Competition and Adverse Selection in Consumer Credit Markets:
Payday Loans vs. Overdraft Credit

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Abstract

We investigate the relationship between payday lenders, which offer small, short-term consumer loans, and traditional depository institutions using a national survey on the provision and pricing of checking account services. Somewhat surprisingly, we find that payday loan competition leads to higher prices for overdraft credit and bounced check transactions at traditional depositories. In addition, we find that banks and credit unions are less likely to offer free checking accounts when payday loans are available. We hypothesize that customer sorting and adverse selection are responsible for these effects. Price sensitive, low risk borrowers substitute cheaper payday credit for overdraft credit, leaving depositories with a riskier and less price elastic clientele. Accordingly, depositories raise rates to cover higher costs and maximize profits, and they cut back on free checking accounts to mitigate increased risk.

I. Introduction

In this paper, we investigate the nature of competition and consumer behavior in the short-term credit market by evaluating the impact of payday lending on the provision and pricing of overdraft (OD) credit and non-sufficient funds (NSF) transactions at traditional depository institutions. Payday loans are small, short-term loans used primarily by low to moderate income individuals. While traditional depositories, such as bank, thrifts and credit unions, serve a broad customer base, they earn substantial fee revenue by extending credit to a customer segment that overlaps with that of payday lenders. Depositories do so through OD transactions, in which they pay, for their own checking customer, a check, ATM withdrawal or debit purchase that overdraws the customer's account balance. For this service, the depository charges a flat fee per event, regardless of the overdrawn amount, typically with the requirement that they remedy the negative balance within thirty days. In the case of NSF transactions, the depository refuses to pay the overdrawn amount, and charges the consumer a bounced check fee, but leaves the check's payee as the (unwitting) creditor.

In many cases, payday credit is a cheaper substitute for OD credit (FDIC 2008). Borrowing $300 for two weeks from a payday lender costs $45. By contrast, bouncing six $50 checks costs $156, assuming overdrafts are covered at the median fee of $26 per item. For individuals who foresee overdrawing their account, therefore, taking out a payday loan and depositing the principal to avoid OD and NSF fees can be a financially beneficial move. Banking regulations and the legal interpretations of regulators have left banks unable to offer similar contracts in the OD market as payday lenders offer (i.e., a fee that varies with borrowing amount), without classifying overdraft credit as loans and complying with Truth in Lending Act regulations and usury ceilings.

To study the interactions between these markets empirically, we make use of an extensive national survey of checking account fees and product offerings at depository institutions, conducted annually between 1995 and 2008. The data offer a perspective on checking account fees across a broad array of institution types (credit unions, commercial banks and savings banks), geographic locations and institution sizes. We define three outcomes of interest: whether an institution offers free checking (a binary variable, *Free Checking*), and the prices charged for OD and NSF.

We put forth two methodologies for estimating the effects, taking particular care in the empirical design to isolate variation in payday loan availability that is not confounded with other determinants of the outcomes of interest. Both methodologies take advantage of within-state variation in loan availability, relying in one case on state-level changes over time and in the other case on geographic variation in loan availability across counties.

In the first model, we analyze trends in these outcomes when states transition from allowing to prohibiting payday loans, or vice versa. In order to separate these trends from general time trends in OD and NSF markets, we utilize a differences-in-differences model that attributes to payday lending the differential change in the outcomes within states that change payday loan laws relative to the change in outcomes within all other states.

To complement this analysis, we utilize a second methodology that explores whether the dependent variables of interest correlate with the local availability of payday loans, as measured by the institution's proximity to payday lending locations. Since the presence and concentration of payday store locations are likely to be related to unobserved determinants of *Free Checking* as well as OD and NSF prices, a simple measure of distance to payday locations will not produce a convincing estimate of the effect of payday loan availability. Instead, we focus on institutions in

states that prohibit payday lending, and gauge loan availability by the institution's distance to the nearest payday-allowing state. Measuring loan availability in this way yields a proxy that is uninfluenced by payday store location decisions, and varies purely due to border state regulatory decisions and depository location decisions.

The results from both models suggest that depositories charge *lower* NSF and OD prices following a state's prohibition of payday lending. Said otherwise, depositories raise their prices in the presence of competition from payday loan locations. Moreover, depositories are less likely to offer free checking accounts when payday loans are available, which we interpret as rationing of deposit accounts to low income borrowers as these accounts become riskier and less profitable.

We sketch a theory, centered on adverse selection and incomplete contracting, that explains our findings as well as two other relevant facts from the literature. Morgan and Strain (2007) find that returned check rates increase after payday loans are banned, which suggests that some households use payday credit to avoid even costlier bounced check fees. On the other hand, Campbell, Jerez, and Tufano (2008) find that involuntary deposit account closures *per* capita fall when payday lenders are prohibited in Georgia, which suggests that either bank deposit customers become riskier or bank risk limits become tighter when payday loans are available.

Our hypothesis is that the introduction of payday lending leads to substitution away from overdraft, causing a change in the composition of individuals who use overdraft credit. Payday lenders' better terms and more flexible marginal cost pricing allow them to attract depositories' safest, most price-elastic, borrowers. Remaining with the bank are the riskier, less price-elastic, types who overdraw excessively and default.[1] This adverse selection increases the costs of

[1] We are agnostic on whether they overdraw and default because of unavoidable hazards, or moral hazard.

providing OD credit and leaves less price-elastic borrowers in the overdraft market; both changes cause equilibrium OD prices to rise. In response to greater risk and lower profitability in their overdraft programs, banks also cut back on overdraft credit by increasing involuntary account closures, and raising deposit account fees and minimum balance requirements (i.e., reducing free checking offers).

II. Background on Payday Loans and Overdraft Credit

Payday loans and overdraft credit are substitutes and their suppliers are competitors. Both provide small, short-term loans on-the-spot to lower income borrowers who often borrow repeatedly.

II.1. Payday Loans

If you are not familiar with payday lenders (many states forbid the practice), imagine them as check cashers who also supply credit. They operate out of ground-level stand alone stores or strip malls located along busy routes and intersections in about 35 states and on the Internet. Applicants, who must have a checking account, provide a recent pay stub and bank statement to obtain $300 cash in their hand or account in about 15 minutes. In exchange, they leave the lender with a $345 personal check payable in two weeks. The APR (annual percentage rate) for the loan just described is 390 percent.[2]

An estimated 19 million U.S. households demanded payday loans in 2007 (Stevens Inc. 2007). The clientele is mostly lower or lower-middle income, some college, but no degree. Single mothers, African-Americans, Hispanics, and military personnel may be overrepresented. Repeat borrowing is common. Many users demand four or five loans per year, and a sizable

[2] Repayment of principal can be postponed indefinitely, but the $45 fee/interest is due bi-weekly in the interim.

fraction demand about ten loans per year, either serially (via rollovers) or staggered (Elliehausen and Lawrence 2001, Caskey 2002).

The industry is regulated at the state level, and in the last ten years, a number of states have prohibited the practice by imposing restrictions on interest rates and check cashing practices, while a small number have sanctioned the practice. We use changes to state regulations and differences in regulations across states to identify the effect of competition from payday lenders on overdraft credit terms.

II.2. Overdraft Credit

Unless indicated otherwise, the facts below are from an FDIC (Federal Deposit Insurance Corporation) survey of bank overdraft programs released in November 2008. [3] The survey reveals just how ubiquitous automated overdraft programs have become at mainstream lenders. Over three-fourths of large (asset > $ 5 billion) banks surveyed by the FDIC supplied overdraft credit through automated programs.

Overdraft credit resembles payday loans in clientele and borrowing patterns. The median NSF fee in 2007 was $27. The implied APR on $60 two-week overdraft was 1,173 percent, more than twice the APR for the typical payday loan. Repeat demand is common, nearly ten percent of depositors borrowed more than ten times per year. The average amount borrowed was under $70 (Table IX-17, p. 79). Overdraft credit was used more intensively by lower income depositors.

Supplying OD credit is risky. Survey banks charged off about 400,000 accounts in 2007, with average negative balance of about $300. Cheksystems, the deposit credit bureau, allows

[3] Part 1 of FDIC (2008) queried a random sample of 462 FDIC-supervised institutions banks with assets of at least $5 billion about their ODC programs. Part 2 collected micro data at the depositor and transaction level from a non-random (non-representative) subset of 39 banks that participated in Part 1.

depository institutions to trace the credit worthiness of would-be depositors inquiring about opening an account (Campbell et al 2007)

OD credit is priced peculiarly. Borrowers are supposed to pay a fixed fee per overdraft.[4] Marginal cost pricing, where borrowers pay more per dollar borrowed, is not practiced (FDIC 2008).[5] The reason for this limitation appears to be regulations imposed by the Truth in Lending Act, which requires creditors to give annual percent rate disclosures for finance charges and subjects those charges to usury ceilings. Overdraft fees are deemed by banking and credit union regulators not to be finance charges. This interpretation would be in doubt if the fee varied with the amount borrowed.

III. Theoretical Framework: Payday and Overdraft Competition

We begin with the assumption that depositories are subject to monopolistic competition, as has been maintained and tested (with some confirming evidence) in Barros (1999), Hannan and Prager (2004), and Park and Pennacchi (2008). In these models, depositories exercise some degree of market power in setting deposit interest rates and fees. Equilibrium prices in this context depend upon consumers' price elasticity of demand as well as the marginal cost of providing the service.

Payday loans represent an alternative form of credit to both overdraft, in which the financial institution extends credit, and bounced checks, in which the check's payee (unwittingly) extends credit. For a given individual who anticipates overdrawing his account, the introduction of a payday loan alternative should lower his price elasticity of demand for

[4] A few banks have recently added a further charge assessed every day that the account remains overdrawn.
[5] The a**utomated overdraft programs** we study are not **linked transfer accounts,** contractual agreements linking the customer's transaction account with other accounts within the bank, or o**verdraft lines of credit** (LOCs), contractual agreements wherein the bank covers overdrafts at pre-specified terms. Terms on the latter are much cheaper than on ODC programs (2008)

overdraft and bouncing checks. If the market were homogenous and composed of consumers of this type, payday competition would cause depositories to lower their prices. This effect – greater payday loan competition, lower OD and NSF prices – represents the direct suppression of prices due to increased competition.

However, customer composition and selection effects often play an important role in credit markets. We posit that the most price sensitive customers will substitute toward payday loans when they are available, leaving a pool of less price elastic individuals using overdraft and bouncing checks. In this case, depositories' OD and NSF prices will rise with the introduction of payday lending for two reasons. First, the remaining pool of customers has less price-elastic demand. Second, payday lenders have considerably more pricing flexibility, which enables them to attract lower risk customers with better prices. Adverse selection leads to a riskier pool of overdraft borrowers at depositories and correspondingly higher prices than would be the case in the absence of payday lending. We assume that overdraft lenders cannot distinguish between safe and risky borrowers, and/or, they cannot price discriminate.

The manner by which payday loans are cleared might lead to complementarity between payday loans and bounced checks. Payday loans are "secured" by a personal check, and when an individual fails to repay a loan, the check is drawn against their account. Consequently, individuals who take out, and fail to repay, payday loans might be more likely to bounce checks. Another hypothesis is that the introduction of payday credit leads some individuals to borrow too much, and, due to their deteriorating financial health, they are more likely to default on overdraft credit. However, these two hypotheses cannot explain the results of Morgan and Strain (2007) that the rate of bounced checks falls when payday loans are available.

IV. Data and Measures

IV.1. Data

Data on the provision and pricing of checking account services are sourced from annual surveys of depository institutions conducted by Moebs Services of Lake Bluff, Illinois. These surveys are conducted over the telephone, using a random sample of financial institutions, stratified by institution type (credit union, bank and thrift), geographic region and asset size category. Institutions, rather than branches, are sampled, with phone calls made to the main branch to assess fees charged to customers at that location. In total, the data include roughly 20,000 observations at the branch-year level. Observations on OD and NSF prices begin in 1995 for banks and 1999 for credit unions, and run through 2008 for both types of institution. Observations on the availability of free checking do not begin until 2003, but also continue through 2008. Including all years of data, roughly half of the observations are drawn from commercial banks, while 40 percent are drawn from credit unions and 10 percent are drawn from savings banks.[6]

These data are supplemented with institution-level balance sheet and income statement information drawn from statistical databases maintained by the Federal Depository Insurance Corporation (FDIC) and National Credit Union Administration (NCUA).[7] Market-level information on deposits is gathered from the FDIC's Summary of Deposits database, and summarized in the Herfindahl-Herschleifer Index (HHI) of market concentration for each county and year. County-level control variables, such as median income, racial composition, rate of

[6] Institutions, rather than branches, are sampled, but phone calls are made to the main branch to assess fees charged to customers at that location.

[7] These databases are populated through regulatory filings – bank and credit union Call Reports, and thrift Financial Reports.

home ownership, population and percent urban population, are sourced from the 2000 Census. Finally, unemployment rates, by county and year, are sourced from the Bureau of Labor Statistics' Local Area Unemployment Statistics.

IV.2. Outcomes of Interest

The key dependent variables measure the existence of free checking accounts, as well as the prices charged for overdraft and bounced checks. *Free Checking* is a binary variable that takes the value of one if the institution offers free checking. As shown in Table 1, 73 percent of surveyed institutions offer free checking within the sample. *OD* and *NSF* denote the real price (in 2008 dollars) of the institution's bounced check and overdraft charges, respectively.[8] Within the entire sample the average real prices for OD and NSF are $24.98 and $25.28, respectively. In robustness exercises, we also analyze the natural logarithm of these prices, denoted by *LogNSF* and *LogOD*.

IV.3. Defining Payday Loan Availability

The independent variables of interest are measures of payday loan availability. For the first empirical model, we define the state-year varying *PaydayAllowed*, which takes the value of one if payday lending is permitted in the institution's state during the relevant year and zero otherwise.

In the second empirical model, we define a series of independent variables that measure payday loan availability at a more local geographic level, basing these measures on the surveyed

[8] Nominal prices are converted to real prices, in 2008 dollars, using the level of the June CPI from 1995 to 2008.

institution's distance to the nearest payday-allowing state.[9] More specifically, *PaydayAccess_0_10* is a county-level binary measure that is one if the institution's county is within 10 miles of a payday-allowing state and zero otherwise. Similarly, *PaydayAccess_10_20* and *PaydayAccess_20_30* are county-level binary measures that take the value of one if the institution's county is between 10 and 20 miles, or 20 and 30 miles, respectively, of a payday-allowing state. In section X we elaborate on our reasons for measuring payday loan access in this manner. In robustness exercises, we analyze a non-dichotomous measure of loan access, *LogDistance*, which is the natural logarithm of the distance between the institution's county and the nearest payday-allowing state.

In Appendix A, we describe the state regulations on payday lending that provide the basis for coding *PaydayAllowed* and *PaydayAccess*.

IV.4. The Effects of Payday Loan Prohibitions on Overdraft and Bounced Checks Markets

In the first empirical model, we estimate the effects of payday loan availability by analyzing changes in the outcomes of interest as states transition from sanctioning to prohibiting payday lending, or vice versa. More specifically, the model utilizes a differences-in-differences framework, attributing to the payday law change the differential trend in outcomes for transitioning states relative to all other states that experience no payday loan law change in the relevant time period. The estimation sample includes all years of data as well as observations

[9] In practice, we know the institution's county rather than its precise location, so we use distance from the county center to the border in place of actual distance.

from all states, eight of which experience a transition in payday lending regulations.[10] The fully-controlled version of the model is expressed in the following equation.

$$(1)\ Y_{ijst} = \alpha + \beta PaydayAllowed_{st} + \vec{\gamma}\boldsymbol{CountyControls}_j + \theta HHI_{jt} + \vec{\pi}\boldsymbol{InstitutionControls}_i + \psi_s + \eta_t + \varepsilon_{ijst}$$

In this equation, Y_{ijst} represents the value of the outcome of interest – *NSF*, *OD* or *Free Checking* – for depository institution *i*, in county *j* and state *s*, at year *t*. The key coefficient of interest is β, the coefficient on *PaydayAllowed*. All specifications include state fixed effects, denoted by ψ_s, and year fixed effects, denoted by η_t. The inclusion of state fixed effects restricts the identifying variation in *PaydayAllowed* to temporal changes in payday loan availability arising due to changes in state regulations. The inclusion of year fixed effects purges the estimated effect of *PaydayAllowed* of variation in outcomes due to national time trends around the time of these law changes.

The other control variables within the model vary across specifications. These controls include a vector of institution-level controls: natural logarithm of the institution's total assets, as well as dummy variables indicating whether an institution is a credit union, savings bank or commercial bank. The model also includes county-level unemployment rates for each year as well as a vector of county characteristics, as measured in the 2000 Census.[11] Finally, to control for changes in local banking market competition that might influence checking account fees, we include the deposit market HHI at the county-year level.

[10] New Hampshire transitioned from prohibiting to allowing payday lending, while the District of Columbia, Georgia, Maryland, North Carolina, Oregon, Pennsylvania and West Virginia transitioned from allowing to prohibiting payday lending between 1995 and 2008.

[11] The county-level Census controls are as follows: cubics in median income, population and percent urban population; percent black, white, Hispanic and Asian; percent home hownership and percent foreign born.

In a final specification of the model, we relax the assumption of a common national time trend by including Census Division-Year fixed effects.[12] Including these regional time trends changes the effective comparison group for each transitioning state to its neighboring states as opposed to the full national sample. All specifications of the model are estimated using ordinary least squares, with observations grouped by state in the calculation of Huber-White robust standard errors.[13]

Estimation results for the effect of payday availability on *FreeChecking* are shown in Table 3, Panel A. These results indicate that financial institutions are less likely to offer free checking accounts when payday loans are allowed in their state. Since *FreeChecking* is a binary variable, this model relies on a linear probability assumption, which we relax in a robustness exercise. The first specification, reported in column (1), shows that allowing payday loans results in a 5.1 percentage point reduction in the likelihood of a depository offering free checking. The magnitude of the estimated effect falls slightly to 4.9 percentage points when institution-level and county-level control variables are added to the model. The final specification, reported in column (3), shows that free checking provision falls by 6.9 percentage points in payday-allowing states relative to other states in their Census Division after payday loans are prohibited. The estimated effects of *PaydayAllowed* are statistically significant (at the five percent level) in each specification, and constitute a 7-10 percent change relative to the baseline proportion of institutions offering free checking, which is 73 percent.

The model results for overdraft prices, which are given in Table 3, Panel B, indicate that prices are higher when payday loans are allowed. The coefficient on *PaydayAllowed* is 1.09 in column (1)'s baseline specification. The inclusion of county-level and institution-level control

[12] There are nine Census Divisions, with each Division composed of anywhere from three to nine states.
[13] By clustering observations by state, I address the concern raised in Bertrand, Duflo and Mullainathan (2004) regarding inferences when applying differences-in-differences analysis to serially correlated outcomes.

variables increases the magnitude of the estimated coefficient to 1.31. This increase in OD price represents a roughly 5 percent increase over the average price of $24.98. The final specification, which allows for regional trends via the inclusion of Division-Year fixed effects, shows an estimated *PaydayAllowed* coefficient of 40 cents. The estimated effect falls in this specification, and the standard error also increases by 50 percent.

The analysis of NSF also shows an increase in prices due to payday loan availability. These results are given in Panel C of Table 3. The coefficient on *PaydayAllowed* is positive for all three specifications. The baseline specification of column (1) shows a $1.43 rise in NSF prices due to *PaydayAllowed*. The addition of institution- and county-level controls raises the estimate effect to $1.56. As in the analysis of *OD*, Division trends prove to be important. In the final specification, the estimated effect of *PaydayAllowed* falls substantially to 0.26, and the standard error of this estimate rises nearly 50 percent.

In summary, the first empirical model reveals a robust effect of payday loan availability on the provision of free checking accounts. The evidence, across all specifications, shows that free checking is less likely to be offered when payday loans are available. The results also suggest that OD and NSF prices are higher in the presence of payday lending, though this result is somewhat sensitive to the comparison group assumed for the differences-in-differences analysis.

IV.5. The Effects of Local Payday Loan Availability on Overdraft and Bounced Checks Markets

The second empirical model is an attempt to exploit more local, county-level variation in payday loan access by measuring the distance from the surveyed institution to the nearest payday

loan locations. However, since payday store locations are likely to be related to the outcomes of interest or correlates thereof, a simple measure of distance to payday locations will not produce a convincing estimate of the effect of payday loan availability. We address this concern by focusing on institutions in states that prohibit payday lending and proxying for payday loan availability with the previously defined *PaydayAccess* measures of proximity to the nearest payday-allowing state. The purpose of using these measures is to separate institutions whose customers are close enough to a payday-allowing state to visit payday loan stores from institutions whose customers are far from payday loan stores and therefore face more costly access.

The effect of payday loan availability is determined by comparing values of *Free Checking*, *NSF* and *OD* at institutions that are close to payday-allowing states relative to the values of those measures at institutions that are located far from payday-allowing states. The identifying assumption in this model is that an institution's distance to a payday-allowing state is uncorrelated with other factors that influence the dependent variables of interest. There are two components to this assumption. First, it requires that bordering states do not determine their payday loan regulations in a way that correlates with the characteristics of the individuals or overdraft marketplace across the border. Second, it requires that depositories do not choose their location based on local payday loan availability in a way that leads to a different composition of depository institutions in these border areas relative to other parts of the state. To weaken the latter assumption, we control for the institution type, institution size (log assets), and the concentration of the local deposit market. Additionally, we note that the surveyed branch is in almost all cases the institution's headquarters branch, whose location, for most institutions, was determined long before the advent of payday lending.

The estimation sample includes all years of data as well as observations from all states. The identifying variation in *PaydayAccess* is contributed by institutions in the eleven states that prohibit payday lending at some time during the sample period, but observations from the rest of the states are included to improve the precision in estimating the covariates.[14] The fully-controlled version of this model is given by the following equation.

$$(2)\ Y_{ijst} = \alpha + \vec{\beta}\boldsymbol{PaydayAccess}_{jt} + \vec{\gamma}\boldsymbol{CountyControls}_j + \delta Border_j + \theta HHI_{jt} + \vec{\pi}\boldsymbol{InstitutionControls}_i + \varphi_{st} + \varepsilon_{ijst}$$

The variables and notation in this equation are identical to those of the first empirical model, with three exceptions. First, the independent variables of interest in this model are *PaydayAccess_0_10*, *PaydayAccess_10_20* and *PaydayAccess_20_30*, which substitute for *PaydayAllowed*. Second, instead of state and year fixed effects, all specifications of this model include state-year fixed effects, signified by φ_{st}. The inclusion of state-year fixed effects isolates variation in the *PaydayAccess* variables that is unrelated to the state-level changes payday availability captured in the first empirical model. Third, the fully-controlled version of the model includes *Border*, a dummy variable that measures whether the institution's county is within 25 miles of any state border. The presence of this variable in the model isolates general border effects that might confound the payday access effect. Finally, it is worth noting that institution and county controls potentially play an important role for this model, since sample summary statistics show differences in the average characteristics of *PaydayAccess_0_10* areas compared to non-*PaydayAccess_0_10* areas. These statistics, displayed in Table 2, reveal that *PaydayAccess_0_10* areas are less populous and have lower unemployment. They also have more credit unions and commercial banks, and less savings banks.

[14] The eleven states that prohibit payday lending for some time during the sample period are: CT, GA, MA, MD, NC, NH, NJ, NY, RI, VT, WV.

Estimation results for the model are displayed in Table 4. Similar to the first empirical model, this analysis reveals a negative relationship between *Free Checking* and payday loan access. The baseline specification, reported in Panel A, column (1), shows a *PaydayAccess_0_10* coefficient of -0.051, implying that *Free Checking* is less likely to be offered where payday loans are available. This effect rises to a statistically significant -8.8 percentage points after controlling for institution- and county-level characteristics. As one would predict, the effect of payday loan access falls among institutions that are further from the border: the coefficient on *PaydayAccess_10_20* is -5.0 percentage points in each specification and the coefficient on *PaydayAccess_20_30* is very close to zero in each specification.

Results for OD prices, displayed in Panel B of Table 4, also support the first model's finding that payday loan availability leads to higher OD prices. In the baseline specification, *PaydayAccess_0_10* is estimated to increase OD prices by $1.20. The estimated effect increases to $1.48 when all additional controls are added to the model. In both cases, the effects are statistically significant at the 5 percent level. The model results indicate that the effects are limited to institutions in close proximity to payday-allowing states. The coefficient on *PaydayAccess_10_20* is substantially lower than that of *PaydayAccess_0_10*, and statistically insignificant. Likewise, the coefficient on *PaydayAccess_20_30* is very small and slightly negative. The estimated effect of *PaydayAccess_0_10* represents a roughly 6 percent increase over the average OD fee of $24.98.

Finally, the estimation results for NSF prices also reinforce the finding of the first model. Results in Panel C of Table 4 show a positive *PaydayAccess_0_10* coefficient in both specifications. The baseline model shows that NSF prices are 88 cents higher in *PaydayAccess*

areas. This effect rises, to $1.28, with the inclusion of controls. Again, little effect is observed for institutions that are less proximate to payday-allowing states.

Overall, the second empirical model confirms the first model's estimated effects of payday loan availability on all three outcomes, both in direction and magnitude.

IV.6. Robustness

Using both empirical models, we test a further prediction regarding the effect of payday loan availability on free checking offers: the effect should be concentrated in the type of free checking account used to attract payday loan customers. In some cases banks require customers to establish direct deposit of their paycheck in order to qualify for free checking. We hypothesize that banking customers who also use payday loans are unlikely to have ability to directly deposit their paycheck. Consequently, the effects of payday loan availability on the likelihood of offering free checking ought to be concentrated in cases where direct deposit is not required for free checking. The empirical results displayed in Table 5 confirm this hypothesis. Results in column (1) of Panels A and B show that *PaydayAllowed* reduces the likelihood of offering free checking without direct deposit, but has no effect on free checking offers tied to direct deposit. Similarly, results from column (2) of each panel show that the negative effects of the *PaydayAccess* variables are also limited to free checking accounts that are not tied to direct deposit.

We also evaluate the robustness of the main findings to changes in the assumed functional form of the estimating equations. For analyses using *Free Checking*, which is a binary variable, we estimate probit models to confirm that the assumption of a linear probability model in the main analysis does not crucially affect the results. These results are displayed in Panel A

of Table 6. The probit model delivers estimated marginal effects that are quite similar to the linear probability estimates for each specification. For OD and NSF prices, we estimate log-linear models, with *LogOD* and *LogNSF* as dependent variables. Estimation results using these dependent variables within both empirical models are given in Panels B and C of Table 6. Consistent with the main finding that payday loan availability raises OD and NSF prices, *LogOD* and *LogNSF* are shown to be positively correlated with both *PaydayAllowed* and *PaydayAccess*. The coefficients on *PaydayAllowed* imply a roughly 6 percent rise in OD and NSF prices due to payday loan availability. The coefficients on *PaydayAccess* imply a roughly 4 percent rise in OD prices and 5 percent rise in NSF prices when moving from areas without access to payday loan stores to areas with access. This analysis is important in confirming that the nominal to real price adjustment does not crucially affect the results.

Finally, for the second empirical model, we confirm that the definition of the *PaydayAccess* vector as a set of dichotomous variables does not play a crucial role in the estimated effects. Estimation results for a model that substitutes *LogDistance* in place of *PaydayAccess* are displayed in Table 7. The likelihood of offering free checking rises with *LogDistance*, and OD and NSF prices fall with *LogDistance*, implying that shorter distances to payday allowing states imply higher prices and lower likelihood of offering free checking. The effects on *Free Checking* and OD prices are significant at the 10 percent level. These estimates confirm the main findings.

V. Conclusion

We find that competition from payday lenders increases prices for overdraft and non-sufficient funds transactions at depository institutions. We also find that depositories are less

likely to offer free checking accounts when payday loans are available. We reconcile these surprising findings with two other facts from the literature by proposing a theoretical explanation built around adverse selection. Payday lenders "cherry pick" the most price elastic, low risk borrowers, saddling depositories with less price elastic, riskier borrowers. Depository costs increase so they raise prices, and they manage the extra risk by limiting access to free checking accounts. This explanation accounts for our empirical results as well as those of Campbell et al (2007), who show that forced exit by payday lenders leads to decreased involuntary deposit closures *per* capita, and Morgan and Strain (2007), who show that forced exit by payday lenders leads to higher bounced check rates at depository institutions.

The welfare implications of our findings and explanation are ambiguous. Borrowers who switch to payday lenders may gain from entry, but borrowers who remain with mainstream lenders face higher fees on overdraft and bounced checks, and may be more likely to "bounce out" of the banking system.

In future versions of this research, we plan to formalize the theoretical model to clarify the assumptions and confirm the predictions that we have sketched in the current version.

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Table 1: Summary Statistics for Dependent Variables of Interest

	obs	mean	std dev	median	max
Free Checking	10,542	0.73	0.44	1	1
OD	15,089	24.98	7.32	25.95	55.32
NSF	18,389	25.28	6.27	25.38	50.77

Table 2: Stratified Summary Statistics for Independent Variables of Interest

Summary statistics are given for county characteristics, county-year characteristics and institution characteristics. The sample is stratified in two ways. In Panel A the sample is stratified by whether a state experiences a change in *PaydayAllowed* . In Panel B, the sample is restricted to observations from states that prohibit payday lending and stratified by *PaydayAccess_0_10* , a measure of proximity to payday-allowing states. In each panel, the number of observations and mean value are given for each variable along with an indicator for whether the difference in means across groups is statistically significant at the 5% level.

	Panel A					**Panel B**				
	No Change in *PaydayAllowed*		Change in *PaydayAllowed*		Diff. significant at 5% level	*PaydayAccess_0_10 = 0*		*PaydayAccess_0_10 = 1*		Diff. significant at 5% level
	obs	mean	obs	mean		obs	mean	obs	mean	
County Characteristics										
Median Income	1,750	36,900	264	37,400		199	42,800	38	42,700	
Population	1,750	126,500	264	132,600		199	283,400	38	198,700	
Percent urban	1,750	0.49	264	0.51		199	0.64	38	0.60	
Home ownership	1,750	0.73	264	0.72		199	0.69	38	0.71	
Percent white	1,750	0.82	264	0.81		199	0.83	38	0.84	
Percent black	1,750	0.07	264	0.13	*	199	0.08	38	0.09	
Percent hispanic	1,750	0.07	264	0.03	*	199	0.05	38	0.03	
Percent foreign born	1,750	0.04	264	0.03		199	0.06	38	0.05	
County-Year Characteristics										
Unemployment Rate	7,674	0.052	234	0.052		931	0.050	155	0.046	*
HHI	7,675	0.21	1,114	0.21		931	0.17	155	0.18	
Institution Characteristics										
Credit Union	17,837	0.41	2,375	0.41		2,830	0.44	391	0.49	
Commercial Bank	17,837	0.47	2,375	0.45	*	2,830	0.30	391	0.36	*
Savings Bank	17,837	0.12	2,375	0.14	*	2,830	0.26	391	0.15	*
Total Assets	17,763	2,409,000	2,374	2,738,000		2,802	3,875,000	391	1,824,000	

Table 3: Effects of State Payday Loan Prohibitions

Below are OLS estimation results from a differences-in-differences model that estimates the effect of payday loan availability, as measured by *PaydayAllowed* , on whether depository institutions offer free checking (*FreeChecking*), the price they charge for an overdraft (*OD*) and the price they charge for a bounced check (*NSF*). In each panel, a separate dependent variable is analyzed. Within panels, control variables are layered into the model moving from Column (1) through Column (3). Column (1) specifications include state and year fixed effects, Column (2) specifications also include insitution-level and county-level controls, and Column (3) specifications also include Census Division-Year fixed effects. Coefficient standard errors are reported in parentheses, below coefficient point estimates. In each specification, observations are grouped by state in the calculation of robust standard errors.

$$Y_{ijst} = \alpha + \beta PaydayAllowed_{st} + \vec{\gamma}\boldsymbol{CountyControls}_j + \theta HHI_{jt} + \vec{\pi}\boldsymbol{InstitutionControls}_i + \psi_s + \eta_t + \varepsilon_{ijst}$$

	Panel A			**Panel B**			**Panel C**		
Dependent Variable:	*FreeChecking*			*OD*			*NSF*		
(Mean)	(0.73)			(24.98)			(25.28)		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
PaydayAllowed	-0.051**	-0.049**	-0.069***	1.09*	1.31**	0.40	1.43***	1.56***	0.26
	(0.024)	(0.022)	(0.025)	(0.62)	(0.52)	(0.78)	(0.49)	(0.48)	(0.69)
CreditUnion		0.24***	0.24***		-2.38***	-2.42***		-2.27***	-2.30***
		(0.03)	(0.03)		(0.38)	(0.38)		(0.40)	(0.40)
SavingsBank		0.08**	0.09**		-1.22***	-1.17***		-1.36***	-1.33***
		(0.03)	(0.03)		(0.24)	(0.24)		(0.20)	(0.19)
LogAssets		0.04***	0.04***		0.96***	0.95***		0.78***	0.78***
		(0.01)	(0.01)		(0.09)	(0.09)		(0.08)	(0.08)
HHI		0.04	0.05		-0.33	0.13		-0.18	0.15
		(0.05)	(0.06)		(0.99)	(0.95)		(0.81)	(0.73)
State and Year FEs?	Y	Y	Y	Y	Y	Y	Y	Y	Y
County Controls?	N	Y	Y	N	Y	Y	N	Y	Y
Division-Year Trends?	N	N	Y	N	Y	Y	N	Y	Y
Observations	10,524	10,505	10,505	15,072	15,041	15,041	18,369	18,334	18,334
R^2	0.04	0.10	0.11	0.19	0.32	0.34	0.25	0.40	0.41

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Effects of County-Level Payday Loan Availability

Below are OLS estimation results from a model that estimates the effect of local payday loan availability, as measured by the vector of *PaydayAccess* variables, on whether depository institutions offer free checking (*FreeChecking*), the price they charge for an overdraft (*OD*) and the price they charge for a bounced check (*NSF*). In each panel, a separate dependent variable is analyzed. Within panels, control variables are layered into the model moving from Column (1) to Column (2). Column (1) specifications include state-year fixed effects, and Column (2) specifications include insitution-level controls, county-level controls and a general border control as well. Coefficient standard errors are reported in parentheses, below coefficient point estimates. In each specification, observations are grouped by county in the calculation of robust standard errors.

$$Y_{ijst} = \alpha + \vec{\beta}\boldsymbol{PaydayAccess}_{jt} + \vec{\gamma}\boldsymbol{CountyControls}_j + \delta Border_j + \theta HHI_{jt} + \vec{\pi}\boldsymbol{InstitutionControls}_i + \varphi_{st} + \varepsilon_{ijst}$$

Dependent Variable:	*FreeChecking*		*OD*		*NSF*	
(Mean)	(0.73)		(24.98)		(25.28)	
	(1)	(2)	(1)	(2)	(1)	(2)
PaydayAccess_0_10	-0.051	-0.088**	1.20**	1.48***	0.88*	1.28***
	(0.04)	(0.04)	(0.56)	(0.55)	(0.51)	(0.43)
PaydayAccess_10_20	-0.05	-0.05	0.14	0.22	-0.08	-0.07
	(0.04)	(0.04)	(0.60)	(0.66)	(0.54)	(0.55)
PaydayAccess_20_30	0.01	0.02	-0.18	-0.08	0.04	0.28
	(0.03)	(0.03)	(0.70)	(0.58)	(0.60)	(0.49)
CreditUnion		0.24***		-2.39***		-2.25***
		(0.02)		(0.21)		(0.20)
SavingsBank		0.09***		-1.10***		-1.24***
		(0.02)		(0.21)		(0.17)
LogAssets		0.04***		0.95***		0.78***
		(0.00)		(0.05)		(0.05)
HHI		0.06		-0.07		-0.03
		(0.06)		(0.67)		(0.65)
Border		0.04***		-0.32*		-0.27
		(0.01)		(0.18)		(0.17)
State-Year FEs?	Y	Y	Y	Y	Y	Y
County Controls?	N	Y	N	Y	N	Y
Observations	10,524	10,490	15,072	14,996	18,369	18,282
R^2	0.07	0.12	0.24	0.37	0.30	0.44

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Decomposing Free Checking: With and Without Direct Deposit

In this table, we analyze whether depositories that link free checking accounts with a direct deposit requirement respond differently to payday loan availability than depositories that do not require direct deposit. Within each panel a separate dependent variable is analyzed. Specifications in Column (1) of each panel estimate the first emprical model, with *PaydayAllowed* as the measure of payday loan availability. Specifications in Column (2) estimate the second model, with the vector of *PaydayAccess* variables as measures of payday loan availability. Robust standard errors are reported in parentheses, with observations are grouped by state in Column (1) specifications and county in Column (2) specfications.

Dependent Variable: (Mean)	**Panel A** *Free Checking w/o Direct Deposit* (0.62)		**Panel B** *Free Checking w/Direct Deposit* (0.11)	
	(1)	(2)	(1)	(2)
PaydayAllowed	-0.039*		-0.0003	
	(0.020)		(0.023)	
PaydayAccess_0_10		-0.10**		-0.01
		(0.05)		(0.02)
PaydayAccess_10_20		-0.12**		0.04
		(0.05)		(0.03)
PaydayAccess_20_30		-0.05		0.05*
		(0.04)		(0.03)
CreditUnion	0.26***	0.25***	-0.001	0.002
	(0.03)	(0.02)	(0.02)	(0.01)
SavingsBank	0.05	0.05*	0.02	0.02
	(0.04)	(0.03)	(0.01)	(0.02)
LogAssets	0.03***	0.03***	0.01***	0.01***
	(0.006)	(0.004)	(0.002)	(0.003)
HHI	0.004	0.01	0.02	0.03
	(0.06)	(0.08)	(0.03)	(0.05)
Border		0.06***		-0.03**
		(0.02)		(0.01)
State-Year FEs?	N	Y	N	Y
State and Year FEs?	Y	NA	Y	NA
County Controls?	Y	Y	Y	Y
Observations	9,589	9,576	9,589	9,576
R^2	0.11	0.13	0.03	0.05

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Robustness Relative to Functional Form

Results are provided for the following variations on the basic empirical models in Tables 3 and 4. Regressions in Panel A assume a probit functional form for *Free Checking* as opposed to a linear probability model. Regressions in Panels B and C use the log of OD and NSF prices as the dependent variable. Specifications in Column (1) of each panel estimate the first emprical model, with *PaydayAllowed* as the measure of payday loan availability. Specifications in Column (2) estimate the second model, with the vector of *PaydayAccess* variables as the measures of payday loan availability. Robust standard errors are reported in parentheses, with observations are grouped by state in Column (1) specifications and county in Column (2) specfications.

	Panel A		**Panel B**		**Panel C**	
Estimation Method:	Probit		OLS		OLS	
Dependent Variable:	*Free Checking*		*LogOD*		*LogNSF*	
(Mean)	(0.73)		(3.19)		(3.20)	
	(1)	(2)	(1)	(2)	(1)	(2)
PaydayAllowed	-0.063**		0.061**		0.066***	
	(0.030)		(0.026)		(0.020)	
PaydayAccess_0_10		-0.10***		0.042*		0.054***
		(0.04)		(0.024)		(0.018)
PaydayAccess_10_20		-0.06		-0.01		-0.003
		(0.05)		(0.03)		(0.02)
PaydayAccess_20_30		0.02		0.00		0.02
		(0.04)		(0.02)		(0.02)
CreditUnion	0.25***	0.26***	-0.09***	-0.09***	-0.09***	-0.09***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)
SavingsBank	0.07**	0.08***	-0.04***	-0.04***	-0.05***	-0.04***
	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
LogAssets	0.04***	0.05***	0.04***	0.04***	0.03***	0.03***
	(0.005)	(0.004)	(0.004)	(0.002)	(0.003)	(0.002)
HHI	0.06	0.08	0.03	0.04	0.01	0.02
	(0.06)	(0.07)	(0.04)	(0.03)	(0.04)	(0.03)
Border		0.04***		-0.01		-0.01*
		(0.02)		(0.01)		(0.01)
State-Year FEs?	N	Y	N	Y	N	Y
State and Year FEs?	Y	NA	Y	NA	Y	NA
County Controls?	Y	Y	Y	Y	Y	Y
Observations	10,484	10,269	14,828	14,784	18,326	18,274
R^2/Pseudo-R^2	0.09	0.10	0.25	0.30	0.34	0.39

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Robustness Relative to *PaydayAccess* Definition

Results are provided for a model that uses an alternative definition of local payday loan availability. *LogDistance* , the natual logarithm of the distance to the nearest payday allowing state, substitutes for the *PaydayAccess* variables. All other details of the model follow those of the fully-controlled specifications in Table 3.

$$Y_{ijst} = \alpha + \beta LogDistance_{jt} + \vec{\gamma}\boldsymbol{CountyControls}_j + \delta Border_j + \theta HHI_{jt} + \vec{\pi}\boldsymbol{InstitutionControls}_i + \varphi_{st} + \varepsilon_{ijst}$$

	(1)	(2)	(3)
Dependent Variable:	*Free Checking*	*OD*	*NSF*
(Mean)	(0.73)	(24.98)	(25.28)
LogDistance	0.04*	-0.48*	-0.33
	(0.02)	(0.26)	(0.20)
CreditUnion	0.24***	-2.39***	-2.25***
	(0.02)	(0.21)	(0.20)
SavingsBank	0.09***	-1.12***	-1.25***
	(0.02)	(0.22)	(0.17)
LogAssets	0.04***	0.95***	0.78***
	(0.003)	(0.05)	(0.05)
HHI	0.05	-0.06	-0.03
	(0.07)	(0.67)	(0.66)
Border	0.04***	-0.31*	-0.26
	(0.01)	(0.19)	(0.17)
State-Year FEs?	Y	Y	Y
County Controls?	Y	Y	Y
Observations	10,390	14,903	18,171
R^2/Pseudo-R^2	0.12	0.37	0.44

* significant at 10%; ** significant at 5%; *** significant at 1%

APPENDIX A

PAYDAY LOAN REGULATIONS

States that Prohibited Payday Lending Throughout the Sample Period: Connecticut, Massachusetts, New Jersey and New York

New Jersey and New York forbid payday loans on the basis of check cashing laws that prohibit advancing money on post-dated checks (N.J. Stat. 17:15A-47 and NY CLS Bank 373), and usury laws that limit loan interest rates (N.J. Stat. 2C:21-19 and NY CLS Penal 190.42). Massachusetts banned payday loans through a law limiting interest rates on small loans made or brokered in the state (ALM G.L.c.140 §96 and CMR 209 26.01). Connecticut prohibited lending through a combination of a cap on check cashing fees (Conn. Agencies Reg. § 36a-585-1) and small loan interest rates (Conn. Gen. Stat. 36a-563). For the large operators that constitute 40 percent of the industry – Ace Cash Express, Advanced America, Cash America, Check into Cash, Check 'N Go, Money Mart and Valued Services – there is no evidence on 10-K filings and company websites of stores operating in these three states.

Defining *PaydayAccess*: Regulatory Environment in States Bordering Connecticut, Massachusetts, New Jersey and New York

New Hampshire's small loan interest rate cap acted as a *de facto* ban on payday loans until it was removed in January, 2000 (1999 NH ALS 248), and payday lenders entered thereafter. Through a conversation with the Staff Attorney of the Consumer Credit Division, New Hampshire Department of Banking, I have confirmed that payday lenders did not operate in the state prior to 2000. Rhode Island's small loan interest rate cap (R.I. Gen. Laws § 19-14.2-8) acted as a *de facto* prohibition on payday loans until a July 2001 law change that sanctioned deferred deposit transactions (R.I. P.L. 2001, Ch. 371, § 4). However, according to a regulatory

supervisor in the Division of Banking, check cashers had begun to offer deferred deposit on check cashing transactions in 2000 and 2001, prior to the law change. In Pennsylvania, throughout the sample period direct payday lending was prohibited through a cap on small loan interest rates (P.A. 7 P.S. § 6201-6219), but the agent model was permitted through a law that sanctioned loan brokering (P.A. 73 P.S. § 2181-2192). In practice, payday lenders did not build a presence until 1997. Considering the cross-section of payday loan locations in Pennsylvania as of early 2006, I can confirm that 95 percent of those locations were not making loans in 1996.[15]

States That Experienced a Change in *PaydayAllowed*

Eight states experienced a change in payday loan laws over the sample period, with seven transitioning from allowing to prohibiting payday loans and one transition from prohibiting to allowing.

The District of Columbia, Georgia, Maryland, North Carolina, Oregon, Pennsylvania and West Virginia transitioned from allowing to prohibiting payday lending over the sample period. Maryland banned payday lending through restrictions on fees charged by check cashers (MD Financial Institutions Code § 12-120), restrictions on small loan interest rates (MD Commercial Law Code § 12-306), and finally passed anti-loan brokering legislation (MD Commercial Law Code § 14-1902), effective June, 2002 to eliminate the agency payday lending model. *PaydayAllowed* is coded as one for Maryland observations before 2002. Georgia banned payday lending with a law that took effect in May, 2004 (O.C.G.A. § 16-17-1). Payday lenders finally exited North Carolina in December, 2005, and West Virginia in July, 2006 (add reference).

[15] A predecessor of Advance America, National Cash Advance, entered the state in 1997 (Brickley 1999). Money Mart began its payday lending operation in earnest through an agent relationship in 1997 (See Office of the Comptroller of the Currency 1998). Check ‘N Go did not operate in the state before mid-1997 (Sekhri 1997). Ace Cash Express entered Pennsylvania in 2000 (Ace Cash Express, Inc. 2000). Finally, Cash Today began operations in mid-1999 (Matheson 2005), and Flexcheck Cash Advance began operations in mid-2001 (O’Donoghue 2003).

New Hampshire transitioned from prohibiting to allowing payday lending over the sample period. New Hampshire's small loan interest rate cap acted as a *de facto* ban on payday loans until it was removed in January, 2000 (1999 NH ALS 248), and payday lenders entered thereafter.

Appendix B

Graphical Model

The appendix illustrates the story using a textbook (supply and demand) model. We model risk essentially as a cost shifter; riskier saver-borrowers cost more to serve because they are more likely to default. The expected cost of default (or the cost of managing that risk) shifts the supply curve upward and steepens the slope. At some point, the supply curve becomes vertical, and lenders manage risk by rationing credit. We assume two types: riskier borrowers with inelastic credit demand and safer borrowers with elastic demand. Safer borrowers have more elastic demand because they are more likely to repay the credit. We assume lenders cannot distinguish between safe and risky borrowers, and/or, they cannot price discriminate. That information and/or pricing constraint forces lenders to offer a single supply curve to all takes and let both types choose their preferred quantity of credit. Given their quantity demanded at the fixed price, the lender must expect to break even. The pooling equilibrium is unstable. Risky types will have excess demand (they will be rationed), but more importantly, safer types will face excess supply that attracts payday lenders.

Figure 1 shows segmented equilibria in sub-prime and sub-subprime loan markets. Sub-prime borrowers face higher supply because they are safer/lower cost borrowers. All else equal, subprime borrower demand is lower and more price elastic because they are more likely to repay credit. Excess demand (rationing) may prevail in the sub-subprime market equilibrium if the quantity demanded by sub-subprime borrowers at the profit maximizing interest rate (where supply become vertical) exceeds quantity supplied. Rationing is not necessary for our point, however.

Figure 2 illustrates the pooling equilibrium that prevails if lenders cannot distinguish prime from subprime, or cannot price discriminate. Given price NSF, subprime borrowers pay more and borrow less than in segmented equilibrium because they face higher (more expensive) supply curve. Sub-subprime borrowers pay less and borrow more than in pooling equilibrium because they face lower (less expensive supply curve) than in segmented market. At pooling equilibrium price, prime borrowers face excess supply; lenders would supply them L units buy they demand only amount determined by their demand curve. Suppliers are willing to lend that amount to sub-prime borrowers at lower price (determined by SS'), which creates opening for entry by other lenders (PD), who can distinguish and/or price discriminate. As PD lenders skim off subprime borrowers, the pooling equilibrium breaks down and markets segment. In the segmented market equilbria, sub-subprime borrowers pay more and borrow less, consistent with our findings.

Figure 1: Segmented Credit Market

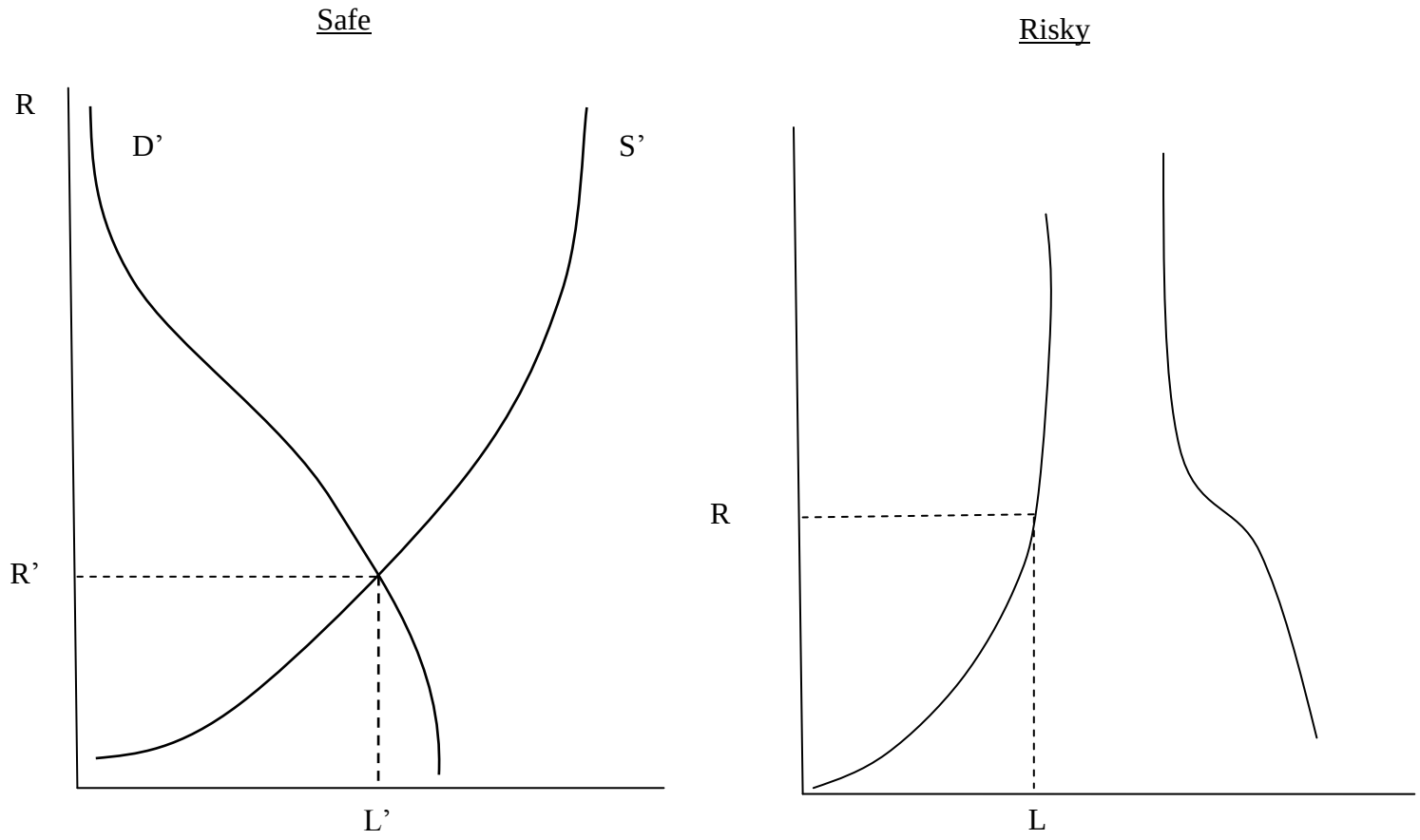
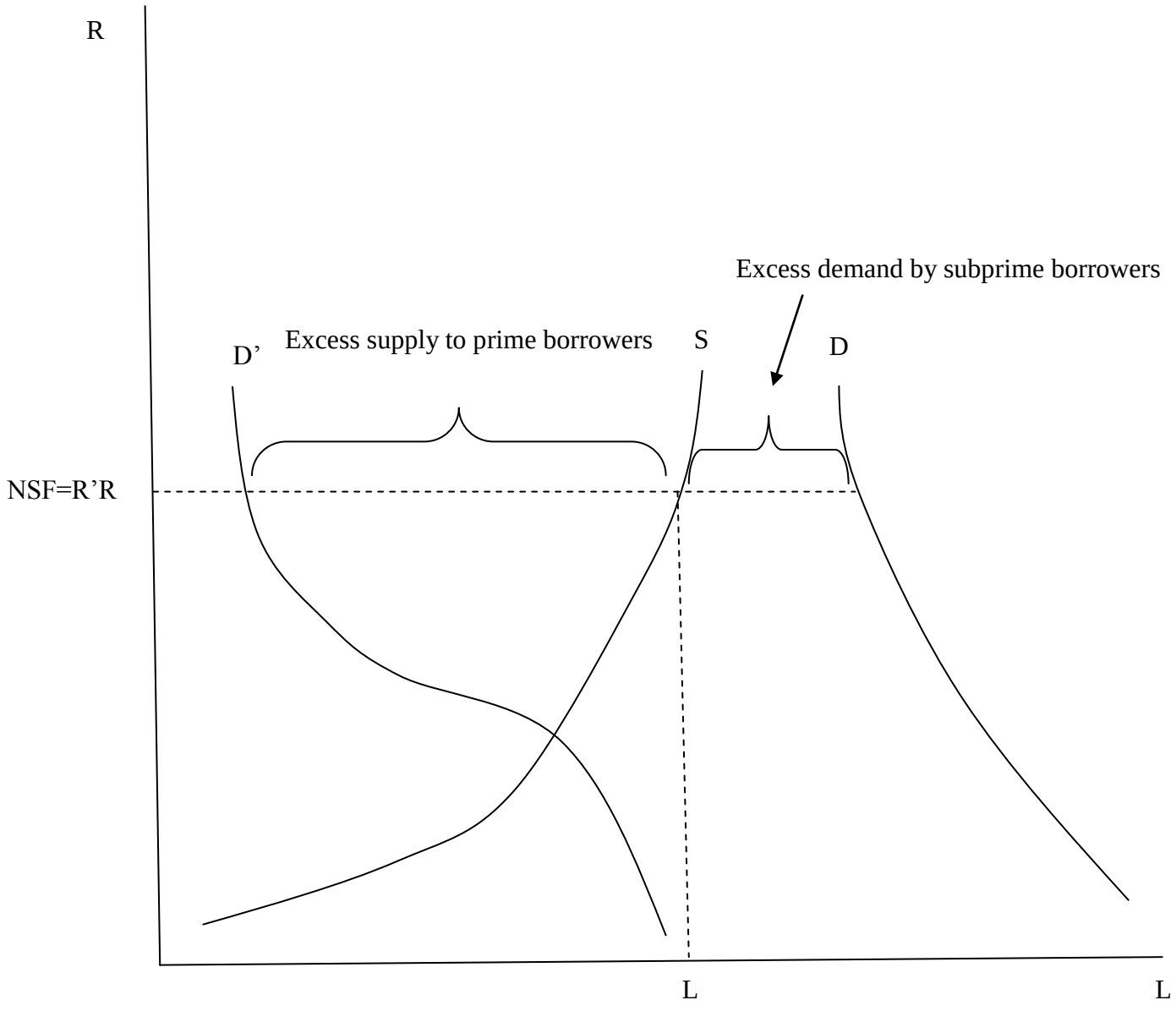
Figure 2: Pooling Equilibrium: Safe-Risky