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The Financial Implications of a Cashless Society on Individual Consumers, Businesses, Banking
Institutions, and the Government

A Project Presented to
the Faculty of the Undergraduate
College of Business
James Madison University

in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Business Administration

by Stephanie Kaitlyn Skaggs

May 2014

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Preface

Within this thesis it is my objective to convince the reader of the following premonition: Despite individual consumers' pernicious loss of financial privacy and transaction anonymity, if a "cashless" society were to prevail in the U.S., it would be primarily for the benefits of businesses, banking institutions, and the government. I will commence distinguishing between pertinent key terms related to this discussion, accompanied by a brief historical familiarization of humanity's progression towards a cashless society. Furthermore, I intend to emphasize the prominence of electronic transactions both domestically and internationally, highlighting U.S. companies, universities, etc., which actively integrate innovative forms of cashless transactions.

I will proceed in uncovering significant international leaps already enacted followed by an analysis of the consequences that have unfolded from these actions. Moreover, I will propose that a cashless society may prevail, primarily through mobile money transfers and eventually through the usage of Radio Frequency Identification Devices (RFID) microchips. The core focus of this paper is a detailed explanation of why a cashless society would be financially advantageous to businesses, banking institutions, and the government. Consequently, these entities would have incentive to push the consumer to participate in exclusive forms of payment, preferably by use of RFID microchips. Ultimately, I will conclude that the individual consumer is better off under the current financial system rather than a cashless one in which the consumer would experience numerous detrimental effects.

Acknowledgments

I deeply appreciate the continued support and encouragement of my advisor Dr. Pamela Drake and my committee readers: Professor Hui He, Professor Kristin Fink, and Professor Nevin Cavusoglu.

Introduction

Money is often broadly defined as any “generally accepted medium of exchange that is used as financial payment”.¹ As a result, money can take unorthodox forms. For example, the current economic slowdown prompted the development of an innovative type of “money”, in the form of babysitting tokens.² Rather than exchange cash for childcare, a Westfield Park group in San Diego, California organized babysitting co-ops to facilitate the transaction of babysitting based on tokens. The operation ran on the principal that tokens could only be earned through providing childcare. Thus, the more childcare a member delivered, the more babysitting tokens one could accumulate and have available for their own babysitting needs. These childcare tokens could be theoretically termed as “money” within the local babysitting co-op communities. In addition to money’s functionality as a medium of exchange, it also serves as unit of account, a common measure of value, a means of payment, a standard for deferred payments, and a store of value.³ It is important to note that the functions of money are not restrained to these and are subject to change over time.

The word “cashless” has evolved in meaning over the past fifty years; consequently, it is essential to clarify the use of the term within this thesis specifically.⁴ Initially, U.S. bankers in the 1960s were in search of an electronic system to substitute paper checks, notes, coins, etc. This effort to digitalize money was referred to as converting to a “cashless” system. The “cashless” system simply implied the automation of existing currencies. With the introduction of BitCoin, the first decentralized and solely digitalized currency, “cashless” has sometimes been widened to include new nongovernment- backed currencies.⁵ Technically these currencies are more accurately called “alternative currencies” or “dollar-less” currencies.⁶ “Dollar-less” is likewise appropriate because these alternative currencies are completely independent of

established government currencies (such as the U.S. dollar).⁷ Therefore, the babysitting cooperative mentioned previously may be identified as a “dollar-less” community because they employed an alternative currency of childcare tokens. Further, there have been philosophical discussions of rejecting a monetary system altogether in which a society would operate entirely “money-less”.⁸ For the purposes of this paper, I will refer to “cashless” in its broadest sense. I will, however, distinguish between “cashless” and “moneyless” since the latter completely abandons a financial system.

Historical Perspective

Humanity's Progression towards the Development of Money

It is often perceived that money originated to simplify the troublesome task of barter. Glyn Davies, author of *History of Money from Ancient Times to the Present Day*, claims that the development of money was prompted by motivations beyond the inefficiency of barter.⁹ In fact, in his book Davies states that money did not originate from economic causes. Rather, Davies informs that it was the legal, religious, and ceremonial processes within societies which initiated the inception of money. Although the development of money occurred independently between regions, many cultures shared the similar societal practices (legal, religious, and ceremonial) responsible for emphasizing the need of standardized money. These societal obligations include the following situations. For example, it was customary for a criminal to make amends for his transgression, such as murder, through an agreed settlement with the victim's family.¹⁰ Similarly, some religious practices required a sinner to atone for his shortcomings through a monetary offering.¹¹ Another widespread expectation was for a groom to make payment to his bride's family to fiscally compensate for the loss of their daughter's household contributions. Moreover, taxes were prominent among ancient civilizations and were regularly imposed on citizens. These "non-economic causes" triggered the formation of money. Such transactions would have been difficult to complete through barter; consequently, nations designated commodities to serve as money.

When establishing an object to serve as money, societies generally sought commodities possessing the following characteristics: durable, portable, divisible, uniform, widely accepted, and of limited supply.¹² Commodities which were widely accepted in a society often held intrinsic value within that culture, particularly for their ceremonial importance. For example,

Incan, Aztec, and Mayan tribes considered chocolate to be “Food for the Gods,” prompting the exchange of cocoa beans as money in the 1400s.¹³ Another unique form of money arose in the South Pacific. The Fijian society considered whale’s teeth to be such a significant icon that they were used as money up until the mid-1960s.¹⁴ Still, Fiji memorializes the whale’s tooth with its image on the current Fijian twenty cent coin.¹⁵ Perhaps the most influential primitive form of money, however, was the cowrie shell in China.¹⁶ The cowrie shell was so widely used as money that ancient China deemed the pictograph of a “cowrie” to mean “money” in their written language. In 1600 BC, the Chinese replaced the cowrie shell with bronze and copper versions of the cowrie shell argued to be “among the earliest countable metallic money”. The Chinese supplemented these cowries with other exchangeable items consisting of base metals such as spades, hoes, and knives. The Chinese also considered these additional items to be coinage; however, historians term them “tool coins” as they were not the traditional coin. Nails were used as tool coins in ancient Greece and sword blades were exchanged in ancient Britain.

Tool coins were not considered true coinage because they lacked practicality, uniformity, and protection against counterfeiters. Tool coins were not particularly valuable and made expensive purchases difficult to conduct. In addition, these coins varied in weight and consequently differed in value. Lastly, they were comprised of base metals, notorious for their susceptibility to counterfeiting. Proper coinage originated in Asia Minor around 640-630 B.C. in the country of Lydia. These coins were gold or silver, allowing costly purchases to be carried out with ease in the marketplace. Lydia combated the variation in weight between coins by honing their metallic sculpting to create coins of comparable value. Furthermore, Lydia preserved its currency’s authenticity by minting it. Lydia’s precautionary actions to improve

their coinage gave the currency credibility. Consequently, the Lydian coins inspired the use and minting of coins in Ionia, Persia, and the city-states of ancient Greece.

The rise of true coinage not only benefited the marketplace, but aided in Greece's warfare efforts.¹⁷ During the Hellenic Empire, coinage enabled Alexander the Great to compensate mercenary soldiers with a secure and widely trusted currency.¹⁸ Naturally, after a conquest the mercenary soldiers purchased goods and services within the region, saturating the market with Greek coinage. This process allowed Alexander the Great to tax the citizens of the acquired province, accepting only Greek coinage as payment. In other words, Greece taxed those it defeated and was conveniently paid with their own currency. It was the introduction of true coinage that facilitated the ease of Greek warfare. Without it, Greece would have bartered for soldiers' participation, an individualized and laborious series of transactions. Additionally, Greece would have been unable to efficiently tax its new citizens and instead would likely have mandated forced labor. Although coinage supported large-scale operations that contributed to the rise of power in ancient Greece, it did present some complications.¹⁹ For example, following the Sparta seizure of Athenian silver mines in 407 B.C., Athens underwent a shortage of silver and was subject to inflation. Consequently, Athens was unable to continue to produce solid silver coins and instead released bronze coins with minimal silver incorporation to take their place. Additionally, the nature of coins, small and easily condensed, allowed the coins to be easily concealed.²⁰ Authorities considered this an obstruction of their power as they were less able to trace the flow of money.

In conclusion, coinage introduced financial freedom within the economy in which it was traded, making it the dominant form of money until the rise of paper money in the thirteenth century.²¹ Its most important contribution to the economy was that it facilitated unconventional

monetary transactions (such as providing a means for religious and legal atonement, tax collection, and payment for a bride).²² This newfound financial freedom fostered economic growth and the development of service professions (such as mercenary soldiers).²³ Furthermore, coinage lifted the double coincidence of wants burden, in which both parties had to possess a commodity the other desired for a transaction to occur. Although tool coins were a quick fix solution to the complications of bartering, their impracticality and susceptibility to be counterfeited left citizens weary to trade.²⁴ The opportunity for deception of value obstructed trade and hampered the economy. Minted coinage, conversely, assured authenticity, and gave citizens the confidence to engage in the marketplace.

Paper money was originated in China under the reign of Emperor Hien Tsung 806-821 A.D. in response to a shortage in the precious metal used to produce coins, copper.²⁵ Paper money was most prevalent in China around 1295 A.D during the rule of Mongolian leader Kublai Khan's. These issued paper notes were authenticated by Khan's officials. To further encourage the exchange of paper money and minimize the circulation of imitation paper copies, the sentence of a guilty counterfeiter was death. Marco Polo, the Italian voyager, prompted bankers in Europe to also employ paper money, specifically "bills of exchange." Such bills allowed travelers to purchase a paper bill of exchange from a local banker that would then be redeemable at the banker's agent for coinage. This process enabled citizens to travel without the inconvenience or danger of carrying large sums of coins. Similarly, bankers and goldsmiths distributed paper notes to their depositors often referred to as "promises to pay." These various forms of notes grew in popularity and became widely accepted. Eventually the use of paper as a currency spread through Europe.

The more current debate is not whether paper money is acceptable but whether it should be backed by a gold standard, silver standard, bimetallic standard, or if it would be more economically beneficial to do away with paper currency all together.

Humanity's Progression towards the Establishment of Banking

A concept that is perhaps counterintuitive is that banking was practiced before the inception of coinage.²⁶ In fact, banking practices were first used in Ancient Mesopotamia for agricultural intent. It was customary for agriculturalists to deposit their grain and other valuable goods within royal estates in an effort to secure their assets. Soon, banking extended to private households. Likewise, Egypt provided state-owned storage facilities designated for the deposit of grain. The Egyptian system was slightly more advanced in that separate lots were developed to distinguish between the grains of various owners. Written orders were created in the event a withdrawal was requested. Although the state warehouse was designed for the purpose of keeping its citizens' assets fortified and safeguarded, it served dually as a center for the transfer of credit. Not only were the citizens able to settle debts among themselves, the king also accepted taxes and other accounts receivable in the form of grain. In fact, the use of grain as credit was encouraged over the use of coinage. The general theory was that grain was a better mechanism to transfer credit domestically and coinage was better allotted for foreign financial affairs. This is because metals used in the production of coins were finite.

The First Central Bank was organized in 1694 in England under the reign of King William III.²⁷ The English Parliament refused to increase taxes, leaving the country unable to finance its war with King Louis XIV of France. Scotsman William Paterson recruited several City of London businesses men willing to make a loan to King William. This company of men deemed themselves the Bank of England, a privately owned commercial bank. Following the

conclusion of the war, London continued loaning from the Bank of England, only paying interest. The Bank of England morphed over time from a privately owned commercial bank into an agency of the state, formally nationalized in 1946. England set the precedent for government funding beyond the taxes collected of its citizens.

A Utopian Anticipation of a “Cashless” Society

The notion that physical money is bothersome and that a cashless society is both more simplistic and economically efficient is not novel. In fact, pre-1900 utopian writers Thomas More, Robert Owen, William Morris, and Edward Bellamy each referenced their own unique monetary vision within their works.²⁸ Edward Bellamy, in particular, proposed a financial system that is often recognized for inspiring the inception of the “credit card.” In Bellamy’s science fiction novel, *Looking Backward*, citizens were unable to operate private businesses or possess private property; rather, the nation was the lone producer of goods. To ensure the country’s gross domestic product was allocated relatively equally among the community, each citizen under Bellamy’s system was given an equal and finite number of “credits.” These credits were redeemable in nation-operated standardized stores where a citizen’s pasteboard “credit card” was punched to reflect the value of product acquired. Although the credits were replenished on an annual basis, it was mandatory that each transaction generate two identical receipts. These receipts served dually as a budgeting tool for the consumer as well as a record in the event of a blunder during the exchange. It is suggested that this illustration of exchange prompted the concept of the “credit card.” Bellamy’s utopian system is distinctive from those of his peers, who chose to opt for largely moneyless societies. Instead, Bellamy formed a “cashless” system that preserved citizens’ ability to consume, a concept well before his time.

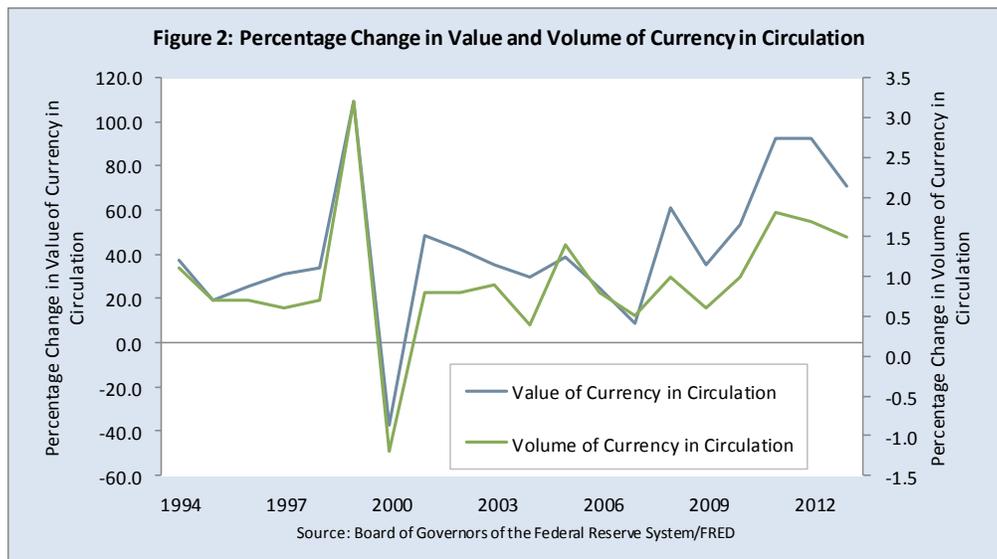
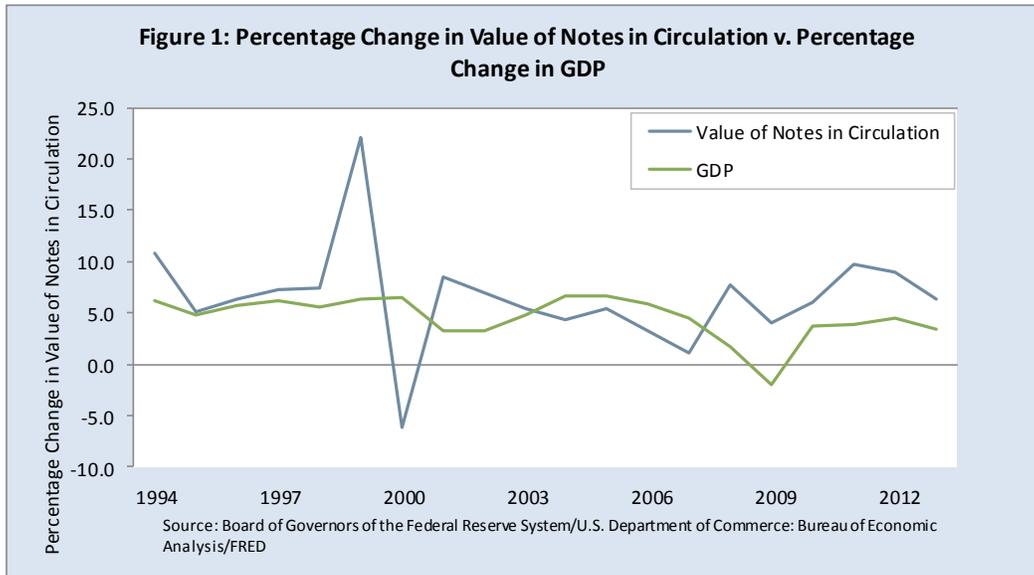
Contemporary Perspective/ Current Developments

The Prominence of Electronic Transactions vs. Cash & Equivalents within America

Research indicates that Americans readily accept the transition from physical wallets to digital ones. According to the American Institute of Economic Research, only 7% of money circulated within America is represented in the form of bills and coinage.²⁹ The American independence from cash is so large that the Rasmussen Report (an American public polling company) found 43% of Americans claimed to have gone a week without using bills or coinage.³⁰ The same source revealed a study conducted by the Pew Research Center which confirms that electronic banking is on the rise, particularly mobile banking. Currently, about 51% of American adults (61% of internet users) bank online, a noteworthy rise from 2010, when 46% of American adults banked online. Further, the study found that currently 32% of American adults (35% of cell phone owners) bank using their mobile phones.³¹ This is a considerable increase from 2011, when only 18% of American adults participated in mobile banking. Likewise, the study was verified by the American Bankers Association which conducted a survey in 2012 and yielded similar conclusions. Both studies suggest that mobile banking is increasing at a higher rate in terms of its growing usage than online banking. This is no surprise considering the American ratio of 89.86 mobile phones per 100 American residents.

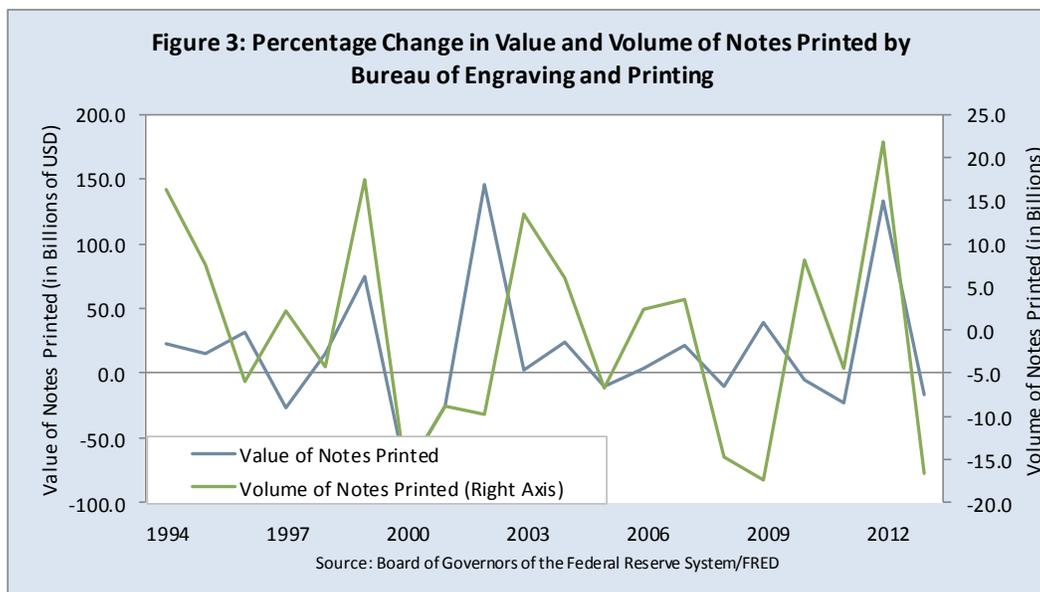
The following research is complementary to these studies; it suggests that the recent decline in the demand for cash may result from a consumer preference for electronic transactions over cash ones. After running a regression on the percentage change of value of notes in circulation with the percentage change in GDP (a proxy for economic conditions), only .205% of the variation in the percentage change of the value of notes can be explained by the percentage change in GDP. The relationship between the two variables are displayed in Figure 1. This low correlation suggests that the declining marginal growth in the value and volume of notes in

circulation (as depicted in Figure 2) may be attributed to another variable other than economic conditions.



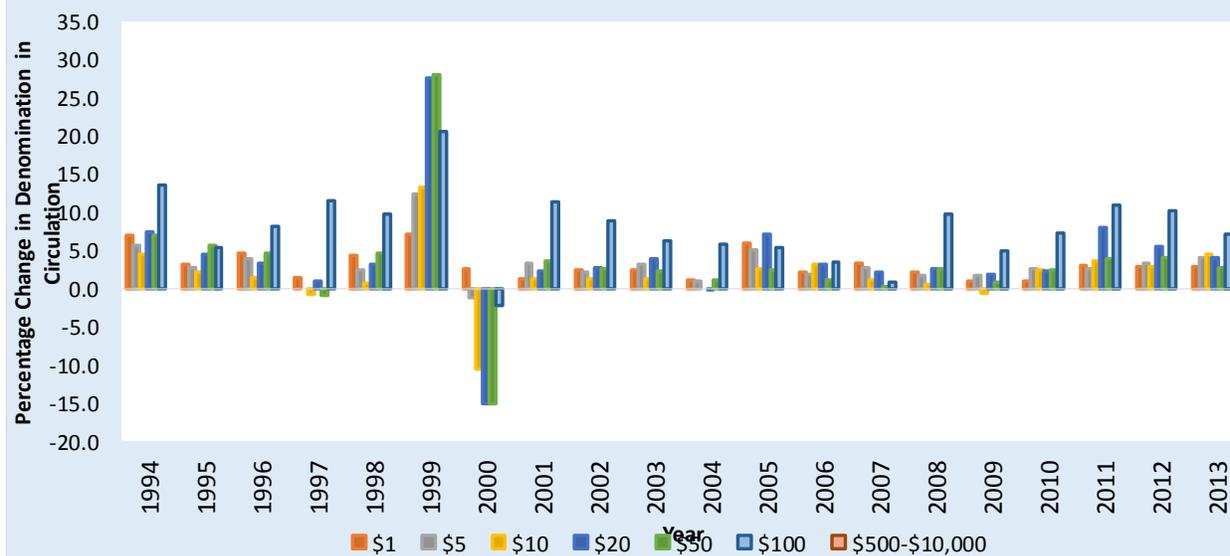
The previously mentioned regression is consistent with the theory that the percentage change in the value of currency in circulation is not predominately determined by the percentage change in economic conditions, and that consumer payment preferences may influence the demand for currency in circulation. If this is true, it is possible to attribute the decline in the

growth of value and volume of notes in circulation to a diminishing demand of cash among consumers. Further, the percentage change in value and volume of notes printed by the Bureau of Engraving and Printing is represented in Figure 3. The percentage change in value and volume of notes printed is currently negative, indicating that growth is not only decreasing, but the absolute value and volume of notes printed are declining.



A possible explanation for the behavior during recessionary periods (spikes in the growth of value of notes in circulation and sharp declines in the volume of the value of notes printed) is that the consumer opts to store value in high denomination notes during uncertain economic periods. Figure 4 provides a breakdown of the denominations of notes currently in circulation and their growth over time. During the 2007-2009 economic recession, the growth in the value of low denomination notes (\$1, \$5, and \$10) was on the decline, while the growth in value of high denomination notes (\$20,\$50, and \$100) was on the rise. The denomination with the most growth was \$100. This observation may verify the theory that consumers prefer to store value in cash during recessionary periods. Perhaps illegal activity also surges during recessionary periods which necessitates higher denominations. It may also be a combination of the two.

Figure 4: Percentage Change in Value of Currency in Circulation



In conclusion, the weak regression between the percentage change in the value of notes and the percentage change in GDP leaves room to suggest that U.S. consumers’ demand for cash is decreasing due rising usage of other electronic forms of payment. Likewise, the cashless movement may be reflected in the declining growth in value and volume of currency in circulation. Another potential indicator of a less cash reliant nation is the decline in the value and volume of notes printed by the Bureau of Engraving and Printing. These three elements leave room to suggest that the U.S. may be moving to a cashless society.

U.S. Companies Facilitate Innovative Forms of Cashless Transactions

As the American propensity to pay electronically increases, the market for innovative and multi-functional mediums of electronic payment grows. To remain competitive, companies are actively designing new applications and conducting mergers, hoping to entice the consumer into choosing their exclusive method of electronic payment. The commonality between these emerging alternative forms of payment is their close integration with the smart phone. Two popular applications include “Square Wallet” and “Google Wallet.” Both applications serve as a

“digital wallet” in which consumers can purchase goods and services via the smart phone. Square Wallet offers its customers cutting edge features, including the ability to make purchases using only the consumer’s name to retrieve their account at checkout rather than using a credit or debit card.³² Likewise, Google Wallet promotes other conveniences such as allowing the consumer to condense all of their loyalty cards and promotional offers into one location within the application.³³ The electronic payment movement is inspiring companies to collaborate in an effort to make their method of payment most attractive and to avoid substitution with rising digital wallets applications. Such alliances include the collaboration between Discover and PayPal as well as the collaboration between Wal-Mart and American Express.³⁴ As of May 2013, PayPal’s 50 million customers were given the option to complete transactions at any business place that accepts the Discover card. This capability is beneficial to PayPal customers as Discover is more prominently accepted among businesses. Furthermore, Wal-Mart and American Express released “Blue-Bird,” a checking and debit alternative that gives customers the option of depositing money at Wal-Mart or via a smart phone.³⁵ Although American companies are consistently taking initiative to provide and promote electronic banking, America is not the global forerunner in this effort.

Sweden’s Progression towards a Cashless Society

Sweden is a proponent of economic evolution. In 1661, Sweden was the first of the European countries to use bank notes; ironically, the country is currently the most eager to replace them through electronic transactions.³⁶ In fact, Sweden is globally recognized and commended for its vigilant movement towards a cashless society. The *Global Information Technology Report* (issued in years 2011 and 2012) and the *Economist Intelligence Unit* (issued in 2010) both position Sweden as the forerunner in integrating information and communication

technologies within a country's economy.³⁷ Sweden's economy is far less reliant on cash relative to other European countries or the U.S. According to the Bank for International Settlements, cash is representative of only 3% of Sweden's economy, while it accounts for 7% of the U.S. and 9% of the Eurozone's economies. This anti-cash movement is largely induced by the Riksbank and other major banks within the country. Swedish banks are promoting the security, environmental, and cost benefits of a cashless system to their Swedish citizens. The Swedish Banker's Association claims that the reduction of cash is responsible for the sharp decline of bank robberies, totaling 110 in year 2008 to 16 in year 2011.³⁸ Par Karlsson, a security specialist from the association, advocates that less cash in circulation increases the safety of the staff exposed to the cash as well as the public. Spokesperson for Swedbank, Peter Borsos revealed to the Swedish public that cash transport costs 11 billion krona per year and emits 700 tons of carbon dioxide.³⁹

Although cash represents a very small portion of Sweden's economy, statistics reveal that citizens do not intend on further decreasing their use of cash. Despite the push by banks to complete only electronic transactions, Sweden's small businesses are consistently conducting about one-third to one-half of their business activities using cash.⁴⁰ In fact, small businesses benefit by conducting cash transactions, given Swedish banks typically charge 5 krona (\$0.8) per credit card transaction.⁴¹ Furthermore, an author of *Global Economic Intersection* referenced a Swedish Quality Index (released in October 2012) which revealed bank customer satisfaction had decreased among banks that had removed the handling of cash within the majority of their branches.⁴² Such an aggressive movement towards a cashless system has also raised concern for the country's elderly who are less familiar with electronic banking.⁴³ Nevertheless, Sweden's banking and technology companies consider a cashless society to be a pressing priority. Thus,

Sweden will continue to fund and press the development of innovative cashless systems. The country's bus system, for example, is already completely intolerant to cash; rather, a commuter prepays or purchases a ticket via a text message.

Canada's Progression towards a Cashless Society

Likewise, Canada has undergone a sequence of milestones suggested to have been designed with the intention of converting the already predominately cashless country into a purely cashless one. One of these milestones included Canada's Economic Action Plan of 2012, which called for a coinage phase out, specifically targeting the penny.⁴⁴ In February 2013, the Canadian government officially stopped the distribution of all pennies.

On January 1, 2013, Canada ceased the printing of all Canadian currency, despite the bills' possible need of replacement; this decision may communicate Canada's intentions of implementing a cashless society prior to the expiration of the bills in current circulation.⁴⁵ Although the Canadian government attributed the retirement of the printing press to a lack of demand for money, the currency's susceptibility to damage may indicate a near transition to a cashless system. However, the currency's susceptibility to damage is controversial. According to the Canadian Broadcasting Corporation (CBC news), the government stated that the demand for money has decreased with the substitution of cotton-based bills for ones with a polymer composition.⁴⁶ The government also asserts that the polymer composition is less susceptible to damage and consequently extends the life expectancy of the bills. Additionally, the government elevated the new bill for its more complex makeup, which hampers the bill's ability to be counterfeited. Canada launched its series of polymer bills in November 2011 with the introduction of the first one hundred polymer dollar bill and commenced the series in November 2013 with the issuance of the 10 and 5 dollar bills. However, CBC news reported that citizens

are complaining about the new polymer notes for their “stickiness” and susceptibility to heat, causing them to melt. Bank of Canada, Canada’s Central Bank, countered these assertions to CBC news within an e-mail. The bank denied the summer news reports which featured polymer susceptibility to heat; further, the bank aimed to discredit the reports by emphasizing the lack of current cases to confirm the accusations made during the summer.

The Bank of Canada did concede that although the bank notes do not melt, they could be damaged. The bank uncovered that they have had over 200 cases in which polymer notes were found to be mutilated. Nevertheless, citizens insist that the notes have the potential to melt and the Bank of Canada has investigated and reimbursed select cases. When the Canadian Press requested Bank of Canada’s internal documents related to these cases, they received 134 of redacted pages. If confirmed, melting bills implies that the Canadian government would need to restart bill production if the country intends on resuming a system that includes cash. The government’s lack of proactivity regarding the potential issue may suggest an underlying expectation of an approaching cashless system.

If this is the government’s intention, it is possible to estimate when Canada expects to complete its transition to a cashless society by finding the expected expiration of bills in current circulation. Potential melting aside, the Bank is aware that notes will still get lost and others will eventually become damaged.⁴⁷ To estimate the life expectancy of a polymer note, the Bank of Canada’s official website asserts that the polymer note lasts 2.5 times the life of a cotton-based one.⁴⁸ The Federal Reserve’s official website has the life expectancy of the U.S. cotton-based notes in accordance to its valuation and volume of circulation.⁴⁹ For estimation, the typical \$10 cotton-based bill lasts, on average, 4.2 years. If the Canadian estimation is correct, the \$10 polymer notes will approximately last 10.5 years. It is possible then, that the Bank of Canada

projects that cash will become obsolete after about 10.5 years. Of course, the Bank of Canada has the ability to speed up this process through legislation.

The push towards a cashless society is not surprising considering Canada's impending launch of the MintChip. President and CEO of the MintChip, Ian E. Bennett explained that the chip is at the forefront of the evolution of money and still offers all the benefits of being electronic.⁵⁰ The appealing nature of cash is that it is not exclusive to any age group, does not require the consumer expose any private information, and does not involve any transaction costs.⁵¹ The MintChip incorporates both of these benefits. MintChip will allow value to be stored and transferred via a variety of devices including USB sticks, MicroSD cards, phones, tablets, and others.⁵² Similar to cash, the MintChip will be used mostly for low- cost transactions, likely under \$10. The Royal Canadian Mint has released an ad that illustrates the vision they hope to achieve. The Royal Canadian Mint also invites software programmers to contribute to their project with the possibility of winning a portion of \$50,000 worth of gold. Considering all of Canada's efforts, the country is considered quite focused in their pursuit of becoming cashless.

Studies reveal that Canadians are embracing this cashless movement, contrary to the Swedish. A study conducted by MasterCard revealed that 90% of Canadian consumer spending is cashless.⁵³ Additionally, PayPal concluded that Canadian's are increasingly comfortable conducting electronic transactions.⁵⁴ PayPal found that between 2011 and 2013, there was an increase of 44% in Canadian consumers' acceptability of electronic transactions. Such studies suggest that Canadians are more welcoming to becoming cashless than the Swedish. However, it is possible that the Canadians will resist this movement after the cash represents less of their economy. Cash transactions represent 10% of Canadian transactions and as mentioned in the

previous sections cash only represents 3% of Swedish transactions. Thus, Canadians may invite more cashless alternatives until cash represents a given percentage around 3%. Consumers worldwide may prefer electronic transactions, but always insist on the option of cash, though it may not occur often. There is no problem with this situation so long as the consumer has the power to dictate the method of transaction, which is not a given. Conversely, Canadians may have different preferences and advocate for a cashless society until the country completely phases out cash.

Global Progression towards a Cashless Society

The MasterCard study briefly mentioned in the previous section is entitled “A Cashless Journey” in which MasterCard evaluated 33 major economies in an effort to identify those which are closest to becoming cashless.⁵⁵ The study’s methodology was to evaluate each economy on three criteria: share, trajectory, and readiness. MasterCard defines these measures. Share refers to the percentage of value of all consumer payments that are presently done by a means other than cash. Trajectory is a measure of the shift in cash share of consumers’ payments value between 2006 and 2011, and readiness is a measure of the future potential for conversion of cash payments to electronic payments. In terms of the share component, MasterCard concluded that the countries are ranked in the following sequence based on the value of transactions which are conducted without cash: Belgium (90%), France (92%), Canada (90%), UK (89%), Sweden (89%), Australia (86%), and the Netherlands (85%). Furthermore, the study identified the United States and Singapore as the two countries on the “tipping point” of becoming nearly cashless. As far as the readiness component, Indonesia, Russia, and Egypt were identified as shifting their cash share of consumer payments at an increasingly quick rate compared to that of developed countries. The significance of the MasterCard study is that although all of the 33

economies may not be at the forefront of a cashless society, even underdeveloped countries score high in their ability to easily convert to a nearly cashless economy. Once the infrastructure is in place, an economy's metamorphosis to a cashless economy will not be a long one.

A Cashless Society may Emerge: Direct Carrier Billing (DCB) and Mobile Money Transfer

There is not only an evolution of money but also an evolution of the technology that facilitates the transition of money from its physical to digital state. While online banking was first to entice consumers in conducting their banking digitally, it would take the growing popularity of electronic banking combined with more convenient banking technologies to convince others. The development of mobile banking was one of the innovative banking technologies responsible for tipping many individuals into becoming users of electronic banking. Still, those individuals without a traditional bank did not have the luxury of participating in electronic transactions, until recently.

The current technology projected to slingshot the remaining cash-oriented consumers into electronic transaction consumers is Mobile Money Transfer. Mobile Money Transfer is the umbrella that encompasses both mobile banking (transactions facilitated via a banking institution) as well as those transactions facilitated by parties other than a banking institution. An example of such a third party is mobile network operators, which provide Direct Carrier Billing (DCB). DCB is an alternative to conventional banking. Rather than participating in mobile banking, in which the consumer keeps their traditional bank while conducting online banking through their cellular device, DCB allows the consumer to bypass their traditional bank using their mobile network operator.⁵⁶ Transactions are executed via short message service (SMS) messages.⁵⁷ According to *Bloomberg BusinessWeek*, half of the world did not have bank accounts in 2012.⁵⁸ Furthermore, a study from MasterCard confirmed that while half of the

world does not have a bank account, 70% of the world has a mobile phone.⁵⁹ Such a statistic indicates that DCB has the potential to be the financial medium responsible for enabling those individuals who possess a mobile phone but not a bank account to engage in electronic transactions. For these reasons, DCB is speculated to grow quickly in use and possibly become the most popular form of mobile money transfer. Once DCB is implemented worldwide, there would likely be only four major explanations for why individuals would still not complete their transactions electronically: the individual does not own a mobile phone, a deliberate objection or avoidance of cashless transactions, a lack of funds to transfer, or participation in illegal business transactions.

Turkcell, a prominent Turkish mobile network operator, was the first to launch DCB services, offering them as early as April 2009.⁶⁰ The purpose of DCB was not to replace the services provided by banking institution, but rather to supplement them.⁶¹ In fact, DCB was designed with the ability to carry out only low cost transactions, facilitating the purchase of online games and other small goods and services. DCB technology platforms advocate DCB, claiming it offers merchants and consumers unique benefits. For example, DCB technology states merchants are given the ability to activate and inactivate customers and make transactions without a physical point of sale terminal. Likewise, the consumer can conduct a secure method of payment while circumventing the exchange of personal and credit card information. Such attractive benefits give rise to strong speculation that DCB technology would soon offer the ability to conduct transactions of larger value and with less restrictions. Authors of a new working paper entitled *Mobile Payment Systems in Turkey* speculated that once the technology exists, DCB has the potential to become a threat to traditional banking institutions, although such a threat does not yet exist.

Perhaps the most stunning finding is that DCB is used predominantly in developing countries and consequently suggests these regions are likely to operate cashless sooner.⁶² In fact, developing countries are considered primary candidates for cashless societies. The consensus behind this theory is impoverished people cannot afford the fees and costs associated with banking institutions. Furthermore, those countries without formal banking sectors, such as Somaliland, rely most on DCB services. Telesom is Somaliland's largest network operator and offers DCB services within its division called Zaad. Unlike the DCB services in Turkey, Zaad does not limit its subscribers to completing only low cost transactions, but allows standard users to transfer up to \$500 transfers. Merchants, however, are permitted to make transfers of up to \$2,000. Zaad informed that its more wealthy clients may make special arrangements, allowing for transactions of greater value. Somaliland's Finance Minister acknowledged the ease of Zaad, but revealed that the government does not have the equipment nor expertise to control Zaad at this time. In conclusion, Somaliland does have the technology that allows larger transactions to take place, but the technology does not yet exist to regulate this systems. While DCB appears to be the future's most promising medium of mobile money transfer, there are still some technological refinements that need to take place before DCB can be considered a serious threat to its financial competitors.

Future Implications: Businesses, Banking Institutions, Government and the Individual Consumer

Businesses

If a cashless society does emerge, firms worldwide would welcome the more profitable alternative because of the real cost of cash transactions, coupled with other advantages only cashless transactions offer.⁶³ Firms that continue to engage in cash transactions would likely be deemed irrational for incurring the unnecessary expenses associated with cash and squandering potential revenue.

Currently, large firms already recognize the overwhelming value in accepting electronic means of payment, eagerly integrating cashless payment options via Square Wallet, Google Wallet, PayPal, Intuit's Go Payment, WePay, etc. Small firms, conversely, are less compliable. According to *Forbes Magazine*, 55% of the United States' 27 million small firms do not accept credit cards.⁶⁴ The consensus among small firms is that the expensive credit card fees deter them from accepting electronic transactions. However, the \$127 billion added to the U.S. economy between 2008-2012 via credit card usage prompted small firms to take note. It is anticipated that a growing number of small firms would find that the opportunity cost of not accepting credit cards far exceeds their expense. These small firms lose an estimated \$100 billion of potential sales annually.⁶⁵

Fortunately for small firms, a U.S. District Court overturned a Fed Reserve "interchange fee" rule.⁶⁶ Prior to its overturn, the rule mandated that interchange fees for specific cards be capped at a rate of 21 cents in addition to 0.05% of the transaction value.⁶⁷ The U.S. District Court considered the cap too high, restoring the rate to a value within the range initially proposed by the Federal Reserve, 7% to 12%.⁶⁸ The rising opportunity cost of forgone credit sales

combined with legislation, which lessened the fees paid by firms, will convert a majority of the 45% cash-exclusive small firms to credit-accepting ones.

Moreover, cashless transactions provide unique opportunities and services that foster firm profitability by inducing the following: increased sales and average ticket size, enhanced customer service, improved business image, and boosted cash flow.⁶⁹ Research indicates firms that accept various forms of credit card payment increase sales by as much as 23%.⁷⁰ This large loss in prospective sales is reasonable considering cash-only firms limit their customer base to those who currently have the financial means, happen to possess the cash on hand, and conduct the transaction at the firm's sale location. Perhaps the most obvious reason cashless transactions generate more sales is that they enable customers to make purchases online. In 2012, there were \$820 billion in e-commerce sales, growing at 19% a year and are expected to be \$1.4 trillion in 2015.⁷¹ These sales are inaccessible to cash-only firms.

Furthermore, cashless transactions lead to larger average ticket size. Customers spend about 20% more when paying via a cashless medium and they would use cash or check.⁷² A study conducted by Richard Feinburg published in the *Journal of Consumer Research* confirmed the tendency.⁷³ Feinburg concluded that customers who see credit card logos prior to making a purchase are generally willing to spend more for a product or service than had they not seen a credit card logo. Studies also found that it is more difficult for people to recall the amount spent after a purchase if it was conducted via a cashless transaction than a cash transaction. Forbes author, TJ McCue, informed that payment options beyond cash induce people to conduct impulse purchases, participate in loyalty programs, and spend more on the transaction; all are consequences which benefit the business.

Moreover, cashless transactions enhance customer service. Cashless transactions are conducted faster than cash ones, facilitating shorter queues and faster checkout times.⁷⁴ Cashless transactions serve as a marketing tool, acting as a medium for firms to offer reward programs and target new customers.⁷⁵ Such programs establish customer loyalty and future business.⁷⁶ In addition, firms are able to broaden their customer base by permitting Equated monthly Installment Payments (EMI), which give customers the option to participate in an automated payment plan.⁷⁷ Such flexible payment options are largely appreciated by customers. In all, cashless transactions facilitate revenue-generating opportunities that collectively improve business image.⁷⁸

A growing number of small firms would deem these advantages enough to join large firms in the embrace of cashless transactions. Soon, however, the remaining resisting firms would be unable to survive in the marketplace. The switch to cashless transactions would no longer only be motivated by profits; it would be motivated by self-preservation. This is because there is a high cost associated with cash that is not incurred through cashless transactions. Authors Bhaskar Chakravorti and Enjamin D. Mazzotta from Tufts University estimate the real cost of cash faced by firms within the U.S. to be \$55 billion a year.⁷⁹ Those firms that offer cashless alternative forms of payment save. As a result, these firms have a cost advantage to its cash-only competitors. It would not be long until the firms utilize the cost advantage to cut prices that cash-only firms would be unable to match. Eventually, firms would exclusively accept cashless transactions to eliminate all cash costs. Likewise, all other firms would be forced to do the same in the interest of remaining competitive.

The primary components that comprise the real cost of cash include processing costs, inaccessibility to free cash flows, and physical vulnerability to counterfeiters and thieves.

Processing costs associated with cash include the additional time to complete the transaction at the register, the cost of securing and monitoring the cash on site, and the specialized transportation to the bank for deposit.⁸⁰ Cash also requires the laborious record keeping by an accountant. Cashless transactions, conversely, are electronically documented and demand less time-consuming attention.⁸¹ Furthermore, cash impedes firms from immediately accessing their accounts receivable. As a result, businesses have less free cash flow, which may obstruct the business from participating in profitable investment opportunities. In addition, cashless transactions allow firms to collect interest on the funds immediately, unlike the delay of cash. The majority of the real cost of cash stems from theft, estimated to total \$40 billion a year.⁸² A Tufts study, also supplied by the previous source, concluded that the volume of cash left losses outweigh the losses of bad checks, credit card fraud, refund fraud, and internet fraud combined. Firms are able to circumvent counterfeiters during cashless transactions. The study pegged the second most expensive cost to the ATM operations involved in processing cash. The third predominant cost was \$5 billion a year in cash transportation.

All firms would conclude that the real cost of cash is simply too high. Many firms are aware of these costs and sensitive to the financial burden of cash. The Euromonitor, a global research company, indicated that within 2005-2010, cash usage decreased among consumers from 43% to 37%.⁸³ Nevertheless, firms replied that they need a 20% decrease to feel any relief. Firms are simultaneously incentivized by the advantages of going cashless and pressured by the costs of cash. As a result, firms that only accept cash are going to feel an increasing financial urgency to engage in cashless transactions. However, opening payment policy to include cashless option would only be a temporary fix. Eventually, consumers can expect that surviving, competitive firms would compel their consumers make exclusively cashless payments.

Banking Institutions

Likewise, banking institutions are aware that cashless transactions are both cost saving and revenue inducing; however, the implementation of a purely cashless system within banks poses potentially severe consequences. Nevertheless, banking institutions would consider a cashless system necessary to remaining competitive with their mobile banking counterparts.

One of the primary reasons cashless transactions are more profitable to banks is the ability to charge fees. Unlike cash, debit card transactions are accompanied with activation, maintenance, and overdraft penalties. Even customers who use credit cards only as convenience cards, paying off the entire balance each month, are most subject to annual maintenance fees. According to the research firm Moeb, card issuers had a total revenue of \$154.9 billion, and \$31.6 billion stemmed from the collection of overdraft fees.⁸⁴ In other words, over 20% of card issuers' revenue is extracted through overdraft fees alone. The more funds transferred through cashless mediums, the more potential bank revenue.

Furthermore, a cashless system would give banks the opportunity to capitalize on the already profitable exchange of consumer data from banks to retailers. Currently, banking institutions sell consumer-purchasing information to retailers hoping to refine their marketing strategy. Retailers often target specific bank customers and embed discounts within online bank statements, e-mails, or text messages.⁸⁵ According to *CNN Money*, each time a customer utilizes a discount which was generated from the banks data, the merchants compensate the bank with a fee; the fee is generally between 10% to 15% of the product's purchase price.⁸⁶ An intermediary that facilitates business between banks and retailer, such as Cardlytics, would require about 25% of the fee.⁸⁷ Still, it is estimated that in 2015, banking institutions would earn \$1.7 billion in annual revenue in exchange for selling consumer data. *CNN Fortune and Money* contributor, Blake Ellis, expresses that selling consumer data does not only increase revenue but also entices

customers to remain with their banks, which acts as a medium through which a consumer's favorite retailers can offer specialized discounts.⁸⁸ Ellis reasoned that by selling consumer data, banks are able to generate more revenue to offset the government regulated fees and elimination of consumer perks; Ellis went further to suggest that the banks may even benefit from an increase in customer loyalty. Thus, banks would continue to sell consumer data and a cashless system would offer banks more revenue making opportunities.

A purely cashless system would force consumers who did not previously participate in cashless transactions to join a bank or use direct carrier billing. Membership would grow among banks, supplying them with more customer data available for sale. Moreover, the cashless system would encourage more consumers to use mobile banking applications. These applications provide banking institutions with new forms of consumer data. For example, Barclays, a global financial service provider, informed its 13 million customers that the company would be selling their consumer data to other companies.⁸⁹ In a letter, they stated that the data may potentially include images of the consumer, recordings of their voice, and any location data derived from mobile device details. The data may also include any comments made via social networking sites between the bank member and the bank. In all, a cashless system would allow banks to capitalize their business of selling consumer data and generate more revenue.

As mentioned in the "direct carrier billing and mobile money transfer" section, banks would feel growing pressure from their competitors to offer advanced mobile banking applications. Consumers, particularly young people, are gravitating towards the convenience of mobile transactions. In a survey, 48% of bank members expressed their preference for mobile wallets over conventional banks.⁹⁰ Although many banks offer a mobile application, banking institutions are aware that companies such as Facebook, Apple, Google, Amazon, and PayPal

have the financial means to swiftly enter the banking sector.⁹¹ As previously discussed, Google, has already dabbled into the market through its launch of “Google Wallet”. It is imperative for banking institutions to confirm it would retain its members with attractive, popular mobile applications. This task is challenging considering a survey found bank members are generally not attracted to payment options provided by their respective bank.⁹² Banking institutions would need to shift their focus and resources to cashless transactions; otherwise, competitors would pounce on the opportunity to expand their business portfolios.

Banking institutions would use the cashless system as an insurance against default loans. The recent collapse in the housing market caused many bank customers to be “under-water,” holding a housing debt greater than its appraised value. An increasingly popular solution is for bank customers to default on their home loan by simply walking away and abandoning the home. A survey conducted in 2011 found that the proportion of strategic walkways increased from 26% (March 2009) of all defaults to 35% (September 2010) of all defaults within 22 months.⁹³ Moreover, a 2012 survey including 1,026 U.S. adults revealed that homeowners generally do not consider walkaways ethically compromising and have little sympathy for banking institutions.⁹⁴ The survey found that 32% of U.S. adults polled feel that homeowners should be able to strategically default on a mortgage without consequences; furthermore, 17% said they know somebody who has done so, and 13% reported that they intend on doing the same.

Currently, banks are gun-shy to lend, and these statistics reveal they have good reason. A cashless system, however, would ensure that bank customers could not walk away from their financial commitments. In a cashless system, bank customers would conduct all of their transactions through their bank. As a result, bank customers would be unable to conceal money. Banking institutions would have the ability to garnish bank customer’s accounts to ensure the

mortgage payments. In other words, bank customers would not have the option of default or the discretion on whether or not to make a loan payment. Banks would likely find this capability for garnishment more attractive as the number of student loans are growing in value. According to the Federal Reserve, there is currently about \$902 billion in total outstanding student loan debit within the U.S.⁹⁵ A cashless system would enable banks to lend large sums of money, such as mortgage and student loans, with confidence of receiving payment.

A cashless system would allow banks to lend more money and make more revenue. The Central Bank of Nigeria legislated a policy intended to simultaneously lessen the volume of cash within the economy and increase the number of cashless transactions. The policy imposed a “cash handling charge” for daily cash withdrawals or deposits greater than N500, 000 for individuals and N3, 000,000 for corporations.⁹⁶ In an analysis of the policy, Nigeria found the following advantage about the policy. The country reported that a cashless policy fosters the growth of banks deposits and increases the money available for commercial lending. This is because a cashless society would force citizens to do join a bank and deposit their funds. A cashless system allows banks to grow larger, conduct more business, and collect more interest.

Similar to firms, banks find cashless transactions alluring because they are cost saving. As previously mentioned, cashless transactions allow firms (including banks) to circumvent the cost of counting, storing, and transporting cash.⁹⁷ Banking institutions would also advocate that a cashless system is safer because it would eliminate physical bank robberies. Banks would feel the relief of time consuming, labor-intensive cash transactions and less bank customer visits.⁹⁸ In all, banks would gain all of the revenue-generating potential of more members, while eliminating the costs associated with cash.

Although banking institutions would shed the cost of cash transactions, banks would face one very expensive cost when they transition into a purely cashless system. Cashless accounts are similar to cash in that both are vulnerable to theft. Since all accounts and transactions would be conducted electronically, banking institutions would need to invest more in cyber security. Bloomberg and Ponemon, an institution that specializes its research in data security, conducted a survey consulting technology managers from 172 U.S. organizations.⁹⁹ The study identified how much money the financial sector would need to invest in order to protect themselves from 95% of all cyber-attacks. The study revealed that the financial services sector requires the most money to achieve the 95% protection statistic. Bloomberg concluded that financial companies can anticipate that their annual security costs would jump nearly 13 fold (from \$22.9 million to \$292.4 million per company) in order to protect themselves against 95% of attacks. The study found even more discouraging results. The financial services sector would need to double the resources currently dedicated to cyber security in order to fend off even 84% of attacks.

As of January 2012, U.S. financial institutions were only able to evade 69% of cyber-attacks. This leaves an uncomfortably large opportunity for third parties to gain system access. Theft, however, is not the only concern financial institutions face; hackers often aim to render banking institutions unable to conduct daily transactions. These attacks are referred to as “distributed denial of service” (DDOS) attacks.¹⁰⁰ The series of cyber-attacks on banking institutions in September 2012, deemed by CNN to be the “largest cyber-attack in history”, was motivated to instill terror, not financial gain.¹⁰¹ A group called Izz ad-Din al-Quassam Cyber Fighters claimed they launched the attack in response to a video featured on Google Inc.’s YouTube.¹⁰² They considered the video offensive for its controversial portrayal of Prophet Muhammad. Rodney Joffe, senior vice president of Virginia-based security firm, Neustar Inc.,

shared an insight when he revealed that even the largest of financial institutions would struggle to defeat such a sophisticated attack. It is evident that banking institutions are not equipped to conduct secure cashless transactions currently much less prepared to convert to a purely cashless system.

Nonetheless, banking institutions would be eager to tap into the revenue ventures and cost reductions a cashless system can offer. The greater threat of cyber-attacks is not the DDoS attacks, but the potential for a cyber-attack to wipe out all financial records. Banks would be left penniless, but the greater stakeholders are the federal government and citizens. Such an attack would leave citizens without any financial documentation. The consequences of a cyber-attack wipeout would be so detrimental to the nation that there is some ambiguity as to who is responsible for securing the cyber banking system. Should the federal government entrust the responsibility to banking institutions? After the 2007 economic crisis, it is only plausible for the nation to have little faith in the discretion of banks. It is likely that banking institutions would lean on the federal government to finance their cyber-attack prevention. As cyber-attacks increase in frequency, it is probable that legislation would be passed to supplement banks in financing more advanced cyber-security. With supplemental financing, banking institutions would have more reason to pursue a cashless system.

Government

Other than increased vulnerability to cyber-attacks, the government would likely conclude that a cashless system is only advantageous. A cashless system's ability to spare some taxpayer dollars, improve the nation's health, obstruct select forms of crime, and grant more government control would convince government officials that the transition is worth the increased threat to national security. Government officials would likely reason that since U.S.

citizens currently store most of their money electronically, cyber-attacks already pose grave risks to national security. Converting the small amount of money that is presently in cash form into digital form would place the U.S. in only a slightly worse position than its current one. Thus, government officials might propose that U.S. citizens commit to a cashless system, allowing the incremental increase in national security to be offset by massive benefits that could not be realized in a society where cash is present.

It is probable that the government would claim that a cashless system is more fiscally sensible. Since 2005, the depreciation of the cent combined with the increased cost of coin production cause U.S. pennies and nickels to cost more to produce than they are worth. It was not until 2011, however, that both the penny and nickel cost twice as much money to produce than their value.¹⁰³ The same source referenced *Slate* magazine which reported that the production of the nickel and penny resulted in a negative seigniorage of more than \$116 million, which is equivalent to 11.6 billion pennies; to better visualize, the volume of pennies is enough change to fill Shamu's tank at Sea World two times. Consequently, the government would likely argue that cash waste taxpayer money and metals.

Moreover, government officials would view a cashless system as a way to enhance U.S. health. Cash exposes consumers to potentially harmful bacteria. In a study conducted by researchers from the Wright Patterson medical center, 68 one-dollar bills were randomly extracted from shoppers in a grocery line.¹⁰⁴ The study concluded that 59 of the bills were contained with a bacteria known to infect people with a compromised immune system (such as HIV or AIDs patients), while 5 of the bills contained a more threatening bacteria capable of infecting even the most healthy of consumers. In another study by the Journal of American

Medical Association, 200 coins and bills were examined.¹⁰⁵ Thirteen percent of the coins had fecal bacteria and staphylococcus, as did forty-two percent of the bills.

The Japanese are especially consciousness of the bacteria on cash and take precautionary measures to address health concerns. Japanese banking customers have the option to withdrawal yen at a “clean ATM” that sanitizes the currency at 392 degrees Fahrenheit prior to dispensing it to the customer. In addition, a cashless system would spare the U.S. air from tons of carbon dioxide. As previously cited, the small country of Sweden emits 700 tons of carbon dioxide via cash transport. Sweden is only slightly larger than the state of California.¹⁰⁶ Thus, it is plausible to deduce the U.S. would save many times the amount of carbon dioxide Sweden would if both countries are completely cashless.

A cashless system would largely relieve law enforcement of cases involving “cash crimes”, or crimes that are able to occur because of the discrete, untraceable nature of cash. The government would be especially motivated to impose a cashless system to eliminate tax evasion. The estimated tax gap between 2000 and 2010 is \$3 trillion, and the majority of the gap occurs because of the under reporting of business income.¹⁰⁷ The under reporting of business income is possible via unreported or underreported cash transactions, which do not leave behind evidence or documentation of an exchange. A cashless system would ensure that all tax discrepancies would be detected. Little mystery would exist, as all transactions would be stored electronically and available for investigation.

Furthermore, a cashless system would assist in combating the war on drugs. The drug trade is an illegal enterprise fueled by cash.¹⁰⁸ In 2006, U.S. citizens purchased \$38 billion in cocaine, \$11 billion in heroin, \$4 billion in marijuana, and \$18 billion in methamphetamine.¹⁰⁹ Law enforcement would be eager to use a cashless system to impede U.S. citizens from drug

consumption. However, a cashless system would only halt drug trade initially. Drug distributors would develop complex payment systems, in which distributors claim to operate under a variety of decoy “legal” businesses to justify the large volume of transactions. Nevertheless, the transactions would be documented and taxes would be paid, even if the businesses go uncovered as drug hubs. The increased complexity and likelihood of being caught would discourage some of the drug trade and potentially save U.S. taxpayers billions of dollars a year. In 2007, the combined cost of crime associated with the drug trade, such as health and productivity paid by U.S. taxpayers totaled \$193 billion.¹¹⁰ Costs of drug related crime include criminal justice system costs, crime victim costs, and other crime costs subtotaling \$61,376,694,000. Health costs include specialty treatment costs, hospital and emergency department costs for nonhomicide cases, hospital and emergency department costs for homicide cases, insurance administration costs, and other health costs subtotaling \$11,416,232,000. Lastly, productivity costs include labor participation costs, specialty treatment costs for services provided at the state level, specialty treatment costs for services provided at the federal level, hospitalization costs, incarceration costs, premature mortality costs (nonhomicide), and premature mortality costs (homicide) subtotaling \$120,304,004. A cashless system would not eliminate drug trade, but at minimum, it would complicate the payment system, create some tax revenue, decrease the number of consumers and distributors within the U.S., and decrease the amount of taxpayer dollars spent on illicit drug use. The government would encounter similar results from the human trafficking business as they operate similarly.¹¹¹

Perhaps the most appealing reason the government would attempt to thrust a cashless system on the citizens of the U.S. is the capabilities offered through Radio Frequency Identification Devices (RFID) microchips. RFID microchips were designed to identify objects

remotely for various purposes including inventory tracking.¹¹² In 2004, however, the technology was approved by the FDA for human implantation.¹¹³ The initial purpose was to implant the chip in the arms of medical patients. The chip is approximately the size of a grain of rice and store codes that allow medical employees to retrieve the patient's medical information from a secure database when scanned. The RFID technology has expanded to offer consumers the option of storing banking information on the chip, allowing the consumer to scan their arm rather than the bar code on a card. The RFID chip has the capability of storing personal information such as social security number. If the cashless system evolved further to accept only embedded RFID microchips accompanied with social security numbers, banking institutions and the government would have the ability to track each U.S. citizen based on the citizen's social security number coupled with the location of their last transaction. The government would find this capability particularly advantageous in securing U.S. borders. Border control officers could scan U.S. citizens entering and exiting the U.S., updating a government database as to which citizens are in the U.S. and which are abroad. Moreover, illegal immigrants would be unable to survive in the U.S. since all transactions would require a RFID microchip with a valid social security number. According to the *Washington Times*, there are currently 18 to 20 million illegal immigrants in the U.S.¹¹⁴ These immigrants would be unable to purchase necessary commodities. In all, the RFID technology would give the government the power to conduct various forms of tracking and monitoring that would be applicable to government responsibilities, such as illegal immigration.

Individual Consumer

Businesses, banking institutions, and the government are uniquely motivated when enticing the consumer to embrace a cashless system. Consumers, particularly Generation Y

(born between 1980-2000), are allured by the convenience and marketing rewards a cashless system facilitates. As the more skeptical and cash-reliant generations are replaced with tech savvy ones, consumers would become increasingly willing to accept a purely cashless system. These entities would promote the cashless system as a tool for enhancing the consumer lifestyle. After implementation, citizens would realize that the implications of a cashless society reach further than expedient shopping and personalized ads. Rather, a cashless system would expose personal information aimed to profit establishments. Unlike businesses, banking institutions, and the government, consumers will likely conclude that a cashless system offers greater detriment than benefit.

The consumer would reap severe financial forfeitures as businesses, banking institutions, and the government prosper. As previously discussed, a cashless system would enable banking institutions to collect more fees (activation, maintenance, overdraft, etc.) from the consumer since all currency would be tied up electronically. This would create the optimal environment for banking institutions to raise fees, as the consumer has no option but to comply. Moreover, the revenue these entities save by avoiding the costs of cash transactions would translate to a loss of jobs for cash producers, cash transporters, and cash security workers. In addition, there would be a reduction in demand for bank tellers and accountants, leaving many consumers facing a loss of income. Simultaneously, banking institutions would continue to work in conjunction with businesses, supplying them with greater volumes of data to sell. Vendors would target consumers with increased accuracy, hoping to trigger impulse purchasing. Consumers would also combat a psychological war, spending 20% more on products and services simply because the payment method would be electronic rather than cash. At a time when consumers would

encounter greater banking charges and less job availability, they would be inundated with opportunities to overspend.

A cashless society would further expose consumers to identity theft. Consumers would no longer have the luxury of storing cash in the event of a DDOS attack or in cases where the consumer's identity was compromised. Furthermore, a new threat is emerging referred to as "electronic pickpocketing". Criminals are now purchasing scanners capable of retrieving information stored in RFID embedded credit cards. The scanners are prevalent and are available for purchase for less than \$100. Security expert, Walt Augustinowicz, explained to Memphis News 3 channel that he is able to retrieve consumer credit card and expiration information via the scanner by positioning himself within a generous radius of the consumer's wallet.¹¹⁵ For those individuals with embedded RFID microchips, criminals need only access to a consumer's arm.

Consumers would no longer possess financial confidentiality or personal autonomy. Consumers would lose all sense of privacy because each of their transactions would be recorded by banks and swiftly shared with vendors and the government. A cashless system would not only reveal shopping trends/habits, but other sensitive information such as a citizen's health status, approximate location, financial wellbeing, etc. These entities would have the ability to deduce a wide spectrum of information based on a consumer's transaction records. For example, if a consumer's bank sold their information to their health insurance provider, the insurance company would be able to spy on their customer. The insurance company may analyze the consumer's food purchases or calculate the frequency the consumer attends a gym. Likewise, a government agency may track a consumer's location based on the place of their last purchase.

The possibilities would be even more invasive with the introduction of RFID microchips. A Texas school district already employs the RFID microchip and embeds them into their student ID tags to track students.¹¹⁶ It is speculated that schools are primarily motivated by government funding, which increases with a growing student attendance. The Texas school verifies student attendance via RFID microchips and is reimbursed accordingly. An embedded RFID microchip would simplify the process. Similarly, employers often assign their hourly employees an RFID card used to track their time.¹¹⁷ Employees swipe their card before and after their shift rather than manually punching a card. As embedded RFID microchips grow in popularity, employers may retire RFID tags and require each employee to wave their arm in front scanner to track hours. Again, another entity would gain at the expense of the citizen. RFID technology would expand the resources available to businesses, banking institutions, and the government in monitoring the consumer's daily life.

Conclusion

Businesses would likely be eager to embrace a cashless system for its ability to increase average ticket size, enhance customer service, and circumvent the costs of cash (i.e. processing costs, inaccessibility to free cash flows, vulnerability to counterfeiters and thieves). Recent legislation, which lowered the interchange fee levied on businesses, further encourages firms to facilitate cashless transactions. For banks, a cashless system increases opportunities to charge consumers more fees (i.e. activation, maintenance, and overdraft fees), to sell greater volumes of consumer data to retailers, to remain competitive with the rising Direct Carrier Billing companies, and (like businesses) to avoid the costs of cash. Moreover, the concentration of money within banking institutions would swell the funds available for lending thereby increasing the collection of interest. Similarly, the government would deem a cashless system exceedingly advantageous because it would save the cost of cash production, improve the nation's health through the elimination of harmful bacteria and emissions, obstruct the drug trade and human trafficking, grant the more government control (particularly in immigration), and arm the government with more ways to monitor its citizens.

The primary negative impact of a cashless system on businesses, banks and the government is an increased vulnerability to cyber-attacks or DDOS attacks. In the interest of preventing a large-scale cyber-attack, the government would likely financially support businesses and banking institutions in installing more secure cyber systems. Consequently, businesses and banking institutions would render the cost saving and revenue inducing cashless system worth the investment in cyber security. The government may reason that cyber-attacks already pose grave risks to national security, and converting the small amount of money that is presently in cash form into digital form would place the U.S. in only a slightly worse position

than its current one. The government would consider the advantages a cashless system would offer to be worth the incremental increase in national security. Lastly, businesses, banks and the government would appeal to the individual consumer, and market a cashless system as a tool to enhance the security and ease of the consumer's lifestyle. Regrettably, after implementation, the consumer would experience unwanted consequences. The consumer would be subject to more banking fees, lose various forms of employment (cash producers, cash transporters, cash security workers, bank tellers, and accountants), be targeted with increased accuracy by marketers, face intense consumer-specific advertising, be exposed to identity theft, loss of financial confidentiality and personal autonomy. Despite individual consumers' pernicious losses a "cashless" society there is room to suggest that if a cashless society prevails in the U.S., it would be primarily for the benefits of businesses, banking institutions, and the government.

Endnotes

1. Peter Platan, "The Evolution of Money and the Development of the Smart Card" (PhD diss., Concordia University, 2000).
2. Cooper, "Free Childcare," San Diego Family, accessed July 20, 2013, www.sandiegofamily.com/travel/travel-tips/801-free-childcare.
3. Roy Davies, "Origins of Money and Banking," May 25, 2005, accessed July 20, 2013, projects.exeter.ac.uk/RDavies/arian/origins.html.
4. David Stearns, "The Cashless Society," World Press, September 26, 2012, accessed July 20, 2013, cashlessociety.wordpress.com/tag/moneyless/.
5. Balaji Viswanathan, "Why are Bitcoins so Hot," accessed July 20, 2013, blog.zingfin.com/2013/04/why-are-bitcoins-so-hot/.
6. Stearns, "The Cashless Society," 3.
7. Viswanathan, "Why are Bitcoins so Hot."
8. Stearns, "The Cashless Society," 3.
9. Davies, "Origins of Money and Banking," 2.
10. James Robertson, *The History of Money: From Its Origin to Our Time*.
11. Davies, "Origins of Money and Banking," 2.
12. "Functions of Money: The Economic Lowdown Podcast Series," Federal Reserve Bank of St. Louis, accessed July 20, 2013, www.stlouisfed.org/education_resources/economic-lowdown-podcast-series/functions-of-money/.
13. "Chocolate as the Perfect Gift: When Did it Start," Mayesa.com, Last modified February 14, 2012, accessed July 30, 2013, mayesa.com/tag/cacao-beans/.
14. Davies, "Origins of Money and Banking"
15. "Tabua or Sperm Whale Tooth Neck Ornament from Fiji," Powerhouse Museum, accessed July 20, 2013, from.ph/356234.
16. Davies, "Origins of Money and Banking," 4.
17. Jean-Paul Chavas and Daniel W. Bromley, "On the Origins and Evolving Role of Money," *Journal of Institutional and Theoretical Economics*.
18. Chavas and Bromley "On the Origins and Evolving Role of Money," 3.
19. Davies, "Origins of Money and Banking," 4.
20. Chavas and Bromley "On the Origins and Evolving Role of Money," 4.
21. Robertson, *The History of Money: From Its Origin to Our Time*, 8.
22. Davies, "Origins of Money and Banking," 2.
23. Chavas and Bromley "On the Origins and Evolving Role of Money," 3.

24. Davies, "Origins of Money and Banking," 4.
25. Robertson, *The History of Money: From Its Origin to Our Time*, 8.
26. Chavas and Bromley "On the Origins and Evolving Role of Money," 3.
27. Robertson, *The History of Money: From Its Origin to Our Time*, 10.
28. Matthew Hollow, "Pre-1900 Utopian Visions of the 'Cashless Society,'" Munich Personal RePEc Archive, 40780 (2012), accessed July 30, 2013, mpra.ub.uni-muenchen.de/40780/.
29. "Got Cash? Not for Long," Last modified June 14, 2012, <https://www.aier.org/article/7672-got-cash-not-long>.
30. "Pew Survey Finds Mobile Banking on the Rise in the U.S," last modified August 23, 2013, www.mobilepaymentstoday.com/article/218409/Pew-survey-finds-mobile-banking-on-the-rise-in-U-S.
31. "Got Cash? Not for Long."
35. "Square Wallet. Pay with Your Name," <https://squareup.com/wallet>.
36. "Shop. Save. Pay. With your Phone," www.google.com/wallet/#utm_source=HA&utm_medium=ha_sem_bk&utm_campaign=en_US&utm_term=google%20wallet
37. "What PayPal's Partnership with Discover Means to Business Owners and Consumers," last modified August 28, 2012, www.entrepreneur.com/blog/224303.
38. "Say Hello to Bluebird," <https://www.bluebird.com/>.
39. "Sweden Moving towards a Cashless Economy," last modified March 18, 2012, www.cbsnews.com/news/sweden-moving-towards-cashless-economy/.
42. Joseph Salerno, "Using Legal Tender Laws Against the State," *Global Economic Intersection*, econintersect.com/b2evolution/blog2.php/2013/03/15/using-legal-tender-laws-against-the-state.
43. Only 250 offices out of the 780 offices that comprise three of Sweden's major banks deal with cash. Likewise, another prominent Swedish bank, Nordea Bank, has 300 branches of which 200 operate cashless. "Sweden Moving towards a Cashless Economy."
44. Salerno, "Using Legal Tender Laws Against the State."
45. Salerno, "Using Legal Tender Laws Against the State."
46. "Sweden Moving towards a Cashless Economy."
47. Salerno, "Using Legal Tender Laws Against the State."
48. "Sweden Moving towards a Cashless Economy."
49. "Phasing Out the Penny," www.mint.ca/store/mint/learn/phasing-out-the-penny-6900002#.Upkrc5Ao74h.
51. "Canada Takes Unprecedented Step towards a Cashless Society," last modified January 2, 2013, canadianawareness.org/2013/01/canada-takes-unprecedented-step-towards-a-cashless-society/.

52. "Bank of Canada Unveils New \$5 and \$10 Polymer Banknotes," last modified November 8, 2013, www.cbc.ca/news/canada/bank-of-canada-unveils-new-5-and-10-polymer-banknotes-1.1373060.
53. "Canada Takes Unprecedented Step towards a Cashless Society."
54. "Bank notes-FAQ," www.bankofcanada.ca/banknotes/bank-notes-faq/.
55. "How Long is the Life Span of U.S. Paper Money?" last modified October 25, 2013, www.federalreserve.gov/faqs/how-long-is-the-life-span-of-us-paper-money.htm.
56. "Royal Canadian Mint Launches MintChip™ Developer Challenge," www.mint.ca/store/news/royal-canadian-mint-launches-mintchip-tm-developer-challenge-14900005?cat=News+Releases&nId=700002&nodeGroup=About+the+Mint#.Upk2cpAo74h.
57. "Digital Cash Replacement from Royal Canadian Mint in the works," last modified April 30, 2013, www.thestar.com/business/personal_finance/spending_saving/2013/04/30/digital_cash_replacement_from_royal_canadian_mint_in_the_works.html.
58. "The Royal Canadian Mint Challenged Software Developers to Create Apps for MintChip, the evolution of Currency," mintchipchallenge.challengepost.com/.
59. "MasterCard Study Ranks Canada, Belgium, and France as Closest to being 'Nearly Cashless,'" last modified October 10, 2013, www.vendingtimes.com/me2/dirmod.asp?sid=EB79A487112B48A296B38C81345C8C7F&nm=Vending+Features&type=Publishing&mod=Publications::Article&mid=8F3A7027421841978F18BE895F87F791&tier=4&id=28B14730823A42748E7EB243F6D638CB.
60. "Canada Becoming a Cashless Society? 7 Signs We are Heading to a Post-Cash World, last modified August 29, 2012, www.huffingtonpost.ca/2012/08/28/canada-cashless-society_n_1837085.html.
62. "MasterCard Study Tracks Progress toward Cashless Economies," last modified September 23, 2013, www.mobilecommerceinsider.com/topics/mobilecommerceinsider/articles/354066-mastercard-study-tracks-progress-toward-cashless-economies.htm.
63. "New Working Paper: Mobile Payments in Turkey," last modified October 11, 2012, cashlessociety.wordpress.com/tag/direct-carrier-billing/.
64. Avunduk Can Ali and Dalziel Nurdilek, "Mobile Payment Systems in Turkey" (University Library of Munich, Germany, 2012).
65. "Why Half the World Doesn't Have Bank Accounts," last modified April 25, 2012, www.businessweek.com/articles/2012-04-25/why-half-the-world-doesnt-have-bank-accounts.
66. Can Ali and Nurdilek, "Mobile Payment Systems in Turkey."
67. Can Ali and Nurdilek, "Mobile Payment Systems in Turkey."
68. "New working Paper: Mobile Payments in Turkey."

69. "Somaliland Telecoms: Cashless Doesn't Mean Broke," somalilandpress.com/somaliland-telecoms%E2%80%A9-cashless-doesnt-mean-broke-28073.
70. "How Accepting Cards Can Help Merchants Increase Revenues," Market Insight, (2013):www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CEsQFjAB&url=http%3A%2F%2Fwww.firstdata.com%2Fdownloads%2Fthought-leadership%2Faccepting-cards-market-insight.pdf&ei=7Ca3UruVMsKCcyAGQroDYDw&usg=AFQjCNHWWjc1g641mSERWONIRxtNrp-57g&sig2=JpD1wLHa5dWjy8Vmal6grw.
71. TJ McCue, Tech, *Forbes*, August 16, 2013, www.forbes.com/sites/tjmccue/2013/08/16/why-dont-more-small-businesses-accept-credit-cards/.
72. "Press Release," Last modified May 22, 2012, about.intuit.com/about_intuit/press_room/press_release/articles/2012/GetBusinessGrowing.html.
73. Katerina Sokou, Business, *The Washington Post*, July 31, 2013, www.washingtonpost.com/business/economy/court-sides-with-retailers-goes-against-fed-rule-on-debit-card-fees/2013/07/31/4f9317ca-fa16-11e2-a369-d1954abcb7e3_story.html.
74. "New Rules on Electronic Payments Lower Costs for Retailers," Last modified September 2011, www.business.ftc.gov/documents/bus78-new-rules-electronic-payments-lower-costs-retailers.
75. Katerina Sokou, Business, *The Washington Post*, July 31, 2013, www.washingtonpost.com/business/economy/court-sides-with-retailers-goes-against-fed-rule-on-debit-card-fees/2013/07/31/4f9317ca-fa16-11e2-a369-d1954abcb7e3_story.html.
76. "Benefits of Credit Card Acceptance," www.monerisusa.com/payment-processing-services/benefits-of-credit-cards.aspx.
77. "Benefits of Credit Card Acceptance."
78. Mary Weinstein, August 9, 2013, "How Many People Shop Online [INFOGRAPHIC]," CPC Strategy Blog, August 9, 2013, www.cpcstrategy.com/blog/2013/08/ecommerce-infographic/.
79. "Benefits of Credit Card Acceptance."
80. Art Markman, *Psychology Today*, December 22, 2013, www.psychologytoday.com/blog/ulterior-motives/201001/spending-and-credit-cards.
81. "How Accepting Cards Can Help Merchants Increase Revenues," Market Insight, (2013):www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CEsQFjAB&url=http%3A%2F%2Fwww.firstdata.com%2Fdownloads%2Fthought-leadership%2Faccepting-cards-market-insight.pdf&ei=7Ca3UruVMsKCcyAGQroDYDw&usg=AFQjCNHWWjc1g641mSERWONIRxtNrp-57g&sig2=JpD1wLHa5dWjy8Vmal6grw.
82. "How Accepting Cards Can Help Merchants Increase Revenues," Market Insight, (2013):www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CEsQFjAB&url=http%3A%2F%2Fwww.firstdata.com%2Fdownloads%2Fthought-leadership%2Faccepting-cards-market-

insight.pdf&ei=7Ca3UruVMsKCyAGQroDYDw&usg=AFQjCNHWWjc1g641mSERWON
IRxtNrp-57g&sig2=JpD1wLHa5dWjy8Vmal6grw.

83. "Benefits of Credit Card Acceptance."
84. "How Accepting Cards Can Help Merchants Increase Revenues," Market Insight, (2013):www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CEsQFjAB&url=http%3A%2F%2Fwww.firstdata.com%2Fdownloads%2Fthought-leadership%2Faccepting-cards-market-insight.pdf&ei=7Ca3UruVMsKCyAGQroDYDw&usg=AFQjCNHWWjc1g641mSERWONIRxtNrp-57g&sig2=JpD1wLHa5dWjy8Vmal6grw.
85. "Benefits of Credit Card Acceptance."
86. "Cash Costs U.S. Businesses \$40 Billion a Year," Last modified September 20, 2013, www.inc.com/will-yakowicz/dealing-with-cash-costs-american-businesses-55-billion.html
87. John Candido, June 28, 2013, "The Future Desirability of a Cashless Society," Finextra Blog, June 28, 2013, www.finextra.com/blogs/fullblog.aspx?blogID=7869.
88. "Pay Electronic," www.fisglobal.com/products-epayment-payelectronic.
89. "Cash Costs U.S. Businesses \$40 Billion a Year."
90. "Cash Costs U.S. Businesses \$40 Billion a Year."
91. Matt Cole, *Urban Intelligence II-A Cashless Society is Coming Soon*, San Diego: 2012, www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=9&ved=0CHIQFjAI&url=http%3A%2F%2Fwww.cubic.com%2FPortals%2F0%2FFiles%2FTech-Center%2F11653%2520Urban%2520Intelligence%2520II%2520White%2520papernew.pdf&ei=wy63Uq2TA8eayQG8kYGoDA&usg=AFQjCNGOBzm32ijgiehwxftmtkulFYJikA&sig2=L71-qEmp9PsZyV6ka8XIkG.
92. Blake Ellis, "The Banks' Billion-Dollar Idea," *CNN Money*, Last modified July 8, 2011, money.cnn.com/2011/07/06/pf/banks_sell_shopping_data/.
93. Ellis, "The Banks' Billion-Dollar Idea."
94. Ellis, "The Banks' Billion-Dollar Idea."
95. Ellis, "The Banks' Billion-Dollar Idea."
96. Rupert Jones, "Barclay's To Sell Customer Data," *Guardian*, June 24, 2013, www.theguardian.com/business/2013/jun/24/barclays-bank-sell-customer-data.
97. Cole, "Urban Intelligence II-A Cashless Society is Coming Soon."
98. John Candido, "The Future Desirability of A Cashless Society," *FinExtra*, Last modified July 1, 2013, www.finextra.com/blogs/fullblog.aspx?blogID=7869.
99. Cole, "Urban Intelligence II-A Cashless Society is Coming Soon."
100. Steve Yoder, "More Americans Walk Away From Their Mortgages," *The Fiscal Times*, www.thefiscaltimes.com/Articles/2012/10/24/More-Americans-Walk-Away-from-Their-Mortgages.
101. Yoder, "More Americans Walk Away From Their Mortgages."

102. "Student Loan Debt Statistics," *American Student Assistance*, Accessed December 28, 2013, www.asa.org/policy/resources/stats/.
103. J. Yaqub, H. Bello, I. Adenuga, and M. Ogundeji, "Cash Policy in Nigeria: Prospects and Challenges," *International Journal of Humanities and Social Science* 3, no. 3 (2013): www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=30&ved=0CIYBEBYwCTgU&url=http%3A%2F%2Fwww.ijhssnet.com%2Fjournals%2FVol_3_No_3_February_2013%2F20.pdf&ei=6V6_UuH_KLKkyAHrgYH4Cw&usg=AFQjCNGKtcebAwwHa0lD_LPWjsJAyyg8TQ&sig2=aQB-grm1PfWbIF38W7b2gg.
104. Candido, "The Future Desirability of A Cashless Society."
105. Cole, "Urban Intelligence II-A Cashless Society is Coming Soon."
106. Eric Engleman, Chris Strohm, "Cybersecurity Disaster Seen in U.S. Survey Citing Spending Gaps," *Bloomberg*, Last modified January 30 2012, www.bloomberg.com/news/2012-01-31/cybersecurity-disaster-seen-in-u-s-survey-citing-spending-gaps.html.
107. Eric Engleman, Chris Strohm, "Cyber Attacks on U.S. Banks Expose Computer Vulnerability," *Bloomberg*, Last modified September 27, 2012, www.bloomberg.com/news/2012-09-28/cyber-attacks-on-u-s-banks-expose-computer-vulnerability.html.
108. Rothman, Paul, "Cyber Terror Rages in the Banking Sector," *Security Info Watch*, Last modified September 28, 2012, www.securityinfowatch.com/blog/10796084/cyber-terror-rages-in-the-banking-sector.
109. Some of the banking institutions which were attacked included: JPMorgan, Citigroup In. © and Charlotte, North Carolina-based Bank of America Corp, Wells Fargo, U.S. Bancorp (USB), and PNC Financial Services Group Inc. (PNC). Engleman and Strohm, "Cyber Attacks on U.S. Banks Expose Computer Vulnerability."
111. Jeremy Stahal, Nickel and Dimed, *Slate*, www.slate.com/articles/business/cashless_society/2012/03/cashless_society_how_much_would_the_united_states_save_by_ditching_paper_money_.html.
112. Jennifer Mitol, "Cash Carries Lots of Bacteria," *ABC News*, last modified May 23. abcnews.go.com/Health/story?id=117433.
113. Christoph Reilly, "Dirty Money: Germs on Money," *Hubpages*, last modified October 17, 2010. christophreilly.hubpages.com/hub/Dirty-Money-Germs-on-Currency.
114. "Geography Stats: Sweden vs. United States." *Nationmaster*. Accessed January 11, 2014. www.nationmaster.com/compare/Sweden/United-States/Geography.
115. Stahal, "Nickel and Dimed."
116. Maitanmi Olsola, Awodele Oludele, Ogbonna Chibueze, and Osundina Samuel. "Cashless Society: Drives and Challenges in Nigeria," *International Journal of Information Sciences and Techniques* Vol. 3, No. 2, March (2013): doi-105121ijist20133201-1-cashless-society-drives-and-challenges-in-nigeria.

117. "Economics," *Drug War Facts Organization*, accessed January 8, 2014, www.drugwarfacts.org/cms/Economics#sthash.ptUmqROP.tRc9OKhH.dpbs.
118. "Economics."
119. Maitanmi Olsola, Awodele Oludele, Ogbonna Chibueze, and Osundina Samuel, "Cashless Society: Drives and Challenges in Nigeria."
120. Mark Roberti, "The History of RFID Technology," *RFID Journal*, www.rfidjournal.com/articles/view?1338.
121. "FDA Approves Computer Chip for Humans," *NBC News*, last modified October 13, 2004, www.nbcnews.com/id/6237364/ns/health-health_care/t/fda-approves-computer-chip-humans/#.UtMUKJAo5jp.
122. Stephen Dinan, "Nearly 20 Million Immigrants in the U.S., Former Boarder Patrol Agents Say," *Washington Times*, last modified September 9, 2013, www.washingtontimes.com/news/2013/sep/9/nearly-20m-illegal-immigrants-us-ex-border-patrol/.
123. Groled, "Electronic Pickpocketing," *News 3 Channel Memphis*, last updated January 10, 2012, wreg.com/2012/01/10/electronic-pickpocketing/.
124. "Judge: School Can Move Girl in ID-Tracking Cause," *Boston*, last updated January 8, 2013, www.boston.com/news/education/2013/01/08/judge-school-can-move-girl-tracking-case/r9LuGuRxlTMeiYjtoFvSK/story.html.
125. "Wasp Time Case Study: Accurately Tracking Employee Time Drives Big Cost Savings," *Wasp Barcode Technologies*, www.waspbarcode.co.uk/wasptime/case_afton.asp.

Bibliography

- American Institute for Economic Research. "Got Cash? Not for long." last modified June 14, 2012. <https://www.aier.org/article/7672-got-cash-not-long>.
- Bank of Canada. "Bank notes-FAQ." www.bankofcanada.ca/banknotes/bank-notes-faq/.
- Banknote News. "Canada." last modified June 7, 2013. www.banknotenews.com/files/tag-canada.php.
- Bastiat. "Sweden's War on Cash Runs Into Wall- and a Heroic Bank." last modified December 27, 2012. bastiat.mises.org/2012/12/swedens-war-on-cash-runs-into-a-wall-and-a-heroic-bank/.
- Bloomberg BusinessWeek. "Why Half the World Doesn't Have Bank Accounts." last modified April 25, 2012. www.businessweek.com/articles/2012-04-25/why-half-the-world-doesnt-have-bank-accounts.
- Bluebird. "Say Hello to Bluebird." <https://www.bluebird.com/>.
- Bureau of Consumer Protection. "New Rules on Electronic Payments Lower Costs for Retailers." Last modified September 2011. www.business.ftc.gov/documents/bus78-new-rules-electronic-payments-lower-costs-retailers.
- Business Insider. "The Real Price of Counterfeit Money [INFOGRAPHIC]." Last modified April 18, 2012. www.businessinsider.com/the-real-price-of-counterfeit-money-infographic-2012-4.
- Can Ali, Avunduk and Dalziel Nurdilek. "Mobile Payment Systems in Turkey." University Library of Munich, Germany, 2012.
- Canadian Awareness Network. "Canada Takes Unprecedented Step towards a Cashless Society." last modified January 2, 2013. canadianawareness.org/2013/01/canada-takes-unprecedented-step-towards-a-cashless-society/.
- Candido, John. "The Future Desirability of A Cashless Society." *FinExtra*. Last modified July 1, 2013. www.finextra.com/blogs/fullblog.aspx?blogID=7869.
- CBC News Canada. "Bank of Canada Unveils New \$5 and \$10 Polymer Banknotes." last modified November 8, 2013. www.cbc.ca/news/canada/bank-of-canada-unveils-new-5-and-10-polymer-banknotes-1.1373060.
- CBS News. "Sweden Moving towards a Cashless Economy." last modified March 18, 2012. www.cbsnews.com/news/sweden-moving-towards-cashless-economy/.
- Chavas, Jean-Paul and Daniel W. Bromley. "On the Origins and Evolving Role of Money." *Journal of Institutional and Theoretical Economics*.
- "Chocolate as the Perfect Gift: When Did it Start." Mayesa.com. last modified February 14, 2012. Accessed July 30, 2013. mayesa.com/tag/cacao-beans/.
- Cole, Matt. *Urban Intelligence II-A Cashless Society is Coming Soon*. San Diego: 2012. www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=9&ved=0CHIQFjAI&url=http%3A%2F%2Fwww.cubic.com%2FPortals%2F0%2FFiles%2FTech-Center%2F11653%2520Urban%2520Intelligence%2520II%2520White%2520papernew.pdf&

ei=wy63Uq2TA8eayQG8kYGoDA&usg=AFQjCNGOBzm32ijgiehwxFTmtkulfYJikA&sig2=L71-qEmp9PsZyV6ka8XIkg.

Cooper. "Free Childcare." San Diego Family. Accessed July 20, 2013.
www.sandiegofamily.com/travel/travel-tips/801-free-childcare.

CPC Strategy Blog. www.cpcstrategy.com/blog/2013/08/ecommerce-infographic/.

Davies, Roy. "Origins of Money and Banking." May 25, 2005. Accessed July 20, 2013.
projects.exeter.ac.uk/RDavies/arian/origins.html.

Dinan, Stephen. "Nearly 20 Million Immigrants in the U.S., Former Border Patrol Agents Say." Washington Times. Last modified September 9, 2013.
www.washingtontimes.com/news/2013/sep/9/nearly-20m-illegal-immigrants-us-ex-border-patrol/.

"Economics." *Drug War Facts Organization*. Accessed January 8, 2014.
www.drugwarfacts.org/cms/Economics#sthash.ptUmqROP.tRc9OKhH.dpbs.

Ellis, Blake. "The Banks' Billion-Dollar Idea." *CNN Money*. Last modified July 8, 2011.
money.cnn.com/2011/07/06/pf/banks_sell_shopping_data/.

Engleman, Eric, Chris Strohm. "Cyber Attacks on U.S. Banks Expose Computer Vulnerability." Bloomberg. Last modified September 27, 2012. www.bloomberg.com/news/2012-09-28/cyber-attacks-on-u-s-banks-expose-computer-vulnerability.html.

Engleman, Eric, Chris Strohm. "Cybersecurity Disaster Seen in U.S. Survey Citing Spending Gaps." *Bloomberg*. Last modified January 30 2012. www.bloomberg.com/news/2012-01-31/cybersecurity-disaster-seen-in-u-s-survey-citing-spending-gaps.html.

Entrepreneur. "What PayPal's Partnership with Discover Means to Business Owners and Consumers." last modified August 28, 2012. www.entrepreneur.com/blog/224303.

"FDA Approves Computer Chip for Humans." *NBC News*. Last modified October 13, 2004.
www.nbcnews.com/id/6237364/ns/health-health_care/t/fda-approves-computer-chip-humans/#.UtMUKJAo5jp.

Federal Reserve. "How Long is the Life Span of U.S. Paper Money?" last modified October 25, 2013. www.federalreserve.gov/faqs/how-long-is-the-life-span-of-us-paper-money.htm.

Finextra Blog. www.finextra.com/blogs/fullblog.aspx?blogID=7869.

Fis. "Pay Electronic." www.fisglobal.com/products-epayment-payelectronic.

"Functions of Money: The Economic Lowdown Podcast Series." Federal Reserve Bank of St. Louis. Accessed July 20, 2013. www.stlouisfed.org/education_resources/economic-lowdown-podcast-series/functions-of-money/.

"Geography Stats: Sweden vs. United States." *Nationmaster*. Accessed January 11, 2014.
www.nationmaster.com/compare/Sweden/United-States/Geography.

Google Wallet. "Shop. Save. Pay. With your Phone."
www.google.com/wallet/#utm_source=HA&utm_medium=ha_sem_bk&utm_campaign=enUS&utm_term=google%20wallet

- Groled. "Electronic Pickpocketing." *News 3 Channel Memphis*. Last updated January 10, 2012. wreg.com/2012/01/10/electronic-pickpocketing/.
- Hollow, Matthew. "Pre-1900 Utopian Visions of the 'Cashless Society.'" Munich Personal RePEc Archive, 40780 (2012). Accessed July 30, 2013, mpra.ub.uni-muenchen.de/40780/
- "How Accepting Cards Can Help Merchants Increase Revenues." Market Insight, (2013): www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CEsQFjAB&url=http%3A%2F%2Fwww.firstdata.com%2Fdownloads%2Fthought-leadership%2Faccepting-cards-market-insight.pdf&ei=7Ca3UruVMsKCyAGQroDYDw&usg=AFQjCNHWWjc1g641mSERWONIRxtNrp-57g&sig2=JpD1wLHa5dWjy8Vmal6grw.
- Huffington Post Canada Business. "Canada Becoming a Cashless Society? 7 Signs We are Heading to a Post-Cash World. Last modified August 29, 2012. www.huffingtonpost.ca/2012/08/28/canada-cashless-society_n_1837085.html.
- Inc. "Cash Costs U.S. Businesses \$40 Billion a Year." Last modified September 20, 2013. www.inc.com/will-yakowicz/dealing-with-cash-costs-american-businesses-55-billion.html
- Intuit. "Press Release." Last modified May 22, 2012. about.intuit.com/about_intuit/press_room/press_release/articles/2012/GetBusinessGrowing.html.
- Jones, Rupert. "Barclay's To Sell Customer Data." *Guardian*, June 24, 2013. www.theguardian.com/business/2013/jun/24/barclays-bank-sell-customer-data.
- "Judge: School Can Move Girl in ID-Tracking Cause." *Boston*. Last updated January 8, 2013. www.boston.com/news/education/2013/01/08/judge-school-can-move-girl-tracking-case/r9LuGuRxlTMeiYjtoFvSK/story.html.
- Markman, Art. *Psychology Today*, December 22, 2013. www.psychologytoday.com/blog/ulterior-motives/201001/spending-and-credit-cards.
- McCue, TJ. Tech. *Forbes*, August 16, 2013. www.forbes.com/sites/tjmccue/2013/08/16/why-dont-more-small-businesses-accept-credit-cards/.
- MintChip Challenge. "MintChip- The Evolution of Currency." last modified March 4, 2012. developer.mintchipchallenge.com/.
- MintChip Challenge. "The Royal Canadian Mint Challenged Software Developers to Create Apps for MintChip, the evolution of Currency." mintchipchallenge.challengepost.com/.
- Jennifer Mitol. "Cash Carries Lots of Bacteria." *ABC News*. Last modified May 23. abcnews.go.com/Health/story?id=117433.
- Mobile Commerce Insider. "MasterCard Study Tracks Progress toward Cashless Economies." last modified September 23, 2013. www.mobilecommerceinsider.com/topics/mobilecommerceinsider/articles/354066-mastercard-study-tracks-progress-toward-cashless-economies.htm.
- Mobile Payments Today. "Pew Survey Finds Mobile Banking on the Rise in the U.S." last modified August 23, 2013. www.mobilepaymentstoday.com/article/218409/Pew-survey-finds-mobile-banking-on-the-rise-in-U-S.

- Moneris Solutions. "Benefits of Credit Card Acceptance." www.monerisusa.com/payment-processing-services/benefits-of-credit-cards.aspx.
- Olsola, Maitanmi, Awodele Oludele, Ogbonna Chibueze, and Osundina Samuel. "Cashless Society: Drives and Challenges in Nigeria." *International Journal of Information Sciences and Techniques* Vol. 3, No. 2, March (2013): doi-105121ijist20133201-1-cashless-society-drives-and-challenges-in-nigeria
- Platan, Peter. "The Evolution of Money and the Development of the Smart Card." PhD diss., Concordia University, 2000.
- Reilly, Christoph. "Dirty Money: Germs on Money." *Hubpages*. Last modified October 17, 2010. christophreilly.hubpages.com/hub/Dirty-Money-Germs-on-Currency.
- Roberti, Mark. "The History of RFID Technology." *RFID Journal*. www.rfidjournal.com/articles/view?1338.
- Robertson, James. *The History of Money: From Its Origin to Our Time*.
- Rothman, Paul. "Cyber Terror Rages in the Banking Sector." *Security Info Watch*. Last modified September 28, 2012. www.securityinfowatch.com/blog/10796084/cyber-terror-rages-in-the-banking-sector.
- Royal Canadian Mint. "Phasing Out the Penny." www.mint.ca/store/mint/learn/phasing-out-the-penny-6900002#.Upkrc5Ao74h.
- Salerno, Joseph. "Using Legal Tender Laws Against State?" *Global Economic Intersection*. (2013). econintersect.com/b2evolution/blog2.php/2013/03/15/using-legal-tender-laws-against-the-state.
- Sokou, Katerina. Business. *The Washington Post*, July 31, 2013. www.washingtonpost.com/business/economy/court-sides-with-retailers-goes-against-fed-rule-on-debit-card-fees/2013/07/31/4f9317ca-fa16-11e2-a369-d1954abcb7e3_story.html.
- Somaliland Press. "Somaliland Telecoms: Cashless Doesn't Mean Broke." somalilandpress.com/somaliland-telecoms%E2%80%A9-cashless-doesnt-mean-broke-28073.
- Square Up. "Square Wallet. Pay with Your Name." <https://squareup.com/wallet>.
- Stahal, Jeremy. Nickel and Dimed. *Slate*. www.slate.com/articles/business/cashless_society/2012/03/cashless_society_how_much_would_the_united_states_save_by_ditching_paper_money_.html.
- Stearns, David. "The Cashless Society." World Press. September 26, 2012. Accessed July 20, 2013, cashlessociety.wordpress.com/tag/moneyless/.
- "Student Loan Debt Statistics." *American Student Assistance*. Accessed December 28, 2013. www.asa.org/policy/resources/stats/.
- "Tabua or Sperm Whale Tooth Neck Ornament from Fiji." Powerhouse Museum. Accessed July 20, 2013. from.ph/356234.
- The Star. "Digital Cash Replacement from Royal Canadian Mint in the works." last modified April 30, 2013. www.thestar.com/business/personal_finance/spending_saving/2013/04/30/digital_cash_replacement_from_royal_canadian_mint_in_the_works.html.

- Vending Times. "MasterCard Study Ranks Canada, Belgium, and France as Closest to being 'Nearly Cashless.'" last modified October 10, 2013.
www.vendingtimes.com/me2/dirmod.asp?sid=EB79A487112B48A296B38C81345C8C7F&nm=Vending+Features&type=Publishing&mod=Publications::Article&mid=8F3A7027421841978F18BE895F87F791&tier=4&id=28B14730823A42748E7EB243F6D638CB.
- Viswanathan, Balaji. "Why are Bitcoins so Hot." Accessed July 20, 2013.
blog.zingfin.com/2013/04/why-are-bitcoins-so-hot/.
- "Wasp Time Case Study: Accurately Tracking Employee Time Drives Big Cost Savings." *Wasp Barcode Technologies*. www.waspbarcode.co.uk/wasptime/case_afton.asp.
- WordPress. "New Working Paper: Mobile Payments in Turkey." last modified October 11, 2012.
cashlessociety.wordpress.com/tag/direct-carrier-billing/.
- Yaqub, J. H. Bello, I. Adenuga, and M. Ogundeji. "Cash Policy in Nigeria: Prospects and Challenges." *International Journal of Humanities and Social Science* 3, no. 3 (2013):
www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=30&ved=0CIYBEBYwCTgU&url=http%3A%2F%2Fwww.ijhssnet.com%2Fjournals%2FVol_3_No_3_February_2013%2F20.pdf&ei=6V6_UuH_KLKkyAHrgYH4Cw&usg=AFQjCNGKtcebAwsHa0lD_LPWjsJAyyg8TQ&sig2=aQB-grm1PfWbIF38W7b2gg.
- Yoder, Steve. "More Americans Walk Away From Their Mortgages." *The Fiscal Times*. Last modified October 24, 2012. www.thefiscaltimes.com/Articles/2012/10/24/More-Americans-Walk-Away-from-Their-Mortgages.