SUMMARY OF
A Reexamination of Who Gains and Who Loses
from Credit Card Payments

By: Michael Turner, Ph.D., Patrick Walker, M.A., Sukanya Chaudhuri, Ph.D.
Joseph Duncan, Ph.D., Robin Varghese, Ph.D., Walter Kitchenman, M.A.

PERC
RESULTS AND SOLUTIONS

MARCH 2013

Summary of
A Reexamination of Who Gains and Who Loses from Credit Card Payments

By: Michael Turner, Ph.D., Patrick Walker, M.A., Sukanya Chaudhuri, Ph.D.
Joseph Duncan, Ph.D., Robin Varghese, Ph.D.,Walter Kitchenman, M.A.

MARCH 2013

Acknowledgments

Table of Contents

Abstract

This study uses a simple framework to quantify point-of-sale (POS) cross-subsidies between credit card transactions and all other transactions that occur across household income categories. Earlier studies by staff of the Federal Reserve Bank of Boston (Boston Fed) examined these cross-subsidies using a similar framework. In the basic framework used, the Boston Fed staff studies concluded that a cross-subsidy occurs from lower income households to higher income households. These results were driven by the findings that: (1) credit cards tend to be used to a greater extent by higher income households; and (2) the merchant cost for processing credit cards tends to be higher than the associated costs for alternative payment methods.

Using the general methodology of the Boston Fed staff study, this analysis modifies several of the underlying assumptions of the study and then reexamines the results. This analysis finds that the Boston Fed staff cross-subsidy estimates are not very robust, depending a great deal on particular assumptions, the design of the accounting framework, and specific factors that are included and excluded. This is problematic given the lack of precise and consistent data on many aspects of the payment system and household use of payments. The estimated cross-subsidy is also small to non-existent, with the estimated cross-subsidy totaling less than 4% of payment processing costs for the lowest income group. And, assuming that credit card use results in an increase in merchant sales of just 1%—a conservative assumption given available evidence—then the point-of-sale cross-subsidy is likely to be reversed, with higher income households subsidizing lower income households.

To summarize, by using reasonable variations of the framework assumed by the Boston Fed staff, the POS cross-subsidies are found to be small, non-existent, or reversed. Consequently, any policy remedy seeking to redress particular cross-subsidy estimates found in the Boston Fed staff studies could have either no effect or, worse yet, could have negative unintended consequences, such as economic harms to lower income consumers. Improved data collection and a better understanding of the interactions of households, merchants and payment systems, enabling more robust and sophisticated analysis appear needed to inform sound policy inquiry.

Executive Summary

Recent reports from the staff of the Federal Reserve Bank of Boston (Boston Fed) argue that credit card users and participants in credit card reward programs are subsidized at the point of sale (POS) by non-card users and non-participants. The Boston Fed staff studies find that the cross-subsidies involve a net transfer from members of lower-income households to members of higher-income households.

However, as shown in this study, the results of the Boston Fed staff studies are critically dependent upon specific assumptions, the design of the cross-subsidy accounting, and the factors considered. In this study, PERC used the same general methodology of the 2010 Boston Fed staff study, modified several of the underlying assumptions and reexamined results. In general PERC finds that the potential POS cross-subsidy identified by the Boston Fed staff studies could be highly overstated. This report further cautions that policymakers cannot have much confidence in the cross subsidy estimates owing to data limitations and poor understanding of key aspects of the interplay between households, retailers, financial institutions and payment systems. Key findings include:

» POS cross-subsidy estimates are small, nonexistent or reversed: Using the same assumptions and general methodology as the Boston Fed staff report, PERC finds the POS cross-subsidy to be minus $29 for households with under $100,000 in income. However this falls to minus $14 when using more realistic assumptions regarding the cost of non-credit card payments. The cross-subsidy falls further to minus $11 when shopping patterns are assumed to vary by household income. This is small by most measures, it is less than 3% of the total cost of payment processing for this group and less than a tenth of one percent of consumption (total spending) for this group. This cross-subsidy is dwarfed by credit card interest payments paid by this group (which is nearly 30 times as large) and is less than the value of credit card rewards received by this income group. And if higher income / credit card using shoppers disproportionately purchase items with higher mark ups it is possible that cross-subsidies are nonexistent, or that lower income households receive a subsidy from higher income households.

» **Increased sales from card use could eliminate any POS cross-subsidy:** The framework used by the Boston Fed research team does not consider the generation of new sales resulting from accepting credit cards and consumer use of credit cards. A small increase in the volume of sales could cover the cost of merchant fees, eliminating any potential POS cross-subsidies. For instance, PERC estimates that an increase of less than 1% in total merchant sales could cover all additional costs to merchants of accepting credit cards. In such a case, there is no POS cross-subsidy. If the sales increase is higher, then the POS cross-subsidy is reversed, with higher-income households subsidizing lower-income households. Without knowing how credit card use impacts merchant sales for individual merchants or for the retail sector as a whole, little can be said about the size or direction of POS cross-subsidies.

» **Key factors that impact consumers are excluded:** The Boston Fed researchers fail to consider important costs and benefits relating to payments transactions, including those directly impacting consumers. Without considering all such major costs and benefits one is unable to determine the overall impacts on consumers from specific payment choices or the overall impact of payment choice policy on consumers. Excluded factors include ATM fees, overdraft fees, over limit fees, checking account fees, and prepaid card fees. These are non-trivial: for instance, the total value of overdraft fees collected is roughly the same as the total value of merchant fees examined in this (and the Boston Fed authors') analysis. The total cost to consumers from checking, debit, and ATM fees could be hundreds of dollars a year, many times the estimated POS cross-subsidies. In addition, the analysis does not include non-monetary aspects of the various payment choices, such as time spent going to an ATM/teller, the value of the security, and the importance of consumer-friendly purchase protection and dispute policies when paying for large ticket items with credit cards. While finding reliable data points for some of these issues may be challenging, they at least must be recognized and considered. There are good reasons to believe that in so doing, the findings could be impacted—potentially even dramatically so.

» **Including extraneous factors undermines results:** The Boston Fed researchers extended their analysis in 2011 to include bank and merchant profits. Net transfers to higher-income households exist if only due to the profits being made. Consequently, even if there were no POS cross-subsidies (the same processing cost was used for all payment instruments), there would still be a transfer to higher-income households (stock holders), if banks made profits on revolving credit card balances. These results speak more to income and wealth inequality, in general, than to POS cross-subsidies. Such net transfers to higher income households would result from any company that charged the same price to all customers and made a profit.

Given the serious limitations of current research on POS cross-subsidies, it would be unwise to make policy recommendations, particularly policy based on specific cross-subsidy results.

1. Introduction

The wide-spread use of credit cards has led to a hypothesis popularly known as the "Reverse-Robin-Hood-Cross-Subsidy". [1] Proponents of this theory make a very simple claim: high-income credit card users are subsidized by low-income customers who do not use credit cards. In its simplest form, the argument asserts that merchants face higher costs for accepting credit cards than they do for other payment methods, and they must find ways to pay those costs. They argue that this leads to higher prices, an outcome that affects all customers, credit card users and non-users alike. Because customers generally pay the same price for goods and services regardless of payment choice, the claimed result is that the low-income consumers, who are less likely to use credit cards, are burdened with extra costs incurred as a direct result of higher income credit card users.

In their 2010 study, the Boston Fed staff provide support for this argument by using a simple accounting framework that quantifies the transfers, or cross-subsidies, by household income. [2] They find that, on average:

» Households with the lowest income (less than $20,000) pay $32 annually at the point of sale; and,

» Households with the highest income (more than $150,000) receive $313 annually. [3]

This summary is an abridged version of a report by Turner et al. (2013) that reexamines the estimated POS cross subsidies as reported in the Boston Fed staff study (2010). [4] The PERC report compares results with different assumptions and highlights some basic data limitations. Different data points are used in the PERC analysis in an effort to make them both more germane to the US retail market and more reflective of merchant and consumer behavior and perceptions. The next section examines these issues in more detail.

---

[1] Term used by Steven Semeraro in "The Reverse-Robin-Hood-Cross-Subsidy Hypothesis: Do Credit Card Systems Effectively Tax the Poor and Reward the Rich?" Rutgers Law Review 40 (2009): 419.

[2] Scott Schuh, Oz Shy, and Joanna Stavins, "Who Gains and Who Loses from Credit Card Payments? Theory and Calibrations" (Boston: Federal Reserve Board, 2010). Available at http://www.bos.frb.org/economic/ppdp/2010/ppdp1003.pdf

[3] Cross-subsidy of each income group consists of the difference between cost imposed on the payment system by that group and the share of the cost of the payment system paid by that income group. The total cost imposed on the payment system is the sum of the total merchant fees paid on credit card payments and the total cost of the non-credit card system for that group. The cost paid by the income group is the share of the total expenditure by that group times the total cost of all payment systems by all income groups.

[4] Michael Turner, Patrick Walker, Sukanya Chaudhuri, Joseph Duncan, Robin Varghese and Walter Kitchenman, "A Review of Who Gains and Who loses from Credit Card Payments" (2013)

2. Data related Issues

The PERC cross-subsidy estimates were calculated using the general methodology outlined in the Boston Fed staff study (2010). Replication of the Boston Fed staff report (2010) results using assumptions outlined in the Boston Fed staff reports (such as the cost of credit card and non-credit card payment) produced estimates that varied somewhat from the figures presented in the Boston Fed staff (2010) studies but show the same basic patterns and magnitudes. The differences may be due to slight methodological differences in the details of how the PERC study and the Boston Fed staff study (2010) datasets were compiled (that is details that were not reported in the Boston Fed staff study (2010) or slight methodological changes between the different versions of the Boston Fed staff studies (2010, 2011) that were not reported).[5] [6]

Combining data from a variety of sources was needed in order to calculate the cross subsidies. The Survey of Consumer Finances (SCF) was used extensively but it was supplemented by calculations made from the Consumer Expenditure Survey (CEX). When combining data from different sources, there are several issues of data accuracy, compatibility, and bias that can arise (and do arise here). For instance, the average income reported in the 2007 CEX for those who earn over $150,000 is $235,000, while the average

income reported for the same group in the 2007 SCF is $417,000. And summing the income or expenditure data from these surveys (and multiplying by the appropriate number of households) does not equal the commensurate data from national accounting figures.

This inconsistency is handled in a direct way, by choosing income and credit spending *levels* from SCF, consumption ratios from CEX, and then scaling expenditures to national accounting levels. But, given such large level differences between the data sets, it is likely that applying ratios calculated on one to another produces somewhat biased results. That is, it would seem unlikely that the data differ in scaling alone.

Furthermore, problems *within* the data sets may also be large. For instance, it was found that while credit card charges in the 2004 SCF aggregate credit card charges match well with industry figures, the SCF misses half of revolving credit card debt.[7] Zinman also found that this discrepancy was likely to grow over time.[8]

Given the challenges in combining inconsistent data sets and the identified inaccuracy of some of the datasets used, the created dataset used to estimate POS cross-subsidies is undoubtedly flawed and misrepresents reality, to some degree at least. As such, the figures calculated here and in Boston Fed staff study

---

[5] The signs on the cross-subsidies in Table 5 are the reverse of those in the Boston Fed paper because of how cross-subsidies are defined. In this research subsidies are positive when they are received and negative when they are paid.

[6] Scott Schuh, Oz Shy, and Joanna Stavins, "Who Gains and Who Loses from Credit Card Payments? Theory and Calibrations" 2011

[7] Jonathan Zinman. " Where is the missing credit card debt? Clues and Implications." Review of Income and Wealth, Series 55, Number 2, June 2009.

[8] Ibid.

(2010) should not be taken as precise estimates, but as approximations or estimates of magnitudes at best. A worthwhile extension may be to explore to what extent these data imperfections could impact the results. Noting the difficulty in studying the payment system market that arises from a lack of consistent and comprehensive data, much of the work on the payment markets has emphasized the need to collect more data.[9]

3. Modifications Explored

The following modifications are explored with the resulting POS cross-subsidies summarized in a chart that follows.

Cost of non-credit card payments

The first modification considered is a more information rich cost of non-credit card payments. The cost of non-credit card payments was computed as a weighted average of different payment methods like debit cards, cash, check etc. For more details on exact calculation of cost of non-credit card payments please see Turner et al. 2012.[10] A more reasonable estimate of the cost of non-credit card payments is taken as 1.3% of the purchase amount. The Boston Fed staff study (2010) assumed this to be 0.5%, an estimate from a study on the cost of cash in Norway. PERC's cost of cash takes the average estimate from this source and others.

This simple modification reduces the cross subsidy of the low-income group (those households earning under $100,000 a year) by more than half, to minus $14 from minus $29. This highlights the sensitivity of findings to changes in the assumptions, which is problematic given the lack of solid data underlying the needed assumptions.

Different Merchants

The above cross-subsidy falls from minus $14 to minus $11 when shopping patterns (across two merchants) are assumed to vary by household income. If all high-income households spend at hi-mart and all low-income households spend at lo-mart, then no cross-subsidy would result, since the relevant merchant would have no customers of the other income group to subsidize. On the other hand, if the two types of household were equally likely to spend at each merchant, then the full cross-subsidy would occur. In this study, spending patterns are calibrated across the two merchants by income tier in a manner broadly consistent with the Boston Fed staff study (2011).

Pass Through

Thus far it has been assumed that all additional merchant costs to accepting credit cards are passed through to consumers (via higher prices). This is referred to as a 100% pass through rate. The opposite would be if prices were completely unaffected by

---

[9] For instance, in the policy implication section, Schuh et al. 2011, "Who Gains and Who lLoses from Credit Card Payments? Theory and Calibrations" include data collection as needed. Also, see the conclusions of Hayashi and Weiner (2008) "Developments in Interchange Fees in United States and Abroad" and Hayashi (2006), " "A Guide to the ATM and Debit Card Industry: 2006 Update"which call for gathering comprehensive data.

[10] Michael Turner, Patrick Walker, Sukanya Chaudhuri, Joseph Duncan, Robin Varghese and Walter Kitchenman, "A Reexamination of Who Gains and Who Loses from Credit Card Payments" (2012)

merchant costs with merchant profits rising and falling with merchant costs. Survey evidence from the U.S. and experience resulting from policy changes in Australia suggest that the merchant pass through rate is highly unlikely to be 100%, particularly in the short run and possibly in the medium run.[11] If a somewhat lower pass through rate is assumed, say 70%, then the cross subsidy of minus $11 would fall further to minus $8. That is, the original cross subsidy from the Boston Fed study of $29 has been reduced by 72% simply by modifying three assumptions to make them more reflective of the contemporary U.S. retail market.

Rewards

Assuming a 1.3% cost of non-credit card payments and two merchants, when factoring in the dollar value of benefits awarded to rewards cards participants, all income tiers experience net gains. This is partly driven by the fact that even among households with the lowest income, reward cards are used. In fact, there appears to be a trend towards greater rewards penetration among all household income groups and a more egalitarian distribution of reward cards across households by income.[12]

By balancing a consumer's ledger with the dollar value of costs and benefits, the PERC replicated cross-subsidy estimate from the Boston Fed staff study (2010) from low-income households to higher income households is entirely eliminated.

Alternate Dataset

To test the value of using different underlying data sets, PERC used a Phoenix Marketing International (PMI) data set to calculate price/POS cross-subsidies. The PMI study is based on consumers surveyed between June 2009 and June 2010, and includes data on credit card and non-credit card spending for consumers from different income groups. In all, 21,866 consumers who had a credit card were surveyed. Unfortunately, the data set did not have spending for households with incomes under $20,000, so the SCF was used for this. The data set also did not have spending for those without credit cards. As such, comparisons between the two should be treated with caution. The value of using the PMI data was both to highlight the fact of data limitations, and to use a separate source of data.

---

[11]PERC. PERC/ORC Consumer Survey, 2012. PERC Business Survey, 2012.
PERC/ORC Survey of 2,000 credit cardholders was an online survey. 1,589 were reward cardholders. Additionally, 501 non-credit card holders were surveyed. The online survey was carried out by ORC in January of 2012.
PERC Business Survey was a telephonic survey during the last week of January and the beginning of February 2012 , it included 558 small business owners. The retail sector was oversampled and the public administration sector was undersampled. For all other sectors, the sample differs by no more than 4% from the aggregate data. The survey included small business operators in the gulf coast states of Louisiana, Florida, Alabama, and Mississippi.
[12]Comparing the PERC/ORC consumer survey in 2012 with the OSU Consumer Finances monthly survey in 2007-2008 data, shows that the reward card penetration rate on those card holders with household incomes under $20,000 was 64% of the rate of those with household incomes over $150,000 in the 2007-08 data, and 74% in the 2012 data.

Changes in Consumer Spending

In order to understand how an increase in sales and profits from accepting credit cards might impact a POS cross-subsidy, the following crude calculation was made. First, non-credit card transactions were assumed to have a 1.3% average cost. It is further assumed that merchants earn a 20% average markup or profit on goods and services sold.[13] In this case, if 3.5% of credit card spending were new spending, then this would completely cover the 0.7% additional cost to the merchants of accepting credit cards over non-credit card purchases.[14] In this case, there would be no cross-subsidies because the additional costs of credit cards are fully recovered through additional sales. On the other hand, if 5% of credit card spending was new spending (which would reflect a modest 1% rise in total sales) then the direction of the cross subsidy would be reversed.

Given that the majority of small businesses surveyed by PERC in 2012 reported additional sales attributable to credit card purchases, and many reported that credit card users buy more when using credit cards, assuming an increase in total sales as a direct consequence of credit card use seems reasonable.[15] The question is likely not whether credit card acceptance and use increases retail sales, but by how much. The reality may be far more than the 1% increase hypothesized here. If so, then the entire discussion of a subsidy of card users by non-card users becomes moot.

Other issues

The minus $11 cross-subsidy for the low-income group found in this study is small by most measures. For instance, it is less than 3% of the total cost of payment processing for this group and less than a tenth of one percent of consumption (total spending) for this group. This cross-subsidy—if it exists at all—is dwarfed by credit card interest payments paid by this group (which are nearly 30 times as large) and is less than the dollar value of credit card rewards received by this income group.

And if credit card use increases retail sales (as noted above) and/or if higher income/ credit card using shoppers disproportionately purchase items with higher mark ups it is also possible that cross-subsidies are nonexistent, or that lower income households receive a subsidy from higher income households.

Again, the assumptions and framework make a dramatic difference in the findings. For instance, assume the following:
(1) a cost of non-credit card payments of 1.3%,
(2) a cost of credit cards of 2%,
(3) two groups of consumers (high income and low income),
(4) one merchant that serves both groups, and,
(5) members of high-income households purchase goods and services with mark-ups 7% higher than members of low-income house holds.

---

[13]This level of markup is not unrealistic and may even be conservative. For instance, see gross margins by retail segment at http://www.retailowner.com/Benchmarks.aspx, and see http://www.ericsink.com/bos/Product_Pricing.html and http://www.ehow.com/info_12006023_normal-markup-percentage.html

[14] This can be seen since the additional profit from the new spending would be 20%*3.5%*credit card sales = 0.7%*credit card sales. Since merchants are paying an extra 0.7% (2%-1.3%) for credit card sales, the additional profits cover the additional cost of accepting credit cards.

[15] PERC. PERC Business Survey. 2012.

Chart 1: POS cross-subsidies findings for $100,000 and $100,000+ household incomes

An example of this would be if members of low-income households paid an average mark up of 20% and members of high-income households paid an average mark up of 21.4%. That is, a slight, practically irrelevant difference. In this case, however, the direction of the POS cross-subsidy reverses, with high-income households subsidizing lower income households.

Without a better understanding of this (the way costs are actually passed on to customers), whether or not there actually exists a cross-subsidy, let alone the direction of a potential POS cross-subsidy are both entirely unclear.

By combining reasonable assumptions such as heterogeneous markups within a store (different goods have different margins) and varied shopping patterns across merchants with different merchant fees by type of card and merchant, it becomes clear that estimating potential POS cross-subsidies in the real world is very challenging. The table below summarizes some of the different findings from the PERC study that uses the same general methodology as the Boston Fed staff study (2010), but then modifies assumptions and the framework. These simple modifications yield dramatically different results.

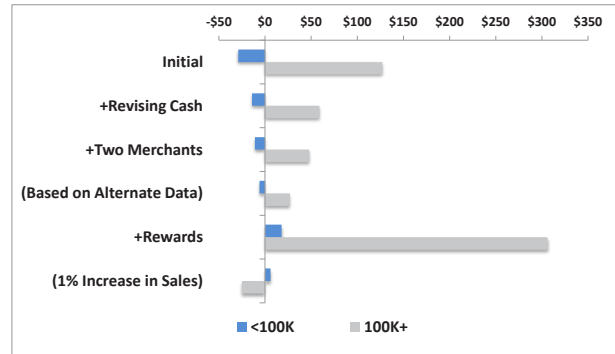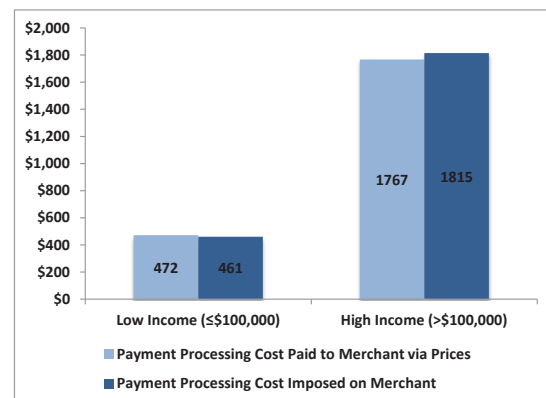Chart 1 summarizes some of the different estimated cross-subsidy estimates.

Chart 2 shows the small scale of the cross-subsidies, which graphs the high income and low-income groups for the "Two merchants" case from above. The cross-subsidy, either received or paid, is the difference in the height of the bars for each group. So, the high-income group receives a subsidy since the processing costs it imposes on the merchants is more than the costs it pays. The opposite is true for the low-income group.

The difference in the height of the bars for each group is barely perceptible.

Chart 2: Processing Costs and Cross-subsidies for High- and Low-income Households

4. Conclusion

The rapidly evolving payment market landscape—driven in part by technological innovation—complicates attempts to analyze the system, and shortens the shelf-life of such analyses. The biggest risk of making policy changes under these circumstances is that they may have a chilling effect on innovation, or may result in other unintended consequences. While this risk is always present to some extent, it is particularly true for a market as complex and fast-changing as this one, which has so many new players—pre-paid, online, digital financial services—that it is very difficult to anticipate its nature and operation over the next five or ten years.

A real danger with enacting policy based on an analysis of only one part of a very complex system is that policymakers will engage in a "whack-a-mole" strategy. Some fees will be "whacked" down, only to see fees pop up in other areas. If the distribution patterns of the new fees are found to be unfair, then these fees in turn will be targeted, and so on. Such an outcome would neither help consumers or commerce.

Specifically, this study finds a general lack of confidence in any particular cross-subsidy estimates (or conclusions based on them) given a combination of factors:
(1) there is a lack of robustness in estimated cross-subsidies depending on the data sets used and/or assumptions made;
(2) the size of the POS cross-subsidies is relatively small;
(3) other key elements of the payment system that have an impact on consumers are excluded;
(4) there are uncertainties regarding the impacts on sales and profits from accepting credit cards; and,
(5) there are uncertainties regarding how costs are actually passed on to customers.

One key aspect of payment choice deserving deeper consideration is consumer behavior. Do consumers spend more with credit cards? Are they more likely to make larger purchases with credit cards? Are consumers willing to pay more for a particular good or service because the use of credit cards gives them greater confidence or makes them less price sensitive? If so, then increased costs associated with accepting credit cards could be covered by increased income generated by increased consumer spending or more profitable spending. And it may simply be the case that higher income / credit card using consumers purchase items with higher mark ups, which disproportionately contribute to merchant profits and cover merchant costs. In these cases, the use of a simple cross-subsidy framework for a study such as this one and the one conducted by the Boston Fed staff (2010) may be altogether inappropriate. In absence of solid answers to these questions, the true magnitude and direction of POS cross-subsidies remains unclear.

So long as consumers use different payment methods, there will undoubtedly be different costs (and benefits) associated with them for merchants. These will also vary among merchants. Although merchants can choose to provide discounts based on payment method, the fact that most do not

choose to do so is compelling evidence of the lack of support for such a measure in the market. Majorities of both cardholders and small business operators expressed opposition to multiple pricing schemes. Cardholders opposed it believing it to be confusing, as did the merchants.[16]

Cross-subsidies (or at least what could be viewed as cross-subsidies) exist in nearly every industry as a result of system inefficiencies, lack of perfect information, and unwillingness to charge every customer different prices depending on the associated costs of specific customer transactions. For instance, airlines offer free coffee to all passengers, even though only some will drink it, some restaurants offer free Wi-Fi to customers, even though only some will use it, and some hotels have pools and gyms, even though only some guests will swim and workout. These practices, and countless others, could result in cross-subsidies since certain customers benefit without explicitly paying for the benefit.

Some cross-subsidies may be seen as progressive, some may be seen as regressive, and some may not fit either category. In some cases, like free coffee on airlines, it may be difficult to argue that the benefit increases demand and pays for itself. In the case of credit cards, however, it may be that some or all of the cost is recouped through increased demand. Even excluding this possibility, the results of this study indicate that, to the extent that a cross-subsidy exists between credit cards and other payment methods, it appears to be nominal.

[16] PERC. PERC/ORC Consumer Survey , 2012 & PERC Business Survey 2012.

PERC

RESULTS AND SOLUTIONS

PERC

302 E. Pettigrew St., Suite 130

Durham, NC 27701

p: +1 (919) 338-2798

f: +1 (919) 640-8881

www.perc.net