

Internet Appendix For “Dealer Financing in the Subprime Auto Market: Markups and Implicit Subsidies”

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Supplementary figures and tables

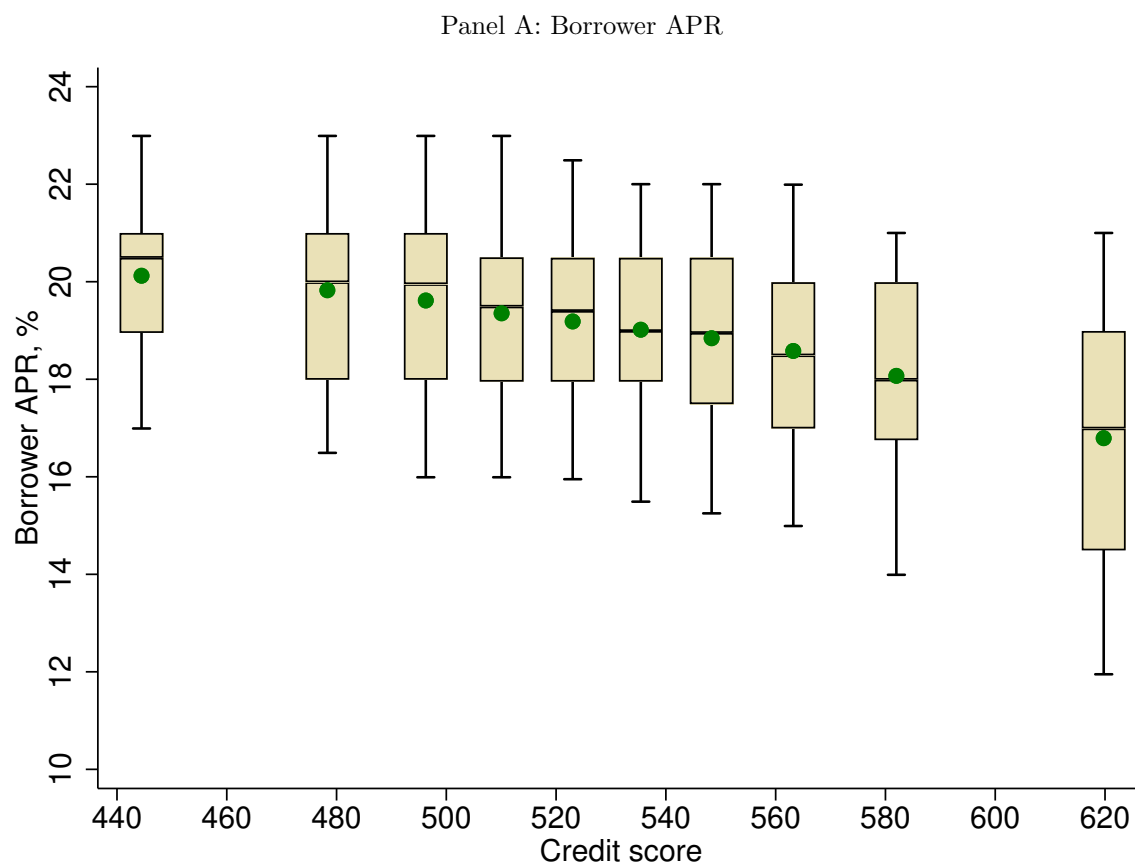
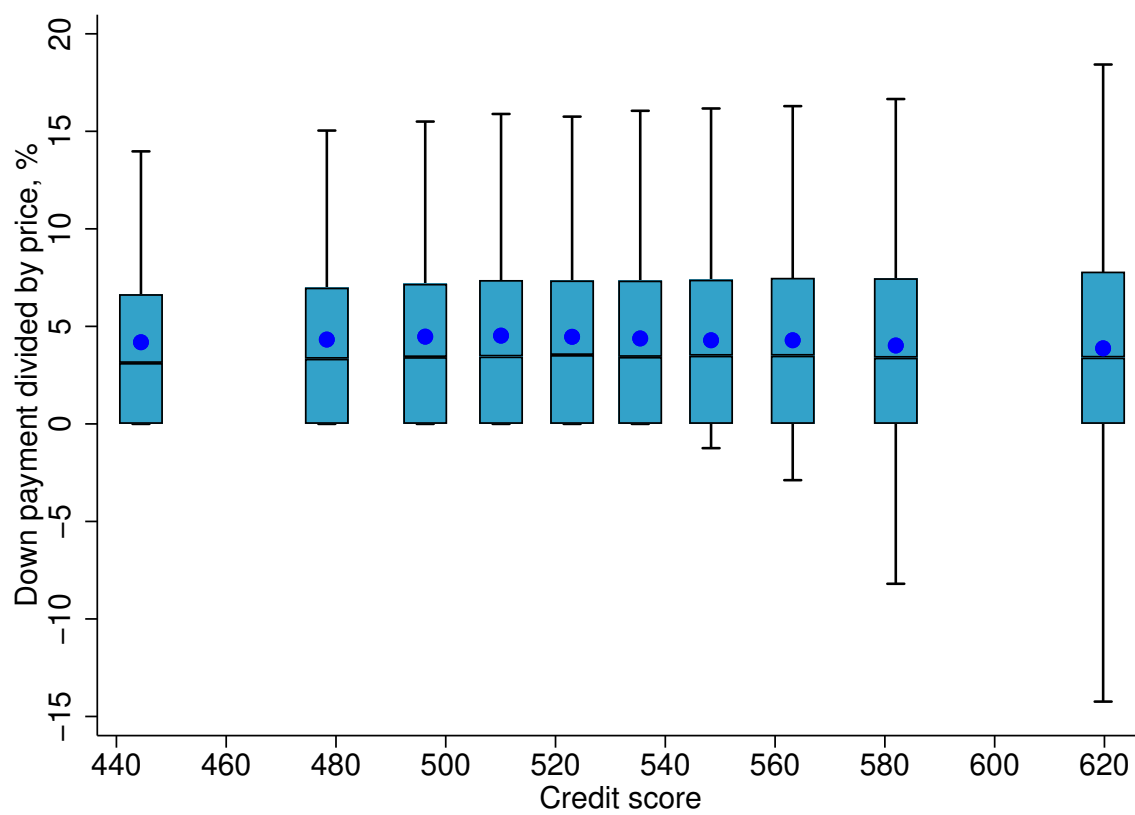


Figure IA.1. Borrower APR and down payment by credit score bins. This figure plots the interquartile range of borrower APR (Panel A) and down payment divided by vehicle price (Panel B) for deciles of borrower credit score. The horizontal line in each box represents the median value and solid circles represent mean values.

Panel B: Down payment divided by price



Panel A: Number of dealers by state

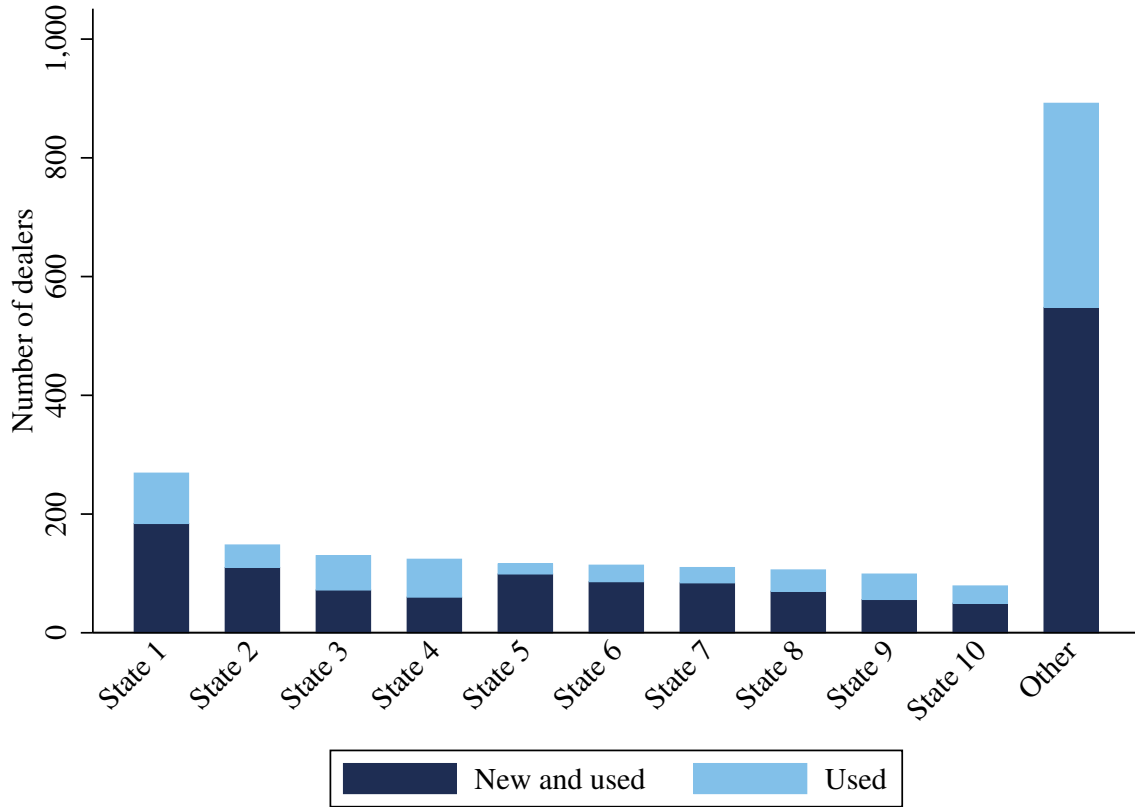
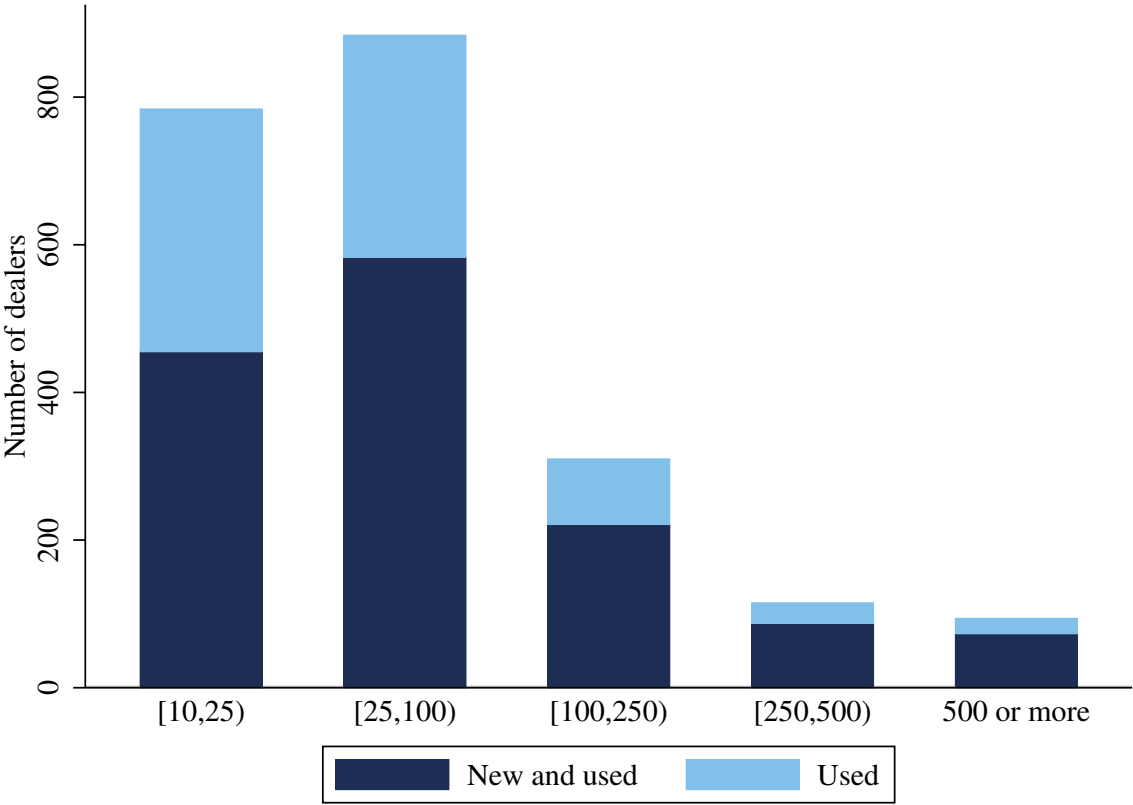


Figure IA.2. Sample dealerships. This figure describes the dealerships in the final sample. Panel A plots the number of dealers per state, for the largest 10 states in the sample. Panel B plots the number of dealers across number of transactions bins. The dark section of the bars represents dealerships that sell both new and used cars, while the light section of the bars represents dealerships that only sell used cars.

Panel B: Number of dealers by number of transactions



Panel A: Histogram of interest rate markup

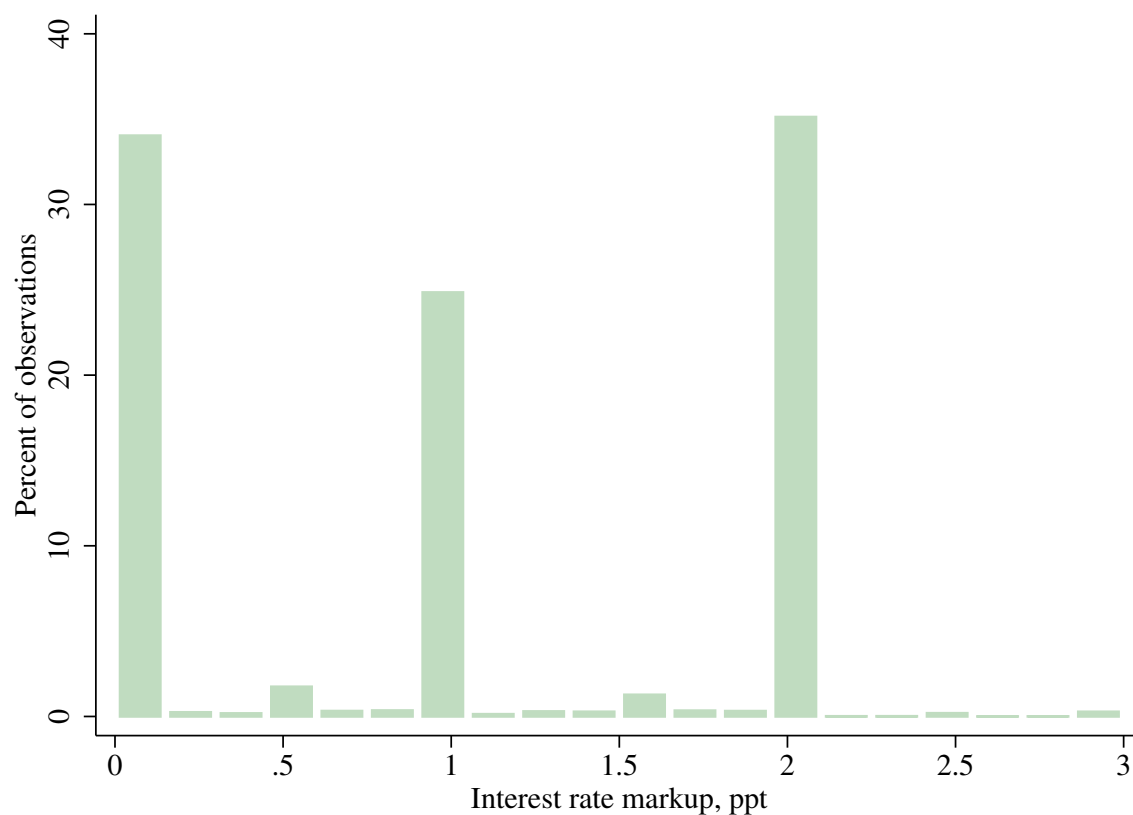
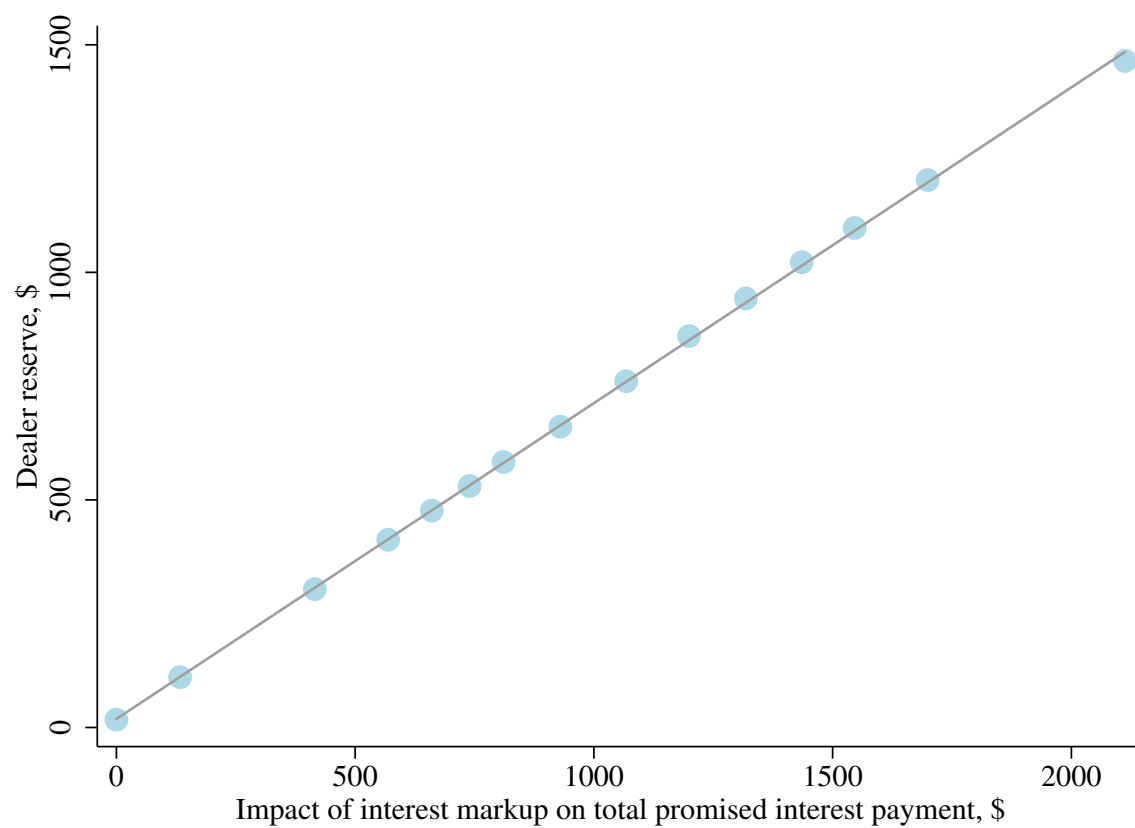


Figure IA.3. Interest rate markup. This figure plots the distribution of the dealership interest rate markup (Panel A) and a binned scatter plot of the relation between the interest markup (in dollar terms) and dealer reserves (Panel B). The interest rate markup is the difference between the interest rate paid by the borrower and the buy rate, which is available for 94% of loans originated after January 2012. In Panel B, the gray line denotes the linear interpolation.

Panel B: Interest rate markups and dealer reserves



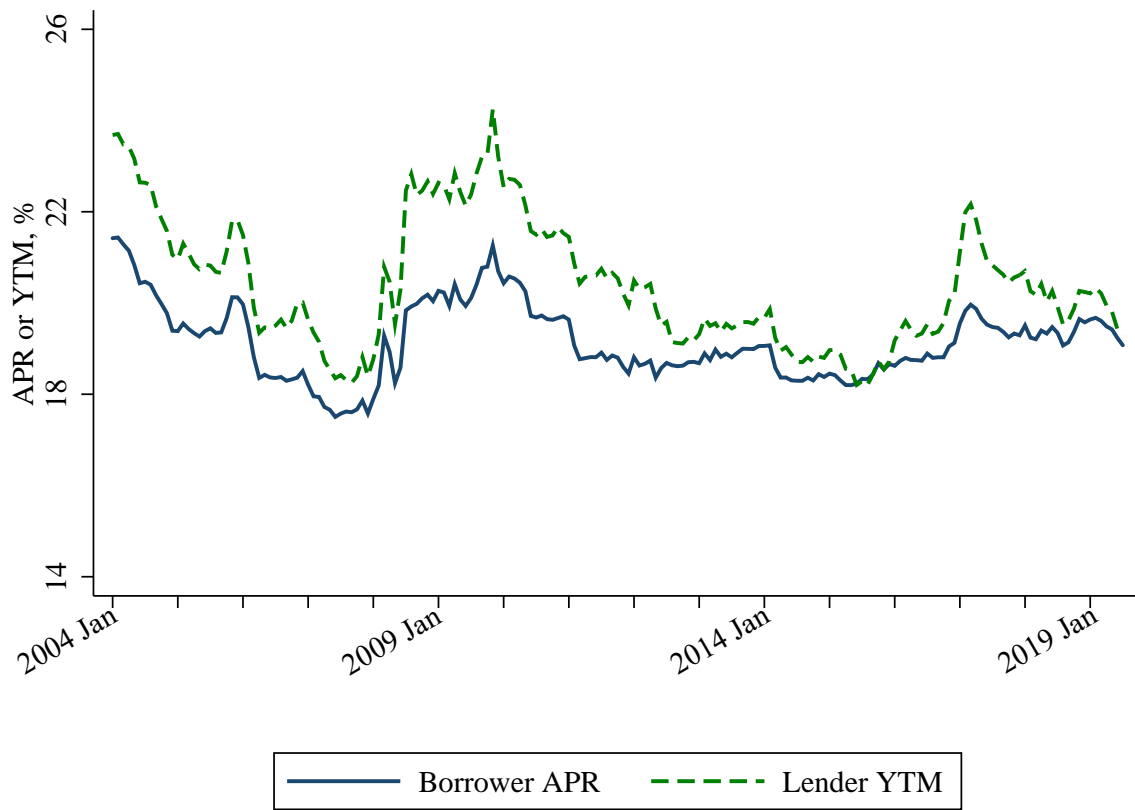


Figure IA.4. Borrower APR and lender yield-to-maturity over time. This figure plots the evolution (at monthly frequency) of borrower APR (solid line) and lender yield-to-maturity (dashed line) from January 2004 to July 2019.

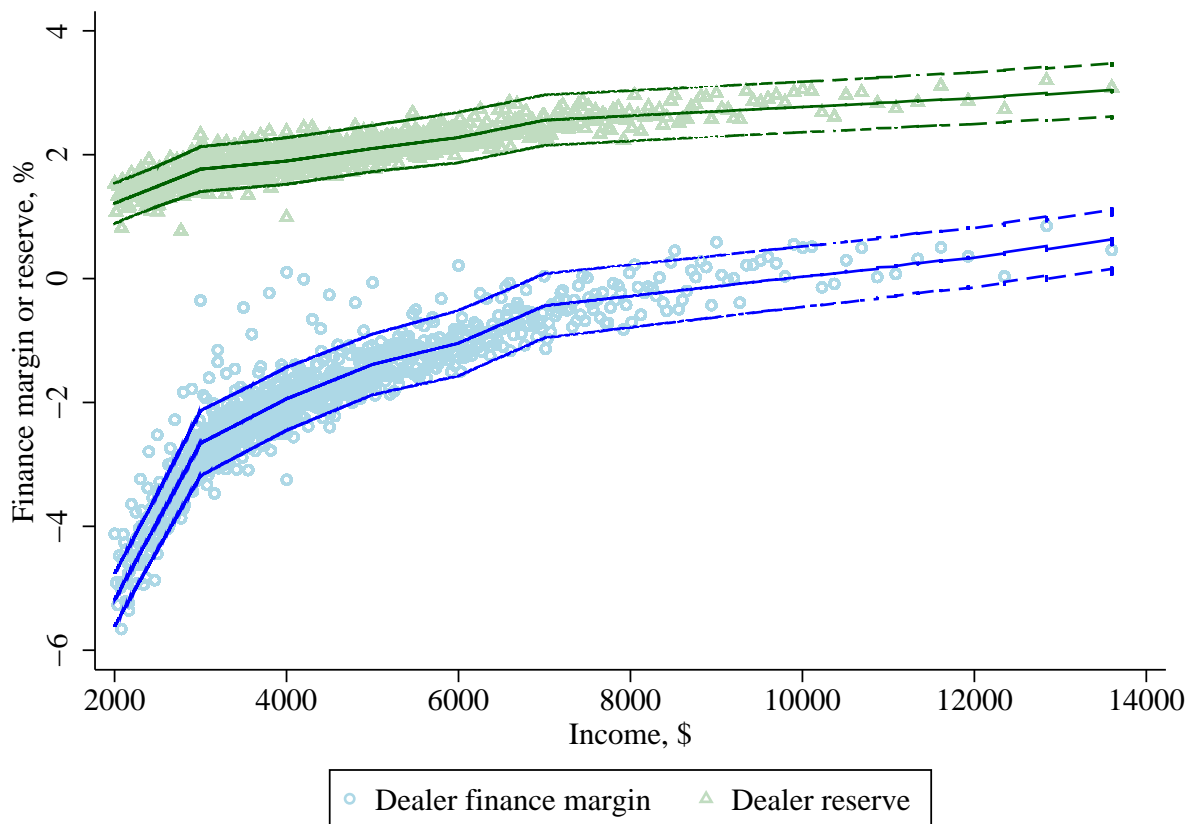


Figure IA.5. Finance margin and dealer reserve by income bins. This figure shows binned scatter plots for finance margins (hollow circles) and reserves (hollow triangles) by income for 1,000 income bins, each with an equal number of loans. The solid lines represents the corresponding interpolation after estimating a linear spline with knots at incomes of \$3,000, \$4,000, \$5,000, \$6,000, and \$7,000. Dashed lines denote 95% confidence intervals.

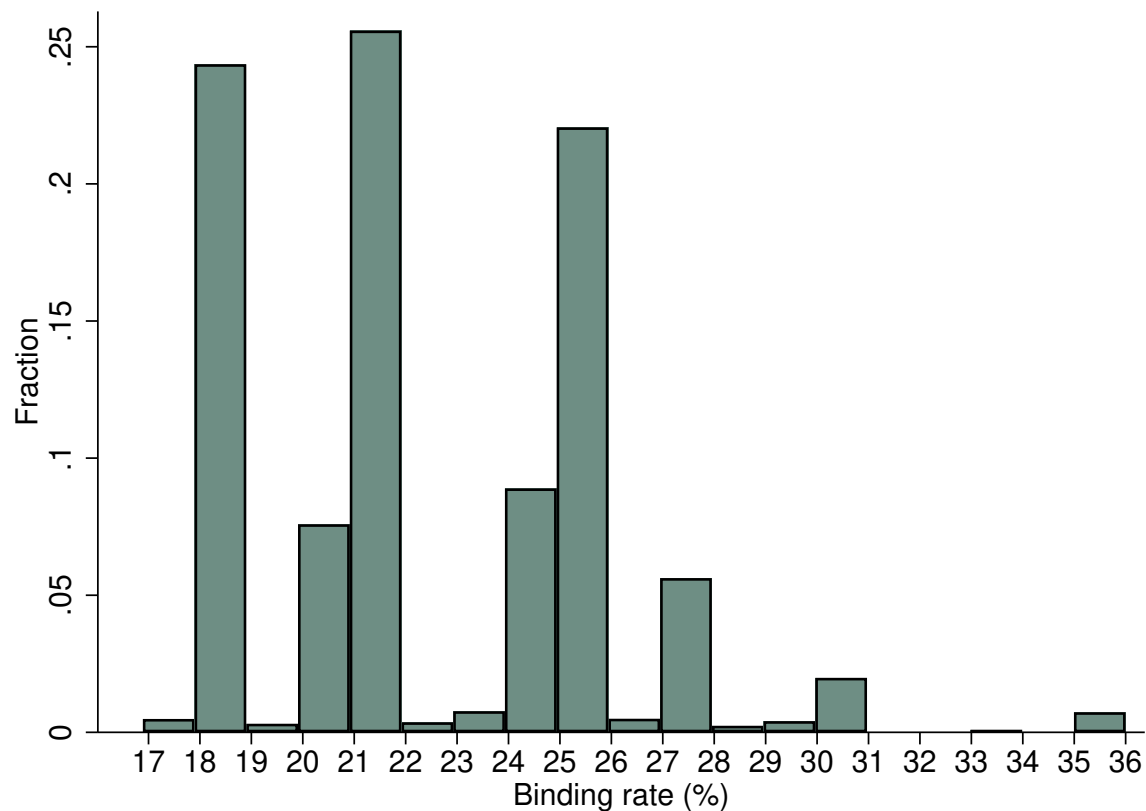


Figure IA.6. Histogram of usury rate caps. This figure plots the fraction of loans with usury rate caps by cap rate. The most common caps (i.e., binding rates) are 18%, 21%, and 25%. Note that the plotted bins also include caps that are close to but not exactly equal to these rate caps. Analysis restricted to these rate caps only uses caps that exactly equal these values.

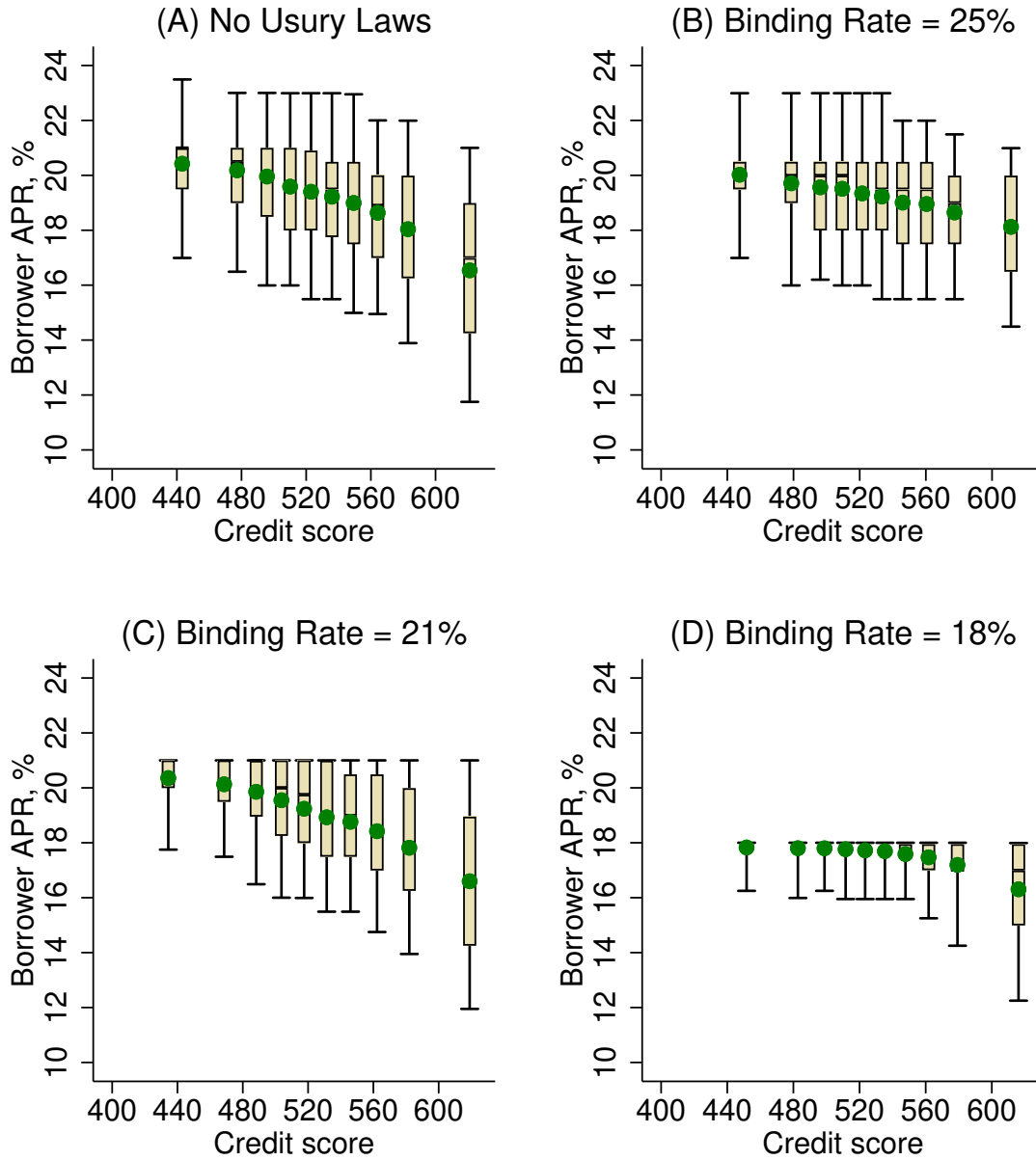


Figure IA.7. Borrower APR by credit score bins by usury law cap rate. This figure is identical to Figure 3 except that the decile split is based on credit score instead of lender yield-to-maturity. Panel A plots loans originated in states with no usury laws, whereas Panels B, C, and D plot loans with usury rate caps (i.e., binding rate) of 18%, 21%, and 25%, respectively. Boxes represent the interquartile range of borrower APR. The horizontal line in each box represents the median value and solid circles represent mean values.

Table IA.1**Reserve adjustments**

This table presents summary statistics for reserve adjustments and defaults. (d) denotes dummy variables.

	Observations	Mean	SD	P25	P50	P75
<u>Full Sample:</u>						
Reserve Adjustment (d)	243,032	0.0116	0.107	0	0	0
Default (d)	243,032	0.254	0.436	0	0	1
<u>Loans with Reserve Adjustments:</u>						
Reserve Adjustment (%)	2,830	0.618	0.194	0.493	0.632	0.771
Default (d)	2,830	1	0	1	1	1

Table IA.2**Default regressions**

This table estimates OLS regressions where the dependent variable is an indicator for whether a borrower defaulted (i.e., filed bankruptcy, or the vehicle was repossessed (multiplied by 100 so that coefficient estimates are in percentage points). The explanatory variables of interest are borrower APR and lender YTM, which accounts for discounts and reserves. All regressions include vehicle and loan control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Default (%)		
	(1)	(2)	(3)
Borrower APR	2.204*** (0.151)		0.419*** (0.111)
Lender YTM		1.684*** (0.102)	1.442*** (0.078)
Credit score	-0.081*** (0.007)	-0.078*** (0.006)	-0.077*** (0.006)
Income	-0.238*** (0.024)	-0.223*** (0.023)	-0.226*** (0.023)
Bankruptcy	-6.301*** (0.752)	-6.154*** (0.755)	-6.112*** (0.771)
Homeowner	5.011** (2.335)	5.149** (2.351)	5.157** (2.342)
Vehicle control variables	Yes	Yes	Yes
Loan term control variables	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes
Observations	216,588	216,588	216,588
R^2	0.296	0.298	0.298
Mean of dependent variable	26.00	26.00	26.00

Table IA.3**Bankruptcy regressions**

This table estimates OLS regressions where the dependent variables are an indicator for whether a loan defaulted (i.e., filed bankruptcy or the vehicle was repossessed, multiplied by 100 so that coefficient estimates are in percentage points, columns (1) and (2)) or reported APR (columns (3) and (4)). The explanatory variable of interest is an indicator for whether the borrower had experienced a bankruptcy within seven years before the loan's origination. All regressions include vehicle and loan control variables (other than borrower APR) described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Default (%)		Borrower APR (%)	
	(1)	(2)	(3)	(4)
Bankruptcy	-4.389*** (0.364)	-7.660*** (0.566)	-0.073 (0.181)	-0.616*** (0.149)
Credit score		-0.120*** (0.006)		-0.018*** (0.002)
Income		-0.212*** (0.025)		0.012*** (0.002)
Homeowner		4.398* (2.476)		-0.278*** (0.072)
Vehicle control variables	Yes	Yes	Yes	Yes
Loan control variables	Yes	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes
Observations	216,588	216,588	216,588	216,588
R^2	0.275	0.289	0.476	0.568
Mean of dependent variable	26	26	18.94	18.94

Table IA.4**Finance margin and reserve regressions (dollar margins and reserves)**

This table reports regressions identical to those in Table 2 except that finance margin and reserve are in dollar terms. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Dealer finance margin (\$)			Dealer reserve (\$)		
	(1)	(2)	(3)	(4)	(5)	(6)
Credit score	2.848*** (0.253)	2.972*** (0.225)		1.165*** (0.135)	1.187*** (0.121)	
<u>Spline coefficients</u>						
Credit score (<450)			1.127*** (0.392)			0.802*** (0.185)
Credit score (450 to 500)			2.425*** (0.232)			0.751*** (0.096)
Credit score (500 to 550)			3.124*** (0.284)			1.136*** (0.150)
Credit score (550 to 600)			3.850*** (0.407)			1.767*** (0.280)
Credit score (600 to 650)			2.603*** (0.415)			1.257*** (0.304)
Credit score (>650)			-1.148 (0.858)			-1.014 (0.605)
Income		5.640*** (0.269)	5.645*** (0.268)		3.063*** (0.199)	3.061*** (0.200)
Bankruptcy		81.590*** (21.491)	79.353*** (22.204)		20.683* (11.470)	18.700 (11.868)
Homeowner		67.084*** (7.552)	66.433*** (7.674)		18.312*** (4.226)	18.010*** (4.247)
Vehicle control variables	Yes	Yes	Yes	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	216,588	216,588	216,588	216,588	216,588	216,588
R^2	0.475	0.492	0.493	0.499	0.509	0.510
Mean of dependent variable	-299.5	-299.5	-299.5	357	357	357

Table IA.5**Interest rate markup regressions**

This table reports regressions identical to those in Table 2 except that the dependent variable is interest rate markup. Interest rate markup data is available for 94% of loans originated after January 2012. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Interest rate markup (ppt)		
	(1)	(2)	(3)
Credit score	0.002*** (0.000)	0.002*** (0.000)	
Spline coefficients			
Credit score (<450)			0.003*** (0.000)
Credit score (450 to 500)			0.002*** (0.000)
Credit score (500 to 550)			0.002*** (0.000)
Credit score (550 to 600)			0.002*** (0.000)
Credit score (600 to 650)			0.000 (0.000)
Credit score (>650)			0.001 (0.001)
Income		0.007*** (0.000)	0.007*** (0.000)
Bankruptcy		0.185*** (0.014)	0.190*** (0.014)
Homeowner		0.075*** (0.014)	0.075*** (0.014)
Vehicle control variables	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes
Observations	120,649	120,649	120,649
R^2	0.428	0.450	0.451
Mean of dependent variable	1.032	1.032	1.032

Table IA.6**Finance margin and reserve regressions (net of reserve adjustments)**

This table reports regressions identical to those in Table 2 except that finance margins and reserves are adjusted to reflect reserve adjustments that are made to some defaulted loans. See Table IA.1 for details on the adjustments. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Dealer finance margin (%)			Dealer reserve (%)		
	(1)	(2)	(3)	(4)	(5)	(6)
Credit score	0.016*** (0.001)	0.017*** (0.001)		0.006*** (0.001)	0.006*** (0.000)	
Spline coefficients						
Credit score (<450)			0.006** (0.002)			0.004*** (0.001)
Credit score (450 to 500)			0.015*** (0.001)			0.005*** (0.001)
Credit score (500 to 550)			0.018*** (0.001)			0.006*** (0.001)
Credit score (550 to 600)			0.021*** (0.002)			0.008*** (0.001)
Credit score (600 to 650)			0.015*** (0.003)			0.007*** (0.002)
Credit score (>650)			-0.004 (0.004)			-0.003 (0.003)
Income		0.034*** (0.001)	0.034*** (0.001)		0.014*** (0.001)	0.014*** (0.001)
Bankruptcy		0.486*** (0.123)	0.478*** (0.128)		0.143** (0.062)	0.134** (0.064)
Homeowner		0.368*** (0.047)	0.365*** (0.048)		0.085*** (0.024)	0.084*** (0.024)
Vehicle control variables	Yes	Yes	Yes	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	216,585	216,585	216,585	216,585	216,585	216,585
R^2	0.499	0.516	0.517	0.521	0.529	0.530
Mean of dependent variable	-2.104	-2.104	-2.104	1.894	1.894	1.894

Table IA.7**Vehicle markup regressions (dollar markup)**

This table reports regressions identical to those in Table 3 except that vehicle markup is in dollar terms. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Vehicle markup (\$)		
	(1)	(2)	(2)
Credit score	1.440*** (0.260)	1.177*** (0.254)	
<u>Spline coefficients</u>			
Credit score (<450)			1.594** (0.703)
Credit score (450 to 500)			0.146 (0.300)
Credit score (500 to 550)			0.922*** (0.290)
Credit score (550 to 600)			1.605*** (0.428)
Credit score (600 to 650)			4.157*** (1.194)
Credit score (>650)			-3.490*** (0.806)
Income		12.215*** (0.897)	12.198*** (0.894)
Bankruptcy		-91.129*** (20.236)	-97.667*** (20.143)
Homeowner		9.492 (15.852)	9.173 (15.759)
Vehicle control variables	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes
Observations	216,588	216,588	216,588
R^2	0.447	0.456	0.456
Mean of dependent variable	3,696	3,696	3,696

Table IA.8**Vehicle markup regressions (vehicle markup based on Black Book values)**

This table reports regressions identical to those in Tables 3 and IA.7 except that vehicle markup is based on Black Book's wholesale vehicle value. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Vehicle markup (%)			Vehicle markup (\$)		
	(1)	(2)	(3)	(4)	(5)	(6)
Credit score	0.014*** (0.003)	0.011*** (0.003)		1.425*** (0.285)	1.111*** (0.264)	
Spline coefficients						
Credit score (<450)			0.012 (0.013)			1.709* (0.906)
Credit score (450 to 500)			0.004 (0.006)			0.033 (0.394)
Credit score (500 to 550)			0.011** (0.005)			1.061** (0.440)
Credit score (550 to 600)			0.011* (0.006)			1.305*** (0.389)
Credit score (600 to 650)			0.024* (0.012)			3.516** (1.358)
Credit score (>650)			0.015 (0.025)			-0.535 (1.315)
Income		0.069*** (0.007)	0.069*** (0.007)		9.564*** (0.751)	9.551*** (0.751)
Bankruptcy		-1.447*** (0.216)	-1.482*** (0.210)		-124.299*** (20.433)	-130.052*** (19.821)
Homeowner		-0.336 (0.278)	-0.337 (0.279)		-31.392 (22.689)	-31.588 (22.888)
Vehicle control variables	Yes	Yes	Yes	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	186,283	186,283	186,283	186,283	186,283	186,283
R^2	0.443	0.444	0.444	0.529	0.532	0.532
Mean of dependent variable	29.83	29.83	29.83	3815	3815	3815

Table IA.9**Recovery value regressions**

This table estimates OLS regressions where the dependent variable is recovery rate of the vehicle which is defined as the vehicle's recovery value after default as a percentage of the vehicle's book value at the time that the loan was originated. All regressions include vehicle control variables described in Table 1 and the age of the loan (in months) at the time of default, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Recovery rate (%)		
	(1)	(2)	(3)
Log(book value) \times 100	0.012958 (0.018777)		
Log(purchase price) \times 100		0.060370*** (0.012326)	
Vehicle margin (%)			0.078499*** (0.018103)
Vehicle control variables	Yes	Yes	Yes
Loan age at default	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes
Observations	27,148	27,148	27,148
R^2	0.654679	0.655971	0.656175
Mean of dependent variable	0.392	0.392	0.392

Table IA.10**Add-on revenue regressions (dollar add-ons)**

This table reports regressions identical to those in Table 4 except that add-on revenue is in dollar terms. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Add-on revenue (\$)		
	(1)	(2)	(3)
Credit score	1.084*** (0.175)	0.895*** (0.201)	
<u>Spline coefficients</u>			
Credit score (<450)			0.776* (0.395)
Credit score (450 to 500)			0.544** (0.248)
Credit score (500 to 550)			0.650*** (0.223)
Credit score (550 to 600)			1.220*** (0.329)
Credit score (600 to 650)			2.211*** (0.777)
Credit score (>650)			-0.776 (1.026)
Income		8.074*** (0.498)	8.066*** (0.498)
Bankruptcy		-64.459*** (21.321)	-67.787*** (21.309)
Homeowner		42.509*** (9.355)	42.319*** (9.295)
Vehicle control variables	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes
Observations	216,588	216,588	216,588
R^2	0.403	0.417	0.417
Mean of dependent variable	1038	1038	1038

Table IA.11**Finance margin and reserve regressions (states without usury laws)**

This table reports regressions identical to those in Table 2 except that the sample is restricted to loans originated in states without usury laws. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Dealer finance margin (%)			Dealer reserve (%)		
	(1)	(2)	(3)	(4)	(5)	(6)
Credit score	0.016*** (0.001)	0.017*** (0.001)		0.006*** (0.001)	0.006*** (0.001)	
<u>Spline coefficients</u>						
Credit score (<450)			0.008*** (0.003)			0.005*** (0.001)
Credit score (450 to 500)			0.015*** (0.002)			0.005*** (0.001)
Credit score (500 to 550)			0.017*** (0.001)			0.006*** (0.001)
Credit score (550 to 600)			0.021*** (0.002)			0.009*** (0.001)
Credit score (600 to 650)			0.015*** (0.003)			0.007*** (0.002)
Credit score (>650)			-0.006 (0.005)			-0.005 (0.004)
Income		0.035*** (0.002)	0.035*** (0.002)		0.015*** (0.001)	0.015*** (0.001)
Bankruptcy		0.494*** (0.162)	0.488** (0.167)		0.146 (0.088)	0.140 (0.090)
Homeowner		0.368*** (0.077)	0.360*** (0.080)		0.118*** (0.037)	0.115*** (0.038)
Vehicle control variables	Yes	Yes	Yes	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	127,283	127,283	127,283	127,283	127,283	127,283
R^2	0.487	0.504	0.505	0.506	0.515	0.515
Mean of dependent variable	-1.935	-1.935	-1.935	1.940	1.940	1.940

Table IA.12**Vehicle markup regressions (states without usury laws)**

This table reports regressions identical to those in Table 3 except that the sample is restricted to loans originated in states without usury laws. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Vehicle markup (%)		
	(1)	(2)	(3)
Credit score	0.014*** (0.002)	0.012*** (0.002)	
Spline coefficients			
Credit score (<450)			0.015** (0.005)
Credit score (450 to 500)			0.004* (0.002)
Credit score (500 to 550)			0.010*** (0.003)
Credit score (550 to 600)			0.013*** (0.004)
Credit score (600 to 650)			0.041*** (0.006)
Credit score (>650)			-0.008 (0.014)
Income		0.086*** (0.009)	0.086*** (0.009)
Bankruptcy		-0.831*** (0.162)	-0.894*** (0.159)
Homeowner		0.168 (0.190)	0.161 (0.190)
Vehicle control variables	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes
Observations	127,283	127,283	127,283
R^2	0.573	0.580	0.581
Mean of dependent variable	28.98	28.98	28.98

Table IA.13**Default regressions (interest rates and markups)**

This table estimates OLS regressions where the dependent variable is an indicator for whether a borrower defaulted (i.e., filed bankruptcy, or the vehicle was repossessed (multiplied by 100 so that coefficient estimates are in percentage points). The explanatory variables of interest are borrower APR, buy rate APR (the minimum APR at which the lender is willing to make the loan), and APR markup. All regressions include vehicle and loan control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Default (%)		
	(1)	(2)	(3)
Borrower APR	2.848*** (0.166)		
Buy rate APR		2.850*** (0.173)	2.525*** (0.169)
APR Markup		0.911*** (0.190)	1.049*** (0.181)
Loan purchase discount (%)			0.566*** (0.124)
Credit score	-0.065*** (0.006)	-0.061*** (0.006)	-0.061*** (0.006)
Income	-0.187*** (0.021)	-0.180*** (0.021)	-0.180*** (0.020)
Bankruptcy	-3.016*** (0.527)	-2.629*** (0.543)	-2.652*** (0.550)
Homeowner	-2.967*** (0.588)	-2.828*** (0.595)	-2.763*** (0.607)
Vehicle control variables	Yes	Yes	Yes
Loan term control variables	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes
Observations	120,649	120,649	120,649
R^2	0.342	0.343	0.343
Mean of dependent variable	22.11	22.11	22.11

Table IA.14**Price discrimination regressions (finance margin version)**

This table reports regressions identical to those in Table 5 except that finance margin is the independent variable instead of reserves. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable	Vehicle markup (\$)				
	(1)	(2)	(3)	(4)	(5)
Finance margin (\$)	0.193*** (0.022)	0.169*** (0.025)	0.108*** (0.018)	0.192*** (0.019)	0.206*** (0.023)
Finance margin (\$) × High Credit Score		0.048*** (0.013)			
Finance margin (\$) × Attended College			0.001 (0.021)		
Finance margin (\$) × Positive Down Payment				0.063 (0.039)	
Finance margin (\$) × High Competition					-0.029 (0.037)
Vehicle control variables	Yes	Yes	Yes	Yes	Yes
Borrower control variables	Yes	Yes	Yes	Yes	Yes
Dealer × month fixed effects	Yes	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	216,588	216,588	58,034	216,588	216,588
R^2	0.459	0.459	0.577	0.486	0.459
Mean of dependent variable	3,696	3,696	3,939	3,696	3,696

Table IA.15**Price discrimination regressions (percent markup)**

This table reports regressions identical to those in Table 5 except that vehicle markups and reserves are in percent terms instead of dollar terms. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable	Vehicle markup (%)				
	(1)	(2)	(3)	(4)	(5)
Reserve (%)	0.250*** (0.033)	0.279*** (0.045)	0.175*** (0.037)	0.320*** (0.049)	0.261*** (0.036)
Reserve (%) × High Credit Score		-0.052* (0.028)			
Reserve (%) × Attended College			-0.002 (0.044)		
Reserve (%) × Positive Down Payment				-0.038 (0.053)	
Reserve (%) × High Competition					-0.024 (0.046)
Vehicle control variables	Yes	Yes	Yes	Yes	Yes
Borrower control variables	Yes	Yes	Yes	Yes	Yes
Dealer × month fixed effects	Yes	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	216,588	216,588	58,034	216,588	216,588
R^2	0.600	0.600	0.699	0.626	0.600
Mean of dependent variable	28.81	28.81	30.95	28.81	28.81

Table IA.16**Price discrimination regressions (percent markup, finance margin version)**

This table reports regressions identical to those in Table 5 except that finance margin is the independent variable instead of reserves and vehicle markups and finance margins are in percent terms instead of dollar terms. All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable	Vehicle markup (%)				
	(1)	(2)	(3)	(4)	(5)
Finance margin (%)	0.222*** (0.030)	0.219*** (0.034)	0.066** (0.029)	0.340*** (0.025)	0.237*** (0.033)
Finance margin (%) × High Credit Score		0.006 (0.016)			
Finance margin (%) × Attended College			0.039** (0.014)		
Finance margin (%) × Positive Down Payment				-0.078** (0.034)	
Finance margin (%) × High Competition					-0.034 (0.033)
Vehicle control variables	Yes	Yes	Yes	Yes	Yes
Borrower control variables	Yes	Yes	Yes	Yes	Yes
Dealer × month fixed effects	Yes	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	216,588	216,588	58,034	216,588	216,588
R^2	0.601	0.601	0.699	0.628	0.601
Mean of dependent variable	28.81	28.81	30.95	28.81	28.81

Table IA.17**Price discrimination (add-on revenue regressions)**

This table reports regressions identical to those in Table 5 except that the dependent variable is add-on revenue (in dollar terms in Columns (1) and (2) and as a percentage of purchase price in Columns (3) and (4)). All regressions include vehicle control variables described in Table 1, as well as dealer-month fixed effects and vehicle make-model fixed effects. Standard errors (in parentheses) are double-clustered by state and loan origination month. * indicates 10% significance, ** indicates 5% significance, and *** indicates 1% significance.

Dependent variable:	Add-on revenue (\$)		Add-on revenue (% of purchase price)	
	(1)	(2)	(3)	(4)
Reserve (\$)	0.532*** (0.026)			
Vehicle markup (\$)		0.465*** (0.022)		
Reserve (%)			0.471*** (0.028)	
Vehicle markup (%)				0.516*** (0.019)
Vehicle control variables	Yes	Yes	Yes	Yes
Borrower control variables	Yes	Yes	Yes	Yes
Dealer \times month fixed effects	Yes	Yes	Yes	Yes
Vehicle make-model fixed effects	Yes	Yes	Yes	Yes
Observations	216,588	216,588	216,588	216,588
R^2	0.444	0.466	0.460	0.496
Mean of dependent variable	1038	1038	6.377	6.377