Online Appendix for: Taxation and Entrepreneurship in the United States

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Online Appendix (Supplemental material, for Online Publication Only)

This Appendix is orgaized as follows: Section A conducts additional robustness tests of our empirical analysis. Section B discusses the properties of our tax function and provides additional detail on how we estimate it in the data. Section C studies the relationship between entrepreneurial choice and taxation in simple models to develop intuition. Section D formally defines a stationary recursive competitive equilibrium in our benchmark model. Section E describes the numerical solution of the model. Section F provides additional details on the structural model estimation. Section H contains figures with additional statistics from our calibrated benchmark model. Section H presents the results from additional counterfactual model experiments. We study the determinants of entrepreneurship and the interaction between different model elements and tax progressivity.

A Empirical Analysis: Additional Robustness Tests

In this section we provide a number of further robustness tests of our main empirical results on the impact of taxes on entrepreneurial activity. We study the impact of including additional control variables and analyze the impact of migration as well as the dynamic effects of tax changes.

A.1 Including Local Non-linear Trends and More Local Business Cycle Variables

Some readers may be concerned that not all states in the US are growing at the same rate and perhaps faster growing states have different economic conditions, which could be correlated with entrepreneurship. To address this concern we allow for different quadratic trends for each state. We also include more local business cycle variables, such as unemployment rates and real GDP growth rates starting from 4 years ago. These results are presented in Table A.1. We observe that for all the measures of entrepreneurship, our main results are still robust.

A.2 The Possible Impact of Migration

One possible concern is that entrepreneurs may respond not only to their own state's policy changes but also to the policies in other states. In our empirical analysis, we are mostly focusing on relatively small variations in taxes within states, the federal tax changes can be somewhat larger (see Table A.1 in the regular Appendix for the standard deviations of average tax rates and θ_1 in the pooled sample and the within-states sample), and we therefore think that migration in response to tax changes may be less important. Larger tax changes are presumably more relevant for migration decisions as there are relatively large moving costs involved. However, we conduct some robustness tests aimed at confirming that our main results are not due to migration: (1) In Table A.5, we compute each state's population share, the fraction of the population in the whole country that live in the state, for each year. We then control for current, lagged $(t-2)$ and future

$(t + 2)$ population shares in our benchmark and IV regressions. The rationale is that if there is significant migration across states due to tax changes and large changes in population shares, the additional control variables should help to absorb these effects. Since entrepreneurs employ half of the private sector labor force, a movement of entrepreneurs would also be correlated with a movement of people. However, we find that our results for the impact of taxes on entrepreneurship are not affected when introducing population shares as control variables. (2) In Table A.6, we address this concern from another point: we include local time trends at the US regional level (4 in total) and US census economic division level (9 in total) in the benchmark regressions. Intuitively, if households and entrepreneurs migrate from states where taxes are currently high to state where the current tax conditions are favorable, we could hope to pick up some of this by using trends at the regional level. While we cannot fully capture all migration patterns, these additional controls can help us control for some of the moves within larger areas. Table A.6, however, shows that our results are robust to adding these additional control variables.

A.3 Effects at Different Time-horizons

In our benchmark regressions, we look at the effects of tax changes on entrepreneurship 2 years later. Here we provide more results, considering different time horizons for the dependent variable, ranging from $t - 3$ to $t + 9$. In Figures A.1 and A.2 we plot the coefficients from regressing our measures of entrepreneurship at different times on the average tax rate at the 50th percentile and on tax progressivity, θ_1, at time t. The approach is similar to the projection methods used in Jordà (2005) and Teulings and Zubanov (2014). Across different time horizons, we generally find that the impact of changes in the average tax rate at the 50th percentile on entrepreneurship is more pronounced in the short run, and that the effect is decreasing or even disappears in the long-run. For example, in panel (d) of Figure A.1, we plot the evolution of the regression coefficient from the regression of employment at small establishments on the average tax rate at the 50th percentile. On impact, employment at small establishments drops by about 1.5%, but over time, the effect is almost monotonically decreasing and after 9 years, the effect is not statistically different from 0. This diminishing effect is perhaps not that surprising, since the taxes could be changed in later years. The results from regressing our measures of entrepreneurship on tax progressivity, θ_1, while controlling for θ_0, in Figure A.2 are also similar. In short, when looking at the dynamics of tax impacts, we find negative and quite persistent effects, that tend to diminish after 9 years.

In addition to considering the regression coefficients using future values of the dependent variables, Figures A.1 and A.2 also plot the dynamics of measures of entrepreneurship before the tax changes occur. We look at $t - 3$, $t - 2$ and $t - 1$. We find that conditional on our benchmark control variables, the effects of taxes on the dependent variables in years prior to the year of the tax change, are generally not significant. For example, consider panel (a) of Figure A.1, where clearly there is no effect at $t - 3$ and a weak but statistically insignificant effect at $t - 2$ and $t - 1$. Thus, these results imply that conditional on our state level controls, different U.S. states have more or less similar levels of entrepreneurship before tax changes take place in a state. However, it would also not be completely surprising to find an effect of taxes at time t on entrepreneurship at time $t-1$ or $t-2$. The reason is that tax changes can sometimes be expected or announced ahead of the actual implementation time.

A.4 Reshuffling Tax Changes

We also conduct another experiment, "permutation tests", where we randomly shuffle the tax measures (θ_0 and θ_1) across states within each given year. We run the random experiments many times and test if the regression coefficients are significantly different from zero. We find that none of the regression results are significant. In other words, if we randomly assigned the tax measures across states, we would not observe significant regression results, like we do in the benchmark regressions in Table 2.

A.5 Federal Tax Reforms and Big Changes

Lastly, we only focus on those periods with "big national shocks". In particular, we focus the years 1988, 1991, 1992, 1993 and 2001, as in these years the US government (the Reagan and Bush Sr. and Jr. administrations) implemented relatively large national tax reforms. Different states that are subject to the same large national tax changes still experience smaller state-level tax changes, see Figures A.3, A.4 in the main text for the average tax rates at the median and 90^{th}percentile of income and Figures A.5 and A.6 in the main text for the estimated level of tax progressivity, θ_1). Table A.3 displays the results. Overall, we find negative impacts of tax changes due to state-level variations around the national reform years. However, since the sample periods are quite limited and the sample size is much smaller now (only about 10% of the full sample is used here), the results are in general weaker and most of them are not statistically significant, except for the results with respect to measured tax progressivity, θ_1.

Table A.1: Taxes and Entrepreneurial Activities: Robustness Tests With More Lagged Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Num. of Entre.			Num. of College Entre.			Num. of Small Estab.			Small Estab. Emp			Total Emp.		
Avg. rate at 50^{th}	-0.0437**			-0.0614**			-0.0136***			-0.0156***			-0.0109***		
	(0.0182)			(0.0241)			(0.00230)			(0.00274)			(0.00280)		
Avg. rate at 90^{th}		-0.0387**			-0.0470**			-0.00908***			-0.00713***			-0.00414**	
		(0.0170)			(0.0223)			(0.00179)			(0.00207)			(0.00205)	
Avg. rate at 95^{th}			-0.0475***			-0.0493**			-0.00872***			-0.00608***			-0.00348*
			(0.0170)			(0.0226)			(0.00169)			(0.00190)			(0.00195)
Observations	1,626	1,626	1,626	1,626	1,626	1,626	1,534	1,534	1,534	1,534	1,534	1,534	1,600	1,600	1,600
R-squared	0.901	0.901	0.901	0.888	0.888	0.888	1.000	1.000	1.000	0.999	0.999	0.999	0.999	0.999	0.999
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Business cycles	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the regression results when we include more lagged economic control variables (local GDP, GDP growth rates, local population shares, local unemployment rates) and local linear and quadratic time trends, relative to the benchmark setting as specified in the main text. "Num. of Entre." uses the log of total number of entrepreneurs in each state and each year (from CPS, and weighted by CPS sampling weights); "Num. of College Entre." uses the log of total number of entrepreneurs with at least some-college degrees. "Num. of Small Estab." uses the log of total number of small-sized establishments, and "Small Estab. Emp" is for the log of employment at small-sized establishments. Column "Total Emp." uses the log of total employment for all establishment in each state and each year.

Table A.2: Robustness Test for Instrumental Variable Analysis: Controlling for Lagged Entrepreneurial Activities

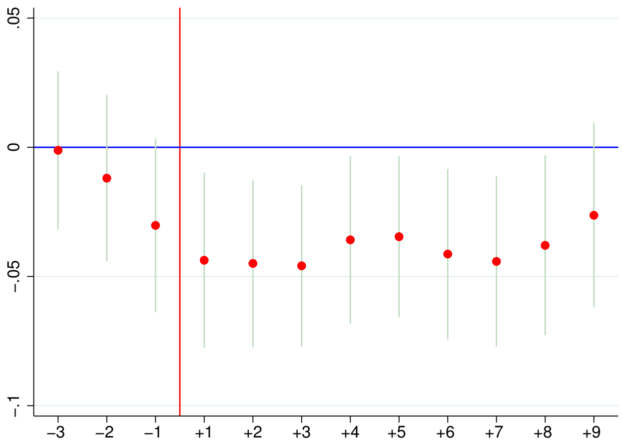
Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Num. of Entre.		Num. of Estab.		EMP		Num. of Small Estab.		Small Estab. Emp	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Avg. rate at 50^{th}	-0.0416**	-0.0734***	-0.0109***	-0.0158***	-0.00936***	-0.0132***	-0.0159***	-0.0225***	-0.0125***	-0.0170***
	(0.0165)	(0.0280)	(0.00163)	(0.00338)	(0.00250)	(0.00397)	(0.00294)	(0.00501)	(0.00221)	(0.00452)
Observations	1,783	1,783	1,752	1,752	1,752	1,752	1,395	1,395	1,395	1,395
R-squared	0.895	0.895	1.000	1.000	0.999	0.999	1.000	1.000	1.000	1.000
First stage F stat	68.79	68.79	68.79	68.79	68.79	68.79	68.79	68.79	68.79	68.79
p-value for F stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Avg. rate at 90^{th}	-0.0347**	-0.0997**	-0.00602***	-0.0102	-0.00239	-0.0113	-0.00579***	0.00454	-0.00667***	0.00365
	(0.0154)	(0.0481)	(0.00137)	(0.00629)	(0.00199)	(0.00774)	(0.00214)	(0.00542)	(0.00170)	(0.00509)
Observations	1,783	1,783	1,752	1,752	1,752	1,752	1,395	1,395	1,395	1,395
R-squared	0.895	0.893	1.000	1.000	0.999	0.999	1.000	1.000	1.000	1.000
First stage F stat	37.70	37.70	37.70	37.70	37.70	37.70	37.70	37.70	37.70	37.70
p-value for F stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Avg. rate at 95^{th}	-0.0408***	-0.130	-0.00473***	0.0101	-0.00134	-0.0111	-0.00373*	0.00172	-0.00535***	-8.39e-05
	(0.0155)	(0.106)	(0.00136)	(0.0149)	(0.00195)	(0.0155)	(0.00199)	(0.00729)	(0.00165)	(0.00617)
Observations	1,783	1,783	1,752	1,752	1,752	1,752	1,395	1,395	1,395	1,395
R-squared	0.895	0.892	1.000	1.000	0.999	0.999	1.000	1.000	1.000	1.000
R-squared	0.894	0.893	1.000	1.000	0.999	0.999	1.000	1.000	1.000	1.000
First stage F stat	18.81	18.81	18.81	18.81	18.81	18.81	18.81	18.81	18.81	18.81
p-value for F stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Num. of Entre.		Num. of Estab.		EMP		Num. of Small Estab.		Small Estab. Emp	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Progressivity θ_1	-8.408**	-14.12*	-2.244***	-5.453***	-1.547**	-5.502***	-0.610	-15.13***	-1.577***	-13.11***
	(4.243)	(8.438)	(0.499)	(1.292)	(0.684)	(1.262)	(0.719)	(4.577)	(0.611)	(3.546)
θ_0	0.256**	0.371*	0.0805***	0.137***	0.0816***	0.181***	0.0434**	0.560***	0.0580***	0.472***
	(0.123)	(0.217)	(0.0165)	(0.0292)	(0.0212)	(0.0344)	(0.0211)	(0.160)	(0.0180)	(0.123)
Observations	1,783	1,783	1,752	1,752	1,752	1,752	1,395	1,395	1,395	1,395
R-squared	0.895	0.895	1.000	1.000	0.999	0.999	1.000	0.999	1.000	1.000
First stage F stat (for θ_0)	84.14	84.14	84.14	44.78	84.14	44.78	44.78	84.14	84.14	44.78
p-value for F stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
First stage F stat (for θ_1)	44.78	44.78	44.78	84.14	44.78	84.14	84.14	44.78	44.78	84.14
p-value for F stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

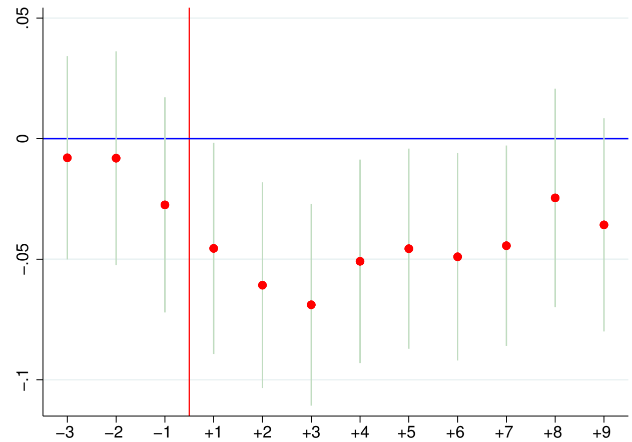
Note: This table reports the regression results using instrumental variables and also controlling for lagged Entrepreneurial Activities (by 2 periods) in the regressions. For more details on the construction of instrumental variables please see the main text. "Num. of Entre." uses the log of total number of entrepreneurs in each state and each year (from CPS and weighted by CPS sampling weights) as dependent variable; "Num. of Estab." uses the log of total number of establishments and "EMP" is for the log of total employment. "Num. of Small Estab." uses the log of total number of small-sized establishments, and "Small Estab. Emp" is for the log of employment at small-sized establishments in each state and each year. Note that for all regressions we always control for State FE, Year FE, State time-varying Control variables, Local Business cycles and local non-linear trends. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure A.1: Taxes and Entrepreneurship at Different Time Horizons (Using Avg. rate at 50^{th})

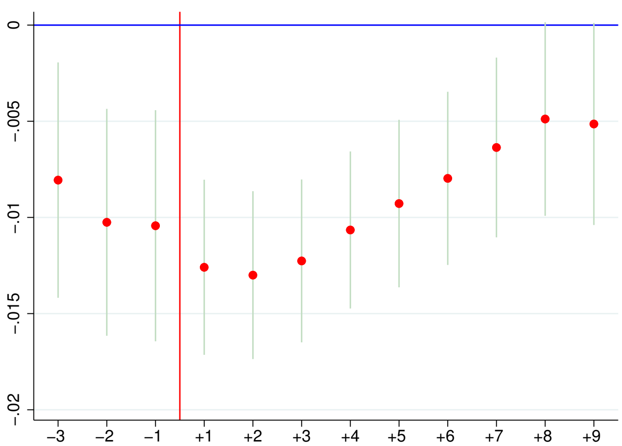
(a) Num. of Entre.



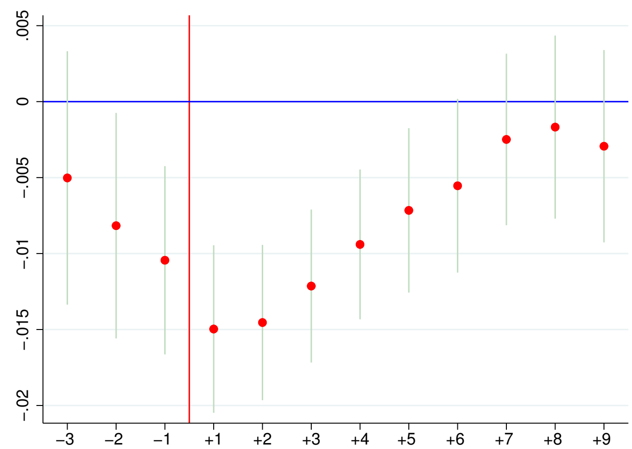
(b) Num. of College Entre.



(c) Num. of Small Estab.



(d) Small Estab. Emp



(e) Total Emp.

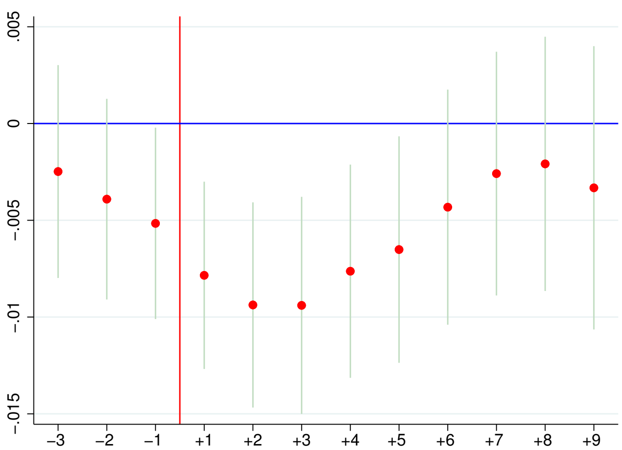
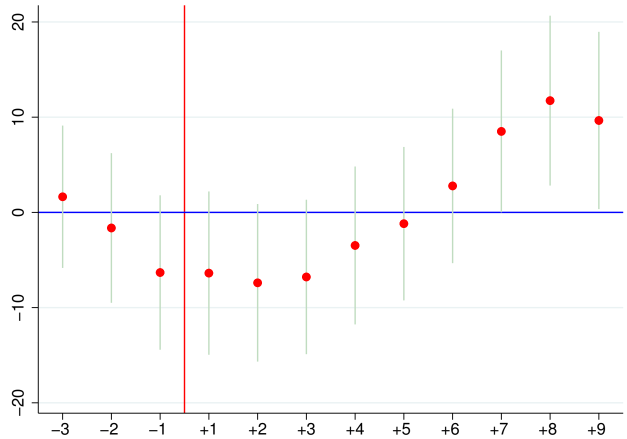
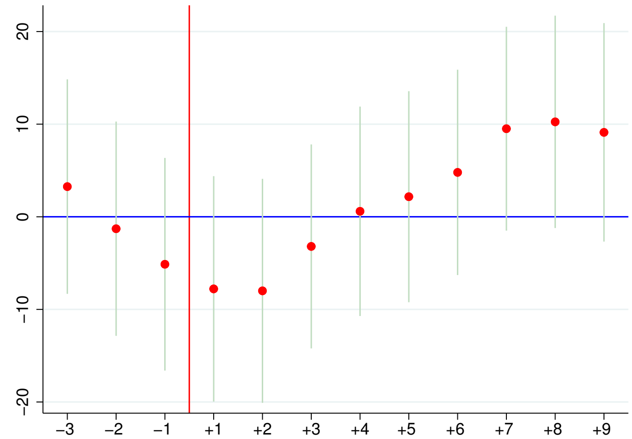


Figure A.2: Taxes and Entrepreneurship at Different Time Horizons (Using Measured Tax Progressivity θ_1)

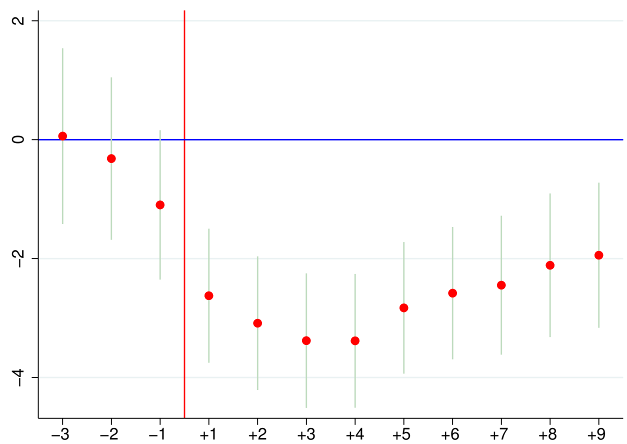
(a) Num. of Entre.



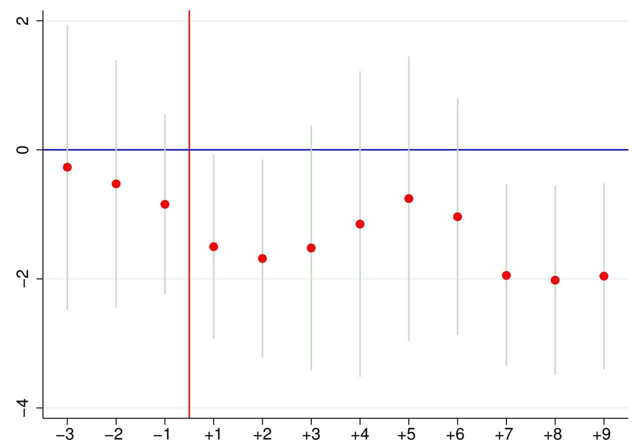
(b) Num. of College Entre.



(c) Num. of Small Estab.



(d) Small Estab. Emp



(e) Total Emp.

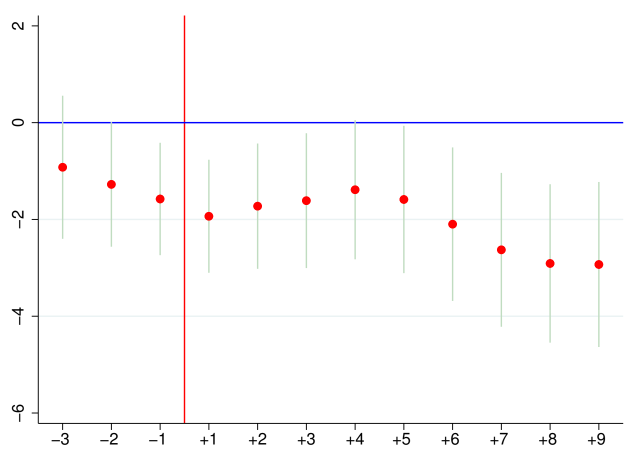


Table A.3: Taxes and Entrepreneurial Activities Around Selected Reform Years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Num. of Entre.				Num. of College Entre.				Num. of Small Estab.				Num. of Small Estab. Emp				Total Emp.			
Avg. rate at 50^{th}	-0.0443				0.00425				-0.0207				-0.00402				-0.00807			
	(0.0519)				(0.0594)				(0.0434)				(0.0444)				(0.0455)			
Avg. rate at 90^{th}		-0.0430				0.00145				-0.0317				-0.0221				-0.0274		
		(0.0379)				(0.0455)				(0.0339)				(0.0346)				(0.0356)		
Avg. rate at 95^{th}			-0.0431				-0.00218				-0.0366				-0.0284				-0.0351	
			(0.0358)				(0.0431)				(0.0326)				(0.0334)				(0.0344)	
Progressivity θ_1				-10.43				4.404				-1.861				-0.766				-3.367
				(13.97)				(15.04)				(13.64)				(14.20)				(15.04)
Observations	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	250	250	250	250
R-squared	0.832	0.833	0.833	0.833	0.831	0.831	0.831	0.832	0.948	0.948	0.948	0.948	0.948	0.948	0.949	0.949	0.948	0.949	0.949	0.949
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Business cycles	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

NOTE: This table reports the regression results using different average tax rates and also our measured tax progressivity θ_1 as described in the main text as explanatory variables. The sample is restricted to the nationwide reform years of 1988, 1991, 1992, 1993 and 2001. For more details please see the main text. When using progressivity, θ_1, as the explanatory variable, note that θ_0 is always controlled for. "Num. of Entre." uses the log of total number of entrepreneurs in each state and each year (from CPS and weighted by CPS sampling weights); "Num. of College Entre." uses the log of total number of entrepreneurs with at least some-college degrees. "Num. of Small Estab." uses the log of total number of small-sized establishments, and "Num. of Small Estab. Emp" is for the log of employment at small-sized establishments. Column "Total Emp." uses the log of total employment for all establishment in each state and each year.

Table A.4: Taxes and Entrepreneurial Activities: The Impact of Average Tax Rates at Multiples of Average Earnings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Num. of Entre.				Num. of College Entre.				Num. of Small Estab.				Small Estab. Emp.				Total Emp.			
Avg. rate at 1 AE	-0.0799***				-0.0811***				0.00109				0.00619				0.00897			
	(0.0188)				(0.0212)				(0.00732)				(0.00702)				(0.00597)			
Avg. rate at 2 AE		-0.103***				-0.0937***				-0.00647				-0.00393				0.00176		
		(0.0178)				(0.0195)				(0.00732)				(0.00702)				(0.00631)		
Avg. rate at 5 AE			-0.107***				-0.0845***				-0.0369***				-0.0330***				-0.0197***	
			(0.0175)				(0.0185)				(0.00724)				(0.00696)				(0.00630)	
Avg. rate at 10 AE				-0.0700***				-0.0546***				-0.0329***				-0.0287***				-0.0170***
				(0.0137)				(0.0148)				(0.00567)				(0.00545)				(0.00501)
Observations	1,588	1,588	1,588	1,588	1,588	1,588	1,588	1,588	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,417	1,588	1,588	1,588	1,588
R-squared	0.840	0.841	0.841	0.840	0.858	0.859	0.858	0.857	0.996	0.996	0.996	0.996	0.997	0.997	0.997	0.997	0.996	0.996	0.996	0.996
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Business cycles	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the regression results using average tax rates at different multiples of average earnings (1, 2, 5, 10 times of average earnings of US in each year) as explanatory variables. For more details please see the main text. "Num. of Entre." uses the log of total number of entrepreneurs in each state and each year (from CPS and weighted by CPS sampling weights); "Num. of College Entre." uses the log of total number of entrepreneurs with at least some-college degrees. "Num. of Small Estab." uses the log of total number of small-sized establishments, and "Small Estab. Emp" is for the log of employment at small-sized establishments. Column "Total Emp." uses the log of total employment in all establishments in each state and each year.

Table A.5: Robustness Tests: Controlling for Lagged and Current Population Shares

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Num. of Entre.		Num. of Estab.		EMP		Num. of Small Estab.		Small Estab. Emp	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Progressivity θ_1	-8.115*	-14.64	-3.951***	-9.373***	-2.275***	-7.122***	-2.102**	-8.586*	-3.626***	-14.59***
	(4.398)	(8.950)	(0.578)	(1.379)	(0.689)	(1.229)	(0.837)	(4.460)	(0.605)	(2.150)
θ_0	0.228*	0.420*	0.127***	0.252***	0.0994***	0.233***	0.0957***	0.339**	0.122***	0.514***
	(0.129)	(0.235)	(0.0192)	(0.0344)	(0.0214)	(0.0355)	(0.0319)	(0.166)	(0.0212)	(0.0797)
Observations	1,720	1,720	1,694	1,694	1,694	1,694	1,533	1,533	1,533	1,533
R-squared	0.895	0.894	1.000	0.999	0.999	0.999	0.999	0.999	1.000	0.999
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Business cycles	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Time Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A.6: Robustness Tests: Controlling for Region/Divisions Time trends

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Num. of Entre.		Num. of Estab.		EMP		Num. of Small Estab.		Small Estab. Emp	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Progressivity θ_1	-10.81**	-21.98**	-3.892***	-9.215***	-1.991***	-6.297***	-1.119	-4.778	-2.477***	-11.63***
	(4.275)	(8.731)	(0.525)	(1.309)	(0.632)	(1.164)	(0.807)	(4.080)	(0.602)	(1.967)
θ_0	0.321***	0.648***	0.117***	0.229***	0.0785***	0.185***	0.0497	0.166	0.0771***	0.386***
	(0.124)	(0.221)	(0.0167)	(0.0306)	(0.0190)	(0.0322)	(0.0306)	(0.155)	(0.0205)	(0.0728)
Observations	1,783	1,783	1,752	1,752	1,752	1,752	1,591	1,591	1,591	1,591
R-squared	0.898	0.898	1.000	1.000	0.999	0.999	0.999	0.999	1.000	1.000
Region FE × Time Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Divisions FE × Time Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Business cycles	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Time Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: These tables report the regression results using instrument variables (and the corresponding OLS results), with some further controls for a robustness check. For more details please see the main text. "Num. of Entre." uses the log of total number of entrepreneurs in each state and each year (from CPS and weighted by CPS sampling weights) as the dependent variable; "Num. of Estab." uses the log of total number of establishments and "EMP" is for the log of total employment. "Num. of Small Estab." uses the log of total number of small-sized establishments, and "Small Estab. Emp" is for the log of employment at small-sized establishments in each state and each year. Note that for all regressions we always control for State FE, Year FE, State time-varying Control variables, Local Business cycles and local non-linear trends.

B Tax Function

This appendix discusses the properties of our tax function and explain why it is desirable to normalize income by the average earnings in a given tax year when applying the tax function. Finally, Section B.3 provides additonal details on our estimation of the tax function from the data.

B.1 Properties of the Tax Function

Given the tax function

$$y_a = \theta_0 y^{1-\theta_1}$$

that we employ, the after tax income is defined as

$$y_a = (1 - \tau(y))y.$$

And thus we have,

$$\theta_0 y^{1-\theta_1} = (1 - \tau(y))y.$$

and further,

$$\begin{aligned} 1 - \tau(y) &= \theta_0 y^{-\theta_1}, \\ \tau(y) &= 1 - \theta_0 y^{-\theta_1}, \\ T(y) &= \tau(y)y = y - \theta_0 y^{1-\theta_1}, \\ T'(y) &= 1 - (1 - \theta_1)\theta_0 y^{-\theta_1}. \end{aligned}$$

Thus the tax wedge for any two incomes (y_1, y_2) is given by

$$1 - \frac{1 - T'(y_2)}{1 - T'(y_1)} = 1 - \left(\frac{y_2}{y_1}\right)^{-\theta_1} = 1 - \frac{1 - \tau(y_2)}{1 - \tau(y_1)}. \tag{B.1}$$

Therefore, the tax wedge is independent of the scaling parameter θ_0.[1] Thus by construction, one can raise average taxes by lowering θ_0 and not change the progressivity of the tax code, since (as long as tax progressivity is defined by the tax wedges) the progressivity of the tax code[2] is uniquely determined by the parameter θ_1. Heathcote et al. (2017) estimate the parameter $\theta_1 = 0.18$. They include some transfers to households in their estimation and this is the reason for a somewhat more progressive tax schedule than what we find in the current paper.

[1]It should be noted that the last inequality only holds in the absence of additional lump-sum transfers.

[2]Note that

$$1 - \tau(y) = \frac{1 - T'(y)}{1 - \theta_1} > 1 - T'(y)$$

and thus as long as $\theta_1 \in (0, 1)$ we have that

$$T'(y) > \tau(y),$$

so marginal tax rates are higher than average tax rates for all income levels.

B.2 Adjusting the Tax Function by AE to Compare Taxes Across Different Economies

When we compare different economies the average income, AE, is not necessarily 1 (in our benchmark economy we have normalized AE to 1). To compare taxes across different economies (model economies or different years in the data), the tax function faced by households needs to be adjusted by the corresponding equilibrium AE so that the tax is always relative to average income. To see this, suppose in an economy the tax function is not adjusted, and the average income is AE. The tax function is given simply by

$$y_a = \theta_0 y^{1-\theta_1}.$$

Then, for a person with average income, AE, in this model economy, his/her tax rate is computed as:

$$\frac{AE - y_a}{AE} = \frac{AE - \theta_0 (AE)^{1-\theta_1}}{AE} = 1 - \theta_0 (AE)^{-\theta_1},$$

which clearly depends on the scale of the economy.

On the other hand, consider the tax function that is adjusted by AE:

$$y_a / AE = \theta_0 (y/AE)^{1-\theta_1}.$$

Then, for a person with average income AE in this model economy, his/her tax rate is computed as:

$$\frac{AE - y_a}{AE} = 1 - \theta_0 (AE/AE)^{1-\theta_1} = 1 - \theta_0,$$

which clearly is independent of the scale of the economy.

B.3 Estimating the Tax Function from the Data

To construct our measures of tax level (θ_0) and tax progressivity (θ_1) from the data, we perform the following steps:

1. Using the data from CPS 2010, we keep all observations where individuals are 20 years of age and older, and for whom the family income[3] is no less than 50% of the average wage income in 2010[4].

2. Income is taken relative to the national average earnings, AE, in 2010. To obtain income to be used in each year, we then multiply by AE_t.

3. For each observation in the resulting sample, we use the TAXSIM program to compute federal and state personal income tax liabilities implied by the tax code:

    (a) For this exercise, we do not use the actual information about which state the observation comes from. Instead, we artificially assign the value of the state to each of the 51

[3] Individual income for singles, the sum of the income of the two spouses for married.

[4] We exclude households at the very bottom of the income distribution as they are usually not prospective entrepreneurs.

possible values (50 U.S. states plus the District of Columbia), and then submit the data on individual income, spouse's income for married households, their marital status and the number of young children in the household to the TAXSIM program, which generates the hypothetical tax liabilities for each observation in the CPS 2010 sample that would occur if an individual (or a family) were residing in each of the U.S. states in a given year.

(b) We calculate gross (pre-tax) income (y) by adding to the income reported in the CPS the employer share (50%) of the Federal Insurance Contribution Act (FICA) tax (the sum of Social Security and Medicare taxes) computed by TAXSIM.

(c) We calculate net (after-tax) income (y_a) by subtracting state and federal income taxes and the FICA tax from the gross income computed by TAXSIM.

4. We estimate θ_0 and θ_1 by regressing the logarithm of net (after-tax) income on the logarithm of gross (pre-tax) income. We obtain an estimate of θ_0 and θ_1 in each state in each year from 1977 to 2019.

C Building Intuition: The Impact of Taxation on Entrepreneurial Choice in Simple Models

In this section we develop simple one- and two-period models to theoretically illustrate how higher and more progressive taxes may affect entrepreneurial choice intuitively. The impact of tax progressivity is ultimately a quantitative question, and we show that theoretically increased tax progressivity has opposing effects on entrepreneurial choice through the "risk-" and "return-effect" in a static model without wealth. It lowers the return but also the risk of entrepreneurship.[5] In this appendix we also study the impact of risk aversion, a fixed entry cost of entrepreneurship, initial wealth and their interactions with taxation.

C.1 A Static (one-period) Model With Mean-Variance Utility

There is a continuum of individuals who differ in their type a, which determines their productivity if they choose to become workers. They draw their type from some distribution with cdf F_a, and their type is known when they decide whether they want to be a worker or an entrepreneur. Let I denote their gross (pre-tax) income. It is subject to a progressive tax, so that their net (after-tax) income is $\theta_0(I/AE)^{1-\theta_1}$, where AE is the average earnings in this economy. Consumption is equal to net income, $c = m$. If they decide to be workers, they earn a gross income $I_w = a$, while their net income is $m_w = \theta_0(a/AE)^{1-\theta_1}$. On the other hand, if they choose to become entrepreneurs,

[5] In models with assets things are more complicated because of the negative effect tax progressivity typically has on savings, which makes entrepreneurship less profitable for constrained individuals and also riskier.

they earn some profit π, which is random and unknown at the time of the career decision. π has cdf F_π, with mean $\bar{\pi}$ and variance σ_π^2. For entrepreneurs, $m_\pi = \theta_0 \left(\frac{\pi}{AE}\right)^{1-\theta_1}$.

Assume mean-variance utility, $U(m) = E(m) - \frac{1}{2}\text{var}(m)$. An individual of type a decides to become an entrepreneur if $U(m_\pi) \geq U(m_w) = \theta_0(a/AE)^{1-\theta_1}$. We observe that $\partial U(m_w)/\partial\theta_1$ is positive if $a < AE$ and negative if $a > AE$. In other words, when tax progressivity increases, the net earnings of individuals making less than the average increase and the net earnings of individuals making more than the average decrease. Let $\bar{a}$ be a cut-off in terms of the worker's productivity such that the individual of type $\bar{a}$ is indifferent between becoming an entrepreneur and a worker, so that $U(m_\pi) = \theta_0(\bar{a}/AE)^{1-\theta_1}$. Notice that since worker's productivity is non-random, we have $\bar{a} < E\pi = \bar{\pi}$.

Using linear approximation around $E\pi = \bar{\pi}$, we have:

$$m_\pi = \theta_0 \left(\frac{\bar{\pi}}{AE}\right)^{1-\theta_1} + \frac{\theta_0(1-\theta_1)}{AE} \left(\frac{\bar{\pi}}{AE}\right)^{-\theta_1} d\pi.$$

Let $d\pi$ be such that $E(d\pi) = 0$ and $E((d\pi)^2) = \sigma_\pi^2$, which implies the mean and variance for m are as follows:

$$E(m_\pi) = \theta_0 \left(\frac{\bar{\pi}}{AE}\right)^{1-\theta_1},$$

and

$$\text{var}(m_\pi) = \left(\frac{\theta_0(1-\theta_1)}{AE}\right)^2 \left(\frac{\bar{\pi}}{AE}\right)^{-2\theta_1} \sigma_\pi^2.$$

We then have the following result for the impact of tax progressivity on expected after-tax income:

$$\frac{\partial E(m_\pi)}{\partial\theta_1} = -\theta_0 \left(\frac{\bar{\pi}}{AE}\right)^{1-\theta_1} \log(\bar{\pi}/AE) < 0.$$

Notice that we assume that on average, entrepreneurs are high earners: they earn more than the average earnings in the economy, so that $\bar{\pi} >$ AE and thus $\log(\bar{\pi}/AE) > 0$. The result above shows that with our tax function, increasing tax progressivity reduces the average payoff to being an entrepreneur. Since $\bar{a} < \bar{\pi}$, higher progressivity reduces the average payoff to being an entrepreneur more than it reduces the payoff to being a worker for the marginal individual (recall that if $\bar{a} < AE$, higher tax progressivity actually *increases* the payoff to being a worker for the marginal individual).

At the same time, we also have:

$$\begin{aligned}\frac{\partial \text{var}(m_\pi)}{\partial\theta_1} &= \left(-2(1-\theta_1)\left(\frac{\bar{\pi}}{AE}\right)^{-2\theta_1} - 2(1-\theta_1)^2\left(\frac{\bar{\pi}}{AE}\right)^{-2\theta_1}\log(\bar{\pi}/AE)\right)\left(\frac{\theta_0}{AE}\right)^2\sigma_\pi^2 \\ &= -2(1-\theta_1)\left(\frac{\bar{\pi}}{AE}\right)^{-2\theta_1}\left(\frac{\theta_0}{AE}\right)^2\sigma_\pi^2\left(1 + (1-\theta_1)\log\left(\bar{\pi}/AE\right)\right) < 0.\end{aligned}$$

Thus, increasing tax progressivity also reduces the variance of after-tax income for entrepreneurs. The overall effect of changes in tax progressivity on entrepreneurs' utility is unclear in this example.

The lower expected mean return makes it less attractive to become an entrepreneur but the lower variance makes it more attractive to become an entrepreneur.

Below, we study several other simple cases: (1) Log-normal distribution of profits and CRRA utility. We show that entrepreneurial choice is independent of the income tax level. With an inter-temporal elasticity of substitution smaller than one, entrepreneurship is, however, more attractive with higher mean profit but also with less variable profit. The return effect, however, dominates and an increase in tax progressivity, θ_1, leads to less entrepreneurs. (2) Deterministic profit, CRRA utility and fixed cost of entry. With a fixed entry cost, like we have in the quantitative model below, we show that the number of entrepreneurs is decreasing in the income tax level. (3) A simple two-period model with saving and borrowing constraint. We show that individuals with less wealth are less likely to become entrepreneurs. If higher and more progressive taxes lead to less savings, then this is a channel through which they also reduce the number of entrepreneurs.

C.2 Log-normal Distribution of Profits

Assume that $\log(\pi) \sim \mathbf{N}(\bar{\pi}, \sigma_\pi^2)$. If we have $u(c) = \log(c)$, an individual of type a will choose to be an entrepreneur if and only if:

$$E \log\left(\theta_0 \left(\frac{\pi}{AE}\right)^{1-\theta_1}\right) \geq \log\left(\theta_0 \left(\frac{a}{AE}\right)^{1-\theta_1}\right) \quad \Leftrightarrow \quad \bar{\pi} \geq \log(a),$$

and the cutoff does not depend on the taxes at all in this special example.

What if we have $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$, with $\gamma > 1$? Then the expected payoff from becoming an entrepreneur is:

$$E\frac{\left(\theta_0 \left(\frac{\pi}{AE}\right)^{1-\theta_1}\right)^{1-\gamma}}{1-\gamma} = \left(\frac{\theta_0}{AE^{1-\theta_1}}\right)^{1-\gamma} \left(e^{(1-\theta_1)(1-\gamma)\bar{\pi}+\frac{1}{2}(1-\theta_1)^2(1-\gamma)^2\sigma_\pi^2}\right)\frac{1}{1-\gamma}$$

This is very much like mean-variance utility: it increases in π and decreases in σ_π^2. The individual of type a chooses to become an entrepreneur if and only if:

$$E\frac{\left(\theta_0 \left(\frac{\pi}{AE}\right)^{1-\theta_1}\right)^{1-\gamma}}{1-\gamma} \geq \frac{\left(\theta_0 \left(\frac{a}{AE}\right)^{1-\theta_1}\right)^{1-\gamma}}{1-\gamma} \Leftrightarrow \quad \bar{\pi} + \frac{1}{2}(1-\theta_1)(1-\gamma)\sigma_\pi^2 \geq \log(a)$$

Thus, the left hand side of the last inequality is just like the mean-variance utility (note that $1-\gamma < 0$, so it is decreasing in σ_π^2). Let $\bar{a}$ be the cutoff such that:

$$\bar{\pi} + \frac{1}{2}(1-\theta_1)(1-\gamma)\sigma_\pi^2 = \log\left(\bar{a}\right).$$

This implies that entrepreneurial choice is independent of, θ_0, governing the tax level. The change in the cutoff responding to the change in tax progressivity is:

$$\frac{\partial \log(\bar{a})}{\partial \theta_1} = \frac{(\gamma - 1)\sigma_\pi^2}{2} > 0.$$

With more progressive taxes, less people will choose to become entrepreneurs. The negative effect on the mean return dominates the positive effect on the variance.

C.3 The Impact of the Average Tax Level with Fixed Entry Costs

Here, we drop the assumption that entrepreneurs' profit is risky. Assume that entrepreneurs earn a deterministic profit π which is higher than the earnings of the worker with ability a, but they need to pay a fixed monetary "entry cost". The cutoff in terms of the worker's ability so that the individual is indifferent between becoming an entrepreneur or a worker is determined by:

$$\frac{\left(\theta_0\left(\frac{\pi}{AE}\right)^{1-\theta_1} - F\right)^{1-\gamma}}{1-\gamma} = \frac{\left(\theta_0\left(\frac{\bar{a}}{AE}\right)^{1-\theta_1}\right)^{1-\gamma}}{1-\gamma} \tag{C.1}$$

The derivative of the left-hand side of the above equation with respect to θ_0 is:

$$\frac{\partial}{\partial \theta_0}\left[\frac{\left(\theta_0\left(\frac{\pi}{AE}\right)^{1-\theta_1} - F\right)^{1-\gamma}}{1-\gamma}\right] = \left(\left(\theta_0\left(\frac{\pi}{AE}\right)^{1-\theta_1} - F\right)^{1-\gamma}\right)^{-\gamma}\left(\frac{\pi}{AE}\right)^{1-\theta_1}$$

The derivative of the right-hand side of the above equation with respect to θ_0 is:

$$\frac{\partial}{\partial \theta_0}\left[\frac{\left(\theta_0\left(\frac{\bar{a}}{AE}\right)^{1-\theta_1}\right)^{1-\gamma}}{1-\gamma}\right] = \left(\theta_0\left(\frac{\bar{a}}{AE}\right)^{1-\theta_1}\right)^{-\gamma}\left(\frac{\bar{a}}{AE}\right)^{1-\theta_1}$$

From (C.1), we have $\left(\left(\theta_0\left(\frac{\pi}{AE}\right)^{1-\theta_1} - F\right)^{1-\gamma}\right)^{-\gamma} = \left(\theta_0\left(\frac{\bar{a}}{AE}\right)^{1-\theta_1}\right)^{-\gamma}$, and $F > 0$ implies $\frac{\pi}{AE} > \frac{\bar{a}}{AE}$. Therefore:

$$\frac{\partial}{\partial \theta_0}\left[\frac{\left(\theta_0\left(\frac{\pi}{AE}\right)^{1-\theta_1} - F\right)^{1-\gamma}}{1-\gamma}\right] > \frac{\partial}{\partial \theta_0}\left[\frac{\left(\theta_0\left(\frac{\bar{a}}{AE}\right)^{1-\theta_1}\right)^{1-\gamma}}{1-\gamma}\right],$$

which means that a decrease in the tax level (or an increase in θ_0) leads to an increase in $\bar{a}$, and thus to an increase in the share of entrepreneurs.

C.4 A Simple Two-period Model with Saving and Borrowing Constraint

We can also illustrate the impacts of tax changes on endogenous saving and entrepreneurial choices with a simple two period model. Consider an individual who lives for 2 periods: at age $j = 1$, he can only be a worker with productivity ε_1, which is a random variable with some distribution. At age $j = 2$, he can be either a worker with some fixed productivity ε_2, or an entrepreneur. In period 1, the individual can invest in an asset, a, which yields a risk free return, r, for workers and entrepreneurs in period 2. Entrepreneurs, however, also use a to finance capital in their production function in period 2. They produce output with the technology: $z\left(n\right)^{\nu\vartheta}\left(k^*\right)^{\nu}$. A worker of age $j = 2$ consumes $c = \theta_0(w\varepsilon_2 + ra)^{1-\theta_1} + a$.

An entrepreneur consumes $c = \theta_0(\pi(a) + ra)^{1-\theta_1} + a$. Profit, $\pi(a)$, potentially depends on savings a because of a borrowing constraint. An entrepreneur that is not constrained chooses the unconstrained optimal $Ak^* = n^* = \frac{R\vartheta k^*}{w(1-\vartheta)}$, where $A = \frac{R\vartheta}{w(1-\vartheta)}$. A constrained entrepreneur instead chooses $k = \Theta a$ and $n = Ak = A\Theta a$. Therefore:

$$\pi = \begin{cases} z\left(A\right)^{\nu\vartheta}\left(k^*\right)^{\nu} - \frac{R}{1-\vartheta}k^* & \text{if } k^* \leq \Theta a, \\ z\left(A\right)^{\nu\vartheta}\left(\Theta a\right)^{\nu} - \frac{R}{1-\vartheta}\Theta a & \text{other cases} \end{cases}$$

Suppose that savings are high enough for unconstrained production in period 2, $k^* \leq \Theta a$, and that $z\left(A\right)^{\nu\vartheta}\left(k^*\right)^{\nu} - \frac{R}{1-\vartheta}k^* > w\varepsilon_2$, so the individual chooses to be an entrepreneur. With savings below the level that allows for unconstrained production, profit will be increasing in a. There will be some cutoff level of savings $\bar{a}$ at which the individual is indifferent between being a worker and an entrepreneur:

$$z\left(A\right)^{\nu\vartheta}\left(\Theta\bar{a}\right)^{\nu} - \frac{R}{1-\vartheta}\Theta\bar{a} = w\varepsilon_2.$$

Intuitively, savings will be increasing in ε_1. Consider an individual with savings such that in period 2, he becomes an entrepreneur, $a > \bar{a}$, but his choice of capital and labor inputs are constrained by the borrowing limit, $\Theta a < k^*$. Suppose per period utility is $u(c) = \log(c)$. His choice of saving a will satisfy the following Euler equation:

$$\frac{1}{\theta_0(w\varepsilon_1 + ra)^{1-\theta_1} - a} = \frac{1 + \theta_0(1-\theta_1)(\pi + ra)^{-\theta_1}\left(\frac{\partial\pi}{\partial a} + 1\right)}{\theta_0(\pi + ra)^{1-\theta_1} + a}$$

where $\frac{\partial\pi}{\partial a} = z\left(A\right)^{\nu\vartheta}\nu\Theta^{\nu}a^{\nu-1} - \frac{R}{1-\vartheta}\Theta$ denotes the marginal increase in profit from saving. This is the term that differentiate the constrained entrepreneurs from the unconstrained ones. An increase in tax progressivity, θ_1, has several effects on the above Euler equation:

1. Individuals who decide to become entrepreneurs in period 2 are more likely to be high earners in period 1, so more progressive taxes will lower income and consumption, $c_1 = \theta_0(w\varepsilon_1 + ra)^{1-\theta_1} - a$ for them (the denominator on the LHS), this ceteris paribus will also reduce their savings and make it less likely they will become entrepreneurs in period 2.

2. If we assume that entrepreneurs are high earners, more progressive taxes will reduce the level of income in the second period even if holding savings constant, $c_2 = \theta_0(\pi + ra)^{1-\theta_1} + a$ (the

denominator on the RHS), and thus increasing the incentive for them to save more.

3. More progressive taxes reduce the marginal returns of saving (the numerator on the RHS), thus reducing incentives to save. Individuals who are constrained entrepreneurs in period 2 get an "extra savings kick" from the $\frac{\partial \pi}{\partial a}$ term but this effect is also reduced by higher progressivity.

In this model, we can see that it is hard to say theoretically whether (1) + (3) or (2) will dominate. However, we know from the quantitative macro literature that higher and more progressive taxes usually have a strong negative impact on the labor supply and savings of workers, see e.g Holter et al. (2019). Our full-blown, quantitative, structural model therefore can provide us more quantitative impacts of progressive taxes.

D Definition of Recursive Competitive Equilibrium

Let $\mu^W(j, \alpha, \epsilon, z, a)$ denote the measure of workers at the beginning of age j, $\mu^E(j, \alpha, \epsilon, z, a)$ denote the measure of entrepreneurs and similarly $\mu^R(j, \alpha, z, a)$ denote the measure of retirees, and like before $s = (j, \alpha, \epsilon, z, a)$ is the state space. We study a small open economy by fixing prices, w and r, since most of our empirical exercises is supposed to resemble U.S. states. We define a Stationary Recursive Competitive Equilibrium as follows:

1. For a given tax function with parameters of (θ_0, θ_1), transfers, Γ_g, social security, ω, risk-free interest rate, r, and wage, w, all households optimize. The value functions, $V^E(s)$, $V^W(s)$ and $V^R(s)$ and policy functions, $c^E(s)$, $k^E(s)$, $n^E(s)$, $a^E(s)$, $o^E(s)$, $c^W(s)$, $n^W(s)$, $a^W(s)$, $o^W(s)$, $c^R(s)$, $n^R(s)$ and $O^R(s)$ solve the households optimization problems as described above.

2. In the corporate sector, the first order conditions for factor demand are:

$$\begin{aligned} w &= (1-\vartheta)\left(\frac{K}{N}\right)^{1-\vartheta}, \\ r &= \vartheta\left(\frac{K}{N}\right)^{-\vartheta} - \delta. \end{aligned}$$

   Inflow of capital from the international market will ensure that these conditions hold.

3. The labor market clears:
$$\int \Phi h d\mu^W = N + \int n d\mu^E$$
   where $\int \Phi h d\mu^W$ is the total labor supply.

4. Total bequest-assets from the oldest cohort plus interests payments in the current period equals the total transfer to all others:

$$\left[\int_{j=J} a d\mu^R\right](1+r) = \Gamma_b \left[\int_{j<J} d\mu^W + \int_{j<J} d\mu^E + \int_{j<J} d\mu^R\right],$$

5. The government budget constraint balances in each period:

$$\int T(w\Phi h+ar)d\mu^W+\int T(\pi+ar)d\mu^E+\int T(\omega_R\alpha+ar)d\mu^R = G+\int \omega_R\alpha_i d\mu^R+\Gamma_g \left[\int d\mu^W + \int d\mu^E + \int d\mu^R\right]$$

E Numerical Solution of the Model

Below we describe the numerical algorithm used to solve our model.

E.1 Grid Points

For the asset space, a, we use 50 grid points with more points closer to zero and then approximately linear spacing of grid points when a is sufficiently large. For the log of α, we use 5 evenly distributed grid points. We use the Rowenhurst method to approximate the stochastic AR(1) processes for ζ_ϵ and ζ_z with six discrete grid points for each, since the persistence parameters could be very high. The size of the state space, $(j, \alpha, \epsilon, z, a)$, is then $61 \times 5 \times 6 \times 6 \times 50$ points.

E.2 Household Optimization

For given tax parameters, (λ_0, θ), transfers, Γ_b and Γ_g, risk-free interest rate, r, and wage rate, w, households solve their optimization problem backwards. Starting from period $J-1$, for a given bequest utility (a function of assets) in period J, we use Golden search to solve the optimization problem conditional on each possible individual state $(j, \alpha, \epsilon, z, a)$. Overall, we find that the Golden search method delivers relatively fast and robust solutions.

E.3 Labor Supply

The worker's optimal choice of labor supply is characterized by the first-order condition:

$$\begin{aligned} v'(h) &= \chi h^\eta \\ \chi h^\eta &= u'(c)\theta_0 \left[ar + yhw\right]^{-\theta_1} (1-\theta_1) yw (AE)^{\theta_1} \end{aligned}$$

For given values of (c, a, r, y, w) and $\theta_0 > 0, 1 > \theta_1 > 0, \eta > 0$, there is a unique solution for labor $h(c, a, r, y, w)$. Thus when searching for the optimal consumption, labor supply and savings for workers, we can search for the optimal level of consumption, using the implied optimal value of h. c and h also imply next period's savings, a'.

E.4 Firm's Profit

We can pre-solve for the profit function: π

$$\begin{aligned}\pi(z,a;r,w,r^B) &= \max_{\{k,n\}} z(k^{1-\vartheta}n^{\vartheta})^{\nu} - (r^B+\delta)k - wn - c_f \\ k &\leq \Theta a.\end{aligned}$$

For the relaxed problem (without the constraint $k \leq \Theta a$), we have the below first order conditions:

$$\begin{aligned} k &: \quad Rk = \nu(1-\vartheta)y = \nu(1-\vartheta)z(k^{1-\vartheta}n^{\vartheta})^{\nu} \\ n &: \quad wn = \nu\vartheta y = \nu\vartheta z(k^{1-\vartheta}n^{\vartheta})^{\nu} \\ &\Rightarrow \quad n^{(1-\nu\vartheta)} = \frac{\nu\vartheta z}{w}k^{(1-\vartheta)\nu}\end{aligned}$$

where $(r^B+\delta) = R$, $y = z(k^{1-\vartheta}n^{\vartheta})^{\nu}$. Thus we have the solution for labor, $n^{(1-\nu\vartheta)} = \frac{\nu\vartheta z}{w}k^{(1-\vartheta)\nu}$, for any given level of k (including constrained cases). With $\frac{Rk}{(1-\vartheta)} = \frac{wn}{\vartheta}$, we can further solve for the optimal unconstrained level of k :

$$\begin{aligned} n^{(1-\nu\vartheta)} &= \frac{\nu\vartheta z}{w}k^{(1-\vartheta)\nu} \\ &\Rightarrow \left[\frac{R}{(1-\vartheta)}\frac{\vartheta}{w}k\right]^{(1-\gamma\vartheta)} = \frac{\nu\vartheta z}{w}k^{(1-\vartheta)\nu} \\ &\Rightarrow k^{(1-\nu)} = \frac{\nu\vartheta z}{w}\left[\frac{R}{(1-\vartheta)}\frac{\vartheta}{w}\right]^{(\nu\vartheta-1)} \\ k^{(1-\nu)} &= \nu z\left[\frac{(1-\vartheta)}{R}\right]^{(1-\nu\vartheta)}\left[\frac{\vartheta}{w}\right]^{(\nu\vartheta)}\end{aligned}$$

If the optimal level of k is not available due to the collateral constraint, then we have $k = \Theta a$, and then we can solve for n.

E.5 Expected Value Functions

To compute the expected value functions. We use the following method. Define expected value functions as:

$$E[V^W(s,a)] \equiv E\left[\max\{V'^W(s',a'), V'^E(s',a')\}\right]|_{(s)}$$

$$E[V^E(s,a)] \equiv E\left[\max\{V'^W(s',a'), V^E(s',a')\}\right]|_{(s)}$$

Since the state variables for ϵ', z' are stochastic in the next period and both follow an AR(1) process, we can use numerical integration to compute $E[V^W(s,a')]$ and $E[V^E(s,a')]$. In particular, we choose N_ϵ points for the normal distribution of the innovations to ϵ and N_z points for the normal distribution of the innovations to z, and let w_{ϵ_i}, w_{z_j} are corresponding probability weights.

$$\begin{aligned} E[V'^W(s',a')] &\equiv E\left[\max\{V^W(s',a'), V^E(s',a')\}\right]|_{(s)} \\ &\approx \sum_{i=1}^{N_\epsilon}\sum_{j=1}^{N_z} w_{\epsilon_i} w_{z_j}\left[\max\{V^W(j+1,\sigma,\alpha,\rho_\epsilon\epsilon+\eta_{\epsilon_i},\rho_z z+\eta_{z_j},a'), V^E(j+1,\sigma,\alpha,\rho_\epsilon\epsilon+\eta_{\epsilon_i},\rho_z z+\eta_{z_j},a')\}\right], \\ E[V'^E(s',a')] &\approx \sum_{i=1}^{N_\epsilon}\sum_{j=1}^{N_z} w_{\epsilon_i} w_{z_j}\left[\max\{V^W(j+1,\sigma,\alpha,\rho_\epsilon\epsilon+\eta_{\epsilon_i},\rho_z z+\eta_{z_j},a'), V^E(j+1,\sigma,\alpha,\rho_\epsilon\epsilon+\eta_{\epsilon_i},\rho_z z+\eta_{z_j},a')\}\right] \end{aligned}$$

E.6 Algorithm for Computing General Equilibrium when Running Policy Experiments

For a given set of model parameters, we use the following procedure to compute general equilibrium. Partial equilibrium will be similar but without adjusting prices, r and w.

1. Guess the tax coefficient, θ_0, which is needed for government budget clearing, the bequests to households, Γ_b, and the average earnings in the economy, AE.
2. Guess prices, r and w:
3. Guess risk-free interest rate, r, and use the representative firm's first order condition to find the implied value on wage w
4. Solve for individual value functions using backward induction.
5. Simulate a large number of individuals forward, and obtain implied model moments, including total bequest assets and total tax revenues (net of social security payments).
6. Check the implied excess demand for capital and update the initial guess on interest rates r until excess demand converges to zero.
7. Update the guesses for the tax level, bequests and average earnings until they converge.

F Structural Estimation

As noted in the main text, we use a Simulated Method of Moments approach to endogenously estimate 7 model parameters. Denote the model moments, a 24×1 vector, by $g(\omega)$ and the parameter vector by ω. We search over the space for ω and minimize the distance, $[g(\omega)-m]^\top W\,[g(\omega)-m]$, where m is the corresponding data moments, W is a 24×24 diagonal weighting matrix. It has the same weight for all moments, except the aggregate wealth to output ratio and the population share of entrepreneurs. We believe these moments are crucial to our study so we assign them 10 times higher weight. The estimation is roughly similar to Lee and Ingram (1991) and Hansen (1982). In particular, for each given choice of parameters, we simulate the whole equilibrium economy with 100000 households, each living for 61 periods. We then compute the 24 equilibrium moments based on the simulated panel data of households. This is $g(\omega)$. We then use a variety of algorithms to obtain the optimal estimate, including partitioning the space, using Sobol sequences, and obtaining some rough estimate first, and then using the Nelder Mead algorithm for finer estimates. Since we use several different data sources to obtain moments, some of them not from micro-level data sets, we do not report standard errors from the estimation.

To make sure that all the parameters in our estimation are well disciplined by our data moments, we conduct a "sensitivity analysis" where we change one parameter value at the time, while keeping the others at their estimated values, and compute the model implied equilibrium moments. We report some of the results in this Appendix (Figures F.1, F.2, F.3, F.4, F.5, F.6). For almost all of the parameters, most of the model moments move monotonically with the parameter. There are a few exceptions; for example, the top wealth shares do not change that much when firms' operating costs change. This is, however, quite intuitive since relative to the wealth of rich entrepreneurs the operating cost is just tiny. Similarly, the top income and wealth shares move little as the entrepreneurs' switching costs change. However, other moments, such as the overall population share of entrepreneurs, and also the income and wealth shares for medium entrepreneurs (e.g. wealth larger than the 50^{th} percentile), change monotonically with the parameter of interest and the pattern is quite robust.

Figure F.1: Sensitivity Analysis: Model Moments for Different Values of the Discount Factor, β

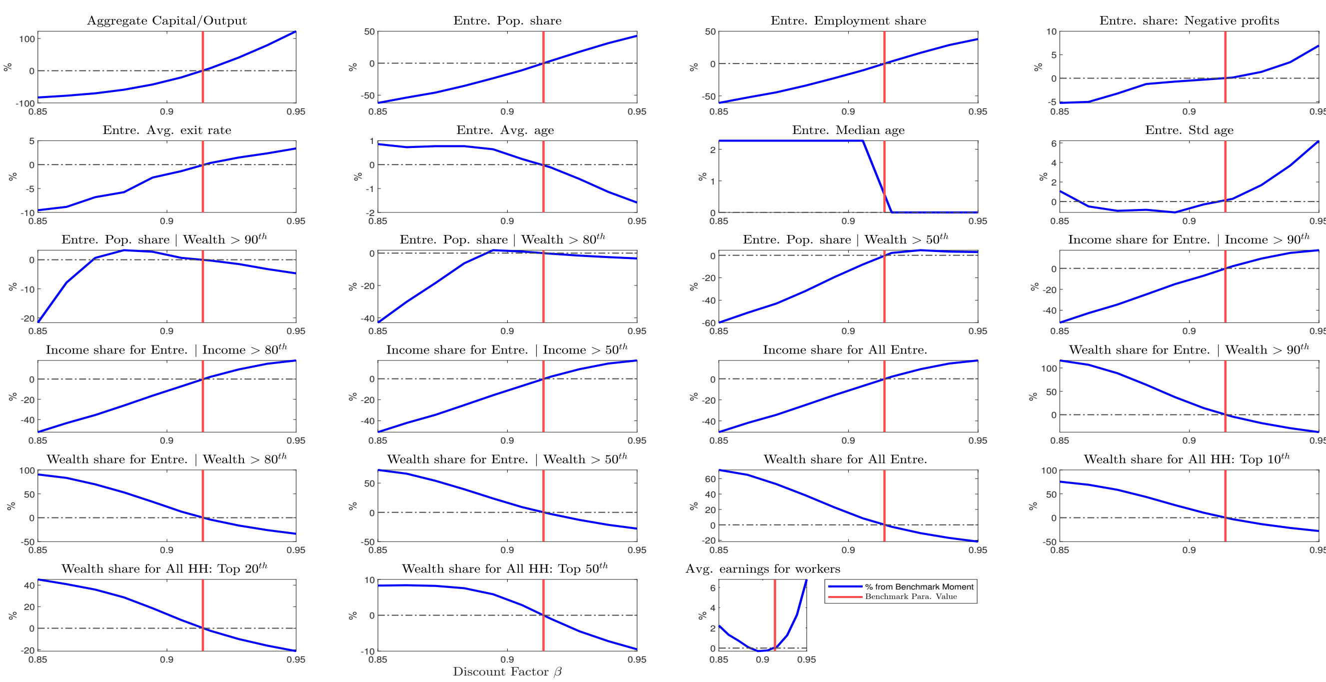
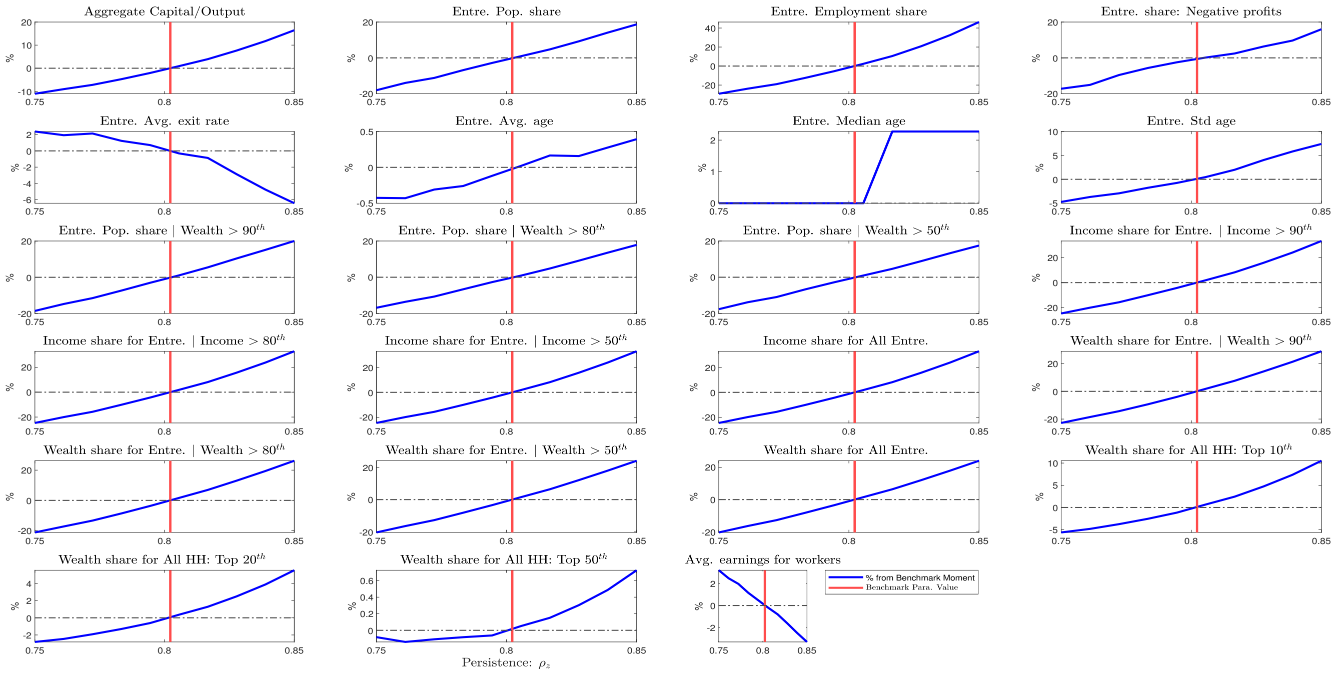


Figure F.2: Sensitivity Analysis: Model Moments for Different Values of the Persistence of Productivity, ρ_z



Note: For each moment, data values are in black long dashed lines, model implied values are in red circled lines, and the blue dashed line is for the benchmark model implied values. The benchmark value for the parameter is highlighted with green line.

Figure F.3: Sensitivity Analysis: Model Moments for Different Values of Std., σ_z

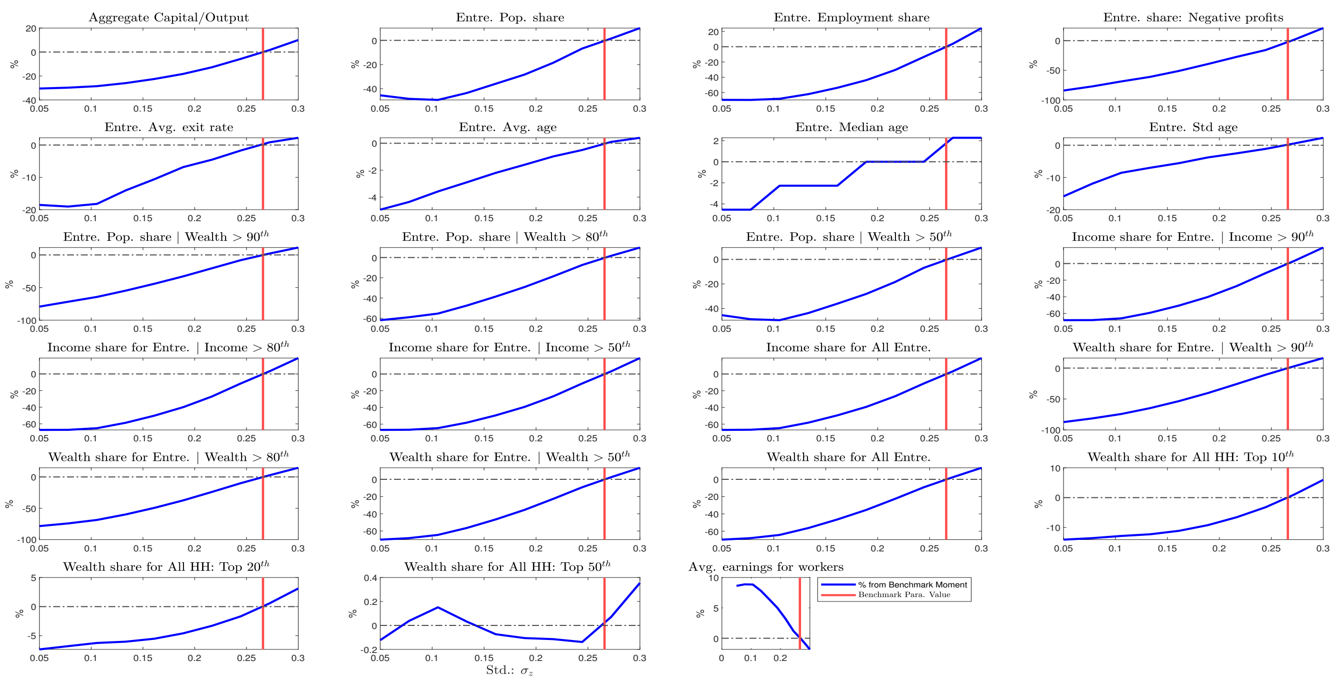
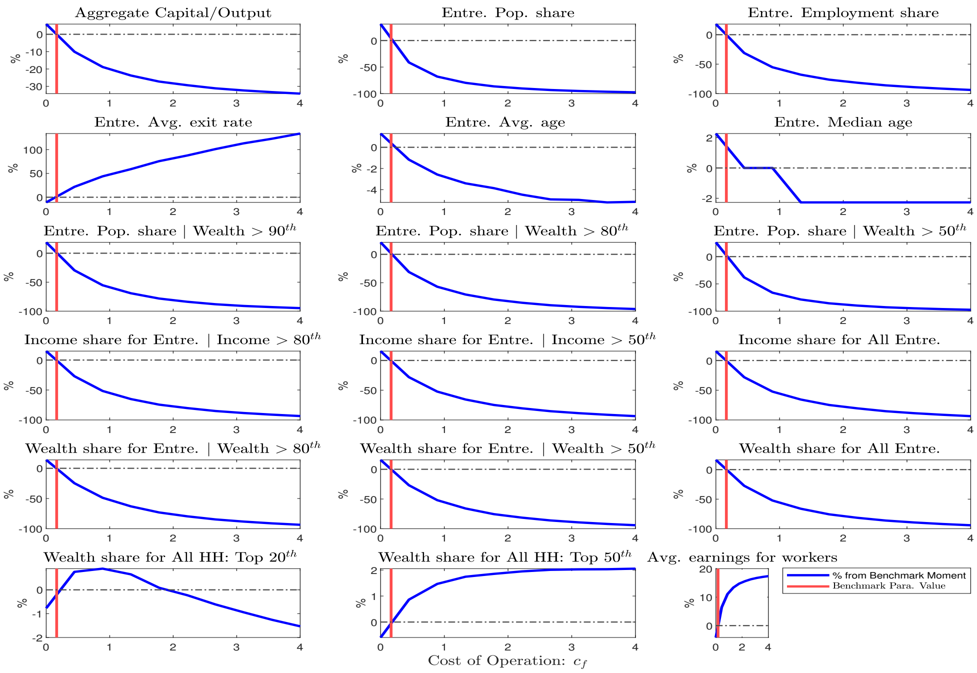


Figure F.4: Sensitivity Analysis: Model Moments for Different Values of the Operating Cost, c_f



Note: For each moment, data values are in black long dashed lines, model implied values are in red circled lines, and the blue dashed line is for the benchmark model implied values. The benchmark value for the parameter is highlighted with green line.

Figure F.5: Sensitivity Analysis: Model Moments for Different Values of the Entry Cost, c_e

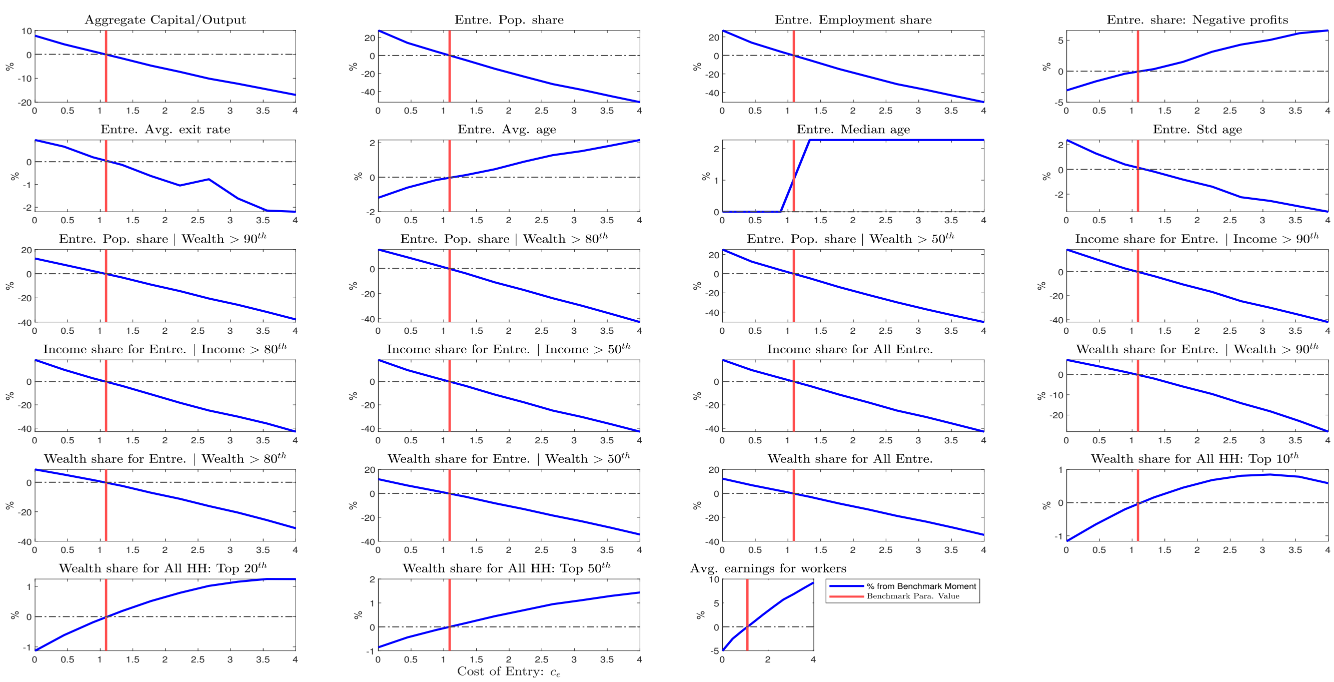
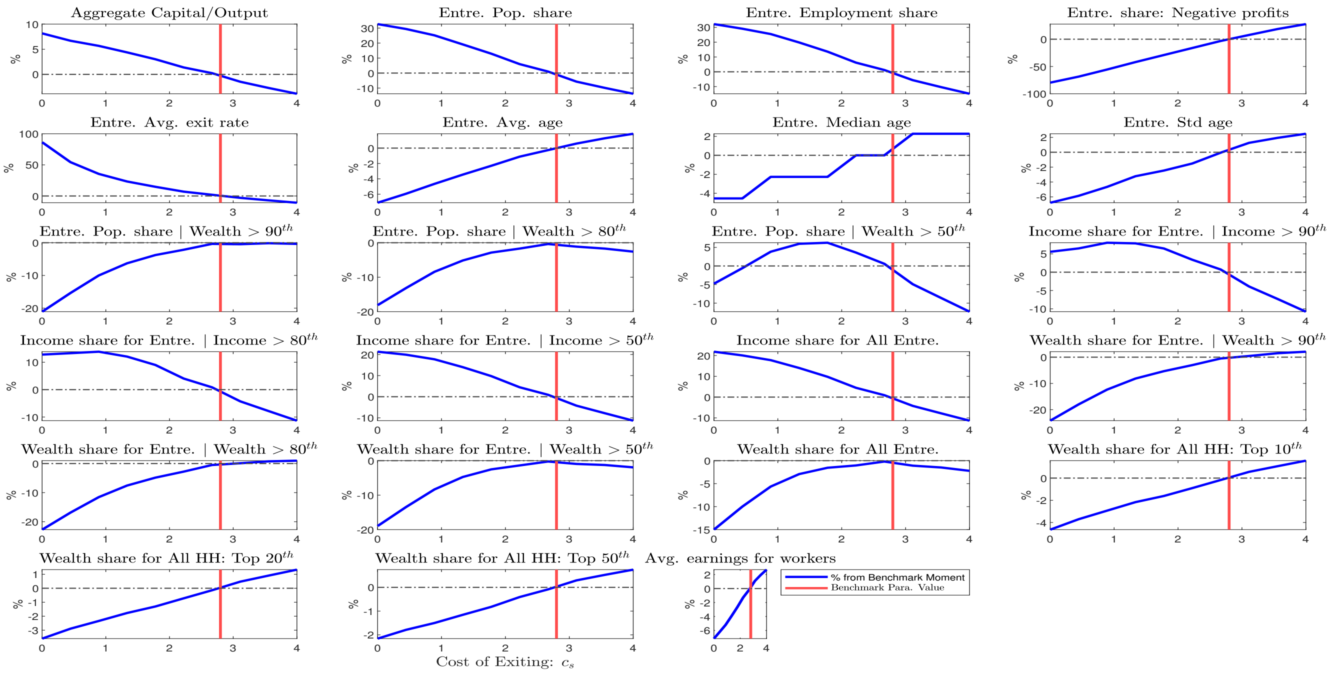


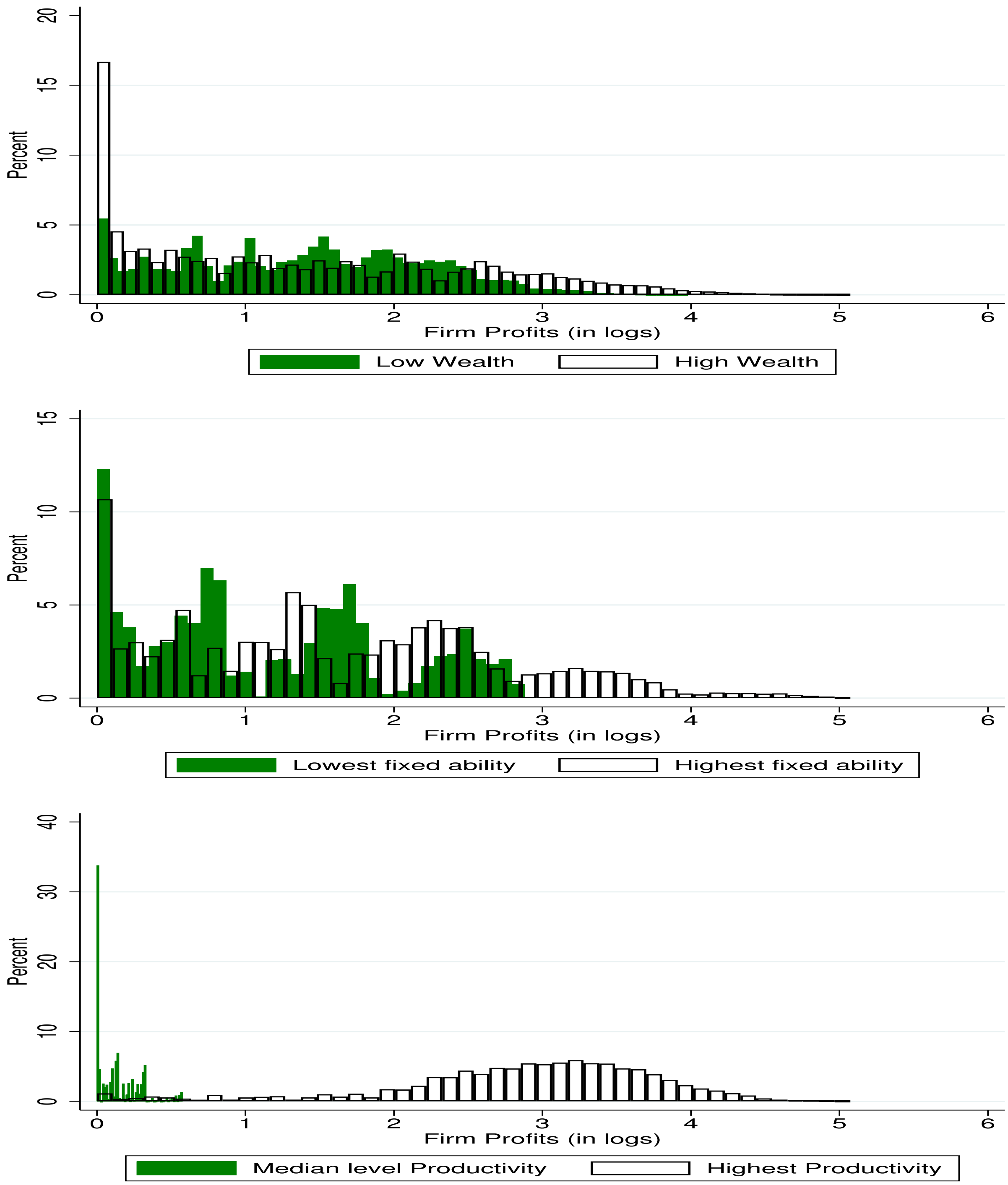
Figure F.6: Sensitivity Analysis: Model Moments for Different Values of the Exit Cost, c_s



Note: For each moment, data values are in black long dashed lines, model implied values are in red circled lines, and the blue dashed line is for the benchmark model implied values. The benchmark value for the parameter is highlighted with green line.

G Calibration - Additional Figures

Figure G.1: Simulated Model Distribution of Firm Profits: by Wealth, Ability (α) and Stochastic Productivity (z)



Note: We plot the histograms for the distribution of firm profits in the simulated benchmark economy. When firm profit is 0 or negative, it is replaced as 0 in the histograms; when firm profit is strictly positive, we use the transformation $log(1 + x)$ for $x > 0$. We then make plots conditioning on the different state variables of the entrepreneurs: by wealth (upper panel), by α (middle panel), by z (lower panel).

H Quantitative Model: Additional Experiments

In this section, we conduct more counterfactual experiments to understand the determinants of entrepreneurship and the interaction between tax changes and different model elements as well as different policies related to entrepreneurs. We confirm that our main results on the effect of tax progressivity on entrepreneurship are robust to changes in parameter values and alternative policies. In Section H.1, we experiment with increasing the tax progressivity only for entrepreneurs or only for workers, while keeping the tax system for the other group unchanged, and in Section H.2 we experiment with changes in the borrowing limit and interacting it with changes in tax progressivity. In Sections H.3 and H.4, we consider changes in the volatility of entrepreneurial productivity, with and without preserving the mean, to study the relative strength of the risk vs. return consideration of becoming an entrepreneur. In Section H.5, we also consider changes in the households' starting wealth level, and in Section H.6, changes in entrepreneurial firms' entry costs. Finally, we consider some more policy changes. We study the effects of changes in entrepreneurs' financing conditions (Section H.7) and changes in entrepreneurial firms' business loss taxes (Section H.8), and we interact these changes with changes in tax progressivity.[6]

H.1 Changing Tax Progressivity Only for Workers or Only for Entrepreneurs

To further explore the role of the impact of tax progressivity on asset accumulation vs. the direct return and insurance effect from increased tax progressivity, In Table H.1, we experiment with increasing the tax progressivity parameter, θ_1, by 0.02 only for entrepreneurs or only for workers, while keeping the tax system for the other group unchanged. We compare the results to the benchmark model and to the case when taxes change for both occupations. In all the experiments we keep constant the economy's average tax rate. Table H.1 reports the equilibrium mean and standard deviation of entrepreneurs' after-tax profit, the population share of entrepreneurs and also the composition across age groups. Figure H.1 plots more selected simulated model statistics by age for the 4 economies. We observe that increasing tax progressivity only for entrepreneurs has a

Table H.1: Tax Changes Only for Entrepreneurs

	Profit: mean	Profit: std	Pop. Share	20-29	30-39	40-49	50-59	60+
Benchmark Model	3.24	4.41	11.74%	0.19%	3.15%	5.18%	2.81%	0.40%
θ_1 increase only for Entre.	3.14	4.10	11.26%	0.18%	3.00%	5.02%	2.68%	0.38%
θ_1 increase only for Workers	3.26	4.46	11.81%	0.20%	3.16%	5.21%	2.84%	0.40%
θ_1 increase for All	3.17	4.15	11.32%	0.18%	3.01%	5.05%	2.70%	0.38%

large impact on the population share of entrepreneurs. It drops from 11.74% to 11.25%. Increasing progressivity for workers as well leads to slightly more entrepreneurs (the population share increases from 11.25% to 11.32%). When we only tax entrepreneurs the mean after-tax profit also decreases, from 3.24 to 3.14 and the standard deviation falls from 4.41 to 4.10. The assets of all entrepreneurs drop considerably, whereas the assets of new entrepreneurs do not change much (see Figure H.1).

[6] For better comparison in this section we increase the number of grid points for z from 6 to 10.

The effect of increasing progressivity only for entrepreneurs is relatively large, mainly because the return to entrepreneurship compared to being a worker is directly reduced (reduced volatility is not compensating for this). When we also increase progressivity for workers, this should lower the payoff to being a worker, especially for highly paid workers (marginal entrepreneurs), and one could possibly expect to see a significant increase in the share of entrepreneurs. However, there is almost no change due to the negative effect on worker's wealth working in the other direction. Most entrepreneurs need to slowly accumulate wealth as workers before they can start a business. Higher tax progressivity depresses workers' labor supply and wealth accumulation, and this makes it less tempting to start a business.

Increasing tax progressivity only for workers confirms the same pattern, it leads to a slight increase in entrepreneurship. There are two forces working in opposite directions: on the one hand, we may have expected more highly productive workers to become entrepreneurs when tax progressivity increases only for workers. However, workers' assets decrease significantly as their after-tax income declines, and as a result, the average assets of new entrepreneurs (those who were workers in the periods before entry) also drop considerably. This negative effect on asset accumulation is sufficiently strong, almost counteract the effect of more progressive taxes on labor income. These findings are also consistent with the message from Section 6.4 in the main text.

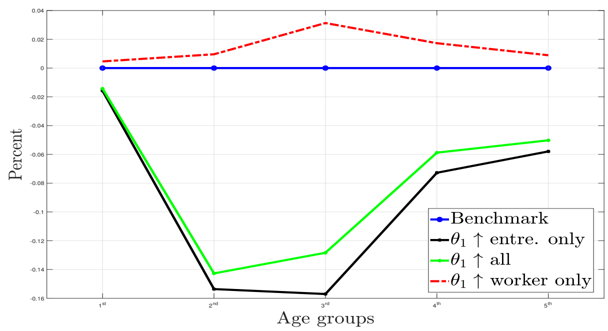
H.2 Changing the Borrowing Limit and Interacting it with Changes in Tax Progressivity

As another exercise to explore the role of assets for entrepreneurship and how it interacts with tax progressivity, we conduct an experiment where we first increase the collateral constraint parameter Θ by 50% (Θ from 0.55 to 0.75). Then we also increase the tax progressivity parameter θ_1 by 0.02. When we increase θ_1, we also keep the tax level constant as in the benchmark economy. For each economy, we compute various statistics by age. The results are shown in Figure H.2. Intuitively, relaxing the collateral constraint increases the return to entrepreneurship for relatively poor entrepreneurs by allowing them to access more credit for a given level of assets. For sufficiently wealthy entrepreneurs, however, Θ has no impact on the marginal return in the current period (it can still affect the probability of becoming credit constrained in future periods).

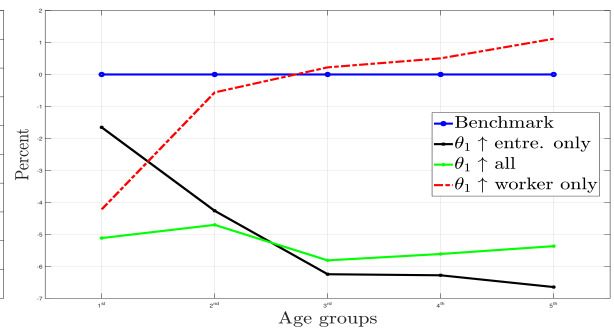
Figure H.2 illustrates that when the collateral constraint parameter Θ increases, it boosts entrepreneurs' after-tax personal income, induces negative selection with respect to firm productivity (less productive individuals now find it attractive to be entrepreneurs), and lowers the required assets for new start-ups, resulting in increased entrepreneurship. These findings illustrate the importance of credit constraints for entrepreneurial choice. Panel (a) in the figure shows that when we combine the increase in the borrowing limit with an increase in tax progressivity, the overall impact on entrepreneurship is still slightly positive but increased tax progressivity goes a long way in canceling out the effect of a more generous borrowing limit.

Figure H.1: Increasing Tax Progressivity, θ_1, Only for Workers or Only for Entrepreneurs

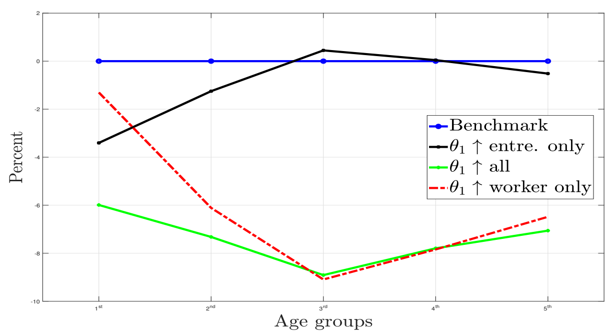
(a) Share of Entrepreneurs



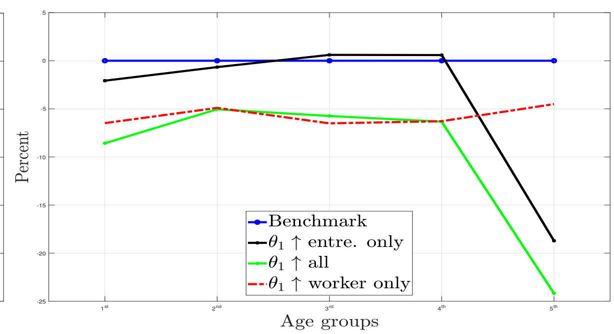
(b) Average Assets, a: Entrepreneurs



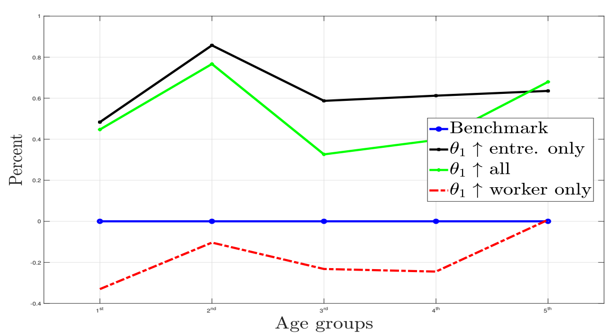
(c) Average Assets, a: Workers



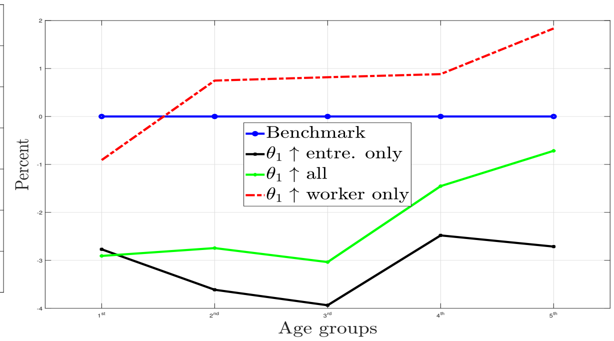
(d) Average Assets, a: New Entrepreneurs



(e) Average Productivity: Entrepreneurs

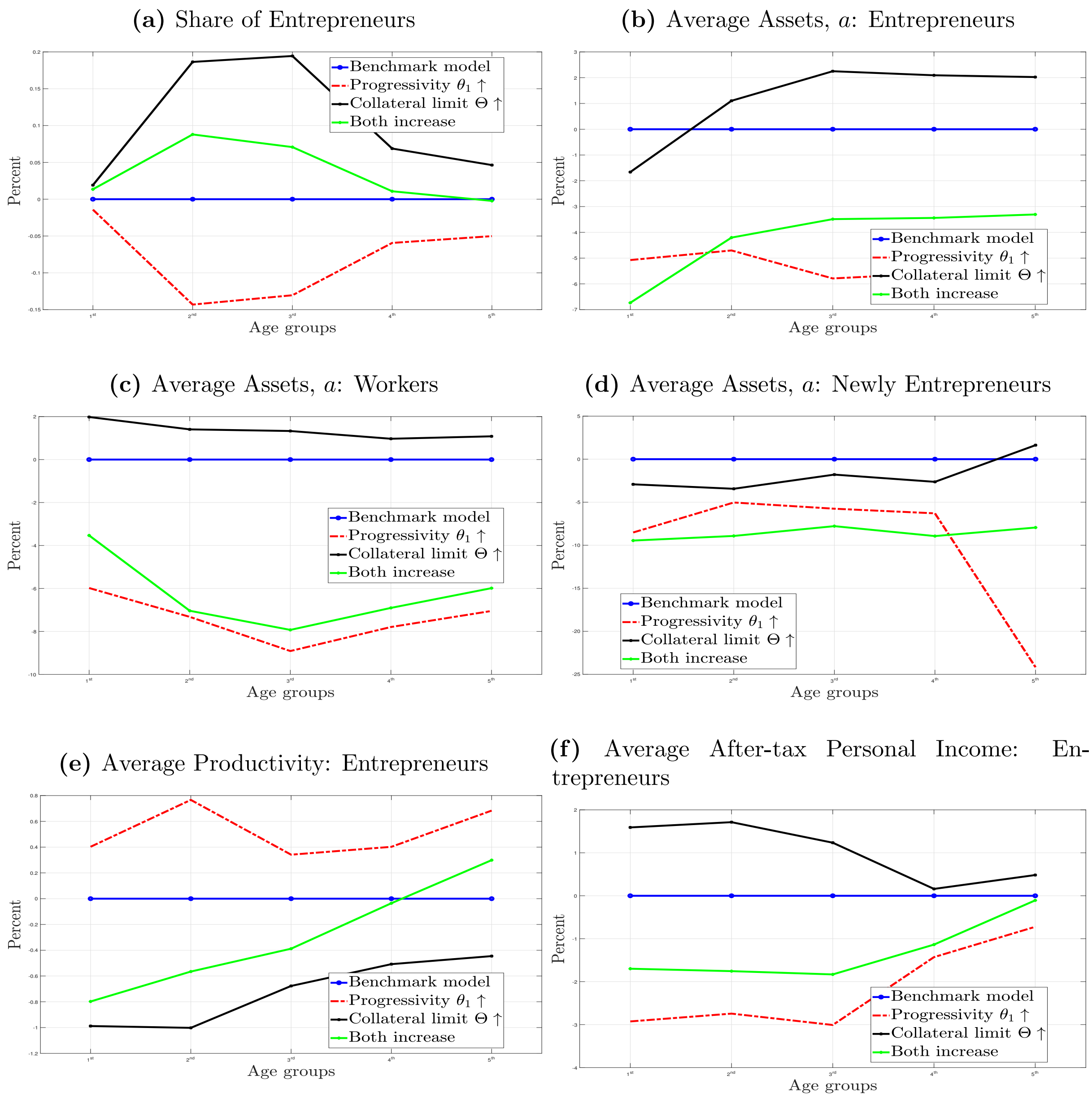


(f) Average After-tax Personal Income: Entrepreneurs



Note: The figure displays simulated statistics from four model economies: the benchmark model, labeled "Benchmark"; the model where tax progressivity, θ_1, increases by 0.02 only for workers, labeled "θ_1 ↑ worker only"; the model where tax progressivity, θ_1, increases only for entrepreneurs, labeled "θ_1 ↑ entre. only"; the model where tax progressivity, θ_1, increases for both workers and entrepreneurs, labeled "θ_1 ↑ all". For each case, we compute statistics by age groups (20-29, 30-39, 40-49, 50-59, 60-69): Panel (a) shows the percent change in the share of entrepreneurs within each age group (relative to the benchmark); Panels (b), (c) and (d) shows the percent change in average assets, a, by age group for entrepreneurs, workers, and new entrepreneurs, respectively; Panels (e) and (f) show the percent change in the average productivity and after-tax personal income of entrepreneurs. We compare the deviations of the other economies from the benchmark model in percent.

Figure H.2: Increasing the Borrowing Limit, Θ, and Tax Progressivity, θ_1.



Note: The figure displays statistics from four simulated model economies: the benchmark model, labeled "Benchmark model"; the model where tax progressivity, θ_1, increases by 0.02, labeled "Progressivity $\theta_1 \uparrow$"; the model where the collateral constraint parameter Θ increases by 50%, labeled "Collateral limit $\Theta \uparrow$"; the model where both the progressivity, θ_1, and collateral limit, Θ, increase, labeled "Both increase". For each case, we compute statistics by age groups (20-29, 30-39, 40-49, 50-59, 60-69): Panel (a) shows the percent change in the share of entrepreneurs within each age group (relative to the benchmark); Panels (b), (c) and (d) shows the percent change in average assets, a, by age group for entrepreneurs, workers, and new entrepreneurs, respectively; Panels (e) and (f) show the percent change in the average productivity and after-tax personal income of entrepreneurs. We compare the deviations of the other economies from the benchmark model in percent.

H.3 Mean-preserving Changes to the Volatility of Productivity Shocks

We consider an increase or decrease in σ_z, the standard deviation of the innovations to the stochastic component of entrepreneurial firm productivity, of 10%. We adjust the unconditional mean of the new productivity process so that average productivity is the same as in the benchmark case. We then vary the tax progressivity (by +0.02 or -0.02) and compare to the benchmark. The results are displayed in Tables H.2 and H.3. We observe that mean-preserving higher volatility on average will induce more people to become entrepreneurs. This happens because it is the households with the highest entrepreneurial ability that choose to become entrepreneurs and the top entrepreneurial ability is now higher. More often than before, even for lower wealth workers, will the entrepreneurial shock be sufficiently high to justify becoming an entrepreneur. Thus, even if this experiment keeps the mean entrepreneurial ability in the population constant, the mean among entrepreneurs increases, and we do not really isolate the effect of risk on entrepreneurial choice.

Table H.2: Changes in Risk Environments and Population Share of Entrepreneurs

Age groups	20-29	30-39	40-49	50-59	60+
High Risk Environment baseline	0.23%	3.19%	5.28%	3.02%	0.46%
θ_1 increase	0.22%	3.08%	5.14%	2.90%	0.43%
θ_1 decrease	0.25%	3.29%	5.40%	3.13%	0.49%
Low Risk Environment baseline	0.16%	2.99%	4.91%	2.52%	0.34%
θ_1 increase	0.16%	2.89%	4.79%	2.43%	0.32%
θ_1 decrease	0.18%	3.11%	5.07%	2.63%	0.37%

Table H.3: Comparing Elasticities Across Different Model Environments

Benchmark Model	Pop. Share	Entre. Employment
θ_1 increase	-1.78%	-2.11%
θ_1 decrease	1.66%	2.05%
High Risk Environment		
θ_1 increase	-1.73%	-2.04%
θ_1 decrease	1.50%	1.90%
Low Risk Environment		
θ_1 increase	-1.56%	-1.97%
θ_1 decrease	1.98%	2.23%

Table H.3 reports elasticities with respect to the progressivity parameter, θ_1, percent changes of the outcome variables per 0.01 change in θ_1, for the population share of entrepreneurs and also the average employment hired by entrepreneurs (the latter captures both the extensive and intensive margins of entrepreneurial activity). When tax progressivity decreases, the changes of the population share of entrepreneurs are larger for the low-risk environment compared to the high-risk environment, 1.98% change vs. 1.50% change in the population share of entrepreneurs for a 0.01 increase in tax progressivity. In the low-risk environment, when the highest states of entrepreneurial productivity are lower, there will be more marginal entrepreneurs that can be pushed out of entrepreneurship by tax changes.

H.4 More Experiments on the Mean and Standard Deviation of Entrepreneurial Productivity

We also experiment with the process for z and vary the mean and standard deviation (without preserving the mean). These results are displayed in Table H.4. We increase the parameter σ_z by 1% or 2%, and also increase the mean of z (denoted as m_z) by 1% or 2%. In the upper panel of Table H.4, we first compare several implied aggregate variables to the benchmark model. Each column is in percent deviation from the benchmark values. Note that since entrepreneurs are endogenously selected, all the means and standard deviations are equilibrium objects. We observe that with higher m_z or σ_z, there is a significant inflow of entrepreneurs. For example if the mean of z increases by 2% we get about 10% more entrepreneurs. In the lower panel of Table H.4, we again compute the semi-elasticity for different model statistics with respect to an increase in tax progressivity. We observe that the elasticities are now significantly higher, compared to Table H.3. When the average entrepreneurial productivity increases more people are induced to become entrepreneurs. However, these people are marginal entrepreneurs that are pushed back to being workers by the more progressive tax schedule.

Table H.4: Changes in the Mean and Standard Deviation of Entrepreneurial Productivity

	Profit: mean	Profit: std	Pop. share	Entre. Emp.	Y	C
Relative to Benchmark						
σ_z +1%	0.90%	2.13%	1.39%	2.50%	0.20%	0.41%
σ_z +2%	1.70%	4.21%	3.15%	5.29%	0.36%	0.82%
m_z +1%	0.45%	1.10%	5.05%	5.68%	-0.02%	0.62%
m_z +2%	0.96%	2.29%	10.02%	11.44%	0.03%	1.29%
With θ_1 increase						
Benchmark	-4.40%	-8.60%	-6.58%	-7.18%	-0.28%	-3.42%
σ_z +1%	-4.45%	-8.69%	-6.49%	-7.10%	-0.29%	-3.46%
σ_z +2%	-4.36%	-8.70%	-6.72%	-7.20%	-0.27%	-3.50%
m_z +1%	-4.33%	-8.59%	-6.78%	-7.27%	-0.26%	-3.49%
m_z +2%	-4.34%	-8.69%	-6.34%	-6.84%	-0.33%	-3.55%

H.5 The Distribution and Level of Initial Wealth

In our benchmark model we assume that all households begin with the same initial wealth. Alternatively, we here assume that households are endowed with different initial wealth levels, proportional to their innate ability (e^{α} in the model), but the mean initial level is still consistent with the society's bequest transfers. This can help us capture that some households may have larger inheritance or other transfers than others. The results in Tables H.5 and H.6 are essentially the same as in the benchmark model. This is because the initial wealth is still modest, even for the high ability levels.

If we instead significantly increase the starting wealth of all households (from the benchmark level of about 10% of average earnings to 100% of average earnings), we get a boost to entrepreneurship across all ages and in particular at younger ages when credit constraints are more likely to bind. The elasticity of entrepreneurship with respect to tax progressivity drops. This would be consistent with many of the marginal entrepreneurs being credit constrained. Having more wealth also reduces the risk of becoming constrained in the future and generally reduces the riskiness of entrepreneurship.

H.6 Easier Entry Conditions

We study a 20% increase or decrease in the entry cost, c_e. In Tables H.5 and H.6, the resulting population share of entrepreneurs changes in the same direction across all age groups: it increases with lower costs. Total employment at entrepreneurial firms is also decreasing in the entry costs. Across the age distribution, we find that more young households select into entrepreneurship, since they have relatively lower wealth when they become entrepreneurs, and reduced entry costs are more valuable to them. The elasticity of entrepreneurs to increases in progressivity is slightly higher with lower entry costs (easier entry); again, this is because the selection of entrepreneurs now is relatively less restrictive, with more marginal entrepreneurs. The elasticity to a decrease in progressivity is slightly lower with lower entry costs because some of the marginal workers have become entrepreneurs.

H.7 Easier Financing Conditions

In Tables H.5 and H.6, we also consider changes in the collateral constraint parameter, Θ. We increase it or decrease it by 20%. The population share of entrepreneurs is increasing across all age-groups with easier financing conditions. The relative size of the effect is, however, larger for younger households. This is natural because younger entrepreneurs are more likely to be constrained (recall the steady state characteristics in Table 6 of the main text). For households aged 31-40, the share of entrepreneurs relative to the total population is for example increasing from 3.15% to 3.34% with a more generous borrowing limit. The elasticity of entrepreneurship with respect to tax changes becomes higher when financing is more scarce. With tougher financing conditions there are more marginal entrepreneurs that can be pushed out by increases in tax progressivity, which makes it harder to accumulate assets.

H.8 Tax Credits for Business Income Losses

Governments often use tax credit policies to encourage risk-taking entrepreneurs; one particularly relevant policy is to offset the business income loss (see e.g. Kaymak and Schott (2019)). For example, when business income is negative, $\pi < 0$, it is typically the case that firms can carry some part of the income loss forward (or backward) when computing tax payments. Effectively, there is some loss-offset from tax policy. In our model environment, we can capture this spirit and conduct a similar exercise: when $\pi < 0$, we assume that some fraction, 20% (mild) or 80% (heavy), of this loss is offset by the government, so that the eventual business income for entrepreneurs is $\pi \times (1 - 0.2)$ or

$\pi \times (1 - 0.8)$. We report the results in Tables H.5 and H.6. We find that the quantitative impact of this tax experiment is quite small, mainly because entrepreneurs endogenously accumulate wealth to help them insure against negative productivity shocks when markets are incomplete. There are, however, some differences across different age groups: perhaps surprisingly, we do not find much of a difference for younger households. However, for relatively old households the impact is slightly larger. This is mainly due to the fact that young households are more exclusively selected based on firm productivity (they have the highest productivity state and are likely to stay there). As time goes on, there are entrepreneurs with worse productivity states that would be more likely to experience negative shocks. With more generous income loss offsetting, these entrepreneurs are less likely to exit. We also observe that the elasticity of entrepreneurs to tax progressivity is more or less the same as the benchmark case.

Table H.5: Distribution of Entrepreneurs Across Different Model Environments

Age Groups	20-29	30-39	40-49	50-59	60+
Benchmark Model	0.20%	3.07%	5.11%	2.77%	0.40%
Worse Financing Environment	0.16%	2.77%	4.76%	2.58%	0.37%
Better Financing Environment	0.23%	3.28%	5.33%	2.89%	0.42%
Worse Entry Environment	0.18%	2.93%	4.96%	2.70%	0.39%
Easier Entry Environment	0.22%	3.23%	5.28%	2.85%	0.41%
Business Loss Offset: Mild	0.20%	3.07%	5.12%	2.81%	0.44%
Business Loss Offset: Heavy	0.20%	3.07%	5.14%	2.96%	0.58%
Unequal Starting Wealth	0.20%	3.07%	5.11%	2.77%	0.40%
Higher starting wealth	1.03%	5.13%	7.28%	4.47%	0.64%

Table H.6: Comparing Elasticities Across Different Model Environments

Benchmark Model	Pop. Share	Entre. Employment
θ_1 increase	-1.78%	-2.11%
θ_1 decrease	1.66%	2.05%
Worse Financing Environment		
θ_1 increase	-2.03%	-2.39%
θ_1 decrease	2.04%	2.36%
Better Financing Environment		
θ_1 increase	-1.63%	-1.93%
θ_1 decrease	1.42%	1.79%
Worse Entry Environment		
θ_1 increase	-1.69%	-2.06%
θ_1 decrease	1.64%	2.06%
Easier Entry Environment		
θ_1 increase	-1.88%	-2.13%
θ_1 decrease	1.59%	1.95%
Business Loss Offset: Mild		
θ_1 increase	-1.75%	-2.07%
θ_1 decrease	1.70%	2.07%
Business Loss Offset: Heavy		
θ_1 increase	-1.76%	-2.06%
θ_1 decrease	1.76%	2.10%
Unequal Starting wealth		
θ_1 increase	-1.78%	-2.11%
θ_1 decrease	1.66%	2.05%
Larger Wealth		
θ_1 increase	-0.77%	-1.35%
θ_1 decrease	0.76%	1.32%

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