Half Banked: The Real Effects of Financial Exclusion on Firms

Elizabeth Berger[*]
Cornell University

Nathan Seegert[†]
University of Utah

Monday 9th September, 2019

Preliminary and Incomplete: Comments Welcome.

Abstract

This paper studies the real economic effects of financial exclusion on firms. Although the credit side of financial inclusion is well understood, we know considerably less about how banking services create firm value by storing wealth and providing payment services. The purpose of this paper is to measure the economic effects of bank access on firms. Almost all firms have access to banking services. To address this empirical challenge, we focus on firms in the marijuana business that face hurdles to obtaining financial services. The results show that banking services improve the business methods of firms. Because banking services allow firms to make different business decisions, these firms are more profitable.

JEL: D22; D24; G21; L25; L26; O16; O43
Keywords: Banking; Financial Inclusion; Firm Outcomes; Small Business; Marijuana Industry

---

[*]elizabeth.a.berger@cornell.edu
[†]nathan.seegert@business.utah.edu

1 Introduction

What are the real economic effects of bank access on firms? A deep and important literature has shown bank access provides credit that can relieve financial constraints for firms (Adelino, Ma, and Robinson (2017); Beck, Demirguc-Kunt, and Martinez Peria (2006); Rice and Strahan (2010); Krishnan, Nandy, and Puri (2014)). Moreover, small business and household credit improves credit market development (Brown, Cookson, and Heimer (2017)).

However, we know considerably less about the effects of firm financial inclusion beyond credit access. Specifically, banks provide services other than credit that may lubricate market transactions. Donaldson, Piacentino, and Thakor (2018) define these benefits as the warehouse function of banks. Banks in this role store wealth, provide checking and cards for payment, and offer a centralized institution for inflows and outflows of the firm. This warehouse function may, therefore, be a primary determinant of financial health. Brown et al. (2017) provide some support for the benefits of the warehouse function of banking in the household finance literature. In particular, they find that mere exposure to financial institutions increases household financial inclusion and better household financial health. Understanding how exposure to banks and the warehousing role of banks affect firms is important for contemporary bank regulation.

Identifying the effects of banking services on business outcomes and decisions is challenging due to a lack of variation in access to banking services, the inherent selection issues that arise from the decision to use banking services, and a host of potential omitted variables that could bias the estimates. In most industries there is very little variation across firms in the decision and ability to use banking services. In fact, almost all businesses use banking services and the few businesses that do not are likely very different and not comparable to businesses that do.

The purpose of this paper is to measure the economic effects of financial inclusion via

bank access on firms. In our unique setting, businesses face regulatory hurdles to obtaining financial services, which we use to address the empirical challenges. Most firms in our sample struggled to obtain financial services at some point. Our results show that banking services improve the business methods of firms. Our evidence suggests that firms with financial access sell higher quality products, sell to a different set of consumers, and make higher profits.

We use marijuana legalization throughout the US as an empirical setting that provides variation in firms' access to finance. Marijuana is a federally prohibited substance and FDIC insured banks are subject to federal laws. The federal government considers it money laundering to handle any money from the marijuana industry. Efforts to clarify the laws pertaining to the interaction between banks and the marijuana industry have only made existing laws more ambiguous. Hence, FDIC insured banks have primarily chosen to avoid the marijuana industry.

However, the marijuana industry is economically large and growing rapidly. Despite its size, business has been conducted almost entirely in cash. The lack of banking services to help with the most basic tasks, such as cash management, is a growing problem.

In Washington state, four independent credit unions (which we refer to as 502 credit unions) elected to provide cash management services to marijuana firms. To reduce information asymmetry, these banks require site visits to ensure that cash from marijuana firms is generated through legal activity (according to state law). Quarterly site visits help banks verify soft information but so does knowledge about the firm that comes with physical proximity. Distance has traditionally played a role in forming bank relationships by enabling banks to gather soft information about firms.[1] Hence, distance is a crucial element of firm access to 502 credit unions. The combination of soft information needs, required on-site visits, and the need for physical proximity mean that not all firms have

---

[1]Related results in the literature include Berger, Miller, Petersen, Rajan, and Stein (2005); Brickley, Linck, and Smith Jr (2003); Butler and Cornaggia (2011); Cetorelli and Strahan (2006); Gilje, Loutskina, and Strahan (2016); Gilje (2017); Paravisini (2008); Petersen and Rajan (1994); Petersen and Rajan (2002); Rice and Strahan (2010).

access to these financial institutions.

We use variation in firm distance from 502 credit unions as a proxy for financial access. In our sample, we find that distance matters for financial access. The probability of using financial services is 23 and 21 percentage points higher if the dispensary is within 2 or 3 miles of a 502 credit union, respectively.

We build our dataset by combining two novel data sources (survey and transaction-level data). Survey data of retail cannabis firms come from the Banking, Entrepreneurship, Regulation, and Taxes (BERT) Study. These data include a module on access to finance. Data from this survey reports that only 49% of dispensaries have access to a business bank account, 30% indicate they do not use any financial services, and 18% use personal accounts.

Transaction level data come from the state of Washington and are generated by the state from filings based on reporting requirements for firms. Specifically, firms must report details of all marijuana transactions at each establishment and provide addresses of each establishment.

The results of the instrumental variables (IV) analysis show that firms with 502 credit union access run businesses differently than firms without. Financial services increase firm profits by 8.5% and reduce markups by 6 percentage points. Wholesale and retail prices are higher and sales are higher. After controlling for fixed effects based on the strain of marijuana, the combination of these results suggest that financial services increase profits, which are due to higher sales of higher quality products.

One potential concern with the IV design, however, is that distance to a 502 credit union could be conflating other effects of proximity to geographic areas where financial institutions locate. The conflating factors could bias the estimates and make them less precise. If 502 credit unions are located in areas that are different from other areas in ways that impact business decisions and outcomes, then the estimates from the IV specification could be imprecise or biased.

To address these concerns, we use additional analysis on firms close to other credit unions to control for these conflating factors in a panel data fixed effects model. This panel data fixed effects model extends the IV specification by using additional variation in type of credit union to control for other potential unobserved differences. The PDFE results support the IV results. Firms within 2 miles of a 502 credit union have higher profits, lower markups, and higher sales.

We explore the drivers of these results. The higher sales, lower markups, and higher wholesale prices are consistent with two mechanisms. First, the cost savings from dispensaries using banking services may partially pass-through upstream to suppliers, leading to higher wholesale prices. Second, banking services may improve transactions with suppliers, thereby improving their relationship, and may allow dispensaries that use banking services to acquire higher quality products from their suppliers.

To disentangle these mechanisms, we analyze transaction level data with strain fixed effects. These data include over 62 million observations of transactions between dispensaries and retail consumers. Rather than aggregating transactions to the establishment level, this analysis allows us to compare transactions for the same strain of marijuana. The evidence suggests that some of the cost savings from banking services are passed upstream to processors. Sales are 5 to 16 percent higher for firms that use banking services per transaction. Overall, banking services allow firms to make different business decisions that lead to an increase in profits of 23 to 25 percent higher per transaction. This evidence suggests that firms that use banking services have different types of consumers—those that consume more. These consumers may be less likely to be tourists or casual consumers.

The results in this paper add to the literature on that studies the economic impacts of financial inclusion (Brown et al. (2017)). Our results shed light on the impact of financial inclusion for firms. This area is understudied due to a lack of data. We use a novel setting in which to identify how being "unbanked" affects the way that firms are managed.

In addition, our paper estimates the economic value of warehouse banking for firms

(Donaldson et al. (2018)). Using the fact that marijuana firms have access to only the cash management function of banking, and not lending services, we are able to isolate the economic value of the warehouse function. Our results reveal an economically meaningful value of these services for firms.

Finally, our results contribute to the literature that explores the value of financial integration for economic growth (Jayaratne and Strahan (1996)). Our results reveal that adding financial services to an economy permits firms to improve the efficiency of operations and the quality of supply chain relationships.

2 Background: Empirical Setting

2.1 Legal Status of Marijuana Businesses

Marijuana production and consumption is federally illegal in the United States. However, in 2012 individual states started legalizing recreational marijuana for adults 21 years of age or older. As of 2019, 11 states have legalized recreational marijuana—each with their own idiosyncratic rules. Following state-level marijuana legalization, the rules about whether banks could provide services to marijuana firms were ambiguous. Unlike marijuana, which is subject to state law, FDIC-insured financial institutions are subject to federal law FIN-2014-G001 (2014).

Despite the fact that marijuana is legal at the state level, marijuana production and consumption is classified as a Schedule I substance, making it federally illegal in the United States. The Comprehensive Drug Abuse Prevention and Control Act of 1970 includes a schedule of five tiers of controlled substances based on characteristics such as acceptable medical use, potential for abuse, and general safety. Schedule I substances are defined as drugs with no currently accepted medical use and a high potential for abuse; examples include heroin, LSD and marijuana (Drug Enforcement Administration).[2]

---

[2]https://www.dea.gov/druginfo/ds.shtml

Despite the clear federal regulations, states have legalized marijuana either for medical or recreational purposes. Between 1996 and 2018, 33 states elected to permit production and use of marijuana for medical purposes.[3] Moreover, starting in 2012 with Colorado and Washington, states began to legalize recreational marijuana for adults 21 years of age or older.

Reconciling state and federal marijuana laws has been a challenge for regulators. The Ogden Memorandum, announced on October 19, 2009 by Deputy United States Attorney David W. Ogden, states that medical marijuana firms in compliance with state medical marijuana laws would not be an enforcement priority for the Department of Justice. While most medical marijuana businesses have not been raided or prosecuted following this memorandum there have been several instances in Montana, California, Nevada, Colorado, and Michigan where business property has been seized.

Financial institutions required specific direction from federal regulators FIN-2014-G001 (2014). On August 29, 2013, the FDIC issued guidance about how financial institutions should interact with marijuana firms (Cole, 2013). Unfortunately, this guidance included the provision that all rules could be revoked at any time. This guidance resulted in confusion and many unanswered questions (Cole, 2013).

Meanwhile, legal marijuana was growing into a large industry. Firms grew into large businesses in terms of size and sales volumes. In 2018, the marijuana industry generated $367.4 million in annual revenues to the state of Washington. Despite its size, firms in this industry conducted business entirely in cash.

Firm managers grew concerned about the safety and efficiency of an all cash business (Weed, 2018). These concerns extended beyond individuals in the industry. Local community leaders were increasingly uncomfortable with the amount of cash circulating through the community. Overall, cash management became a greater concern as the marijuana industry grew (Weed, 2018). In the state of Washington, four independent

---

[3]Washing D.C. and Puerto Rico also permit medical use of marijuana.

credit unions, which we refer to as 502 credit unions, elected to provide cash management services to marijuana firms.[4] These credit unions were primarily responding to perceived danger in communities as businesses accumulated more and more cash. Their interest was to provide bank accounts as a safe storage facility for this cash.

2.2   Banking Literature and Practical Implications

Theoretically, financial access should be important for small businesses in general and marijuana firms in particular. If holding cash on hand creates frictions, then financial institutions provide an important function as storage facilities or "warehouse banks" (Donaldson et al. (2018)). Because marijuana firms cannot borrow from financial institutions, the value of financial institutions comes primarily from cash management services. In addition, the household finance literature shows that mere exposure to financial institutions increases financial inclusion, and thereby improves financial health (Brown et al. (2017)).

Distance and bank size and scope have traditionally played an important role in determining banking relationships. Figure 1, Panel (A) graphs the relationship between firms with financial access and distance to a credit union. The majority of firms are located within 5 miles of a credit union. Banks gather information about potential borrowers. The information can be either hard information or soft information. To reduce information asymmetry in banking relationships, banks gather soft information and form relationships with borrowers that are physically near the bank (Petersen and Rajan (1994) and Petersen and Rajan (2002)). Small, local banks rely more on soft information and relationship capital about the borrower to assess a borrower's creditworthiness (Williamson, 1967). Banks in close physical proximity to borrowers have a comparative advantage in gathering soft information.[5]

---

[4]The accounts were called 502 bank accounts because retail marijuana was legalized in the Washington Initiative 502 legislation.

[5]Related results in the literature include Berger et al. (2005); Brickley et al. (2003); Butler and Cornaggia (2011); Cetorelli and Strahan (2006); Gilje et al. (2016); Gilje (2017); Paravisini (2008); Petersen and Rajan

Information frictions potentially link local 502 credit unions and marijuana firms. Even for simple bank accounts, financial institutions that work with marijuana firms in the marijuana industry must provide verification that the deposits from marijuana firms originate from legal activity. Hence, marijuana firms are more soft information intensive. For example, 502 credit unions require quarterly site visits to verify that firms are operating legally. Hence, physical distance between financial institutions and marijuana firms should be important for establishing financial relationships.

Because soft information about the legality of business activities is important in the marijuana industry, firms should rely more on local financial institutions and physical distance should be a primary determinant of banking relationships. Hence local 502 credit unions may better serve marijuana firms, which have higher information asymmetry (Adelino, Schoar, and Severino (2015)).

In this paper, we use these characteristics of the banking sector to design our empirical tests that measure how financial access influences firms.

3   Data

We pair two novel data sets to provide evidence on how banking influences firms in the cannabis industry. First, we use administrative records from the Washington State Liquor and Cannabis Board (WSLCB). The administrative data contains the universe of businesses and includes 62 million retail transactions from 2014 through 2017. Second, during the period July 10 through October 31, 2016, we conducted a survey in three states, Colorado, Oregon, and Washington. The survey provides detailed information on 462 individual marijuana businesses.

(1994); Petersen and Rajan (2002); Rice and Strahan (2010).

3.1 Washington State Liquor and Cannabis Board

Most states that have legalized recreational marijuana production and consumption legislate extensive data reporting requirements.[6] Firms are required to provide data on all plants from planting, harvesting, production, and final retail sale. In terms of reporting, BioTrackTHC is one company that provides technology that tracks cannabis from "Seed-to-Sale," with contracts in Delaware, New Mexico, Illinois, New York, Hawaii, and for our purposes notably Washington. In terms of enforcement, the state of Washington uses random audits with penalties and inventory destruction to ensure compliance with the tracking system.

Processors record characteristics of each plant, including weight and test results for the primary psychoactive ingredients tetrahydrocannabinol (THC), tetrahydrocannabinolic acid (THC-A), and cannabidiol (CBD). They then seal the product into packages of specific weights (e.g., 1 gram) and sell a retail lot to dispensaries, where each lot is considered identical and given its own retail lot identification number.

At the retail level, firms record the strain, quantity (weight), retail price, and wholesale price for each transaction. Because data are tracked at the transaction level, these data allow us to construct transaction level variables. Specifically, we construct a profit by transaction variable: $Profit = (\text{retail price} - \text{wholesale price}) \times \text{quantity}$, and a markup by transaction variable: $Markup = (\text{retail price} - \text{wholesale price})/\text{retail price}$. Because most firms operate in cash due to lack of financial services, most retail firms choose prices such that the tax-inclusive price is a round number (Hansen et al., 2017). These pricing decisions lower the transaction costs of using cash.

The WSLCB administrative data provides a unique look at business operations because it records retail and wholesale prices, as well as sales volume. The average retail price is $15 per gram and the median transaction is 2 grams. The average markup across

---

[6]States require a large amount of disclosure due, in part, to a response to the Cole Memo (Cole 2013). For more information on disclosure see Hansen, Miller, and Weber (2017).

dispensaries is 134%. Note, these markups do not include labor costs, rent, and other fixed costs. The 25th and 75th percentile markups are 92.9% and 146.5%, respectively. Panel c of Figure 1 shows the full distribution of markups. Table 3 summarizes the data for the interactions between dispensaries and retail consumers.

The data also include information about the strains of marijuana—which can be thought of as wine varieties such as a Giuseppe Rinaldi 2010 Brunate. The median dispensary sold 422 different strains, and the 25th and 75th percentile dispensaries sold 257 and 673 strains, respectively.

The data include the latitude and longitude of every establishment. We pair this geographic information with credit union data from the National Credit Union Administration (NCUA) to calculate the distance to the nearest credit union and 502 credit union. We also calculate the number of other marijuana establishments (competitors) within 1, 2, and 5 miles of each marijuana establishment.

3.1.1 Where are Dispensaries located?

The WSLCB administrative data include records on 434 unique medical and recreational retail locations. These retail establishments are in 152 cities or towns within Washington. Seattle, Spokane, and Tacoma are the three largest cities in Washington and they have the most retail dispensaries. The percent of dispensaries in these cities is roughly similar to their percentage of the population of Washington. For example, Seattle accounts for 9% of Washington's population and has 13% of the dispensaries in the state.

Dispensaries are typically in commercial areas and as a result close to financial institutions. The average distance between a dispensary and a bank is 1.1 miles and the maximum distance is 11.9 miles. The average distance between a dispensary and a credit union is slightly further, 2.4 miles. The maximum distance between a dispensary and a credit union is 46 miles, though, 95% are within 12.5 miles. Figure 1 shows that the distribution of distance is highly skewed, which is why we use log distance in our empirical

analysis.

3.2 Banking, Entrepreneurship, Regulation, and Taxes (BERT) Study

The second dataset used in this study is a survey that was part of the Banking, Entrepreneurship, Regulation, and Taxes (BERT) Study. As part of the BERT study, we included a survey module specifically about access to financial services. Building on existing surveys of individuals and small businesses, we developed an initial set of questions to include in the survey (Fairlie, 2014; US Bureau of Labor Statistics, Retrieved 2018; Kauffman Firm Baseline Public Use Survey Data (KFS)). The questions cover a range of topics from personal details about the business owner, such as education and occupation of parents, and technical details of the business, such as whether the business uses banking services and what type of banking institution it works with. We incorporated feedback from academics and marketing experts into the survey over several iterations. We then piloted the survey through in-person interviews with small businesses in different industries to ensure participants and researchers had similar interpretations of the questions and to minimize biases induced by the survey. Participants took an average of 40 minutes to complete the survey. Participation entailed visiting a website and inputting answers to survey questions. Participants were compensated $50 and entered to win a $500 reward, which was given away randomly to two participants. To determine if participant fatigue affected the quality of answers, we implemented two versions of the survey with different ordering of the nondemographic sections. We find no evidence that the quality of response rate differs depending on the ordering of the questions.

We contacted all retail cannabis dispensaries, medical and recreational, in Colorado, Washington, and Oregon through several waves of contact.[7] First, we mailed letters that contained information and instructions on how to take the survey with an enclosed $2 bill

---

[7]The BERT study information can be found at eccles.link/bert.

as a free gift to increase participation. Second, we called all businesses. If their given phone number did not work we used internet searches to find updated numbers. Third, we partnered with several industry groups that emailed their members information about the survey. Fourth, we sent another wave of letters. Fifth, we had a research assistant physically visit businesses for two months.

After all waves of the survey, the response rate was 21% and our sample contains 325 firms. This response rate is similar to recent surveys of businesses. For example, Graham and Harvey (2001) obtained 16%, Trahan and Gitman (1995) 12%, and Graham and Harvey (2001) 9%—though these surveys focused on CFOs and business executives of large firms.

Our goal was to have owners or managers fill out the survey. One of the first questions asks the participant whether they are an owner, manager, both, or neither. In our sample we have 65% of respondents were either an owner or owner and manager and 31% of respondents were managers and the remaining eight responses were filled out by someone else such as an accountant or office manager.

To supplement the survey evidence, we followed up with businesses in Washington that had not replied to answer a short six question survey about their access to banking services. These questions included several demographic questions and the banking module from the full survey. In Washington, we identified 325 dispensaries. Of these, 295 answered at least the banking module, a 90% response rate. We use these data in the first-stage regression of our instrumental variable analysis.

3.2.1 Banking Services in the Marijuana Industry

Guidance for financial institutions seeking to provide services to marijuana-related businesses came from the Financial Crimes Enforcement Network ("FinCEN") and the Cole Memo (2013) to clarify Bank Secrecy Act ("BSA") expectations. The guidelines suggested banks should know their clients to ensure they were not engaged in illegal

activities outlined in the Cole memo (Cole, 2013). The Drug Enforcement Administration has formally warned banks that marijuana remains illegal at the federal level and Colorado Bankers' association formally urged its members to avoid serving marijuana businesses. As a result of these clarifications and warnings, very few financial institutions are willing to take the risk of potential money laundering from marijuana firms. Many financial institutions will close personal and business bank accounts if they learn that the accounts are linked to marijuana in any way.

Most dispensaries have struggled to obtain financial services at some point due to these ambiguities. Survey data reported in Table 1 reveal that only 49% of dispensaries have access to a business bank account, 30% indicate they do not use any financial services, and 18% use personal accounts. Our pilot interviews bolster these statistics. Some participants told us that they used personal bank accounts but that banks frequently closed these accounts if they discovered that the account was related to a marijuana business. National banks are especially likely to close accounts. One pilot participant discussed a strategy to conceal the fact that money was coming from the marijuana industry. The business owner sprayed Febreze (a scented laundry spray) on the money before depositing it at the bank to conceal the scent of marijuana.

Most financial institutions that provide services to the marijuana industry do so discretely, mostly through word of mouth, and with heightened oversight. In response to federal guidance, financial institutions working with the marijuana industry require businesses to disclose financial records, personal information of the owners including tax records, and in some cases regular, on-site inspections of the businesses.

This data collection is costly for financial institutions and limits financial access for the marijuana industry. At one credit union in Colorado, five of the 13 employees solely focus on compliance in the marijuana industry (Mandelbaum, 2018). As a result, financial institutions that work with dispensaries limit the number of dispensaries that they work with and often have long waiting lists of marijuana dispensaries that need bank accounts.

Because of the nature of the oversight required between financial institution and marijuana firm, the type of financial institution (i.e., local bank, national bank, and credit union) matters. Table 1 reports that 69% of those dispensaries with financial services obtained them through a community or regional credit union. In comparison, only 11% of dispensaries report working with a national bank.

3.2.2 The Effects of Lack of Financial Services

One effect of limited financial services is that the marijuana industry is mostly a cash business. Table 2 shows that in our survey, 49% of dispensaries report that they only accept cash, 40% also accept checks, and only 3% accept credit cards. Even dispensaries that have bank accounts with a financial institution may not be able to process credit card transactions because of increased regulations.

The frictions associated with being a cash industry creates additional costs from security, theft, and fees from financial institutions. Table 2 reports that in our survey, 30% of dispensaries use a security company to transport their cash or product at a cost of $348 a month. Cash is also more vulnerable to theft. Dispensaries reported an average loss from theft of $618 per month. Even normal business activities, such as payroll, are more costly when transacted in cash. For example, many dispensaries have to pay employees in cash rather than writing checks which puts a burden of risk on employees. Due to these costs, dispensaries are willing to pay large fees to financial institutions to hold their cash. In our survey, dispensaries report paying fees between $437 and $1,059 for access to financial services.

4   Instrumental Variable Evidence

Identifying the effects of banking services on business outcomes and decisions is challenging. In most industries there is very little variation across firms in the decision and

ability to use banking services.[8] Moreover, the few businesses that do not use banking services are likely very different and not comparable to businesses that do resulting in selection issues in the decision to use banking services. Finally, a host of potential omitted variables could bias the estimates.

In the marijuana industry, the choice not to use banking services is in large part driven by search and transaction costs. Specifically, firms do not know which financial institutions will provide these services, there may not be any financial institutions that provide these services nearby, and there may be large costs in working with a financial institution far away due to the information frictions associated with the mostly cash based nature of the industry. These institutional details suggest that the decision to use banking services is plausibly exogenous to other observable factors (e.g., firm business decisions).

In light of the industry-specific difficulties in accessing bank finance, the marijuana industry provides a unique opportunity to study the impact of banking services on firm outcomes and decisions. We specifically are interested in how banking services impact a firm's (1) profits, (2) markups, (3) retail price, (4) wholesale price, and (5) sales—our dependent variables $Y_{i,t}$. To investigate these relationships, we consider the specification

$$Y_{i,t} = \beta_0 + \beta_1 \text{Banking Services}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t} \tag{1}$$

where we use month and location fixed effects and other controls to isolate the effect of banking services on firm decisions. We control for the number of competing marijuana firms within 5 miles in the regression specification. Standard errors are clustered at the dispensary level. Under the null hypothesis that using banking services does not impact a firm's choices and outcomes, β_1 should be small in magnitude and not statistically different from zero.

If the decision to use banking services is related to unobserved differences between firms, then β_1 may be biased. Therefore, we instrument for using banking services with the

---

[8]In fact, almost all businesses use banking services, though some through personal accounts ().

nearest distance between a dispensary and a financial institution that provides banking services to the marijuana industry. Due to the search and transaction costs of financial intermediation, this distance strongly affects a firm's decision on whether to use banking services (section 3.2.1 discusses this in more detail). In addition, due to several institutional details, the distance between a firm and a financial institution that provides these services is plausibly exogenous (section 4.2 discusses this in more detail).

In Washington, four independent credit unions decided to provide banking services to the marijuana industry. We refer to these as 502 credit unions because they provide banking under the code 502 that legalized marijuana in Washington. Other financial institutions did not provide these services either due to risk or legal constraints, as the case with federally chartered banks. We use the distance to the closest branch of one of these four 502 credit unions as our instrument in the specification below,

$$Y_{i,t} = \beta_0 + \beta_1 \text{Distance to 502 Credit Union}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}. \tag{2}$$

Our baseline specifications limit the sample of firms to those within 10 miles of a 502 credit union. This specification, therefore, uses variation in distance between 0 and 10 miles. Using this cutoff provides a cleaner comparison group. The estimates are not sensitive to this cutoff. The coefficient β_1 captures the causal effect of banking services on business decisions and outcomes, $Y_{i,t}$, if the conditions for a valid instrumental variable are met, which we discuss in more detail in the next two sections. We use month and location fixed effects and other controls to isolate the effect of banking services on firm decisions. We control for the number of competing marijuana firms within 5 miles in the regression specification. Standard errors are clustered at the dispensary level.

4.1 Distance and Banking Services

For the instrument (distance to 502 credit union) to be valid, it must strongly affect a firm's decision to use banking services. This instrument builds on a large literature on banking services that suggest that physical distance is an important predictor of access to finance (Petersen and Rajan, 1994). The literature suggests that relationships in banking are important and that firms close to a financial institution may have the opportunity to build a better relationship (Berger et al., 2005).

Evidence from our survey suggests that distance, in the form of search and transaction costs, is an important determinant of financial access. Our survey confirms that the marijuana industry is a largely cash based industry (Table 2). Larger distances between the firm and the financial institution may increase transaction costs because firms have to physically transport cash. Moreover, because very few financial institutions provide financial services to the marijuana industry, firms may not know which institutions would provide service for them and may rely on nearby banks due to visibility.

In addition, the relationship between firm and financial institution may be more important in the marijuana industry due to legal ambiguities. Using the survey, we run a first-stage regression and find that distance to a 502 credit union predicts a firm's decision to use banking services. Specifically, 502 credit unions require quarterly site visits to all client locations to determine the nature of the proceeds from the business.

We use the instrumental variable of distance to a 502 credit union to proxy for access to a bank account. The first-stage results, presented in Table 4, demonstrate the effect of a firm's distance to a 502 credit union on its decision to use banking services. The dependent variable is equal to one if a firm indicates it uses banking services (not necessarily with a credit union) and zero otherwise. Column 1 of Table 4 shows that the probability a dispensary uses financial services decreases by 9 percentage points for every additional mile to the nearest 502 credit union. Columns 2 shows that the probability of using financial

services is 29 percentage points higher if a dispensary is within 1 mile of a 502 credit union. Columns 3 and 4 show that the effect decreases with distance, as we would expect. Specifically, the probability of using a financial service is 23 and 21 percentage points higher if a dispensary is within 2 or 3 miles of a 502 credit union. The first-stage results also suggest the instrument is strong. The F-statistic equals 22 and exceeds the standard threshold of F=10 (Bound, Jaeger, and Baker, 1995; Staiger and Stock, 1997).

Overall, the first-stage results, evidence from the literature, and our survey evidence indicate that distance to a financial institution has a strong effect on a firm's decision to use banking services.

4.2 The Exclusion Restriction Condition

A valid instrument should affect business outcomes only through the decision to use banking services, i.e., the exclusion restriction, and not through any other channel. Formally, the exclusion restriction states that the instrument is uncorrelated with the residuals in equation A.5.

The distance instrument abstracts from these selection issues, is unlikely to directly impact profits, and increases the likelihood a firm uses financial services. The proximity to 502 credit union variable is bounded by 0 and 1 and equal to (10 - distance)/10. This variable equals 1 for firms within 1 mile and 0 for firms 10 miles away. Firms more than 10 miles away from a 502 credit union are excluded from the sample.

The weakness of the simple IV specification is the additional noise in the estimates because firm profits depend on many factors. Through a series of additional tests we add precision to this estimate by controlling for these other factors.

We provide several pieces of collaborating evidence to alleviate concerns about the exclusion restriction:

1. *Timing of location choice:* One concern is that firms with more financially savvy managers choose to locate near financial institutions that provide banking services to

the marijuana industry. Financially savvy managers may make other decisions that affect business outcomes we are interested in, such as profits, markups, prices, and sales. To investigate whether this concern is problematic, we consider the timing of when firms chose their location and when financial institutions began offering banking services to the marijuana industry. Recreational marijuana was legalized in Washington when voters passed Initiative 502 in November of 2012. At that time a rush of firms applied for licenses. Washington regulations initially required that firms have at most three locations and no one person could hold a stake in more than one firm.[9] As the need for banking services became apparent, two credit unions offered banking services to the marijuana industry. Other banks decided not to provide these services or, as the case with federally charted banks, were not permitted to do so. These institutional details suggest that firms could not have chosen their location based on the location of these financial institutions because that information was not available when they made their location decisions.

2. *Balance of observable characteristics:* Another concern is that a firm that locates near a financial institution that provides banking services to the marijuana industry differs from a firm that does not. To investigate this concern, we test for the balance in observable characteristics between these sets of firms. Table 3 reports that there are no significant differences between these sets of firms across observable characteristics such as, product potency, sales, and retail price.

4.3   Instrumental Variable Empirical Evidence

We begin the analysis of the impact of banking services on firms by studying dispensary-level data. We aggregate transaction-level data to the dispensary level such that the analysis examines how marijuana firms operate, on average.

Table 5 reports evidence at the dispensary level on the impact of banking services.

---

[9]The rule...

Column (1) reports that firms closer to 502 credit unions (within 1 mile) have profits that are 3.4 percent higher than firms that are far away (10 miles). This evidence suggests that banking services have a real impact on firm behavior and outcomes. To calculate the effect of banking services on profits, we combine the reduced form estimates in Table 5 with the estimates of the first stage in Table 4. The ratio of the effect of distance on profits, 3.4 percent, reported in Table 5, and the increase in probability a firm uses banking services given that the firm is close to a 502 credit union, 29 percent reported in Table 4, provides the effect of banking services on profits. This calculation implies that banking services increase profits by 8.5 percent. This estimate may be an underestimate due to attenuation bias from measurement error.

Tables 7 and 8 provide additional specifications to control for confounding factors that could be causing this estimate to be attenuated and imprecisely estimated. Before discussing those specification, the remaining columns in Table 5 provide insights into the mechanisms that are leading to higher profits for firms that use banking services.

Column (2) considers how banking services impact the markup percentage firms set. The administrative data from the state of Washington provides exact retail and wholesale prices for every transaction. This novel data allows us to calculate (as opposed to estimate) markups as the ratio of the difference in retail and wholesale price divided by the retail price; markup $= (p_{\text{retail}} - p_{\text{wholesale}})/p_{\text{retail}}$ for each transaction.

Column (2) reports that firms closer to 502 credit unions have markups that are 6 percentage points lower. This evidence is consistent with several conjectures. First, banking services allow firms to be more competitive and set lower prices to increase sales. Second, firms that use banking services may have better relationships with their suppliers and customers that allow them to sell higher quality products that have lower markups. Third, lower costs from using banking services could be partially passed through to their suppliers causing wholesale prices to be higher and as a result markups to be lower. Fourth, there could be confounding factors with distance such that firms in areas where 502 credit

unions all charge lower markups. We examine each of these conjectures. Specifications in Tables 10 and 11 alleviate concerns about the fourth conjecture. To separate the first three conjectures, we consider retail price, wholesale price, and sales separately.

Columns (3) and (4) of Table 5 reports that firms close to 502 credit unions have retail prices that are on average 2.2 percent higher and wholesale prices that are 4.5 percent higher. Higher retail prices suggest that firms are not passing on cost savings through banking services onto customers. Higher wholesale prices are consistent with banking services causing firms to sell higher quality products—higher wholesale prices in combination with higher retail prices. Banking services may ease transactions with suppliers, improve that relationship, and lead dispensaries to buy higher quality products.

Table 6 shows that dispensaries with financial access do indeed sell products with different chemical content. Dispensaries with financial access sell products with higher average potency. Within the two main chemical compounds in marijuana, i.e., THC and CBD, these dispensaries sell products with higher THCA levels than dispensaries without financial access.

This evidence is also consistent with some of the cost savings from using banking services being passed through to suppliers. We will investigate these mechanisms in section 6 using transaction level data and marijuana strain fixed effects. Differences between the dispensary and strain level results will indicate whether firms are paying and charging higher prices generally or if they are selling higher quality products that have a higher wholesale and retail price.

Column (5) reports that sales, measured as usable weight of marijuana, are 3.2 percent higher for firms close to a 502 credit union. Evidence using transaction data and strain fixed effects, reported in section 6, will provide evidence about whether dispensaries using banking services have a larger number of transactions or are selling more product per transaction.

Taken together, the evidence using distance as an instrumental variable suggests that

banking services increase profits (8.5 percent) and that these higher profits are due to increased sales of higher quality products. One potential concern with the instrumental variable design, however, is that distance to a 502 credit union could be conflating other effects of proximity to geographic areas where financial institutions locate. The conflating factors could bias the estimates and make them less precise. To address these concerns, we use additional analysis on firms close to other credit unions to control for these conflating factors in a panel data fixed effects model.

5 Panel Data Fixed Effects Evidence

If 502 credit unions are located in areas that are different from other areas in ways that impact business decisions and outcomes, then the estimates from the IV specification could be imprecise or biased. To control for these differences, we implement a panel data fixed effects (PDFE) model. If credit unions locate in areas that provide some advantage (or disadvantage) to marijuana dispensaries, then we might be concerned that distance alone is not capturing the effect estimated in the IV specification.

The model uses within group variation (Cameron and Trivedi, 2005; Bloom, Sadun, and Van Reenen, 2012), with groups close and far and type of credit union (ones that provide or do not provide services to the marijuana business). The PDFE specification, however, controls for that by including a distance measure to any credit union,

$$Y_{i,t} = \beta_0 + \beta_1 \text{Close 502 CU}_{i,t} + \beta_2 \text{Close Non-502 CU}_{i,t}$$
$$+ \beta_3 \text{Far Non-502 CU}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}. \tag{3}$$

The *close 502 CU* variable is one if a firm is within 2 miles of a 502 credit union and zero otherwise. The *close non-502 CU* variable is one if a firm is within 2 miles of a credit union that does not provide services to the marijuana industry and zero otherwise. The *far non-502 CU* variable is one if a firm is between 2 and 10 miles of a credit union that does

not provide services to the marijuana industry and zero otherwise. The omitted group is firms that are 2 to 10 miles from a credit union that does provide services to the marijuana industry. Firms that are not within 10 miles of a credit union are excluded from the sample to provide a clean comparison group. The estimates are not sensitive to this restriction.

The coefficient of interest β_1 captures the causal effect of banking services on business decisions and outcomes if the differences in error terms is zero, discussed further below.

5.1 Panel Data Fixed Effects Identification

For the panel data fixed effects model to causally identify the effect of banking services on business decisions and outcomes, the effect cannot vary differently across groups. This approach removes omitted variable bias from differences between groups due to strategic, non-random, or confounded selection into our groups (Bloom et al., 2012). To formalize this point, let our outcome variables be denoted $y_{i,k}^j$ and depend on observable groups $j = \{0, 1\}$ and $k = \{0, 1\}$, following the notation of Cameron and Trivedi (2005). Define group variables D^j, D_k, and D_k^j such that $D^j = 1$ if $j = 1$, $D_k = 1$ if $k = 1$, $D_k^j = 1$ if both k and j equal 1 and $D^j = 0$, $D_k = 0$, and $D_k^j = 0$ otherwise. This leads to the specification

$$y_{i,k}^j = \alpha + \alpha_j D^j + \alpha_k D_k + \beta D_{i,k}^j + \varepsilon_{i,k}^j, \tag{4}$$

where $\varepsilon_{i,k}^j$ is a zero-mean constant-variance error term. The coefficient on $D_{i,k}^j$ is the policy impact parameter of interest. To make concrete how β identifies the policy impact, consider the four group outcomes,

$$y_{i,1}^0 = \alpha + \alpha_k + \varepsilon_{i,1}^0 \tag{5}$$

$$y_{i,1}^1 = \alpha + \alpha_k + \alpha_j + \beta + \varepsilon_{i,1}^1 \tag{6}$$

$$y_{i,0}^0 = \alpha + \varepsilon_{i,0}^0 \tag{7}$$

$$y_{i,0}^1 = \alpha + \alpha_j + \varepsilon_{i,0}^0. \tag{8}$$

The coefficients α_k and α_j change the outcome for groups $k = 1$ and $j = 1$ and β additionally changes the outcome for firms in group $k = 1$ and $j = 1$. All reasons why an outcome may differ across groups are captured by the coefficients α_k and α_j. The effect of being in both groups is captured by β. In our context, β captures the effect of banking services, which we instrument as being close to a credit union and that credit union being one that provides banking services to the marijuana industry.

The differences in outcomes across groups is given by

$$y_{i,1}^1 - y_{i,1}^0 = \alpha_j + \beta + \varepsilon_{i,1}^1 - \varepsilon_{i,1}^0 \tag{9}$$

and

$$y_{i,0}^1 - y_{i,0}^0 = \alpha_j + \varepsilon_{i,0}^1 - \varepsilon_{i,0}^0. \tag{10}$$

The level effects α_k and α_j are eliminated by taking the differences in and between equations (9) and (10). In our context, this demonstrates that the differences we explicitly modeled between being close to a credit union and that credit union providing banking services are eliminated in the fixed effects specification. We recover the effect of banking services β by taking the difference between equations (9) and (10),

$$(y_{i,1}^1 - y_{i,1}^0) - (y_{i,0}^1 - y_{i,0}^0) = \beta + (\varepsilon_{i,1}^1 - \varepsilon_{i,1}^0) - (\varepsilon_{i,0}^1 - \varepsilon_{i,0}^0) \tag{11}$$

and assuming that $E[(\varepsilon_{i,1}^1 - \varepsilon_{i,1}^0) - (\varepsilon_{i,0}^1 - \varepsilon_{i,0}^0)] = 0$ for identification. Said differently, the model allows for there to be differences between firms that are close or far to financial institutions and differences between firms that are close (far) to 502 credit unions and firms that are close (far) to non 502 credit unions. The model is unable to identify β if the difference between being close to a 502 credit union relative to being far from a 502 credit union is different than the difference between being close to a non 502 credit union relative

to being far from a non 502 credit union. Note that β is consistently estimated even if the estimates of the level differences, e.g., α_k, are not (Cameron and Trivedi, 2005).

This panel data fixed effects model extends the instrumental variable specification by using additional variation in type of credit union to control for other potential unobserved differences.

5.2   Panel Data Fixed Effects Empirical Evidence

Tables 7 and 8 report evidence using our panel data fixed effects specification. These specifications ensure that conflating factors with distance in our instrumental variable do not drive our IV results. These specifications can also add precision to the estimates. Table 7 compares firms within 2 miles of a 502 credit union to firms between 2 and 10 miles of one of these 502 credit unions and firms within 2 miles of and 2 to 10 miles away from a credit union that does not provide these services.

In Table 11 we explicitly model the incremental effect of distance by extending this comparison to firms within 2 miles, 2–4 miles, 4–6 miles, 6–8 miles, and 8–10 miles. Table 11 reports our preferred estimates because they model the most comprehensive distance controls and as a result, the cleanest estimates.

Column (1) of Tables 7 and 8 report that being within 2 miles of a 502 credit union increases a firm's profits by 18.1 percent and 18.6 percent, respectively. These estimates are relatively precisely estimated and statistically significant at the 5 percent level. The consistency in these estimates across specifications adds to the validity of these specifications and demonstrates that the value of the distance controls is mostly to add precision as opposed to correct for bias. This evidence reinforces the IV estimate that banking services can substantially increase profits.

The IV estimates in Table 5 suggest that profits are higher for firms that use banking services because they sell more and higher quality products, though with a lower markup. Tables 7 and 8 support these findings. Profits are higher despite lower markups because

sales are higher for firms that use banking services. In particular, sales are 16 to 17 percent higher and these estimates are precisely estimated. These estimates, again, follow that pattern that they are strongest for firms within 2 miles from a credit union that provides these services and decrease the further away from a firm is from a 502 credit union. The transaction level estimates in section 6, can also provide additional insights into the sources of these higher sales. In particular, do firms with banking services engage in more individual transactions or do they sell a higher quantity of product per transaction?

We estimate that markups are 9 to 10 percentage points lower for firms within 2 miles of 502 credit unions (Table 8). Table 8 shows that the markups increase with distance, which is consistent with our first stage estimates that firms are more likely to use banking services if they are closer to credit unions that provide these services. In particular, we find markups increase from negative 9 percentage points 2 to 4 miles away, to negative 4 percentage points from 4 to 6 miles, and negative 1 percentage point 6 to 8 miles, relative to firms 8 to 10 miles away. These estimates control for other factors that might be correlated with distance from credit unions generally. In fact, we find that markups decrease with distance from credit unions that do not provide services to the marijuana industry.

Markups are lower for firms that use banking services because their wholesale prices are 5 to 7 percent higher, reported in column (3) of Tables 7 and 8. This evidence is consistent with two mechanisms. First, the cost savings from dispensaries using banking services may partially pass-through upstream to suppliers, leading to higher wholesale prices. Second, banking services may improve transactions with suppliers, thereby improving their relationship, and may allow dispensaries that use banking services to acquire higher quality products from their suppliers. To investigate these two mechanisms, the analysis in section 6 uses transaction level estimates with strain fixed effects.

6 Transaction Level Evidence

We use a dataset of transaction level data to explore the channels through which these effects occur. The data provide a unique look at business operations because it records retail and wholesale prices, as well as sales volume. The data contain the universe of businesses and includes 62 million retail transactions from 2014 through 2017. The data include the latitude and longitude of every establishment.

Tables 9–11 repeat the empirical specifications in Tables 5–8 using transaction-level data and strain fixed effects. These estimates provide complementary evidence to the dispensary-level evidence by detailing the mechanisms underlying the results at the dispensary level. For example, the dispensary-level evidence suggests that markups are lower and profits are higher for firms that use banking services. The transaction-level evidence can inform us as to whether banking services cause firms to charge a lower markup on all products or to sell a different set of products that have a lower markup.

Column (2) and (3) of Tables 9–11 report that firms that use banking services charge 3 to 6 percent higher retail prices and pay 5 to 7 percent higher wholesale prices than other firms for the same strain. This evidence suggests some of the cost savings from using banking services are passed upstream to processors.

Sales are 5 to 16 percent higher for firms that use banking services per transaction, reported in column (5) of Tables 9–11. This evidence suggests that firms that use banking services have different types of consumers—those that consume more. These consumers may be less likely to be tourists or casual consumers.

We find strong evidence that at the transaction level, profits are higher, retail and wholesale prices are higher, and sales are higher. In contrast, markups are not as strongly negative at the transaction level as they are at the firm level. Taken together, this evidence suggests that some of the lower markups at the firm level are due to these firms selling a different set of products that have lower markups.

Banking services allow firms to make different business decisions that lead to an increase in profits of 23 to 25 percent higher per transaction. The estimates from Table 10 and 11 provide the strongest evidence combining the instrumental variable design with extensive distance controls.

7   Conclusion

In this paper we measure the economic effects of financial inclusion on firms. To address the empirical challenges of answering this question, We use the marijuana industry as a unique setting. Most firms in our sample struggled to obtain access to financial institutions at some point during the sample period. Some firms were successful and others unsuccessful at achieving financial inclusion.

In an IV setting, the results show that firms with 502 credit union access have higher profits lower markups. Wholesale and retail prices are higher and sales are higher for these firms. When we control for the strains of marijuana that a firm sells, the results suggest that access to 502 credit unions increases profits, which are due to higher sales of higher quality products. Results from a panel data fixed effects model confirm the IV results. Firms within 2 miles of a 502 credit union have higher profits, lower markups, and higher sales.

The cost savings from dispensaries using banking services may partially pass-through upstream to suppliers, leading to higher wholesale prices. Alternatively, banking services may improve transactions with suppliers, thereby improving their relationship, and may allow dispensaries that use banking services to acquire higher quality products from their suppliers.

We analyze transaction level data with strain fixed effects to disentangle these effects. The evidence suggests that some of the cost savings from banking services are passed upstream to processors. In addition, access to 502 credit unions lead to an increase in

profits of 23 to 25 percent higher per transaction. The evidence suggests that firms with banking services have different types of consumers—those that consume more. These consumers may be less likely to be tourists or casual consumers.

In developed economies, unbanked firms are rare. In contrast to the abundance of literature surrounding credit access and firm outcomes, there is no evidence about access to the warehouse banking function. Using the marijuana industry, we are able to provide a first glimpse of how financial inclusion affects firms. In addition, as the number of bank branches declines and banking moves online, the results shed light on the potential impact of reduced local bank access on firms.
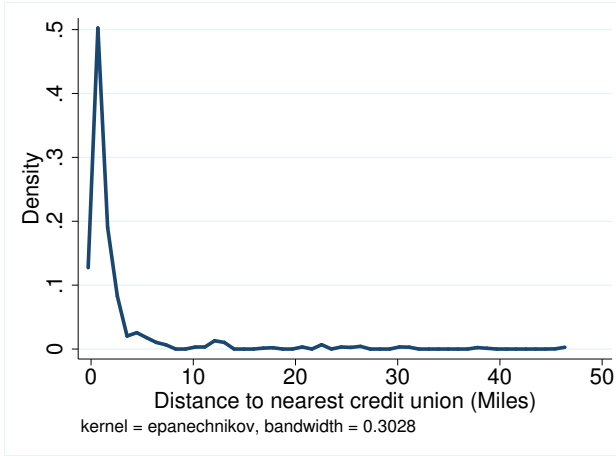
References

Adelino, M., S. Ma, and D. Robinson (2017). Firm age, investment opportunities, and job creation. *The Journal of Finance 72*(3), 999–1038.

Adelino, M., A. Schoar, and F. Severino (2015). House prices, collateral, and self-employment. *Journal of Financial Economics 117*(2), 288–306.

Beck, T., A. Demirguc-Kunt, and M. S. Martinez Peria (2006). *Banking services for everyone? Barriers to bank access and use around the world*. The World Bank.

Berger, A. N., N. H. Miller, M. A. Petersen, R. G. Rajan, and J. C. Stein (2005). Does function follow organizational form? evidence from the lending practices of large and small banks. *Journal of Financial economics 76*(2), 237–269.

Bloom, N., R. Sadun, and J. Van Reenen (2012). The organization of firms across countries. *The Quarterly Journal of Economics 127*(4), 1663–1705.

Bound, J., D. A. Jaeger, and R. M. Baker (1995). Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak. *Journal of the American Statistical Association 90*(430), 443–450.

Brickley, J. A., J. S. Linck, and C. W. Smith Jr (2003). Boundaries of the firm: evidence from the banking industry. *Journal of Financial Economics 70*(3), 351–383.

Brown, J. R., J. A. Cookson, and R. Z. Heimer (2017). Courting economic development. *The World Bank Economic Review 30*(Supplement_1), S176–S187.

Butler, A. W. and J. Cornaggia (2011). Does access to external finance improve productivity? evidence from a natural experiment. *Journal of Financial Economics 99*(1), 184–203.

Cameron, A. C. and P. K. Trivedi (2005). *Microeconometrics: methods and applications*. Cambridge university press.

Cetorelli, N. and P. E. Strahan (2006). Finance as a barrier to entry: Bank competition and industry structure in local us markets. *The Journal of Finance 61*(1), 437–461.

Donaldson, J. R., G. Piacentino, and A. Thakor (2018). Warehouse banking. *Journal of Financial Economics 129*(2), 250–267.

FIN-2014-G001 (February 14, 2014). Bsa expectations regarding marijuana-related businesses. *Department of the Treasury; Financial Crimes Enforcement Network*.

Gilje, E. P. (2017). Does local access to finance matter? evidence from us oil and natural gas shale booms. *Management Science 65*(1), 1–18.

Gilje, E. P., E. Loutskina, and P. E. Strahan (2016). Exporting liquidity: Branch banking and financial integration. *The Journal of Finance 71*(3), 1159–1184.

Graham, J. R. and C. R. Harvey (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics 60*(2-3), 187–243.

Hansen, B., K. Miller, and C. Weber (2017). The taxation of recreational marijuana: Evidence from washington state. *National Bureau of Economic Research working paper*.

Jayaratne, J. and P. E. Strahan (1996). The finance-growth nexus: Evidence from bank branch deregulation. *The Quarterly Journal of Economics 111*(3), 639–670.

Krishnan, K., D. K. Nandy, and M. Puri (2014). Does financing spur small business productivity? evidence from a natural experiment. *The Review of Financial Studies 28*(6), 1768–1809.

Mandelbaum, R. (January 4, 2018). Where pot entrepreneurs go when the banks just say no. *The New York Times*.

Paravisini, D. (2008). Local bank financial constraints and firm access to external finance. *The Journal of Finance 63*(5), 2161–2193.

Petersen, M. A. and R. G. Rajan (1994). The benefits of lending relationships: Evidence from small business data. *The journal of finance 49*(1), 3–37.

Petersen, M. A. and R. G. Rajan (2002). Does distance still matter? the information revolution in small business lending. *The journal of Finance 57*(6), 2533–2570.

Rice, T. and P. E. Strahan (2010). Does credit competition affect small-firm finance? *The Journal of Finance 65*(3), 861–889.

Staiger, D. and J. Stock (1997). Instrumental variables regression with weak instruments. *Econometrica 65*(3), 557–586.

Trahan, E. A. and L. J. Gitman (1995). Bridging the theory-practice gap in corporate finance: a survey of chief financial officers. *The Quarterly Review of Economics and Finance 35*(1), 73–87.

Figure 1: Distance to Nearest Credit Union

(a) Distribution of Distance

kernel = epanechnikov, bandwidth = 0.3028

(b) Distribution of Log Distance

kernel = epanechnikov, bandwidth = 0.3309

(c) Distribution of Markups

kernel = epanechnikov, bandwidth = 14.9626
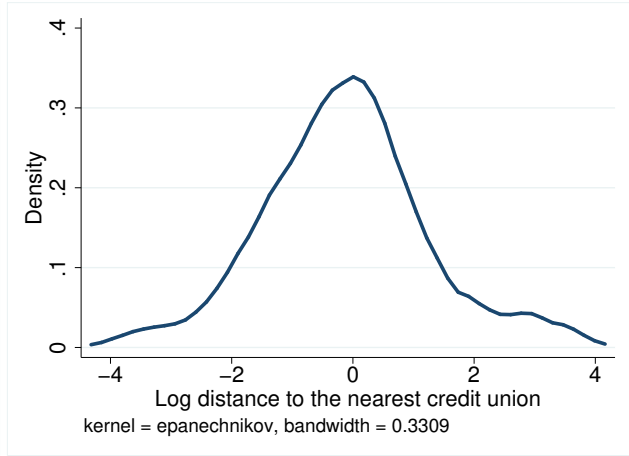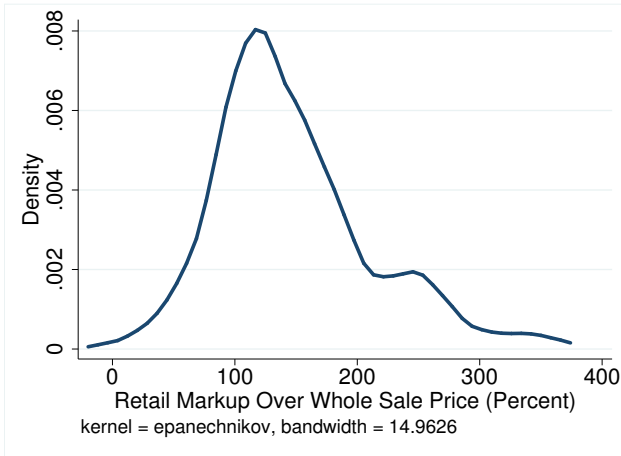
Table 1: **Banking in the Marijuana Industry**

This table shows survey responses from marijuana firms in Washington state in 2016 about whether they use banking services and from what type of financial institution. The survey questions are shown in Appendix A.

| | All Types (1) | Credit Union | | Bank | | | Other |
		Community (2)	Regional (3)	Community (4)	Regional (5)	National (6)	
Business	49%	30%	36%	5%	14%	12%	2%
Personal	18%	27%	26%	2%	9%	8%	5%
Other	3%						
No Acct.	30%						
Total		33%	36%	3%	14%	11%	3%

Table 2: **Transactions and Financial Services in the Marijuana Industry**

This table shows survey responses from marijuana firms in Washington state in 2016 about transactions and financial services. The survey questions are shown in Appendix A.

What forms of payment do you accept? (Please mark all that apply).	
Cash Only	49%
Checks	40%
Debit Cards	14%
Credit Cards	3%
Do you pay for a security company that transports cash and/or product?	
Yes	30%
Dollars per month	$348
How much do you lose due to theft?	
Dollars per month	$618
How much does your business pay per month, in dollars, to use all financial services at	
Bank or credit union	$748
Non-bank financial institution	$1,059
Other	$437

Table 3: **Summary Statistics: Marijuana Dispensaries**

The table reports summary statistics for the sample of marijuana dispensaries as of February 2017. The sample consists of marijuana dispensaries with both retail and medical marijuana licenses. Column 1 reports means of variables for the set of dispensaries within 3 miles of a special financial institution and Column 2 reports means for the set of dispensaries more than 3 miles from special financial institutions. Column 3 reports the difference in means between Columns 1 and 2 and the p-value of the t-statistic of these differences, with standard errors clustered by dispensary. Number of financial institutions is a variable that measures how many financial institutions are within 1 mile (5 miles) of the dispensary. The potency variables measure the chemical contents of each strain of marijuana that a dispensary sells. Markup percentage measures the percentage by which the price charged exceeds the cost of the marijuana. Sales measures the number of transactions at a dispensary in each month, Sales Volume measures the total product weight of these transactions, and Number of strains sold counts the total number of unique strains that the dispensary sells in these transactions. The average retail price measures the price paid by the consumer to the dispensary and the average wholesale price measures the price paid by the dispensary to the processor (distributor).

Dispensaries With:	Special Finance = 0	Special Finance = 1	Difference
Number of Fin Institutions within 5 miles	40.824	92.474	51.651
	(41.071)	(54.316)	(0.000)
Number of Fin Institutions within 1 mile	4.662	9.255	4.593
	(5.726)	(10.168)	(0.002)
Potency (Total)	20.387	20.230	-0.157
	(1.679)	(1.591)	(0.004)
Potency (CBD)	0.389	0.375	-0.014
	(0.431)	(0.339)	(0.054)
Potency (THC)	6.444	5.752	-0.692
	(4.727)	(4.293)	(0.206)
Potency (THCA)	15.211	15.790	0.579
	(5.189)	(4.772)	(0.285)
Markup Percentage	136.121	126.954	-9.167
	(37.747)	(35.677)	(0.003)
Ln(Sales)	9.010	9.222	0.212
	(1.130)	(1.067)	(0.112)
Ln(Sales Volume)	9.820	10.099	0.279
	(1.097)	(1.076)	(0.069)
Ln(Number of Strains Sold)	5.208	5.390	0.182
	(0.800)	(0.774)	(0.037)
Average Unit Price (Retail)	20.891	21.936	1.044
	(7.147)	(7.444)	(0.175)
Ln(Avg Unit Price, Retail)	2.871	2.913	0.043
	(0.309)	(0.323)	(0.210)
Ln(Avg Wholesale Price)	2.119	2.195	0.076
	(0.259)	(0.276)	(0.038)
Number of Observations	3550	1809	

Table 4: **IV: First Stage—Banking Services and Distance**

This table shows how the probability of using banking services changes with proximity to a credit union. Observations are at the marijuana firm level. The sample combines survey data and administrative data from the state of Washington (see section 3.2.2). The dependent variable, $\mathbb{1}$(Use Banking Services), is an indicator variable equal to one if in the survey the firm indicated that it used banking services and zero otherwise. *Proximity to credit union* is the log of the distance between a marijuana firm and the closest credit union. *Within 1 mile of credit union* is an indicator variable equal to one if the distance to the nearest credit union is less than 1 mile and zero otherwise. Similarly, *Within 2 miles of credit union* and *Within 3 miles of credit union* are indicator variables equal to one if the distance to a credit union is less than 2 or 3 miles, and zero otherwise. Standard errors appear in parentheses and *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable: $\mathbb{1}$(Use Banking Services)				
	(1)	(2)	(3)	(4)
	A	B	C	D
Proximity to credit union	-0.094***			
	(0.020)			
Within 1 miles of credit union		0.293***		
		(0.056)		
Within 2 miles of credit union			0.229***	
			(0.065)	
Within 3 miles of credit union				0.210***
				(0.079)
F-statistic	22.302	27.355	12.303	7.011
Adj. R-Square	0.068	0.082	0.037	0.020
Observations	295	295	295	295

Table 5: **Average Monthly Dispensary Markups, Prices, and Profits - Instrumental Variable**

This table reports the effects of banking services on marijuana dispensaries using an instrumental variable specification at the dispensary-month level. The instrumental variable specification uses distance to a 502 credit union as an instrument for whether a dispensary uses banking services. The specification includes controls for whether the firm is within 2 miles of a 502 credit union, the number of dispensaries (competitors) within 5 miles, as well as month and county fixed effects, α_t and α_j.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Distance to 502 Credit Union}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are aggregated to the dispensary month level from transaction-level data. Each column reports the effects of banking on the following dependent variables: Column (1) markup percentage, which is defined as the difference between retail and wholesale price divided by retail price; Column (2) the log of the average retail price per unit, where the retail price is observed; Column (3) the log of the average wholesale price per unit, where the wholesale price is observed; Column (4) log profit, where profit is defined as the difference between retail and wholesale price multiplied by the sales volume; Column (5) the log of usable weight of marijuana by volume, where the usable weight is observed. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Markup	Price		Profits	
	(1)	(2)	(3)	(4)	(5)
	Markup Percentage	Ln(Avg Unit Price, Retail)	Ln(Avg Wholesale Price)	Profit	Ln(Ussble Weight)
Proximity to 502 CU	-6.313***	0.018*	0.042***	0.013	0.017
	(2.261)	(0.009)	(0.014)	(0.030)	(0.021)
Firms within 2mi of 502 CU	1.144	0.029	0.024	0.159**	0.113**
	(3.124)	(0.021)	(0.021)	(0.070)	(0.053)
Marijuana firms w/in 5 miles	-0.048	-0.001	-0.000	-0.002	-0.001
	(0.061)	(0.000)	(0.000)	(0.001)	(0.001)
R-squared	0.501	0.649	0.496	0.371	0.102
Number of Observations	5,703	5,703	5,703	5,703	5,703
Number of Clusters	280	280	280	280	280
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary	Dispensary	Dispensary

Table 6: **Average Monthly Dispensary Markups, Prices, and Profits - Instrumental Variable**

This table reports the effects of banking services on marijuana dispensaries using an instrumental variable specification at the dispensary-month level. The instrumental variable specification uses distance to a 502 credit union as an instrument for whether a dispensary uses banking services. The specification includes controls for whether the firm is within 2 miles of a 502 credit union, the number of dispensaries (competitors) within 5 miles, as well as month and county fixed effects, α_t and α_j.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Distance to 502 Credit Union}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are aggregated to the dispensary month level from transaction-level data. Each column reports the effects of banking on the following dependent variables: Column (1) markup percentage, which is defined as the difference between retail and wholesale price divided by retail price; Column (2) the log of the average retail price per unit, where the retail price is observed; Column (3) the log of the average wholesale price per unit, where the wholesale price is observed; Column (4) log profit, where profit is defined as the difference between retail and wholesale price multiplied by the sales volume; Column (5) the log of usable weight of marijuana by volume, where the usable weight is observed. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Total	CDB	THC	THCA
	(1)	(2)	(3)	(4)
	Potency (Total)	Potency (CBD)	Potency (THC)	Potency (THCA)
Proximity to 502 CU	0.261**	0.266	-0.328	0.499***
	(0.117)	(0.167)	(0.373)	(0.140)
Firms within 2mi of 502 CU	0.151	0.592	0.339	0.177
	(0.174)	(0.379)	(0.467)	(0.259)
Marijuana firms w/in 5 miles	-0.002	0.002	0.008	-0.003
	(0.003)	(0.007)	(0.007)	(0.004)
R-squared	0.370	0.137	0.380	0.326
Number of Observations	5,703	5,703	5,703	5,703
Number of Clusters	280	280	280	280
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary	Dispensary

Table 7: **Average Monthly Dispensary Markup, Prices, and Profits - Panel Data Fixed Effect**

This table reports the results of the effects of 502 credit unions on the markup, prices, and profits of marijuana dispensaries. The panel data fixed effects identification strategy relies on cross-sectional variation in the distance between marijuana dispensaries and 502 credit unions across counties within Washington. The data are monthly averages of a dispensary's total transactions within a given month. The control variables include: number of firms within 2 miles of the 502 credit union to measure financial access, number of other dispensaries within 5 miles of the dispensary to measure product market competition, and the number of firms within 2 and 10 miles of any credit union to measure potential for financial access. In addition the regression specification includes county and year fixed effects.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Close 502 CU}_{i,t} + \beta_2 \text{Close Non-502 CU}_{i,t} + \beta_3 \text{Far Non-502 CU}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are aggregated to the dispensary month level from transaction-level data. Each column reports the effects of banking on the following dependent variables: Column (1) markup percentage, which is defined as the difference between retail and wholesale price divided by retail price; Column (2) the log of the average retail price per unit, where the retail price is observed; Column (3) the log of the average wholesale price per unit, where the wholesale price is observed; Column (4) log profit, where profit is defined as the difference between retail and wholesale price multiplied by the sales volume; Column (5) the log of usable weight of marijuana by volume, where the usable weight is observed. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Markup	Price		Profits	
	(1)	(2)	(3)	(4)	(5)
	Markup Percentage	Ln(Avg Unit Price, Retail)	Ln(Avg Wholesale Price)	Profit	Ln(Ussble Weight)
Firms within 2 of 502 CU	-10.316*	0.035	0.074*	0.181*	0.164**
	(5.299)	(0.045)	(0.042)	(0.097)	(0.068)
Firms 2 - 10 mi from any CU	-8.833*	-0.001	0.033	0.025	0.050
	(5.245)	(0.040)	(0.039)	(0.074)	(0.046)
Firms within 2 of any CU	10.238**	0.010	-0.031	0.072	0.014
	(4.490)	(0.023)	(0.028)	(0.064)	(0.043)
Marijuana firms w/in 5 miles	-0.086	-0.000	-0.000	-0.002	-0.001
	(0.062)	(0.000)	(0.000)	(0.001)	(0.001)
R-squared	0.499	0.648	0.490	0.372	0.102
Number of Observations	5,703	5,703	5,703	5,703	5,703
Number of Clusters	280	280	280	280	280
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary	Dispensary	Dispensary

Table 8: **Average Monthly Dispensary Transactions: Markups, Prices, and Profits - Panel Data Fixed Effects - All distances**

This table reports the results of the effects of 502 credit unions on the markup, prices, and profits of marijuana dispensaries. The panel data fixed effects identification strategy relies on cross-sectional variation in the distance between marijuana dispensaries and 502 credit unions across counties within Washington. The data are monthly averages of a dispensary's total transactions within a given month. The control variables include: number of firms within 2 miles of the 502 credit union to measure financial access, number of other dispensaries within 5 miles of the dispensary to measure product market competition, and the number of firms within 2-4, 4-6, 6-8, and 8-10 miles of any credit union to measure potential for financial access. In addition the regression specification includes county and year fixed effects.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Close 502 CU}_{i,t} + \beta_2 \text{Close Non-502 CU}_{i,t} + \beta_3 \text{Far Non-502 CU}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are aggregated to the dispensary month level from transaction-level data. Each column reports the effects of banking on the following dependent variables: Column (1) markup percentage, which is defined as the difference between retail and wholesale price divided by retail price; Column (2) the log of the average retail price per unit, where the retail price is observed; Column (3) the log of the average wholesale price per unit, where the wholesale price is observed; Column (4) log profit, where profit is defined as the difference between retail and wholesale price multiplied by the sales volume; Column (5) the log of usable weight of marijuana by volume, where the usable weight is observed. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Markup	Price		Profit	
	(1)	(2)	(3)	(4)	(5)
	Markup Percentage	Ln(Avg Unit Price, Retail)	Ln(Avg Wholesale Price)	Profit	Ln(Ussble Weight)
Firms within 2mi of 502 CU	-11.593**	0.030	0.075*	0.188*	0.178**
	(5.176)	(0.046)	(0.044)	(0.099)	(0.070)
Firms within 2-4mi of 502 CU	-11.754**	-0.002	0.045	0.032	0.065
	(5.566)	(0.042)	(0.043)	(0.080)	(0.048)
Firms within 4-6mi of 502 CU	-7.456	-0.056	-0.025	-0.016	0.062
	(6.585)	(0.051)	(0.049)	(0.114)	(0.072)
Firms within 6-8mi of 502 CU	-3.268	-0.021	-0.011	0.002	0.026
	(8.007)	(0.059)	(0.051)	(0.120)	(0.055)
Firms within 8-10mi of 502 CU	-5.594	0.024	0.043	0.005	0.001
	(7.045)	(0.044)	(0.041)	(0.086)	(0.056)
Firms within 2mi of any CU	-32.087***	-0.099	0.026	-0.025	0.154***
	(10.493)	(0.069)	(0.019)	(0.069)	(0.053)
Firms within 2-4mi of any CU	-40.495***	-0.105	0.053	-0.045	0.176**
	(11.706)	(0.075)	(0.034)	(0.112)	(0.076)
Firms within 4-6mi of any CU	-51.395***	-0.114	0.092	-0.133	0.149**
	(12.167)	(0.077)	(0.057)	(0.098)	(0.072)
Firms within 6-8mi of any CU	-33.267**	-0.111	0.004	-0.340**	-0.117
	(15.593)	(0.077)	(0.063)	(0.167)	(0.128)
Marijuana firms w/in 5 miles	-0.076	-0.000	-0.000	-0.002	-0.001
	(0.064)	(0.000)	(0.000)	(0.001)	(0.001)
R-squared	0.504	0.649	0.493	0.374	0.107
Number of Observations	5,703	5,703	5,703	5,703	5,703
Number of Clusters	280	280	280	280	280
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary	Dispensary	Dispensary

Table 9: **Monthly Transactions: Markups, Prices, and Profits - Instrumental Variables**

This table reports the effects of banking services on marijuana dispensaries using an instrumental variable specification at the transaction-month level. The instrumental variable specification uses distance to a 502 credit union as an instrument for whether a dispensary uses banking services. The specification includes controls for whether the firm is within 2 miles of a 502 credit union, the number of dispensaries (competitors) within 5 miles, as well as month and county fixed effects, α_t and α_j.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Distance to 502 Credit Union}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are at the transaction level for each dispensary month. Each column reports the effects of banking on the following dependent variables: Column (1) markup percentage, which is defined as the difference between retail and wholesale price divided by retail price; Column (2) the log of the average retail price per unit, where the retail price is observed; Column (3) the log of the average wholesale price per unit, where the wholesale price is observed; Column (4) log profit, where profit is defined as the difference between retail and wholesale price multiplied by the sales volume; Column (5) the log of usable weight of marijuana by volume, where the usable weight is observed. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Markup	Prices		Profits	
	(1)	(2)	(3)	(4)	(5)
	Markup Percentage	Ln(Avg Unit Price, Retail)	Ln(Avg Wholesale Price)	Profit	Ln(UsableWeight)
Proximity to 502 CU	-4.433*	0.020	0.039**	0.027	0.026
	(2.526)	(0.012)	(0.018)	(0.029)	(0.022)
Firms within 2mi of 502 CU	2.441	0.057**	0.046*	0.194***	0.110***
	(2.959)	(0.024)	(0.024)	(0.064)	(0.040)
Competitors within 5 miles	-0.097*	-0.001*	-0.000	-0.002**	-0.001
	(0.058)	(0.000)	(0.000)	(0.001)	(0.001)
R-squared	0.303	0.090	0.055	0.053	0.034
Number of Observations	1,707,936	1,707,936	1,707,936	1,706,318	1,707,936
Number of Clusters	280	280	280	280	280
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes	Yes	Yes
Strain FE	Yes	Yes	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary	Dispensary	Dispensary

Table 10: **Monthly Dispensary Transactions: Markups, Prices, and Profits - Panel Data Fixed Effects**

This table reports the results of the effects of 502 credit unions on the markup, prices, and profits of marijuana dispensaries. The panel data fixed effects identification strategy relies on cross-sectional variation in the distance between marijuana dispensaries and 502 credit unions across counties within Washington. The data are each transaction of a dispensary within a given month. The control variables include: number of firms within 2 miles of the 502 credit union to measure financial access, number of other dispensaries within 5 miles of the dispensary to measure product market competition, and the number of firms within 2 and 10 miles of any credit union to measure potential for financial access. In addition the regression specification includes county and year fixed effects.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Close 502 CU}_{i,t} + \beta_2 \text{Close Non-502 CU}_{i,t} + \beta_3 \text{Far Non-502 CU}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are measured at the transaction level. Each column reports the effects of banking on the following dependent variables: Column (1) markup percentage, which is defined as the difference between retail and wholesale price divided by retail price; Column (2) the log of the average retail price per unit, where the retail price is observed; Column (3) the log of the average wholesale price per unit, where the wholesale price is observed; Column (4) log profit, where profit is defined as the difference between retail and wholesale price multiplied by the sales volume; Column (5) the log of usable weight of marijuana by volume, where the usable weight is observed. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Markup	Prices		Profits	
	(1)	(2)	(3)	(4)	(5)
	Markup Percentage	Ln(Avg Unit Price, Retail)	Ln(Avg Wholesale Price)	Profit	Ln(UsableWeight)
Firms within 2 of 502 CU	-0.106	0.065∗	0.063∗∗	0.230∗∗∗	0.141∗∗∗
	(6.046)	(0.036)	(0.028)	(0.088)	(0.054)
Firms 2 - 10 mi from any CU	-0.445	0.000	0.000	0.030	0.024
	(5.862)	(0.032)	(0.024)	(0.068)	(0.039)
Firms within 2 of any CU	7.434∗	-0.007	-0.036	0.046	0.019
	(4.454)	(0.025)	(0.028)	(0.057)	(0.038)
Competitors within 5 miles	-0.119∗∗	-0.001	-0.000	-0.002∗	-0.001
	(0.056)	(0.000)	(0.000)	(0.001)	(0.001)
R-squared	0.302	0.089	0.054	0.053	0.034
Number of Observations	1,707,936	1,707,936	1,707,936	1,706,318	1,707,936
Number of Clusters	280	280	280	280	280
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes	Yes	Yes
Strain FE	Yes	Yes	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary	Dispensary	Dispensary

Table 11: **Monthly Dispensary Transactions: Markups, Prices, and Profits - Panel Data Fixed Effects - All Distance**

This table reports the results of the effects of 502 credit unions on the markup, prices, and profits of marijuana dispensaries. The panel data fixed effects identification strategy relies on cross-sectional variation in the distance between marijuana dispensaries and 502 credit unions across counties within Washington. The data are each transaction of a dispensary within a given month. The control variables include: number of firms within 2 miles of the 502 credit union to measure financial access, number of other dispensaries within 5 miles of the dispensary to measure product market competition, and the number of firms within 2-4, 4-6, 6-8, and 8-10 miles of any credit union to measure potential for financial access. In addition the regression specification includes county and year fixed effects.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Close 502 CU}_{i,t} + \beta_2 \text{Close Non-502 CU}_{i,t} + \beta_3 \text{Far Non-502 CU}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are measured at the transaction level. Each column reports the effects of banking on the following dependent variables: Column (1) markup percentage, which is defined as the difference between retail and wholesale price divided by retail price; Column (2) the log of the average retail price per unit, where the retail price is observed; Column (3) the log of the average wholesale price per unit, where the wholesale price is observed; Column (4) log profit, where profit is defined as the difference between retail and wholesale price multiplied by the sales volume; Column (5) the log of usable weight of marijuana by volume, where the usable weight is observed. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Markup	Prices		Profits	
	(1)	(2)	(3)	(4)	(5)
	Markup Percentage	Ln(Avg Unit Price, Retail)	Ln(Avg Wholesale Price)	Profit	Ln(UsableWeight)
Firms within 2mi of 502 CU	-0.986	0.066*	0.068**	0.245***	0.156***
	(5.980)	(0.037)	(0.030)	(0.093)	(0.056)
Firms within 2-4mi of 502 CU	-3.110	0.009	0.020	0.053	0.044
	(6.231)	(0.035)	(0.029)	(0.078)	(0.041)
Firms within 4-6mi of 502 CU	2.212	-0.029	-0.037	0.038	0.051
	(7.053)	(0.044)	(0.034)	(0.101)	(0.052)
Firms within 6-8mi of 502 CU	-0.957	-0.026	-0.025	-0.024	-0.003
	(6.991)	(0.041)	(0.031)	(0.089)	(0.040)
Firms within 8-10mi of 502 CU	2.243	0.003	-0.008	-0.009	-0.015
	(7.087)	(0.046)	(0.034)	(0.086)	(0.043)
Firms within 2mi of any CU	-21.993***	-0.058***	0.021***	-0.062***	0.048***
	(0.297)	(0.004)	(0.004)	(0.008)	(0.005)
Firms within 2-4mi of any CU	-26.072***	-0.046	0.045	-0.078	0.034
	(5.066)	(0.031)	(0.028)	(0.076)	(0.044)
Firms within 4-6mi of any CU	-41.976***	-0.050	0.111*	-0.126*	0.066
	(6.284)	(0.037)	(0.059)	(0.071)	(0.058)
Firms within 6-8mi of any CU	-16.074*	-0.081***	-0.037	-0.355***	-0.210**
	(8.384)	(0.030)	(0.047)	(0.110)	(0.084)
Competitors within 5 miles	-0.112*	-0.001	-0.000	-0.002*	-0.001
	(0.060)	(0.000)	(0.000)	(0.001)	(0.001)
R-squared	0.305	0.090	0.055	0.053	0.035
Number of Observations	1,707,936	1,707,936	1,707,936	1,706,318	1,707,936
Number of Clusters	280	280	280	280	280
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes	Yes	Yes
Strain FE	Yes	Yes	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary	Dispensary	Dispensary

Table A.1: **IV: First Stage—Banking Services and Distance With Controls**

This table shows how the probability of using banking services changes with proximity to a credit union controlling for distance to a bank. Observations are at the marijuana firm level. The sample combines survey data and administrative data from the state of Washington (see section 3.2.2). The dependent variable, $\mathbb{1}$(Use Banking Services), is an indicator variable equal to one if in the survey the firm indicated that it used banking services and zero otherwise. *Proximity to credit union* is the log of the distance between a marijuana firm and the closest credit union. *Proximity to bank* is the log of the distance between a marijuana firm and the closest bank. *Within 1 mile of credit union* is an indicator variable equal to one if the distance to the nearest credit union is less than 1 mile and zero otherwise. Similarly, *Within 2 miles of credit union* and *Within 3 miles of credit union* are indicator variables equal to one if the distance to a credit union is less than 2 or 3 miles, and zero otherwise. *Within 1 mile of bank*, *Within 2 mile of bank*, and *Within 3 mile of bank* are similarly defined as indicator variables equal to one if the distance to the nearest bank is within 1, 2, or 3 miles, and zero otherwise. Standard errors appear in parentheses and *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable: $\mathbb{1}$(Use Banking Services)

	(1)	(2)	(3)	(4)
Proximity to credit union	-0.161*** (0.022)			
Proximity to bank	0.147*** (0.024)			
Within 1 miles of credit union		0.439*** (0.063)		
Within 1 miles of bank		-0.317*** (0.069)		
Within 2 miles of credit union			0.384*** (0.076)	
Within 2 miles of bank			-0.344*** (0.093)	
Within 3 miles of credit union				0.287*** (0.092)
Within 3 miles of bank				-0.183* (0.110)
F-statistic	30.781	25.110	13.251	4.903
Adj. R-Square	0.168	0.141	0.077	0.026
Observations	295	295	295	295

44

This table shows a placebo test that shows how the probability of using banking services changes with proximity to a bank, despite banks typically not working with marijuana businesses. Observations are at the marijuana firm level. The sample combines survey data and administrative data from the state of Washington (see section 3.2.2). The dependent variable, $\mathbb{1}$(Use Banking Services), is an indicator variable equal to one if in the survey the firm indicated that it used banking services and zero otherwise. *Proximity to bank* is the log of the distance between a marijuana firm and the closest bank. *Within 1 mile of bank*, *Within 2 mile of bank*, and *Within 3 mile of bank* are similarly defined as indicator variables equal to one if the distance to the nearest bank is within 1, 2, or 3 miles, and zero otherwise. Standard errors appear in parentheses and *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable: $\mathbb{1}$(Use Banking Services)				
	(1)	(2)	(3)	(4)
Proximity to bank	0.056**			
	(0.023)			
Within 1 miles of bank		-0.072		
		(0.064)		
Within 2 miles of bank			-0.088	
			(0.081)	
Within 3 miles of bank				-0.009
				(0.097)
F-statistic	6.016	1.245	1.181	0.008
Adj. R-Square	0.017	0.001	0.001	-0.003
Observations	295	295	295	295

Table A.3: **IV: First Stage—Other Covariates**

This table shows how the probability of using banking services changes with whether your parents ran a company and your level of education. The sample combines survey data and administrative data from the state of Washington (see section 3.2.2). The dependent variable, $\mathbb{1}$(Use Banking Services), is an indicator variable equal to one if in the survey the firm indicated that it used banking services and zero otherwise. Standard errors appear in parentheses and *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable: $\mathbb{1}$(Use Banking Services)				
	(1)	(2)	(3)	(4)
Proximity to credit union				-0.095***
				(0.021)
Parents ran company	0.308***		0.283***	0.266***
	(0.061)		(0.058)	(0.056)
Highschool degree (or equivalent)		-0.069	-0.086	-0.055
		(0.141)	(0.135)	(0.130)
Assoc. or technical degree		-0.090	-0.126	-0.080
		(0.135)	(0.130)	(0.125)
College degree		0.326**	0.271**	0.272**
		(0.137)	(0.132)	(0.127)
Professional or doctorate		-0.100	-0.139	-0.091
		(0.152)	(0.145)	(0.140)
F-statistic	25.453	9.397	13.042	15.276
Adj. R-Square	0.090	0.120	0.197	0.258
Observations	247	247	247	247

Table A.4: **IV: First Stage—Other Covariates**

This table shows how the proximity to a credit union changes with whether your parents ran a company and your level of education. The sample combines survey data and administrative data from the state of Washington (see section 3.2.2). The dependent variable, *Proximity to credit union*, is the log of the distance between a marijuana firm and the closest credit union. Standard errors appear in parentheses and *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable: Proximity to credit union			
	(1)	(2)	(3)
Parents ran company	-0.189		-0.175
	(0.172)		(0.172)
Highschool degree (or equivalent)		0.317	0.328
		(0.404)	(0.404)
Assoc. or technical degree		0.466	0.488
		(0.387)	(0.387)
College degree		-0.023	0.011
		(0.392)	(0.394)
Professional or doctorate		0.486	0.510
		(0.433)	(0.434)
F-statistic	1.205	1.622	1.503
Adj. R-Square	0.001	0.010	0.010
Observations	247	247	247

Table A.5: **Monthly Dispensary Transactions: Sales - Instrumental Variable**

This table reports the effects of banking services on marijuana dispensaries using an instrumental variable specification at the dispensary-month level. The instrumental variable specification uses distance to a 502 credit union as an instrument for whether a dispensary uses banking services. The specification includes controls for whether the firm is within 2 miles of a 502 credit union, the number of dispensaries (competitors) within 5 miles, as well as month and county fixed effects, α_t and α_j.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Distance to 502 Credit Union}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are aggregated to the dispensary month level from transaction-level data. Each column reports the effects of banking on the following dependent variables: Column (1) total transactions, which is defined as the total number of retail transactions that occur at a dispensary in a given month; Column (2) the log of sales volume, which is the total number of transactions weighted by the usable weight of each sale; and Column (3) the log of the number of strains sold, which is a count of the total number of strains that the dispensary sold in a given month. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Sales		
	(1) Ln(Total Transactions)	(2) Ln(Sales Volume)	(3) Ln(Number of Strains Sold)
Proximity to 502 CU	0.061	0.098	0.079**
	(0.064)	(0.065)	(0.039)
Firms within 2mi of 502 CU	0.076	0.187	0.138
	(0.141)	(0.142)	(0.089)
Marijuana firms w/in 5 miles	-0.000	-0.001	-0.002
	(0.003)	(0.002)	(0.002)
R-squared	0.326	0.330	0.324
Number of Observations	5,703	5,703	5,703
Number of Clusters	280	280	280
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary

Table A.6: **Monthly Dispensary Transactions: Sales - Panel Data Fixed Effects**

This table reports the results of the effects of 502 credit unions on the markup, prices, and profits of marijuana dispensaries. The panel data fixed effects identification strategy relies on cross-sectional variation in the distance between marijuana dispensaries and 502 credit unions across counties within Washington. The data are monthly averages of a dispensary's total transactions within a given month. The control variables include: number of firms within 2 miles of the 502 credit union to measure financial access, number of other dispensaries within 5 miles of the dispensary to measure produce market competition, and the number of firms within 2 and 10 miles of any credit union to measure potential for financial access. In addition the regression specification includes county and year fixed effects.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Close 502 CU}_{i,t} + \beta_2 \text{Close Non-502 CU}_{i,t} + \beta_3 \text{Far Non-502 CU}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are aggregated to the dispensary month level from transaction-level data. Each column reports the effects of banking on the following dependent variables: Column (1) total transactions, which is defined as the total number of retail transactions that occur at a dispensary in a given month; Column (2) the log of sales volume, which is the total number of transactions weighted by the usable weight of each sale; and Column (3) the log of the number of strains sold, which is a count of the total number of strains that the dispensary sold in a given month. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Sales		
	(1)	(2)	(3)
	Ln(Total Transactions)	Ln(Sales Volume)	Ln(Number of Strains Sold)
Firms within 2 of 502 CU	-0.068	0.140	0.196
	(0.237)	(0.235)	(0.173)
Firms 2 - 10 mi from any CU	-0.172	-0.082	0.028
	(0.213)	(0.210)	(0.160)
Firms within 2 of any CU	0.234	0.226	0.038
	(0.143)	(0.161)	(0.097)
Marijuana firms w/in 5 miles	-0.000	-0.001	-0.001
	(0.003)	(0.002)	(0.002)
R-squared	0.329	0.330	0.321
Number of Observations	5,703	5,703	5,703
Number of Clusters	280	280	280
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary

This table reports the results of the effects of 502 credit unions on the markup, prices, and profits of marijuana dispensaries. The panel data fixed effects identification strategy relies on cross-sectional variation in the distance between marijuana dispensaries and 502 credit unions across counties within Washington. The data are monthly averages of a dispensary's total transactions within a given month. The control variables include: number of firms within 2 miles of the 502 credit union to measure financial access, number of other dispensaries within 5 miles of the dispensary to measure produce market competition, and the number of firms within 2-4, 4-6, 6-8, and 8-10 miles of any credit union to measure potential for financial access. In addition the regression specification includes county and year fixed effects.

$$Y_{i,t} = \beta_0 + \beta_1 \text{Close 502 CU}_{i,t} + \beta_2 \text{Close Non-502 CU}_{i,t} + \beta_3 \text{Far Non-502 CU}_{i,t} + \beta X_{i,t} + \alpha_t + \alpha_j + \varepsilon_{i,t}.$$

Dependent variables are aggregated to the dispensary month level from transaction-level data. Each column reports the effects of banking on the following dependent variables: Column (1) total transactions, which is defined as the total number of retail transactions that occur at a dispensary in a given month; Column (2) the log of sales volume, which is the total number of transactions weighted by the usable weight of each sale; and Column (3) the log of the number of strains sold, which is a count of the total number of strains that the dispensary sold in a given month. Standard errors are clustered at the dispensary level. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

	Sales		
	(1)	(2)	(3)
	Ln(Total Transactions)	Ln(Sales Volume)	Ln(Number of Strains Sold)
Firms within 2mi of 502 CU	-0.082	0.146	0.196
	(0.242)	(0.245)	(0.178)
Firms within 2-4mi of 502 CU	-0.218	-0.106	-0.013
	(0.233)	(0.234)	(0.172)
Firms within 4-6mi of 502 CU	-0.253	-0.170	0.106
	(0.307)	(0.299)	(0.235)
Firms within 6-8mi of 502 CU	-0.021	0.016	0.292
	(0.304)	(0.284)	(0.249)
Firms within 8-10mi of 502 CU	-0.064	-0.031	0.002
	(0.283)	(0.272)	(0.210)
Firms within 2mi of any CU	-1.839***	-1.784***	-0.831***
	(0.023)	(0.015)	(0.048)
Firms within 2-4mi of any CU	-2.167***	-2.057***	-0.915***
	(0.183)	(0.191)	(0.137)
Firms within 4-6mi of any CU	-1.766***	-1.677***	-0.677***
	(0.180)	(0.192)	(0.127)
Firms within 6-8mi of any CU	-2.743***	-3.074***	-1.383***
	(0.158)	(0.174)	(0.129)
Marijuana firms w/in 5 miles	0.000	-0.001	-0.002
	(0.003)	(0.003)	(0.002)
R-squared	0.337	0.342	0.329
Number of Observations	5,703	5,703	5,703
Number of Clusters	280	280	280
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Location Type FE	Yes	Yes	Yes
Cluster Variable	Dispensary	Dispensary	Dispensary

Appendix A Survey

<div align="center">Survey Questions</div>

What type of bank account does [your business] use? Please mark all the apply.

- Business bank account

- Owner's personal bank account

- No bank account

- Other

If [your business] does bank, which best describes [your business]'s banking? (Please mark all that apply).

- Community credit union

- Regional credit union

- Community bank

- Regional bank

- National bank

- Other

How much does [your business] pay per month, in dollars, to use all financial services? These are defined as a checking account, savings account, money market account, and access to loans from a Bank or credit union, a Non-bank financial institution (finance companies, insurance companies, brokerage or mutual fund companies, leasing companies, mortgage banks, private equity, etc.), or Other (friends, family, other companies, other individuals, etc.).

- Bank or credit union

- Non-bank financial institution

- Other

What forms of payment do you accept? (Please mark all that apply).

- Cash

- Check

- Debit cards

- Credit cards

Do you pay for a security company that transports cash and/or product (if yes how much per month, in dollars, do you pay to your security company?

What is the highest level of education you have?

- Less than 9th grade

- Some highschool but no diploma

- Highschool graduate (diploma or equivalent diploma GED)

- Technical, trade, or vocational degree

- Some college, but no degree

- Assoicate's degree

- Bachelor's degree

- Some graduate school but no degree

- Master's degree

- Professional school or doctorate

Did either of your parents ever own or run a company?

- Yes

- No

Appendix B   Additional Results

Tables 4–6 report detailed evidence on sales decomposed into total transactions, sales volume, and number of strains sold using our IV and PDFE specifications. These tables suggest that banking services increase sales volume and the number of stains sold, the evidence on transactions is mixed. In particular, we find that sales volume is 12 to 16 percent higher for firms using banking services across different specifications. Similarly we find that the number of strains sold is 9 to 19 percent higher for firms using banking services across different specifications. The estimates, however, are noisy and are statistically significant at conventional levels only in the instrumental variable specification.