

THE COST OF CASH IN THE UNITED STATES

BHASKAR CHAKRAVORTI & BENJAMIN D. MAZZOTTA



THE INSTITUTE FOR
BUSINESS IN THE
GLOBAL CONTEXT

THE COST OF CASH IN THE UNITED STATES

Part one of a series on the cost of cash around the world, including
Egypt, India, and Mexico.

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RAI STONES

Stone discs were used as a form of currency on the island of Yap



INTRODUCTION

On the island of Yap, in the Western Pacific, large discs made of limestone—some up to 12 feet in diameter—were used as form of currency for important social transactions such as marriage, inheritance, political alliance and, in times of great need, in exchange for food. Most of the time, these heavy stone discs did not change hands; everybody in the village just acknowledged that the stone had a new owner. The stone need not even be on the island to be regarded as something of monetary value. Once upon a time, according to Yap lore, a stone disc was lost at sea by a crew bringing it back from a limestone quarry on another island. Everyone on the island accepted the crewmen’s account that the stone lay at the bottom of the sea and so, granted someone’s claim over its value. This stone, or the idea of it, was thereafter considered good money and accepted as fair compensation.¹

Money is an abstraction built on trust. As such, alternatives to the most tangible form of money—currency or cash—and its replacement with cashless payments have become possible. Such an ecosystem is one where no transaction requires money in the form of notes and coins, and where value can be exchanged through the transfer of information between transacting parties.

MONEY IS AN ABSTRACTION BUILT ON TRUST.

There have been multiple waves of such alternatives. Established alternatives to cash include checks, credit cards, debit cards, and prepaid debit cards. More recently, innovative options have sprung up that not only threaten to imperil the ubiquity of cash but also upend the traditional payment ecosystem. These include smartphone-enabled credit card acquirers, such as Square, and Automated Clearing House or ACH acquirers, such as PayPal and Dwolla. And then there are even more ambitious alternatives to cash that have been proposed, such as Bitcoin, a web-based cryptocurrency. Unlike traditional money, such alternatives do not derive their value from government fiat. Each of these alternatives have evolved networks within which they are uniformly accepted as a means of payment; the more established alternatives, of course, have the widest networks.

This study starts from a simple observation: cash derives its value from the information it contains and is a classic information good, which can be replaced by a digital substitute.²

1 William Henry Furness, *Island of Stone Money, Uap of the Carolines* (Philadelphia: J.B. Lippincott Company, 1910).

2 Hal R Varian, "Markets for Information Goods," October, 1998; Carl Shapiro and Hal R. Varian, *Information Rules: a Strategic Guide to the Network Economy* (Harvard Business Press, 1999).

Today most information goods with a sufficiently developed digital substitute have been disrupted and displaced. Cash, however, is different from the usual examples that spring to mind: communication, music, movies, and, increasingly, books. Money in the form of cash is a tangible embodiment of value. Cash is itself nothing more than a promise to pay: a completely interchangeable, transferable promise to pay the bearer. The purpose of money is to have stored wealth on hand for purchases today and tomorrow. Individuals derive a certain utility from holding cash that stems from many factors combining rational, behavioral, institutional and emotional drivers. That said, cash must be held in physical form, counted, guarded, and accounted for. It can be difficult to transport and send. Being possibly the last thing you can expect to recover from a stolen wallet, acceptable everywhere, and anonymous, it is inherently insecure. In any serious quantity, most legitimate businesses prefer some other party, such as a bank, to handle cash on their behalf. In other words, cash satisfies two of the most significant criteria of digital disruption: there are viable digital alternatives with wide networks of adopters and cash presents the carrier with multiple forms of disutility or costs.

This begs the questions: why has cash not been completely displaced, what are the costs and benefits of its continued use, and what are the implications for innovation in the use of cash and its alternatives?

There are many factors that account for the continued prevalence of cash use:

First, there is a powerful force of habit and inertia that helps lock in behaviors and expectations, particularly when there are multiple stakeholders involved. Both parties to a transaction must be plugged into a compatible network. Both the payer and the payee must have compatible payment accounts, whether with depository institutions, issuing and acquiring banks, or disruptive innovators such as Bitcoin and Paypal. If payer and payee do not have compatible accounts, third parties such as check cashing stores must stand in for one of the counterparties' depository institutions. Merchants are used to processing payments in the same way their customers are used to paying for them. Everyone finds the status quo convenient and can be assured that all stakeholders accept cash as a legitimate form of payment. Adopting a new payment interface, whether it involves a new interface for an existing account or a new set of hardware to acquire payments from familiar payment cards, entails new behaviors, risks or expectations that merchants and consumers are ill-equipped to assess.

Second, network effects are hard at work in endowing money with value. Because more or less everyone accepts it—including the government and banks—money is the natural way to denominate prices in the economy. Cash can, in principle, be used to buy, well, anything that money can buy. The origins of currency notes are in promises to redeem the notes for something scarcer still: a quantity of precious metal, or an amount of money issued by a different authority. But with the closure of the gold window in 1973, money became a snake biting its own tail, a promise to repay the bearer with an abstraction, a dollar is, ultimately another identical currency note. Cash represents the ultimate guarantee to all sides of the transaction. In a way, holding cash provides a sense of comfort and assurance, which is an important consideration for consumers who wish to have a certain minimum amount of cash.

THE CENTRAL INCONVENIENCE OF MONEY IS ITS VERY PHYSICAL MANIFESTATION.

Third, cash gives the spender a sense of control over spending and visibility over how much of a budget has been expended. This feature is convenient not just for the spender but also for others who care about the spender's budget—for example, parents who wish to establish limits on their children's spending.

Fourth, cash offers anonymity and financial privacy. This feature is a strong motivation for many consumers who do not wish to establish a traceable record for their personal transactions in general or for particular purposes.

Fifth, there are multiple alternatives to cash, ranging from credit cards and checks to mobile payments services, among others. The field is quite fragmented, particularly for newer alternatives, which creates barriers to adoption, since every potential adopter may worry about whether they can reliably use the option as a substitute for cash in a sufficiently wide variety of transactions.

Sixth, in order to truly see cash replaced with alternatives, key traits of the tangible features of currency would have to be replicated. Something or someone would have to ensure that when an e-dollar entered one person's wallet, it also left the wallet of some other person. An e-dollar, shouldn't be allowed to be in two places at once, but there are very few examples of such technology in the world. By default, most computer files can be copied. If one copy of an e-dollar exists, as many copies of that e-dollar as one might want can be created. A whole field of cryptography undergirds the software used to decide whether or not a book can be read on a specific Kindle, whether or not a song can be played on a specific iPod. Attempts to circumvent that digital rights management (DRM) software are a felony, and the subject of contentious debate on college campuses and in Congress. The technology to implement DRM, essentially a system of cryptographic locks, on every e-dollar in the economy is just not there yet. And there is good reason to suspect it never will be. DRM is highly contextual: it only works within a given ecosystem of software used to read and play the files. It also depends on a central database of permissions that decides whether or not to allow the file to be read. So aside from the bandwidth and hardware requirements that would be necessary to create true digital money, the anonymity of cash would also have to be compromised. A dollar bill has no idea who is holding it. But a system of digital payments, such as mobile money, cannot operate independent of the notion of account holders, at least not today. Mobile money systems, for all the metaphors, behave much more like bank accounts than they do like money itself. So with digital innovation one must be on guard against misnomers and false analogies.

Seventh, major factors that get in the way of scaling up alternatives to cash, such as mobile payment systems, are the regulatory constraints and the separate silos within which the relevant industry players—banking services, telecommunications, software, retail—operate. Mobile payments require a degree of cooperation across these industries. Such coordination and agreement is difficult to orchestrate.

In summary, cash has several benefits and there are switching costs that deter users from turning to alternatives and displacing cash altogether. Currency retains several appeals as a means of payment, only some of which will be replicated by innovators. It requires no intermediaries; any two counterparties can come together face to face and transact with precision and speed. It is anonymous as it bears no record of the user's identity. All other payment systems are based on account balances tied to identities. There is no mobile money or other digital solution on the market today that provides the same type of anonymity cash provides. Cash is tangible, and bearers get constant feedback about current balances (provided balances are small). Transactions are usually instantaneous, and once money is handed over the remaining balance is visibly lessened. This constant feedback about remaining balances can be leveraged for any variety of purposes, such as sticking to a budget or reinforcing the pain of spending. Because digital signals can be replicated, there is no such thing as a unique copy of a file that can replicate this tangible, anonymous, and disintermediated store of value in the same way that a coin and a currency note can.

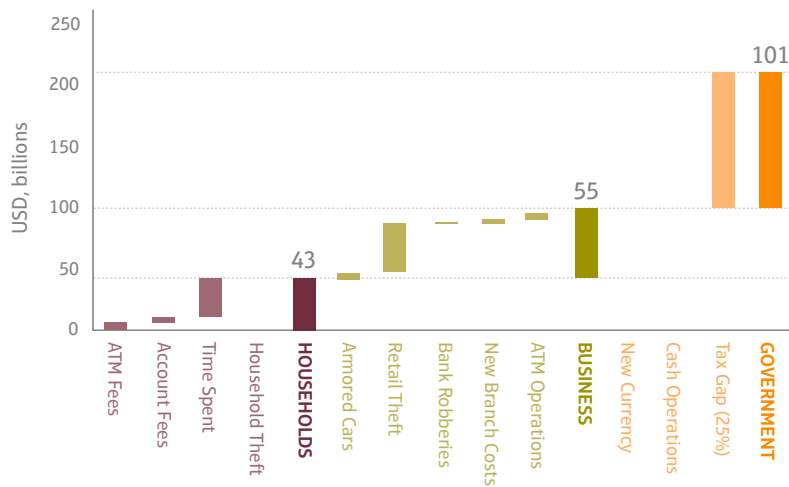
On the other hand, the central inconvenience of money is its very physical manifestation. Because money is somewhere, it must be brought somewhere else in order for a payment to be completed. No fax machine or website shopping cart can move the money from your wallet to the merchant. Bills distributed by mail take pains to warn the payer not to remit cash by mail, since the cash might be lost in transit. In order to transact in cash, two counterparties must arrange to meet face to face, or entrust a courier with the cash for delivery. These costs of travel, and the risks of loss, make cash seem hardly an ideal medium of payment. And yet cash comprises a large proportion of transactions in the economy, and not only in the peer-to-peer space where electronic payments were (until recently) expensive to accept.

So, then, what benefits can be gained from continued use of cash, and what costs might push users to more widely adopt alternative payment methods? This report is part of a larger study, performed by The Fletcher School at Tufts University's Institute for Business in the Global Context (IBGC) that seeks to ascertain the private costs and risks of cash management facing each of a set of stakeholders in the American economy: consumers, firms, the government, and also financial institutions. It does not intend to evaluate the likelihood of cash use falling to a given level. Unlike much of the academic work previously done in this area, which focuses explicitly on the analysis of social costs with a view to inform public policy, IBGC's approach uses opinion surveys to collect data from stratified samples of American consumers and merchants to understand the real costs and risks they face as private actors in their usage of cash. The findings are then integrated with estimates based on secondary research and analyses.

Figure 1 provides a summary of the cost of cash to various stakeholders. The estimates below are based on highly conservative assumptions. On aggregate, the cost of cash in the United States is \$200 billion annually.

FIGURE 1. COST OF CASH SUMMARY

Annual Cost of Cash in the United States Stakeholder, Breakdown





PAYING FOR CASH

Consumers spend approximately 28 minutes per month traveling to the point where they access cash.



CONSUMER STUDY: OVERVIEW AND FINDINGS

Introduction

Consumers invest considerable time and money in managing their personal finances. Increasingly, as electronic payments—phone, card, and computer—continue to gain market share of payment transactions in the United States, the cost of cash transactions is increasingly unclear and the costs of managing cash are rarely measured. As part of a larger initiative which seeks to understand the changing landscape of global payment systems, this study attempts to document the “Cost of Cash,” hoping to understand the financial, time and productivity outlays associated with cash use in the United States for consumers, businesses, and governments.

In order to understand the actual and perceived impact of cash on consumers, The Institute for Business in a Global Context (IBGC) conducted a survey of 1,000 Americans. The questionnaire assessed how respondents obtained cash, how often they exchanged cash for checks or bank deposits, the aggregate cost of cash management, and the determinants of those costs. This chapter will describe the research design, and will then evaluate reported cash usage and aggregate private costs of cash management, disaggregating the analysis of the survey’s findings by demographic and financial features. Finally, a simple model is proposed that could, based on the stylized facts of the survey’s findings, explain why the cost of cash management might vary with financial features of the respondents.

**THE COST OF CASH IS HIGHER FOR
POOR AND UNBANKED AMERICANS
THAN FOR OTHER GROUPS.**

Study Design

IBGC’s study used random telephone digit dialing within contiguous blocks of 100 phone numbers and computer-assisted telephone interviews, with the assistance of an external vendor. The interview covered consumer behavior and attitudes regarding the use of cash. The sample was stratified by income, racial self-identification, educational attainment, and urban centrality. The twelve-minute survey consisted of questions that covered the respondent’s demographic and employment profile, portfolio of payment accounts, and specific habits and perceptions related to cash use. Most answers were closed-form, requiring a multiple choice selection or a single number as a response. Key demographic questions are described in detail below.

DEMOGRAPHICS AND EMPLOYMENT PROFILE

The survey collected demographic data including racial self-identification, educational attainment, and urban centrality. In addition, employment information such as employment status, and the payment method for receiving income was collected. Respondents were asked if they had a bank account and if they used check cashing services. In this report, income source refers to how the respondent earns a living: through a job, help from friends and family, investment income, or various types of government support. Separately from the discussion of income source, respondents were asked to identify their occupation. This section of the interview also asked about financial access: meaning which commonly held assets the respondent had, such as a checking account and savings account.

INCOME AND CASH SOURCES

Respondents were asked about how they typically receive income and, separately, how they typically obtain cash. Distinct from the income source, these answers are referred to as the income instrument and the cash source. Income instruments are paychecks, Direct Deposit, cash, and a few other choices. Cash sources are bank branches, check cashing stores, ATMs, employers, friends and family, or a few other places where cash might typically be accessed.

Additionally, respondents recalled recent cash access events in the past 30 days. For each event, the respondent was asked when the cash was received or obtained (in number of days past), the amount obtained (in dollars), the type of cash source (ATM, bank teller, employer, friend/family, etc.), the time required to get the cash (in minutes), the mode of transit used to get the cash, and the fees paid for the transaction (in dollars), if any. For those that received income in cash, respondents specified how that cash was typically stored: as hard currency on hand, in a bank account, on a prepaid or stored value card, with a trusted acquaintance, or in some other way.

RISK PERCEPTIONS

IS CASH SAFE?

To estimate consumers' risk preferences with regard to holding cash, consumers were asked whether they find some cash balances "too large." Without suggesting any specific cause of risk (e.g., theft), a binary yes/no answer was solicited regarding whether a sum could be too large to hold in cash. If yes, the consumer was asked how much and how best to handle the cash: deposit, entrust, spend, or give it (away).

IS CASH NECESSARY?

In order to estimate consumer's perception of cash's necessity, respondents were asked if there was "A there a minimum amount of cash that you always try to keep on hand?" No specific scenario (such as an emergency fund, enough for a tank of gas, enough to settle an informal debt, etc) was given. This question was designed to estimate an observable consequence of obligatory (i.e., necessary) cash balances.

Total individual and household cash balances, (i.e., the amount of cash in the wallet and in the house), were also assessed. Finally, respondents were asked about decision rules related to the cash balance: whether they had maximum or minimum preferred cash balances, and how consumers with preferred cash maxima avoid holding too much cash on hand.

ANALYSIS

The following sections describe the results of the logistic regressions that explain the likelihood of paying for access to cash, the likelihood of traveling farther than average to obtain cash, and whether the costs of cash are systematically higher among certain groups.

Key Findings

The consumer survey yielded three key insights:

- **The cost of cash is higher for poor and unbanked Americans than for other groups.** Poor Americans who lack access to formal financial institutions carry larger amounts in cash and pay the most fees in aggregate terms for cash access transactions. Well-banked wealthier Americans, on the other hand, report carrying far lesser amounts in cash, traveling less to access cash, and pay few, if any, fees.
- **The costs of using cash do not accrue at points of sale.** Since merchants rarely provide discounts or surcharges for using cash at the point of sale, the costs of cash manifest elsewhere in the lifecycle of cash. This could mean, among other things, costs that accrue as a result of the time or money spent in making trips to a bank, ATM, or fees to cash checks.
- **Personal cash theft is a relatively minor problem** for American consumers, who lose less than \$500 million through such crimes, but pay close to \$8 billion dollars in fees for ATM transactions outside of their account-holding bank's network. This is an interesting contrast to the high costs that businesses bear from cash theft.

Detailed Findings

WHO HOLDS CASH?

Households generally carry small cash balances. The middle three quintiles of US households (those earning approximately \$20,000 to \$100,000 in annual income) report that they usually carry cash balances of under \$100.

The survey explored cash usage in detail, and found that the prevalence of cash in a household is correlated with key financial and demographic traits. Preferences for cash and for higher cash balances demonstrated a significant relationship with the traits explored in detail below.

DEMOGRAPHIC TRAITS:

The demographic traits of age, income, race, and gender had durable influence on cash holdings, perceptions, and costs.

AGE

Americans under 35 have median cash balances roughly half those aged over 55, but pay more in fees than older Americans. Several factors may be at work here. As individuals age, they are likely to earn more and accumulate assets, and therefore they may simply have more money that could be held in cash. Additionally, older Americans prefer using bank tellers for transactions, a practice which typically carries no fee. Consumers using check cashing, ATM cards, and types of cash advances may face higher charges in some locations. Older Americans also access cash far less frequently, perhaps because of the temporal distribution of income, reduced mobility, or long established habits.

INCOME

Richer Americans carry more cash in their wallets. Median cash balances for those earning over \$60,000 are about the same as those of people earning less than \$40,000. Income correlates not only with age, but also with higher levels of education. Furthermore, the rich tend to hold more different types of payment instruments, and to be more aware of the risks of accidental or malicious cash loss. Perceptions of the risks associated with cash are explored in detail below.

RACE

Among racial groups, Latinos, Pacific Islanders, and American Indians report much higher average maxima of cash holdings, as compared to white, African American, and especially Asian Americans. African Americans and Pacific Islanders are likely to hold minimum balances nearly double those of other groups.

GENDER

Men carry nearly double the amount of cash that women do. Men are slightly more likely to keep some cash always on hand than are women, and they use roughly 50% more cash per month than do women.

FINANCIAL TRAITS:

The financial traits investigated included: whether the household has access to formal financial institutions through a bank account, the types and sources of income the household receives, and the way in which the receive income, or payment instrument. They were found to be correlated with who holds higher cash balances and who pays more for cash.

BANKED STATUS

The unbanked access greater amounts of cash in a typical month than those with bank accounts. Those with bank accounts are roughly twice as likely to report that it is possible to hold too much cash. The unbanked, meanwhile, report substantially higher ceilings on cash balances if they have them at all, in absolute terms and not adjusted for income.

EMPLOYMENT STATUS

Self-employed and multiple job holders had the greatest cash balances (not adjusted for income), and the unemployed and those on disability held the least. Employees and the unemployed were the most likely to report that it was possible to hold too much cash. Those receiving federal benefits, including Social Security, were about half as likely as others to think it was possible to hold too much cash.

INCOME INSTRUMENT

The payment instrument by which the consumer typically receives income can greatly affect the number of cash access events required in a given month and the source of funds. Direct deposit transactions from an employer lend themselves very well to access via ATM, cash back transactions at the point of sale, and other comparatively cheap and ready sources of cash. Paper checks received by the unbanked may require high fees and long wait times to be converted into cash, but the number of cash access transactions may be quite small. Of course, informal transfers received as cash needed no separate transaction to be held in cash.

WHAT COSTS DO CONSUMERS PAY FOR CASH?

After understanding who holds cash, the study investigated what costs people pay for their cash. There are four main costs that consumers must pay for cash: fees, time, theft risk, and theft risk mitigation. Many consumers pay fees in order to access cash, such as ATM withdrawal fees and check cashing fees. The time and money spent getting to the bank or check cashing store are also important costs. Additionally, consumers bear costs for the risk of cash theft, and the costs to mitigate that risk, such as periodic fees on deposit accounts and prepaid cards used to avoid holding large cash balances. Each of these costs is explored below.

ATM AND CHECK CASHING FEES

Many customers that use ATMs away from their account holding or “home” bank pay fees to access cash. About 80% of ATM transactions are cash withdrawals,³ and the vast majority of home bank ATM transactions are free. Therefore, the survey focused on the fees due for non-home bank ATM transactions. Nearly \$8 billion in fees is collected from these transactions annually. Some 2.1 billion fee-carrying ATM transactions occur annually in the United States.⁴ On average, these transactions each incur about \$3.85 in fees, counting both home and host institutions.⁵

In addition, check cashing services generate approximately \$200 million in additional revenue.⁶ The majority of other cash access transactions are either free or nearly free.

3 Chris Costanzo, “ATMs Unplugged,” *Community Banker* 11, no. 10 (2002): 24.

4 Federal Reserve System and McKinsey, *The 2010 Federal Reserve Payments Study*, 2010.

5 *ATM Fee Survey of Westchester County Banks*, 2010.

6 Christine Bradley et al., “Alternative Financial Services : A Primer,” *FDIC Quarterly* 3, no. 1 (2009): 39–47.

THOSE PAID IN CASH REPORTED THEY WERE COMFORTABLE HOLDING \$12,000 MORE THE AVERAGE.

TIME

Consumers spend on average approximately 28 minutes per month traveling to the point where they access cash. (Queue time was not included in the study's time cost calculations.) However, there is a high degree of variation in time costs faced by consumers, and the median trip to fetch cash was just five minutes. If the average time cost of 28 minutes monthly were distributed across the American working population, it would equal nearly 5.6 hours per year per individual spent fetching cash, worth a collective \$31 billion at the mean wage. Few would suggest this is time Americans would otherwise have spent working, so the tradeoff is most likely in leisure time and not directly in earnings. Nevertheless, it is indicative of just how much time in the aggregate is spent managing currency.

Part-time workers, retirees, the unbanked, and those in the second income quintile (making between \$61,000 and \$100,000 annually) show an elevated likelihood of longer time spent to access cash, not controlling for demographic characteristics. The unbanked face a rise of more than 50% in the odds ratio for high time costs. Retirees face a very similar margin, a bit over 50% higher. And part-time employment indicates a rise of about 75% in the odds ratio.

Presenting these differences in minutes, it is evident that banking status and mode of income payment have important time cost effects. Those receiving income in cash spent about 12 minutes longer per month getting to the point where cash was accessed than did others. The unbanked faced additional time costs of about five minutes per month, and the unemployed nearly nine minutes per month. Interpersonal cash transfers required even greater travel times, an average of 15 minutes per month greater than for ATM users.

CASH THEFT

Consumers face a very small risk of cash theft, particularly theft as a personal crime rather than a property crime or housebreak. Households that lose cash due to theft primarily do so as a function of housebreaks and other property crimes, rather than personal crimes. Some 1.8% of households annually report a property crime resulting specifically in cash loss, such as forced entry into a house or motor vehicle. Only about 6 crimes per 10,000 people nationwide result specifically in the loss of cash. All these crimes together, including both property crimes and personal crimes, will total about \$500 million in cash losses.⁷

By almost any measure, cash stocks kept in the house represent a major source of risks to households. Nationwide, nearly fifteen times as many housebreaks result in cash loss as personal theft. The aggregate value of those losses is similarly larger: eight times as much cash will be lost from housebreaks as from personal thefts. If the whole value of the housebreak is considered, counting only those crimes where cash is lost, the value distribution of crimes involving cash is much higher. The median loss for housebreaks involving cash theft is about \$500, versus \$100 for personal thefts.

Relatively few cash theft crimes involve the loss of less than the total amount of cash available to take. Cash is light, fungible, anonymous, and valuable. This makes it an excellent prospect for theft. Thieves do not need to find someone to sell the cash for them. With anything less than tens of thousands of dollars, it

⁷ Bureau of Justice Statistics, *National Crime Victimization Survey*, 2011.

is easy to conceal and to transport. If discovered with the loot, thieves do not have to account for possession of a specific bill, the cash itself presents a limited evidentiary risk to the thief. Cash cannot be tracked in the way that stolen vehicles and stereos can. And finally, cash can hold a lot of value. Even using twenty dollar bills, the weight of \$1 million is 55 kg.⁸ Any able-bodied adult should be able to comfortably carry \$1 million in US \$100, at less than 25 lbs. Even before the circulation of euro notes began, pundits debated whether the European central bank was deliberately courting money laundering and related seigniorage profits through €500 note issuance.⁹ To thwart money launderers, the UK in 2011 banned that note from its exchange houses.

THEFT RISK MITIGATION

Cash theft can be mitigated through a variety of strategies. When cash is likely to be taken from the home or the wallet, those with a better option do not leave it there. They store it using bank accounts, mobile money, prepaid balances with frequent counterparties, paying down debt, entrusting assets to a friend, etc. A host of coping strategies might also accompany the rise in theft avoidance.

Individuals might employ safes, firearms, constant supervision of the home, home and vehicle alarms, and other strategies to limit the risk of successful theft. Holding less cash is the best strategy. On the other hand, most ways of mitigating cash theft risk are not focused on cash. Leaving the lights on automatic timers may help reduce theft. Installing safes and burglar alarms may help reduce theft. Asking the postman to hold the mail during vacations, getting to know your neighbors, and illuminating the areas outside the home can all nudge thieves to target another house. Virtually none of the things that people do to manage theft specifically address cash losses in the way that reducing household balances do.

Keeping money in the bank, no matter how poor the interest rate earned, is a time-honored strategy for ensuring it cannot be stolen. All of the security costs are outsourced to the bank. In the United States, the Federal Deposit Insurance Corporation (FDIC) insures against bank runs, while the Consumer Financial Protection Bureau does its best to ensure consumers earn a return on their investments, or at least do not pay too heavy fees on their accounts.

Exactly how much wealth households keep in cash is something of a mystery. Edgar Feige notes that if all currency were held by households, the average household would have upwards of \$10,000 in cash on the premises.¹⁰ Federal Reserve household surveys gave vastly lower answers. The average consumer held \$291, and the median consumer held just \$78 in total, between cash in the wallet and cash in the home.¹¹ The average withdrawal size was roughly \$120, and the total cash used in a month was \$434 per capita.

8 Friedrich Schneider and Ursula Windischbauer, "Money Laundering: Some Facts," *European Journal of Law and Economics* 26, no. 3 (October 21, 2008): 387–404.

9 Kenneth Rogoff, Francesco Giavazzi, and Friedrich Schneider, "Blessing or Curse? Foreign and Underground Demand for Euro Notes," *Economic Policy* 13, no. 26 (1998): 261–303.

10 E.L. Feige and I. Urban, "Measuring Underground (unobserved, Non-observed, Unrecorded) Economies in Transition Countries: Can We Trust GDP?," *Journal of Comparative Economics* 36, no. 2 (2008): 287–306.

11 Kevin Foster et al., "The 2009 Survey of Consumer Payment Choice" (Boston, MA, 2011).

Since using a checking account is the only reasonable way to minimize the cash risk of theft separately from all the other risk mitigation strategies, this study estimates the cost of consumers' checking accounts from survey data. A careful study in 2009 estimated that, ignoring transaction fees (such as overdrafts and ATM withdrawals), about half of checking account holders managed to escape periodic charges.¹² Banks earned roughly \$460 million in periodic fees each year from the other half of account holders. These fees are not solely due to the desire to mitigate risk of theft loss. Depositors at retail banks get a variety of other services with these periodic fees, such as cheap payments (both inbound and outbound), financial advice and perhaps documentation of assets that would lower the cost of credit. But as a first cut, they seem vastly more specific to the cost of keeping cash in the bank, which is the primary means of avoiding the risk of theft or loss.

HOW MUCH DO CONSUMERS PAY FOR CASH?

After examining the types of costs borne by consumers to access cash, and the distribution of those costs across different groups, the study examined how much consumers pay for cash.

BY FINANCIAL TRAITS

Financial traits, such as employment, financial access, and the instrument used to receive income can all affect the risk that consumers pay for cash access. Figures in this section are described in terms of odds ratios, rather than probabilities. Predictor variables are largely qualitative, meaning that they measure effects based on group membership (such as those with a bank account vs. those without), rather than cardinal (such as numerical age or household income). Those who pay nothing for cash were excluded from calculations about the levels, as opposed to the incidence, of bank fees and wait times.

BANKED STATUS

The unbanked pay on average about \$3.66 per month more than banked consumers. From a statistical perspective, the effect is very strong. Those without a bank account face elevated odds of paying cash fees at more than 3.7 times higher than the background. (To put this in perspective, if there were a 10% background rate and an odds ratio of this magnitude, the prevalence in the unbanked group would be more than 40%. The regression model used estimates log odds ratios, not linear multiples of probability. This is a good thing, because it avoids nonsensical predictions of probabilities greater than 100% or less than 0%. No matter how large the increase in the odds ratio, one should always end up with sensible predictions of probability.)

Controlling for demographic and income characteristics, these results become even more pronounced.

A second regression model was used to estimate whether the effect of financial inclusion on cash access fees is sensitive to demographic variables such as race and urbanicity. Financial inclusion, meaning whether or not the individual has a bank account, is a reliable predictor of whether that individual pays for access to cash. The odds ratio of paying something for cash access rises by 340% (more than four times the background odds ratio), even when controlling for race, income, age, sex, and urbanicity. This rela-

¹² Victor Stango and Jonathan Zinman, "What Do Consumers Really Pay on Their Checking and Credit Card Accounts? Explicit, Implicit, and Avoidable Costs," *American Economic Review Papers and Proceedings* 99, no. 2 (2009): 424–429.

tionship is also statistically significant in the classic sense, meaning the data clearly indicate that an effect of financial inclusion that is different from zero.

In the demographically controlled model, no observable differences exist between urban and rural, between male and female, or between rich and poor, that are not better explained by the ownership of a bank account. The most statistically important demographic factor is race. African Americans are more than twice as likely, as measured by the logit coefficient (2.2) to pay for access to cash. All other racial groups in the sample were at lower risk than African Americans. Latino identity did raise the risk somewhat, but not in a statistically significant manner.

TYPES AND SOURCES OF INCOME

Employment status had a large effect on wallet cash balances and cash perceptions. Self-employed and multiple job holders had the greatest cash balances (not adjusted for income), and the unemployed and those on disability held the least. Employees and the unemployed were the most likely to report that it was possible to hold too much cash. Those receiving federal benefits, including Social Security, were about half as likely as others to think it was possible to hold too much cash.

From **employment status** alone changes to risk are observed. Retirees, who favor in-person bank teller transactions, are 2.5 times less likely to pay for access to cash. However, while many retirees pay no fees, those retirees that do pay fees pay \$3 more per month. By contrast, the unemployed face increased risk of fees at double the background rate. Unemployed people pay a hefty \$11 more per month, and those on disability pay \$6 more per month than the rest.

However, employment status shows no similar robustness to demographic controls. When accounting for age, sex, race, and income, the apparent effects of retirement, self-employment, and multiple jobs dissipate. This tends to support the idea of inertia in payment habits: meaning that habits formed in cash management are slow to change. So there is no reason to suspect that the individual's income source (a paycheck, self-employment, government benefits, social transfers) is more important than personal habits in determining whether they face costs for access to cash.

Income sources matter even more than employment status. Among those that pay for cash, the amount paid by someone on Social Security is about \$8 per month above what a typical employee pays. The self-employed have the lowest costs of all, saving about \$1.40 per month over what a typical employee pays. Possible explanations are at this point purely speculative. Perhaps these individuals (retirees, leave takers, and the disabled) value convenience more and are willing to pay for it. They might prefer cash for careful budgeting, suggesting further that they are keen to avoid risks of credit card bills or bank charges, or that the cards they carry do not provide free access to cash back at the point of sale.

PAYMENT INSTRUMENT

Income instruments also have important effects on the prices facing Americans for access to their cash. Those receiving income by prepaid or payroll card faced average costs more than four times as high as the rest of the sample. The lowest fees were paid by those who received income by electronic funds transfer or directly in cash. Ironically those paid in cash faced the longest travel times to reach the point of access to their cash.

- From the **payment instrument** alone, groups that are more likely to pay for access are identifiable. Receiving income as a prepaid card, such as an electronic benefits card or a payroll card, increases the odds of paying cash access fees by approximately five times.
- **Prepaid cards, on the other hand, clearly increase the risk that some fees will be paid to access cash.** Controlling for age, sex, urbanicity, and income, the prepaid card increases the odds of paying for cash by nearly seven times. This risk does not attenuate the effects of age or race, which are relatively stable with respect to other specifications.
- Finally, IBGC checked whether income source and wealth trump financial access. They do not. In this model, which ignores race, urbanicity, and age, the survey found familiar results. **The risk increase due to financial exclusion is four and a half times.** Due to the fee-avoidance of older Americans, retirees see an apparent risk reduction three times. Receiving income as a prepaid card, rather than bank transfer, check or cash, drives risk up by perhaps 500%. Since there are fewer individuals using prepaid cards to receive income, this last estimate is less certain than the rest.

Payment instruments have a surprisingly strong effect on fees paid. Electronic income payment instruments are significantly cheaper for the recipient than paper checks. Controlling for income, income source and employment intensifies this effect. EFT transfers lower the cost of access to cash by some \$5 per month. EBT and payroll cards are ambiguous, but a plausible effect seems to be about \$2 lower in costs for cash access (among those paying for cash) when controlling for income sources and the level of income. With only demographic controls and financial access (i.e., ignoring what type of income or employment an individual has) payroll and EBT cards appear to lower monthly fees by about \$3, vs. \$5 for EFT and \$4 for cash, relative to costs incurred by those receiving paper checks.

Households with good financial services do not require much cash, and typically receive income at no cost. When they want access to cash they can choose between zero-cost methods and paying a fee for convenience. Apart from occasional transactions, they overwhelmingly choose free access to cash. On the other hand, barriers between paper checks and the cash economy exist. The risk of paying for cash is higher among the unbanked. And the level of payments for cash has everything to do with financial traits — such as bank account ownership, the type of payments received, whether the individual has a job, what types of benefits are received — all of which reveals something about the role that cash plays in the household books. Is cash a primary means of receiving income, making purchases, buying financial services, and saving for the future? Or is cash simply a convenience account held off to the side from disposable income? The answers to these questions go a long way toward determining the risk of paying for cash.

NEITHER INCOME NOR FINANCIAL INCLUSION HAS A TERRIBLY STRONG EFFECT ON WHETHER PEOPLE HOLD THE VIEW THAT CASH IS NECESSARY.

BY DEMOGRAPHIC TRAITS:

AGE

As discussed above, older retirees are 2.5 times less likely to pay for access to cash, given their preference for banking with a teller. However, while many retirees pay no fees, those retirees that do pay fees, pay \$3 more per month than the average consumer.

INCOME

The lowest income Americans paid the most in fees for cash access. They paid the most for cash in absolute terms, not as a percentage of income or as a percentage of cash balances. This is an unsurprising finding, but it refutes the idea that cash is somehow better suited to low-income households. Meanwhile, higher income Americans generally held higher cash balances, and were more likely to appreciate the risks inherent in carrying larger amounts of cash. Frequency of cash access correlated positively with income, with the lowest quintile's median reporting a single cash access event per month. It would not be surprising if many low-income individuals relied on a monthly fixed income or informal transfer that was immediately cashed.

Income has a weak effect on the likelihood that consumers pay for access to cash in a typical month. The top income quintile faces an increased odds ratio of about two times relative to the bottom quintile, but the effect is not linear through the middle class. The prevalence of fees for cash access among the top 60% of the income distribution is clearly higher than for the lowest 40%, but this effect dissipates when controlling for financial access and employment. There are likely two opposing effects at work: the wealthy are more likely to have cash access offered to them for free, since they are among the better clients of financial institutions. On the other hand, since their time is more valuable, the wealthy may be willing to pay more for the convenience of cash access, even if cheaper alternatives abound.

Income also decreases the amount that individuals pay for cash access. Every quintile that an individual climbs from the bottom 20% to the top 20% reduces monthly expenses for cash by about \$0.65. And although the industry in which the individual works has no effect, employment status itself does matter. Those on leave and on disability each pay large increases above what employed individuals pay: nearly \$12 on average for those on leave and more than \$5 for those with disabilities.

Controlling for all of these variables at the same time, the picture comes into sharper focus. The durable statistical effects come from income, financial access, and employment status—particularly the disabled and leave-takers. Controlling for race, sex, urbanicity, and census region the story is again the same. If anything, these demographic controls highlight the importance of financial access, the lack of which drives up the average paid by over \$4 a month.

CASH HABITS AND PERCEPTIONS OF RISK

FINANCIAL ACCESS: BANKED VERSUS UNBANKED

Financial access is clearly correlated with the perception of cash risks. Financial access is more important to consumer perceptions about risk and necessity than is income or demographics. Only 23% of the unbanked agreed that it was possible to hold too much cash, versus 43% for the rest of the population. The maximum amount considered safe among unbanked consumers (\$16,000) was more than twice as high as that for banked consumers (\$7,000). Since the unbanked are overwhelmingly concentrated in the bottom 40% of the income distribution, this is a very strong statement of risk perception.

Even controlling for income and education, the unbanked are only half as likely to see cash as risky. Those with bank accounts are roughly twice as likely to report that it is possible to hold too much cash; the unbanked access greater amounts of cash in a typical month than those with bank accounts.

Given that this pool of individuals does not hold deposit accounts, it is entirely possible that they use a variety of other informal or tangible assets to manage cash balances. It is also possible that they hold large debt to income ratios, and spend a good deal of available cash managing those debt balances with whatever cash happens to be on hand. But the views of the unbanked with regard to the risks of cash does not seem to fit the story of a large minority of Americans holding hundreds of thousands of dollars in savings, merely because they find the risk-return profile of cash preferable to deposit and investment accounts.

INCOME TRUMPS AGE

Perceptions about cash vary more with income than they do with age. While those over 65 are particularly unlikely to think that carrying large amounts of cash is unsafe, no obvious trend appears in the middle years between 25 and 65 years of age. The richest quintile, on the other hand, are more than twice as likely as the poorest to believe it is possible to hold too much wealth in cash.

Among income groups, certain groups are disinclined to see cash as risky. The self-employed are 2.5 times less likely to see cash as risky; those on disability 3.2 times less likely; retirees 1.7 times less likely, and homemakers 2.1 times less likely. Income and education both linearly increase the likelihood of holding the risky view of cash. The story that more educated individuals would have considered the risks and alternatives of holding cash makes a lot of intuitive sense. Also intuitive is that the wealthy would have had experience with larger assets stocks, and more experience considering the risks and returns of different asset classes.

VIEWS ON THE NECESSITY OF CASH

The results from the view that cash is necessary are ambiguous. Neither income nor financial inclusion has a terribly strong effect on whether people hold the view that cash is necessary. The top quintile was some 60% more likely than the bottom quintile to see cash as necessary. The bottom income quintile was more different from the median than the top. This means that the wealthy are either better able, or more inclined to keep some cash on hand.

THOSE PAID IN CASH WERE SOME 2.2 TIMES MORE LIKELY TO SEE CASH AS NECESSARY.

However, those paid in cash were some 2.2 times more likely to hold the necessity view. This, if anything suggests that perceptions about the role of cash are driven in part by habits. Those paid in cash may simply be used to using cash for more of their purchases, for prudential self-insurance, for interpersonal transfers. They may shop at places where cash is most likely to be accepted. They may even feel that it is polite or normal to pay with cash when possible.

CASH THRESHOLDS

The levels of cash thresholds tell a very similar story. The survey asked consumers to tell us about their personal level of cash ceiling (the maximum amount of cash they are comfortable keeping on their person or at home), and cash floor (the minimum amount of cash they always try to keep on hand). Cash thresholds matter because a great deal of people's behavior with regard to cash is driven by heuristics and habits. Most people don't make precise forecasts of how much cash they plan to use, or careful estimates of the risks that cash could suddenly become necessary. Rather, some people eventually develop the view that it's just not a good idea to carry more than a certain amount of cash. And other people develop the habit of always keeping a certain amount of cash on hand, if indeed it's feasible to keep that buffer.

What sets the levels of those thresholds? The answers are particularly interesting because these practices are so concrete and so much a part of daily life. Virtually everyone has an opinion on the subject, even if the answer is, "I would be comfortable keeping any amount of money at all in the house. No upper limit!" And the development of those heuristics are plausibly linked to an array of behavioral influences on how people prefer to use cash. Heavy cash users must become accustomed to holding higher balances. Cash hoarders and bank skeptics that derive special pleasure from the tangible presence of wealth might be less nervous to hold onto a lot of money. People who are surrounded by cash-only vendors and farther from cash access points should be more sensitive to the risks of finding one's wallet empty.

At first glance, demographics appear to play a strong role in determining attitudes toward cash; but **financial traits explain the story best**. Looking only at the relationship between age and the cash ceiling, for instance, there is a secular decline in the cash ceiling that amounts to about \$4,000 over fifty years. Women hold ceilings about the same amount lower (\$4,000) and little variation appears across racial groups.¹³ Taking account of financial traits changes the picture considerably. After controlling for financial access, employment, and income, the secular decline in cash ceilings due to age fall to about \$350 over fifty years, enough to notice but perhaps not to write home about. Those paid in cash specifically reported up to \$12,000 higher ceilings than the rest. Controlling for income, the self-employed were comfortable holding some \$14,000 more in cash; and those with multiple jobs nearly \$15,000 more. Meanwhile the unbanked, who are heavily concentrated in the bottom two quintiles of income, were content to hold \$9,000 more as well.

Cash floors show much stronger demographic patterns. Women hold about \$30 less in cash than men. African Americans hold about \$40 more than other groups. Income accounts for about \$40 of difference between the top and bottom quintiles, with fairly linear effects across the middle quintiles. Pacific Islanders hold \$120 more than other groups; while this average is exceptionally high (greater than 82% of responses in the survey), it may also be influenced by the relatively small sample size for this group.

¹³ American Indians, who formed a very small part of IBGC's sample, had overwhelmingly lower rates of bank usage, and consequently higher ceilings for cash, to the tune of about \$32,000.

Financial traits also help determine cash floors. Taking account of demographic differences due to age, race, and sex, stark differences remain. Those paid in cash hold nearly \$80 more than the rest. Those that visit bank tellers, as opposed to visiting ATMs, will tend to keep about \$30 more on hand than do the rest. Finally, financial access is less important than demographics and other features of employment or income. Controlling for demographics, the level of income and whether income is received in cash, financial access itself has no observable influence on how much cash individuals see as necessary to hold.

The most interesting thing about the data on perceptions of cash is that the patterns are much starker than the data with respect to actual holdings on any given day. Cash balances fluctuate enormously through the month. A cash windfall might sit in the home for weeks before it is deposited or used. For those that mostly do not use cash to make purchases, cash might simply sit, ignored, in the wallet for a month or longer. There are few, if any, robust trends in the demographic patterns of cash holdings in the cross-sectional data. Currently central banks are at work on diary datasets that will give us a much better window into how much cash balances fluctuate, when and why. But at the moment it appears that even if the data on cash holdings are noisy, patterns in how people hold cash are emerging: who sees cash as necessary, how much to keep on hand, who sees cash as risky, and how to safeguard balances when they are too high.

Conclusions

Financial access matters. The price for basic cash transactions depends greatly on whether individuals have a bank account. Payment instruments are all promises to pay, in one form or another. Those obligations are discharged either when balances are deposited, converted into cash, or spent at the point of sale. The prices for cash-out transactions are systematically higher for the unbanked than for the typical consumer. Bringing these consumers into the financial system could improve the prices they face in the marketplace, provided the accounts they adopt do not offset gains with additional periodic fees, transaction fees and penalties. Finally, these accounts may dramatically lower the amount of time required for currently unbanked customers to receive income, pay bills, and make purchases.

Demographics matter. For reasons that are not entirely clear, certain demographic groups see the need for cash differently. African Americans report a greater need to keep cash on hand; and women report less need. This is reflected in the likelihood that they keep some cash on hand and the amounts that they keep on hand. It may have to do with the portfolio of payments they prefer to make or the places they prefer to shop. It may have to do with lessons hard learned about the prices they face for financial services and the risks of using noncash payment instruments. But the trends are robust to controls for income, employment, urbanicity, and other measures of financial access.

Habits are hard to break. Because household finances are so important to quality of life, consumers are slow to change habits formed over a lifetime of experience. In the same way that it takes time to become accustomed to a new car or a new computer, consumers become accustomed to paying, saving, and being paid in a certain way. Learning new systems and changing habits takes time. So regardless of the speed with which young people adopt new technologies, comparable changes among seniors will take more time.

Checks are expensive for the recipient. Prior payment studies have focused on the inconvenience of writing, depositing and clearing checks. Now that every smartphone can be a camera and processing of checks is digital, a great deal of the overhead in clearing checks has been eliminated. For Americans with good financial services, checks are no longer a completely paper-based instrument. They no longer need even to visit an ATM, much less a bank during business hours. Moreover, checks are prevalent in business, when counterparties are trusted, payments are infrequent, and post-dating a payment can be convenient. On the other hand, the statistics indicate that particularly for unbanked consumers, the cost of receiving checks in fees and time spent is higher than for comparable electronic payment instruments.

Youth favor electronic balances. Controlling for income, youth tend to hold lower balances on average than older cohorts. On the other hand, these findings do not generalize well to perceptions about the risk and necessity of cash. Controlling for income, Americans in middle age are least likely to see a need to keep some cash on hand. The amounts of cash they find useful are larger.

The risks of cash become apparent when choices become realistic. As incomes and thus assets rise, consumers are more likely to see the risks inherent in holding onto too much cash. Cash also becomes less attractive when consumers entrust banks with their deposits. The unbanked may be less likely to describe cash as risky particularly because they don't see a preferable alternative, such as a bank account, as risk-free.

Cash use occurs in pockets. The chances that consumers will hold cash, that they will make a point of keeping some cash on hand, and the amounts of cash they will be comfortable holding all vary with the role that cash plays in the consumer portfolio. When consumers use cash instead of banks to manage wealth, and when they are paid directly in cash rather than with some other instrument (checks, cards, electronic funds transfers), they use correspondingly larger balances of cash and are more likely to see cash as necessary.

Transaction costs of currency trump risks and risk mitigation. In the aggregate, consumers spend more time and money on currency transactions than they lose from cash's inherent risks. Although cash risks are widespread and simple strategies to mitigate the risk of loss exist (i.e., hold less cash), because theft is rare the aggregate value is not very much. As with many low-frequency events, such as damage to houses and automobiles, consumers might be willing to invest substantial amounts of time and money into risk mitigation, to ensure that they don't get hit with a catastrophic cash loss.



Valuable

GUARDING CASH

Theft risk constitutes the overwhelming majority of businesses' costs of cash.



BUSINESS STUDY: OVERVIEW AND FINDINGS

Introduction

As part of the larger study of the costs of cash in the United States, IBGC conducted a study specifically aimed at understanding the costs borne by businesses, if any, as related to cash. The costs of processing payments from the merchant's perspective can accrue at several points in time.¹⁴ When consumers pay in cash, key actions must occur for the payment to be processed: (1) the cashier accepts the payment; (2) a manager or accountant prepares the cash for bank deposit; (3) the bank may charge a fee for deposits or to restock till cash; (4) the cash may be lost or stolen before it gets to the bank; and, (5) the merchant may pay an armored car to transport the cash.

Based on analysis of potential costs, and in accordance with the approach taken by other key studies of payment choice in America, this study focused on the following principal sources of cash-related costs for businesses:

- Theft risk: risks from theft, counterfeit, and change making errors
- Security costs: armored cars, cash security, and logistics
- Tender time: the value of cashiers' labor in taking payments

The most exhaustive study of payment costs to date in the United States found that more than half of the cost of cash is the cash-in-transit charge, or \$0.16 on a typical cash transaction of \$12.¹⁵ The second greatest share is due to cashier labor, or \$0.11. These two categories plus theft risk account for 98% of the costs associated with processing a cash transaction (with float costs, bank charges and deposit preparation accounting for a rounding error).

These findings suggest that a large part of the costs of cash transactions come from allocating cashier labor and cash in transit costs to cash transactions. Drawing upon these findings, IBGC sought to answer two important and difficult-to-answer questions:

- Would changing payment instruments have any observable effect on the merchant's wage bill for cashiers?
- Would changing payment instruments have any observable effect on the merchant's security expenses associated with cash?

14 Daniel D. Garcia-Swartz, Robert W. Hahn, and Anne Layne-Farrar, "The Move Toward a Cashless Society: A Closer Look at Payment Instrument Economics," *Review of Network Economics* 5, no. 2 (June 1, 2006).

15 Ibid

LARGE BUSINESSES MAKE VERY DIFFERENT DECISIONS FROM SMALL BUSINESSES.

To investigate these questions, and explore the costs of cash to business generally, IBGC conducted a survey of store managers in a broad cross-section of industries (food, transportation, entertainment, health care, lodging, etc.). This survey helps to explore whether there exists a relationship between payment choice (i.e., whether consumers use cash versus a different payment method) and the two above important expense line items.

Study Design

The business study included the collection of new data, and the analysis of new and existing data sources. The new data was gathered through a phone survey of 130 businesses. The results from that survey were analyzed in conjunction with data gathered by the American Bankers Association, the US Federal Reserve, McKinsey, the National Retail Security Survey, and the US Economic Census.

IBGC designed and commissioned a computer assisted telephone survey of 130 businesses drawn from Dun and Bradstreet's global commercial database. The sampling was stratified by SIC code and not by business size. The universe of SIC codes from which businesses were drawn included retail businesses by 4-digit SIC codes, predominantly from the 5000-series but also including some examples from 4000, 6000, 7000, and 8000 series. Eligible SIC codes were all categorized by the top-level expenditure categories in the Consumer Expenditure Survey (CEX), an annual release of the US Bureau of Labor Statistics: food, housing, apparel, transportation, health care, entertainment, and other.

The study's sample was composed almost entirely of small and medium businesses—the ones likely to use cash in their transactions. The median values of key business characteristics in the sample are: 4 employees, \$300,000 in annual revenue, and 20% of revenue received as cash.

BUSINESS CHARACTERISTICS

The business questionnaire began by asking about the business and its stores as a whole, including: estimated revenues, number of employees on payroll, the business's legal form, location, and headquarters location, and fraction of the business's sales received in cash.

PERCEPTIONS OF CASH-RELATED EXPENSES

Merchants were asked whether any of the following expenses rise when consumers pay mostly in cash: additional sales staff and cashiers, additional currency from a bank or cash in transit (CIT) vendor, additional accounting expenses, additional bank deposits, additional CIT visits, additional cash logistics and security expenses, and additional counterfeit detection services.

FINANCIAL SERVICES OFFERED BY THE BUSINESS

Businesses were asked whether or not point-of-sale transactions involved cash back to the consumer, and if so, the number of transactions, the average amount of cash back, marginal fees the merchant paid for till cash. The merchant was asked to evaluate, using a five-point scale, the importance of payment tender time to their customers. Finally, the last part of the questionnaire covered financial services related to cash transactions—the costs of various financial services related to the use of cash, from making deposits to providing cash for the till.

Key Findings

The business component of the study yielded 3 key insights:

- **Small businesses do not stand to realize significant costs savings by encouraging other payment modes over cash.** The cash-related costs of security and tender time are negligible for small businesses. The majority of survey respondents strongly disagreed with the proposition that payment choice would affect labor costs (including cashier labor) or security costs, unless there was a huge shift in consumer payment behavior towards non-cash payments.
- **Theft of cash is costly for businesses.** Theft risk constitutes the overwhelming majority of businesses' costs of cash. IBGC estimates that \$40 billion dollars annually are lost to US retail businesses through cash theft. The security costs related to this risk are also significant, although not for the small businesses included in the survey sample.
- **Cash costs and management processes differ greatly across firm size.** Large businesses invest heavily in optimizing the efficiency of cash operations. However, as small businesses do not perceive cash to be a significant cost driver, they are unlikely to invest in upgrading their cash procedures.

Detailed Findings

DO BUSINESSES OPTIMIZE CASH MANAGEMENT PROCEDURES?

BUSINESS SIZE DETERMINES CASH MANAGEMENT PROCEDURES

Business size is the critical determinant of investment in cash optimizing systems. Large businesses make very different decisions from small businesses regarding the payment options offered to customers, the security infrastructure needed to safeguard cash, the accounting controls used for daily cash flows, and bank deposit procedures.

Small businesses make few investments in infrastructure or processes specifically intended to manage cash more efficiently or safely. Small businesses are more likely to carry their own deposits to the bank. They are less likely to use smart safes and remote deposit services, or to hire additional shifts of cashiers and sales clerks at peak hours of customer traffic. They are more likely to view their costs as fixed, being insensitive to, among other things, the types of payments offered, seasonal variations in business, the mix of products and services sold, the number of customers in the store, and even to the total volume of goods and services sold.

Large retailers, on the other hand, find it easier to identify, manage, and optimize costs associated with processing cash payments. The benefits of investing in a system such as advanced cash logistics, digital video recording, or counterfeit detection, can be widely replicated across many checkout counters and many store locations. They have greater flexibility to tailor labor needs to the specific time of day, day of the week, and week of the year. They have greater leverage in negotiating service agreements and pricing, such as for cash-in-transit services, that deliver value to the business.

WHAT IS THE COST TO BUSINESSES OF CASH THEFT RISK?

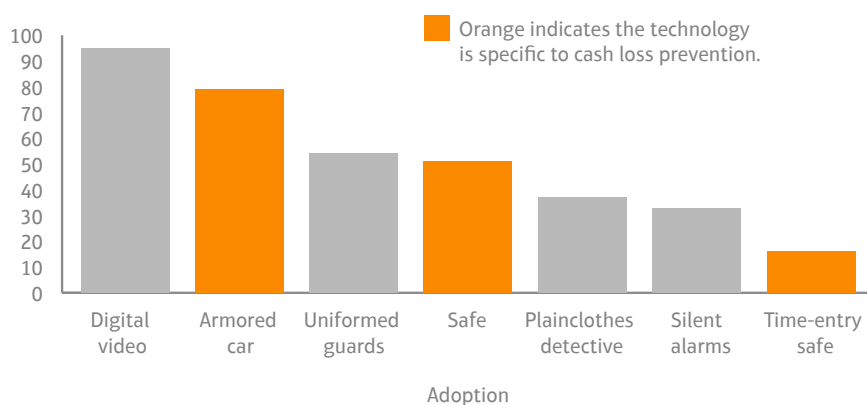
The overwhelming majority of businesses' costs associated with cash are those due to theft. Aggregate cash losses cost retailers \$40 billion annually in the United States, equivalent to nearly 1% of revenues.¹⁶ In addition, banks report thefts valued at another \$38 billion annually—incidentally down from a few years ago.¹⁷ Cash theft losses are greater than bad checks, credit card fraud, refund fraud, and internet fraud combined. Estimates from the National Retail Security Survey, which covers 140 retailers with an average of \$1.5 billion in sales and including most of the largest 100 in the United States, indicate that average losses from burglaries run a little over \$7,000 a year, and an average of 36 incidents nationwide per billion dollars in sales.

The survey showed no indication that broad retail sectors, such as those related to food, entertainment, lodging, transportation, health care, or personal services, face higher cash theft rates than others. The factors that determine a retail establishment's risk of attempted theft are beyond the store's control, such as the 24-hour operations of convenience stores and the easy highway access of gas stations. These attributes are often central to the value retail establishment's business model.

WHAT ARE THE COSTS OF SECURITY?

Businesses can adopt a range of strategies for mitigating theft risk. In the aggregate, the cost of security measures is roughly half the amount lost from cash theft, or 0.46% of gross sales.¹⁸ The National Retail Security Survey found the following adoption rates for various strategies:

FIGURE 2: RATES OF MERCHANT ADOPTION OF SECURITY TECHNOLOGY



Source: National Retail Security Survey 2010.

¹⁶ Richard Hollinger, *National Retail Security Survey*, 2010.

¹⁷ Federal Bureau of Investigations, *Bank Crime Statistics*, 2011.

¹⁸ Hollinger, *National Retail Security Survey*.

However, business size is a major determinant of investment in security measures. Most large retailers (79%) in the United States rely on armored car services for cash deposits, but the same is not true of small businesses, nor is it true of other cash security measures.¹⁹

Of the businesses in the survey sample, only 10% used armored car services, and only 20% used time-entry safes. Of the 92 respondent firms without armored car service, only 2 expected armored car costs to increase if cash usage increased, and only 2 of 10 firms with armored car service expected the same. It is evident that small businesses do not incur high costs from spending on security measures.

DOES CASH RAISE THE COSTS OF TENDER TIME?

The costs of tender time reflect the value of the cashier's wage invested in processing payments related to cash. Small retailers were asked to estimate the degree to which payment choice could affect labor costs, their largest cost category apart from the cost of goods sold.

IBGC's survey finds that small businesses perceive little to no linkage between consumer payment choice and their labor costs. In fact, payment choice ranked last in a list of factors that businesses believe affect their labor costs, behind seasonal and weekly variation, the amount and type of products sold, and the number of shoppers in the store. Very few respondents found that labor costs were sensitive to payment type at all, and respondents representing traditional brick and mortar retailers perceive that there would be little downstream effect on their non-bank costs if consumers switch from one payment mode to another. Indeed, the majority of respondents felt that cash use would have to fall by 20% before the business would realize any cost savings.

Additionally, more than 80% of respondents believed that increased cash use would not cause their accounting costs to rise. Businesses' expenses for accounting and bookkeeping are largely divorced from the day-to-day operations of the store. Businesses that do a large volume of sales in cash are not concerned about higher accounting costs.

Conclusions

Small businesses do not stand to realize significant costs savings by encouraging other payment modes over cash. While the Garcia et al. study found significant security and tender time costs to larger businesses, those costs are negligible for small businesses. The small business survey respondents disagreed strongly that payment choice would have any effect on labor costs, including cashier labor, or security costs, unless there was a massive change in consumer payment behavior away from cash.

Small businesses do not invest in maximizing the efficiency or safety of cash management. This is very different from the large investments that big businesses make in optimizing cash management. Small businesses simply do not perceive cash to be a significant cost driver, and therefore, they are unlikely to invest in upgrading their cash procedures.

Cash theft costs businesses billions of dollars annually. Secondary analysis shows that theft risk constitutes the overwhelming majority of businesses' costs of cash. The study estimate that \$40 billion dollars annually are lost to US retail businesses through cash theft. The security costs related to this risk are also significant, although not for the small businesses included in the survey sample.

¹⁹ Hollinger, *National Retail Security Survey*.



CASH AND THE TAX GAP

The United States Internal Revenue Service declared the 2006 value of under-reported taxes at \$376 billion.

GOVERNMENT STUDY: OVERVIEW AND FINDINGS

Introduction

It is no surprise that cash use imposes costs on the United States Government just as it does for American consumers and businesses. Most significantly, the government loses billions of dollars each year from underreported income due to cash transactions, particularly those in the informal economy. In addition, costs accrue from the production and management of currency. These cost areas are explored in detail below.

Study Design

To understand the range and extent of the costs of cash to the US government, the IBGC conducted a review of secondary data sources. Data sources consulted included information from the US Treasury and the Federal Reserve. In addition, academic articles were extensively reviewed, especially those dealing with the size and scope of the informal economy in the United States. The “true” cost to the government varies widely depending on the assumptions one makes. How does one accurately gauge the impact on the government’s revenues if cash transactions were reduced or eliminated? This is, after all, a hypothetical question and does not provide a meaningful basis for analysis. Instead IBGC posed the question: given the costs estimated for consumers and businesses in the earlier sections of this study, what are the minimum assumptions about the government sector required for the overall cost of cash in the United States to reach \$200 billion?

FEIGE ESTIMATES THE SIZE OF THE UNDERGROUND ECONOMY AT ROUGHLY \$2 TRILLION, CONTRIBUTING TO A \$500 BILLION TAX GAP.

Key Findings

- The most important cost of cash to the US government is forgone tax revenue from cash transactions. A conservative estimate yields this value to be \$100 billion annually.
- The government also incurs cash-related expenses from the production and distribution of cash in the United States. In 2012, these costs totaled \$1.2 billion.

Detailed Findings

UNPAID TAXES AND THE INFORMAL ECONOMY

The most important measure of the impact of currency on the federal government's fiscal position is the value of taxes unpaid as a result of off-books transactions in cash. Because cash use is anonymous from a technical perspective, accounting is voluntary. Cash is unique among modern payment instruments in this respect. It is the only commonly used payment instrument that lacks any tangible record of the bearer's identity. Accounts-based payment systems require clearing and settlement instructions, and off-setting credit and debit entries on custodians' databases. This extensive paper trail makes audits possible. With cash transactions, selective transaction reporting permits businesses and consumers to influence their apparent profits, net worth, and thus the tax liability.

The IRS reported the 2006 value of underreported taxes (the principal component of the Tax Gap) at \$376 billion. Adjusted for economic and monetary expansion in the meantime, the value of under-reported taxes should be well over \$400 billion by now. Other studies place the value of this under and improper reporting of income to be well over \$600 billion.²⁰ The IRS classifies the categories of tax dodging by types of taxes evaded and the underreporting of income vs. improper reporting of expenses. But no reliable statistics exist on the degree to which off-books cash transactions rely on cash. According to estimates by Nina Olson, National Taxpayer Advocate, in a written response, dated January 20, 2011, to the House Committee on Ways and Means, 52% of the under-reported taxes can be attributed to under-reporting by self-employed taxpayers who file their own taxes.²¹ At best, alternate scenarios can be posited based on broad assumptions about the extent of the gap that could be reduced if the cash economy were to be replaced with payments involving an electronic record. Even assuming a small fraction, say 25%, of the current tax gap was possible due to cash transactions, the value lost to public coffers from cash-related improper tax reporting would have been more than \$100 billion. IBGC considers this a highly conservative scenario—involving a low percentage attributed to cash use using a lower estimate of the tax gap—suggesting how easily the overall cost of cash in the United States approaches \$200 billion once the consumer, business and government costs are aggregated.

A variety of methods are used in the literature to estimate the size of the informal economy. Extra circulation of currency in areas is the key signature of informal economic activity. Survey data and national accounts are used in conjunction with currency circulation to identify whether additional demand for currency indicates domestic informal activity, non-payments behavior, or international shipments of currency. Surveys on attitudes to informal economic activity indicate national willingness to participate in informal labor markets and evade business taxes.²² Fluctuations in key economic inputs, such as electrical power, relative to GDP, can also indicate broad national trends in the level of informality. Additional power consumption, controlling for the weather, should reflect additional economic activity. Labor markets can also indicate temporary rises in informal economic activity. Temporary rises in unemployment without accompanying drops in currency circulation or consumption can indicate rises in informal economic activity.

20 Richard J. Cebula and Edgar L. Feige, "America's Unreported Economy: Measuring the Size, Growth and Determinants of Income Tax Evasion in the U.S.," *Crime, Law and Social Change* 57, no. 3 (December 17, 2011): 265–285.

21 Nina E Olson, "Written Statement of National Taxpayer Advocate Hearing on Tax Reform Before the Committee on Ways and Means of the US House of Representatives," 2011.

22 F. Schneider and D. Enste, "Shadow Economies Around the World: Size, Causes, and Consequences," *Journal of Economic Literature* 38, no. March (2000).

Central bank economists also analyze the patterns of demand for specific notes in the United States. Bills in circulation fall into three categories: ATM denominations (\$20), large bills (\$50 and \$100 notes with a few large legacy bills outstanding but no longer printed), and small bills (\$1, \$2, \$5, and \$10).²³ Ruth Judson and Richard Porter pointed out net outflows of one hundred dollar bills from New York and inflows to Los Angeles and Miami.²⁴ These findings suggest that most of US currency circulates overseas, some 65% in total, although the range of plausible estimates is very large (anywhere from half to three quarters). Feige takes issue with the share of US currency thought to circulate overseas. He claims that survey evidence indicates can only account for about 15% of the value of currency in circulation, and that the likely figure for US notes circulating abroad is significantly lower: roughly 35% (not the widely used 65%).²⁵ Half of the currency in circulation is in domestic hands and does not appear in survey evidence by his estimates; so there is reason to suspect it circulates in an underground economy. As he points out, currency in circulation at this magnitude would suggest an average family of four would hold more than 90 one hundred dollar bills. Since few households behave in this manner, the implication is that a few businesses and individuals use vastly more cash than others; and in so doing, likely underreport income for taxes. Using reasonable assumptions, Feige estimates the size of the underground economy at roughly \$2 trillion, contributing to a \$500 billion tax gap—significantly larger than the recently reported figures for 2006.

The International Labor Organization conducts surveys on the informal economy annual Statistical Update on Employment in the Informal Economy.²⁶ At present 49 countries, not including the United States, estimate both the share of the labor market and the share of firms that participate in the informal economy. Informal economy businesses are unregistered or unincorporated or both. Both formal and informal businesses may have informal employees that lack formal contracts and the protections of national law for working conditions, contractual protections, leave, and documentation of income for tax purposes. Informal businesses may also have formal employees. Statistics for the United States, were not available at the time of this study.

While a number of countries have banned large cash transactions in an effort to broaden the tax base and prevent bank runs, the US has made no serious effort to stamp out cash transactions. Spanish and Italian reforms during the euro crisis have limited cash transactions to values of 1,000 and 2,500 euros. Mexico has introduced a tax on currency deposits intended to encourage formalization of payments for businesses. Cash deposits over MXP 15,000 per month, about 150% of median household income, incur about a 3% tax that is rebated to the business through income tax credits. This is intended to rebalance business incentives in favor of formal payments and tax reporting, presumptively taking tax payments from cash receipts upon deposit in the banking system. Businesses that avoid tax liabilities through cash sales thus face a heavy tax on earnings if receipts are ever deposited in the bank. The only comparable law

23 Gene Amromin and Sujit Chakravorti, "Whither Loose Change? The Diminishing Demand for Small-Denomination Currency," *Journal of Money, Credit and Banking* 41, no. 2–3 (March 2009): 315–335; G.R. Gerdes, "Recent Payment Trends in the United States," Web Site no. Oct (2008): A75–A106.

24 R. Judson and R. Porter, "Estimating the Volume of Counterfeit US Currency in Circulation Worldwide: Data and Extrapolation," *Policy Discussion Paper Series* (Federal Reserve Bank of Chicago, 2010); R. Judson, R. Porter, and Federal Reserve System Board of Governors, *Estimating the Worldwide Volume of Counterfeit US Currency: Data and Extrapolation* (Board Of Governors Of The Federal Reserve System, 2003).

25 Edgar L. Feige, "New Estimates of U.S. Currency Abroad, the Domestic Money Supply and the Unreported Economy," *Crime, Law and Social Change* 57, no. 3 (December 10, 2011): 239–263.

26 International Labor Organization, *Measuring Informality: A Statistical Manual*, 2012; International Labor Organization, *Statistical Update on Employment in the Informal Economy*, 2011.

THE US HAS MADE NO SERIOUS EFFORT TO STAMP OUT CASH TRANSACTIONS.

to the author's knowledge in the United States is a ban on cash for second-hand sales in Louisiana in 2011. Second-hand goods may not be sold for cash in Louisiana, apart from a few exempted businesses, such as nonprofits, pawn brokers, auto parts recyclers, and yard sales. This law has analogs in other states that govern the sale of material from junk yards but not all second-hand goods. Under the Louisiana law, failure to obtain a statement of ownership by the seller constitutes prima facie evidence of fraud; in other words, there is a presumption of fraud in second-hand sales, and thus the aggressive prohibition on cash sales.

PRODUCING CURRENCY

There is a significant cost to producing and managing money in the form of notes and coins. The US Treasury creates currency and coins in the Bureau of Engraving and Printing, and the Mint, respectively. Currency and coin are purchased by the Federal Reserve Banks. The Treasury also provides notes to regional Federal Reserve Banks' custodial inventory sites and to cash logistics providers, whose commercial operations serve both banks and non-bank ATMs. The Fed reports the public cost of currency production in an annual statistical series. These costs include processing, paying, receiving, verification, destruction, transportation, and non-standard packaging of currency. Annual costs run in the neighborhood of half a billion dollars; the figures for 2009-2011 are below.²⁷

TABLE 1. US COST OF CURRENCY OPERATIONS

Year	Amount (millions)
2011	\$516
2010	\$523
2009	\$477

Additionally, the Federal Reserve reports annual costs of currency production and distribution on its website. Taken together, all expenses related to production and distribution of cash in the United States amounted to just \$1.2 billion in 2012. The value of new currency in circulation, by contrast, grew at \$90 billion in year-on-year terms. But since the Federal Reserve's introduction of new notes and coin into the economy operates through purchases and sales of Treasury debt, it is misleading to simply deduct the cost of Federal Reserve currency operations from the rise in currency in circulation and call the difference value that accrues to the government. Open market operations and the monetization of federal debt have a greater impact on liquidity in the economy and the price of US federal borrowings than any other single operation. Year on year growth in the money stock (M2) was \$600 billion in 2012, and the narrower measure of currency plus demand deposits rose by \$330 billion.²⁸

At the bottom of the currency pyramid, there has been a tussle over the form of \$1 notes and coins in the United States. Two competing bills in 2012 sought to do away with \$1 notes and \$1 coins. The \$1 coin ban

27 Federal Reserve Bank of New York, "Currency and Coin Services," 2012, http://www.federalreserve.gov/paymentsystems/coin_data.htm.

28 Federal Reserve Bank of St. Louis, "Federal Reserve Economic Data (FRED2)," 2012.

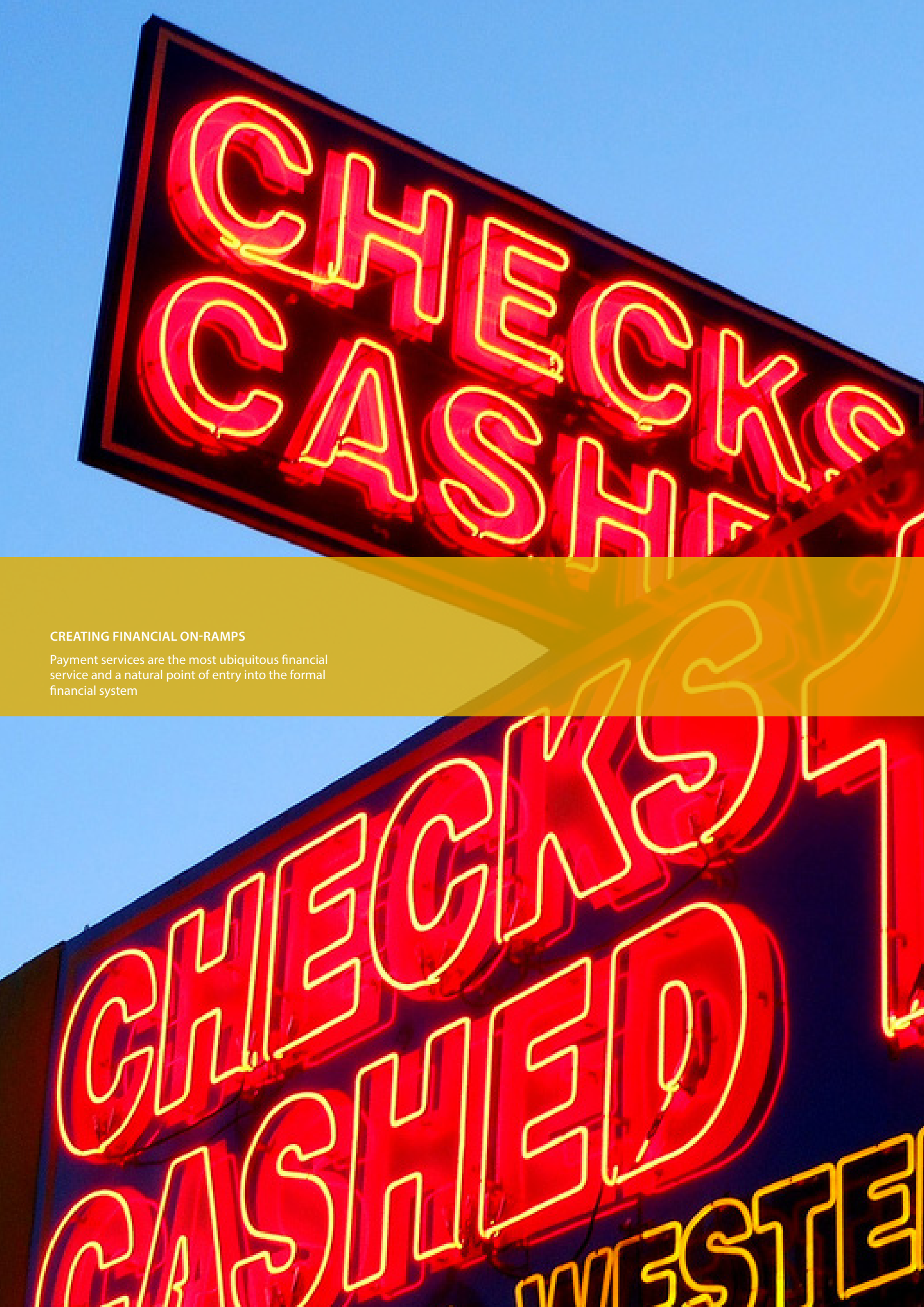
was proposed following the Fed's disclosure that unwanted coins had accumulated to the tune of \$1.4 billion, and would grow to \$2 billion by 2016 if unchecked.²⁹ Storing the dollar coins would have required an expensive new warehouse for the Fed. And since new coin production was mandated by law, legislation was required to reverse the mint policy. At the same time, a Government Accountability Office (GAO) report estimated that thirty-year savings from phasing in dollar coins and retiring \$1 notes at \$5 billion. The savings stem from the longevity of coins, which can run many times the 2 year lifespan of a typical currency note. The key to the savings is the withdrawal of \$1 notes from circulation, since the public apparently prefers notes to coins.

Conclusions

As is the case with consumers and businesses, the government also bears costs from the use of cash in the economy. Most importantly, the anonymous nature of cash allows cash transactions to remain unreported, and contributes to the tax gap of approximately \$400 billion. Assuming very conservative parameters, the tax revenue lost to public coffers from cash-related improper tax reporting is more than \$112 billion each year. The "true" value is much higher. However, by applying the approach of "what are the minimum assumptions IBGC considers", it is possible to identify the conditions under which the overall cost of cash in the United States approaches \$200 billion annually. IBGC applied a conservative estimate attributing only twenty-five percent of the under-reporting of taxable income to cash use and it yields a figure that when added to the costs estimates for consumer and businesses results in an aggregate cost of approximately \$200 billion. To establish a frame of reference, it is useful to note that by applying the full 52%, estimated by Nina Olson, the National Taxpayer Advocate, as the proportion of tax revenue lost due to under-reporting by self-employed taxpayers, the cost to the government alone exceeds \$200 billion.³⁰

²⁹ Neal S. Wolin, "Reducing the Surplus Dollar Coin Inventory, Saving Taxpayer Dollars" (US Department of the Treasury. Treasury Notes., 2012).

³⁰ Olson, "Written Statement of National Taxpayer Advocate Hearing on Tax Reform Before the Committee on Ways and Means of the US House of Representatives."



CREATING FINANCIAL ON-RAMPS

Payment services are the most ubiquitous financial service and a natural point of entry into the formal financial system

SALIENT FINDINGS AND IMPLICATIONS

This report closes with several key observations and their implications.

- **Cost of Cash is Meaningful:** The cost of cash to the various stakeholders, consumers, businesses, and the government amounts to at least \$200 billion in the United States. Given that the aggregate costs have an impact on all US citizens, this amounts to approximately \$1,739 as the annual cost imposed per US household, or 3.3% of median household income, using estimates from US Census data.³¹ Despite the fact that the United States is among the most advanced countries in the world in terms of adoption of alternatives to cash, the steadily decreasing share of cash in all consumer transactions (dropping from 43% to 37% from 2005 to 2010, according to Euromonitor) and the fact that on a relative basis its informal economy is small and tax compliance is high, the cost of cash on the average household is quite significant.
- **Cash Economy Exacerbates Social Inequities:** Consumers with access to formal financial services pay relatively little to access cash. However, the costs are disproportionately borne by specific segments of the US population; for example, unbanked individuals are four times as likely to pay fees to access their money, they pay \$4 higher fees per month for cash access on average than those with formal financial services access, and have a five times higher risk of paying fees with payroll/EBT cards. These differences are sobering in light of the fact that 8.2% of US households are unbanked and 20.1% of US households are underbanked and only two-thirds of households have both checking and savings accounts.³² The persistence of a cash economy creates social inequity and has the effect of a regressive tax. Policies and measures that help reduce the percentage of the population that is financially excluded will help reduce these inequitable costs in addition to introducing additional benefits.

31 The US has 115 million households over 2007-2011 with median household income of \$52,762 and 27 million firms in 2007, according to the US Census Bureau. See: <http://quickfacts.census.gov/qfd/states/00000.html>, accessed May 28, 2013.

32 Federal Deposit Insurance Corporation, *2011 FDIC National Survey of Unbanked and Underbanked Households*, 2012.

THE PERSISTENCE OF A CASH ECONOMY CREATES SOCIAL INEQUITY AND HAS THE EFFECT OF A REGRESSIVE TAX.

- **Triggers for Switching to Non-Cash Alternatives are Different for Consumers and Businesses:** Point-of-sale transaction costs continue to be relevant, but cash costs most frequently arise in the stages of the life-cycle beyond the point-of-sale. For consumers, the biggest source costs is in the form of foregone time. For businesses, the biggest source of the cost is due to theft and loss during transporting cash. Any business or policy decision-maker or innovator seeking to introduce alternatives to cash will benefit from addressing these “pain points”, as they are likely to be the triggers for switching to any alternative.
- **Unbanked Households Need More On-Ramps to Financial Services.** Frictions tend to arise in the cash economy when unbanked individuals have to interface with noncash payment systems. For those without accounts, there are additional costs to accept checks for wages, salary, transfers, benefits, and contract work. Part of the reason for that is the failure to create a financial persona. The absence of a financial persona forces financial institutions to assume the worst about unbanked Americans. That assumption, known in economics as a “lemons problem”, underlies the heavy fees charged for alternate financial services (AFS): payday lending, buy-here-pay-here auto loans, rent-to-own, remittances, check cashing, and pawn brokers. In the aggregate, AFS markets are large, representing \$46 billion in remittances, \$48 billion in payday lending, \$58 billion in check cashing, and \$80 billion in buy-here-pay-here auto lending.³³ Financial institutions can provide payments, lending and savings at arm’s length, but with limited credit analysis and no collateral, default rates are high and so are transaction costs. Both financial institutions and consumers benefit when consumers have access to transparent and appropriate financial instruments.
- **Payments are a Natural Point of Entry into Financial Services.** While most consumer advocates tend to focus on the price of credit and returns on savings, payment services are the most ubiquitous financial service. FDIC survey evidence indicates that previously banked Americans miss the payment services more than they miss the savings vehicle when they lose their accounts. Regardless of whether households can afford to borrow and save, they must make payments to get through each month. Not all of those payments are convenient to make in cash. Payment systems are much more straightforward in pricing and disclosure than lending, savings, and investment products. They are also cheaper to administer because they need not involve any credit analysis or credit risk at all. Ideally, entry-level payment instruments could be priced at low flat rates that make the product sustainable and backed by good funds rather than credit. Regular usage will enable the account holder to document income, consumption and investment patterns in preparation for a day when higher value-added services in lending, saving, investment, and insurance are appropriate.

33 Sources: FDIC, FISCa, World Bank, US Treasury, Association of Progressive Rental Organizations, and Leedom and Associates LLC.

- **Policies to Shrink the Cash Economy Can Help Grow Government Revenues:** The cash economy is a key contributor to the tax gap in the United States and constitutes a significant social loss. Recovering even a fraction of the foregone tax revenues could be a fiscal game-changer. Closing or reducing the tax gap of over \$400 billion (of which 84% is due to under-reporting) should be a priority, particularly in a political and economic environment with so much focus on the size of the federal deficit. Many solutions have been proposed to close the gap, ranging from dedicating more resources to collecting unpaid taxes to simplifying the US tax code. There are several actions that can be taken by the public sector and by policymakers to reduce the size of the cash economy and its contribution to the tax gap. These include: systematic policies that provide incentives for replacing cash transactions with electronic or traceable forms of payments; placing restrictions on the use of cash (e.g. cash bans on certain transactions); and providing financial and regulatory incentives that enable innovative e-payment services to develop and scale up.



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APPENDIX 1: CONSUMER CASH HABITS

DEMOGRAPHICS

IBGC's sample reached 1,000 US adults by random digit dialing. The survey used a mix of landline and cell phone random digit dialing within contiguous blocks of 100 numbers. The survey design was stratified by income, education, and region.

Age was converted to a decennial bracket, with cutoffs at under 25 years of age, 35, 45, 55, 65, and higher. Respondents provided their age in years, which were assigned to the decennial ranges.

Income was reported only by individual income quintiles with cutoffs under \$21,000, \$38,000, \$61,000, \$100,000 and higher. Respondents did not disclose the true dollar amount of gross income.

Education was reported as the highest degree completed: no diploma, high school, associate's degree, bachelor's degree, and master's and professional degrees, and doctorate.

Race comprised a set of mutually exclusive racial categories, and separately, a dummy variable for Latino identity.

Urbanicity is a difficult variable to measure. Individuals rarely know the density per square mile or their location within a metropolitan statistical area. IBGC's telephone survey provided information about the location of the land line's termination. Urban areas include the center city in a metropolitan statistical area (MSA). Suburban areas include the non-central cities of MSAs. And rural areas are outside of US Census Bureau MSAs.

Region is a geographic category taken from the US Census Bureau, that divides the country into four regions (Northeast, South, Midwest, and West).

TABLE 1: FREQUENCY COUNTS FOR DEMOGRAPHICS

Age	Under 25	Under 35	Under 45	Under 55	Under 65	Over 65				
Frequency	110	161	221	133	187	188				
Percent	0.11	0.161	0.221	0.133	0.187	0.188				
Sex	Male	Female								
Frequency	461	537								
Percentage	46.20%	53.80%								
Race	White	Afr Am	Asian	Am Ind	Pac Isl	Other				
Frequency	740	116	23	16	11	92				
Percentage	74.10%	11.60%	2.30%	1.60%	1.10%	9.20%				
	Latino	Non-Latino								
Frequency	84	914								
Percentage	8.40%	91.60%								
Education	8th grade or less	High school diploma	Associate (2 year) degree	Bachelor's degree	Master's degree	Doctorate				
Frequency	42	314	217	260	140	25				
Percentage	4.20%	31.50%	21.70%	26.10%	14%	2.50%				
Region	Northeast	Midwest	South	West						
Frequency	193	248	346	211						
Percentage	19.30%	24.80%	34.70%	21.10%						
Urbanicity	Urban	Suburban	Rural							
Frequency	314	498	186							
Percentage	31.50%	49.90%	18.60%							
Employment	Full time	Part time	Self-employed	Multiple	Un-employed	Leave	Disabled	Retired	Home-maker	Other
Frequency	410	92	58	17	78	7	52	202	58	24
Percentage	41.10%	9.20%	5.80%	1.70%	7.80%	0.70%	5.20%	20.20%	5.80%	2.40%
Income	Under \$21k	Under \$38k	Under \$61k	Under \$100k	Over \$100k	Refused				
Frequency	194	185	192	191	186	50				
Percentage	19.40%	18.50%	19.20%	19.10%	18.60%	5%				
Income Source	Employer	Self-employed	Investments	Social Security	Other Govt. Benefits	Personal transfers	Pension	Other	No income	
Frequency	540	78	17	157	32	62	89	5	18	
Percentage	54.10%	7.80%	1.70%	15.70%	3.20%	6.20%	8.90%	0.50%	1.80%	
Income Instrument	Check	EFT	Prepaid	Cash	Not Sure	Refused	No Income			
Frequency	220	691	13	49	5	4	16			
Percentage	22%	69.20%	1.30%	4.90%	0.50%	0.40%	1.60%			
Cash Source	ATM	Bank teller	Check casher	Money transfer	POS Cash Back	Family or friend	Employer	Other		
Frequency	491	249	24	2	81	44	48	59		
Percentage	49.20%	24.90%	2.40%	0.20%	8.10%	4.40%	4.80%	5.90%		

FINANCIAL TRAITS

Employment was reported according to commonly used American categories: full time, part time, multiple, self-employed, retired, disabled, homemaker, unemployed, on leave, and other.

Financial access was measured by a simple dummy variable, banked, is equal to one if the respondent has an account at a formal financial institution, such as a checking or savings account.

Income source described whether the respondent's primary source of income was a job, government transfer, return on assets, personal transfers, or something else.

Cash source indicated the respondent's typical mode of access to cash, such as an ATM, bank teller, check cashing store, point of sale cash back, money transfer, employer, friend or family.

CASH BALANCES

IBGC's survey asked two questions about current cash balances.

4.4 *How much cash do you have in your wallet, pocket and/or purse? Do not include amounts of cash that others in your household might have.*

4.5 *How much cash do you have elsewhere in your home, office, car, etc? Again, please do not include amounts of cash that others in your household might have.*

From these three quantities were calculated:

- **Wallet cash balance**, meaning the total cash presently on the subject's person.
- **House cash balance**, meaning the total cash presently in the subjects' possession but not on their person.
- **Total cash balance**, meaning all cash currently in the respondent's possession.

TABLE 2. SUMMARY STATISTICS FOR NUMERIC VARIABLES

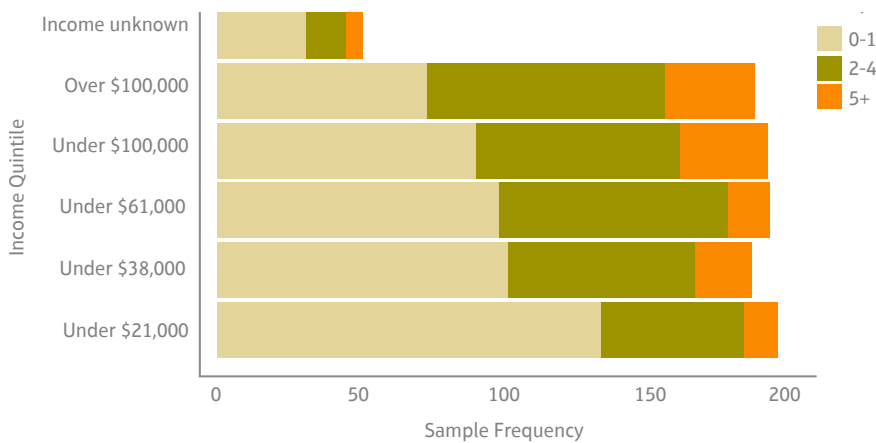
Variable	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
Wallet Cash	\$0	\$0	\$15	\$42.23	\$43	\$800	\$4
Household Cash	\$0	\$0	\$0	\$103.50	\$5	\$20000	\$1
Total Cash	\$0	\$0	\$20	\$143.10	\$80	\$20400	\$5
Cash Events (count)	0	0	1	2.31	3	30	4
Monthly Fees	\$0	\$0	\$0	\$0.36	\$0	\$36	\$7
Average Fee	\$0	\$0	\$0	\$0.32	\$0	\$36	\$7
Time Required (minutes)	0	1	5	10.55	10	405	7
Monthly Cash	\$0	\$0	\$50	\$181.40	\$200	\$5000	\$7
Maximum Cash	\$1	\$100	\$500	\$7468.00	\$1000	\$500000	\$34
Minimum Cash	\$0	\$0	\$0	\$33.68	\$30	\$800	\$15

RECALL OF CASH ACCESS EVENTS

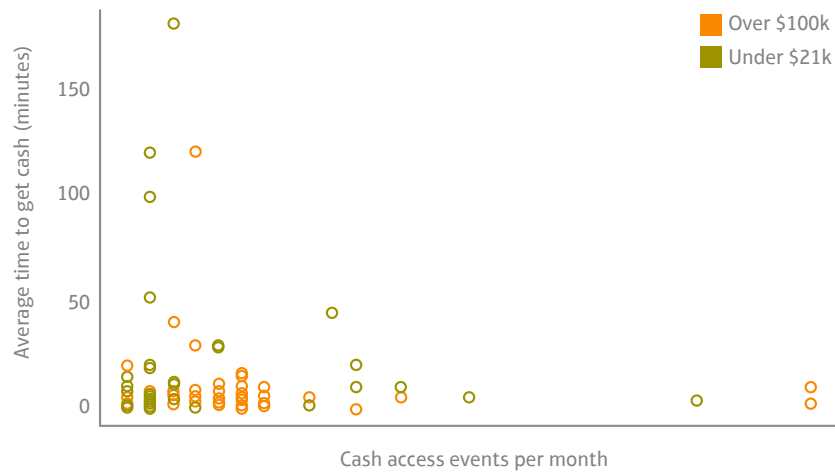
IBGC’s survey asked a series of questions about the times that respondents obtained cash in the last 30 days. For each transaction, respondents were asked: whether fees were charged and how much, the time required for travel to the point where cash was accessed, the mode of transit, the type of cash access point, and the amount of cash accessed.

- **Transaction Source**, the source for a particular cash access transaction.
- **Transaction Size**, the value of cash obtained in a particular transaction.
- **Events**, the frequency of cash access events in the last 30 days.
- **Total time**, the respondent’s total time invested traveling to cash access transactions.
- **Average time**, the respondent’s total time invested traveling to cash access transactions divided by the number of those transactions.
- **Modeled time**, the product of the average time and the number of cash access transactions in a typical month.
- **Total fees**, the respondent’s total pecuniary charges from specifically recalled transactions.
- **Average fees**, the respondent’s total pecuniary charges from specifically recalled transactions divided by the number of those transactions.
- **Modeled fees**, the product of the average fee and the number of cash access transactions in a typical month.

CASH ACCESS EVENTS PER MONTH BY INCOME, CEME CONSUMER CASH HABITS SURVEY



HIGH INCOME PEOPLE TAKE LESS TIME TO GET CASH AND GET IT MORE OFTEN

*RISK OF NO CASH*

IBGC's survey asked two questions about whether having no cash posed a risk. While language of risk was avoided, respondents were specifically asked about the heuristics used to manage cash balances.

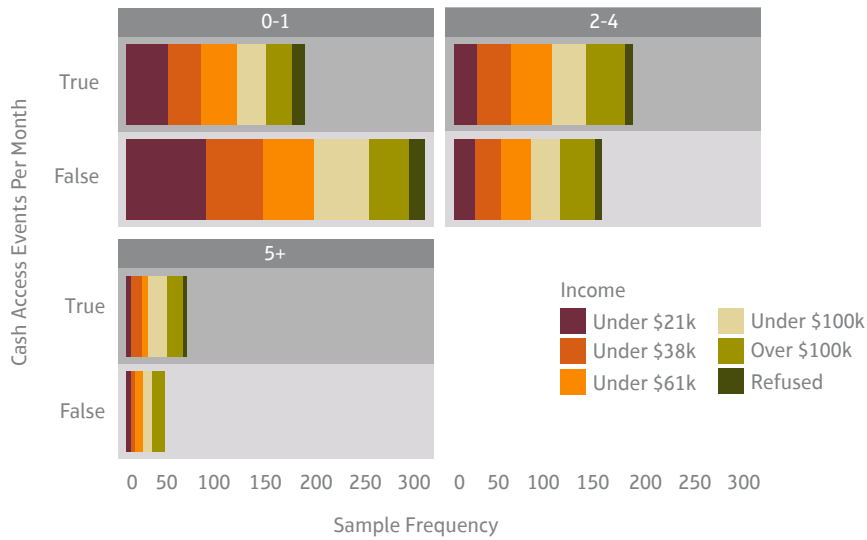
4.10 *Is there a minimum amount of cash that you try to keep on hand?*

4.11 *If yes, what is the minimum amount of cash that you try to keep on hand?*

These answers directly constituted two variables.

- **Has Minimum**, equals 1 if the respondent tries to keep some cash on hand and 0 otherwise.
- **Minimum Balance**, equal to the respondent's stated preferred minimum balance.

CASH ACCESS EVENTS BY NECESSITY PERCEPTION AND INCOME QUINTILE, CEME CONSUMER CASH HABITS SURVEY



RISK OF TOO MUCH CASH

IBGC’s survey asked four questions about whether having too much cash posed a risk.

4.6 Can income, money transfers or cash gifts ever be too large to hold in cash?

4.7 If so, what would you do with extra cash?

4.8 What amount of money would you consider too large to hold in cash?

4.9 Have you ever received an amount larger than [previous] and decided to store it in [second previous]? How often?

These answers directly constituted four variables.

- **Has Maximum**, equals 1 if the respondent believes too much cash is possible and 0 otherwise.
- **Maximum Balance**, equal to the respondent’s stated maximum acceptable cash balance.
- **Cash Sink**, meaning the preferred method of storing excessive cash.
- **Excess Frequency**, meaning how often the respondent has decided to deposit or invest excess cash

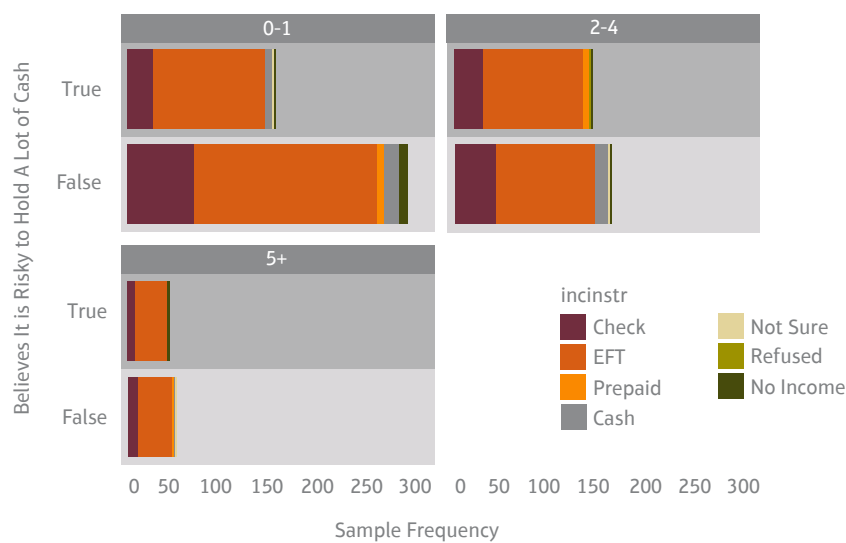
THOSE THAT DO NOT SEE A RISK TO HOLDING CASH TEND ALSO TO TAKE CASH ONLY MONTHLY, AVOIDING THE NEED FOR ADDITIONAL BANK VISITS.

Perceptions of the risks of cash were directly related to demographic and financial traits. The variable Has Maximum exhibited high correlations with income (19%), education (20%), full time employment (14%), and financial access (13%). Cash access points behaved similarly (15%) when consumers reported typically using ATMs, bank tellers, and POS cash back to receive cash. The level of the cash ceiling is correlated with self-employment (10%), financial access (-9%), and gender (5%).

Surprisingly, there is little correlation between having a cash minimum and having a cash maximum. Perhaps there are some contrary effects. A world comprised of two types of people, those who actively worry about the contents of their wallets versus those that don't, would promote a positive correlation. And yet a different distinction between people that like a lot of cash on hand and those that don't would promote a negative correlation.

The cash recall diary showed that demographic and financial traits make a big difference in determining how often people obtain cash. For instance, in Figure 3, cash access events, risk perceptions, and income instruments, there is a clear difference in the behavior of people based on their risk perceptions. The three panels of the chart correspond to monthly, weekly, and more frequent cash access. Within each panel, the bars compare the behavior of individuals based on their stated risk perceptions—i.e., whether it is risky to hold a lot of cash. Those that do not see a risk to holding cash tend also to take cash only monthly, avoiding the need for additional bank visits. Similar structures are visible when one looks at the frequency of cash access and necessity perceptions. Income effects can be illuminated through a similar method, indicating generally that the lowest income brackets take the least frequent access to cash, and the middle income brackets the most frequent.

FIGURE 3. CASH ACCESS EVENTS, RISK PERCEPTIONS AND INCOME INSTRUMENTS
Cash Access Events by Risk Perception and Income Instrument CEME Consumer Cash Habits Survey



WHO PAYS FOR CASH?

The following chart is a plot of regression coefficients for an logistic model of fees for cash access, using the full sample from IBGC's survey.

$$\text{Pays} = \beta_0 + \beta_1 \text{Income} + \beta_2 \text{IncInstr} + \beta_3 \text{Employment} + \varepsilon$$

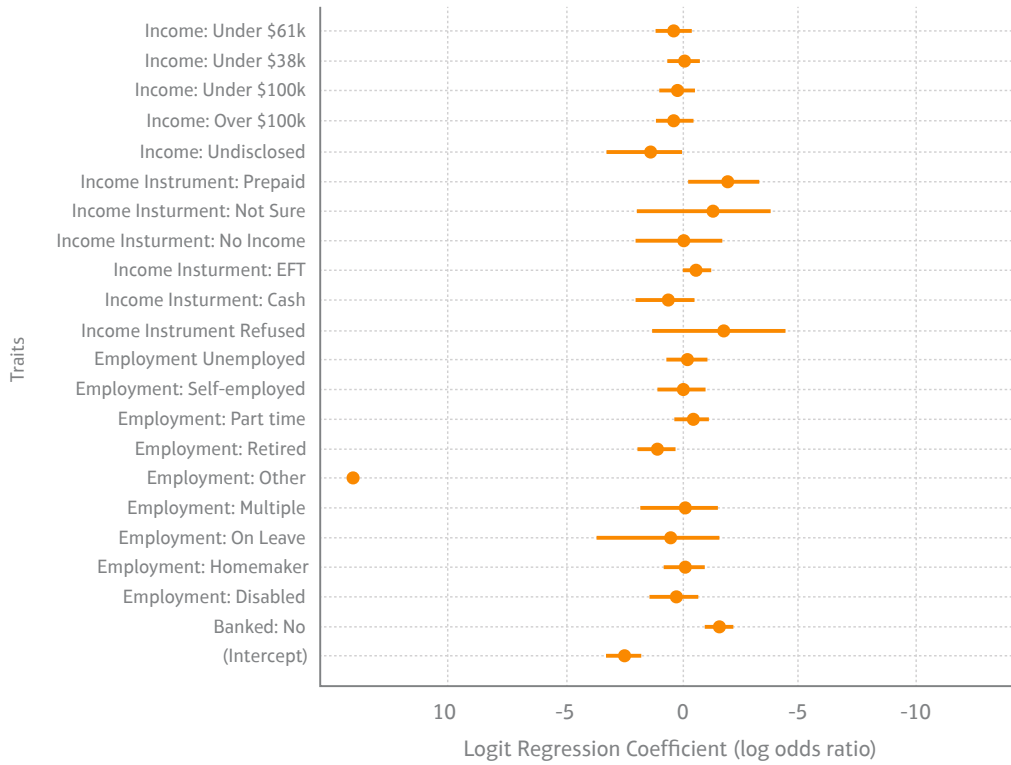
As described above, the variables are defined:

- Pays is a dummy variable, equal to 1 if the respondent pays transaction fees for cash and 0 if not.
- Income is the respondent's individual income quintile.
- IncInstr is the respondent's instrument used to receive income, e.g., a pay-check or Direct Deposit.
- Employment is the respondent's employment status.

The results show that

- The unbanked face increased risk of paying for cash access, e.g., check cashing.
- Retirees, who prefer bank tellers, face very low incidence of fees for cash access.
- Receiving income electronically to bank accounts and prepaid cards increases the risk of paying fees for cash access.

FIGURE 4. REGRESSION OF CASH FEE INCIDENCE ON INCOME, INCOME INSTRUMENT, AND EMPLOYMENT
 Logit Regression of Cash Fee Incidence on Financial Traits Regression Coefficients and 95% Confidence Interval



WHO PAYS MORE FOR CASH?

The following chart is a plot of regression coefficients for an OLS model of fees for cash access, using the restricted sample of respondents pay some type of transaction fees.

$$\text{Fees} = \beta_0 + \beta_1 \text{Income} + \beta_2 \text{IncInstr} + \beta_3 \text{Employment} + \epsilon$$

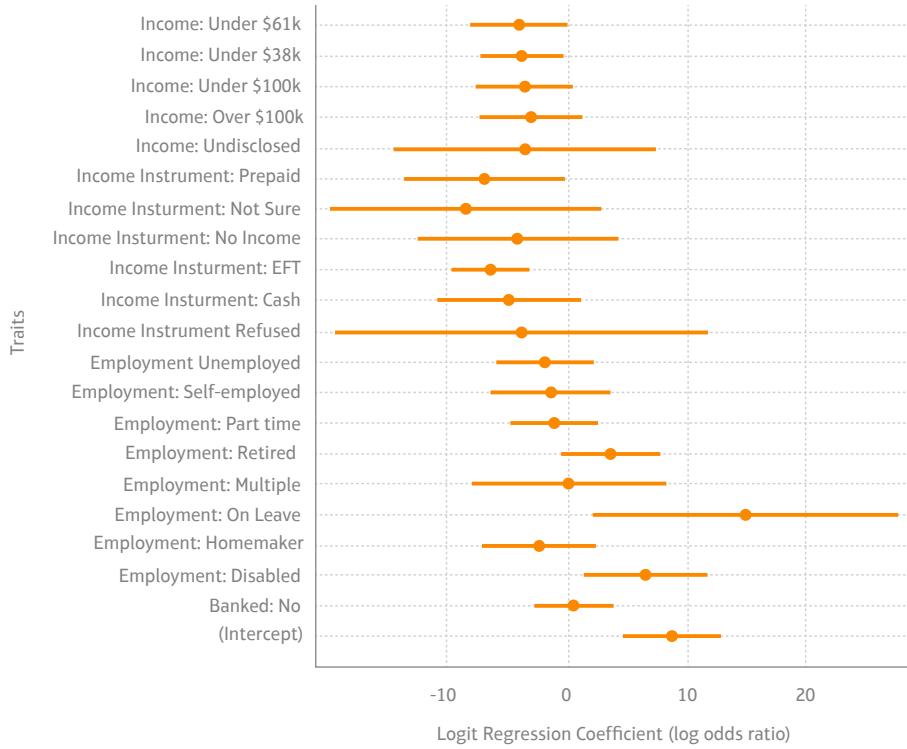
As described above, the variables are defined:

- Fees are reported monthly fees for cash access transactions.
- Income is the respondent's individual income quintile.
- IncInstr is the respondent's instrument used to receive income, e.g., a pay-check or Direct Deposit.
- Employment is the respondent's employment status.

The results show that

- Prepaid cards and electronic funds transfers reduce the cost of obtaining cash for the recipient.
- Retirees, disabled and those on leave pay higher fees for cash access.
- Higher income brackets probably face lower fees for cash access.

FIGURE 5. OLS REGRESSION OF FEES FOR CASH ACCESS ON INCOME, INCOME INSTRUMENT, AND EMPLOYMENT
 Monthly Fees Paid for Cash Regressed on Financial Traits Regression Coefficients and 95 % Confidence Interval, Restricted Sampled Fees >0





APPENDIX 2: MERCHANT STUDY

MOTIVATION

Merchants must cope with the expense of accepting payments. Merchants pay for cash registers and more complex point-of-sale machines, cashiers' labor, accountants' labor, rent, and utilities to keep the shop running. In studies of payment costs, how should economists allocate merchants' expenses across payment instruments? There are essentially two bases on which to calculate allocated costs. The common method allocates cost for a payment type based on an ex-post average of costs and transactions. In prior studies, treatment of cashier costs exemplifies this perspective: the cashier's wage, times the tender time for a payment, gives the merchant's cost for tender time in payment cost allocation. In the merchant's operations, however, it is not clear that the allocation of cashier time to payment tender and processing is a high-fidelity model either of what cashiers do, or of what merchants pay their cashiers, or of how merchants decide to work with cashiers. For small businesses, often the cashiers are there no matter whether they are actively running the till or not. In a larger business, clerks will be pulled from stocking to cashier duty on a flexible basis. Accepting payment is just one of the things cashiers do; so the marginal time needed to process a cash transaction may or may not have an effect on the manager's decision to increase or decrease the number of clerks on the floor. An alternative analysis would ask which costs are marginal to a given payment instrument—in this case, cash—at the point of sale. Rather than allocating fixed and sunk costs based on observed transaction shares, IBGC asked what costs rise with marginal cash use; and what costs are unique to the merchant's decision to adopt cash.

IBGC'S STUDY IS EXPLICITLY CONCERNED WITH THE DETERMINANTS AND LEVELS OF COSTS.

OBJECTIVES

IBGC begins with a deceptively simple set of questions. What does it cost a merchant to accept cash payments? To what extent do those costs scale with the amount of cash used, or with the number of cash transactions? And finally, to what extent would cash use have to fall before merchants could recoup savings on fixed costs (such as cash in transit bills, security costs attributable to cash, and the cost of keeping cash in the till)?

There are good reasons to suspect that consumer purchasing behavior is qualitatively different for cash, debit, credit, check, and mobile payments. Therefore it may be a gross oversimplification of the merchant's payments problem to ask, "What if you did the same volume of sales with the same profile of customers but mostly in cash? Or mostly without cash?" Merchants also need to accept the payments that their customers offer, with a couple of important caveats. (Captive customers, as for example in airline cabins, can be induced to use plastic. And certain restaurants and bars manage cash-only sales without apparent difficulty.) But largely speaking, merchants accept payment instruments out of a commitment to customer service, regardless of the pro rata charges. The logistics of cash operations and cash management, which are of central importance to this study, might not even seem like the most relevant feature of payment instrument choice to merchants. Potentially, other factors implicit in the payment instrument chosen might trump the logistics of doing business in cash. Cash processing involves accounting and securing the cash, deposit preparation, armored car service, bank visits, and may lengthen the business's cash conversion cycle, unless remote deposit safes are used on site. Checks entail somewhat less security risk but greater counterparty risk, and they are typically handled with the same deposits (bank visit or armored car) as cash. Merchants' face per-transaction, pro rata charges and chargeback risk with cards; and also some additional risk if consumer payment credentials are improperly disclosed.

A key study of payment economics described earlier in the report describes the costs facing merchants in categories. Theft and counterfeit costs reflect the possibility that cash will be stolen before deposit or use in accounts payable. Float costs reflect the interest cost of time required to clear payments, typically a day or two for checks and credit cards. Tender time is the value of cashier's labor at the point of sale. Deposit preparation and armored car costs reflect labor and services consumed sending cash and checks to the bank. And noncash other direct costs include credit risk, collection fees, and chargeback risks.

COST DRIVERS

This study is explicitly concerned with the determinants of costs, as well as their levels; whether cash-related costs vary systematically through the economy. The Survey of Consumer Payment Choice focuses on the difference in payment behavior according to payment context: specifically in-person sales, online sales, and bill payment. Other payment cost studies have looked at specific types of retail establishments: big box retailers, electronics shops, supermarkets, service stations. Payment customs and norms can be heavily contextual. For example, restaurants, insurance companies, dentists, retail shops, and online retailers disclose prices and accept payments in specific ways that are considered normal business practice. Yet all of these, since they involve consumer payments to a business, from the perspective of payment, count as retail payments. This study sought to understand whether specific industries are more cash intensive than others, and whether businesses' legal entity, corporate structure, and size could reveal something about the processes used to manage cash.

To the authors' knowledge, there have been no explicit attempts in the academic literature to measure the impact of changes to the cash share of sales on cash-related expenditures. If cash-related expenses are fixed, there should be little to no additional cost when cash transactions rise; and correspondingly little savings when cash use falls.

FINDINGS

Small businesses find it difficult to observe the costs associated with payments. The largest categories of cost associated with cash payments, i.e., cashiers' labor and accounting costs, are generally not thought to be marginal to the consumer's payment choice decision. Cash related costs are fixed, from the point of view of the merchant. One of the principal reasons that costs are fixed is that more than half of the managers in the survey always have about the same number of staff on hand: in other words they don't vary the number of staff on the floor to serve anticipated rises or falls in consumer demand.

With regard to cash, the subset of retailers that do substantial business in cash acknowledge that a rise in cash sales would necessitate some additional activities: principally additional bank visits, and perhaps also some orders of notes and coin for the till or counterfeit detection. A fall in cash use of something about 20% would be required before those merchants could imagine seeing cash-related costs drop appreciably.

With a different sample, this survey would undoubtedly have turned up clearer findings on expenses whose cost profile is marginal to cash use. But the rest of the study looked at the economy as a whole and not narrow retail segments that rely principally on brick and mortar stores with flexible cashier staffing. So it would have been hard to learn much about the remainder of the economy where payment patterns are more diffuse. Even in a traditional retail environment, payment patterns are fast changing. Retailers are experimenting with handheld payment devices that make obsolete the traditional checkout line, and in so doing are very likely to influence consumers' choice of payment instruments.

DATA

IBGC contacted 200 merchants nationwide through a telephone survey. The survey asked merchants to explain key features of their business that related to cash processing. Interviews were completed through computer assisted telephone interviews. A reputable commercial vendor was selected to complete the telephone interviews.

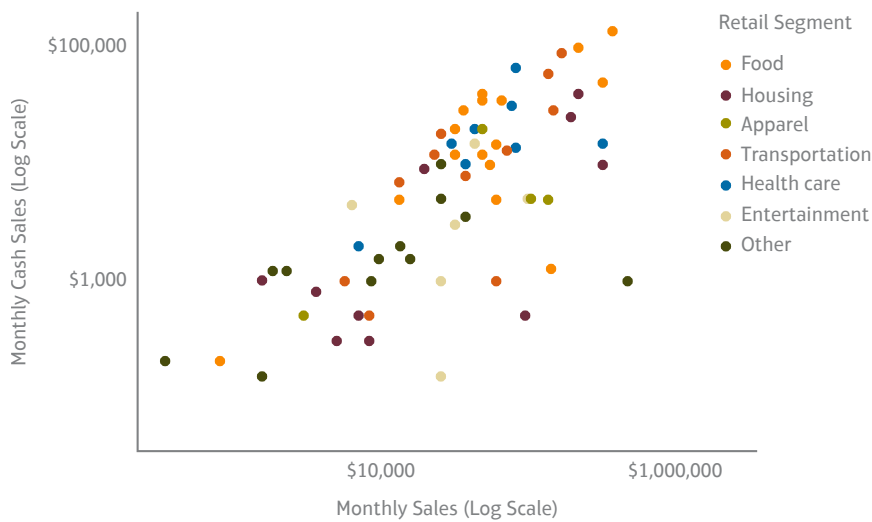
This sample of retail merchants included representatives of key retail categories from the Consumer Expenditure Survey (CEX): food, transportation, housing, clothing, entertainment, personal services, financial services, and health care. The major categories tracked by the Bureau of Labor Statistics for expenditures are conceptually broad. Each category includes related supplies, services, maintenance, and furnishings. So food would include both groceries and food services, the category of housing would include home furnishings, maintenance, and supplies. CEX expenditures data have two principal advantages. First, they are estimated on the basis of expenditures per capita for a wide variety of demographic categories. Second, they are possible to decompose into a large number of subcategories, any of which might be more likely (e.g., linens) or less likely (e.g., monthly rent on a home) to be bought from a retailer.

To retail analysts, the Standard Industrial Codes (SIC) might be a more natural way to classify expenditures. Since reliable estimates of consumer spending by SIC were not available, but by CEX category were, this study mapped SIC codes into CEX categories. This was the list of SIC codes from which samples were drawn, since the SIC code descriptions clearly matched CEX headline categories for consumer expenses. Since the share of American consumer spending in these areas is known, if cash-related costs, as a function of revenues, can be derived, then aggregate costs of cash-related expenses, at any given level of aggregate retail cash spent, should be estimable. Ultimately no significant variation in the total level of cash-related expenditures by CEX categories was found, and so estimates of cash-related costs using this method were not scaled-up.

IBGC’s questionnaire for merchants began with some basic information about the store and the firm as a whole. Merchants were asked to estimate revenues and employment for the firm, about the business’s legal form, location, and headquarters location. Merchants were asked what fraction of the firm’s sales were made in cash by value and by number of transactions.

Percentile (sample)	Total firm’s revenue in the United States, all locations, annual	Number of employees in the United States, total	Monthly store sales, average	Cash sales monthly, average	Percent of store sales transaction in cash	Average transaction size	Average cash back transaction size
Min.	600	0	200	40	0	2	0
25th	9400	2	8000	1000	4.00	25	0
50th	30000	4	25000	5000	20.00	100	0
Mean	29 million	1380	92513	14546	32.17	6211	8.983
75th	90000	10	70000	15000	55.00	800	65
Max.	26 billion	100000	2500000	140000	100.00	250000	100
NA	39	3	40	51	8	31	10

SALES VS. CASH SALES



IBGC asked for the monthly cost of cash-related in five key categories. Note that most of these costs and the largest costs are spread across several categories. These ratios do not reflect the share of expense or effort related specifically to cash business in any sense. Rather these expense categories are related to cash payments in the sense that they are necessary to effective handling of cash, even if the majority of the expense lines are not allocated to cash-related activities.

- Accounting and bookkeeping: average of 3% of total revenue, and 66% of cash revenue.
- Cashier labor costs: average of 7% of total revenue, and 89% of cash revenue.
- Point of sale terminals: 1.7% of sales, and 28% of cash sales
- Cash security including safes, security and maintenance: 0.84% of sales, and 5% of cash sales.
- Armored car or cash in transit: 0.43% of sales, and 1% of cash sales.

IBGC asked businesses to state whether they paid for cash delivery, and if so how much per month and per strap of one hundred (100 count) \$20 bills. Respondents were asked whether the business has an armored car service and how many visits per week. Respondents were asked how many bank visits per week the business makes, the amount of time required and the wage of the person making the deposit, and whether the bank account carries a fee. 10% of respondents indicated that their business used a cash in transit service. 9% indicated they paid for cash delivery to the store. And only 19% of respondents indicated daily visits to the bank to deposit cash and checks.

The next section of the interview covered drivers of expenses for the merchant. Merchants were asked to tell the number of checkout counters, types of checkout counters, and sales staff on the floor at any given time. We asked merchants to tell us, using a Likert scale, what features of the business had the greatest impact on labor expenses: the value of sales, customer head count, type of goods sold, type of payment offered, and seasonal or weekly patterns. Respondents did not see that payment choice has an appreciable effect on the biggest cash-related cost measured, the cashier's wages.

TABLE 2. DETERMINANTS OF MERCHANT LABOR COSTS

What determines the number of employees on duty?	Median (1 – 5 Scale)	Mean (1-5 Scale)
Expected sales	3 = Not Sure	3.1
Type of goods or services expected to sell	3 = Not Sure	2.8
Payment methods used	1 = Strongly Disagree	2.0
Customer traffic	3 = Not Sure	2.9
Time of day or day of the week (peak hours)	3 = Not Sure	3.0
Seasonal calendar	3 = Not Sure	2.9
Always about the same number of employees	5 = Strongly Agree	3.8

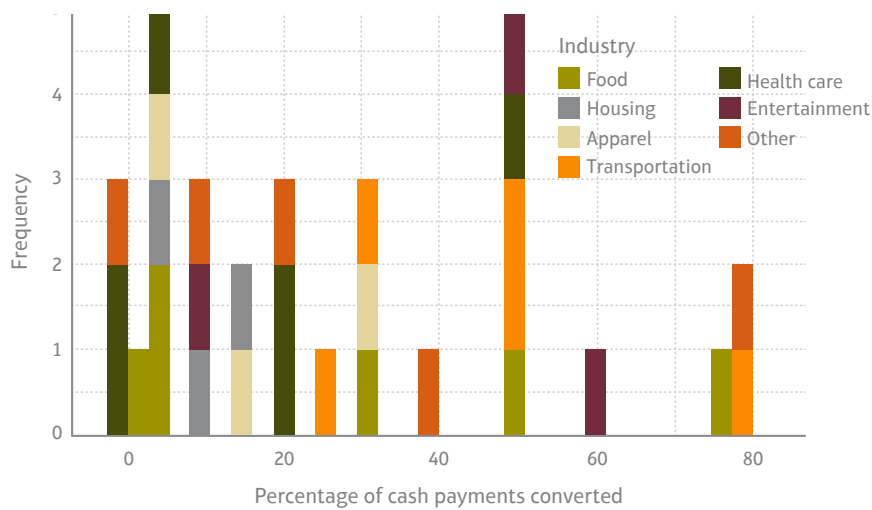
IBGC also asked merchants whether any *additional* expenses rise when consumers pay mostly in cash: sales staff and cashiers, currency from a bank or cash in transit (CIT) vendor, accounting expenses, bank deposits, CIT visits, cash logistics and security expenses, and counterfeit detection services. The most common responses to additional expenses were more bank visits, counterfeit detection, currency delivery and security on site. Finally, merchants were asked if they could save money if a consumer paid less often in cash, and about how much cash use would have to fall in order for expenses to respond.

TABLE 3. HOW CASH SALES AFFECT MERCHANT PRACTICES

Likely Response to More Cash Sales	Median (1 – 5 Scale)	Mean (1 – 5 Scale)
Spend more on cashiers	1 = Strongly Disagree	1.7
Require more cash from the bank	1 = Strongly Disagree	2.4
Spend more on accounting	1 = Strongly Disagree	1.7
Additional bank deposits	3 = Not Sure	2.8
Additional armored car visits	1 = Strongly Disagree	1.3
Spend more on cash security	1 = Strongly Disagree	1.8
Spend more on counterfeit detection	2 = Disagree	2.3

FIGURE 7. MINIMUM DECLINE IN CASH USE THAT WOULD AFFECT MERCHANT COSTS

Minimum Fall in Cash Payments Before Merchants Save on Associated Costs



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