

Online Appendix

“The Impact of Consumer Credit Access on Self-Employment and Entrepreneurship”

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A Data Definitions and Construction

TransUnion. Our credit data are measured as of September in each year t , so there are instances in which flags are removed in October, November, or December of the prior year $t-1$ (i.e., prior fiscal year $t-1$ ending Dec. 31 through which we measure earnings and self-employment earnings), but the flag removal is classified as a removal only in the following year t . In results available on request, we attempt to capture these early transitions by using beginning-of-year employment (e.g., if an individual earned \$1,000 last year and \$1,000 this year, then they were employed at the beginning of the year, and they may have transited from bankruptcy in October - December of the prior year). Under these alternate beginning-of-year definitions of employment and self-employment, our main results persist.

The Integrated Longitudinal Business Database (ILBD). The ILBD merges two different databases. The first database is the Longitudinal Business Database (LBD), which tracks the universe of all U.S. establishments that have paid employees.⁸ The second database is the universe of IRS non-employer tax records (i.e., those who fill out 1040 Schedule C tax returns). As soon as an entity hires a non-contractor, full-time employee, the business owner must obtain an EIN and will enter the LBD.⁹ Davis et al. (2007) construct the ILBD using the SSN-EIN link found on the application for an EIN, and they also use exact business name matches. These matches yield a crosswalk between non-employers and the subsequent businesses they become.¹⁰ We subsequently merge the ILBD using anonymized unique identifiers with our credit bureau data and the LEHD.

⁸“Overview: The Longitudinal Business Database (LBD) is a research data set constructed at the Center for Economic Studies (CES) in the U.S. Census Bureau. The LBD contains the universe of all U.S. business establishments with paid employees listed in the Census Bureau’s business register.” <http://maryannfeldman.web.unc.edu/data-sources/longitudinal-databases/longitudinal-business-database/>

⁹According to the IRS, “As a business owner, when another person performs work for you, you must first correctly classify that person as an independent contractor or employee. If the person is an independent contractor, refer to Forms and Associated Taxes for Independent Contractors for your tax responsibilities. If the person is classified as an employee you must have an Employer Identification Number (EIN). Your tax responsibilities include withholding, depositing, reporting, and paying employment taxes. You must also give certain forms to your employees, they must give certain forms to you, and you must send certain forms to the IRS and SSA.” <https://www.irs.gov/businesses/small-businesses-self-employed/businesses-with-employees>

¹⁰Quoting from Davis et al. (2007) “...we create a set of firm-level matches between employers and nonemployers for our selected industries. These matches rely on numeric identifiers and exact literal matches on business names. In matching on numeric identifiers, we exploit the fact that many business records contain both an EIN and an SSN. For example, when a business owner or officer applies for an EIN, he or she must fill out an SS-4 form for the IRS. This form includes the business name, the EIN and the SSN of the business owner or chief officer, all of which are included in Census Bureau business registers. These data allow us to build a crosswalk between EINs and SSNs, which we then use to match business records across universes... we rely only on the EIN-SSN crosswalk and exact literal matches on business name. As an example of how our matching algorithm works, consider all establishments with employees in our selected industries as of 2000. Using the longitudinal links in the LBD, we first create a set of identifiers (EINs, SSNs and business names) associated with each establishment with employees in 2000 for each year back to 1992... About 17% of our employer-nonemployer matches rely on exact literal matches on business name strings.”

B Theoretical Model

In this section, we present an illustrative model to derive some simple tests of alternative theoretical explanations for the importance of credit discussed in Section 2. Consider an individual who works for 2 periods, $t = 1, 2$. Suppose the individual either has access to credit markets (G denotes good credit standing) or is bankrupt and has no access to credit markets (B denotes bad credit standing). In the first period, an individual must choose between searching for a formal sector job, F , which pays a fixed wage, or becoming self-employed, S , and earning risky income that varies with entrepreneurial ability. In bad standing, agents cannot borrow. In good standing, agents can borrow up to \underline{b} . Those that become self-employed invest in capital to produce in the first period. Let k denote capital, p_k the price of capital, δ the depreciation rate, and let $b < 0$ denote borrowing and $b > 0$ denote saving. In the second period, all individuals have the option of receiving fixed income w , while entrepreneurs have the additional option of continuing to run their business.

We assume the individual has initial wealth b and unknown entrepreneurial ability z (this ability can simply be interpreted as *relative* entrepreneur ability relative to wage work). Let $F(z)$ denote the distribution of entrepreneurial ability. Let σ_z denote the variance of $F(z)$. We assume that entrepreneur ability is only revealed after entry into self-employment – thus initial wealth and credit market standing determine entrepreneurial entry. Let $V^{S,G}(z, b)$ be the value of an entrepreneur in good credit standing, $V^{F,G}(z, b)$ be the value of entering the formal sector in good credit standing, let $V^{S,B}(z, b)$ be the value of an entrepreneur in bad credit standing, and let $V^{F,B}(z, b)$ be the value of entering the formal sector in good credit standing. The beginning-of-life decision is to work or start a business:

$$\begin{aligned} & \max_{\text{self-empl}, \text{formal-empl.}} \left\{ \int V^{S,G}(z, b) dF(z), V^{F,G}(z, b) \right\} \\ & \max_{\text{self-empl}, \text{formal-empl.}} \left\{ \int V^{S,B}(z, b) dF(z), V^{F,B}(z, b) \right\} \end{aligned}$$

We assume entrepreneurs face a working capital constraint (payments to capital cannot exceed cash-on-hand, $p_k k \leq b - qb'$), and a borrowing limit ($b' \geq \underline{b}$). Entrepreneurs choose borrowing b' and capital purchases k subject to these constraints. In the second period of life, the entrepreneur may stop operating the business and receive a fixed wage income w or continue to operate the business with undepreciated capital. Regardless of their decision, they sell undepreciated capital after production in the second period. Those who choose to start a business in good credit standing have a continuation value given by,

$$V^{S,G}(z, b) = \max_{b', k} u(c) + \beta u \left(\max_{\text{work, run firm}} \{w + p_k k(1 - \delta) + b', z(k(1 - \delta))^\alpha + p_k k(1 - \delta) + b'\} \right)$$

subject to

$$c + qb' \leq zk^\alpha - p_k k + b$$

$$\begin{aligned}
p_k k &\leq b - qb' \\
b' &\geq \underline{b} \\
q &= \frac{1}{1 + r_f}
\end{aligned}$$

Those who start a business in bad credit standing have a continuation value given by,

$$V^{S,B}(z, b) = \max_{b', k} u(c) + \beta u \left(\max_{work, run \ firm} \{w + p_k k(1 - \delta) + b', z(k(1 - \delta))^\alpha + p_k k(1 - \delta) + b'\} \right)$$

subject to

$$\begin{aligned}
c + qb' &\leq zk^\alpha - p_k k + b \\
b' &\geq 0 \\
p_k k &\leq b - qb'
\end{aligned}$$

Those who search for a job face employment risk. The notation convention we use is to script continuation values with W for those who find a job, e.g., $V^{W,G}(z, b)$, and script continuation values with U for those who do not find a job, e.g., $V^{U,G}(z, b)$. Suppose their job finding rate is p^G with good standing and p^B with bad standing. The value of searching for a formal job in good credit standing is therefore given by,

$$V^{F,G}(z, b) = p^G V^{W,G}(z, b) + (1 - p^G) V^{U,G}(z, b)$$

and for those in bad credit standing,

$$V^{F,B}(z, b) = p^B V^{W,B}(z, b) + (1 - p^B) V^{U,B}(z, b)$$

Conditional on finding a job, the value of an agent in good standing is given by,

$$V^{W,G}(z, b) = \max_{b'} u(c) + \beta u(w + b')$$

subject to

$$\begin{aligned}
c + qb' &\leq w + b \\
b' &\geq \underline{b}
\end{aligned}$$

Similarly, the value of an agent in bad standing is given by,

$$V^{W,B}(z, b) = \max_{b'} u(c) + \beta u(w + b')$$

subject to

$$c + qb' \leq w + b$$

$$b' \geq 0$$

Conditional on not finding a job, workers receive home production g . In the second period of life, they receive fixed wage income w . Therefore, the value in good standing is given by,

$$V^{U,G}(z, b) = \max_{b'} u(c) + \beta u(w + b')$$

subject to

$$c + qb' \leq g + b$$

$$b' \geq \underline{b}$$

Likewise, the value in bad standing is given by,

$$V^{U,B}(z, b) = \max_{b'} u(c) + \beta u(w + b')$$

subject to

$$c + qb' \leq g + b$$

$$b' \geq 0$$

2.1. Parameterization

We parameterize the model so that each period corresponds to 15 years. We set risk aversion $\sigma = 2$, annual depreciation to 10%, and the risk-free rate to 4% per annum (the corresponding annual household discount factor is $\beta = .96$); the wage rate and price of capital are set to unity ($w = p_k = 1$); benefits replace 50% of lost income $g = \frac{1}{2}w$; and the borrowing limit is equal to labor income in the second period, $\underline{b} = -1$. The production technology assumes a capital share of $\alpha = \frac{1}{3}$. We set the job finding rate to produce the average formal-employment rate among our sample of 78.2%. We set the job finding rate of the good types to 78.7%, which is .5% higher according to our estimates.

We assume $z \in \{z_L, z_H\}$, and that $F(z)$ is a symmetric distribution, i.e., $F(z)$ places equal density on $\{z_L, z_H\}$ with corresponding variance σ_z and that z_H and z_L are also symmetrically spaced around the mean \bar{z} , $\bar{z} = \frac{1}{2}z_L + \frac{1}{2}z_H$. We assume $\bar{z} = 2$. In the numerical examples below, we consider mean-preserving spreads of $F(z)$. Given symmetry, a mean-preserving spread of $F(z)$ is simply an expansion of the support from (z_L, z_H) to $(z_L - \Delta, z_H + \Delta)$ for arbitrary Δ .

2.2. Model Predictions

The model yields three testable predictions. First, Figure 8 shows that conditional on the same initial wealth, startup rates are higher for those in good relative to bad credit standing. As the riskiness of entrepreneurship increases, the region in which individuals start a new

business declines.¹¹

Second, Figure 9 shows that conditional on the same initial wealth, new entrants who realize high entrepreneur ability borrow to finance capital purchases (the working capital constraint binds). For a symmetric mean-preserving spread $F^1(z)$ (with new support $[z_L^1, z_H^1]$) of $F(z)$ (with support $[z_L, z_H]$) such that $\sigma_z^1 > \sigma_z$, we must have $z_H^1 > z_H$, and our model implies $b'(z_H^1) < b'(z_H)$. In other words, new entrants who realize higher entrepreneur ability borrow more. They do so in order to produce more, and thus their self-employment income is higher. This borrowing generates a *negative* covariance between net assets and self-employment income or, in other words, a positive covariance between borrowing (defined to be the negative of net assets) and self-employment income.

Third, Figure 10 shows that conditional on the same initial wealth, new entrants who realize low entrepreneur ability borrow to smooth consumption. For a symmetric mean-preserving spread $F^1(z)$ of $F(z)$ (thus $\sigma_z^1 > \sigma_z$), we must have $z_L^1 < z_L$, and our model implies $b'(z_L^1) < b'(z_L)$. In other words, new entrants who realize lower entrepreneur ability borrow more as well. They do so in order to smooth consumption. The lower the ability, the less they produce and the more they borrow. This borrowing generates a *positive* covariance between net assets and self-employment income or, in other words, a negative covariance between borrowing (defined to be the negative of net assets) and self-employment income.

We formally measure this correlation between ability and borrowing by solving the model under various mean-preserving spreads $F^j(z)$, and then considering the covariance between ability and borrowing across these model economies. Consider a sequence of mean-preserving spreads, $\{F^1, \dots, F^j, \dots, F^J\}$, where $\sigma_z^1 < \dots < \sigma_z^j < \dots < \sigma_z^J$, and thus $z_L^1 > \dots > z_L^j > \dots > z_L^J$ and $z_H^1 < \dots < z_H^j < \dots < z_H^J$. Let the corresponding borrowing decisions be denoted by $\{b'^j(z_L^j)\}$. To measure the way ability interacts with borrowing, we consider the correlation of $\{z_L^j\}_{j=1}^J$ with $\{b'^j(z_L^j)\}_{j=1}^J$.¹² As discussed above, we expect a positive covariance – lower values of z_L^j are associated with lower values of $b'^j(z_L^j)$ since low-ability entrepreneurs must borrow to smooth consumption, and the lower their ability, the more they have to borrow.

Table B1 reports the covariance between realizations of z and borrowing for high- and low-ability individuals. Rows 1 and 3 show that for low-ability individuals, there is a positive correlation of .97 between ability and net assets, and a positive correlation of the same magnitude between self-employed income and net assets. Row 5 shows that the correlation of income and ‘borrowing’ (which we approximate by the negative of net assets, $-b'^j$) has a negative correlation of -.97. This correlation suggests that if there are consumption-smoothing motives due to bad realizations of self-employment income shocks, those with

¹¹While not depicted here, at some point the value of z_L is so low that the individual buys near-zero capital (effectively shutting down), and higher values of entrepreneurial income variance *increase* the region in which individuals enter entrepreneurship. The value of operating with zero capital implies a lower bound on payoffs to entrepreneurs.

¹²We compute $\text{Corr}([z_L^1, \dots, z_L^J]', [b'^1(z_L^1), \dots, b'^J(z_L^J)])$ and $\text{Corr}([z_H^1, \dots, z_H^J]', [b'^1(z_H^1), \dots, b'^J(z_H^J)])$.

lower self-employed income should borrow more.

Rows 2 and 4 of Table B1 show that for high-ability individuals, there is a negative correlation of $-.61$ between ability and net assets; since self-employed income is proportional to ability, the correlation between self-employed income and net assets has the same sign and magnitude. Last, row 5 shows that the correlation of income and ‘borrowing’ (which we approximate by the negative of net assets, $-b^j$) has a positive correlation of $+.61$. Thus, if debt is used for investing in the business, we expect a positive correlation between borrowing and self-employed income.

It is important to note that the ‘cash-on-hand’ constraint drives this correlation between the high-ability realization and self-employed income. These types of working capital constraints are used often in the literature, and covenants imply strong links between the amount that can be borrowed and contemporaneous profitability. Modeling alternative collateral constraints in a dynamic setting with time-to-build is beyond the scope of this paper, but we posit that higher-ability entrepreneurs should borrow to finance investment, yielding a similar positive covariance between self-employed income and consumer credit.

Figure 8: Startup Decision

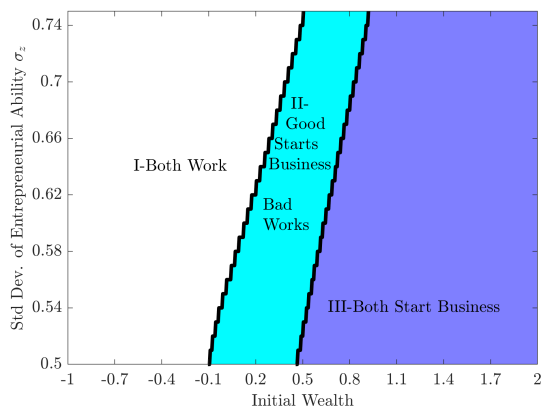


Figure 9: High-ability entrepreneurs

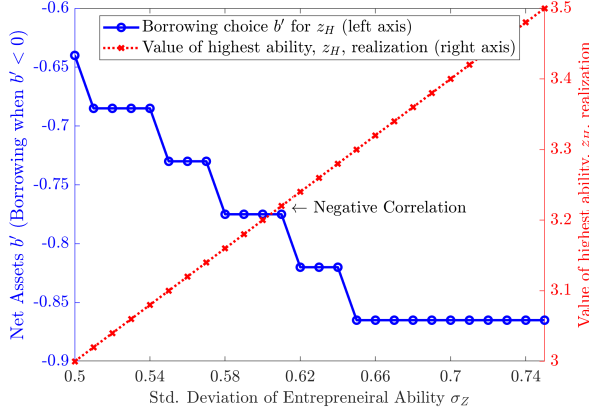
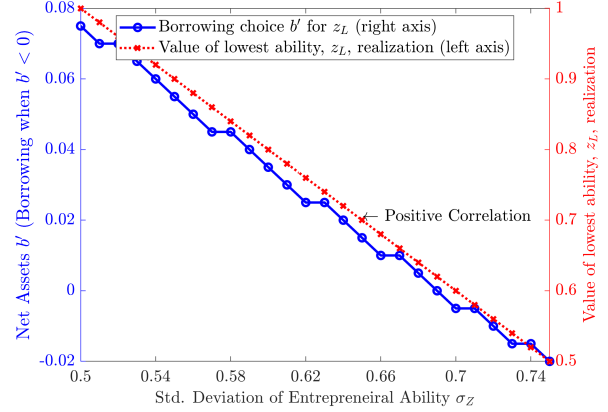


Figure 10: Low-ability entrepreneurs

Table B1: Borrowing and Self-employed Income. Correlation between Self-employed Income and Net Assets as Dispersion of $F(z)$ Increases

Description	Correlation
Correlation of net assets and ability z_L^j as σ_z varies, $\text{corr}(b'^j, z_L^j)$	+0.97
Correlation of net assets and ability z_H^j as σ_z varies, $\text{corr}(b'^j, z_H^j)$	-0.61
Corr. of net assets and self-empl. income for those with low realization z_L^j as σ_z varies, $\text{corr}(b'^j, z_L^j k^\alpha - p_k k)$	+0.97
Corr. of net assets and self-empl. income for those with high realization z_H^j as σ_z varies, $\text{corr}(b'^j, z_H^j k^\alpha - p_k k)$	-0.61
Corr. of borrowing (negative of net assets) and self-empl. income for those with low realization z_L^j as σ_z varies, $\text{corr}(-b'^j, z_L^j k^\alpha - p_k k)$	-0.97
Corr. of borrowing (negative of net assets) and self-empl. income for those with high realization z_H^j as σ_z varies, $\text{corr}(-b'^j, z_H^j k^\alpha - p_k k)$	+0.61

This table reports results from solving the model for each mean-preserving distribution F^j . Rows 1 and 2 compute the correlation of ability and net assets among low- z individuals across these model simulations, $\text{Corr}([z_L^1, \dots, z_L^J]', [b'^1(z_L^1), \dots, b'^J(z_L^J)])$. Rows 3 and 4 compute the same correlation among high- z individuals, $\text{Corr}([z_H^1, \dots, z_H^J]', [b'^1(z_H^1), \dots, b'^J(z_H^J)])$. Rows 5 and 6 replace net assets $b'^j(\cdot)$ with the negative of net assets $-b'^j(\cdot)$.

C Robustness and Additional Empirical Results

3.1. Population Results

Table C1 reports the full regression from Table 2, including the coefficients on the terms for the levels of credit and credit scores. The table also includes non-employment and dual employment measures. Self-employment and transitions into self-employment increase as the marginal cost of \$1 of credit declines (i.e., as the credit score improves). Credit scores are an ordinal rank, and thus the deciles convey information about the ranking of marginal costs of funds, not the level. While revolving credit limits are typically populated in our data set, the unused mortgage credit is defined as the highest mortgage balance observed less the current mortgage balance and is therefore zero for non-mortgagors. Likewise, the unused non-mortgage and non-revolving credit corresponds to the highest non-mortgage and non-revolving debt observed less the current non-mortgage and non-revolving debt. The mortgage deciles 1 through 6 include those with a zero balance for their mortgage (roughly 40% of U.S. households have a mortgage). Table C2 yields similar results when we aggregate all forms of credit.

Table C1: Population Relationships between Self-/Formal-Employment Outcomes and Credit (Source: 100% Sample)

	(1) Self \$1,000+ t+1	Employed (d), t+1	(2) Transition Self-Employed \$1,000+ t+1	Into (d), t+1	(3) Transition Out of Self-Employed \$1,000+ (d), t+1	(4) Firm ship, 1+ Yrs, t+1	Owner- ship, 1+ Yrs, t+2	(5) Firm Ownership 2+ Yrs, t+1 and t+2	(6) Formal- Employed \$1,000+ (d), t+1
Unused Revolving Credit Decile 3, t	0.00173*** (0.000343)		0.000989*** (0.000287)		0.000148 (0.000253)	0.000177*** (5.34e-05)		0.000123*** (4.03e-05)	-0.00160*** (0.000463)
Unused Revolving Credit Decile 4, t	0.00204*** (0.000328)		0.00139*** (0.000267)		0.000358 (0.000237)	0.000123** (5.76e-05)		0.000102** (4.38e-05)	-0.00220*** (0.000436)
Unused Revolving Credit Decile 5, t	0.00338*** (0.000357)		0.00267*** (0.000288)		0.000538** (0.000255)	0.000243*** (6.80e-05)		0.000180*** (5.36e-05)	-0.00321*** (0.000466)
Unused Revolving Credit Decile 6, t	0.00481*** (0.000388)		0.00326*** (0.000308)		-4.19e-05 (0.000274)	0.000209*** (7.61e-05)		0.000138** (5.96e-05)	-0.00332*** (0.000498)
Unused Revolving Credit Decile 7, t	0.00555*** (0.000422)		0.00400*** (0.000331)		0.000223 (0.000296)	0.000287*** (8.58e-05)		0.000177*** (6.80e-05)	-0.00465*** (0.000534)
Unused Revolving Credit Decile 8, t	0.00698*** (0.000471)		0.00552*** (0.000364)		0.000474 (0.000327)	0.000206** (0.000101)		0.000199** (8.20e-05)	-0.00542*** (0.000585)
Unused Revolving Credit Decile 9, t	0.00891*** (0.000538)		0.00718*** (0.000410)		0.000150 (0.000372)	0.000388*** (0.000123)		0.000254** (0.000101)	-0.00661*** (0.000657)
Unused Revolving Credit Decile 10, t	0.00954*** (0.000644)		0.00797*** (0.000488)		0.000115 (0.000444)	0.000672*** (0.000162)		0.000453*** (0.000135)	-0.00868*** (0.000762)
Credit Score Decile 2, t	-0.000452 (0.000390)		-0.000113 (0.000321)		0.000214 (0.000290)	-0.000113 (7.14e-05)		-6.85e-05 (5.39e-05)	-0.000338 (0.000539)
Credit Score Decile 3, t	0.000108 (0.000375)		0.000394 (0.000307)		-0.000428 (0.000278)	-0.000149** (6.99e-05)		-4.07e-05 (5.34e-05)	-0.00270*** (0.000508)
Credit Score Decile 4, t	0.000941** (0.000380)		0.000924*** (0.000309)		-0.000360 (0.000280)	-8.34e-05 (7.37e-05)		-5.62e-05 (5.75e-05)	-0.00351*** (0.000507)
Credit Score Decile 5, t	0.00172*** (0.000392)		0.000987*** (0.000317)		-0.00123*** (0.000286)	-0.000107 (7.86e-05)		-9.04e-06 (6.10e-05)	-0.00402*** (0.000516)
Credit Score Decile 6, t	0.00152*** (0.000408)		0.000781** (0.000328)		-0.00113*** (0.000297)	-0.000146* (8.37e-05)		-2.28e-05 (6.48e-05)	-0.00447*** (0.000535)
Credit Score Decile 7, t	0.00148*** (0.000427)		0.00102*** (0.000341)		-0.00135*** (0.000309)	-0.000152* (8.98e-05)		-7.03e-05 (7.00e-05)	-0.00575*** (0.000555)
Credit Score Decile 8, t	0.000961** (0.000449)		0.000607* (0.000357)		-0.00181*** (0.000324)	-0.000229** (9.68e-05)		-9.15e-05 (7.60e-05)	-0.00766*** (0.000581)
Credit Score Decile 9, t	0.00140*** (0.000487)		0.000850** (0.000384)		-0.00212*** (0.000350)	-0.000163 (0.000108)		4.98e-05 (8.72e-05)	-0.00996*** (0.000620)
Credit Score Decile 10, t	-0.000153 (0.000505)		-0.000292 (0.000396)		-0.00207*** (0.000356)	-0.000239** (0.000108)		-0.000154* (8.70e-05)	-0.0108*** (0.000663)
Unused Mortgage Credit Decile 7, t	0.00343*** (0.000328)		0.00152*** (0.000264)		7.53e-05 (0.000240)	0.000167** (7.39e-05)		0.000111* (5.84e-05)	-0.00317*** (0.000366)
Unused Mortgage Credit Decile 8, t	0.00363*** (0.000323)		0.00195*** (0.000255)		7.69e-05 (0.000234)	0.000239*** (7.59e-05)		0.000148** (6.10e-05)	-0.00364*** (0.000364)
Unused Mortgage Credit Decile 9, t	0.00368*** (0.000348)		0.00173*** (0.000266)		-0.000113 (0.000247)	0.000343*** (8.61e-05)		0.000148** (7.07e-05)	-0.00525*** (0.000396)
Unused Mortgage Credit Decile 10, t	0.00141*** (0.000407)		0.00111*** (0.000304)		0.000297 (0.000286)	0.000292** (0.000114)		0.000197** (9.48e-05)	-0.00745*** (0.000461)
Unused Non-Mortgage and Non-Revolving Credit Decile 4, t	0.000670** (0.000304)		0.000352 (0.000253)		5.66e-05 (0.000231)	-9.05e-05 (6.58e-05)		-0.000128** (5.25e-05)	0.000316 (0.000390)
Unused Non-Mortgage and Non-Revolving Credit Decile 5, t	0.00118*** (0.000273)		0.00111*** (0.000226)		6.57e-05 (0.000202)	-3.07e-05 (5.16e-05)		-4.90e-05 (4.06e-05)	-0.000932*** (0.000354)
Unused Non-Mortgage and Non-Revolving Credit Decile 6, t	0.00182*** (0.000279)		0.00171*** (0.000229)		5.06e-05 (0.000205)	-3.69e-05 (5.58e-05)		-4.50e-05 (4.40e-05)	-0.00119*** (0.000354)
Unused Non-Mortgage and Non-Revolving Credit Decile 7, t	0.00200*** (0.000287)		0.00179*** (0.000232)		5.41e-05 (0.000209)	6.62e-06 (5.96e-05)		-1.65e-05 (4.73e-05)	-0.000558 (0.000358)
Unused Non-Mortgage and Non-Revolving Credit Decile 8, t	0.00262*** (0.000297)		0.00247*** (0.000238)		8.70e-05 (0.000215)	-1.93e-05 (6.43e-05)		-4.90e-05 (5.14e-05)	-2.15e-05 (0.000363)
Unused Non-Mortgage and Non-Revolving Credit Decile 9, t	0.00213*** (0.000312)		0.00228*** (0.000246)		0.000639*** (0.000226)	3.56e-05 (7.16e-05)		4.71e-05 (5.78e-05)	0.000924** (0.000373)
Unused Non-Mortgage and Non-Revolving Credit Decile 10, t	0.00232*** (0.000360)		0.00262*** (0.000278)		-2.01e-05 (0.000256)	0.000368*** (9.66e-05)		0.000235*** (8.04e-05)	-0.000475 (0.000410)
Fixed Effects	Y		Y		Y	Y		Y	Y
Controls	Y		Y		Y	Y		Y	Y
R-squared	0.019		0.059		0.073	0.002		0.001	0.170
Individuals (millions)	3.06		3.06		3.06	3.06		3.06	3.06
Total Person-Year Obs. (millions)	16.40		16.40		16.40	16.40		16.40	16.40

Notes: SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (d) denotes an indicator variable that takes the values 0,1. Controls include: lagged labor earnings and self-employed income, deciles of cumulative lagged earnings dummies, quadratics in age and tenure. Fixed effects include individual fixed effects and year effects.

Table C2: Population Relationships Between Self-/Formal-Employment Outcomes and Total Credit (Source: 100% Sample)

	(1) Self Employed \$1,000+ t+1	(2) Transition Into Self-Employed \$1,000+ (d), t+1	(3) Transition Out of Self-Employed \$1,000+ (d), t+1	(4) Firm Ownership 1+ Yrs, t+1	(5) Firm Ownership 2+ Yrs, t+1 and t+2	(6) Formal- Employed \$1,000+ (d), t+1
Unused Total Credit Decile 2, t	0.00128*** (0.000339)	0.000962*** (0.000285)	0.000133 (0.000249)	0.000114** (4.85e-05)	2.76e-05 (3.69e-05)	-0.00290*** (0.000507)
Unused Total Credit Decile 3, t	0.00300*** (0.000354)	0.00224*** (0.000292)	0.000119 (0.000256)	0.000158*** (5.42e-05)	4.16e-05 (4.26e-05)	-0.00442*** (0.000513)
Unused Total Credit Decile 4, t	0.00406*** (0.000374)	0.00291*** (0.000305)	0.000252 (0.000268)	0.000179*** (5.93e-05)	3.17e-05 (4.59e-05)	-0.00483*** (0.000531)
Unused Total Credit Decile 5, t	0.00530*** (0.000391)	0.00375*** (0.000316)	0.000526* (0.000279)	0.000185*** (6.47e-05)	7.06e-05 (5.11e-05)	-0.00475*** (0.000545)
Unused Total Credit Decile 6, t	0.00579*** (0.000411)	0.00463*** (0.000330)	0.000859*** (0.000293)	0.000247*** (7.26e-05)	0.000136** (5.73e-05)	-0.00459*** (0.000563)
Unused Total Credit Decile 7, t	0.00685*** (0.000437)	0.00521*** (0.000346)	0.000471 (0.000308)	0.000340*** (8.17e-05)	0.000172*** (6.48e-05)	-0.00589*** (0.000586)
Unused Total Credit Decile 8, t	0.00786*** (0.000472)	0.00654*** (0.000370)	0.000315 (0.000331)	0.000394*** (9.58e-05)	0.000209*** (7.71e-05)	-0.00645*** (0.000619)
Unused Total Credit Decile 9, t	0.00971*** (0.000527)	0.00774*** (0.000408)	0.000163 (0.000368)	0.000601*** (0.000117)	0.000310*** (9.54e-05)	-0.00787*** (0.000674)
Unused Total Credit Decile 10, t	0.00882*** (0.000626)	0.00805*** (0.000478)	0.000519 (0.000437)	0.000804*** (0.000159)	0.000404*** (0.000131)	-0.0111*** (0.000769)
Fixed Effects	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
R-squared	0.019	0.059	0.073	0.002	0.001	0.170
Individuals (millions)	3.06	3.06	3.06	3.06	3.06	3.06
Total Person-Year Obs. (millions)	16.40	16.40	16.40	16.40	16.40	16.40

Notes: SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (d) denotes an indicator variable that takes the values 0,1. Controls include: deciles of credit scores dummies, deciles of unused mortgage credit dummies, deciles of unused non-mortgage and non-revolving credit dummies, lagged labor earnings and self-employed income, deciles of cumulative lagged earnings dummies, quadratics in age and tenure. Fixed effects include individual fixed effects and year dummies.

3.2. *Gross Formal and Self-Employment Flow Results*

Table C3 shows the impact of flag removal on formal employment. Column (1) defines formal employment to be those who have earned at least \$1,000 in an unemployment-insured job, whereas Column (2) defines formal employment to be those who have earned at least \$5,000 in an unemployment-insured job. Using the \$1,000 threshold, Column (1) shows that the stock of formally employed individuals increases by .465% after flag removal. Using the \$5,000 threshold in Column (2), formal-employment increases by .323% after flag removal.

Columns (3) through (6) of Table C3 illustrate the impact of bankruptcy flag removal on formal-employment flows. Columns (3) and (4) show that for the baseline definition of formal employment, the flows in and flows out are insignificant. We attribute the lack of significance to the sample size and churn, since the level increases significantly.

In Columns (5) and (6) of Table C3, if we define formal employment using a more stringent earnings threshold of \$5,000, we do see flows into and out of formal employment increase significantly following flag removal. The flow rate into formal employment increases by .24% in the year of removal, relative to the omitted group. We can reject equality of coefficients in the year of removal and 2 years prior to removal, but the increase is short-lived. The flow rate out of formal employment also increases following flag removal.

Last, we reconcile our results with Bos et al. (2018) by examining gross flows into and out of self-employment. In the U.S., flows into and out of self-employment increase in response to bankruptcy flag removal, suggesting that there may be a role for both credit constraints and screening. In Columns (7) and (8) of Table C3, we use a \$5,000 cutoff for self-employment (see Table 5 for \$1,000 results); we find that flows into self-employment still increase by .11% and flows out of self-employment increase by .13%. While we do not have direct evidence of the credit constraint and screening channels, the flow rate into self-employment is qualitatively supportive of a role for credit constraints, and the flow rate out of self-employment is qualitatively supportive of a role for employer screening.

Table C3: Baseline Formal-Employment Results

	(1) Formal- Employed	(2) Formal- Employed, \$5,000+	(3) Transition into Formal-Employed, \$1,000+	(4) Transition out of Formal-Employed, \$1,000+	(5) Transition into Formal-Employed, \$5,000+	(6) Transition out of Formal-Employed, \$5,000+	(7) Transition into Self-Employed, \$5,000+	(8) Transition out of Self-Employed, \$5,000+
2 Years Before Removal (d)	0.000308 (0.000897)	0.000425 (0.000914)	-0.000892 (0.000687)	0.000709 (0.000686)	0.000788 (0.000711)	0.000595 (0.000703)	0.000536 (0.000491)	0.000644 (0.000458)
1 Year Before Removal (d)	0.00154 (0.00120)	0.00129 (0.00121)	0.000127 (0.000763)	0.000421 (0.000764)	0.00118 (0.000786)	0.000927 (0.000784)	0.000219 (0.000540)	0.000939* (0.000509)
Year of Removal (d)	0.00289* (0.00149)	0.00292* (0.00151)	-0.000380 (0.000878)	0.000932 (0.000887)	0.00241*** (0.000907)	0.00224** (0.000912)	0.00107* (0.000630)	0.00131** (0.000590)
1+ Years After Removal (d)	0.00465** (0.00185)	0.00323* (0.00187)	-0.00121 (0.00107)	0.00168 (0.00108)	0.000713 (0.00110)	0.00303*** (0.00111)	0.000119 (0.000757)	0.00149** (0.000708)
Individual Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Age and Tenure Controls	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.122	0.122	0.026	0.026	0.018	0.011	0.000	0.001
Round N	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06
N Indiv	220000	220000	220000	220000	220000	220000	220000	220000
Reject Equality of 1+ Yrs & 2 Yrs at 10%	Y	Y	N	N	N	Y	N	N
Reject Equality of 0 Yrs & 2 Yrs at 10%	Y	Y	N	N	Y	Y	N	N

Notes: SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All dependent variables are 0,1 binary indicator variables. (d) denotes an indicator variable that takes the values 0,1. Age and Tenure controls include quadratics in age and tenure. Fixed effects include individual fixed effects and year dummies. See notes to Table 7.

3.3. *Alternative Definitions of Self-Employment*

In this section, we consider alternative definitions of self-employment. Table C4 illustrates the impact of bankruptcy flag removal on more stringent definitions of self-employment. Columns (1) and (2) define an individual as self-employed if they earn \$1,000 of Schedule C net income consecutively in year t and year $t - 1$. Using this definition in Column (1), we see no significant effects of flag removal on the stock of self-employed. However, in Column (2), we do see a significant increase in the flow rate into self-employment one or more years after flag removal. Columns (3) and (4) define self-employment using the requirement that individuals earn at least \$5,000 of Schedule C net income in consecutive years. There are no significant effects of bankruptcy flag removal on the stock or flow rate of self-employment using this definition. Last, Columns (5) and (6) define the self-employed as those who earned at least \$5,000 of Schedule C net income and their Schedule C net income was at least 50% of their total income (formal labor earnings plus Schedule C net income). Again, there are no significant effects of flag removal on the stock of self-employed. However, in Column (6) there is a marginally significant increase in the flow rate into self-employment. Column (7) repeats this exercise using a \$5,000 cutoff for self-employment, which also yields an insignificant effect. Column (8) yields a similar result to the baseline, Table 5, which is that the flow rate into self-employment increases with marginal significance after flag removal.

Table C4: Alternative Definitions of Self-employment

	(1) Self-Employed, Consecutive \$1,000+	(2) Transition into Self-Employed, Consecutive \$1,000+	(3) Self-Employed, Consecutive \$5,000+	(4) Transition into Self-Employed, Consecutive \$5,000+	(5) Self-Employed, At Least \$5,000+ and 50% of Total Income	(6) Transition into Self-Employed, At Least \$5,000+ and 50% of Total Income	(7) Self-Employed, \$5,000+	(8) Transition into Self-Employed, \$5,000+
2 Years Before Removal (d)	7.26e-05 (0.000552)	4.94e-05 (0.000420)	0.000383 (0.000469)	0.000121 (0.000358)	0.000780* (0.000473)	0.000547 (0.000390)	0.000919 (0.000597)	0.000536 (0.000491)
1 Year Before Removal (d)	-0.000410 (0.000750)	0.000747 (0.000474)	0.000134 (0.000638)	0.000545 (0.000405)	0.000641 (0.000609)	0.000462 (0.000429)	0.000353 (0.000772)	0.000219 (0.000540)
Year of Removal (d)	-0.000659 (0.000931)	9.20e-05 (0.000543)	1.10e-05 (0.000794)	0.000395 (0.000466)	0.000902 (0.000754)	0.000893* (0.000502)	0.00108 (0.000955)	0.00107* (0.000630)
1+ Years After Removal (d)	0.000428 (0.00115)	0.00153** (0.000664)	0.000864 (0.000978)	0.000897 (0.000568)	0.00147 (0.000925)	0.000533 (0.000603)	0.000983 (0.00117)	0.000119 (0.000757)
Individual Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Age and Tenure Controls	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.003	0.001	0.003	0.001	0.007	0.001	0.003	0.000
Round N	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06
N Indiv	220000	220000	220000	220000	220000	220000	220000	220000

Notes: SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All dependent variables are binary 0,1 indicator variables. (d) denotes an indicator variable that takes the values 0,1. Age and Tenure controls include quadratics in age and tenure. Fixed effects include individual fixed effects and year dummies. 'Transition Into Trans Into Non-Exclusive Self-Employed, \$1,000+ (d)' (or \$5,000) is an indicator variable that takes the value 1 when someone transitions into self-employment while being formally employed and 0 otherwise. See notes to Table 7.

3.4. Borrowing by New self-Employed Entrants

Table C5 illustrates the borrowing behavior of individuals who transition into self-employment. Individuals who transition into self-employment following a bankruptcy flag removal borrow heavily using revolving and secured credit. Column (1) of Table C5 shows that individuals who transition into self-employment, regardless of whether their flag is removed, borrow very little using their bankcards (note, ‘bankcards’ refers to traditional unsecured credit cards issued by banks). However, following flag removal, those who transition into self-employment borrow significantly using revolving credit (e.g., revolving personal finance loans) as shown in Column (2). They also take out large amounts of mortgage credit as shown in Column (3).

Two caveats must be discussed. Table C5 exhibits a pre-trend because credit partially recovers before flag removal (e.g., see the discussion in [Cohen-Cole et al. \(2013\)](#)). However, we argue that a better gauge of ability to borrow is the credit score. The total amount that can be borrowed is proportional to the credit score, and the credit score exhibits a stable trend prior to flag removal (e.g., Figure 4) and a large discrete rise following flag removal. Throughout the main text, we formally test for parallel trends in every specification by including dummies for years prior to flag removal. It is the exception that our regressions show significant pre-trends.

3.5. Alternative Clustered Standard Errors

To address concerns about potential cohort and regional labor market effects, in this table we also double cluster standard errors at the zip code and bankruptcy cohort. Columns (1) and (5) show that the increase in credit scores and new firm ownership (2+ years) after flag removal is still significant even after clustering at an alternative level. Column (3) shows that the marginal increase of the flow rate into self-employment after flag removal remains significant even after clustering at an alternative level.

Table C5: Transitions into Self-Employment: Borrowing

	(1) Real Bankcard Balance	(2) Real Revolv- ing Balance	(3) Real Mort- gage Balance
2 Yrs. Before Removal (d) x Trans Into Self-Employed, \$1,000+ (d)	99.73 (66.47)	298.4 (216.5)	5,642*** (1,835)
1 Yr. Before Removal (d) x Trans Into Self-Employed, \$1,000+ (d)	91.64 (74.23)	822.2*** (252.3)	10,086*** (1,875)
Yr. of Removal (d) x Trans Into Self-Employed, \$1,000+ (d)	46.52 (86.61)	598.9** (271.6)	7,348*** (2,026)
1+ Yrs. After Removal (d) x Trans Into Self-Employed, \$1,000+ (d)	416.6*** (74.15)	1,610*** (211.2)	13,714*** (1,483)
Transition Into Self-Employed (d)	-62.55*** (24.01)	-461.9*** (75.81)	-5,635*** (742.6)
2 Years Before Removal (d)	202.1*** (13.09)	1,112*** (40.60)	6,023*** (329.1)
1 Year Before Removal (d)	336.3*** (18.21)	1,793*** (56.30)	8,957*** (443.1)
Year of Removal (d)	586.4*** (23.83)	2,735*** (72.19)	10,387*** (556.3)
1+ Years After Removal (d)	892.7*** (28.47)	4,257*** (83.77)	8,084*** (675.8)
Individual Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Age and Tenure Controls	Y	Y	Y
R-squared	0.027	0.050	0.092
No. Person-Yr Obs.	1.500e+06	1.500e+06	1.500e+06
No. of Indiv.	220000	220000	220000
Combined Coeff Diff 1+ Yrs & -2 Yrs	1,007	4,457	10,133
Combined Coeff Diff Sig at 10%	Y	Y	Y

Notes: SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (d) denotes an indicator variable that takes the values 0,1. Age and Tenure controls include quadratics in age and tenure. Fixed effects include individual fixed effects and year dummies. 'Combined Coeff Diff 1+ Yrs & -2 Yrs' compares the overall effect of transitioning 1+ years after flag removal to the overall effect of transitioning 2 years before flag removal.

Table C6: Main Results with Clustered Standard Errors at the Cohort \times Zip Level

	(1) Credit Score	(2) Self-Employed (d)	(3) Transition into Self-Employed, \$1,000+ (d)	(4) Firm Ownership 1+ Years, (d)	(5) Firm Ownership 2+ Years, (d)
2 Years Before Flag Removal (d)	19.70*** (0.506)	0.000600 (0.000701)	0.000527 (0.000576)	-0.000126 (0.000172)	1.30e-05 (0.000110)
1 Year Before Flag Removal (d)	13.26*** (0.698)	-0.000384 (0.000902)	2.64e-05 (0.000635)	-0.000110 (0.000214)	0.000113 (0.000148)
Year of Flag Removal (d)	68.70*** (0.944)	0.000950 (0.00112)	0.00161** (0.000747)	0.000179 (0.000259)	0.000394** (0.000191)
1+ Years After Flag Removal (d)	7.046*** (1.153)	0.00108 (0.00138)	0.000649 (0.000895)	0.000297 (0.000334)	0.000540** (0.000230)
Individual Fixed Effects	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
Age and Tenure Controls	Y	Y	Y	Y	Y
R-squared	0.134	0.003	0.000	0.001	0.000
No. Person-Yr. Obs.	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06
No. Indiv. Obs.	220000	220000	220000	220000	220000

Notes: SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (d) denotes an indicator variable that takes the values 0,1. 'Firm Ownership, 1+ (2+ Yrs)' are forward-looking indicator variables that take the value 1 if an individual owns a firm in year t (and in the subsequent year $t + 1$), and 0 otherwise. Age and Tenure controls include quadratics in age and tenure. Fixed effects include individual fixed effects and year dummies. See notes to Table 7.

3.6. *Earnings Among New Formal Sector Entrants*

This appendix subsection examines the impact of bankruptcy flag removals on formal sector employment. Table C7 includes interaction terms between the dummies surrounding the bankruptcy flag removal and an indicator for whether the individual transitioned into formal employment. The non-interacted dummies around flag removal can be interpreted as the effect of flag removal on labor earnings of non-transitioners, i.e., those who remain employed throughout the flag removal; those dummies show a slightly declining profile of earnings for non-transitioners.

The interaction terms in Table C7 illustrate that among individuals who transition into formal employment, earnings rise significantly, and this increase is largely driven by the interaction of having a bankruptcy flag removed and simultaneously transitioning into a formal sector job. For example, Column (1) shows that individuals who transition into formal employment 1 or more years after bankruptcy flag removal earn \$1,816 ($= (4033-847) - (1459-89.74)$) more than individuals who transition into formal employment 2 years prior to bankruptcy flag removal. Relative to the sample average of labor earnings, which is \$41.5k (see Table 4), these gains in labor earnings represent a 4.3% increase.

Column (2) of Table C7 shows that those who transition into formal sector employment earn less from self-employment. This result intuitively makes sense: since the individual is taking a formal sector job, they have less time to devote to self-employment.

Column (3) of Table C7 looks at the sum of labor earnings and self-employment earnings. Column (3) shows that individuals who transition into formal employment 1 or more years after bankruptcy flag removal have a total annual income that is \$1,696 ($= (3726-870.7) - (1209-49.87)$) more than individuals who transition into formal employment 2 years prior to bankruptcy flag removal. Relative to the sample average of total income, which is \$34.8k, these gains are quite large, approaching 5% of the average individual's total income.

Table C7: Transitions into Formal-Employment: Earnings

	(1) Real Annual La- bor Earnings	(2) Real Annual Self-Employed Net Income	(3) Real Annual To- tal Income (SE and Non-SE)
2 Years Before Removal (d)	-89.74** (44.94)	39.87* (22.45)	-49.87 (48.18)
1 Year Before Removal (d)	-239.8*** (62.11)	11.64 (29.39)	-228.1*** (65.74)
Year of Removal (d)	-381.2*** (78.42)	10.57 (36.76)	-370.6*** (82.76)
1+ Years After Removal (d)	-847.1*** (96.50)	-23.63 (44.79)	-870.7*** (101.7)
Transition into Formal-Employed, \$1,000+ (d)	2,673*** (91.15)	-332.2*** (47.31)	2,341*** (98.08)
2 Yrs. Before Removal (d) x Trans. into Formal-Employed, \$1,000+ (d)	1,459*** (207.1)	-249.9** (110.8)	1,209*** (225.6)
1 Yr. Before Removal (d) x Trans. into Formal-Employed, \$1,000+ (d)	2,013*** (215.0)	-455.0*** (117.5)	1,558*** (235.6)
Yr. of Removal (d) x Trans. into Formal-Employed, \$1,000+ (d)	2,695*** (237.3)	-140.5 (131.0)	2,554*** (259.2)
1+ Yrs. After Removal (d) x Trans. into Formal-Employed, \$1,000+ (d)	4,033*** (169.9)	-307.3*** (91.28)	3,726*** (185.4)
Individual Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Age and Tenure Controls	Y	Y	Y
R-squared	0.126	0.004	0.100
No. Person-Yr Obs.	1.500e+06	1.500e+06	1.500e+06
No. of Individ.	220000	220000	220000
Combined Coeff Diff 1+ Yrs & -2 Yrs	1,817	-121	1,696
Combined Coeff Diff Sig at 10%	Y	N	Y

Notes: SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (d) denotes an indicator variable that takes the values 0,1. Age and Tenure controls include quadratics in age and tenure. Fixed effects include individual fixed effects and year dummies. 'Combined Coeff Diff 1+ Yrs & -2 Yrs' compares the overall effect of transitioning 1+ years after flag removal to the overall effect of transitioning 2 years before flag removal.

3.7. *Importance of Credit for Newly Self-Employed vs. Other Job-Transitioners*

This appendix subsection compares the borrowing of the newly self-employed to individuals who are newly formally employed. It thus examines whether all job-transitioners are more likely to borrow, simply because they have earnings gains, or whether the newly self-employed rely particularly heavily on credit.¹³ Thus, as another test of the importance of credit for the self-employed, Table C8 compares borrowing by those who transition into formal sector employment and those who transition into self-employment.

Recall that both sets of individuals realize income gains, (\$991 for the new self-employed entrants after flag removal and \$1,817 for the new formal-employed entrants after flag removal). Table C8 illustrates that those who transition into formal employment after flag removal borrow \$4,526 relative to those who transition prior to flag removal; however, the interaction terms are negative, indicating that formal transitioners are just like everyone else, and if anything, they borrow less than non-transitioners. In contrast, those who transition into self-employment after flag removal borrow \$15,337 more relative to those who transition prior to flag removal. So even though self-employed entrants have smaller earnings gains than new formal-employment entrants after flag removal, the self-employed borrow much more heavily following flag removal, nearly $\sim 10k$ more. This evidence is consistent with the credit-access effect being important for self-employment entrants.

¹³We thank Nawid Siassi for suggesting this exercise.

Table C8: Comparison of Total Borrowing by Newly Formal Employed and Newly Self-Employed

	(1) Total Balance		(2) Total Balance
	<u>Formal Trans.</u>		<u>Self-Empl Trans.</u>
2 Yrs. Before Removal (d) x Trans into Formal-Empl , \$1,000+ (d)	-5,095*** (1,361)	2 Yrs. Before Removal (d) x Trans Into Self-Empl , \$1,000+ (d)	6,422*** (1,955)
1 Yr. Before Removal (d) x Trans into Formal-Empl , \$1,000+ (d)	-1,600 (1,453)	1 Yr. Before Removal (d) x Trans Into Self-Empl , \$1,000+ (d)	11,815*** (2,011)
Yr. of Removal (d) x Trans into Formal-Empl , \$1,000+ (d)	-6,143*** (1,616)	Yr. of Removal (d) x Trans Into Self-Empl , \$1,000+ (d)	8,511*** (2,162)
1+ Yrs. After Removal (d) x Trans into Formal-Empl , \$1,000+ (d)	-6,555*** (1,164)	1+ Yrs. After Removal (d) x Trans Into Self-Empl , \$1,000+ (d)	16,195*** (1,594)
Transition into Formal-Employed , \$1,000+ (d)	-1,976*** (536.2)	Transition Into Self-Employed (d)	-6,483*** (790.1)
2 Years Before Removal (d)	9,234*** (353.2)	2 Years Before Removal (d)	8,809*** (350.1)
1 Year Before Removal (d)	13,483*** (478.8)	1 Year Before Removal (d)	13,038*** (475.3)
Year of Removal (d)	16,355*** (602.0)	Year of Removal (d)	15,800*** (598.6)
1+ Years After Removal (d)	15,220*** (729.9)	1+ Years After Removal (d)	14,373*** (728.1)
Individual Fixed Effects	Y	Individual Fixed Effects	Y
Year Fixed Effects	Y	Year Fixed Effects	Y
Age and Tenure Controls	Y	Age and Tenure Controls	Y
R-squared	0.105	R-squared	0.105
No. Person-Yr Obs.	1.500e+06	No. Person-Yr Obs.	1.500e+06
No. of Indiv.	220000	No. of Indiv.	220000
Combined Coeff Diff 1+ Yrs & -2 Yrs	4,526		15,337
Combined Coeff Diff Sig at 10%	Y		Y

Notes: SE in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (d) denotes an indicator variable that takes the values 0,1. Age and Tenure controls include quadratics in age and tenure. Fixed effects include individual fixed effects and year dummies. 'Combined Coeff Diff 1+ Yrs & -2 Yrs' compares the overall effect of transitioning 1+ years after flag removal to the overall effect of transitioning 2 years before flag removal.

3.8. Tests for Selection among Self-Employed Transitioners

In this appendix subsection, we discuss the role of selection for the transition results. Since flag removal is foreseeable, there is the concern that better entrepreneurs who anticipate the need for credit deliberately wait until the flag is removed to start a business to access cheaper credit. However, such selection still suggests that credit can play an important role for business startups. In this section, we examine whether the entrepreneurs who transition into self-employment following flag removal are very close in terms of 1-, 2-, and 3-year lags of annual labor earnings relative to those who flow into self-employment 1 or 2 years prior to flag removal. We repeat the same exercise using 1-, 2-, and 3-year lags of annual self-employed income. The idea is that if these were repeat entrepreneurs as in [Gompers, Kovner, Lerner, and Scharfstein \(2006\)](#), then we should see non-zero or greater lagged self-employed income.

Table C9 provides the regression results. Columns (1) through (3) regress lagged labor earnings on the self-employment transition indicator interacted with the window of dummies around flag removal. Columns (4) through (6) regress lagged self-employed income on an indicator interacted with the window of dummies around flag removal. To interpret the coefficients and test for selection, Table C10 tests whether those who transition into self-employment in the year of flag removal differ from those who transition into self-employment 1 and 2 years before flag removal. For example, the upper left-hand cell of Table C9 computes the prior labor earnings of those transitioning into self-employment in the year of removal \$552 ($= -120.5 + 1731 - 1058$) less the prior labor earnings of those transitioning into self-employment 1 year before flag removal \$944 ($= -36.63 + 1731 - 749.7$) to arrive at a difference in prior labor earnings between these two cohorts of self-employed individuals of \$-391.9 ($= -36.63 + 1,731 - 749.7 - (-120.5 + 1,731 - 1,058)$).

The standard error of this difference in prior labor earnings is \$353, and the corresponding test statistic is -1.11, indicating that there is no difference in prior labor earnings between those who transition into self-employment one year before flag removal to one year after flag removal. The right-hand panel of Table C10 conducts the same exercise using self-employed earnings. Again, in all but one specification, we fail to reject that those who waited to start a business after flag removal had any difference in prior self-employment earnings compared to those who started their business one year before removal.

Table C11 conducts the same exercise for longer lags of self-employed income, from 7 to 12 years, which includes the period before entering bankruptcy (earnings data are not available at these longer horizons). Again, the sample passes the selection tests in all but one specification, indicating that the people who wait to start a business are not necessarily repeat entrepreneurs who had higher income 7 to 12 years ago before entering bankruptcy.

Overall, the results show that those who transition into self-employment have very similar levels of previous self-employed earnings (i.e., they are not people who have failed disproportionately or succeeded disproportionately at entrepreneurship in the past). These results

Table C9: Measures of Selection for Those Who Transition into Self-employment. Regressions of Past Labor Earnings and Self-employed Earnings on Transition Dummies

	(1) 1 Year Lagged Labor Earnings	(2) 2 Year Lagged Labor Earnings	(3) 3 Year Lagged Labor Earnings	(4) 1 Year Lagged Self Employed Income	(5) 2 Year Lagged Self Employed Income	(6) 3 Year Lagged Self Employed Income
2 Yrs. Before Removal (d) x Trans Into Self-Employed, \$1,000+ (d)	-462.9* (271.2)	-422.4 (277.0)	-582.9** (281.8)	655.1*** (184.4)	1,152*** (196.8)	1,113*** (182.1)
1 Yr. Before Removal (d) x Trans Into Self-Employed, \$1,000+ (d)	-749.7*** (270.3)	-721.5** (288.2)	-483.8* (289.8)	516.7*** (184.5)	1,477*** (202.4)	760.6*** (183.2)
Yr. of Removal (d) x Trans Into Self-Employed, \$1,000+ (d)	-1,058*** (286.8)	-418.2 (298.9)	-1.496 (292.7)	847.6*** (191.7)	1,102*** (201.4)	1,178*** (192.1)
1+ Yrs. After Removal (d) x Trans Into Self-Employed, \$1,000+ (d)	-1,655*** (209.6)	-1,430*** (216.6)	-1,182*** (213.9)	1,802*** (147.0)	2,623*** (150.5)	2,382*** (141.5)
Transition Into Self-Employed (d)	1,731*** (118.6)	1,934*** (120.7)	1,507*** (121.1)	-8,960*** (94.26)	-3,902*** (87.84)	-2,516*** (78.77)
2 Years Before Removal (d)	42.06 (43.19)	110.4** (45.68)	283.2*** (46.65)	40.16* (21.50)	-12.00 (21.71)	15.14 (21.50)
1 Year Before Removal (d)	-36.63 (58.90)	86.06 (62.34)	279.4*** (64.85)	36.16 (29.28)	7.120 (28.82)	35.83 (28.62)
Year of Removal (d)	-120.5 (74.07)	24.97 (78.21)	348.5*** (82.17)	19.74 (36.79)	31.14 (36.17)	70.09** (35.66)
1+ Years After Removal (d)	-469.6*** (91.25)	-291.8*** (96.37)	178.6* (101.6)	15.44 (45.19)	-3.157 (44.66)	89.44** (44.55)
Individual Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Age and Tenure Controls	Y	Y	Y	Y	Y	Y
R-squared	0.181	0.082	0.040	0.055	0.010	0.005
Round N	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06	1.500e+06
N Indiv	220000	220000	220000	220000	220000	220000

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (d) denotes an indicator variable that takes the values 0,1. Age and Tenure controls include quadratics in age and tenure.

suggest that they have similar prior levels of entrepreneurial talent. However, we cannot definitively rule out differences in unobserved talent.

Table C10: Measures of selection for those who transition into self-employment. Comparison of past labor earnings and past self-employed net income between those who transit into self-employment 1 and 2 years before flag removal versus those who transition into self-employment in the year of flag removal

	Difference in Labor Earnings X years ago between those who become SE 1 year before flag removal vs. those who wait until year of flag removal				Difference in Self-Employed net income X years ago between those who become SE 1 year before flag removal vs. those who wait until year of flag removal		
X=	1 Year	2 Years	3 Years		1 Year	2 Years	3 Years
Difference Labor Earnings	-391.9	242.1	551.4	Difference in Net Income	314.4	-350.5	451.9*
Std. Error	353.7	376.1	371.3	Std. Error	241.3	256.9	240.3
T-stat	-1.11	0.64	1.49	T-stat	1.30	-1.36	1.88

	Difference in Labor Earnings X years ago between those who become SE 2 years before flag removal vs. those who wait until year of flag removal				Difference in Self-Employed net income X years ago between those who become Self-Employed 2 years before flag removal vs. those who wait until year of flag removal		
X=	1 Year	2 Years	3 Years		1 Year	2 Years	3 Years
Difference in Labor Earnings	-757.5**	-81.29	646.7*	Difference in Net Income	172.1	-6.9	120.6
Std. Error	355.7	365.6	362.8	Std. Error	231.5	252.6	237.2
T-stat	-2.13	-0.22	1.78	T-stat	0.74	-0.03	0.51

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Estimates based on Table C9 and calculations are explained in detail in the text.

Table C11: Measures of selection for those who transition into self-employment. Comparison of 7 to 12 year lagged self-employed net income between those who transit into self-employment 1 and 2 years before flag removal versus those who transition into self-employment in the year of flag removal

	Difference in Self-Employed net income X years ago between those who become Self-Employed 2 years before flag removal vs. those who wait until year of flag removal					
X=	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years
Difference in Net Income	-282.6	581.2	35.5	273.3	497.4	319.9
Std. Error	458.8	482.3	480.4	569.2	590.0	363.8
T-stat	-0.62	1.21	0.07	0.48	0.84	0.88

	Difference in Self-Employed net income X years ago between those who become SE 1 year before flag removal vs. those who wait until year of flag removal					
X=	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years
Difference in Net Income	-139.6	-1264	936.9	-831.5	727.1	-339.3
Std. Error	509.1	1178	470.8	754	551.6	416.6
T-stat	-0.27	-1.07	1.99	-1.10	1.32	-0.81

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

8.1. *Natural rate of entrepreneurship*

This appendix subsection further explores the issues of whether our results can be explained by a differential natural rate of entrepreneurship. We examine this issue in Table C12 by including dummies for prior self-employment 7 to 12 years prior to flag removal. We repeat the analysis in Table 12 simultaneously controlling for a set of self-employment dummies (self-employed income of at least \$1,000) 7, 8, 9, 10, 11, and 12 years prior to flag removal. Columns (1) through (5) show that our benchmark results are mostly unchanged. The sign, significance, and magnitude of the interaction between pre-determined credit access and flag removal are quite robust. In Columns (6) through (10), we include a full set of interactions between flag removal dummies and self-employment dummies 7, 8, 9, 10, 11, and 12 years prior to flag removal. Columns (6) through (10) repeat our main results with these extra interaction terms and they also show that our benchmark estimates remain unchanged.

Overall, we view these results as suggestive evidence that the correlation between pre-determined credit variables and entrepreneurship is unlikely to be entirely driven by underlying differences of entrepreneurial talent. In future work, we plan to explore drivers of entrepreneurial failure and repeat entrepreneurship, which may further shed light on these issues.

Table C12: Robustness for Heterogeneous Effects of Flag Removal: Including Set of Control Dummies for Positive Self-employed Earnings 7 to 12 Years before Flag Removal and a Full Set of Interactions between Flag Removal Dummies and Dummies for Positive Self-employed Earnings 7 to 12 Years before Flag Removal

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs	Firm Ownership, 2+ Yrs
Year of Flag Removal (d)	0.000406*** (0.000125)	0.000512*** (0.000127)	0.000302*** (0.000107)	0.000272** (0.000113)	0.000263** (0.000120)	0.000402*** (0.000123)	0.000477*** (0.000124)	0.000284*** (0.000105)	0.000242** (0.000111)	0.000274** (0.000115)
1 Year After Flag Removal (d)	0.000715*** (0.000177)	0.000777*** (0.000169)	0.000591*** (0.000167)	0.000591*** (0.000163)	0.000506*** (0.000177)	0.000703*** (0.000167)	0.000708*** (0.000163)	0.000549*** (0.000153)	0.000525*** (0.000147)	0.000532*** (0.000163)
Year of Flag Removal (d) × age ≥ 40 (d)	0.000100 (0.000209)					0.000109 (0.000199)				
1 Year After Flag Removal (d) × age ≥ 40 (d)	5.21e-05 (0.000294)					7.96e-05 (0.000261)				
Year of Flag Removal (d) × College Educ (d)		-0.000172 (0.000211)					-6.69e-05 (0.000202)			
1 Year After Flag Removal (d) × College Educ (d)		-0.000121 (0.000296)					8.29e-05 (0.000260)			
Year of Flag Removal (d) × Unused Revolv. ≥ p50 (d)			0.000312 (0.000207)					0.000349* (0.000198)		
1 Year After Flag Removal (d) × Unused Revolv. ≥ p50 (d)			0.000306 (0.000283)					0.000391 (0.000252)		
Year of Flag Removal (d) × Unused Total Credit ≥ p50 (d)				0.000371* (0.000206)					0.000434** (0.000196)	
1 Year After Flag Removal (d) × Unused Total Credit ≥ p50 (d)				0.000306 (0.000285)					0.000439* (0.000252)	
Year of Flag Removal (d) × Score ≥ p50 (d)					0.000388* (0.000206)					0.000364* (0.000195)
1 Year After Flag Removal (d) × Score ≥ p50 (d)					0.000479* (0.000283)					0.000427* (0.000248)
Individual FE, Year FE, Age and Tenure Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Controls for prior entrepreneurship indicators, 7 to 12 years ago	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Interact prior entrepreneur indicators with prior credit access	N	N	N	N	N	N	N	N	N	N
R-squared	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
No. Person-Yr. Obs	410000	410000	410000	410000	410000	410000	410000	410000	410000	410000
No. Indiv. Obs.	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000

Notes: All dependent variables are 0,1 binary indicator variables. (d) denotes a 0,1 binary indicator variable. 'Firm Ownership, 2+ Yrs' is a forward-looking indicator variable that takes the value 1 if an individual owns a firm in year t (and in the subsequent year t + 1), and 0 otherwise. Standard errors clustered at individual level. *** p < 0.01, ** p < 0.05, * p < 0.1. Sample includes only those in our baseline sample within +/- 1 year of bankruptcy flag removal. See notes to Table 5 for controls and variable definitions. Columns (1) through (5) include a simultaneous set of dummies for whether an individual had positive real self-employed earnings 7, 8, 9, 10, 11, and 12 years prior to flag removal. Columns (6) through (10) include a full set of interactions between flag removal dummies and dummies for positive real self-employed earnings 7, 8, 9, 10, 11, and 12 years prior to flag removal.