

ACCESS TO MAINSTREAM FINANCIAL SERVICES: DOES BEING BANKED
HELP SMOOTH CONSUMPTION VOLATILITY?

A Thesis
submitted to the Faculty of the
Graduate School of Arts and Sciences
of Georgetown University
in partial fulfillment of the requirements for the
degree of
Master of Public Policy
in Public Policy

By

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Washington, DC
April 12, 2018

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ABSTRACT

Since the 1970s, income volatility and consumption volatility have been increasing in magnitude for households across the United States. Traditionally, households smooth up and down swings with savings, credit, or public assistance programs. Low-income households, however, have lower savings and less access to credit and other resources, so financial shocks impose serious constraints on consumption. While access to mainstream financial services is widely lauded for improving financial wellbeing, there is relatively little research on the effects of banking access on financial wellbeing. I intend to address this knowledge gap by analyzing the relationship between banking status and four types of consumption volatility (utilities, food, transportation, and medical) that serve as proxies for financial wellbeing. I hypothesize that unbanked households experience greater consumption volatility than banked households because they have fewer financial resources to withstand financial shocks. The results partially support this hypothesis. Only in the case of utilities consumption volatility does being unbanked correspond with greater consumption volatility. There are many constraints to the data, however, and policy recommendations center on further avenues for research and data collection to more clearly understand if and how banking access can fundamentally help the U.S.'s most financially vulnerable households.

The research and writing of this thesis is
dedicated to everyone who helped along the way.

Many thanks,
Sarah Belford

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INTRODUCTION

In this paper, I examine the correlation between access to mainstream financial services and financial wellbeing, as measured by banking status and food consumption volatility, respectively. My hypothesis is that households that are unbanked are more likely to experience greater consumption volatility because they have fewer financial resources to withstand financial shocks, which can come in the form of income volatility or emergency expenses. I seek to better understand if access to mainstream financial services such as a checking or savings account does fundamentally help the most financially vulnerable households.

The financial security of American households is a concern that crosses the political aisle. A death in the family, medical emergency, major housing repair, or job loss can cause a financial shock that rocks a family to its core. In 2014, about 60 percent of households experienced at least one shock, and over half of them were unable to cover their expenses in the aftermath.¹ An important factor in this inability to withstand a financial shock is income volatility. When a household sees its monthly income go above or below 25 percent of its average monthly income in a year, the household is said to be experiencing income volatility. Since the 1970s, individual and household income volatility has been rising. Especially since the 2007-2008 financial crisis, the rise of the gig economy, part-time work, and self-employment have meant more individuals have inconsistent or unpredictable income streams.²

¹ Pew Charitable Trusts. “Are American Families Becoming More Financially Resilient?” April 5, 2017. Accessed at <http://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2017/04/are-american-families-becoming-more-financially-resilient>.

² Urban Institute and Brookings Institution. “Income Volatility: New Research Results with Implications for Income Tax Filing and Liabilities.” May 25, 2017. Accessed at https://www.urban.org/sites/default/files/publication/90431/2001284-income-volatility-new-research-results-with-implications-for-income-tax-filing-and-liabilities_0.pdf.

In order to deal with these income fluctuations or unexpected expenses, households could utilize savings or other financial tools to help smooth the shocks. This is frequently not an option for all, however. A recent study by JP Morgan Chase Institute looking at a sample of 2.5 million customer accounts found that month-to-month income volatility was greater than year-to-year volatility and that the typical customer did not have liquid savings to weather volatility, be it from unexpected changes in income or expenses.³ Low-income households are especially vulnerable to income volatility. A household whose annual income is above the poverty threshold, for example, may actually be dipping below the poverty line many months out of the year. Poor households have fewer resources to deal with this income volatility and can experience housing insecurity, food insecurity, and financial insecurity, especially in regards to weathering any of the not-uncommon financial shocks mentioned before.

Examining the contributing factors to income volatility can further our understanding of threats to and potential policy solutions for financial security. Access to mainstream financial services such as a savings account, a credit card, or a check-cashing service can play a role in managing income volatility. The U.S. does not have universal banking access, however. In 2015, 7 percent of U.S. households were unbanked, meaning no one in the household had a checking or savings account, and 19.9 percent of U.S. households were underbanked, meaning someone in the household did have an account at an insured institution but also used alternative financial services (AFS) outside of the banking system.⁴ AFS products typically cost more. Examples of AFS are money orders, check cashing, international remittances, payday loans, refund

³ JPMorgan Chase Institute. "Weathering Volatility: Big Data on the Financial Ups and Downs of U.S. Individuals." May 2015. Accessed at <https://www.jpmorganchase.com/corporate/institute/report-weathering-volatility.htm>.

⁴ 2015 FDIC National Survey of Unbanked and Underbanked Households Executive Summary. Accessed at <https://www.fdic.gov/householdsurvey/2015/2015execsumm.pdf>.

anticipation loans, rent-to-own services, pawnshop loans, or auto title loans. Low-income households tend to have higher rates of being unbanked and underbanked, so it is the households who can least afford it that are paying for AFS. I seek to better understand the relationship between mainstream banking access and consumption volatility, more specifically does being fully banked decrease the likelihood of consumption volatility?

I hypothesize that those who are unbanked experience greater consumption volatility than peers with the same characteristics who are banked. I first examine the existing literature on income and consumption volatility and studies on the domestic banked, unbanked, and underbanked populations. I then explain the conceptual model, the data and its sources, and the methodology for the regression testing the relationship between banking status and consumption volatility. Next, I describe the empirical model and its results. Finally, I discuss conclusions from the regression analysis and its implication for broader policy making.

BACKGROUND AND LITERATURE REVIEW

Financial wellbeing is a measure of a household's financial capability and resiliency such that it can smooth income to adequately meet consumption needs over the course of a lifetime.⁵ When people are young, they need to invest in work opportunities to make a livelihood. As adults on their career path, they need to save their earnings. In old age, they will retire and spend their savings. The optimal financial life cycle would enable an individual to invest and save enough so that he or she can smooth income and consumption over the course of a lifetime. This smoothing is important both for retirement and for those unexpected instances that involve an emergency expense or problematic drop in income. Such an instance can be described as a financial shock. From a policy perspective, financial shocks are particularly problematic for low-income households that are the least likely to have enough in liquid savings or access to other resources to weather unexpected circumstances.

According to Gottschalk and Moffitt (2012), income volatility in the U.S. has been increasing since the 1970s. A 2015 Pew study found that half of the U.S. population is affected by income volatility and a third of the population has no savings. For households seeking greater economic wellbeing, more control over their financial lives is central. A steady, predictable income flow, and positive socio-economic mobility are two components of more financial control. A Pew Study in 2015 found that 92 percent of those surveyed would choose greater stability over upward mobility.⁶ Consumption volatility has been increasing over the past couple decades,

⁵ Andersen, Virginia, Sarah Austin, Joel Doucette, Ann Drazkowski, and Scott Wood. 2015. "Addressing Low-income Populations Income Volatility." University of Wisconsin.

⁶ Pew Charitable Trusts. 2015. "Americans' Financial Security: Perception and Reality." Available at <http://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2015/02/americans-financial-security-perceptions-and-reality>.

pointing to an inability for many households to adequately smooth their income or deal with financial shocks without adversely impacting basic consumption.

A. Income Volatility

Income volatility can refer to a change in income day to day, week to week, month to month, or year to year. Traditionally, studies on income volatility have examined the fluctuation in annual income levels. While not definitive, the majority of studies on annual income use the Panel Survey on Income Dynamics (PSID), and they largely conclude that income volatility has increased over the past 30 years. Gottschalk and Moffitt (1994) identified an uptick in the transitory earnings of white male workers in the 1970s and 1980s that they said accounted for one-third to one-half of the total change in the income distribution of that period of time. They defined transitory earnings as the short-term fluctuations in earnings that are temporary, as opposed to permanent changes in income level.⁷ Gottschalk and Moffitt (2009) again found that individual earnings and household earnings were increasing in volatility using the same measure of change in transitory earnings as a measure of income volatility. They use transitory earnings to get at the involuntary fluctuations that households were not expecting and therefore may pose a risk or financial burden.⁸ This is particularly important for households that are low-income, low-wage, and/or unskilled workers and their households that face serious liquidity constraints. Hacker (2008) and Jacobs and Hacker (2008) also found that short-term family income variance, as a measure of transitory income, doubled from 1969 to 2004. While income volatility decreased some in the 1990s, it rose again to peak 1980 levels in the 2000s. One in ten working-

⁷ Gottschalk, Peter and Moffitt, Robert. 1994. "The Growth of Earnings Instability in the U.S. Labor Market, *Brookings Papers on Economic Activity*," 25, issue 2, p. 217-272.

⁸ Gottschalk, Peter, and Robert Moffitt. 2009. "The Rising Instability of U.S. Earnings." *Journal of Economic Perspectives*, 23(4): 3-24.

age individuals experienced a drop in family income of 50 percent or greater in 2002, compared to one in twenty-five in the early 1970s.⁹

Different studies have used different measures of income volatility and reached similar conclusions. Using the standard deviation of two-year percent change in income to measure the magnitude of total income volatility, Dynan, Emendorf, and Sichel (2012) found that household income volatility increased 30 percent between 1971 and 2008. This was a steady upward trend, and it was found across different education levels and age ranges. Less-educated households were more likely to experience greater income volatility. The overall increase in volatility was also the result of more frequent large changes in income, rather than larger changes in the distribution of income change. The three main sources of income volatility were volatility in household labor earnings, transfer income, and to a lesser degree capital income. Interestingly, they found that, while household labor earnings increased in volatility, individual labor earnings decreased in volatility. This was due to the fact that female earnings were becoming less volatile, but male earnings were becoming more volatile because of rising volatility in hours worked and wage per hour. Because men earn more on average than women, their wages matter more for the overall stability of household income.¹⁰ The fact that wage per hour was significantly volatile supports the conclusion that rising income volatility is at least partly involuntary. Dynan, Emendorf, and Sichel (2012) also provide a summary of other papers and their various measures for income volatility, such as the fraction of households with a 25 percent decrease or increase in income, median absolute dollar change in income, and variation in income around average

⁹ Jacobs, E., and J. Hacker. 2008. "The Rising Instability of American Family Incomes, 1969-2004," Washington, DC: Economic Policy Institute. [<http://www.epi.org/publication/bp213/>]

¹⁰ Dynan, Karen, Elmendorf, Douglas and Sichel, Daniel. 2012. "The Evolution of Household Income Volatility." *The B.E. Journal of Economic Analysis & Policy*, 12, issue 2, p. 1-42.

income, et al. The vast majority of studies conclude income volatility has risen significantly over the past few decades.

While the study of annual income volatility gives us an important backdrop and broader trends for financial wellbeing in the U.S., a closer examination of monthly income volatility is necessary to understand the extent of financial instability facing low-income families in the U.S. Month to month and week to week swings in income and expenses can cause stressful financial conditions that have important ramifications for long-term financial wellbeing. A few recent studies have begun to look at income volatility on this scale. Using data from the Survey of Income and Program Participation (SIPP), Bania and Leete (2009) found that monthly income volatility is highest for low-income households and that it increased substantially for households between 1991/1992 and 2002/2003. Income volatility was biggest for households in deep poverty (i.e. incomes below 50 percent of the poverty threshold) and households headed by a single adult without a high school degree (who are thus at-risk for receiving welfare). This is especially concerning because Bania and Leete also found that increasing income volatility for poor households is largely the result of greater dependence on earnings as opposed to relatively more stable public benefits (including TANF and AFCD).¹¹ An increase in income volatility for households near the poverty line means there is a greater chance for households to slip below the poverty line within a month to month timeframe, which is otherwise not captured by average annual income data.

In conducting the U.S. Financial Diaries Project, Hannagan and Murdoch (2015) found that,

¹¹ Bania and Leete measure income volatility as the coefficient of variation (CV) of monthly income over a 12-month period, taking into consideration income from all sources. Bania, Neil and Laura Leete. 2009. "Monthly household income volatility in the U.S., 1991/92 vs. 2002/03." *Economics Bulletin*, Vol. 29 no.3 pp. 2100-2112.

within a single year, the coefficient on income varied 32 percent month to month on average for low and moderate income households. While not a nationally representative sample, the U.S. Financial Diaries surveyed 244 low and moderate income households in 10 cities across the U.S. for a period of 12 months. They found, on average, households in the study experienced 2.5 months when income dipped more than 25 percent below average, and 2.6 months when income rose more than 25 percent above average. The study also found income volatility was greater under the poverty line, and remains relatively high for households at 100 percent to 300 percent of the poverty line. As in previous studies, this study also finds that greater female earning stability offsets higher male earning volatility within households.¹²

Additional studies confirm the finding that monthly income volatility has increased for low-income households. Morris et al. (2015) found that monthly income volatility increased the most for households with children in the poorest income decile between 1984 and 2008 using data from SIPP. Households with children in the highest income decile experienced decreasing income volatility, with the difference in monthly income volatility being four times greater for poor households than for rich households.¹³ Mills and Amick (2010) also found that monthly income volatility was highest for households in lower quintiles than in upper quintiles of income distribution. They concluded the volatility of income for low-income households was largely due to volatility in monthly earnings, which were only partially offset by public assistance.¹⁴ Both of the studies show the particularly strong effects of income volatility on the poorest, most

¹² Hannagan, Anthony, and Jonathan Murdoch. "Income Gains and Month-to-Month Income Volatility: Household Evidence from the US Financial Diaries." NYU Wagner Research Paper No. 2659883. US Financial Diaries Working Paper, 2015.

¹³ Morris, Pamela, Heather Hill, Lisa A. Gennetian, Chris Rodrigues, and Caroline Tubbs. "Income Volatility in US Households with Children: Another Growing Disparity between the Rich and the Poor." Institute for Research on Poverty, 2015.

¹⁴ Mills, Gregory and Joe Amick. 2010. "Can Savings Help Overcome Income Instability?" Perspectives on Low-Income Working Families Brief 18. Washington, DC: Urban Institute.

vulnerable households. In fact, a 2015 Pew study using PSID found that for households that experienced a drop in income of more than 25 percent in 1994 had not recovered to previous income levels in 2004.¹⁵

B. Consumption Volatility

While income volatility is an important indicator of financial wellbeing, consumption volatility is an equally important measure for households that cannot adequately smooth income. Milton Friedman's Permanent Income Hypothesis states that people will smooth consumption over swings in income based on an expected permanent income level. Expectations of the future, however, cannot account for unpredicted swings in income or unexpected expenses. Households aim to smooth up and down swings with savings, borrowing/credit, or other public assistance programs. Low-income households, however, tend to have lower savings and less access to credit and other resources, so financial shocks can impose constraints on consumption. Keys (2008) found that consumption volatility, while not as large in magnitude as income volatility, has been increasing since 1970. It has been increasing in particular for low-income households.¹⁶ Gorbachev (2011) also finds that mean household food consumption volatility rose 21 percent from 1970 to 2004, and that consumption volatility was even greater for non-white households and households with less education. This evidence suggests that households generally were not able to adequately smooth income over the same time period income volatility was increasing.¹⁷

¹⁵ Pew Charitable Trusts. 2015. *Americans' Financial Security: Perception and Reality* (Issue Brief, March 2015). Available at <http://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2015/02/americans-financial-security-perceptions-and-reality>.

¹⁶ Keys, Benjamin. 2008. "Trends in Income and Consumption Volatility, 1970-2000," in D. Joliffe and J. Ziliak, eds., *Income Volatility and Food Assistance in the United States*, p. 11-34, Upjohn Institute Press.

¹⁷ Gorbachev, Olga. 2011. "Did household consumption become more volatile?" *American Economic Review* 101: 2248-2270.

Gorbachev concludes that income volatility has led to greater consumption volatility. Possible reasons for these trends are policy changes since the 1970s towards a less progressive tax system, greater wage volatility, increasing health care costs, and less generous public assistance – all of which effectively limit the resources low-income houses can use in the event of a financial shock. Food consumption is a particularly good measure because a basket of staple foods has low income elasticity, meaning change in income will not significantly change demand for food.¹⁸ Consumption volatility is, thus, a useful metric for determining if a low-income household's wellbeing is affected by increasing income uncertainty.

Consumption volatility can also be measured by other material hardships. Mills and Amick (2010) examine the effects of savings and income volatility on the chances of experiencing one of more material hardships. They define eight material hardships: being unable to meet basic living expenses, missing a utility payment, having a utility turned off, having a phone disconnected, missing a rent or mortgage payment, forgoing a doctor visit, forgoing a dentist visit, or experiencing food insecurity. They find that lower monthly income volatility and lower overall monthly income are both associated with a higher incidence of material hardships. Having moderate savings for the lowest income quintile is associated with lowered incidence of material hardship for six of the eight hardship outcomes, including food insecurity. Savings is one such mechanism for dealing with short-term financial shocks.

¹⁸ Jolliffe, Dean, and James P. Ziliak. 2008. Income Volatility and Food Assistance in the United States. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. <https://doi.org/10.17848/9781435684126>

C. Access to Banking Services

Beyond fluctuations in income and expenditure, financial wellbeing is also dependent upon a household's savings and access to financial tools and resources. In the case of an unexpected financial shock, a household requires immediate access to funds to replace a sudden income drop or cover an emergency expense to avoid a hardship. In 2014, about 60 percent of households experienced at least one shock, and over half of them were unable to cover their expenses in the aftermath.¹⁹ The wealth of low and moderate income households usually resides in their home, retirement savings, or other assets that cannot readily be liquidated to meet short-term needs.²⁰ Many poor households, however, do not have sufficient savings or access to credit to provide liquidity in the short-term. Access to mainstream financial services is a potential part of the solution. Recent years have seen an increasing interest in the size of banked, underbanked, and unbanked populations in the United States. Since 2009, the FDIC has conducted a biennial survey measuring rates of domestic banking access and usage. In 2015, 7 percent of households were unbanked, meaning 9 million U.S. households had no access to a checking or savings account in a federally insured institution. Another 19.9 percent of households were underbanked, meaning 24.5 million households had a checking or savings account but also used alternative financial services (AFS) outside of the banking system. Unbanked and underbanked rates were higher for certain populations including low-income, lower-education, and black and Hispanic households. The FDIC survey also found that unbanked and underbanked households were more likely to experience month to month income change "somewhat" or "a lot." Even among households with higher levels of income, income volatility was greater for the unbanked and

¹⁹ Pew Charitable Trusts (2017).

²⁰ Mills and Amick (2010).

underbanked. Thirty-one percent of households with income that varied a lot monthly, 27 percent of households with income that varied somewhat monthly, and 19 percent of those with steady monthly income were unbanked.²¹ Sixty percent of unbanked households cited “too little income” as a reason for not having an account. Interestingly, a higher portion of previously banked, now unbanked households cited high or unpredictable fees associated with accounts as a reason for being unbanked, compared with unbanked households who had never been banked before. These data set the stage for a discussion of the benefits of banking access in the context of rising income volatility and consumption volatility.

Access to mainstream financial services has been widely lauded because it improves financial wellbeing for households, yet there has been relatively little research on the relationship between banking access and financial wellbeing.²² Benefits of mainstream financial services can include opportunities for savings, longer-term asset purchase, federally insured accounts, low or no-cost check cashing, transferring money, and utilizing other bank products and services such as consumer, auto, home, and other loans.²³ Mainstream financial services are often juxtaposed with more expensive alternative financial services (AFS) and some informal services (e.g. “loan sharks”). AFS include check cashing, money transmission, payday loans, pawnshop loans, auto title loans, rent-to-own arrangements, refund-anticipation loans, and prepaid cards. In 2013, the average household spent \$2,412 on interest and fees for AFS services.²⁴ In total, consumers spent

²¹ FDIC. 2015. “National Survey of Unbanked and Underbanked Households Executive Summary.” Accessed at <https://www.fdic.gov/householdsurvey/2015/2015execsumm.pdf>.

²² Shtauber, Assaf A. 2013. “The Effects of Access to Mainstream Financial Services on the Poor: Evidence from Data on Recipients of Financial Education.” Columbia Business School Research Paper No. 14-11.

²³ Birkenmaier, Julie and Qiang Fu. 2015. “The Association of Alternative Financial Services Usage and Financial Access: Evidence from the National Financial Capability Study.” *J Fam Econ Iss* (2016) 37:450–460.

²⁴ Office of the Inspector General United States Postal Service. 2014. “Providing non-bank financial services for the underserved.” White paper.

\$103 billion in nonbank fees for AFS, compared to \$32 billion in annual bank overdraft fees.²⁵ Birkenmaier and Fu (2015) found that being unbanked was positively associated with AFS usage and that being unbanked predicted AFS usage independent of financial education or knowledge. They also found that households with lower income, lower education, lower financial education and knowledge, and those who are male, young (18 to 34 years of age), racial minorities, living with a partner, and renters were more likely to use AFS. Rhine and Greene (2012) found that households that lost a job, health insurance, or income were more likely to move from banked to unbanked.²⁶ In 2015, 26 percent of households with income \$15,000 or less were unbanked, the highest percentage of any income group. Unbanked individuals were the biggest group of AFS users (57.3 percent of the unbanked used AFS).²⁷

While there are no national domestic studies that show a causal link between banking access and greater financial wellbeing, it is undeniable that being underbanked is associated with higher income volatility and generally lower levels of income. Using a dataset of low-income participants of financial education workshops in New York City, Shtauber (2013) finds that opening a bank account lowers delinquency and increases the likelihood of credit score improvement among previously unbanked participants. Shtauber finds no effects on saving, self-reported overspending, and several measures of “financial wellbeing” such as finance-related stress. The 2015 JP Morgan study of its customer accounts found that the typical customer did not have liquid savings to weather volatility.²⁸ Though their sample only included accounts with at least \$500 deposited, 5 transactions per month, and possession of a Chase credit card, this

²⁵ Birkenmaier and Fu (2015).

²⁶ Rhine, S. L. and Greene, W. 2012. “Factors that contribute to becoming unbanked.” *Journal of Consumer Affairs*.

²⁷ FDIC (2015).

²⁸ JPMorgan Chase Institute. “Weathering Volatility: Big Data on the Financial Ups and Downs of U.S. Individuals.” May 2015. Accessed at <https://www.jpmorganchase.com/corporate/institute/report-weathering-volatility.htm>.

points to the conclusion that just having a bank account will not result in strong savings that enable income or consumption smoothing. Further research is needed to understand the causal effects of banking access on household financial wellbeing and use of mainstream financial services and AFS on a household's ability to weather financial shocks.

My research intends to address some of these knowledge gaps by conducting a regression of consumption volatility on banking status. My goal is to analyze the correlation between access to mainstream financial services and consumption volatility, in particular for low-income households. As the existing research shows, financial instability is increasing for many populations and is particularly concerning for low income households. Low-income households are more likely than middle or upper income households to be unbanked. This paper will contribute to the literature on the potential consequences of being unbanked for low-income populations by determining the relationship between banking access and consumption volatility.

THEORETICAL FRAMEWORK

Access to banking services for low-income populations in particular can mean the difference between having to choose between the electricity bill and putting food on the table. In order to examine the importance of having mainstream banking services, I developed the following theoretical model. This model sets the framework for testing the relationship between banking status and consumption volatility:

(1)

$$\text{Consumption Volatility} = f(\text{Banking Status}, \text{Income Level}, W, \mu)$$

The logic of this model is that banking services can enable a household to smooth consumption of important quarterly goods (e.g. food, utilities, transportation, and medical/health) during a financial shock. Quarterly expenditure on food, for example, is an important measure of a household's financial well-being because food consumption generally has low income elasticity, especially for low-income families. A mainstream banking service like a savings or checking account is a tool for maintaining or improving financial flexibility and security. Banking status in this model will refer to whether a household has a checking and/or savings account. This is a basic bank service, without which the household is highly unlikely to have access to any other mainstream bank services like check cashing or lending. This model will control for income level and other household demographic characteristics " W " (e.g. race, education level, gender, age, marital status). This model aims to capture the effect of being banked on a household's ability to smooth consumption during such a potential episode of financial shock. μ represents the random error not accounted for by the rest of the model.

DATA DESCRIPTION

I use data from the Bureau of Labor's *Consumption Expenditure Survey* (CEX) for this study. According to the Bureau of Labor, the CEX is the only federal survey to capture information on a complete range of consumer level expenditures and incomes. The CEX has been continuously administered since the 1980s. The Interview Survey series is one component of the CEX that surveys approximately 7,000 consumer units (or households for the purposes of my study) each quarter for four continuous quarters. The consumer unit is defined as all members of a household who are related by blood, marriage, or other legal arrangements and are making joint financial decisions or are otherwise financially dependent on the head of the household. For the purposes of this study, I will refer to this unit as the household. The sample of households selected is designed to be representative of the U.S. civilian population, including urban and rural areas. The Interview Survey is a rotating panel survey. This means that, during each quarter, about one-fourth of the sample is new to the survey, one-fourth has been surveyed once, one-fourth has been surveyed twice, and one-fourth has been surveyed three times. Each household is interviewed for four consecutive quarters, unless it dropped out of the study or skipped an interview. While each household only reports quarterly information, the survey calculates monthly information to report one record per expenditure per purchase month/year.

My sample includes all households in the CEX that report at least three quarters of information between the second quarter of 2013 and the first quarter of 2017. The first quarter of 2017 is the most recent quarter of data available. I start at the second quarter of 2013 because this is the first quarter in which the CEX started asking a series of questions that gets at banking status. This is called the LIQUID series and it reports answers to the following two questions: (1) What is the

total value of all checking, savings, money market accounts, and certificated of deposit or CDs you have? Or (2) What is the range of that value? These questions are preceded by a screener question whose response is not included in the public data. The screener question asks: Do you have any checking accounts, savings accounts, money market accounts, or certificates of deposit? If a household answers yes to this question, then they have the chance to answer the next two questions. By examining the CEX's flag values for the two publically available questions, I determine whether or not the household answered yes to the screener question. Essentially, if the household answers no to the screener question, then their subsequent answers to the question asking about dollar amount will be missing. For all households that have a missing value for both of the subsequent questions, I code the household as unbanked. For all households that have some non-missing value for this question (that is, the amount reported is greater than or equal to \$0), I code the household as banked. While it is possible that a household has zero dollars in their checking and/or savings account, this model only seeks to know if having such an account decreases the likelihood of experiencing consumption volatility.

The CEX survey also provides monthly income and monthly expenditure on a range of goods, including monthly food expenditure, medical expenses, transportation expenses, rent/mortgage expenses, and basic utilities, among many others. I first calculate the average quarterly consumption deviation for each consumption expenditure category by dividing the difference between the household's consumption that quarter and its average quarterly consumption of a given basket by the household's average quarterly consumption of that basket. I then take the average of the quarterly deviations in each expenditure category to be equal to the consumption volatility variables used in my final regressions. In short, each household now has one

consumption volatility measure in each of the four main consumption expenditure categories. The CEX survey also captures household characteristics including education, race, age, gender, salary and other income sources, housing, and occupation.

The LIQUID series questions are usually asked of households only in their fourth and final quarter of being surveyed. Because the data set including only observations with four quarters of data had too few unbanked households (about 39 unbanked households out of 11,577 total households), I impute missing banking status data for observations with only three quarters in the CEX data using the Federal Reserve's 2013 Survey of Consumer Finances (SCF). The SCF takes a representative sample survey of all U.S. households on a triennial basis. It surveys households on wealth, income, pensions, and demographic characteristics. I use this survey to impute banking status for all of the households in my CEX sample that have only three quarters of information and thus no banking status. To do so, I must select control variables that are contained in both the CEX and SCF in order to properly match households. Because many demographic characteristics are not collected in the exact same manner, this limits the number of control variables I can use in my final regression to the following: income, age, gender, race, marital status, and education level. Out of 30,075 total households in the 2013 SCF, I find there are 1,861 unbanked households, which is approximately 6.2 percent of the sample population. I run the following OLS regression in the SCF data set (see Equation 2) using the population weights and record the coefficients on each variable.

(2)

$$\begin{aligned}
 \text{unbanked} = & B_0 + B_1 * \text{income} + B_2 * \text{lesshs} + B_3 * \text{somehs} + B_4 * \text{hsgrad} + B_5 * \text{white} + B_6 * \text{black} + \\
 & B_7 * \text{age} + B_8 * \text{male} + B_9 * \text{married} + \varepsilon
 \end{aligned}$$

The results of this equation are in Table 1. I use these coefficients to generated a predicted bank status (*impbankstat*) for those households missing it in the CEX data set (see Equation 3). The imputation is predicting a household's bank status based on its demographic characteristics.

Table 1: SCF Imputation Step 1 – OLS	
Independent Variables	<i>unbanked</i>
<i>income</i>	-.00000000453
	(-0.00000000375)
<i>lesshs</i>	0.186***
	(-0.00716)
<i>somehs</i>	0.174***
	(-0.00522)
<i>hsgrad</i>	0.0685***
	(-0.00314)
<i>white</i>	-0.0408***
	(-0.00406)
<i>black</i>	0.0609***
	(-0.00517)
<i>age</i>	-0.00165***
	(-0.0000834)
<i>male</i>	0.00378
	(-0.00429)
<i>married</i>	0.0507***
	(-0.00388)
<i>constant</i>	0.0553***
	(-0.00962)
Observations	30,075
R-squared	0.106
Prob > F	0.000

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

(3)

$$\begin{aligned}
 \text{impbankstat} = & .0553 + .00000000453*\text{income} + .186*\text{lesshs} + .174*\text{somehs} + .0685*\text{hsgrad} + \\
 & -.0408*\text{white} + .0609*\text{black} + -.00165*\text{age} + .00378*\text{male} + .0507*\text{married}
 \end{aligned}$$

The OLS regression used in the imputation (Equation 3) predicts a continuous value for probability of being banking (generally between 0 and 1). I choose a cutoff at which all those above are unbanked and all those below are banked. I chose this cutoff such that the imputation results in a population with approximately 7 percent unbanked households, which is the level of unbanked households across the U.S. according to the 2015 FDIC National Survey of Unbanked and Underbanked Households. Using this imputation method to assign banking status to households with only three quarters of banking status, I now have 1,354 total unbanked households out of a total 19,602 households. Table 2 details the number of households by banking status, and Table 3 details the descriptive statistics of all variables in my final data set.

Table 2: Banking Status Summary				
# Quarters	# Households	% of Total	# Banked	# Unbanked
3	8,025	41%	6,710	1,315
4	11,577	59%	11,538	39

Table 3: Descriptive Statistics								
Variable	N	Mean	S.D.	Min	0.25	Median	0.75	Max
<i>unbanked</i>	19,602	0.07	0.25	0.00	0.00	0.00	0.00	1.00
<i>income</i>	19,602	59923.52	72311.89	-0.000023	15624.00	38758.00	79886.82	16,000,000
<i>lesshs</i>	19,602	0.05	0.21	0.00	0.00	0.00	0.00	1.00
<i>somchs</i>	19,602	0.08	0.27	0.00	0.00	0.00	0.00	1.00
<i>hsgrad</i>	19,602	0.24	0.43	0.00	0.00	0.00	0.00	1.00
<i>college</i>	19,602	0.64	0.48	0.00	0.00	1.00	1.00	1.00
<i>white</i>	19,602	0.69	0.46	0.00	0.00	1.00	1.00	1.00
<i>black</i>	19,602	0.11	0.31	0.00	0.00	0.00	0.00	1.00
<i>other</i>	19,602	0.21	0.40	0.00	0.00	0.00	0.00	1.00
<i>age</i>	19,602	52.36	17.06	16.00	38.74	52.62	65.00	87.00
<i>male</i>	19,602	0.47	0.50	0.00	0.00	0.00	1.00	1.00
<i>married</i>	19,602	0.52	0.50	0.00	0.00	1.00	1.00	1.00
<i>UCV</i>	19,602	0.18	0.16	0.00	0.08	0.14	0.24	1.00
<i>FCV</i>	19,602	0.22	0.15	0.00	0.12	0.19	0.29	1.00
<i>TCV</i>	19,602	0.46	0.30	0.00	0.22	0.39	0.67	1.00
<i>MCV</i>	19,602	0.37	0.35	0.00	0.07	0.27	0.27	1.00

EMPIRICAL MODEL

I seek to understand the relationship between access to mainstream financial services and consumption volatility. In particular, I ask the question, does greater access to financial services correlate with lower consumption volatility? I hypothesize that households who are unbanked experience greater consumption volatility, controlling for income level, educational attainment, race, age, gender, and marital status. In order to test this hypothesis, I will use the following empirical models:

(4)

$$UCV = B_0 + B_1*unbanked + B_2*income + B_3*lesshs + B_4*somegrad + B_5*hsgrad + B_6*white + B_7*black + B_8*age + B_9*male + B_{10}*married + \varepsilon$$

(5)

$$FCV = B_0 + B_1*unbanked + B_2*income + B_3*lesshs + B_4*somegrad + B_5*hsgrad + B_6*white + B_7*black + B_8*age + B_9*male + B_{10}*married + \varepsilon$$

(6)

$$TCV = B_0 + B_1*unbanked + B_2*income + B_3*lesshs + B_4*somegrad + B_5*hsgrad + B_6*white + B_7*black + B_8*age + B_9*male + B_{10}*married + \varepsilon$$

(7)

$$MCV = B_0 + B_1*unbanked + B_2*income + B_3*lesshs + B_4*somegrad + B_5*hsgrad + B_6*white + B_7*black + B_8*age + B_9*male + B_{10}*married + \varepsilon$$

- *UCV* refers to utility consumption volatility, or the average quarterly volatility in total utilities expenditure, i.e. natural gas, electricity, all other fuels, water, and telephone. It is calculated by taking the average of all quarterly volatilities. Each quarter's volatility is calculated by dividing the deviation in quarterly consumption (the absolute value of the difference between total quarterly consumption and average quarterly consumption) by average quarterly consumption.
- *FCV* refers to food consumption volatility, or the average quarterly volatility in total food expenditure. It is calculated by taking the average of all quarterly volatilities. Each quarter's volatility is calculated by dividing the deviation in quarterly consumption (the absolute value of the difference between total quarterly consumption and average quarterly consumption) by average quarterly consumption.
- *TCV* refers to transportation consumption volatility, or the average quarterly volatility in total transportation expenditure, i.e. gas, car insurance and maintenance, car purchase, public and other transportation. It is calculated by taking the average of all quarterly volatilities. Each quarter's volatility is calculated by dividing the deviation in quarterly consumption (the absolute value of the difference between total quarterly consumption and average quarterly consumption) by average quarterly consumption.
- *MCV* refers to medical consumption volatility, or the average quarterly volatility in total medical expenditure, i.e. health insurance, physician expenses, dental, vision, drug prescriptions, etc. It is calculated by taking the average of all quarterly volatilities. Each quarter's volatility is calculated by dividing the deviation in quarterly consumption (the absolute value of the difference between total quarterly consumption and average quarterly consumption) by average quarterly consumption.

- *unbanked* is a binary variable. A value of 1 means the household is unbanked, and 0 means the household is banked.
- *income* is a continuous control variable for the annual pre-tax income for the household. I divide this into percentiles to look at the specific effects of banking status by relative income.
- *lesshs* is one of four education controls that refers to the highest education level attained by the head of household. *lesshs* means the head of household has 8 years or fewer of education.
- *somehs* is one of four education controls that refers to the highest education level attained by the head of household. *somehs* means the head of household has some high school (between 9 and 11 years of education).
- *hsgrad* is one of four education controls that refers to the highest education level attained by the head of household. *hsgrad* means the head of household has 12 years of education.
- *college* is one of four education controls that refers to the highest education level attained by the head of household. *college* means the head of household has more than 12 years of education. *college* is the excluded category.
- *white*, *black*, and *other* are the three race category controls for the head of household. This variable factors in Hispanic ethnicity to a certain degree. *white* refers to non-Hispanic whites. *black* refers to non-Hispanic blacks. *other* refers to all other racial categories including Hispanic white and Hispanic black. *other* is the excluded category.
- *age* is a continuous control for the age of the head of household.
- *male* is a binary control for the gender of the head of household. A value of 1 means male, and 0 means female.
- *married* is a binary control for the marital status of the head of the household. A value of 1 means currently married, and 0 means not currently married.

UCV and *FCV* are the key dependent variables used to understand the importance of having a bank account on smoothing quarterly consumption of essential goods. *TCV* and *MCV* are additional consumption volatility measures to check if a household changes consumption of other regular common expenses such as transportation and health. Because there are important goods beyond food and utilities that a household depends on to meet basic living standards, it is possible that banking status affects a household's ability to smooth consumption of these other categories in the event of a financial shock or hardship.

unbanked is the key independent variable that measures a household's banking status. If a household has a checking or savings account, then it is banked. If no one in the household has a checking or savings account, then it is unbanked. I expect a positive relationship between bank status and the level of consumption volatility in each of these categories, i.e. an unbanked household will experience a greater level of consumption volatility than a banked household.

income, *age*, *lesshs*, *somehs*, *hsgrad*, *white*, *black*, *male*, and *married* are included in each regression to control for individual household characteristics that would otherwise bias the coefficient on banking status because they can relate to both banking status and consumption volatility. I expect the coefficient on *income* to be negative, i.e. as income increases, consumption volatility will go down. I also expect that only very low income households will be unbanked, again supporting the hypothesis that the unbanked and poor are more likely to experience greater consumption volatility. I hypothesize that the coefficient on *age* will be negative, i.e. as the head of household gets older, consumption volatility will decrease. This makes sense because households tend to become more stable and more wealthy as they get older.

I expect the coefficients on each of the education controls to be positive because each is compared to the reference category *college*, which indicates the highest level of education. Those with the highest level of education are most likely to be banked and to be higher income. Thus, households with low levels of education (a high school graduate or below) will likely experience more consumption volatility than a household with higher levels of education. I also expect the coefficients on each education control to increase in magnitude as the number of years of education decrease.

I expect the coefficient on *white* to be negative because *white* households are more likely to be higher income than most other households of color. A negative coefficient on *white* will mean that a white household experiences less consumption volatility than a household in the *other* racial category. I expect the coefficient on *black* to be negative or insignificant, since it is in reference to the category *other*. Minority households and households of color are more likely to be experience greater consumption volatility than non-Hispanic white households.

I expect the coefficients on *male* and *married* to be negative because households that are headed by a male or by a married person are more likely to be high income than households headed by a woman or by a single person. A negative coefficient on *male* indicates that a male-headed household will experience less consumption volatility than a female-headed household. A negative coefficient on *married* indicates that a married household will experience less consumption volatility than a household headed by a single person.

In the next section, I present the results from estimating these equations.

DISCUSSION OF RESULTS

As in the empirical model described in the previous section, I use the generalized linear model (GLM) regression and margins commands to examine the correlation between banking status and four types of consumption volatility, while controlling for household demographic characteristics. Each of the four consumption volatility regressions use the same data set containing 19,602 total observations. Using these data, I find support for my hypothesis that lacking access to mainstream financial services results in greater consumption volatility to be inconclusive. My hypothesis is partially supported and partially unsupported by the results of the various regressions. The coefficients on *unbanked* are statistically significant only for the regressions for utilities consumption volatility (*UCV*) and medical consumption volatility (*MCV*) (at the 90 percent and the 95 percent confidence levels, respectively). The coefficients on *unbanked* are statistically insignificant for the regressions on food consumption volatility (*FCV*) and transportation consumption volatility (*TCV*). Furthermore, the relationship between being unbanked and experiencing consumption volatility is positive only for utilities and food consumption volatility. It is negative for transportation and medical consumption volatility. I will elaborate on potential reasons for these results below. The coefficients on the demographic variables *income*, *lesshs*, *white*, *age*, and *marital* are significant in at least two or more of the four regressions, which shows that income level, education level, race, age, and marital status do help explain a household's likelihood to experience consumption volatility. The magnitude and sign of the control variables will be discussed below.

I will start by describing results for the *UCV* regression because it is the kind of consumption that is relatively inelastic and can be a proxy for severe financial distress. It is a reasonable proxy

because if a family was unable to smooth income and expenses during a period of financial shock, then fluctuation in its expenditure on utilities would indicate deprivation of basic amenities that could not be avoided. Utilities include such necessary home expenses as natural gas, electricity, water, telephone, and other fuel and utility services that can be considered essential for maintaining a minimum quality of life. The default household depicted in my margins Table 1 output is a household of average age and income level headed by an unmarried female with some college education of the racial category *other*. For this default household, going from banked to unbanked is correlated with a 1.04 percent increase in utilities consumption volatility (significant at the 90 confidence level) (see Table 1). For a household of average age and income level headed by an unmarried white male with less than a high school education, going from banked to unbanked is correlated with a 1.23 percent increase in utilities consumption volatility (significant at the 90 confidence level) (see Table 2). A household identical to that one in all characteristics except marital status (i.e. household head is married) is predicted to experience a 1.07 percent increase in utilities consumption volatility when it goes from banked to unbanked. These variations all paint a similar picture: going from banked to unbanked is correlated with about a 1% increase in utilities consumption volatility. In other words, going from banked to unbanked corresponds to an increase of about \$1 in average quarterly variation per \$100 of average quarterly utilities consumption. While this is a relatively small change, it could still be significant to a household on a financial precipice, for example, a family with a very tight budget, living paycheck to paycheck.

These results are also true across different income levels. For both very poor households (whose income is below 90 percent of all other households in the sample) and for poor to moderate

income household (whose income is below 25 percent and 50 percent of all other households in the sample), the percent increase in *UCV* as a result of going from banked to unbanked is about 1 percent, with slightly higher percent increases as income gets lower. The differences between the income levels tested, however, are too small to make an economic difference (i.e. differences are less than 0.01 percent) (see Table 3). This shows that the percent change in the consumption volatility experienced does not differ significantly for different income levels. This result is significant at the 90 percent confidence level. The results lose significance for very rich households, which is not surprising because rich households are all banked.

Table 4: GLM Margins Output (Version 1)				
Independent Variables	<i>UCV</i>	<i>FCV</i>	<i>TCV</i>	<i>MCV</i>
<i>unbanked</i>	0.0104* (0.00574)	0.00413 (0.00516)	-0.00674 (0.0101)	-0.0308** (0.0125)
<i>income</i>	-0.0000000877*** (0.0000000193)	-0.0000000268 (0.0000000171)	0.0000000914*** (0.0000000317)	-0.0000000256 (0.0000000348)
<i>lesshs</i>	0.0207*** (0.00684)	0.0198*** (0.00598)	0.0232* (0.0121)	0.0467*** (0.0140)
<i>somehs</i>	0.0140*** (0.00491)	0.00643 (0.00464)	-0.00931 (0.00949)	-0.0135 (0.0111)
<i>hsgrad</i>	0.000296 (0.00285)	-0.000142 (0.00269)	-0.00809 (0.00535)	-0.0114* (0.00621)
<i>white</i>	0.00927*** (0.00317)	-0.0181*** (0.00287)	0.0138** (0.00569)	-0.00721 (0.00694)
<i>black</i>	-0.00566 (0.00455)	0.00476 (0.00430)	0.0034 (0.00870)	-0.0213** (0.0103)
<i>age</i>	0.0000299 (0.0000773)	0.000588*** (0.0000705)	0.000772*** (0.000137)	-0.00192*** (0.000151)
<i>male</i>	0.00259 (0.00233)	-0.00112 (0.00223)	0.00583 (0.00433)	-0.0107** (0.00499)
<i>married</i>	-0.0332*** (0.00244)	-0.0265*** (0.00227)	-0.00752* (0.00452)	-0.00123 (0.00526)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: GLM Margins Output (Version 2) (married=0 male=1 white=1 lesshs=1)				
Independent Variables	<i>UCV</i>	<i>FCV</i>	<i>TCV</i>	<i>MCV</i>
<i>unbanked</i>	.0123* (0.00667)	0.00448 (0.00557)	-0.00678 (0.0102)	-0.0319** (0.0125)
<i>income</i>	-0.0000000103*** (0.0000000225)	-0.0000000291 (0.0000000185)	0.0000000920*** (0.0000000319)	-0.0000000265 (0.0000000361)
<i>lesshs</i>	0.0244*** (0.00863)	0.0214*** (0.00685)	0.0234* (0.0122)	0.0483*** (0.0150)
<i>somehs</i>	0.0165*** (0.00588)	0.00697 (0.00506)	-0.00937 (0.00955)	-0.0139 (0.0114)
<i>hsgrad</i>	0.000348 (0.00335)	-0.000154 (0.00292)	-0.00814 (0.00538)	-0.0118* (0.00640)
<i>white</i>	0.00109*** (0.00383)	-0.0196*** (0.00302)	0.0139** (0.00573)	-0.00746 (0.00716)
<i>black</i>	-0.00666 (0.00532)	0.00516 (0.00468)	0.0034 (0.00876)	-0.0220** (0.0106)
<i>age</i>	0.0000351 (0.0000907)	0.000638*** (0.0000757)	0.000777*** (0.000138)	-0.00199*** (0.000161)
<i>male</i>	0.00305 (0.00276)	-0.00121 (0.00234)	0.00587 (0.00436)	-0.0111** (0.00514)
<i>married</i>	-0.0391*** (0.00314)	-0.0287*** (0.00262)	-0.00757* (0.00455)	-0.00127 (0.00544)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: GLM Margins Output (Version 3) (Income levels)					
Independent Variables	Income level	<i>UCV</i>	<i>FCV</i>	<i>TCV</i>	<i>MCV</i>
<i>unbanked</i>	at 10th percentile	0.0106489* (0.0058553)	0.0041522 (0.0051835)	-0.006727 (0.0101041)	-0.0307995** (0.0124562)
	at the 25th percentile	0.0106007* (0.005829)	0.0041478 (0.0051781)	-0.0067297 (0.0101081)	-0.0308104** (0.0124603)
	at the 50th percentile	0.0105114* (0.0057804)	0.0041396 (0.0051679)	-0.0067345 (0.0101153)	-0.0308306** (0.012468)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

While the coefficient on *unbanked* is statistically significant and positive for *UCV*, the coefficient on *unbanked* for *FCV* was positive, but insignificant. This could be explained by the fact that food consumption can be more volatile for the very rich and for the very poor. It could be the case that the *FCV* is not adequately precise enough to capture the change in consumption of foods due to a financial shock. *FCV* does not include just a basket of staple foods, which might demonstrate more significance since staple foods are arguably more inelastic. *FCV* however is a variable taken from the CEX that includes all food consumption. In addition, it is possible that the families most likely to experience food shortages or food consumption volatility due to financial shocks are also the most likely to receive food stamps, which would help smooth *FCV*. Receipt of food stamp benefits is not a variable included in my data set unfortunately. This would be an area for future research to examine.

Contrary to my hypothesis, the coefficients on *TCV* and *MCV* are both negative. For the default household, going from banked to unbanked is correlated with a 0.67 percent decrease in transportation consumption volatility, but this result is insignificant (see Table 1). For a household of average age and income level headed by an unmarried white male with less than a high school education, going from banked to unbanked is correlated with a 0.68 percent decrease in *TCV*, which is again insignificant (see Table 2). The coefficients for unbanked on *MCV* are negative and significant. For the default household, going from banked to unbanked is correlated with a 3.08 percent decrease in medical consumption volatility (significant at the 95 confidence level) (see Table 1). Similarly, for a household of average age and income level headed by an unmarried white male with less than a high school education, going from banked to unbanked is correlated with a 3.19 percent decrease in *MCV* (significant at the 95 confidence level) (see

Table 2). There are several conclusions we can draw from these results. It is reasonable that medical consumption volatility is greater for banked individuals, because they tend to be better off financially and thus can afford to spend on medical expenses. A \$30 copayment for a doctor's appointment is a high price to pay for a low income household, and this copayment may not cover additional fees for blood tests and prescriptions. Low income households may be more likely to avoid medical expenses until it is an absolute emergency. So, on average, those households that are unbanked and low income will experience less medical consumption volatility because they spend less on medical consumption to begin with. Similarly, with transportation expenses, it could be that low income households are more likely to use the cheapest transportation sources (i.e. public transportation) so quarterly expenses for buses or trains would not fluctuate significantly. The same could be said for monthly car payments and insurance payments, however, so this may be the reason there is no significant difference between being banked or unbanked in terms of transportation consumption volatility. It is also interesting to note that these results are relatively consistent across income levels. Table 3 shows that as income increases, medical consumption volatility increases; however, the differences are less than 0.01 percent. These results are significant at the 95 percent confidence level.

The control variables tell an interesting story. The coefficients on the demographic variable *income* are significant in two of the four regressions, for utilities and transportation consumption volatility. For the default banked household, a \$1000 increase in income is correlated with a 0.09 percent decrease in *UCV* (significant at the 99 percent confidence level) (see Table 1). For a banked household of average age headed by an unmarried white male with less than a high school education, a \$1000 increase in income is correlated with a 0.01 percent decrease in *UCV*

(significant at the 99 percent confidence level) (see Table 2). This means that as income increases, consumption volatility goes down. This is consistent with my hypothesis that the more financially secure households (who also are more likely to be banked) experience less consumption volatility on the whole. As with the coefficient on *unbanked*, when different income levels are imposed, the results remain largely constant. The coefficients on *income* for *FCV* and *MCV* are also negative, though insignificant. The coefficient on *income* for *TCV*, however, is positive and significant at the 99 percent confidence level. For the default banked household in Table 1 and for the other household described in Table 2, a \$1000 increase in income is correlated with a 0.09 percent increase in *UCV* (significant at the 99 percent confidence level) (see Table 1). This is consistent with the logic behind the decrease associated with the *unbanked* variable previously described. As a household increases in income (and thus in the likelihood of being banked), it experiences more consumption volatility. This may be because poorer households have more consistent transportation spending (which is necessary to get to work), while wealthier households have more flexibility in how they get around (whether to work or other locales) and how much it may cost (e.g. drive, public transport, taxi, or Uber).

The coefficients on education are largely insignificant, except for *lesshs*, which is significant and positive across all four types of consumption volatility. Comparing a household with some college to a household with less than high school education, the increase in consumption volatility ranges from 2.0 percent to 4.7 percent for the default household in Table 1 and from 2.1 to 4.8 percent for the second type of household in Table 2. The coefficients are significant at the 99 percent confidence level for *UCV*, *FCV*, and *MCV*. The coefficients are significant at the 90 percent confidence level for *TCV*. This is consistent with my hypothesis that less education is

correlated with greater consumption volatility. The less educated are more likely to be lower income and unbanked than households with more education. Similarly, the coefficient on *somehs* is highly significant and positive for *UCV* (at the 99 percent confidence level).

The coefficients on the racial category *white* are significant though not consistently positive. For the default household in Table 1, a *white* household experiences 0.93% greater utilities consumption volatility than a racial category *other* households (which includes Hispanic-white), with a 99 percent confidence interval. This means a white household experiences more consumption volatility than a minority household, which was not my hypothesis. The coefficient on *white* for food consumption volatility, on the other hand, is negative and larger in magnitude with a 1.8 percent increase in consumption volatility (at the 99 percent confidence level). This result is consistent with my hypothesis. Interesting, the coefficient on white is positive and significant at the 95 percent confidence level for *TCV*, but negative and insignificant for *MCV*. All coefficients for the racial category *black* are insignificant except for *MCV*, which shows that the default banked household with a black head of household will experience a decrease of 2.1 percent medical consumption volatility as compared with the default banked *other* racial category household (see Table 1). While this does not match my hypothesis, it is consistent with the signs of the other coefficients for *MCV* that indicate decreased consumption volatility.

The largely insignificant coefficients on gender indicate gender does not influence a household's rate of consumption volatility, when controlling for the other demographic categories. The only significant *male* coefficient is for *MCV*. As indicated in Table 1, a default household headed by a male will experience 1.1 percent less consumption volatility than a comparable household

headed by a female, significant at the 95 percent confidence level. This is consistent with my prediction, but does not paint a consistent picture for how gender definitively influences consumption volatility.

Finally, in examining the coefficients on marital status, the results show that being married corresponds with less consumption volatility. For the default banked household, being married as opposed to being unmarried is correlated with a 3.3 percent decrease in *UCV* (significant at the 99 percent confidence level), a 2.7 decrease in *FCV* (significant at the 99 percent confidence level), and a 0.75 percent decrease in *TCV* (significant at the 90 percent confidence level) (see Table 1). The coefficient was also negative for *MCV* but smaller in magnitude and insignificant. The results are similar in direction, magnitude, and significance for the household described in Table 2. This means that an unmarried household is predicted to experience greater consumption volatility than a married household, when controlling for education, income, race, age, gender, and banking status. This is consistent with my hypothesis that married households tend to experience greater financial stability (due to combined incomes) and thus are less likely to experience hardship in smoothing consumption and are less likely to be unbanked.

As a sensitivity check, I ran the regressions with a data set that included only those households with four quarters of original observations (i.e. the households that reported banking status and thus did not require an imputed banking status). These results were largely insignificant, however, as suspected because the number of unbanked person was too small to get reliable results. I have thus not reported these results in the output shown here. See Table 1 for summary statistics describing the banked and unbanked populations in my final data set. I also ran

Ordinary Least Squares (OLS) regressions for each of the four dependent variable scenarios. The magnitude and direction of the results from the OLS regression were very similar to those of the GLM regression output (see Appendix I). OLS was not the preferred regression method for my research question, however, because OLS treats all individuals the same (e.g. the poor and the rich are assigned the same *unbanked* coefficient), whereas GLM allows for examination of the marginal effects of each of the independent variables (e.g. going from very poor to moderately poor). These narrow margins are the very place where the financial vulnerable and the unbanked are likely to reside.

In the next and final section, I conclude and present policy recommendations based on these results.

CONCLUSION AND POLICY RECOMMENDATIONS

The purpose of this study was to examine the effects of access to mainstream financial services on a household's ability to smooth consumption for basic necessary expenditures over the course of a year. I expected the results of the regressions to show that banked households experience less consumption volatility than households that are unbanked on average. My hypothesis was only partially supported by the results of my GLM regression analysis. First, the coefficients on *unbanked* are relatively small in magnitude and statistically significant only for utilities consumption volatility and medical consumption volatility. The coefficients on *unbanked* are interestingly insignificant for the regressions on food consumption volatility and transportation consumption volatility, for reasons discussed in the previous section. My hypothesis that utilities consumption volatility would be positive was correct, but my similar hypothesis for medical consumption volatility was incorrect. In fact, the magnitude of the negative *unbanked* coefficient on *MCV* was much larger (a 6% decrease) than the positive *unbanked* coefficient on *UCV* (a 1% increase). There are multiple conclusions we can draw from this.

Utilities consumption volatility likely follows my hypothesis because it is the category of expenditure most likely to be relatively consistent on average (compared to the other three) and is truly essential for everyday living. A change in its consumption could mean the household is experiencing a financial hardship. The ability to save with a checking or savings account enables a household to smooth consumption of utilities (e.g. gas for the stove or electricity for hot water). In addition, a household with a checking or savings account is more likely to use other banking services such as credit. In the event of an emergency, such a household could use credit to cover an unexpected expense or a drop in income. The relatively small coefficient can also indicate

that, in the event a household does experience some kind of financial shock, utilities would be one of the last expenses to forego. Entertainment, eating out, temptation goods (e.g., alcohol, cigarettes), non-emergency healthcare expenses, and even car payments are more likely to be impacted before utilities. The *unbanked* coefficient for medical consumption is likely large in magnitude and negative in direction because many poor households simply avoid health care expenses. They go to emergency room only when they require urgent care, rather than going to regular doctor visits. They may forego vision and dental care and drug prescriptions altogether. Wealthier households and households with more financial stability are more likely to experience greater medical volatility because of the nature of medical expenses. Besides regular health insurance payments, expenses from various doctor appointments are highly irregular. Wisdom teeth removal, blood work, allergy tests, short-term braces, new eye glasses, more frequent updates to glasses prescriptions, physical therapy after an injury, or one-time surgery are just a few examples of irregular medical expenses that those with higher income are more likely to encounter.

My hypotheses for the *unbanked* coefficients for medical and transportation consumption volatility were inconclusive. Though the coefficients are both statistically insignificant, it could be due to omitted variable bias. For example, my data do not include receipt of food stamps which would significantly affect low-income households' food consumption volatility. As well, I examine total food consumption as opposed to consumption of a small basket of staple food items. A small basket of staple food items could better demonstrate essential food consumption volatility because it excludes eating out or luxury food items that only certain households partake in. While it may be tricky to ascertain which food items are truly staple across all households in

the multicultural U.S., this is an avenue for future research to explore. The insignificant *unbanked* coefficient for transportation consumption volatility is confounding, but we could potentially attribute this to the fact that a household's total transportation expenses are incredibly diverse for higher income households. This variable not only captures the expense to get between work and home, but also the irregular weekend trips and vacations which are presumably much greater in expense and volatility for higher income households.

When discussing all of these outcomes, it is also important to keep in mind that the data collected are self-reported. People naturally misremember, without intending to misreport. The CEX collects information on a quarterly basis and asks household to report for the previous quarter. A quarter is three months long, and the ability of a member of the household to remember average expenditure across that entire quarter is influenced by a number of factors, including how much volatility they actually experienced. If they experienced great fluctuation in monthly expenditure, reporting the quarterly information may already be an approximated average. The CEX conducts the Diary Survey for this very reason, but it only collects information from households for a two-week period which was inadequate for the purposes of this analysis.

The coefficients on the demographic variables *income*, *lesshs*, *white*, *age*, and *married* are significant in at least two or more of the four regressions, which supports the conclusion that income, education level, race, age, and marital status do help explain a household's likelihood to experience consumption volatility, but only to a limited extent. The coefficients on *lesshs* tended to be the largest in magnitude, which supports my hypothesis that the lowest levels of education correspond to the greatest consumption volatility. The other education controls were largely

insignificant, however. The coefficients on *white* give inconsistent results. On the one hand, the results supported my hypothesis that *white* corresponds with less consumption volatility for food expenditure, but, on the other, the results refuted my hypothesis for utilities and transportation consumption volatility. The coefficient on gender was significant only for medical consumption volatility, which makes it hard to conclude that gender has any significant relationship with consumption volatility. The coefficient on *age* was highly significant for three of the four regressions (though not for *UCV*), but very small in magnitude. The logic that older households experience less volatility was only seen in *MCV*. The logic for these inconsistent positive and negative coefficients on age reasonably follows the same logic as that for the *unbanked* coefficient across expenditure categories. Finally, my hypothesis regarding the coefficients on *married* was largely supported. The coefficients were significant for all but medical consumption volatility, and these coefficients were all negative. They were also all relatively substantial (ranging from -3.3% to -0.8%). This supports the conclusion that married households are more stable financially and thus experience less consumption volatility.

If access to mainstream financial services improves the financial stability of American households, then it is within the prerogative of federal and local governments to support access to and usage of such services. The results for utility consumption volatility support the implementation of policies that promote greater financial inclusion for the poorest and most vulnerable households. The results, however, cannot support this conclusion in regards to food, transportation, or medical consumption volatility without further research.

A set of recommendations that ascribe to the benefits of being banked can focus on a set of

policies that improve access to and usage of banking services. Policies for improving access may include financial consumer protection laws that regulate fees for checking and savings accounts such as minimum deposits necessary to open accounts and identification requirements. Policies for promoting usage of banking services once a household secures an account may include educational campaigns to promote savings, improve financial literacy, and disseminate information on other bank services like access to short-term and long-term credit. Financial access can be a necessary, but not sufficient condition, for greater financial wellbeing.

In short, more research is necessary to draw stronger conclusions on the relationship between banking access, consumption volatility, and financial wellbeing. Specific avenues for further research should include variables on other sources of financial stability besides income, such as food stamps (in regards to FCV) or universal health insurance (in regards to MCV). Another avenue for further research can compare (1) households that are unbanked, (2) banked households with the same characteristics as the unbanked, and (3) banked households that do not frequently use their accounts (e.g. maintain zero or near zero dollar balance). Comparing the unbanked to households that have a basic savings and checking account but do not fully utilize them can shed light on other barriers to financial stability and reasons for consumption volatility despite having basic banking access. It would also be interesting if data were available to study the effects of households changing banking status, i.e. from banked to unbanked to banked or unbanked to banked to unbanked. However, no surveys to my knowledge follow households long enough or with enough detail to capture this information. Another avenue for research would be to focus surveys on immigrant households, who are more likely to be unbanked and thus use alternative financial services.

For stronger conclusions on this issue, I also recommend the following approaches for attaining better data. There are very few surveys that examine unbanked households in the U.S. Those that do examine them in depth (for example, the FDIC's National Survey of Unbanked and Underbanked Households) do not also gather detailed information on household level income, benefit, and spending habits. Those surveys that have detailed spending information, e.g. the CEX, do not also have a large enough sample of unbanked households to make meaningful conclusions within its data set. New surveys or extensions of existing surveys should be designed to capture household level information on banking status, income, consumption, and other factors of financial wellbeing (e.g., financial literacy, trust in financial institutions, use of alternative banking services, ease of use of various financial services). In addition, extending the length of time over which individual households are surveyed would make for better results. In particular, it would be helpful to collect detailed long-term information on consumption habits. The recent JP Morgan Chase study of private bank accounts and the U.S. Financial Diaries Project mentioned in the background section were two examples of specific and detailed household-level data collection efforts; however, both data sets are not available to the public and one did not follow households for a long enough period of time. While surveys are expensive and difficult to administer nationally and over long periods of time, the resulting data would be incredibly powerful. Income volatility and consumption volatility are two fields of study emerging in importance when scholars and policy practitioners discuss individual and household financial wellbeing. The U.S. economy and financial system run on the premise that banking is a given for consumers. Unbanked households are often excluded from policy conversations. Understanding unbanked households is vital for tackling policy questions on how best to improve the financial wellbeing of the U.S.'s most vulnerable households.

APPENDIX

Table 7: OLS Output				
Independent Variables	<i>UCV</i>	<i>FCV</i>	<i>TCV</i>	<i>MCV</i>
<i>unbanked</i>	0.0114* (0.00642)	0.00419 (0.00556)	-0.0115 (0.0121)	-0.0609 (0.0445)
<i>income</i>	-0.0000000878*** (0.0000000173)	-0.0000000288* (0.0000000164)	9.68e-08*** (0.0000000374)	-1.23e-07** (0.0000000543)
<i>lesshs</i>	0.0250*** (0.00808)	0.0219*** (0.00688)	0.0387*** (0.0149)	0.109*** (0.029)
<i>somehs</i>	0.0163*** (0.00569)	0.00584 (0.00496)	0.000317 (0.0115)	0.11 (0.114)
<i>hsgrad</i>	0.000131 (0.00299)	-0.000318 (0.00282)	-0.00529 (0.00634)	0.000337 (0.00916)
<i>white</i>	0.00994*** (0.00332)	-0.0184*** (0.00304)	0.0167** (0.00671)	0.00288 (0.0187)
<i>black</i>	-0.00612 (0.0048)	0.00529 (0.00479)	0.0138 (0.0105)	-0.0298** (0.0151)
<i>age</i>	1.41E-05 (0.0000847)	0.000623*** (0.0000759)	0.000837*** (0.000164)	-0.00253*** (0.000315)
<i>male</i>	0.00295 (0.00247)	-0.00227 (0.00223)	0.00313 (0.00513)	-0.0107 (0.0145)
<i>married</i>	-0.0355*** (0.00258)	-0.0282*** (0.00235)	-0.0135** (0.00535)	-0.0224 (0.014)
<i>constant</i>	0.198*** (0.00553)	0.219*** (0.00472)	0.431*** (0.0103)	0.561*** (0.0198)
Observations	19,602	19,602	19,602	19,602
R-squared	0.017	0.020	0.003	0.002
Prob > F	0.000	0.000	0.000	0.000

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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