

The Digital Credit Divide: Marketplace Lending and Entrepreneurship

Online Appendix

A: Exogeneity tests

Table A.1: Exogeneity Tests

	1	2
<hr/> Dependent variable: Treatment <hr/>		
Estab	-0.2650 (-1.58)	
Δ Estab		0.1485 (0.99)
State FE	Yes	Yes
Year FE	Yes	Yes
<hr/>		
Observations	357	306
R^2	0.8850	0.8855

Notes: This table presents estimates of the equation $Treatment_{st} = \alpha + \beta Estab_{st} + \delta_s + \delta_t + \varepsilon_{st}$ where $Treatment_{st}$ is a dummy variable equal to 1 if state s permits marketplace borrowing during year t ; $Estab_{st}$ is either the level or change in the number of establishments per capita within the state; δ_s and δ_t indicate state and year fixed effects, respectively; ε_{st} is the error term. The data contain observations from all 50 states and the District of Columbia during the sample period (2010 to 2016). The standard errors are bootstrapped using 50 replications. t -statistics are reported in parentheses.

B: Dynamic effects and effect magnitude

Table A.2: Year-by-Year Dynamic Specifications

Dependent variable:	1 Estabs
D_s	0.9342*** (19.31)
$D_s * Y2001$	0.0036 (0.06)
$D_s * Y2002$	0.0326 (0.45)
$D_s * Y2003$	0.0066 (0.09)
$D_s * Y2004$	0.0328 (0.54)
$D_s * Y2005$	0.0204 (0.24)
$D_s * Y2006$	0.0002 (0.01)
$D_s * Y2007$	-0.0134 (-0.18)
$D_s * Y2008$	-0.0114 (-0.16)
$D_s * Y2009$	-0.0089 (-0.13)
$D_s * Y2010$	-0.0038 (-0.05)
$D_s * Y2011$	0.0230 (0.33)
$D_s * Y2012$	0.1331* (1.95)
$D_s * Y2013$	0.1619** (2.23)
$D_s * Y2014$	0.1995*** (2.84)
$D_s * Y2015$	0.2185*** (3.07)
$D_s * Y2016$	0.4408*** (5.97)
Industry FE	Yes
Year FE	Yes
Observations	2,334,199
R^2	0.0556

Notes: This table reports estimates of the equation $Estabs_{izst} = \alpha D_{zs} + \beta_j \sum_{j=2001}^{2016} D_s * Y_j + \delta_i + \delta_t + \varepsilon_{izst}$ where $Estabs_{izst}$ is the number of establishments in industry i in zip code z in state s during year t ; D_{zs} is a dummy variable equal to 1 if state s permits marketplace lending during the post period; Y_j are year dummy variables for 2001, 2002, ..., 2016; δ_i and δ_t are 4-digit industry and year fixed effects, respectively; ε_{izst} is the error term. Standard errors are bootstrapped using 50 replications and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

To gauge to what extent marketplace lending increases entrepreneurship, we estimate a dynamic difference-in-difference using annual industry level data from 2000 to 2016. We estimate

$$Estabs_{izst} = \alpha D_{zs} + \beta_j \sum_{j=2001}^{2016} D_s * Y_j + \delta_i + \delta_t + \varepsilon_{izst},$$

where $Estabs_{izst}$ is the number of establishments in industry i in zip code z in state s during year t ; D_{zs} is a dummy variable equal to 1 if state s permits marketplace lending during the post period; Y_j are year dummy variables for 2001, 2002, ..., 2016; δ_i and δ_t are 4-digit industry and year fixed effects, respectively; ε_{izst} is the error term. The coefficients $\beta_{2001}, \beta_{2002}, \dots, \beta_{2016}$ show whether the number of establishments is significantly different between states that remove marketplace lending restrictions and those that do not during each year. Intuitively, one would expect the interaction coefficients to be insignificant in the years before the introduction of marketplace lending and in the years when marketplace lending is in its infancy and business lending volumes are small. Once, marketplace lending grows to become an important source of business finance, we anticipate the interaction coefficients will become statistically significant.

This is indeed what the data show. The estimates of the test are reported in Table A.2. During the pre-treatment period (i.e. before the introduction of marketplace lending platforms) and in the first years following the entry of marketplace lenders, when lending volumes were small, the interaction coefficients are economically close to zero and statistically insignificant. However, from 2012 onwards the interaction coefficients are significant at conventional levels. Importantly, the economic magnitude of the coefficients grows through time from 0.1331 (t-stat = 1.95) in 2012 to 0.4408 (t-stat = 5.97) and business lending expands on the platforms.

The effect sizes are substantive. The estimates imply that marketplace lending increased the number of establishments within the average 4-digit industry by 3.24% in 2012, 3.90% in 2013, 4.77% in 2014, 5.17% in 2015, and 10.53% in 2016. Hence, as marketplace lending grows through time, we observe significant increases in entrepreneurship.

C: Firm entry and exit rates

We retrieve data from the US Census Business Dynamics Statistics database. This source provides annual state level information on firm entry and exit at the two digit industry level. This is more aggregate in nature than the county level 4-digit industry data in our tests. We continue to use instrumental variables regressions. The second stage equation is

$$y_{ist} = \alpha + \beta MPL_{st} + \delta_i + \delta_t + \varepsilon_{ist}$$

where y_{ist} is a dependent variable (the entry, exit or net entry rate (the difference between the entry and exit rate)) in industry i in state s during year t ; MPL_{st} is the per capita level of marketplace lending; δ_i and δ_t are industry and year fixed effects, respectively; ε_{ist} is the error term. In the first stage equation we regress MPL_{st} on the treatment variable as in the main tests.

Table A.3: Industry Dynamics

Dependent variable:	1 Entry rate	2 Exit rate	3 Net entry rate
MP loans	0.0322*** (8.29)	0.0218*** (7.79)	0.0104** (2.07)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	5,038	5,038	5,038
R^2	0.4986	0.5537	0.2345
Kleibergen-Paap F-statistic	861	861	861

Notes: This table presents estimates of the equation $Treatment_{st} = \alpha + \beta Estab_{st} + \delta_s + \delta_t + \varepsilon_{st}$ where $Treatment_{st}$ is a dummy variable equal to 1 if state s permits marketplace borrowing during year t ; $Estab_{st}$ is either the level or change in the number of establishments per capita within the state; δ_s and δ_t indicate state and year fixed effects, respectively; ε_{st} is the error term. Standard errors are bootstrapped using 50 replications and the corresponding t -statistics are reported in parentheses. *** indicates statistical significance at the 1% level.

D: Crowdfunding deregulation robustness tests

Table A.4: Tests around Equity Crowdfunding Deregulation

Sample	1	2	3
Dependent variable: Estab	2010-2011	2012-2016	2010-2016
MP loans	0.0917*** (7.85)	0.0326*** (7.29)	0.0702*** (15.84)
Equity crowdfunding	-0.0451*** (-7.76)	0.0308*** (8.75)	
Unemployment rate	-0.1952*** (-9.46)	0.0023 (0.12)	-0.0973*** (-7.58)
Population	-0.2449*** (-20.18)	-0.2219*** (-25.29)	-0.2088*** (-29.00)
Ethnicity	-0.0223* (-1.75)	0.0048 (0.50)	0.0073 (0.70)
Degree	-0.0955* (-1.80)	-0.1804*** (-3.51)	-0.4393*** (-9.08)
Latitude	0.0575*** (9.55)	0.0558*** (12.41)	0.0749*** (21.70)
Longitude	0.0076*** (6.99)	0.0082*** (9.81)	0.0118*** (15.71)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	52,149	77,106	112,167
R^2	0.2838	0.2964	0.2567
Kleibergen-Paap F-statistic	1,160	4,643	3,411

Notes: This table presents estimates of equation (2). Variables definitions are reported in Panel A of Table 1. The dependent variable in all regressions is Estab. The dependent and independent variables are measured in natural logarithms. In column 1 (2) the sample contains observations from the years 2010 to 2011 (2012 to 2016). In column 3 the sample contains observations from the years 2010 to 2016 but excludes observations from states that have removed restrictions on equity crowdfunding. The states in our sample that remove crowdfunding restrictions during the sample period are Alabama, Colorado, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Michigan, Minnesota, Mississippi, Nebraska, Oregon, Tennessee, Virginia, Washington, Wisconsin, and Wyoming (data taken from Morrison Foerster). The sample contains observations from within 10 miles of the threshold. Standard errors are bootstrapped using 50 replications and the corresponding t -statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

E: General equilibrium tests

Table A.5: General Equilibrium Tests

Sample	1	2
Dependent variable: Estab	All	< 10 miles
D_{st}	0.6070*** (5.45)	0.2612*** (5.86)
Equity crowdfunding		0.0657*** (4.75)
Unemployment rate		-0.4595* (-1.89)
Population		-1.1813*** (-9.41)
Ethnicity		-0.0935 (-0.83)
Degree		-1.0142** (-2.57)
Zip code FE		Yes
Industry FE		Yes
Year FE		Yes
Observations	7,111,964	164,298
R^2	0.10	0.05

Notes: This table presents estimates of equation (3). Variables definitions are reported in Panel A of Table 1. The dependent variable in all regressions is Estab. The dependent and independent variables are measured in natural logarithms. In column 1 the sample contains observations from zip codes throughout all 50 states. In column 2 the sample contains observations from zip codes within 10 miles of state borders. Standard errors are bootstrapped using 50 replications and the corresponding t -statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.