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IZA DP No. 14891

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ABSTRACT

The Cost of Health Insurance and Entry into Entrepreneurship

Unavailable or expensive health insurance may hinder the transition of individuals from paid employment to entrepreneurship. The literature argues that the guaranteed availability of health insurance introduced by the Affordable Care Act (ACA) of 2010 could reduce this barrier to entrepreneurship and thereby increase entrepreneurial activity. In this paper, we investigate how much the cost of health insurance when leaving paid employment—given availability of health insurance—matters for the decision to become an entrepreneur. We use individual-level data from the Current Population Survey (CPS-ASEC) combined with county-level panel data on health insurance costs in local Health Insurance Exchanges (HIX) introduced by the ACA to estimate county-treatment fixed-effects regressions. The results indicate that increasing the premium of the benchmark HIX plan by $100 per month decreases the annual probability of entry into self-employment by 0.25 percentage points, which corresponds to 18% of the average annual entry rate.

JEL Classification: I13, I11, J22, J23, L26

Keywords: entrepreneurship, health insurance, premium, deductible, MOOP

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1 Introduction

There is increasing interest among academics and policymakers in the factors that influence an individual's decision to become an entrepreneur, due to the role of entrepreneurship in innovation, job creation and growth (Van Stel et al., 2005; Acs and Armington, 2006; Carree and Thurik, 2010; Haltiwanger et al., 2013). Health insurance may be one of the relevant factors that are under the control of government regulation. In the United States, health insurance and employment are inextricably related. 61 percent of non-elderly adults in the U.S. are covered by employer-provided health insurance (EPHI). There are also two government-provided health insurance programs: Medicaid (15 percent; primarily low-income individuals) and Medicare (2 percent among those below 65 years of age; mostly disabled individuals). The remaining non-elderly adults either buy health insurance from the private non-group market (8 percent; primarily self-employed individuals) or remain uninsured (13 percent), according to the Kaiser Family Foundation (2019).

Paid employees who are currently covered by EPHI have to find new health insurance in the private non-group market if they quit their job to become self-employed and are not eligible for health insurance through their spouse or one of the two government programs. Individuals with pre-existing conditions faced many restrictions in buying health insurance from the private non-group market before the Affordable Care Act (ACA) of 2010. Before the ACA, health insurance providers could deny health insurance to individuals who had pre-existing conditions or charge a higher premium, a practice known as medical underwriting. This often made health insurance either unavailable or unaffordable for individuals with pre-existing conditions. Previous research suggests that this unavailability or unaffordability of health insurance may have prevented some individuals from starting entrepreneurial activities (Fairlie et al., 2011).[1] This phenomenon, "entrepreneurship lock", refers to a situation where individuals are locked out of entrepreneurship.[2]

[1]Following the literature (e.g., Holtz-Eakin et al., 1996; Fairlie et al., 2011; Bailey, 2017), we use self-employment in the main job as a measurable proxy for entrepreneurship. The self-employed in our sample include business owners with and without employees.

[2]This is a reminiscence to the job lock literature (Madrian, 1994; Gilleskie and Lutz, 2002), which is concerned with inhibited mobility of paid employees due to EPHI.

However, the ACA changed the private non-group market in dramatic ways. The ACA mandates health insurance providers to sell insurance to all individuals regardless of their health status. Insurance companies can no longer charge different premiums based on the medical history of an individual. They are allowed to vary premiums based on age and smoking status only. The ACA also set up Health Insurance Exchanges (HIX) for individuals to buy insurance in the non-group market.[3] Moreover, the ACA also mandates a set of conditions that all insurance providers need to cover, known as the Essential Health Benefits (EHB). These provisions and the uncertainty associated with the new HIX put upward pressure on the cost of health insurances sold through HIX. While some individuals are shielded from cost increases because of subsidies introduced by the ACA, those who are not eligible for subsidies faced a substantial increase in health insurance cost in the first few years after the full implementation of the ACA in 2014.

In this paper we estimate the effect of the price of health insurance in the HIX on the decision to become self-employed. We use data on the cost of health insurance plans from the Robert Wood Johnson Foundation (RWJF) merged with individual-level data from the Annual Social and Economic Supplement of the Current Population Survey (CPS-ASEC). We contribute to the literature by analyzing whether entrepreneurship lock exists due to health insurance costs. To the best of our knowledge, prior literature has not addressed this research question using the variation in cost prevalent in the HIX. Existing papers on the effect of the ACA on entrepreneurship instead focus on the potential effect of the availability of health insurance brought by ACA on entrepreneurship.

Our results indicate that increasing the premium of the benchmark HIX plan by $100 per month decreases the annual probability of entry into self-employment by 0.25 percentage points or by 18% of the average annual entry rate. We show that this result is robust to a number of changes in the model specification. Our results inform the current policy debate in the United States. The Build Back Better Act (BBBA), currently under

[3]Moreover, the ACA imposed a health insurance mandate for all legal residents of the U.S. to reduce adverse selection and to keep the premiums of health insurances affordable. Non-compliant individuals were assessed with a tax penalty, but the Tax Cut and Jobs Act of 2017 reduced the individual mandate penalty to zero.

consideration in Congress, will reduce the individual premium for HIX consumers by $600 per year or $50 per month by increasing the subsidy. Our estimates suggest that this will increase the annual entry rate into self-employment by 0.12 percentage points or about 9 percent.

2 Literature Review

Extant literature mostly supports that the unavailability of health insurance discourages potential entrepreneurs from starting a business (Wellington, 2001; Fairlie et al., 2011), with some papers reporting this result for specific groups such as married women (Lombard, 2001) and older women (Jia, 2014). In particular, using CPS data, Fairlie et al. (2011) find that individuals without spousal health insurance coverage are significantly less likely to start a business than individuals who have spousal coverage. However, not all studies are conclusive, including the pioneering paper by Holtz-Eakin et al. (1996), which reports estimates that have large standard errors, and the paper by Zissimopoulos and Karoly (2007), whose authors focus on older individuals and conclude that the results from their study are only partially reconcilable with job lock.

Only a few papers investigate the effect of the cost of health insurance on entrepreneurship. Four studies analyze the effects of the 1986 Tax Reform Act and its amendments, which allowed self-employed individuals in the United States to deduct increasing portions of their health insurance premiums from their taxable income (Heim and Lurie, 2010; Gurley-Calvez, 2011; Velamuri, 2012; Gumus and Regan, 2015). These papers find that a lower after-tax price of health insurance in self-employment encourages self-employment, although Gumus and Regan (2015) report significant effects only for entry into self-employment for singles and married men whose wives lack employer-provided health insurance. Fossen and König (2017) analyze the health insurance system in Germany and find that higher health insurance costs in self-employment relative to the costs in paid employment decrease the probability of entry into self-employment. None of the existing papers quantitatively analyzing the effects of the cost of health insurance on entrepreneurship take into account

the changes that the ACA introduced in the United States.

Several papers use the increased availability of health insurance under various state-level insurance mandates to test whether "entrepreneurship lock" exists. For example, Li et al. (2017) find that state-level insurance mandates increased self-employment rates. They also report that most of this increase came from single individuals. Heim and Lurie (2014) find that increased availability of health insurance from the Massachusetts Health Reform Act also led to an increase in self-employment.

A number of studies exploit variation generated by the ACA. While some papers find that the increased availability of health insurance increased self-employment, others do not find any effect. Specifically, Blumberg et al. (2014) estimate that the number of self-employed individuals will increase by 1.5 million due to the availability of health insurance within the first two years of full implementation of the ACA. Bailey and Dave (2019) report that the ACA increased self-employment by 3-4% and full-time self-employment by 9%. In contrast, Barber III and Kavoori (2015) and Heim and Yang (2017) do not find any statistically significant effect of the ACA on self-employment. Bailey (2017) explores the effect of the dependent coverage mandate in the ACA and does not detect any effect on the overall self-employment rate, but an increase of about 20 percent among disabled individuals. In a complementary paper, Barber III and Kavoori (2018) show that the ACA increased the likelihood of private purchase of non-group insurance among self-employed individuals.

Overall, the existing literature provides inconclusive results on the existence of entrepreneurship lock and the ACA's role. A possible explanation for the inconclusiveness is the literature's focus on the extended availability of health insurance through ACA while neglecting costs. We contribute to the literature by exploiting variation in the cost of health insurance introduced by the ACA to estimate the effects on the entry rate into entrepreneurship.

Table 1: Metal tiers of health insurance plans in Health Insurance Exchanges

Metal Tier	Actuarial Value	Number of Policies Sold	Market Share	% of Consumers with Subsidy
Catastrophic	-	76,920	1%	0%
Bronze	60%	1,872,457	21%	79%
Silver	70%	6,090,199	69%	94%
Gold	80%	573,641	6%	63%
Platinum	90%	225,074	3%	60%

Note: The numbers refer to 2015.
Source: ASPE Issue Brief (DeLeire and Marks, 2015).

3 The ACA Provision

The ACA mandates that for a specific insurance plan, the insurance providers have to charge the same premium, deductible, and maximum out of pocket (MOOP) to all persons within a Rating Area, regardless of their health status. The ACA also requires each state to define one or more Rating Areas. States have used metropolitan statistical areas (MSA), counties, or 3-digit zip codes to define Rating Areas. Within a Rating Area the premium of a plan may only depend on age and smoking status. Each plan has a fixed actuarial value. A plan can be a Bronze, Silver, Gold, Platinum, or a Catastrophic plan, where the metal tiers are determined by the plan's actuarial value. A Bronze plan must pay for at least 60% of the expected value of healthcare expenditures for enrollees, a Silver plan for 70%, Gold for 80%, and Platinum for 90%. Silver and Bronze plans accounted for 90% of HIX plans sold in 2015, with Silver plans accounting for the majority of these plans (see Table 1). Catastrophic plans have the smallest market share, because eligibility to purchase these plans is restricted to young adults who meet specific requirements. There may be multiple plans of a metal level in a Rating Area. In some cases, even one insurer may offer multiple plans in a Rating area.

Both EPHI and Medicaid are heavily subsidized. Employers, on average, pay 67 percent of the premium (U. S. Bureau of Labor Statistics, 2020), and Medicaid does not charge

a premium in most states (Brooks et al., 2020).[4] Those who buy health insurance from the HIX may also receive a subsidy. Citizens and legal residents who are not eligible for Medicaid and do not have EPHI may be eligible for subsidies that reduce the cost of insurance. Individuals with income from 133% to 400% of the federal poverty level (FPL) may be eligible to receive an Annual Premium Tax Credit (APTC) for an insurance plan purchased through the HIX in states that expanded Medicaid. In the states that did not expand Medicaid, individuals between 100% and 400% of the FPL are eligible for APTC.

The APTC caps the premium amount an individual would have to pay as a percentage of income. The premium for the Second Lowest Cost Silver Plan (SLCSP) in each Rating Area is used to compute the level of APTC. Table 2 shows the limits and how they vary with income. For example, an individual with income between 100% and 133% of the FPL who purchases the SLCSP offered in her Rating Area would pay 2.08% of her income, and the rest of the premium would be covered by the APTC. If this individual elected to purchase a different HIX plan with a higher premium, the amount of the APTC would remain unchanged and the individual would be responsible for the difference between the higher premium and the computed tax credit. This also implies that the individual may reduce the amount she pays to below 2.08% of her income if she buys a plan with a premium lower than the SLCSP. In addition, individuals with income between 100% and 250% of FPL may also receive Cost Sharing Reduction (CSR) subsidies to reduce deductible and co-insurance payments if they purchase Silver plans through the HIX.

Table 2: Premium caps by income level as % of the Federal Poverty Level (2019)

Income as % of FPL	Cap % (Lower End)	Cap % (Higher End)
Up to 133%	2.08%	2.08%
133%-150%	3.11%	4.15%
150%-200%	4.15%	6.54%
200%-250%	6.54%	8.36%
250%-300%	8.36%	9.86%
300%-400%	9.86%	9.86%

Note: The caps are expressed in percent of an individual's income.

[4]Only five states charge a small Medicaid premium.

Individuals with income above 400% of the FPL are not eligible for any subsidy for HIX plans. It is worth noting that among the individuals who remained uninsured in 2018, almost half had an income above 200% of the FPL, and 16% above 400% of the FPL. Furthermore, about 45% cite the cost of health insurance as the primary reason behind their choice of not buying health insurance (Kaiser Family Foundation, 2015).

4 Data

We use data from the Annual Social and Economic Supplement of the Current Population Survey (CPS-ASEC) from 2015 to 2019, which is collected annually in March. The ASEC is representative of the population in the United States and provides information on labor market outcomes including whether an individual is self-employed at the time of the survey, as well as extensive socio-economic information. However, the CPS does not include information on prices of health insurance plans available to the agents in the local HIX. Therefore, we use the HIX Compare data from the Robert Wood Johnson Foundation (RWJF), which provides plan-level information on HIX market plans offered during the years 2014-2018. The HIX Compare dataset includes information on each plan's metal level, the Rating Area, premiums, and cost-sharing provisions such as the deductible and MOOP. By merging these two datasets, we obtain information on the premium, deductible, and MOOP of the insurances available to the consumers through their local HIX in each Rating Area in every year.

As one would expect, premiums differ by metal level. There is also substantial variation within metal levels across Rating Areas and within each Rating Area. Finally, even for a given plan in a rating area there is inter-temporal variation, which is what we exploit to identify our parameters of interest. In our analysis we use the cost of the median Silver Plan of a 50 year-old person in a Rating Area as the cost of insurance in that Rating Area. Using the SLCSP generates similar results. We use the cost of Silver plans because almost 70% of all insurances sold on the HIX are Silver and because consumers have to buy a Silver plan to be eligible for CSR.

States use counties (40 states), MSAs (seven states), or 3-digit zip codes (three states) to define Rating Areas. California uses a combination of these geographical boundaries. As of 2020, there are 506 Rating Areas in the U.S., and county lines define a vast majority of them: 405 out of the 506 Rating areas. When a Rating Area is a county, we can simply merge CPS data with HIX Compare data, since both datasets identify county. If a Rating Area includes multiple counties then we can safely assume that each of these counties has the same HIX plans. If a county includes multiple Rating Areas then we assume that the county has the average premium prevailing in these Rating Areas as an approximation.

The CPS does not identify the county of residence of some respondents to preserve the confidentiality of respondents; unidentified counties are those with a small number of inhabitants, mostly rural counties. According to the CPS, about 45% of households in recent years are located in a county that is identified. Therefore, the health insurance cost information is not available for the rest of the sample. We exclude these individuals from our analysis. We focus our attention on respondents between the ages of 26 to 64 years. Individuals below the age of 26 years may have health insurance coverage through their parents, and older individuals are usually covered by Medicare. We only include individuals in the sample who were paid employees and had EPHI coverage either as a policyholder or as a dependent in the calendar year before the interview. This sample restriction provides us clean treatment and control groups for our estimation of the probability of becoming self-employed between the previous year and the current interview (see below).

The CPS interviews respondents for four consecutive months and then again for four consecutive months after an eight-month gap. Therefore, if a respondent is included in the ASEC in March of year t, then the individual will be included in the ASEC in March of year $t+1$ a second time, except for unplanned attrition. In each interview, respondents are asked whether they are currently self-employed. Respondents are also asked whether they were a paid employee or self-employed in the previous calendar year, about their health insurance status in the previous calendar year, and their annual income in the previous calendar year, among other things. Using the information contained in the retrospective question on self-employment status, we create a binary variable indicating entry into self-

employment, denoted entry, which takes a value of one if the individual was a paid employee in the previous calendar year but is currently self-employed; otherwise, it takes a value of zero.

At the county level, for each year we merge to our data the unemployment rate and population size obtained from the Federal Reserve Bank of St. Louis and the real Gross Domestic Product (GDP) from the Bureau of Economic Analysis.

Table 3 represents summary statistics for our analysis sample. The first column shows primary policyholders of employer provided health insurance (EPHI); this is our treatment group. The other two columns show alternative control groups: those who are covered by EPHI as a dependent in the previous calendar year, and any individual who is not a primary policyholder of EPHI. The latter group includes EPHI dependents and adds individuals who have private health insurance or who are uninsured. The average annual entry rate into self-employment is 1.3 percent among the EPHI primary policyholders and larger in the two control groups: 1.9 percent among EPHI dependents and 1.7 percent among anybody who is not an EPHI policyholder. This may suggest that being an EPHI policyholder is a barrier to entry into entrepreneurship because EPHI policyholders do not wish to loose their insurance when they quit their job to become an entrepreneur. Not surprisingly, the groups also differ in other characteristics. For example, among EPHI dependents, the shares of women and the number of children are larger than among EPHI policyholders. We control for these differences in our following econometric estimations.

Table 3: Summary Statistics

	EPHI Policyholder	EPHI Dependent	Not EPHI Policyholder
County-level variables:			
premium	4.157	4.248	3.943
	(1.291)	(1.300)	(1.218)
unemployment rate	4.712	4.638	4.966
	(1.450)	(1.447)	(1.627)
population	137.082	124.128	141.802
	(213.455)	(196.939)	(220.939)
GDP	9.995	8.771	9.752
	(16.500)	(14.906)	(16.418)
deductible	2.624	2.589	2.618

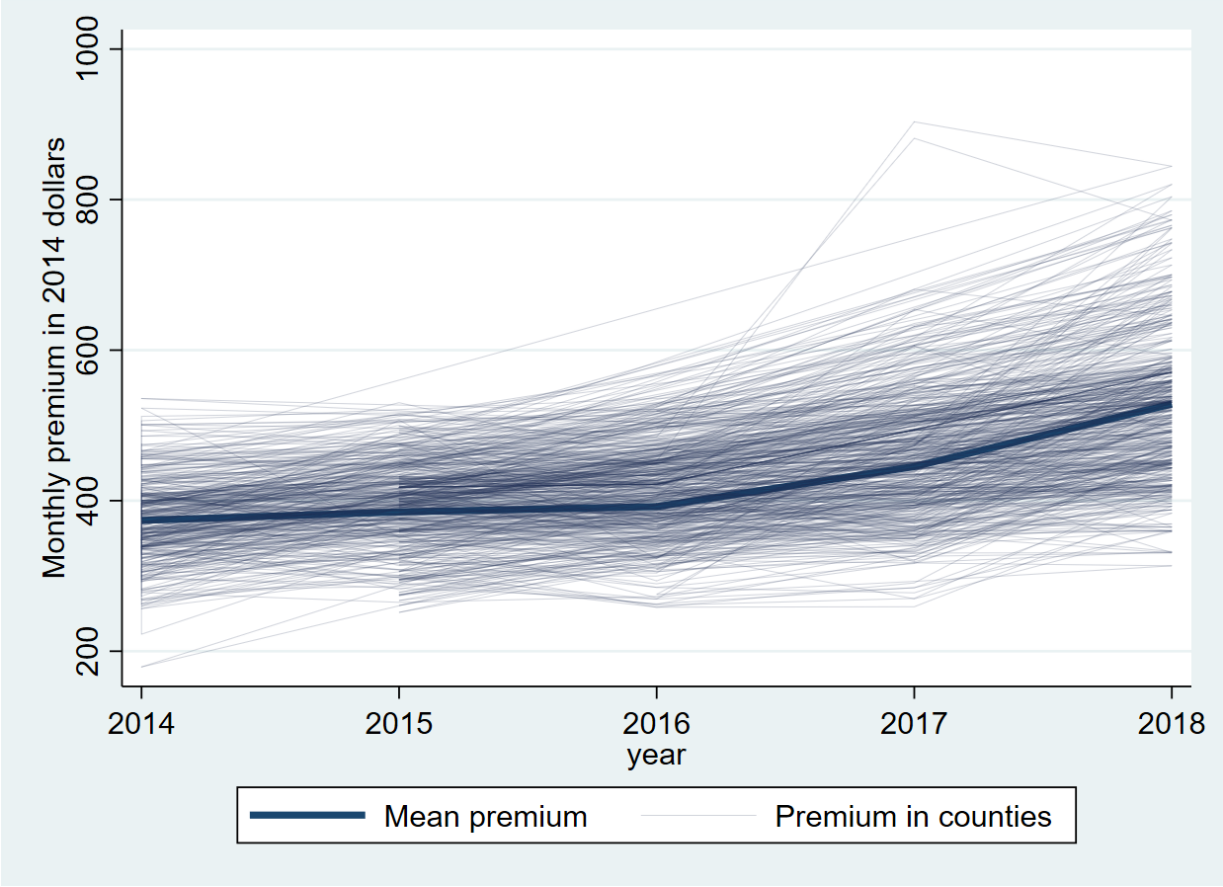
	(1.122)	(1.122)	(1.143)
moop	5.810	5.804	5.801
	(0.751)	(0.751)	(0.762)
Individual-level variables:			
entry	0.013	0.019	0.017
	(0.113)	(0.136)	(0.129)
income	76.632	58.795	47.395
	(81.742)	(74.832)	(63.504)
less than high school	0.039	0.040	0.102
	(0.194)	(0.196)	(0.303)
high school	0.216	0.216	0.272
	(0.411)	(0.412)	(0.445)
some college	0.249	0.260	0.271
	(0.432)	(0.438)	(0.444)
college	0.497	0.484	0.355
	(0.500)	(0.500)	(0.478)
age	44.454	44.881	43.327
	(10.967)	(10.343)	(10.880)
female	0.463	0.624	0.552
	(0.499)	(0.484)	(0.497)
married	0.579	0.920	0.661
	(0.494)	(0.272)	(0.473)
# of children	0.857	1.248	1.097
	(1.099)	(1.124)	(1.194)
race white	0.779	0.819	0.781
	(0.415)	(0.385)	(0.414)
race Black	0.115	0.077	0.114
	(0.319)	(0.266)	(0.317)
race other nonwhite	0.106	0.104	0.105
	(0.308)	(0.305)	(0.307)
poor health	0.049	0.048	0.075
	(0.217)	(0.214)	(0.263)
N	47565	10847	25728

Notes: The table shows means and standard deviations in parentheses below. Income, deductible and MOOP are in $1000 per year; the premium is in $100 per month; deflated to 2014 dollars. GDP and population are in $10,000 and 10,000 respectively.

The premium for the median Silver plan for a 50 year-old person in the local HIX is between about $394 and $425 per month on average in the three groups of respondents (deflated to 2014 dollars using the Consumer Price Index). The standard deviation in the main estimation sample (combining Columns 1 and 2 of Table 3) is $129. Figure 1

shows that the average premium over all counties (thick line) increased from 2014 to 2018 with an average annual real growth rate of 11.0%. The thin lines in the figure depict the development of the premium in each county in the sample and illustrate that there is substantial variation with both positive and negative changes over time.[5] The first decile of the annual real growth rate of the premium is a decrease by 9.2% and the ninth decile an increase by 32.4%. The large variation over time facilitates identification of the effects on entry into self-employment.

Figure 1: Development of the HIX premium over time in each county and on average



[5]Some lines start in 2015 due to missing values in 2014.

5 Methodology and Identification

We aim to estimate how a change in the premium of the median Silver Plan in the local HIX will affect an individual's decision to enter into self-employment. The primary treatment variable is the health insurance premium in the local HIX in the previous year. It is a continuous treatment variable and varies both across space (counties) and time. Higher prices indicate a stronger treatment. However, the HIX premium only affects the decision to become self-employed for individual who would need to purchase health insurance through the HIX in case of self-employment. This is generally the case for employees who have EPHI as the primary policyholder, because they will loose their EPHI if they quit their job to become self-employed. In contrast, individuals who have an employed spouse and are covered through the EPHI of the spouse as a dependent can keep this coverage when they become self-employed; therefore, changes in the HIX insurance premiums will not affect them. Therefore, primary policyholders of EPHI are the treatment group, and individuals covered by EPHI as dependents are the main control group. We exploit the fact that the health insurance premium only affects the treatment group in order to identify the causal effect of the health insurance premium on the decision to become self-employed. In a robustness check, we use an extended control group that includes everybody who is not a primary policyholder of EPHI. Our main control group, EPHI dependents, is a subsample of this extended control group, which in addition includes individuals who have private health insurance or who are uninsured. For these individuals, the health insurance situation does not change when they become self-employed, so they are not affected by the HIX premium.

This setting provides a quasi experiment that allows us to use the difference-in-differences (DD) method to estimate the effect of health insurance premiums in the local HIX on the probability of entry into self-employment. In the main estimations, we control for county×treatment fixed effects, i.e., county fixed effects that are allowed to be different for the treatment and the control groups. Thus, we only use within-county changes in HIX premiums over time for identification, and we account for any time-invariant differences

between the treatment and control groups that are allowed to vary across counties.[6]

The estimation equation for the DD model is

$$\begin{aligned}\text{Prob}\left(entry_{it}=1|premium_{j(i),t-1},d_{i,t-1},X_{it},C_i\right)=\alpha\, premium_{j(i),t-1}\\ +\beta(premium_{j(i),t-1}\times d_{i,t-1})+X'_{it}\theta+\sum_j\left(\gamma_j\, c_{ji}+\delta_j(c_{ji}\times d_{i,t-1})\right)+\epsilon_{it}\end{aligned} \tag{1}$$

where i denotes an individual and t the year the information in a variable pertains to, and $j(i)$ denotes the county individual i lives in. The outcome variable $entry_{it}$ is a dummy indicating entry into self-employment between $t-1$ and t, and Prob(.) denotes the conditional probability of entry. The continuous treatment variable $premium_{j(i),t-1}$ is the premium in the local HIX in the previous year. The treatment dummy variable $d_{i,t-1}$ equals one if an individual had EPHI as the primary policyholder in $t-1$, before potential entry into self-employment, and zero otherwise. X'_{it} is a row vector of control variables and θ the corresponding column vector of coefficients. c_{ji} are county dummies (stacked in vector C_i), and ϵ_{it} is the error term. The summation term represents the county×treatment fixed effects (therefore $d_{i,t-1}$ is not separately included). We estimate the linear probability models by OLS. We report standard errors robust to heteroscedasticity and clustered at the county level in all regressions.

The coefficient of the focal interaction term, β, captures the treatment effect on the treated. If the local HIX premium is a barrier to entrepreneurship, we expect this coefficient to be negative.

The DD estimator relies on the assumption, in our context, that the entry rate into self-employment in the treatment and the control group would have trended the same over time if HIX premiums had not changed differentially. Level differences in the entry rates between the treatment and control groups do not distort the estimation of the treatment effect on the treated even if these differences vary by country because we account for county×treatment fixed effects. Furthermore, any unobserved shocks that may be corre-

[6]In a robustness check, we also estimate a model without county×treatment fixed effects, additionally exploiting cross-sectional variation in HIX premiums. This increases efficiency of the estimation, but requires the stronger identifying assumption that unobserved differences between counties are uncorrelated with the local HIX premiums.

lated with HIX premium changes, but affect the treatment and control groups in the same way, are controlled.

Our estimator controlling for county×treatment fixed effects rests on significantly weaker assumptions than a more restrictive standard fixed effects estimator only controlling for county fixed effects. County fixed effects capture any level differences in entry rates between counties. However, the effect of being treated, i.e., of being an EPHI policyholder, may also differ across counties. For example, it is likely that the average quality of EPHI, the average premium paid for EPHI, and the availability of jobs offering EPHI differ across counties.[7] Counties with many jobs offering high-quality and affordable EPHI are likely to have many EPHI policyholders, and the presumably negative effect of being treated on the probability of entry into self-employment may be stronger in these counties in comparison to counties where EPHI is less attractive. Our county×treatment fixed effects capture any such heterogeneity.

Note that our independent variable is the premium in the local HIX, not the amount paid by the individual consumer, even if he or she buys from a HIX, because the APTC lowers the amount paid by many consumers. The fact that the premium is a market-level variable that varies over counties and time and does not depend on individual circumstances rules out potential individual-level sources of endogeneity. Furthermore, the literature suggests that the premium changes during our observation period—predominantly increases—were driven by federal and state-level policy changes unrelated to health or business environments in counties. Figure 1 shows that the growth of the premiums accelerated after 2016. Sacks et al. (2021) report that most of the increases between 2015 and 2017 were due to unplanned defunding of the Risk Corridors program in 2016. Mukhopadhyay et al. (2019) show that part of the premium hikes came from the closure of High Risk pools in some states. Therefore, the changes in premium can be considered plausibly exogenous.

To control for potential changes in the compositions of the treatment and control groups and to increase efficiency of the estimations, we include control variables in all our estima-

[7]For example, the ratio of the HIX premium (before APTC) to the EPHI premium (after employer subsidy) varies from 2.47 in Minnesota to 7.80 in Wyoming.

tions. At the county level, we control for the unemployment rate, population size and GDP as well as the deductible and MOOP of the Silver Plan with median premium in the local HIX health insurance market. At the individual level, we include educational attainments, age, age squared, gender, number of children in the household, race, marital status, health status (all observed in t), and total income and its square in the calendar year $t-1$. Since our main explanatory variable, the HIX premium, only varies at the county level, we also estimate a robustness check excluding the individual-level controls. In all models, we additionally include a full set of year dummies to control for potential general trends in the entry rate into self-employment or effects of the business cycle.

6 Empirical Results

Table 4 displays the main results from estimating the linear probability model of entry into self-employment. The DD estimations compare primary policyholders of EPHI (treatment group) to individuals covered by EPHI as dependents (control group); only these two groups are included in the sample. The DD estimate is the coefficient on the interaction term of the treatment dummy with the health insurance premium in the local HIX, which is the continuous treatment variable. Column 1 provides our main DD estimation. The estimated DD coefficient is negative and significant, which is consistent with entrepreneurship lock due to health insurance costs. Increasing the premium by \$100 per month decreases the annual probability of entry into self-employment by 0.25 percentage points; relative to the baseline annual probability of entry of 1.4% this corresponds to an increase in the entry rate by 17.7% (as indicated at the bottom of the table). The mean monthly premium among EPHI policyholders is about \$420 in the sample of individuals covered by EPHI (Table 3), so the elasticity of the probability of entry with respect to the premium is 0.74 (calculated as $\frac{17.7\%}{\$100/\$420}$) and economically significant.

Columns 2-4 present robustness checks. In Column 2, we drop the individual-level control variables. The estimated treatment effect remains very similar. Column 3 restricts the sample to higher-income individuals who have income above 400% of the federal poverty

level. As mentioned above, these individuals do not receive subsidies for the HIX costs; one could argue that EPHI policyholders below this threshold are less affected by the HIX premium due to the subsidies. However, excluding these individuals from the sample changes the estimate of the treatment effect only slightly. Column 4 uses the premium of the SLCSP in the local HIX instead of the premium of the median silver plan. The SLCSP may be considered relevant because the premium of the SLCSP is used to compute the level of the APTC. Again, the estimated coefficient of the interaction term remains very similar to the one in Column 1.

Table 4: Probability of entry into self-employment

	(1)	(2)	(3)	(4)
treatment×premium	-0.00249**	-0.00237**	-0.00232*	-0.00242*
	(0.00115)	(0.00116)	(0.00140)	(0.00130)
premium	0.00150	0.00374***	0.00113	0.00206
	(0.00135)	(0.00113)	(0.00168)	(0.00145)
unemployment rate	0.000231	0.000101	0.00211	0.000726
	(0.00175)	(0.00186)	(0.00228)	(0.00181)
population	0.000391**	0.000331	0.000164	0.000441**
	(0.000183)	(0.000203)	(0.000194)	(0.000195)
GDP	-0.00116***	-0.000826**	-0.00100***	-0.00106***
	(0.000346)	(0.000340)	(0.000384)	(0.000396)
deductible	-0.0000547	-0.0000647	-0.000268	0.000244
	(0.000581)	(0.000583)	(0.000765)	(0.000622)
moop	0.000397	0.000251	0.000327	0.000723
	(0.000839)	(0.000849)	(0.00116)	(0.000835)
income	0.0000426**		0.0000462**	0.0000464**
	(0.0000205)		(0.0000226)	(0.0000211)
income^2	-2.48e-08		-2.65e-08	-2.83e-08
	(2.28e-08)		(2.42e-08)	(2.34e-08)
high school	-0.000740		0.00209	-0.000517
	(0.00276)		(0.00436)	(0.00276)
some college	-0.0000846		0.00156	0.00116
	(0.00274)		(0.00426)	(0.00272)
college	0.00148		0.00268	0.00246
	(0.00283)		(0.00403)	(0.00280)
age	0.00123***		0.00133**	0.000991**
	(0.000466)		(0.000596)	(0.000435)
age^2	-0.0000111**		-0.0000122*	-0.00000891*
	(0.00000492)		(0.00000624)	(0.00000468)

female	-0.00669***		-0.00670***	-0.00672***
	(0.00111)		(0.00136)	(0.00115)
married	0.000409		0.00107	0.000652
	(0.00128)		(0.00162)	(0.00128)
# of children	0.00129**		0.00214**	0.00106*
	(0.000650)		(0.000944)	(0.000620)
race Black	-0.00500***		-0.00264	-0.00515***
	(0.00172)		(0.00260)	(0.00172)
race other nonwhite	-0.00210		-0.000783	-0.00185
	(0.00173)		(0.00236)	(0.00176)
poor health	0.00320		0.00371	0.00394
	(0.00245)		(0.00368)	(0.00251)
Year fixed effects	Yes	Yes	Yes	Yes
County×treatm. FE	Yes	Yes	Yes	Yes
Sample	EPHI covered	EPHI covered	EPHI covered & high income	EPHI covered
Premium	Median silver plan	Median silver plan	Median silver plan	Second-lowest silver plan
Mean entry prob.	0.0141	0.0141	0.0154	0.0142
Relative effect size	-17.67	-16.81	-15.12	-17.07
R^2	0.0178	0.0156	0.0225	0.0181
N	58412	58412	38663	57313

Notes: Linear probability models of entry into self-employment. The treatment dummy equals one if the respondent has EPHI coverage as the primary policyholder and zero if the respondent has EPHI coverage as a dependent. Income, deductible and MOOP are in $1000 per year; the premium is in $100 per month; deflated to 2014 dollars. GDP and population are in $10,000 and 10,000 respectively. In Column 3 only individuals who have income above 400% of the federal poverty level are included in the sample. Standard errors clustered at the county level in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The coefficients of the control variables confirm results from prior literature (Parker, 2018). Women are less likely to become self-employed than men, and Black Americans less likely than whites, even after controlling for income and education.

In Table 5, we assess the robustness of our results with respect to further specifications.[8] In Column 1, we do not account for county×treatment fixed effects. This way, we use cross-sectional variation in health insurance premiums for identification in addition to the variation over time used in the main analysis. Excluding the fixed effects reduces

[8]In all these robustness checks, we include the same control variables as in Column 1 of Table 4; the full results are available from the authors on request.

Table 5: Further robustness checks

	(1)	(2)
treatment×premium	-0.00153***	-0.00170*
	(0.000342)	(0.000897)
premium	0.00194***	0.000875
	(0.000700)	(0.00103)
unemployment rate	-0.000954***	0.00162
	(0.000358)	(0.00147)
population	0.00000820**	0.000442**
	(0.00000400)	(0.000217)
GDP	-0.000116**	-0.00113***
	(0.0000535)	(0.000298)
Year fixed effects	Yes	Yes
County×treatment fixed effects	No	Yes
Sample	EPHI covered	All
Premium	Median silver plan	Median silver plan
Mean entry probability	0.0141	0.0144
Relative effect size	-10.89	-11.81
R^2	0.00356	0.0158
N	58412	73293

Notes: Linear probability models of entry into self-employment. The treatment dummy equals one if the respondent has EPHI coverage as the primary policyholder and zero otherwise. In Column 1, we drop the county×premium fixed effects. The sample only includes respondents who have EPHI coverage as a primary policyholder (treatment group) or as a dependent (control group), as in Table 4. In Column 2, we extend the control group by adding individuals who have private health insurance or are uninsured. Income, deductible and MOOP are in $1000 per year; the premium is in $100 per month; deflated to 2014 dollars. GDP and population are in $10,000 and 10,000 respectively. Standard errors clustered at the county level in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

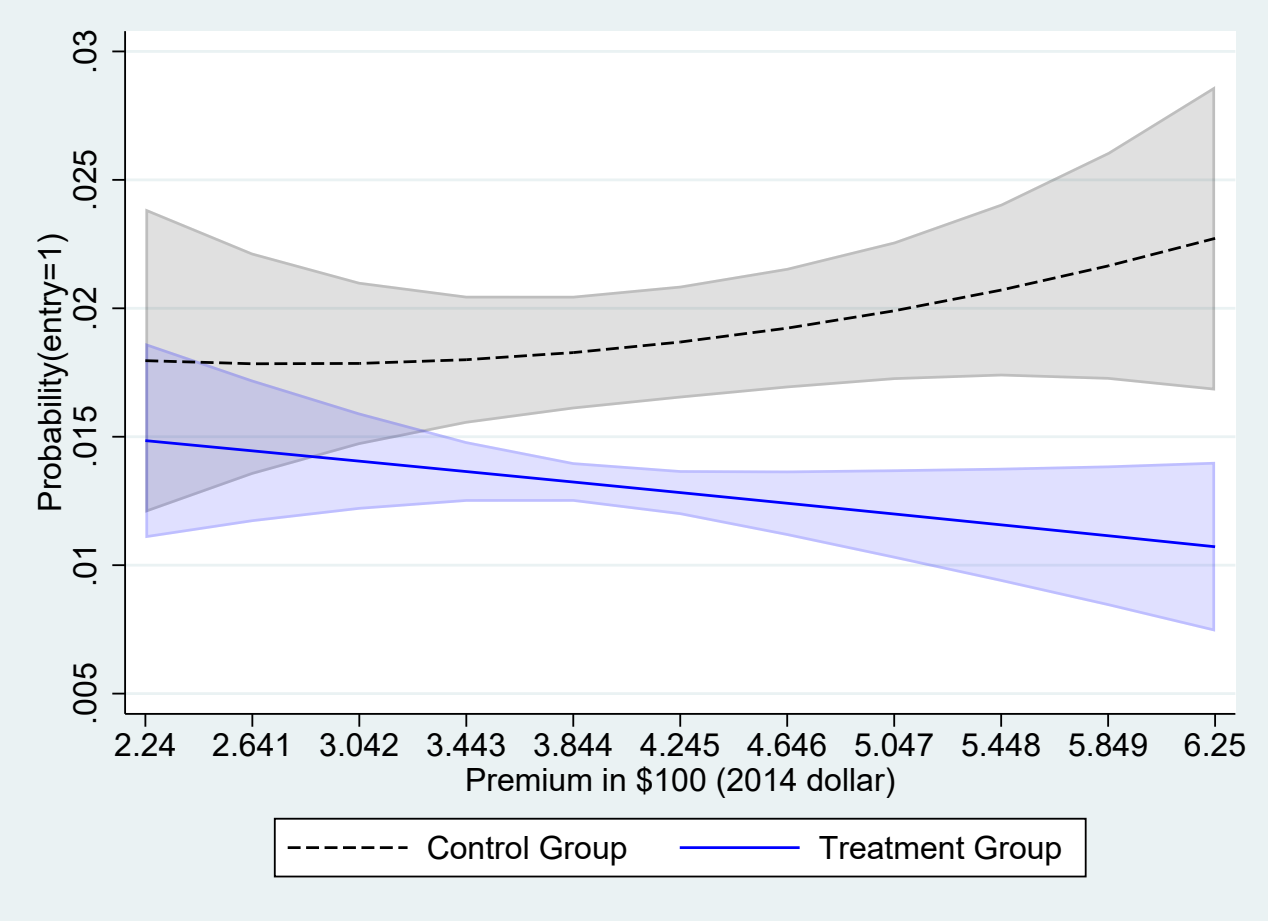
the standard error substantially. However, this comes at the cost of potential bias due to unobserved time-invariant differences between the treatment and control groups in the different counties. The treatment effect remains negative and becomes statistically more significant, but the point estimate of the effect size becomes smaller in absolute terms and may be biased toward zero in this estimation.

In Column 2, we include the county×treatment fixed effects again, but extend the control group. In the other estimations, we only use the sample of individuals currently covered by EPHI either as the primary policyholder (treatment group) or as a dependent

(control group). In this robustness check, we keep the same treatment group, but include all employed individuals who are not EPHI primary policyholders in the control group. Thus, in addition to EPHI dependents, the control group here also includes individuals with private health insurance or who are uninsured. Arguably, the health insurance situation does not change for them if they decide to become self-employed, so for them this decision should not be influenced by the local HIX premium, in contrast to EPHI policyholders, who would loose their EPHI and would be affected by the HIX premium. This is not our preferred estimation because one might argue that the additional individuals in the control group, in particular uninsured individuals, may differ from individuals in the treatment group in ways not captured sufficiently by our control variables. The estimated treatment effect remains significantly negative, but the absolute effect size is smaller than in our main model in Column 1 of Table 4, the relative effect size decreases from 17.7% to 11.8%.

As a final robustness check, we estimate a model including a quadratic term of the HIX premium to allow for potentially non-linear effects. We interact both the linear and squared terms of the premium variable with the treatment dummy. We include the same control variables as in Column 1 of Table 4. Figure 2 shows the predicted probabilities of entry into self-employment using the estimated coefficients from the quadratic DD model, along with 95% confidence bands. The graph compares EPHI primary policyholders (the treatment group) to EPHI dependents (the control group). The probability of entry decreases with higher HIX premiums for the treatment group relative to the control group, which confirms the results from the linear models and is again consistent with entrepreneurship lock. The graph also shows that there are no strong nonlinearities, so the linear main model seems to be a reasonable approximation. From all our robustness checks, we conclude that our findings are robust: Higher local health insurance premiums in the HIX decrease the probability of entry into self-employment for those affected by the HIX premiums in case of entry into self-employment, i.e., current EPHI primary policyholders.

Figure 2: Predicted probabilities of entry into self-employment with 95% confidence intervals using a quadratic function of the premium (shown for the 5^{th} to the 95^{th} percentile of the premium)



7 Conclusion

In this paper we examine whether "entrepreneurship lock" exists due to high prices of health insurance. To examine the impact of the price of health insurance on entry into self-employment we exploit changes of health insurance premiums in local Health Insurance Exchanges after the introduction of the Affordable Care Act as natural experiments. We estimate difference-in-differences models using individual-level data from the CPS-ASEC merged with panel data on health insurance plans. Individuals who were covered by EPHI as primary policyholders before potential entry into self-employment are the treatment group because they lose their EPHI coverage when becoming self-employed and may buy health insurance at the HIX. In contrast, EPHI dependents are the control group because they are not affected by HIX premiums due to health insurance coverage through a spouse.

Our results indicate that a higher health insurance premium in the HIX decreases the probability of entry into self-employment significantly. The estimated elasticity of the entry probability with respect to the health insurance premium is 0.74. Hence, our findings show that higher prices of health insurance are a barrier to entry into entrepreneurship. This result complements prior literature reporting entrepreneurship lock due to the unavailability of health insurance prior to the introduction of the ACA; the novel insight we provide is that the price of health insurance in the HIX plays a significant role for the decision to become self-employed after the introduction of the ACA.

Decreasing the cost of health insurance, and of health insurance premiums in the HIX in particular, has been a policy priority primarily for public health and social reasons. Our results suggest that lower health insurance costs in the HIX would have the additional effect of stimulating entrepreneurship. Reducing entrepreneurship lock will decrease distortions in occupational choice and can therefore improve satisfaction at work and the efficient use of human capital.

Our results also inform the current policy debate in the United States. For individuals who already received APTC subsidies, the American Rescue Plan Act of 2021 (ARPA) has temporarily increased subsidies available to buy health insurance through HIX (McDermott

et al., 2021). Moreover, the ARPA extended the APTC to all income levels. The Build Back Better Act (BBBA), currently under consideration in Congress, may extend these increased levels of APTC or even make them permanent. According to the current draft the BBBA will reduce the individual premium for HIX consumers by $600 per year or $50 per month by increasing the subsidy. Our estimates suggest that this will increase the annual entry rate into self-employment by 0.12 percentage points or about 9 percent.

References

Acs, Z. J. and C. Armington (2006). *Entrepreneurship, Geography, and American Economic Growth*. Cambridge University Press.

Bailey, J. (2017). Health insurance and the supply of entrepreneurs: New evidence from the Affordable Care Act. *Small Business Economics 49*(3), 627–646.

Bailey, J. and D. Dave (2019). The effect of the Affordable Care Act on entrepreneurship among older adults. *Eastern Economic Journal 45*(1), 141–159.

Barber III, D. and T. Kavoori (2015). The effects of the Affordable Care Act on the self-employed. *Academy of Economics and Finance Journal 6*, 15–23.

Barber III, D. and T. Kavoori (2018). The Affordable Care Act, state exchanges and the self-employed in the USA. *Journal of Small Business & Entrepreneurship 30*(6), 499–517.

Blumberg, L. J., S. Corlette, and K. Lucia (2014). The Affordable Care Act: Improving incentives for entrepreneurship and self-employment. *Public Policy & Aging Report 24*(4), 162–167.

Brooks, T., L. Roygardner, S. Artiga, O. Pham, and R. Dolan (2020). Medicaid and chip eligibility, enrollment, and cost sharing policies as of january 2019: findings from a 50-state survey. *The Henry J. Kaiser Family Foundation*.

Carree, M. A. and A. R. Thurik (2010). The impact of entrepreneurship on economic growth. In *Handbook of Entrepreneurship Research*, pp. 557–594. Springer.

DeLeire, T. and C. Marks (2015). Consumer decisions regarding health plan choices in the 2014 and 2015 marketplaces. US Department of Health and Human Services: Office of the Assistant Secretary for Planning and Evaluation. *ASPE Issue Brief 21*.

Fairlie, R. W., K. Kapur, and S. Gates (2011). Is employer-based health insurance a barrier to entrepreneurship? *Journal of Health Economics 30*(1), 146–162.

Fossen, F. M. and J. König (2017). Public health insurance, individual health, and entry into self-employment. *Small Business Economics 49*(3), 647–669.

Gilleskie, D. B. and B. F. Lutz (2002). The impact of employer-provided health insurance on dynamic employment transitions. *Journal of Human Resources 37*(1), 129–162.

Gumus, G. and T. L. Regan (2015). Self-employment and the role of health insurance in the US. *Journal of Business Venturing 30*(3), 357–374.

Gurley-Calvez, T. (2011). Will tax-based health insurance reforms help the self-employed stay in business? *Contemporary Economic Policy 29*(3), 441–460.

Haltiwanger, J., R. S. Jarmin, and J. Miranda (2013). Who creates jobs? Small versus large versus young. *Review of Economics and Statistics 95*(2), 347–361.

Heim, B. T. and I. Z. Lurie (2010). The effect of self-employed health insurance subsidies on self-employment. *Journal of Public Economics 94*(11-12), 995–1007.

Heim, B. T. and I. Z. Lurie (2014). Does health reform affect self-employment? Evidence from Massachusetts. *Small Business Economics 43*(4), 917–930.

Heim, B. T. and L. K. Yang (2017). The impact of the Affordable Care Act on self-employment. *Health Economics 26*(12), e256–e273.

Holtz-Eakin, D., J. R. Penrod, and H. S. Rosen (1996). Health insurance and the supply of entrepreneurs. *Journal of Public Economics 62*(1-2), 209–235.

Jia, Y. G. (2014). Health insurance coverage and self-employment among young US adults. *Available at SSRN 2533648*.

Kaiser Family Foundation (2015). Key facts about the uninsured population. Available at https://bit.ly/3eja5EC. Accessed April 18, 2021.

Kaiser Family Foundation (2019). Health insurance coverage of adults 19-64. Available at https://bit.ly/2RBMxCW. Accessed April 18, 2021.

Li, Y., M. A. Palma, and S. Towne (2017). Does health insurance provision improve self-employment and entrepreneurship? Evidence from state insurance mandates. Technical report, working paper, DOI: 10.22004/ag.econ.258399.

Lombard, K. V. (2001). Female self-employment and demand for flexible, nonstandard work schedules. *Economic Inquiry 39*(2), 214–237.

Madrian, B. C. (1994). Employment-based health insurance and job mobility: Is there evidence of job-lock? *Quarterly Journal of Economics 109*(1), 27–54.

McDermott, D., C. Cox, and K. Amin (2021). Impact of key provisions of the American Rescue Plan Act of 2021 COVID-19 relief on marketplace premiums. Available at https://www.kff.org/health-reform/issue-brief/impact-of-key-provisions-of-the-american-rescue-plan-act-of-2021-covid-19-relief-on-marketplace-premiums/. Accessed October 25, 2021.

Mukhopadhyay, S., J. Wendel, and M. Zou (2019). Impacts of shifting responsibility for high-cost individuals on Health Insurance Exchange plan premiums and cost-sharing provisions. *Journal of Health Economics 66*, 180–194.

Parker, S. C. (2018). *The economics of entrepreneurship*. Cambridge University Press, DOI: 10.1017/9781316756706.

Sacks, D. W., K. Vu, T.-Y. Huang, and P. Karaca-Mandic (2021). How do insurance firms respond to financial risk sharing regulations? Evidence from the Affordable Care Act. *Health Economics 30*(6), 1443–1460.

U. S. Bureau of Labor Statistics (2020). Ted: The Economics Daily-Average employee medical premium $6,797 for family coverage in 2020. Available at https://bit.ly/2OXOgS6. Accessed April 18, 2021.

Van Stel, A., M. Carree, and R. Thurik (2005). The effect of entrepreneurial activity on national economic growth. *Small Business Economics 24*(3), 311–321.

Velamuri, M. (2012). Taxes, health insurance, and women's self-employment. *Contemporary Economic Policy 30*(2), 162–177.

Wellington, A. J. (2001). Health insurance coverage and entrepreneurship. *Contemporary Economic Policy 19*(4), 465–478.

Zissimopoulos, J. M. and L. A. Karoly (2007). Transitions to self-employment at older ages: The role of wealth, health, health insurance and other factors. *Labour Economics 14*(2), 269–295.