she now effectively spends $9.899.49. This consumer increases spending by a smaller percentage
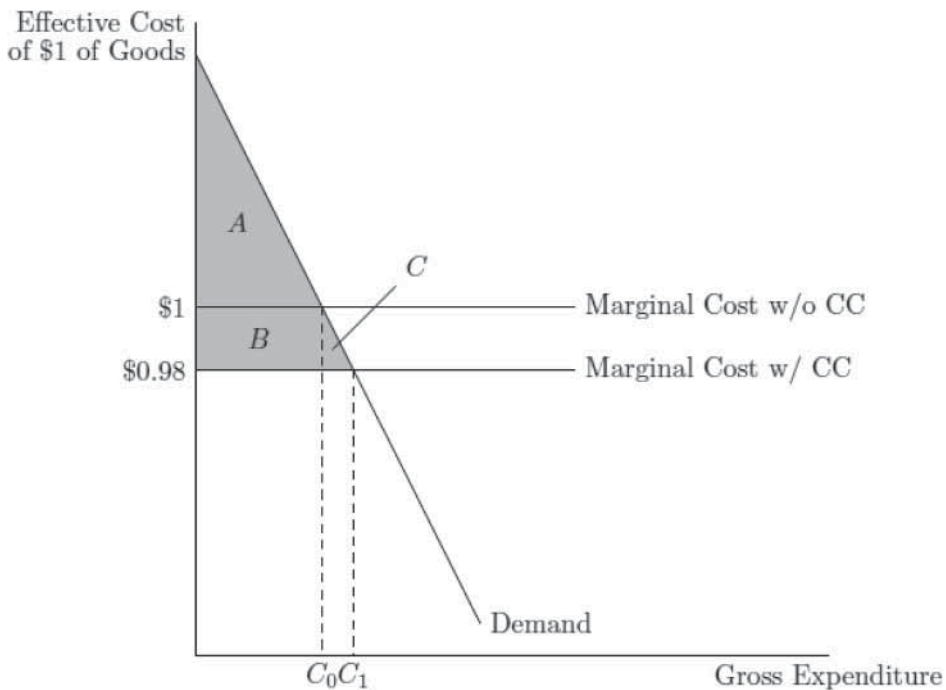

Fig. 4. Consumption using a simple cash-back credit card (inelastic demand).

than the effective price decreases, which means she spends less money as a result of credit card rewards. Thus, her savings rate increases.

Considering the results from Figs. 1, 2, 3, and 4, in unison, it is clear that cash-back credit cards can only have a positive effect on consumer utility, if our (strenuous) assumptions hold. For a rational consumer, consumer surplus, and thus, utility, increases once a consumer takes advantage of the two percent cash-back offer provided by the Citi Double Cash Card. However, it also plainly evident that this gain in utility could serve to hamper retirement planning for consumers with relatively elastic demand.

5.3. Consumption with a cash-back card that offers a minimum spend bonus

Not all cash-back credit cards are as straightforward as the Citi Double Cash Card; rewards become much more complicated with the introduction of minimum spend bonuses (MSB). For example, let's consider the Capitol One Savor Rewards card, once again chosen for its relative simplicity. The Capital One Savor Rewards card offers a $300 cash bonus if the consumer spends $3,000 over the first three months of card ownership (Capital One, 2019). In addition, the card also offers one percent cash-back on all purchases.[11] Because of the design of minimum spend bonuses, the graphical analyses employed must be reconsidered. Consider the marginal cost of a dollar spent while using this card. Technically, the 3,000th dollar spent would possess a marginal cost of -$299. In other words, by spending the 3,000th dollar, the consumer is able to reduce their overall cost by $299 once they receive the $300 cash bonus. As a result, traditional marginal analysis is no longer appropriate. To more accurately model how consumers would approach consumption decisions with an MSB card, we instead consider average cost per dollar spent through the MSB spending range. The need for this for this adjustment should reveal itself as we traverse through the following examples.

Fig. 5 illustrates a consumer's consumption choice given three options. While demand (marginal benefit) shows willingness to pay in a typical fashion, the consumer now faces three payment choice options. First, this consumer could use cash (Marginal Cost w/o CC), which would lead to no rebate on consumption—every $1 spent on items would have an effective cost of $1. The consumer could also choose to use the credit card but fail to meet the MSB. In this case, the consumer receives a flat one percent cash-back reward on every dollar spent leading to an effective cost of $0.99 per $1 of spending. Lastly, the consumer could choose to spend enough money to reach the minimum spend (MS) threshold. If the consumer surpasses the minimum spend threshold, the consumer's average cost would equal $0.89 per dollar spent on the first $3,000 of consumption. How did we arrive at this value? If the consumer spends exactly $3,000, he receives one percent cash-back on all purchases ($30) in addition to $300 for reaching the MSB. Because he effectively pays only $2,670 to purchase $3,000 worth of goods, he is effectively paying $0.89 in average cost per $1 of normal spending. Since the bonus is only applied if he reaches $3,000 in consumption, he will consider the average costs and benefits of spending choices to determine if it is worthwhile to reach the MSB. After he reaches the MSB, however, his choice is less complicated as credit card will now function as a simple cash-back card with a $0.99 effective marginal cost.
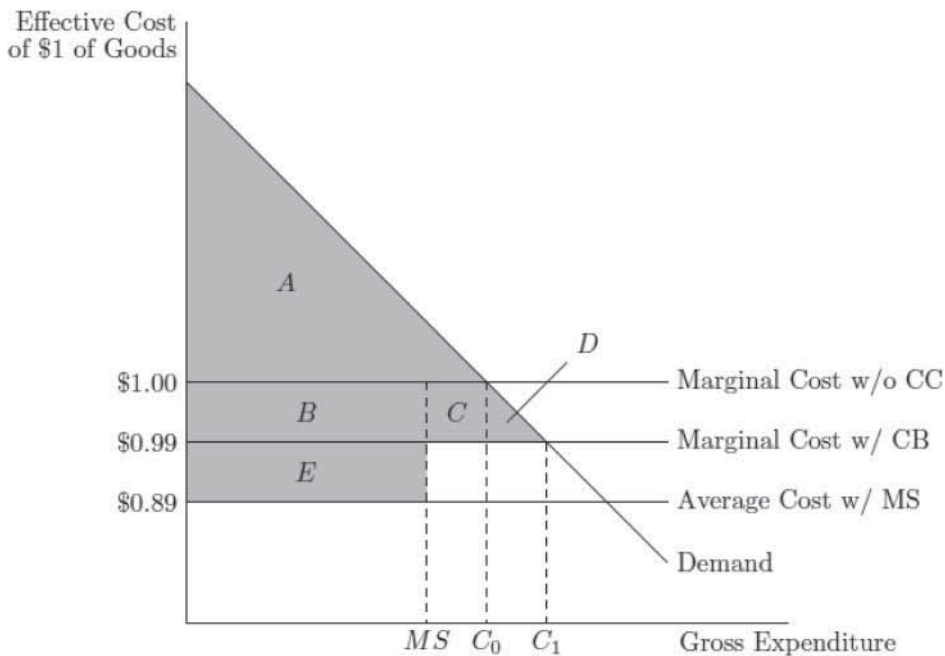
Fig. 5. Consumption with a minimum spend bonus (high demand).

In Fig. 5, the consumer has adequately high demand (MS < C_0) leading to a straightforward consumption choice. If the consumer uses cash, he will consume at level C_0, leading to a consumer surplus of area A. However, if he instead uses the card, he will effortlessly reach the MSB because his current consumption already surpasses the $3,000 level. However, as with Figs. 2-5, his consumption will slightly increase from C_0 to C_1 as a result of the flat one percent cash-back reward. In total, the consumer surplus increases by areas B, C, D, and E. Areas B and C result from the consumer earning one percent cash-back on the items he would buy with cash *or* card. Area D results from new consumption that was incentivized by the one percent cash-back reward. Finally, area E is the $300 minimum spend bonus earned by the consumer. Given that this consumer is earning a $300 cash reward, it is likely that this credit card would have a positive effect on savings. Although the consumer is making more purchases (as evidenced by the increase from C_0 to C_1), his demand would need to be absurdly elastic for this consumption increase to outstrip the $300 in new income that was afforded by the MSB. Thus, for consumers with high demand, it appears that the use of cash-back cards with MSB will have a positive effect on both spending and saving.

Consumption choices become more complex when a consumer's typical spending level is below the MSB threshold. Fig. 6 shows a consumer that will not meet the MSB if they use cash. However, this consumer would indeed choose to increase spending to reach the MSB. Using cash, this consumer would not choose to purchase items that would extend their consumption from C_0 to C_1. However, the consumer will recognize that the average cost per dollar spent would drop tremendously if they increase consumption to C_1 to capture the MSB. For example, if this consumer typically spends $2,800 every three months, it is abundantly clear that they would benefit from spending an extra $200 on their card in order to receive a $300 cash bonus. Once the consumer reaches the MSB, however, they would then choose to cease all consumption since the marginal cost ($0.99 per $1 of goods and services) surpasses
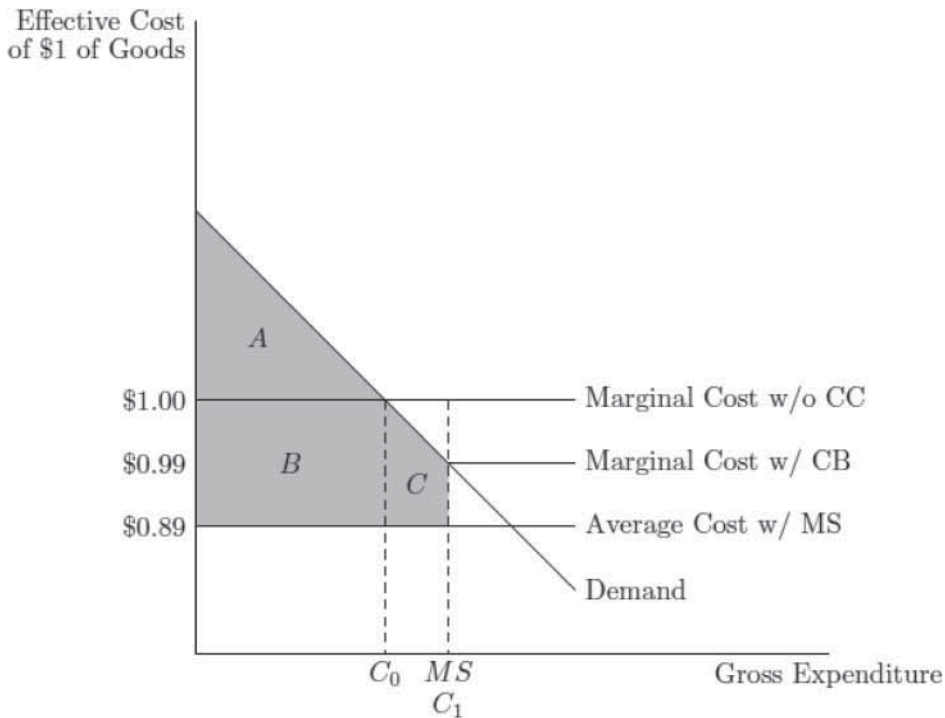
Fig. 6. Consumption with a minimum spend bonus (medium demand).

the marginal benefit. Using the specific values prescribed above, this consumer would *reduce* effective spending by using the card, leading to increased savings. However, this is not necessarily true for all consumers. If, instead, a similar consumer increased consumption from \$2,000 (C_0) to \$3,000 (C_1) to reach the MSB, this consumer would *increase* effective spending, reducing savings. Thus, the effect on savings would be a function of the magnitude and elasticity of the demand curve. For the specific consumer displayed in Fig. 6, their spending would equal C_1 with a flat one percent cash-back credit card or with the MSB card with one percent cash-back. Thus, in this specific case, this consumer would save an extra \$300 (the full value of the MSB) if they use this credit card instead of a one percent cash-back card with no MSB. Clearly, this would boost savings.

Low demand consumers, like those shown in Fig. 7, are the most difficult to analyze when using an MSB credit card. Such consumers do not come close to reaching the minimum spend threshold when using cash. To analyze consumption for this individual, we must introduce a novel concept—*negative* consumer surplus. Typically, consumer surplus is defined by consumption for which the marginal benefit exceeds the marginal cost (price). However, in the forthcoming scenario, the consumer willingly consumes units where the marginal cost exceeds marginal benefit leading to consumption that yields negative consumer surplus. On its own, such consumption reduces utility; however, through this increased spending the consumer is able to reduce the effective cost of consumption for *all* purchases, potentially leading to an overall increase in utility. The following paragraphs discuss this unique scenario.

Without credit cards, this consumer would choose to buy a small amount of goods and services, reaching a consumption level of C_0. In a typical benefit-cost model, this consumer would not want to spend more than C_1, given that the marginal cost exceeds marginal benefit
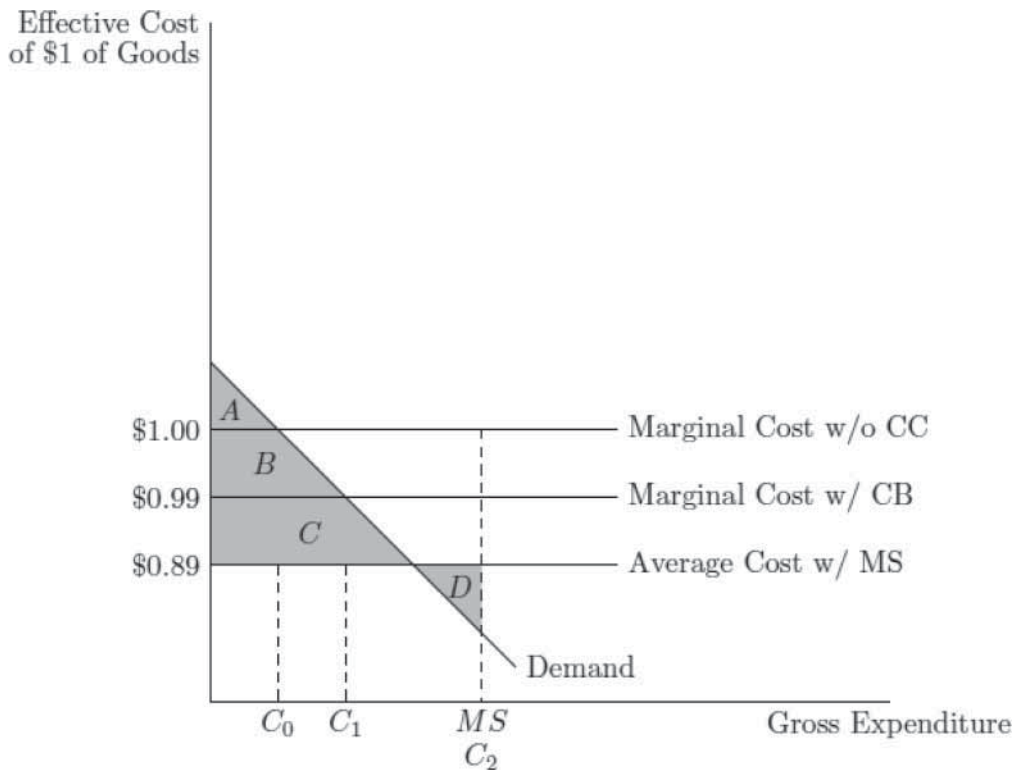
Fig. 7. Consumption with a minimum spend bonus (low demand).

for these goods. However, this consumer would, yet again, consider the average cost of spending if they spent exactly \$3,000 to reach the MSB. Certainly, this consumer (and all consumers bounded by the assumptions) would prefer to use the credit card in lieu of cash, regardless of spending level. Thus, if this consumer fails to reach the MSB, he will face an effective average cost of \$0.99 per dollar of spending, leading to a consumption level of C_1 and a consumer surplus of areas A and B. However, the consumer could also choose to consume at level C_2 to reach the MSB. In this case, the average cost is \$0.89 per \$1 spent. The consumer would gain new consumer surplus equal to area C. However, they would also need to consume units for which the marginal costs exceed the marginal benefits, leading to a negative consumer surplus of area D.

While this seems strange, the logic of such a choice is feasible. Perhaps this consumer only spends \$1,000 when using a simple one percent cash-back card, but would choose to spend \$2,200 in total if the effective cost per dollar spent were reduced to \$0.89. This consumer may be willing to spend an additional \$800 to buy goods and services that they only value at \$600 to reduce their average cost. Graphically, the consumer is left with an interesting choice. If area C is greater than area D, the consumer should choose to spend enough money to reach the MSB (and then cease consuming). If area D, however, is greater than C, this consumer will merely consume at level C_1, earning the flat cash-back rate of one percent. In the former case, it is possible that consumers could increase spending to such a degree that this could greatly reduce their savings rate. However, as in prior cases, this reduction in savings would be a conscious choice made by the consumer that would increase consumer surplus, and in turn, yield higher utility levels.

6. Discussion

In light of the novel, and at times, complicated, models described in Section 4, we hope that the overall findings will leave the reader with an enhanced understanding of how credit card use effects consumer spending. Using simple demand curves for all products, we clearly show that even for rational consumers, cash-back credit cards, will, in some scenarios, incentivize increased consumer spending (even after the consumer receives the cashback award). Thus, it appears that cash-back credit cards could lead to reduced savings for some consumers, potentially delaying retirement.

Prior research has explored the influence of behavioral phenomena on consumer spending. For instance, Chatterjee and Rose (2012) show that credit card users tend to overvalue the benefits of goods and services when they use a credit card to make a purchase. Such findings rely on distorted behavior that aligns with irrationality on the part of consumers. However, our findings show that even fully *rational* agents may consume more when utilizing rewards credit cards.

For example, consider the effects of a simple one percent cash-back credit card. Given that this credit card reduces the cost of spending, we posit that any consumer with a non-perfectly inelastic demand curve would spend more in the face of this new incentive to spend. However, the overall effects on spending, once cash-back rewards are considered, depend on how much extra spending the consumer chose to make. If the one percent cashback rewards card caused a consumer to increase consumption by 0.5%, this consumer will actually spend *less* money once the cash-back reward is attributed to her account. This consumer has an inelastic demand curve; thus, her effective spending drops and her savings rate increases. In contrast, if the one percent cash-back card causes the consumer to spend three percent more on goods and services, this consumer will, effectively, increase spending by two percent and reduce savings. Thus, for the consumer using a simple cash-back credit card, the more elastic their demand for all goods and services, the more spending will increase as a result of cash-back credit card utilization.

Elastic demand curves are not the only potential culprit of increased spending. Minimum spend bonuses offered by many rewards credit cards may also lead to increased spending. For example, the Capital One Cash Rewards Savor card offers $300 cash-back reward for a consumer that manages to spend $3,000 over their first three months of card ownership. For a rational consumer that already spends this much money quarterly, this card will likely lead to reduced effective spending and an increased savings rate. However, some consumers that typically spend much less may rationally choose to spend just enough to reach the threshold. For example, a consumer that spends $2,000 every three months may find it beneficial to spend $1,000 extra to earn the $300 reward, leading to a $700 increase in effective spending.

In both cases described above, it is important to understand that these consumption increases made by the consumers are still rational—these choices make the consumer better off. We show in our graphical analyses that consumers will increase consumer surplus by making these savings-reducing consumption choices. Thus, it seems that credit cards may put many consumers in an awkward position—the rational consumer may choose to spend more, increasing utility, but reducing savings.

The findings from this theoretical study may do little to temper any arguments regarding the efficacy of using rewards credit cards as a personal finance tool. Advocates of rewards cards can use our findings to demonstrate how some consumers can use credit cards to increase spending and consumption simultaneously; this will be true for consumers with an inelastic demand curve using a simple cash-back card and for consumers that already spend an adequate amount to reach minimum spend bonuses. Furthermore, our study shows that all rational consumers are made better off by cash-back cards, even if the cards incentivized increased consumption. Conversely, for Dave Ramsey and other credit card skeptics, the findings herein only serve to show another way that credit cards can reduce savings. If *rational* credit card use leads to more spending for some, just imagine how irrational and/or irresponsible consumers may react when they get their paws on a cash-back card. Ultimately, digesting the findings included in our article requires nuance. For the individual user, cash-back credit cards can clearly enhance utility, when used responsibly. However, the increased spending that could result from using these cards would certainly exacerbate any irresponsible usage.

7. Conclusions

In an effort to gain a better understanding of the role of cash-back credit cards in a personal financial plan, we construct graphical models of consumer demand. Our novel analysis shows that cash-back credit cards have varying effects on consumer spending choices. Focusing only on rational consumers that always pay off their balance in full, we show that cash-back cards will cause some consumers to increase spending and reduce savings. In particular, consumers with elastic demand are likely to increase spending when they earn a set cash-back rate on their credit cards. Relative to cash, a consumer with a demand elasticity of four would spend four percent more on goods services when using a one percent cash-back card; effectively, this consumer spends about three percent more, net of cash-back rewards. Additionally, some consumers, especially those with low expenses, may be incentivized to increase spending to reach minimum spend bonuses often offered by credit card firms.

Prior research has focused on the behavioral effects of credit cards, suggesting that consumers may irrationally increase spending when using a credit card, perhaps because credit card purchases are less memorable (Soll et al., 2013), which potentially causes consumers to underestimate the true cost of a good or service (Chatterjee and Rose, 2012). Our findings are novel since they show that consumer spending may increase, rationally, as a response to the rewards offered by credit cards. As a result, cash-back credit cards, while utility-improving, may reduce savings rates and impede one's progress towards retirement—this is true even for the most responsible and rational of consumers. Given the frequent debates over the viability of credit cards in a personal finance plan, our research offers new insights that will hopefully spark more empirical scrutiny. This is the primary contribution of our research.

In addition to providing important insight into the consumption choices of rewards cardholders, the models above constitute a novel approach to quantifying rewards benefits and a unique application of marginal cost and benefit curves for modeling consumption behavior.

These unique models could easily be adapted for use in undergraduate economics lessons surrounding marginal benefits and costs, consumer surplus, and price elasticity of demand.

Given that rewards credit cards are now a primary method of payment in the United States and many other developed nations, it is imperative that more research be conducted in the field. We hope that our theoretical methods encourage more research examining the wide-reaching effects of expanding rewards credit card usage.

Notes

1. This figured was found by dividing $444 billion in total credit card debt (Issa, 2019) by the total number of US households (Census.gov, 2019).
2. For a colorful example of credit card churning, see Lozano (2019).
3. Cards with significant ancillary benefits typically carry high annual fees. For example, the Chase Sapphire Reserve enforces a $550 annual fee, which is among the highest in the industry. Given the complexity of such cards, we choose to focus our forthcoming analysis on cards with no annual fees and minimal ancillary benefits.
4. For an academic discussion of the value of points and miles in credit card rewards programs, see Jalbert et al. (2010).
5. Note that many cards, such as the aforementioned Chase Sapphire Preferred, provide cash *and* travel rewards redemptions.
6. Her analysis considers technical matters related to credit cards that aren't relevant to our current research. However, we encourage interested parties to read her paper which fully explains the credit card payment process and potential ramifications.
7. However, it's important to remember that credit card use has been linked to increased spending (e.g. Soman 2003).
8. Generally, consumers are unable to use credit cards for some spending categories. For example, mortgage payments often require cash, check, or a bank transfer. Our assumption simplified a consumer's choices, focusing only on the scenarios in which a consumer can freely choose his or her payment method.
9. Credit card points are indeed earned on sales tax. Thus, the sales tax rate levied by a locality has no effect on the relative benefit of using a rewards credit card.
10. Calculations are made using the mid-point formula.
11. Technically, the card offers "4% cash back on dining and entertainment, 2% at grocery stores, and 1% on all other purchases" (Capital One, 2019). For simplicity, we only consider the 1% cash back return that would apply to the majority of purchases for a typical consumer.

References

Barclays. (2019). AAdvantage Aviator Red World Elite Mastercard. (available at https://cards.barclaycardus.com/banking/cards/aadvantage-aviator-red-world-elite-mastercard/).

Bricker, J., Dettling, L. J., Henriques, A., Hsu, J. W., Jacobs, L., Moore, K. B., Pack, S., Sabelhaus, J., Thompson, J., &., Windle, R. A. of the Board's Division of Research and Statistics prepared this article with

assistance from P. Hansen and E. Llanes. (2017). *Changes in U.S. family finances from 2013 to 2016: Evidence from the Survey of Consumer Finance*. (available at https://www.federalreserve.gov/publications/files/scf17.pdf).

Capital One. (2019). *Savor Rewards from Capital One. Capitalone.com*. (available at https://www.capitalone.com/credit-cards/savor-dining-rewards/).

Carten, M., Littman, D., Schuh, S., & Stavins, J. (2007). *Consumer Behavior and Payment Choice: 2006 Conference Summary* (Public Policy Discussion Paper No. 07-4). Boston, MA: Federal Reserve Bank of Boston.

Census.gov. (2019). *2019 U.S. Population Estimates Continue to Show the Nation's Growth is Slowing*. (available at https://www.census.gov/newsroom/press-releases/2019/popest-nation.html).

Chase. (2020). Chase Sapphire Reserve. Chase.com. (available at https://creditcards.chase.com/rewards-credit-cards/sapphire/reserve).

Chatterjee, P., & Rose, R. L. (2012). Do payment mechanisms change the way consumers perceive products? *Journal of Consumer Research*, *38*, 1129-1139.

Ching, A. T., & Hayashi, F. (2010). Payment card rewards programs and consumer payment choice. *Journal of Banking & Finance*, *34*, 1773-1787.

Citi. (2019). *Citi Credit Cards. Citi.com*. (available at https://www.citi.com/credit-cards/credit-card-details/citi.action?ID=citi-double-cash-credit-card).

Cochran, W., & Tesser, A. (1996). The 'what the hell effect': Some effects of goal proximity and goal framing on performance. In L. L. Martin & A. Tesser (Eds.), *Striving and Feeling: Interactions Among Goals, Affect, and Self-Regulation* (pp. 99-120). Mahwah, NJ: Lawrence Erlbaum & Associates,

Creditcards.com. (2018). *Americans Love Their Cash Back Credit Cards. Article by Ted Rossman*. (available at https://www.creditcards.com/credit-card-news/survey-americans-prefer-cash-back-credit-cards.php).

Genter, J. T. (2018). Why Dave Ramsey is both right and wrong on credit cards. (available at https://thepointsguy.com/2018/03/dave-ramsey-right-wrong-credit-cards/).

Hayashi, F. (2009). Do U.S. consumers really benefit from payment card rewards?. *Economic Review*, *94*, 37-63.

Isa, E. E. (2019). 2019 American household credit card debt study. (available at https://www.nerdwallet.com/blog/average-credit-card-debt-household/#footnote-two).

Jalbert, T., Stewart, J. D., & Martin, D. (2010). The value of credit card benefits. *Financial Services Review*, *19*, 227-244.

Kerr, R. (2019). Chase's 5/24 rule: Everything you need to know. (available at https://thepointsguy.com/guide/ultimate-guide-chase-5-24-rule/).

King, A. S., & King, J. T. (2011). Golden eggs versus plastic eggs: Hyperbolic preferences and the persistence of debit. *Journal of Economics and Finance*, *35*, 93-103.

King, A. S., & King, J. T. (2005). The decision between debit and credit: finance charges, float and fear. *Financial Services Review*, *14*, 21-36.

Lopes, P. (2008). Credit card debt and default over the life cycle. *Journal of Money, Credit and Banking*, *40*, 769-790.

Report, N. (2019). U.S. card spending at merchants. *The Nilson Report*. (available at https://nilsonreport.com/publication_the_current_issue.php).

O'Shea, B. (2019). *What is a FICO Score?* (available at https://www.nerdwallet.com/blog/finance/comparing-credit-scores/).

Prelec, D., & Simester, D. (2001). Always leave home without it: A further investigation of the credit-card effect on willingness to pay. *Marketing Letters*, *12*, 5-12.

Ramsey, D. (2019). *The Philosophy of Credit Card Use. Daveramsey.com*. (available at https://www.daveramsey.com/askdave/debt/the-philosophy-of-credit-card-use).

Ricaldi, L., Finke, M. S., & Huston, S. J. (2013). Financial literacy and shrouded credit card rewards. *Journal of Financial Services Marketing*, *18*, 177-187.

Soll, J. B., Keeney, R. L., & Larrick, R. P. (2013). Consumer misunderstanding of credit card use, payments, and debt: Causes and solutions. *Journal of Public Policy & Marketing*, *32*, 66-81.

Soman, D. (2003). The effect of payment transparency on consumption: Quasi-experiments from the field. *Marketing Letters*, *14*, 173-183.

TSYS. (2018). *Consumer Payment Study. 2018 TSYS U.S.* (available at https://www.tsys.com/Assets/TSYS/downloads/rs_2018-us-consumer-payment-study.pdf).

U.S. Census Bureau, Total Households. (2020). *[TTLHH], retrieved from FRED, Federal Reserve Bank of St. Louis.* (available at https://fred.stlouisfed.org/series/TTLHH).

Visa. (2019). *Visa USA Interchange Reimbursement Fees*. (available at https://usa.visa.com/dam/VCOM/download/merchants/visa-usa-interchange-reimbursement-fees.pdf).

Wilcox, K., Block, L. G., & Eisenstein, E. M. (2011). Leave home without it? The effects of credit card debt and available credit on spending. *Journal of Marketing Research*, *48*, S78-S90.