Wealth tax, entrepreneurship and market power*

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Abstract

Most of the wealthiest U.S. households are entrepreneurs earning high returns from their businesses. This paper shows that the distortionary and redistributive effects of top wealth taxation change when entrepreneurs' returns reflect not only productivity but also the market power of their firms. I develop a model in which entrepreneurs accumulate wealth by investing in their own firms, face capital-income risk, and set markups that rise with firm market share. Consistently with U.S. data, wealthier entrepreneurs operate larger firms and charge higher markups. Hence, a top wealth tax falls onto high-markup entrepreneurs, reducing the aggregate markup and increasing the labor share of income accruing to poor workers. I impose a progressive wealth tax raising 1% of GDP, on the wealthiest 1% of households. When market power heterogeneity is neglected, wage losses induced by the tax are overestimated by 1.5 pp and output losses by 1.1 pp. This is because, in the economy with markup heterogeneity, taxed entrepreneurs impose higher markups and thus exhibit lower production and capital elasticities with respect to the tax.

Keywords: top wealth tax, entrepreneurship, heterogeneous markups, inequality
JEL codes: E2, E6, H2

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1 Introduction

US households' wealth is significantly concentrated and in recent decades this concentration has steadily increased. It is also well established that a large fraction of households at the top of US wealth distribution are entrepreneurs. Thus, at the light of this evidence, academics and policy makers have extensively debated the merits and drawbacks of taxing capital income and wealth of these wealthy entrepreneurs for redistributive purposes (Guvenen et al. (2023), Boar and Midrigan (2023)). Do the redistributive gains of these policies outweigh the distortionary effects on entrepreneurs' production? The existing literature has always studied this question under the assumption that profits and returns that entrepreneurs receive from their own businesses entirely reflect their firms' productivity.

This paper, instead, investigates how the equity-efficiency trade-off of top wealth taxation changes when this 1-to-1 relationship between entrepreneurs' returns and productivity breaks. In particular, I study the effects of a top wealth tax policy when the heterogeneous returns that entrepreneurs receive from their own businesses not only reflect the entrepreneur's firm productivity but also his *market power*. Indeed, American entrepreneurs own a universe of extremely heterogeneous firms in terms of dimensions and recent contributions (Baqaee and Farhi (2020), Edmond et al. (2023)) have shown that this large firms heterogeneity is coupled with sizable market power heterogeneity across them.

To study the distortionary and redistributive effects of top wealth taxation in a setting with productivity and market power heterogeneity across entrepreneurs, I assume that - consistently with standard models of monopolistic and oligopolistic competition (e.g. Atkeson and Burstein (2008), Edmond et al. (2023)) - firms' market power increases with firms' market shares. In line with US Survey of Consumer Finances data showing that wealthier entrepreneurs manage larger firms, in my setting wealthier (and more skilled) entrepreneurs produce at larger scale and own firms with more market power imposing larger markups. In this setting I investigate the effects of a progressive top wealth tax on entrepreneurs' production choices, wages and markups induced distortions.

How does the equity-efficiency trade-off of top wealth taxation change when instead the market power heterogeneity across entrepreneurs is neglected? To address this question I compare the previously simulated tax effects to those that would arise in an analogous economy, but in which market power heterogeneity across entrepreneurs has been shut down. Taking into account that wealthier entrepreneurs own firms imposing larger markups relaxes the equity-efficiency trade-off of top wealth taxation, with respect to the case in which this market power heterogeneity is neglected. In other words, for any given tax-revenue objective, in the economy where firms impose heterogeneous markups the considered wealth tax induces higher redistribution from rich entrepreneurs to poor workers, at the cost of lower losses in terms of forgone production. The intuition for this result is the following. Taxing the wealthiest entrepreneurs, taking into account that they are the ones imposing the largest markups, means taking away resources not only from the most productive agents, but also from the ones imposing the largest production distortions and featuring the lowest production elasticities. This limits losses in labor demand and in wage received by workers as an effect of the tax, with respect to the case in which market power heterogeneity across entrepreneurs is neglected. Moreover, when entrepreneurs impose heterogeneous markups, the wealth tax reduces the aggregate markup in the economy, as the tax burden is concentrated on entrepreneurs who impose the highest markups. This effect diminishes the capital share of income that accrues to wealthy entrepreneurs and increases the labor share of income going to poor workers. This extra redistributive effect of wealth taxation would be neglected when market power heterogeneity across entrepreneurs is not taken into account.

The starting point of this analysis is to study whether and how entrepreneurs' firms differ across the wealth distribution. In Section 2 I employ the 2019 Survey of Consumer Finances data to this purpose. First, I show that American entrepreneurs are concentrated at the top of the wealth distribution and their entrepreneurial investment is mainly directed towards a single business, from which they receive heterogeneous returns. I then document that American entrepreneurs' businesses are extremely heterogeneous in terms of size. Indeed, the capital endowment, employees, revenues of entrepreneurs' firms steeply increase across the wealth distribution. Furthermore, using the Compustat data, I argue that larger firms also have larger product market power, i.e. they impose larger markups.

In Section 3 I build a very simple static model that I employ as an illustrative tool to show how the effects of a top wealth tax policy on entrepreneurs' choices and economic aggregates depend on the assumptions on entrepreneurs' market power. In this framework entrepreneurs are heterogeneous in their skills and wealth endowment and manage firms operating in *monopolistic competition*. Each entrepreneur uses its own wealth and hires workers to produce an intermediate variety employed the production of a final consumption good. The shape of final good producers' demand for entrepreneurs' goods determines the mechanism through which their market power arises. In particular, I employ the Kimball (1995) aggregator as final good production technology, so to have a general framework to study wealth taxation under several entrepreneurs' market power assumptions. I first allow the price elasticity of demand for entrepreneurs' goods to be decreasing in the entrepreneur firm's market share. This induces entrepreneurs to impose markups increasing in their firm's market share. I then consider demand curves with constant elasticity of demand which makes entrepreneurs choose constant (potentially heterogeneous) markups.

In this general framework I characterize entrepreneurs' production, labor demand choices and profits. In particular, I identify the conditions under which production and labor demand of entrepreneurs are monotone increasing in their skills and wealth. Furthermore, I also investigate how entrepreneurs' production elasticities depend on the entrepreneurs' market power assumptions. In particular, I show that the entrepreneur's production elasticity with respect to capital positively depends on the level of the price elasticity of demand faced by the entrepreneur and negatively on the rate at which the price elasticity of demand changes.

In Section 4 the model is parametrized and simulated to compare the distortionary and redistributive effects of a progressive top wealth tax policy under different entrepreneurs' market power assumptions. First, I consider the benchmark case of market power increasing with firm's market share[1]. I show that top wealth taxation reduces production and markups of the wealthiest (taxed) entrepreneurs and increases production and markups of the poorest ones. Since the tax is levied on the wealthiest, but also most productive entrepreneurs, aggregate production, labor demand and hence equilibrium wage fall. Furthermore, since the burden of the tax falls onto the entrepreneurs imposing the largest markups, the aggregate markup in the economy falls as well. This induces a redistributive effect by increasing the labor share of income accruing to poor workers. Furthermore, by compressing the markups distribution the wealth tax reduces the misallocation of labor across firms induced by markups heterogeneity. However, this efficiency increase is not strong enough to outweigh the productivity losses coming from taxing the most productive entrepreneurs.

The described tax effects are compared to those arising in an economy observationally

[1]This is the most common framework employed by the macro literature to study the effects of fiscal and monetary policies allowing for markups heterogeneity across firms operating in monopolistic competition, e.g. Baqaee et al. (2024), Champion et al. (2023), Boar and Midrigan (2022), among others.

equivalent to the previous one, featuring the same markups distribution but *constant*, rather than variable, markups. Finally, the same wealth tax is implemented in a framework differing from the previous ones for having all entrepreneurs imposing homogeneous and constant markups.

I show that the losses in equilibrium production are the largest in the economy with no markups heterogeneity, with no effects induced by the tax on the aggregate markup and the labor share of the economy. The intuition is that in the economy with no market power heterogeneity the taxed entrepreneurs at the top of the wealth distribution feature larger production elasticities with respect to ones of the entrepreneurs at the same wealth quantiles in the economies with markups heterogeneity. The tax, as a consequence induces the largest labor demand and wage decrease in the economy featuring homogeneous markups across entrepreneurs. In other words, taking into account that wealthier entrepreneurs own firms with larger market power, relaxes the equity-efficiency trade-off of wealth taxation, with respect to the case in which this market power heterogeneity is neglected. Indeed, poor workers receive the same transfer in the three economies, although suffering the largest reduction in equilibrium wage and the largest production losses in the economy with no market power heterogeneity. Furthermore, I show that depending on whether heterogeneous markups are constant or variable, the effects of the wealth tax on equilibrium aggregates are quantitatively different. In particular, larger equilibrium wage losses and production losses occur in the case of constant but heterogeneous markups.

In Section 5 I build a richer dynamic, stochastic, general equilibrium model which allows me to study how the top wealth tax distorts entrepreneurs' capital accumulation choices under different assumptions about their market power.

Differently from the static framework entrepreneurs not only decide how much to produce and which markups to impose, but also how much capital supply to their own business, by making consumption-saving and portfolio choices. In particular, each entrepreneur invests a fraction of his wealth in his privately owned business, whose return depends on his stochastic entrepreneurial productivity, and the remaining wealth fraction in a "corporate" sector, receiving the riskless return r.

The assumed production structure allows me to capture the distortionary effects of wealth taxation that go through lower capital availability for the privately-owned businesses of American entrepreneurs (which are assumed not to have access to the capital market) but also through higher cost of financing for corporations that have unlimited access to capital market[2]. Similarly to the static framework, in this dynamic economy we also have workers, that receive a stochastic labor income, and invest in the same riskless asset in which entrepreneurs invest.

The steady-state of the model is calibrated to the US economy, first assuming entrepreneurs imposing markups increasing in their firms' market shares and then under the assumption of homogeneous and constant markups across all entrepreneurs. In both scenarios the shape of the actual US wealth distribution is well-matched. Furthermore, the concentration of entrepreneurs at the top of the wealth distribution is captured as well, with workers constituting most of the households at the bottom-middle of the wealth distribution. In this setting I implement a *permanent* wealth tax policy schedule analogous to the one studied in Section 4 and compare the steady-states of the model with and without the tax.

I show that the wealth tax in this dynamic framework reduces wealth accumulation of the wealthiest entrepreneurs, but at the same time generates a positive "selection effect" among them. In other words, in the steady state with wealth taxation, only the most productive entrepreneurs survive at the top of the wealth distribution, while the less productive ones migrate to lower quantiles. The reason is that the most productive entrepreneurs have high returns to wealth, hence they are relatively less affected than less productive entrepreneurs by the distortionary tax effect on savings. Overall, the wealth tax, reduces the capital supplied by entrepreneurs to their own firms, inducing a drop in entrepreneurial production, with lower distortionary effects in the economy with markups heterogeneity across entrepreneurs. Indeed, in the economy with markups heterogeneity, the wealthiest (taxed) entrepreneurs have steeper marginal profits curves. This limits the extent to which entrepreneurs find optimal to reduce their wealth accumulation (and hence capital supply) because of the tax. The supply of capital to the corporate sector is reduced as well, with larger effects in the economy with no markups heterogeneity. In the aggregate, the wealth tax induces a GPD loss in the economy with heterogeneous markups that is by 1.1 p.p. lower than in the economy with no markups heterogeneity.

I then investigate the redistributive effects of the tax. First, although the wealth tax revenues are identical at the initial steady states with homogeneous and heterogeneous markups, in the steady state with wealth taxation implemented the policy generates larger revenues in the setting with markups heterogeneity across entrepreneurs. Hence,

[2]Corporations are assumed to have constant return to scale technology and operate in perfect competition, so they make zero profits. Thus, it is irrelevant the ownership of these firms.

in this economy poor workers benefit from a larger transfer. Furthermore, similarly to the static framework the smaller drop in labor demand in the economy with markups heterogeneity induces an equilibrium wage drop 1.4 p.p. smaller than in the economy with no markups heterogeneity. On the other hand, the increase in equilibrium interest rate is larger in the economy with no markups heterogeneity. However, this effect is quantitatively not large enough to compensate the previously described stronger redistributive effects in the economy with markups heterogeneity..
Hence, even in this richer dynamic framework the redistributive effects of the tax are the largest in the economy with markups heterogeneity.

Related work: this paper contributes to the stream of literature studying wealth taxation in settings where households receive heterogeneous returns to wealth (which have been shown to be a fundamental driver of wealth inequality (Benhabib and Bisin (2018), Hubmer et al. (2019)). This return heterogeneity both between and within investment opportunities has been largely documented by Bach et al. (2020), Fagereng et al. (2020), Xavier (2021). The focus of this paper is on the effects of top wealth taxation on a specific investment opportunity, that is entrepreneurial investment, which is particularly sizable at the top of the wealth distribution. This work complements the empirical literature documenting return heterogeneity by estimating returns to entrepreneurial investment (i.e. returns to investment in privately owned, actively managed businesses) across the wealth distribution in US.

The recent wealth taxation literature has employed models featuring return heterogeneity across households to generate economies with wealth inequality dynamics consistent with the data where to study the effects of wealth tax policies[3]. However, several different mechanisms have been used to generate return heterogeneity across households: these can be categorized into the classes of *type* and *scale* dependence mechanisms.
Guvenen et al. (2023) and Boar and Midrigan (2023) study the effects of wealth taxation (vs capital income taxation) on entrepreneurs' production choices in settings in which entrepreneurs' wealth accumulation is only driven by their *type* (productivity). In these settings return heterogeneity across them is generated by financial frictions (similarly

[3]Studying wealth taxation in a setting with returns heterogeneity allows to compare the effects of wealth taxation to these of taxing capital income. When there is no return heterogeneity across households capital income and wealth taxation are equivalent.

to Cagetti and De Nardi (2006)) which are more or less severe depending on the entrepreneur's productivity type.

Gaillard and Wangner (2021) study top wealth taxation with both "type" or "scale" dependence mechanisms. Under type dependence, households with higher types, invest more in high return assets, receive higher returns and accumulate more wealth. Instead, under scale dependence mechanism the wealthier the household gets, the more it is prone to invest in high-return assets and hence obtains higher returns. In this setting they show that higher top wealth taxation is optimal when return heterogeneity is generated by type, rather than scale dependence.

This paper crucially departs from this literature since assumes that the heterogeneous returns that entrepreneurs receive not only reflect the productivity of the entrepreneurial investment but also the market power of the entrepreneur.

This paper is also related to the literature showing large markups and markups heterogeneity across firms in the US (e.g. De Loecker et al. (2020), Baqaee and Farhi (2020)). Furthermore, several papers have also highlighted that the distortions induced by market power heterogeneity are sizable (Bilbiie et al. (2019), Autor et al. (2020), Edmond et al. (2023)) and some scholars have studied the redistributive effects of policies that restore production efficiency (Boar and Midrigan (2022)). In particular, the production structure employed in this paper to generate heterogeneous markups across firms is similar to that of Boar and Midrigan (2022). However, in their paper entrepreneurs invest in a common financial intermediary and receive homogeneous returns to their entrepreneurial investment. Hence, in this setting a wealth tax would only decrease aggregate capital supply, and uniformly increase the firms' cost of financing through the market.

Finally, this paper is also related to the literature studying optimal taxation in presence of *rent-seeking* activities. Rothschild and Scheuer (2016) show that whenever heterogeneity in returns reflect heterogeneous rents rather than actual productivity differences, taxing away such gains has efficiency benefits. Gaillard and Wangner (2021) show that taxing wealth becomes more desirable whenever returns to risky assets (which are mostly owned by wealthy households) capture rent extraction motives. Although in my setting entrepreneurs do not perform rent extraction activities, the trade-off faced is similar: the wealthiest entrepreneurs, who are the most productive, are also the ones imposing the largest production distortions. Thus, taxing the wealth of these entrepreneurs on the one hand takes away resources from productive entrepreneurs, but on the other hand reduces the production distortions in the economy.

2 Entrepreneurs across the wealth distribution

In this section, I use data from the 2019 *Survey of Consumer Finances* (hereafter, SCF) to study the features of entrepreneurial activity across the U.S. wealth distribution. The evidence reveals large heterogeneity in business size, measured by capital, revenues and employment. In particular, I show that average firm size rises with entrepreneurs' wealth, with substantial heterogeneity in size even within the top percentiles of the wealth distribution.

2.1 Data and variables definitions

To study the features of entrepreneurial activity across the wealth distribution, the 2019 wave of the Survey of Consumer Finances is employed. The choice of SCF over other surveys is due to two reasons. First of all, SCF contains detailed information on households' personal wealth and on businesses owned by each household (business income, employees, age, sector...). Furthermore, SCF surveys many more households at the very top of the wealth distribution, with respect to what other surveys do (for details on the sampling procedure see for example Kennickell (2008)). For the scope of this analysis this feature is of particular importance, given that entrepreneurial activity is primarily concentrated at the top of US wealth distribution.

The SCF contains several questions which can be used to classify a household as an entrepreneur:

1. "Do you (and your family living here) own or share ownership in any privately-held businesses, including farms, professional practices, limited partnerships, private equity, or any other business investments that are not publicly traded?"

2. "Do you (or anyone in your family living here) have an active management role in any of these businesses?"

3. "Do you work for someone else, are you self-employed or something else?"

The entrepreneurial status of an household depends on how the term entrepreneur is defined. In this paper I define an entrepreneur as an household who responds affirmatively to questions 1., 2. and 3. The requirement of the household actively managing the business is imposed in order to exclude from the class of entrepreneurs those households who act as "investors" but do not contribute to the management of the business. The requirement of being self-employed is instead imposed in order to exclude from the entrepreneurs' class those households who have a full-time wage-earning job. This definition is consistent with other works in the literature employing SCF data to study entrepreneurship in the US (e.g. Quadrini (2000), Cagetti and De Nardi (2006))[4].

2.2 Entrepreneurial activity across the wealth distribution

Do entrepreneurs coincide with the wealthiest US households?

Table 1 shows that net wealth in the US is extremely unequally distributed, with around 37% of total wealth accruing to the wealthiest 1% of households. Noticeably, entrepreneurial wealth (i.e. the wealth invested in actively managed privately owned businesses) is even more unequally distributed, with more than 42% of the overall entrepreneurial wealth owned by the wealthiest 1% of households. The concentration of the entrepreneurial activity at the top of the wealth distribution is further highlighted by Figure 1.

TABLE 1. *Net wealth and entrepreneurial wealth distribution: summary statistics*

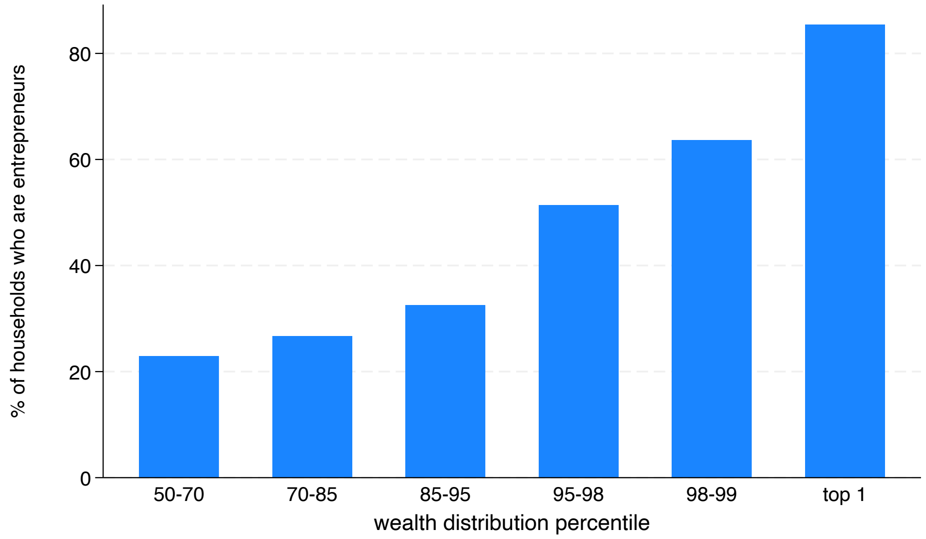
Percentile	**Net wealth share**	**Entrepreneurial wealth share**
top 10%	76.5%	82.6%
top 5%	64.8%	70.5%
top 1%	37.2%	42.6%
top 0.5%	28.0%	33.4%
top 0.2%	16.4%	23.3%
top 0.1%	12.2%	18.0%

Notes: *column 2 of the table reports the share of net wealth (assets - debts) of US households belonging to different percentiles of the wealth distribution. Column 3, instead, reports the share of wealth invested in directly managed private businesses by the wealthiest x% of US entrepreneurs. For details on the definition of entrepreneur see Section 2.1. Data from 2019 Survey of Consumer Finances.*

Figure 1 shows that the fraction of households who are entrepreneurs in a given wealth percentile is increasing across the wealth distribution. In particular, around 40% of the wealthiest 10% of US households are entrepreneurs. This number increases up to 82% for the wealthiest 1% of households. However, this figure does not provide any information on the fraction of overall wealth invested in these businesses, compared to other investment opportunities.

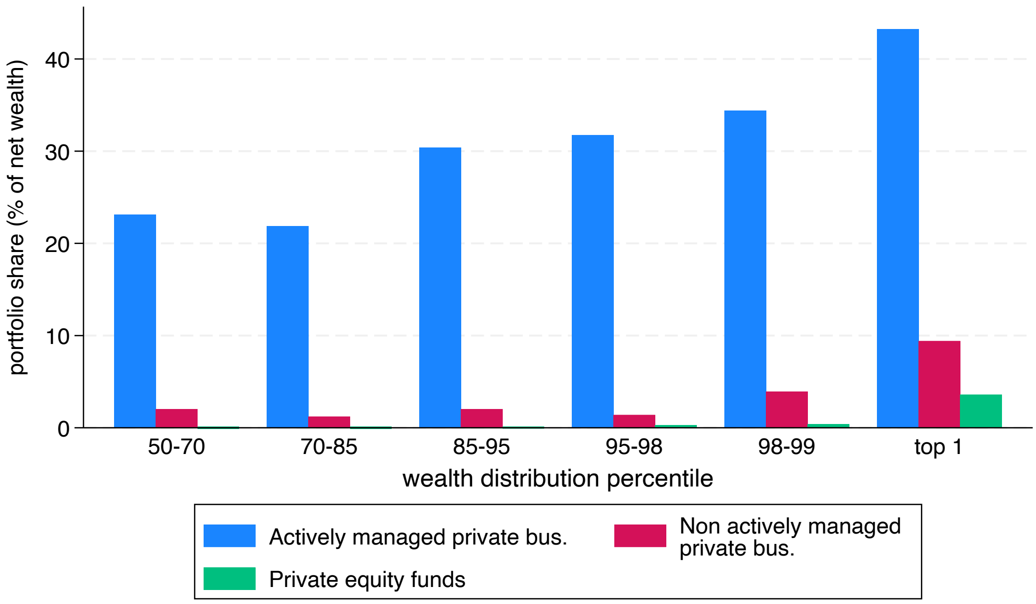
[4]Alternative definitions of entrepreneur employed by the literature consider as an entrepreneur an household responding affirmatively to 1., or 1. and 2. (e.g. Boar and Midrigan (2022)). In any case, the empirical findings I will present do not significantly change when employing alternative definitions of entrepreneur.

Figure 1. *Fraction of US households defined as entrepreneurs across the wealth distribution*



Notes: *the Figure reports the fraction of US households, per given wealth percentiles bin, which satisfy the definition of entrepreneur reported in Section 2.1. Data from 2019 Survey of Consumer Finances.*

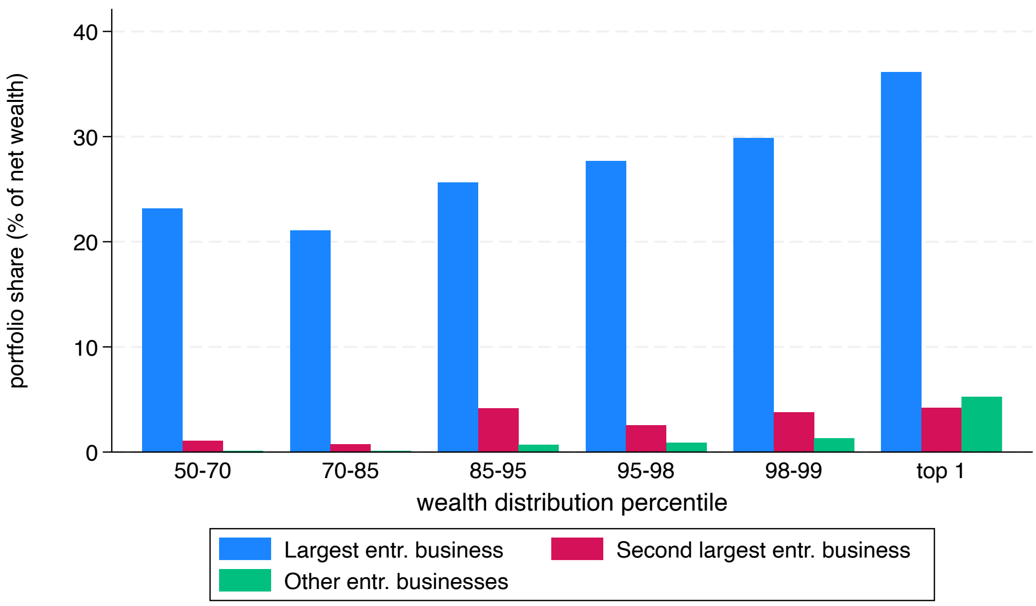
Figure 2. *Portfolio shares across entrepreneurs: private equity investments*



Notes: *the Figure reports the fraction of net wealth that US entrepreneurs (entrepreneur is defined according to the definition reported in Section 2.1) invest in different private equity investment opportunities. The total amount of private equity investment is disaggregated into: investment in actively managed businesses (blue), investment in non-actively managed businesses (red), other private equity investment (green, mainly private equity funds). The value of each column is computed by averaging the portfolio shares invested in each private equity investment opportunity across the entrepreneurs belonging to a given wealth percentiles bin. Data from 2019 Survey of Consumer Finances*

Figure 2 fills this gap by reporting the portfolio share (i.e. fraction of net wealth) that US entrepreneurs hold in actively managed private businesses (blue columns). Notice that the fraction of net wealth invested in actively managed private businesses is increasing across the wealth distribution and it represents a sizable share of US entrepreneurs' portfolios, especially at the very top of the wealth distribution. Furthermore, the fraction of wealth held in actively managed businesses is significantly larger than the fraction of wealth held in other private equity investment opportunities such as non-actively managed private equity businesses (red columns) or private equity funds (green columns). This evidence shows that households actively managing businesses at the top of the wealth distribution are really entrepreneurs, more than just investors. Figure 2 also shows that the wealthier the entrepreneur, the more wealth he confers to his own entrepreneurial activities, suggesting that the size of the entrepreneurs' firms, in terms of capital endowment, increases across the wealth distribution. One potential concern on the previous statement is that capital conferred by each entrepreneur is diluted across many entrepreneurial activities. As shown in Figure 3, this is not the case.

FIGURE 3. *Portfolio shares across entrepreneurs: actively managed private businesses*

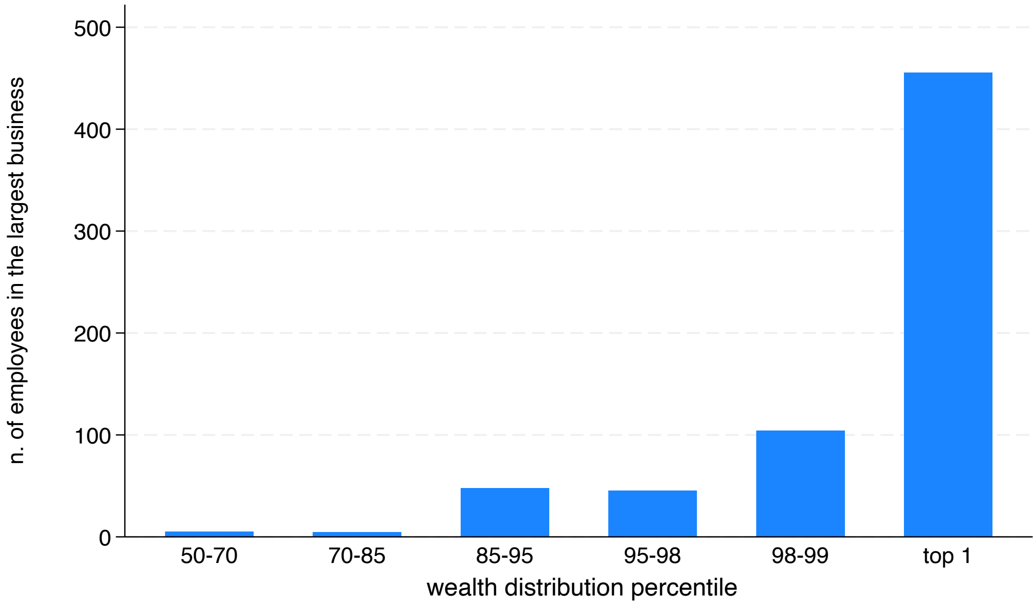


Notes: *the Figure reports the fraction of net wealth that US entrepreneurs (entrepreneur is defined according to the definition reported in Section 2.1) invest in different privately owned actively managed businesses. The total amount of privately owned actively managed business investment is disaggregated into: investment in the largest actively managed businesses (blue), investment in the second actively managed business (red), investment in other privately held businesses (green). The value of each column is computed by averaging the portfolio shares invested in first/second/other actively managed private business across the entrepreneurs belonging to a given wealth percentiles bin. Data from 2019 Survey of Consumer Finances*

Indeed, Figure 3 shows that almost the entire wealth invested in entrepreneurial activities is conveyed towards a single business. Notice that this finding is consistent with the literature arguing that entrepreneurial investment is poorly diversified (Moskowitz and Vissing-Jørgensen (2002)).

However, not only the capital endowment of privately owned businesses is increasing across the wealth distribution, but also their size in terms of number of employees is steeply increasing.

FIGURE 4. *Employees in largest (private) actively managed business*



Notes: *the Figure reports the average number of employees in the largest private actively managed business across the wealth distribution. The value of each column is computed by averaging the number of employees in the largest actively managed business across entrepreneurs belonging to the same wealth percentile bin. The definition of entrepreneur is reported in Section 2.1. Data from 2019 Survey of Consumer Finances*

This pattern is reported in Figure 4, which plots the average number of employees in the largest business of each entrepreneur, for several wealth percentiles bins. A similar pattern could be observed when analyzing the number of employees working in the second largest business owned by each entrepreneur, as well as in further businesses. As Figure 17 (Appendix C) shows, a similar result holds for firms' revenues as well, i.e. the firms owned by entrepreneurs at the top of the wealth distribution have much larger revenues than firms owned by entrepreneurs at lower percentiles.

2.3 Returns to entrepreneurship

Beside owning heterogeneous firms (both in terms of capital endowment and employees), entrepreneurs across the wealth distribution receive heterogeneous returns to their en-

trepreneurial investment.
To estimate returns to entrepreneurship I use the three latest waves of the SCF, namely the 2013, 2016 and 2019[5]. The following variables are employed:

- GI = *directly managed private business* pre-tax (gross) income reported the year preceding the survey date
- EV = value of the *directly managed private business* equity owned by the household at the date of the survey. It is the answer to the following survey question: "what is the net worth of (your share) of this business?"

The reported pre-tax income has to undergo two major transformations to reflect the perceived capital income obtained through entrepreneurial investment. First of all, taxes paid by each firm are subtracted from gross income. The applied tax adjustment is assumed to be 36% of gross income for C-corporation and 0% for S-corporations[6]. The 36% tax rate is an estimate for the effective corporate tax rate and is chosen consistently with Bhandari and McGrattan (2021). They obtain this figure as a weighted sum of the marginal tax rates on firm earnings.
Furthermore, to identify capital income separately from labor income, a salary is imputed to all entrepreneurs not reporting any. This term is subtracted from gross income net of taxes to obtain net capital income (NI):

$$\begin{aligned} NI &= GI \times 0.64 - \text{ imputed salary} \qquad && \text{for C-corp.} \\ NI &= GI - \text{ imputed salary} && \text{for S-corp.} \end{aligned}$$

To obtain the imputed salaries I first run a regression (over households reporting a positive salary) of household-level wage over a constant, age, age squared, a dummy for graduating college and a dummy for gender. I then use the estimated coefficients to

[5]Returns to entrepreneurship across the wealth distribution are pretty volatile. This motivates my choice of using more than one survey wave for the estimation of returns. On the other hand, using too many waves would induce me to compare returns across the wealth distribution with significantly different underlying wealth distributions. These considerations motivate my choice of using the waves in the period 2013-2019 only, in which wealth inequality in the US has remained pretty stable.

[6]A C-corporation is a legal form for a company in which the owners are taxed separately from the entity. C-corporations are subject to corporate income taxation and the net profits distributed to owner also undergo personal taxation. An S-corporation, instead, is a business legal form that allows to pass its taxable income directly to its shareholders, hence is not subject to corporate income taxation

compute the fitted wage for those entrepreneurs not reporting any salary. Finally, I obtain the imputed yearly salary by multiplying the wage rate for the total hours worked in a year. This imputation procedure is consistent with other works employing the SCF data in order to obtain estimates of returns to private equity investment (Moskowitz and Vissing-Jørgensen (2002), Kartashova (2014), Xavier (2021)).

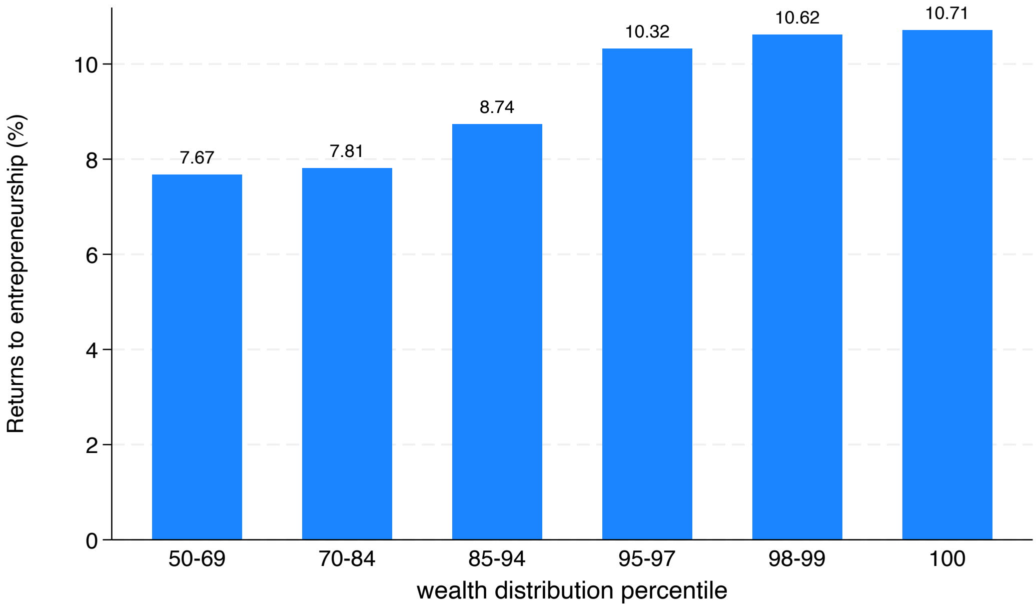
Employing the constructed measure of *net capital income* (NI), I now compute the *annualized returns* to entrepreneurship across the wealth distribution. To do so, for each household i and survey wave $t = \{2013, 2016, 2019\}$ I compute:

$$R_i^t = \left(1 + \frac{3NI_i^t}{EV_i^t}\right)^{\frac{1}{3}} - 1$$

notice that this is the same measure of annualized (SCF is a triennial survey) returns to private equity investment computed by Moskowitz and Vissing-Jørgensen (2002), Kartashova (2014), Xavier (2021) using the SCF data. By averaging R_i^t across households belonging to the wealth percentile bin $p \in \{50-70, 70-85, 85-95, 95-98, 98-99, \ top \ 1\}$ I obtain the returns to entrepreneurship at wealth percentile bin p and survey wave t: R_p^t. Finally, averaging R_p^t across the three survey waves employed (2013, 2016, 2019) I obtain returns to entrepreneurship at wealth percentile bin p: R_p. The returns estimated through this procedure are reported in Figure 5.

Figure 5 shows that returns to entrepreneurship are increasing across the wealth distribution. In particular, the wealthiest 5% of US households receive returns in the ballpark of 10%, reaching 10.7% at the very top of the wealth distribution. The households below the top 5% receive returns to entrepreneurship around 8.7% while those at lower percentiles around 7.7%. Xavier (2021) analyzes the returns to private equity investment (i.e. returns to investment in all private businesses, not only those actively managed, and private equity funds) across US wealth distribution. She reports increasing returns to private equity investment across almost the entire wealth distribution, although she highlights a drop of returns for the wealthiest 3% of US households. For the top 5% she reports returns to private equity investment in the range 14%-16%, although she highlights that around 20-25% of these returns are due to capital gains (which I have not taken into account in my procedure) rather than realized income. Fagereng et al. (2020), using Norwegian administrative data still report a positive relationship between private equity returns and net wealth of the entrepreneur, consistently with my findings for the US.

FIGURE 5. *Returns to entrepreneurship across the wealth distribution*



Notes: *the Figure reports the returns to investment in actively managed private businesses across the wealth distribution. For details on the procedure employed see Section 2.3. Data from 2019 Survey of Consumer Finances*

2.4 Firm size and product market power

The previous empirical evidence has showed that wealthier entrepreneurs own larger firms in terms of revenues and employees. Do larger firms have more market power as well? Let's focus on the relationship between firm's product market power, measured as markups imposed by firms, and firm size. In the standard Cournot model and in more recent frameworks of monopolistic and oligopolistic competition with variable markups this positive relationship between firm size and markups holds (Autor et al. (2020), De Loecker and Syverson (2021), Edmond et al. (2023)) and breaking this positive relationship, instead, requires very restrictive assumptions on the demand function faced by entrepreneurs (Biondi (2022)).
Unfortunately, the SCF dataset does not allow me to investigate this relationship empirically, since it does not contain detailed information on entrepreneurs' firm costs which I would need to estimate firm level markups. To overcome this issue, I employ the Compustat data (1980-2019), which instead provide the financial statements of all listed American firms. Thus, following the production approach of De Loecker et al. (2020) I estimate firm-level markups and regress them on firms' employees and revenues. The results of these regressions are reported in Table 2. The first two columns report the results of regressing firm level markups (as measured by De Loecker et al. (2020)) on

firm level employment shares (i.e. employees of a firm over total employment in a given year), with year and sector fixed effects. The third and fourth columns, instead, report the results of regressing firm level markups on the firms' revenue shares, including again year and sector fixed effects. The results suggest a within-sector positive and significant relationship between markups and firm size among listed American firms.

TABLE 2. *Markups - firm size correlation*

	log(Markup)	log(Markup)	log(Markup)	log(Markup)
log(employment share)	0.023***	0.040***		
	(0.001)	(0.001)		
log(revenue share)			0.190***	0.197***
			(0.002)	(0.002)
Year FE	Yes	Yes	Yes	Yes
Sector 2-digit FE	Yes	No	Yes	No
Sector 4-digit FE	No	Yes	No	Yes
N	105,175	105,175	105,175	105,175
R^2	0.074	0.149	0.770	0.799
Within-R^2	0.006	0.015	0.114	0.134

Notes: *the first two columns report the results of regressing firm level markups (as measured by De Loecker et al. (2020)) on Compustat (1980-2019) data on firm level employment shares (i.e. employees of a firm over total employment in a given year), including year and sector fixed effects. The third and fourth columns, instead, report the results of regressing firm level markups on the firms' revenue shares.*

At the light of this suggestive evidence and consistently with standard models of oligopolistic and monopolistic competition, it is then reasonable to expect that the wealthiest American entrepreneurs manage firms of larger size endowed with larger product market power.

The following sections of the paper will investigate how, taking into account this market power heterogeneity across entrepreneurs, shapes the macroeconomic outcomes of top wealth taxation.

3 Static model

This Section introduces a simple static model to illustrate how the distortionary and redistributive effects of top wealth taxation vary with the degree and heterogeneity of market power held by American entrepreneurs. The framework allows me to characterize how entrepreneurs' production choices and elasticities are shaped by their market power and provides a foundation for interpreting the wealth tax effects in the richer dynamic model of Section 5.

3.1 Households

Let's consider an economy populated by a continuum of households indexed by $i \in [0,1]$. Each of these households is born either as worker or as an entrepreneur and cannot choose its occupation. For simplicity, assume that households $i \in [0,\omega)$ are workers and households $i \in [\omega, 1]$ are entrepreneurs, where the measure of workers, ω, is exogenously given[7].

Workers: are identical and they all inelastically supply a unit of labor. All workers receive the same wage, denoted with w, and use their labor income to consume the amount of final good $c_i = w$. The preferences of each worker i over the final consumption good can be represented by a standard CRRA utility function: $u(c_i) = \frac{c_i^{1-\theta}}{1-\theta}$.

Entrepreneurs: each entrepreneur i is endowed with wealth k_i and entrepreneurial ability z_i. In this static model both k_i and z_i are exogenous and for the moment no assumptions are made on the correlation between the two.
Consistently with the evidence of poor diversification of entrepreneurial investment presented in Section 2, I assume that each entrepreneur owns and operates one firm only. Furthermore, I assume that each entrepreneur invests all his wealth in his own unique entrepreneurial activity. This choice allows to abstract from portfolio composition effects that wealth taxation may induce[8]. Finally, I also assume that each entrepreneur's firm cannot borrow, so the capital employed for production coincides with the wealth of the entrepreneur k_i. Each entrepreneur's income is the profit, π_i, from his own firm. He uses this income for consumption of a final good, c_i, and shares the same preferences as the model's workers.

Entrepreneurs' technology: each entrepreneur i runs a firm operating in monopolistic competition, producing a differentiated intermediate good over which he has monopoly power. These differentiated products are then purchased by final good pro-

[7]In Appendix D I present an extension of this static framework in which I allow household to make an occupational choice between "worker" and "entrepreneur".

[8]Although relevant, see Gaillard and Wangner (2021) and Cremonini (2023), analyzing the portfolio composition effects of wealth taxation goes beyond the scope of this analysis.

ducers and used as inputs to produce the final good consumed by both entrepreneurs and workers.

To produce these differentiated intermediate goods each entrepreneur i employs the following constant return to scale production function:

$$y_i = z_i k_i^{\nu} n_i^{1-\nu}$$

where $0 < \nu < 1$. Notice that y_i indicates the production of entrepreneur's i firm, which is performed using own capital k_i and workers hired from the labor market, denoted as n_i.

Final good production: final good (to be used for consumption) is produced by identical competitive producers employing a bundle of the entrepreneurs' intermediate varieties as inputs. The employed production technology, thus, combines the intermediate goods $\{y_i\}_{i\in[\omega,1]}$ to produce the amount of final good Y.

The final good production technology is chosen to be flexible enough so to obtain demand curves for entrepreneurs' intermediate varieties with both variable and constant price elasticity of demand. This modeling choice allows me to obtain a framework to study the effects of wealth taxation under a wide range of assumptions on entrepreneurs' market power. To this aim, I assume that the final good production technology is the Kimball (1995) aggregator. This is implicitly defined by all the inputs-output pairs $(\{y_i\}_{i\in[\omega,1]}, Y)$ satisfying:

$$\int_{\omega}^{1} \Upsilon_i\left(\frac{y_i}{Y}\right) di = 1 \tag{1}$$

where $\Upsilon_i(\cdot)$ is assumed to be a continuous and twice differentiable function, with $\Upsilon_i'(\cdot) > 0$ and $\Upsilon_i''(\cdot) < 0$ for all i.

Notice that if $\Upsilon_i(\cdot) = \Upsilon(\cdot)$ for all i and $\Upsilon(\cdot)$ is a power function, the technology (1) takes the well-known *CES* form.

Demand for intermediate goods: Final good producers, taking input prices $\{p_i\}_{i\in[\omega,1]}$ as given, choose how much to produce of the final good Y and the best input combination $\{y_i\}_{i\in[\omega,1]}$ for doing that. Define the minimal cost of producing Y given prices $\{p_i\}_{i\in[\omega,1]}$ as:

$$\begin{aligned}
&C(Y,\{p_i\}_{i\in[\omega,1]}) = YC(1,\{p_i\}_{i\in[\omega,1]})\\
&\text{where}\quad C(1,\{p_i\}_{i\in[\omega,1]}) := \min_{\{q_i\}_{i\in[\omega,1]}} \int_\omega^1 p_i q_i di \quad \text{s.t.} \quad \int_\omega^1 \Upsilon_i(q_i)di = 1
\end{aligned}$$

where $q_i := y_i/Y$ is the relative demand for input i. Normalize to unit the price of the final good. The profit maximization problem of final good producers writes:

$$\max_Y \quad Y - YC(1;\{p_i\}_{i\in[\omega,1]})$$

By solving this problem it is possible to obtain the demand function $p_i(\cdot)$ for the intermediate good produced by each entrepreneur $i \in [\omega, 1]$:

$$p_i(q_i, P) = P\Upsilon_i'(q_i) \tag{2}$$

where the price aggregator P is defined as:

$$P := \left(\int_\omega^1 \Upsilon_i'(q_i)\, q_i di\right)^{-1}$$

First, notice that the assumptions $\Upsilon_i'(\cdot) > 0$ and $\Upsilon_i''(\cdot) < 0$ ensure that the demand schedule for each intermediate good i is positive and downward sloped. In particular, the price to be paid for intermediate good produced by entrepreneur i negatively depends on the *relative production* of that good $q_i := y_i/Y$.
Furthermore, notice that the subscript i in $p_i(\cdot)$ highlights that if the function $\Upsilon_i(\cdot)$ is assumed to be heterogeneous across entrepreneurs, then different entrepreneurs will face different demand functions for their own varieties. The elasticity of demand for the intermediate good produced by entrepreneur i takes the form:

$$\mathcal{E}_i^d(q_i) := \left|\frac{\partial \ln(q_i)}{\partial \ln(p_i)}\right| = -\frac{\Upsilon_i'(q_i)}{q_i\Upsilon_i''(q_i)} \tag{3}$$

Notice that in this simple model of monopolistic competition the market power of each entrepreneur is determined by the elasticity of demand he faces for his own intermediate good.
Throughout this paper, I assume entrepreneurs have either market power that increases with their firm's market share, as in standard models of oligopolistic competition, or

constant market power, regardless of their production size. This is equivalent to require the following to hold:

Assumption 1. *Assume that the function $\Upsilon_i(q)$ satisfies:*

$$\frac{\partial}{\partial q}\left[-\frac{\Upsilon_i'(q)}{q\Upsilon_i''(q)}\right] \leq 0 \qquad \forall\, q > 0 \qquad \forall\, i \in [\omega, 1]$$

In other words, when the elasticity of demand for an entrepreneur's product decreases as his relative production increases, his firm gains more market power, allowing him to charge higher markups. Instead, when the elasticity of demand function is a constant, the firm's market power and markups are fixed, regardless of the entrepreneur's production scale.

Entrepreneur's problem: each entrepreneur $i \in [\omega, 1]$ maximizes his own utility defined over final good consumption. In order to consume he employs profits received from his own firm, π_i, after hiring n_i workers from the labor market to produce. Formally, each entrepreneur $i \in [\omega, 1]$ solves:

$$\begin{aligned}
\max_{c_i, p_i, y_i, n_i} \quad & \frac{c_i^{1-\theta}}{1-\theta} \\
\text{s.t.} \quad & c_i = \pi_i \\
& \pi_i = p_i y_i - w n_i \\
& p_i = P\Upsilon_i'\left(\frac{y_i}{Y}\right) \\
& y_i = z_i k_i^{\nu} n_i^{1-\nu} \\
& z_i,\ k_i \text{ given}
\end{aligned} \tag{E}$$

3.2 Optimal entrepreneurs' production choices

Taking the first order conditions of each entrepreneur's $i \in [\omega, 1]$ problem (E) and combining them it is possible to obtain the following equation which characterizes the production choices of each entrepreneur:

$$\underbrace{P\Upsilon_i'(q_i^*)}_{p_i^*} = \underbrace{\frac{\mathcal{E}_i^d(q_i^*)}{\mathcal{E}_i^d(q_i^*)-1}}_{\text{markup}} \cdot \underbrace{\frac{wY^{\frac{1}{1-\nu}}}{(1-\nu)} \left(\frac{q_i^{*\nu}}{z_i k_i^\nu}\right)^{\frac{1}{1-\nu}}}_{\text{marginal cost}} \tag{4}$$

Each entrepreneur i sets a price for his own variety p_i^* larger than its marginal cost of production, where the wedge between the two is the markup $\mu_i(q_i^*) = \frac{\mathcal{E}_i^d(q_i^*)}{\mathcal{E}_i^d(q_i^*)-1}$. First of all, notice that the markup chosen by each entrepreneur can be written as a function $\mu_i(q_i)$ of the relative quantity produced q_i. Assumption 1 guarantees that the markup function $\mu_i(q_i)$ is non-decreasing in relative production q_i. In particular, if the elasticity of demand is strictly decreasing in relative production, firms producing at a larger scale face a more rigid demand and choose higher markups. On the other hand, if the elasticity of demand is constant, the markup function is a constant as well and markups imposed by firms do not depend on their production scale.

Equation (4) also shows that the optimal relative quantity q_i^* chosen by each entrepreneur depends on his wealth k_i, his skills z_i, as well as on the aggregates w, Y, P. Let's define the optimal relative quantity function $\mathcal{Q}_i^*(z_i, k_i, w, P, Y)$ which associates to each wealth level k_i, skills z_i and aggregates w, Y, P the optimal relative quantity q_i^* which solves equation (4). The properties of this function are summarized by the following Lemma:

Lemma 1. *Assume Assumption 1 holds and let $\mathcal{Q}_i^*(z_i, k_i, w, P, Y)$ be the function which associates to each vector (z_i, k_i, w, P, Y) the optimal relative quantity chosen by entrepreneur i, q_i^*, which solves (4). It holds:*

$$\frac{\partial \mathcal{Q}_i^*(\cdot)}{\partial z_i} > 0 \qquad \frac{\partial \mathcal{Q}_i^*(\cdot)}{\partial k_i} > 0 \qquad \frac{\partial \mathcal{Q}_i^*(\cdot)}{\partial w} < 0 \qquad \frac{\partial \mathcal{Q}_i^*(\cdot)}{\partial P} < 0 \qquad \frac{\partial \mathcal{Q}_i^*(\cdot)}{\partial Y} < 0$$

Proof: see Appendix A.

Lemma 1 shows that the higher the entrepreneurial ability z_i or the wealth of the entrepreneur k_i, the larger will be the optimal relative quantity chosen to be produced by the entrepreneur. This holds irrespectively of whether the markup imposed depends on the entrepreneur's production scale. The reason is that wealthier and more skilled entrepreneurs own firms that have lower marginal costs of production, allowing them to produce at a larger scale.

Now, denote with $\mathcal{N}_i^*(z_i, k_i, w, P, Y)$ the function which associates to each vector (z_i, k_i, w, P, Y) the labor force needed by entrepreneur i to produce the optimal relative quantity $\mathcal{Q}_i^*(z_i, k_i, w, P, Y)$

(i.e. the labor demand which solves entrepreneur's i problem (E)):

$$\mathcal{N}_i^*(z_i, k_i, w, P, Y) = \left(\frac{\mathcal{Q}_i^*(z_i, k_i, w, P, Y) \cdot Y}{z_i k_i^{\nu}} \right)^{\frac{1}{1-\nu}}$$

Differently from what happens for optimal relative quantity, Assumption 1 is not enough to guarantee a monotonic (increasing) relationship between optimal labor demand and entrepreneur's wealth k_i and skills z_i. The reason is the following. Whenever the entrepreneur gets wealthier or more productive he wants to produce more (Lemma 1) and to do that he could either hire more labor or just exploit his increase in productivity while employing less labor. It is possible to derive a sufficient condition on the function $\Upsilon_i(\cdot)$ which guarantees that optimal labor demand of each entrepreneur i is monotone increasing in his wealth k_i and skills z_i:

Assumption 2. *The function $\Upsilon_i(q)$ satisfies:*

$$\frac{(2\Upsilon_i''(q) + q\Upsilon_i'''(q))q}{\Upsilon_i'(q) + q\Upsilon_i''(q)} > -1 \quad \forall q > 0, \ \forall i$$

Assumption 2 requires that the elasticity of marginal revenues with respect to relative quantity produced (left-hand side) is greater than -1. In other terms, it ensures that an entrepreneur's marginal revenues do not decrease too steeply with production. If this assumption were violated, an entrepreneur experiencing a positive productivity shock would have to drastically lower prices to sell the additional output. Consequently, it would become optimal for the entrepreneur to limit the production increase due to the productivity shock by reducing his labor demand. Instead, under Assumption 2 an increase in productivity (or capital endowment) is always complemented by an increase in labor employed for production.

Lemma 2 summarizes the properties of the labor demand function $\mathcal{N}_i^*(\cdot)$ when Assumptions 1 and 2 hold:

Lemma 2. *Let Assumption 1 and 2 hold and let $\mathcal{N}_i^*(z_i, k_i, w, P, Y)$ be the function which associates to each vector (z_i, k_i, w, P, Y) the labor demand which allows entrepreneur i to produce $\mathcal{Q}_i^*(z_i, k_i, w, P, Y)$ (i.e. the labor demand which solves entrepreneur's i problem (E)). It holds:*

$$\frac{\partial \mathcal{N}_i^*(\cdot)}{\partial z_i} > 0 \qquad \frac{\partial \mathcal{N}_i^*(\cdot)}{\partial k_i} > 0 \qquad \frac{\partial \mathcal{N}_i^*(\cdot)}{\partial w} < 0 \qquad \frac{\partial \mathcal{N}_i^*(\cdot)}{\partial P} < 0 \qquad \frac{\partial \mathcal{N}_i^*(\cdot)}{\partial Y} > 0$$

Proof: see Appendix A

Noticeably, it is possible to show that if the price elasticity of demand that the entrepreneur faces is a constant function then Assumption 2 is met for every value of the elasticity of demand greater than one[9]. Hence, when this is the case, the labor demand of the entrepreneur is monotonic increasing in his skills and wealth. When the elasticity of demand, instead, varies with the relative production of the entrepreneur, whether Assumption 2 is satisfied depends on the functional form chosen for $\Upsilon_i(\cdot)$[10].

The profits of each entrepreneur i when making his optimal production choices are:

$$\Pi_i^*(z_i, k_i, w, P, Y) := p_i\left(\mathcal{Q}_i^*(z_i, k_i, w, P, Y), P\right) \cdot \mathcal{Q}_i^*(z_i, k_i, w, P, Y) \cdot Y - w\mathcal{N}_i^*(z_i, k_i, w, P, Y)$$

where $p_i(\cdot)$ denotes the demand function for the intermediate good produced by the entrepreneur i derived in (2). Using the FOC of the entrepreneur (4) and rearranging, optimal profits re-write as:

$$\Pi_i^*(z_i, k_i, w, P, Y) = \left(\frac{\mu_i(\mathcal{Q}_i^*(z_i, k_i, w, P, Y))}{1-\nu} - 1\right) w\mathcal{N}_i^*(z_i, k_i, w, P, Y) \tag{5}$$

where $\mu_i(q) = \mathcal{E}_i^d(q)/(\mathcal{E}_i^d(q) - 1)$ is the markup function. The profits that each entrepreneur makes are the product of two terms: the one in parenthesis indicates the marginal profit per dollar of input purchased from the market. The second term $w\mathcal{N}_i^*(z_i, k_i, w, P, Y)$, instead, indicates the total value of inputs purchased from the market by the entrepreneur. The following Lemma summarizes the properties of the profits function:

Lemma 3. *Let Assumption 1 and 2 hold and let $\Pi_i^*(z_i, k_i, w, P, Y)$ be the function which associates to each tuple (z_i, k_i, w, P, Y) the profits entrepreneur i makes when producing $\mathcal{Q}_i^*(z_i, k_i, w, P, Y)$. It holds:*

$$\frac{\partial \Pi_i^*(\cdot)}{\partial z_i} > 0 \qquad \frac{\partial \Pi_i^*(\cdot)}{\partial k_i} > 0 \qquad \frac{\partial \Pi_i^*(\cdot)}{\partial w} < 0 \qquad \frac{\partial \Pi_i^*(\cdot)}{\partial P} < 0 \qquad \frac{\partial \Pi_i^*(\cdot)}{\partial Y} > 0$$

Proof: see Appendix A

[9]Notice that if $\mathcal{E}_i^d(q) \leq 1$ then equation (4) admits no solution

[10]Assumption 2 will be satisfied by the functional forms for $\Upsilon_i(\cdot)$ that I will employ in the following Sections of the paper.

Wealthier and more skilled entrepreneurs make larger profits. Furthermore profits are decreasing in the equilibrium wage to be paid to workers and increasing in aggregate production Y.

3.3 Production elasticities

How do the entrepreneurs' production elasticities depend on the assumptions on entrepreneurs' market power? The answer to this question is of crucial importance for our goal of studying how wealth taxation (or any other policy which redistributes capital across entrepreneurs) affects entrepreneurial choices and economic aggregates under different assumptions on entrepreneurs' market power.

For notational convenience denote $q_i^* = \mathcal{Q}_i^*(z_i, k_i, Y, w, P)$ and let $\epsilon^{q_i^*,k_i} = \frac{\partial q_i^*}{\partial k_i}\frac{k_i}{q_i^*}$ indicate the elasticity of entrepreneur's i optimal relative production with respect to capital. Using the Implicit Function theorem and equation (4), it is possible to show that this elasticity takes the following form:

$$\epsilon^{q_i^*,k_i} = \frac{\nu}{1-\nu}\left(\frac{\nu}{1-\nu} + (\mathcal{E}_i^d(q_i^*))^{-1} - (\mathcal{E}_i^d(q_i^*) - 1)^{-2}\frac{\partial \mathcal{E}_i^d}{\partial q_i}(q_i^*)\right)^{-1} \tag{6}$$

The production elasticity of an entrepreneur i producing the optimal relative quantity q_i^*, is influenced by two key determinants. First, it positively depends on the price elasticity of demand that the entrepreneur faces at the production level q_i^*. Second, the production elasticity also negatively depends the slope of the elasticity of the demand curve at q_i^*. To get intuition on this result consider the following two cases:

- Entrepreneur i faces a *constant elasticity of demand function* for his own variety: $\mathcal{E}_i^d(q) = \sigma_i \quad \forall q$. When this is the case:

  $$\epsilon^{q_i^*,k_i} = \frac{\nu}{\nu + (1-\nu)(\sigma_i)^{-1}}$$

  Notice, the smaller the value of σ_i the higher the rate of decline of the entrepreneur's marginal revenues. Consequently, the lower σ_i the smaller the increase in entrepreneur's production in response to a rise in capital (low production elasticity) due to the rapid fall of his marginal revenues.

  Under the assumption that $\sigma_i > 1$, it holds $\nu < \epsilon^{q_i^*,k_i} < 1$, and the production elasticity takes its maximum value when the entrepreneur has almost no market power ($\sigma_i \to \infty$) and the minimum when the entrepreneur has the largest degree of market power ($\sigma_i \to 1$).

- Entrepreneur i faces a *variable elasticity of demand function* for his own variety and Assumption 1 holds: $\frac{\partial \mathcal{E}_i^d}{\partial q}(q) < 0 \quad \forall q$. The demand elasticity he faces at q_i^* is $\mathcal{E}_i^d(q_i^*)$. Equation (6) show that his production elasticity is lower than the production elasticity of an entrepreneur facing a constant elasticity of demand curve with constant elasticity at $\sigma_i = \mathcal{E}_i^d(q_i^*)$. This is because the declining elasticity of demand implies that marginal revenue decreases more rapidly for the entrepreneur with a variable elasticity curve, which diminishes their incentive to increase production in response to an increase in capital.

3.4 Equilibrium

The equilibrium of this static economy consists of the tuple (w^*, Y^*, P^*), a vector of quantities consumed by each household (workers and entrepreneurs) $(c_i^*)_{i\in[0,1]}$, relative quantity functions $(\mathcal{Q}_i^*(z_i, k_i, w, P, Y))_{i\in[0,1]}$, labor demand functions $(\mathcal{N}_i^*(z_i, k_i, w, P, Y))_{i\in[0,1]}$, profit functions $(\Pi_i^*(z_i, k_i, w, P, Y))_{i\in[0,1]}$ such that:

- Each worker $i \in [0, \omega]$ consumes his labor income $c_i^* = w^*$
- Given (w^*, Y^*, P^*) the functions $\mathcal{Q}_i^*(z_i, k_i, w^*, P^*, Y^*)$, $\mathcal{N}_i^*(z_i, k_i, w^*, P^*, Y^*)$, $\Pi_i^*(z_i, k_i, w^*, P^*, Y^*)$ solve each entrepreneur's $i \in [\omega, 1]$ problem (E)
- Each entrepreneur $i \in [\omega, 1]$ consumes his own profits: $c_i^* = \Pi_i^*(z_i, k_i, w^*, P^*, Y^*)$
- Labor market clears:
$$\omega = \int_\omega^1 \mathcal{N}_i^*(z_i, k_i, w^*, P^*, Y^*)di$$
- Kimball aggregator holds:
$$\int_\omega^1 \Upsilon_i\left(\mathcal{Q}_i^*(z_i, k_i, w^*, P^*, Y^*)\right)di = 1$$
- Aggregate price index P^* is:
$$P^* = \left(\int_\omega^1 \Upsilon_i'\left(\mathcal{Q}_i^*(z_i, k_i, w^*, P^*, Y^*)\right)\mathcal{Q}_i^*(z_i, k_i, w^*, P^*, Y^*)di\right)^{-1}$$

3.5 Aggregation and distortions from markups

It is possible to write the aggregate production Y of this economy as:

$$Y = ZK^{\nu}N^{1-\nu}$$

where $K := \int_{\omega}^{1} k_i di$, $N := \int_{\omega}^{1} \mathcal{N}_i^*(z_i, k_i, w, P, Y)di$ and aggregate productivity is defined as:

$$Z := \left(\int_{\omega}^{1} \frac{\mathcal{Q}_i^*(z_i, k_i, w, P, Y)}{z_i} di \right)^{-1} \tag{7}$$

In particular, notice that it is possible to interpret aggregate productivity Z as the *harmonic weighted average* of the entrepreneurial productivities z_i, where the individual weights are given by the relative quantities q_i produced by each entrepreneur i.
In this setting aggregate production Y is distorted by markups imposed by entrepreneurs through two channels: the level of the aggregate markup in the economy and markups dispersion across entrepreneurs. First, integrating equation (4) across all entrepreneurs I get:

$$\frac{wN}{Y} = \frac{1-\nu}{\mathcal{M}} \tag{8}$$

where the *aggregate markup* $\mathcal{M}$ is defined as:

$$\mathcal{M} = \int_{\omega}^{1} \mu_i(\mathcal{Q}_i^*(z_i, k_i, w, P, Y)) \frac{\mathcal{N}_i^*(z_i, k_i, w, P, Y)}{N} di$$

that is the aggregate markup is an input-weighted arithmetic average of firm-level markups.
Notice that a higher aggregate markup increases the capital share of income accruing to entrepreneurs and reduces the labor share going to workers.
Second, consider the problem of a planner that takes as given the skill and wealth distribution of entrepreneurs and has to decide how to allocate the labor supply L across

firms owned by entrepreneurs:

$$
\begin{aligned}
\max_{\{y_i,n_i\}_{i\in I},Y} \quad & Y \\
\text{s.t.} \quad & \int_{\omega}^{1} \Upsilon\left(\frac{y_i}{Y}\right) di = 1 \\
& \int_{\omega}^{1} n_i di = L \\
& y_i = z_i k_i^{\nu} n_i^{1-\nu} && \text{for all } i \in I \\
& z_i,\ k_i && \text{given, for all } i \in I
\end{aligned}
$$

Denote with λ the multiplier associated with the labor supply constraint. The first order conditions of the problem imply:

$$
P\Upsilon_i'\left(q_i^*\right) = \frac{\lambda Y^{\frac{1}{1-\nu}}}{(1-\nu)} \left(\frac{q_i^{*\nu}}{z_i k_i^{\nu}}\right)^{\frac{1}{1-\nu}}
$$

where λ denotes the multiplier associated to the resource constraint. The planner makes firms produce up to the point in which the marginal value of the production of firm i (left hand side) equalizes its marginal cost of production (right hand side). On the other hand, in the decentralized equilibrium, entrepreneur i produces up to the point in which the marginal value of production (price) equalizes its marginal cost times a markup. If markups are increasing in firm size ($\partial \mathcal{E}_i^d(q)/\partial q < 0$) the most productive entrepreneurs produce on a larger scale and impose the largest markups. Hence, firms imposing above the average markups (the most productive ones) underproduce with respect to the social optimum. Instead firms imposing below the average markups (the least productive ones) overproduce with respect to the optimum. This misallocation of labor force due to markups dispersion induces a reduction in aggregate productivity Z.

4 Wealth taxation and market power heterogeneity

The static model outlined in Section 3, despite its simplicity, does not have a closed-form solution. Consequently, numerical methods are necessary to solve the model and obtain the effects of top wealth taxation on entrepreneurial decisions and macroeconomic aggregates.

First, I study the wealth tax effects under the assumption that entrepreneurs' market power, and hence markups, increase with their firm market share. In this case, the

model parameters and functional forms are chosen so to obtain an empirically plausible equilibrium markup distribution across entrepreneurs. In this setting I investigate how wealth taxation affects the distortions induced by markups.
These wealth tax effects are then compared to those that would arise in an observationally equivalent economy, in which the markups imposed by entrepreneurs are *constant*, although heterogeneous. Finally, to highlight the role of market power heterogeneity in shaping the wealth tax effects the same wealth tax is implemented in an another observationally equivalent economy in which market power heterogeneity across entrepreneurs has been shut down. To do this, I assume that all entrepreneurs now impose the same constant markup, equal to the average one in the economies with markups heterogeneity.

4.1 Taxing wealth with market power increasing in firms' market shares

Parametrization: the fraction of workers in this economy is $\omega = 0.88$. This value is obtained using the 2019 SCF data, classifying the households not satisfying the definition of an entrepreneur (see Section 2) as workers. Each entrepreneur $i \in [\omega, 1]$ draws his entrepreneurial skills z_i from a Pareto distributed random variable $Pa(x_z, \eta_z)$. The parameters x_z and η_z represent, respectively, the scale and shape parameters and are calibrated to match the observed distribution of returns to entrepreneurship[11] (see Section 2). In a dynamic setting in which entrepreneurs accumulate their own wealth (see Section 5) the correlation between entrepreneurial skills and their wealth arises endogenously. In this static setting it has to be assumed[12]. In particular, I assume that the wealth of each entrepreneur is a monotone increasing function of his skills, that is $k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$ with $\alpha_0, \alpha_1 > 0$. Two remarks are due. First, the positive relationship between skills and wealth is essential to replicate the empirically observed increasing returns to entrepreneurship across the wealth distribution. Second, the function $k(\cdot)$ is specifically

[11] x_z and η_z are calibrated so to minimize the sum of squared errors between simulated and empirical returns to entrepreneurship across the following wealth groups: $\{50-70p., 70-85p., 85-95p., 95-98p., 98-99p., top\ 1\}$

[12] In this setting there is no distinction between overall wealth of the entrepreneur and wealth held as capital in the business (i.e. "entrepreneurial wealth"). Here the calibration target is the distribution of the latter. The reason of this choice is that the focus of this Section is on how wealth taxation affects entrepreneurial production decisions, which are directly influenced by the availability of capital, not by total wealth.

chosen to transform the entrepreneurial skill distribution from a Pareto into another Pareto distribution. This is required for replicating the observed entrepreneurial wealth distribution, as its fat upper tail is well-fit by a Pareto distribution. (Benhabib and Bisin (2018), Vermeulen (2018)).

To model market power (and hence markups) to be increasing in firms' market share I assume the function $\Upsilon_i(\cdot)$ takes the Klenow and Willis (2016) functional form for all i:

$$\Upsilon_i(q;\sigma,\psi) = \Upsilon(q;\sigma,\psi) = 1 + (\sigma-1)e^{1/\psi}\psi^{\frac{\sigma}{\psi}-1}\left[\Gamma\left(\frac{\sigma}{\psi},\frac{1}{\psi}\right) - \Gamma\left(\frac{\sigma}{\psi},\frac{(q)^{\frac{\psi}{\sigma}}}{\psi}\right)\right] \tag{9}$$

with $\sigma > 1$ and $\psi \geq 0$, and where $\Gamma(s,x)$ denotes the function:

$$\Gamma(s,x) := \int_x^\infty t^{s-1}e^{-t}dt$$

The reason for this choice is twofold. First, as Edmond et al. (2023) show, once appropriately calibrated it allows to replicate very-well the empirically observed relationship between markups and market shares across US firms. Furthermore, notwithstanding its complicated functional form, it generates easily interpretable elasticity of demand and markups functions (for derivation see Appendix B):

$$\mathcal{E}_i^d(q_i) = \sigma(q_i)^{-\frac{\psi}{\sigma}} \qquad\qquad \mu_i(q_i) = \frac{\mathcal{E}_i^d(q_i)}{\mathcal{E}_i^d(q_i)-1} = \frac{\sigma}{\sigma - q_i^{\frac{\psi}{\sigma}}} \tag{10}$$

Notice that σ captures the level of the elasticity of demand when $q_i = 1$. Instead, the parameter ψ identifies the sensitivity of the elasticity of demand to changes in q_i (super-elasticity of demand). In this setting it is possible to show that the ratio of parameters $\frac{\psi}{\sigma}$ corresponds to the coefficient in a regression of (a monotone increasing transformation of) firms' markups on firms' market shares[13]. Exploiting this relationship, Edmond et al. (2023) use 1972-2012 US Census of Manufacturers data to estimate $\frac{\psi}{\sigma}$ across 3-digits NAICS sectors. I choose to target $\frac{\psi}{\sigma} = 0.162$, which is the mid-point of the Edmond et al. (2023) parameter estimates range. The parameter σ is then chosen so to match $\mathcal{M} = 1.2$, a figure consistent with the estimates of Edmond et al. (2023), ranging between $1.05 < \mathcal{M} < 1.35$ for the US economy.

Table 3 summarizes the parameter choices described above and Figure 18 (Appendix

[13] A proof of this statement is provided in Appendix B of Edmond et al. (2023).

Table 3. *Market power increasing in firms' market shares: parametrization summary*

Par.	Description	Value	Target
ω	fraction of workers	0.88	non-entrepreneur household in SCF
ν	capital exponent prod.	0.28	labor share = 0.6
x_z	scale par. entr. ability dist.	0.12	observed returns to entrepreneurship
η_z	shape par. entr. ability dist.	5.0	observed returns to entrepreneurship
σ	demand elasticity when $q = 1$	11.75	$\mathcal{M} = 1.2$
ψ	shape par. demand elasticity	1.90	$\psi/\sigma = 0.16$
α_0	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	383	min. wealth = 1
α_1	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	3.97	tail par. ent. wealth 1.25

Notes: *the Table summarizes the chosen parameters values. The first column indicates the symbol used to identify the parameter in the model, the second column the parameter description, the third column the chosen value for the parameter, the fourth column the moment targeted to calibrate each parameter.*

shows that the calibrated model closely replicates the observed returns to entrepreneurial investment.

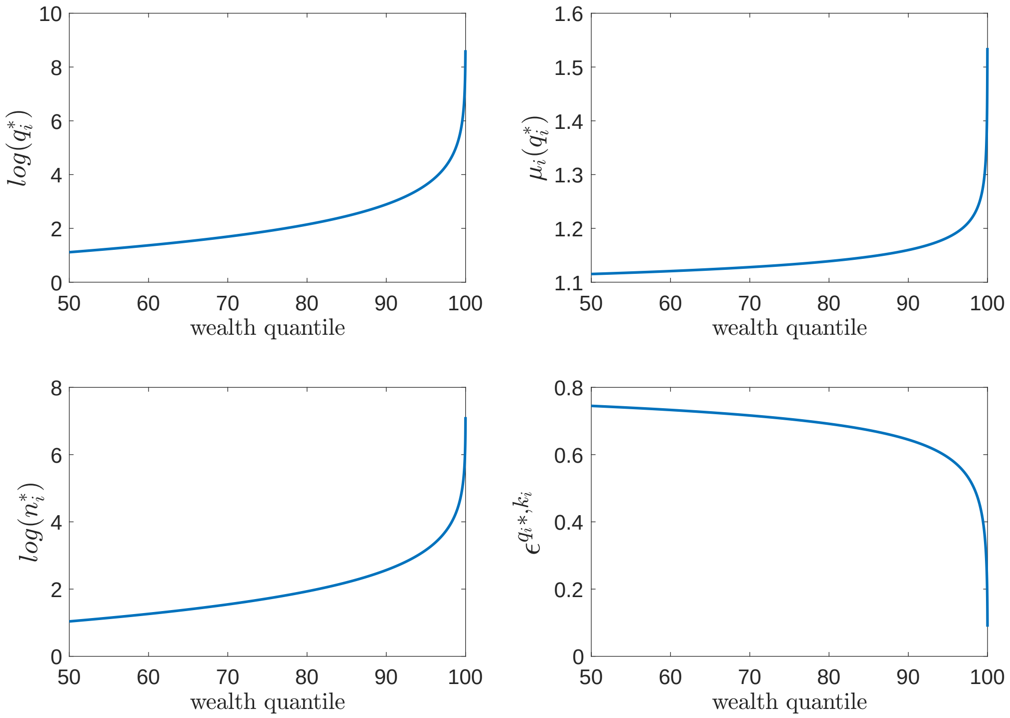
Table 4. *Distribution of markups (cost-weighted)*

	Compustat - Edmond et al. (2023)	Simulated model
aggregate markup $\mathcal{M}$	1.26	1.20
p25	0.97	1.10
p50	1.12	1.16
p75	1.31	1.27
p90	1.69	1.39

Notes: *the Table reports some descriptive statistics of the markups distribution estimated in the data by Edmond et al. (2023) (first column) and simulated by the model (second column). The statistics have been obtained computing the cost-weighted percentiles of the markup distribution, where the weight associated to each observation is given by the share of labor employed by each firm n_i/N.*

Simulation results: Figure 6 shows the simulated relative quantities, markups and labor demand chosen by entrepreneurs across the wealth distribution. Notice that, since entrepreneurial ability z_i is assumed to be positively correlated with entrepreneurial wealth k_i, relative quantities produced and hence markups are strictly increasing across the wealth distribution (Lemma 1). Table 4 compares the simulated markup distribution with the empirical one estimated by Edmond et al. (2023) using 2012 Compustat data. The two distributions are quite similar, except for the fact that the simulated one is less right-skewed. The reason behind this discrepancy is that the Compustat dataset is limited to publicly traded firms, including most of the largest American ones. In contrast, the modeled economy has been calibrated using the Census data which is more representative of the entire American firm population, although it captures less firms at

FIGURE 6. *Entrepreneurs' choices and production elasticities across the wealth distribution*



Notes: *the Figure reports the simulated relative quantities q_i^*, markups $\mu(q_i^*)$, labor demand n_i^*, and production elasticity with respect to capital $\epsilon^{q_i^*,k_i}$ for entrepreneurs at different quantiles of the wealth distribution when the static model presented in Section 3, calibrated as described in Table 3, is simulated.*

the very top of the size (and hence markups) distribution.

The bottom-right panel of the Figure presents the production elasticities of entrepreneurs with respect to capital, which are crucial to assess the effects of wealth taxation. Notably, a clear negative correlation exists between an entrepreneur's wealth and their production elasticity. This relationship arises because wealthier entrepreneurs experience a more rapid decline in their marginal revenues (see discussion of equation (6)).

Top wealth tax policy: only three OECD countries currently levy a tax on a comprehensive measure of wealth, that is Norway, Switzerland and Spain. The wealth taxes implemented in these countries share the common feature of being proportional wealth taxes on the wealth in excess of a given threshold. Consistently with this evidence I study a proportional wealth tax, with tax rate $\tau > 0$, on the wealth in excess of an exogenously given threshold $\underline{k} > 0$. The tax revenues collected are uniformly redistributed to all households (workers and entrepreneurs) through a lump-sum transfer T. Each worker $i \in [0, \omega]$, once the tax policy is implemented, consumes $c_i = w + T$. The problem (E) of each entrepreneur $i \in [\omega, 1]$, now becomes:

$$\begin{aligned}
\max_{c_i, p_i, y_i, n_i} \quad & \frac{c_i^{1-\theta}}{1-\theta} \\
\text{s.t.} \quad & c_i = \pi_i + T \\
& \pi_i = p_i y_i - w n_i \\
& p_i = P \Upsilon_i' \left(\frac{y_i}{Y} \right) \\
& y_i = z_i \left(k_i - \tau \max\{k_i - \underline{k}, 0\} \right)^{\nu} n_i^{1-\nu} \\
& z_i, \; k_i \text{ given}
\end{aligned}$$

where the lump sum transfer T satisfies:

$$T = \int_{\omega}^{1} \tau \max\{k_i - \underline{k}, 0\} di$$

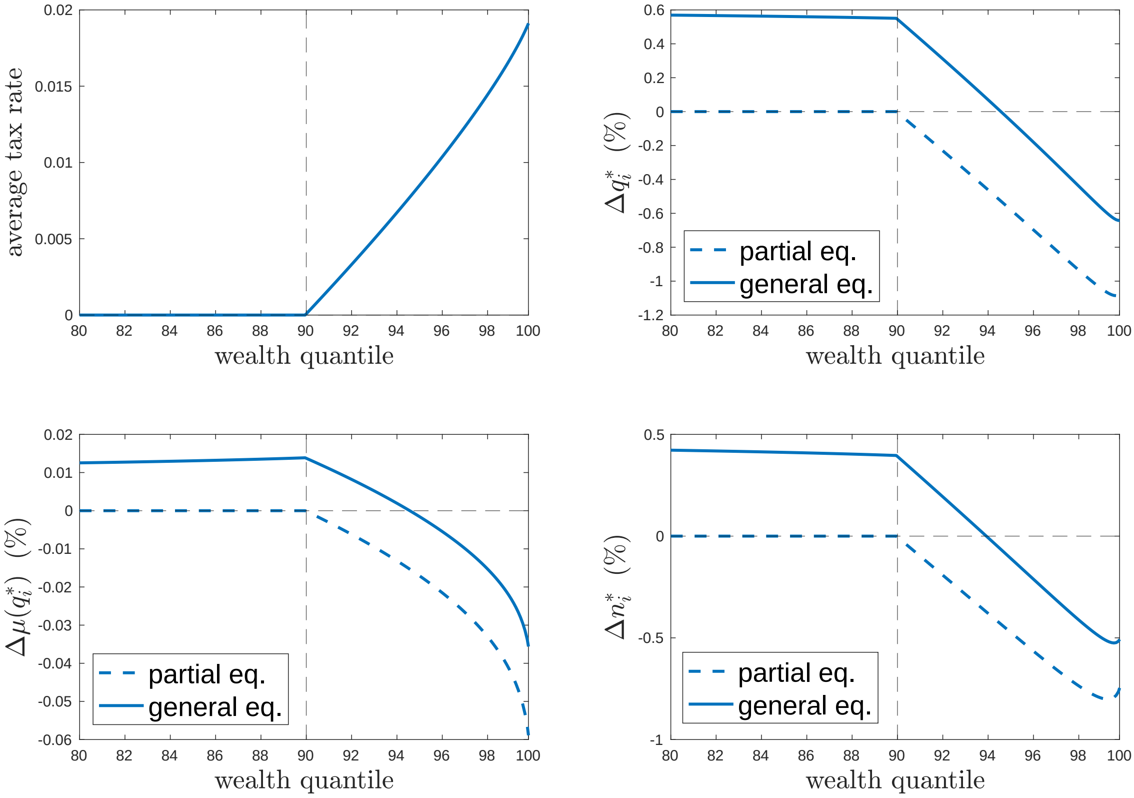
Just for illustrative purposes I first study an extensively discussed policy Saez and Zucman (2019), i.e. a wealth tax which falls onto the wealthiest 1% of American households. In my static economy this corresponds to taxing approximately the wealthiest 10% of entrepreneurs. Furthermore, I assume $\tau = 2\%$ so that wealth tax revenues amount approximately to 1% of GDP, a reasonable figure for a top wealth tax absent tax evasion and tax elusion effects (Saez and Zucman (2022)). Further comparative statics show how varying the tax rate and tax threshold changes the wealth tax effects.

Effects on entrepreneurial choices: Figure 7 illustrates the effects of the aforementioned wealth tax policy on entrepreneurial decisions across the wealth distribution. The first panel of the Figure shows the average tax rate, which is positive and increasing for entrepreneurs beyond the 90^{th} percentile of the wealth distribution.

First of all, consider the partial equilibrium effects of the wealth tax (dotted blue lines). Untaxed entrepreneurs, in partial equilibrium, do not change their production choices, while taxed entrepreneur, experiencing a decrease in their wealth endowment decrease their relative production, the markup they impose and also their labor demand (Lemma 1-2). The wealth tax hence, by taking away resources from productive entrepreneurs and redistributing them as lump-sum transfers used for consumption reduces aggregate production, aggregate labor demand and hence equilibrium wage.

In general equilibrium (solid blue lines) untaxed entrepreneurs exploit the wage and production decrease to expand their relative production and markups they impose. Also

Figure 7. *Wealth tax simulation: effect on entrepreneurs' choices*



Notes: *the Figure represents the effects of the wealth tax described in Section 4.3 with $\tau = 0.02$ on the model calibrated as described in Section 4.2. The first panel indicates the average tax rate (total taxes paid/ total wealth). The other panels represent the differences between entrepreneurs' choices (relative quantities, markups, labor demand) when the tax policy is implemented and the same quantities when the tax policy is not in place. Dotted lines indicate the partial equilibrium effects of the wealth tax (i.e. keeping fixed w, P, Y). Solid lines indicate the effect of the wealth tax on entrepreneurs' choices taking into account general equilibrium effects.*

the entrepreneurs between the 90^{th} and 95^{th} wealth percentile, although being taxed, experience an increase in their relative production, markups and labor demand due to the general equilibrium effects. Finally, entrepreneurs beyond the 95^{th} wealth percentile still decrease their relative quantity, markups and labor demand, although in a lower extent with respect to the partial equilibrium effects.

The implemented wealth tax unambiguously diminishes aggregate production by both reducing the aggregate stock of capital and lowering overall productivity, as production is reallocated from highly productive to less productive entrepreneurs.

Furthermore, the tax policy decreases the economy's aggregate markup by reducing the markups of the wealthiest entrepreneurs and (in a lower extent) increasing those of the poorest. This effect not only mitigates production distortions arising from the average markup level but also redistributes resources from wealthy entrepreneurs to poor workers by increasing the labor share of income (see equation (8)). What about the effect on misallocation of production factors? Let's denote with $e_i = z_i k_i^{\nu}$ the "effective" productivity of entrepreneur i, which captures the entrepreneur's productivity from fixed factors, i.e. capital and inherent skills. The wealth tax compresses the distribution of effective productivity, by reducing the capital available for the most productive entrepreneurs. This mechanically leads to a decrease in markup dispersion and, consequently, misallocation. However, this reduced misallocation merely reflects a change in the effective productivity distribution rather than an improvement in labor allocation for a *given* effective productivity distribution.

Overall, the distortionary effect of taxing the most productive entrepreneurs' wealth outweighs the benefits from lower markups-induced inefficiencies. This is why the tax policy ultimately reduces aggregate production and wages. Specifically, the considered wealth tax determines a reduction of GDP of 0.25% ($\Delta Y = -0.25\%$) a reduction in equilibrium wage of 0.21% ($\Delta w = -0.21\%$) and in aggregate markup of 0.04%. These figures will be useful to compare the strength of general equilibrium effects under different market power assumptions in the subsequent sections.

4.2 Wealth taxation with constant market power

I now study how the distortionary and redistributive effects of the wealth tax change when the entrepreneurs are assumed to impose the same heterogeneous, yet constant, markups. The analysis is conducted within an economy observationally equivalent[14] to the one studied in the previous section, but now assuming the entrepreneur's market power is independent of his production scale. This experiment serves to isolate the wealth tax effects arising from *variable* market power from those that simply stem from it being *heterogeneous* across entrepreneurs. Finally, to highlight the role of market power heterogeneity in shaping the wealth tax effects the same wealth tax is implemented in an another economy, differing from the previous ones for having entrepreneurs imposing the same constant markup (equal to the average one in the economies with markups heterogeneity).

Constant markups model parametrization: to have entrepreneurs imposing constant markups (potentially heterogeneous) I assume that each entrepreneur faces a demand function for his own variety featuring constant elasticity of demand. To this aim I assume that for each entrepreneur i:

$$\Upsilon_i(q) = q^{\frac{\sigma_i - 1}{\sigma_i}}$$

with $\sigma_i > 0$ for all i. Under this assumption the demand curve faced by entrepreneur i is:

$$p_i(q) = q^{-\frac{1}{\sigma_i}}$$

Now each entrepreneur i produces up to the point in which the price of his good equalizes his marginal cost of production times a markup $\frac{\sigma_i}{\sigma_i - 1}$ which is independent of the production size.

First, let's parametrize the economy with constant, although heterogeneous, markups across entrepreneurs. I assume the elasticity of demand σ_i of entrepreneur i to be a monotone increasing polynomial function of the entrepreneur's skills: $\sigma_i = \sigma(z_i)$. The functional form for $\sigma(\cdot)$ is specifically chosen so that an entrepreneur at a given wealth (and skill) distribution quantile, imposes the exact same markup as the entrepreneur at the same quantile in the variable markups model. In this way I perfectly replicate the markup distribution across entrepreneurs obtained in the variable markups model. I then re-parametrize this model so to match the same targets matched in the economy with variable markups. In particular, to match the observed returns to entrepreneur-

[14] In this setting two economies are "observationally equivalent" when the observed distribution of entrepreneurial production choices (quantity produced, labor employed, markups) are the same.

ship distribution I need to suitably change the parameters of the entrepreneurial skills distribution x_z, η_z. The remaining parameters, instead, remain unchanged. Notice that, although not targeted, the aggregate markup in this economy still remains $\mathcal{M} = 1.2$. The reason is that the markup distribution, production and labor demand choices of entrepreneurs replicate extremely closely the ones of the model with variable markups. Table 9 (Appendix C) summarizes the chosen parameter values. Figure 19 (Appendix C) shows that the calibrated model closely replicates the observed distribution of returns to entrepreneurship.

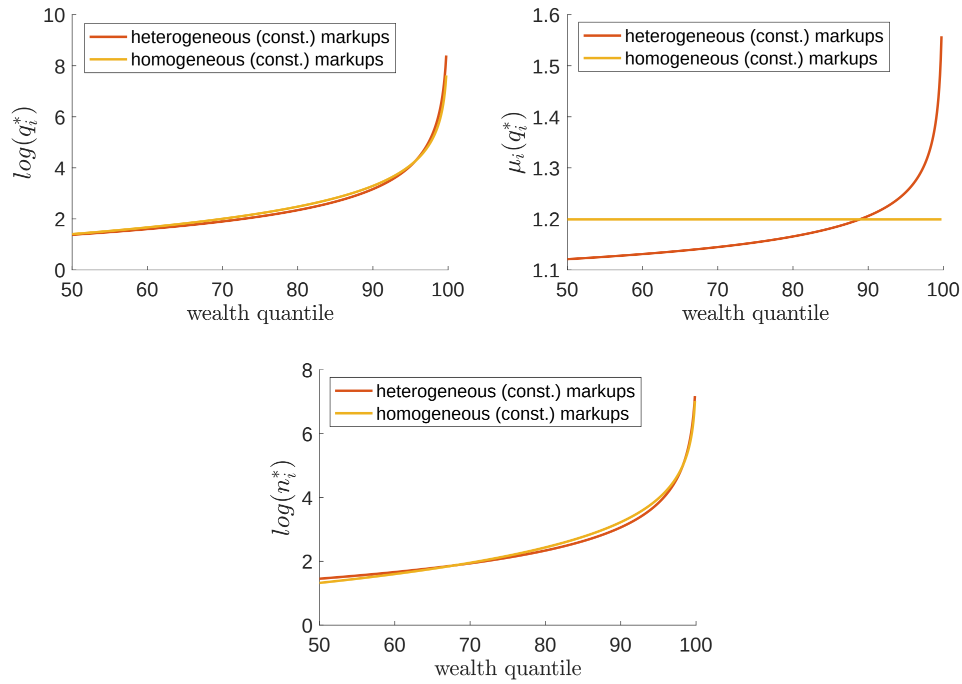
In the alternative scenario in which all entrepreneurs impose the same constant markup, I assume that the elasticity of demand parameter $\sigma_i = \sigma = 1.2$ for all i. Again, the parameters of the entrepreneurial skills distribution $Pa(x_z, \eta_z)$ are adjusted so to match the observed return distribution. Table **??** (Appendix C), summarizes the parameter choices and Figure 20 (Appendix C) shows that the calibrated model is able to closely replicate the observed return distribution.

Finally, Figure 8 reports the simulated choices of entrepreneurs across the wealth distribution in the two calibrated economies with constant markups.

Wealth tax policy - effects comparison: I now implement the same revenue-equivalent wealth tax studied in the variable markups economy in the two economies described above: one with constant and heterogeneous markups, and the other one with constant and homogeneous markups. The effects of the wealth tax on entrepreneurial choices in all three settings are reported in Figures 9 and 10.

Let's begin by examining the partial equilibrium effects of the wealth tax, as shown in Figure 9. In all three economies, entrepreneurs subject to the tax, that is those at or above the 90^{th} percentile, reduce their production and decrease their labor demand. However, even with the same revenue-equivalent wealth tax, the quantitative effects differ across the three economies. These differences arise from the different shapes of the marginal revenue curves and hence different production elasticities across the considered economies (see eq. (6)). First, let's focus on the difference between the economy in which entrepreneurs impose heterogeneous but constant markups (orange curves) and the one in which entrepreneurs impose homogeneous markups (yellow curves). In the economy with markups heterogeneity, entrepreneurs at the very top of the wealth distribution (beyond 97^{th} wealth percentile) impose an above the average markup, larger than the one imposed by entrepreneurs with the same wealth in the economy with homogeneous markups. This is the case because entrepreneurs beyond 97^{th} wealth percentile face a more rigid demand

Figure 8. *Simulated entrepreneurs' choices across the wealth distribution: constant markups model*



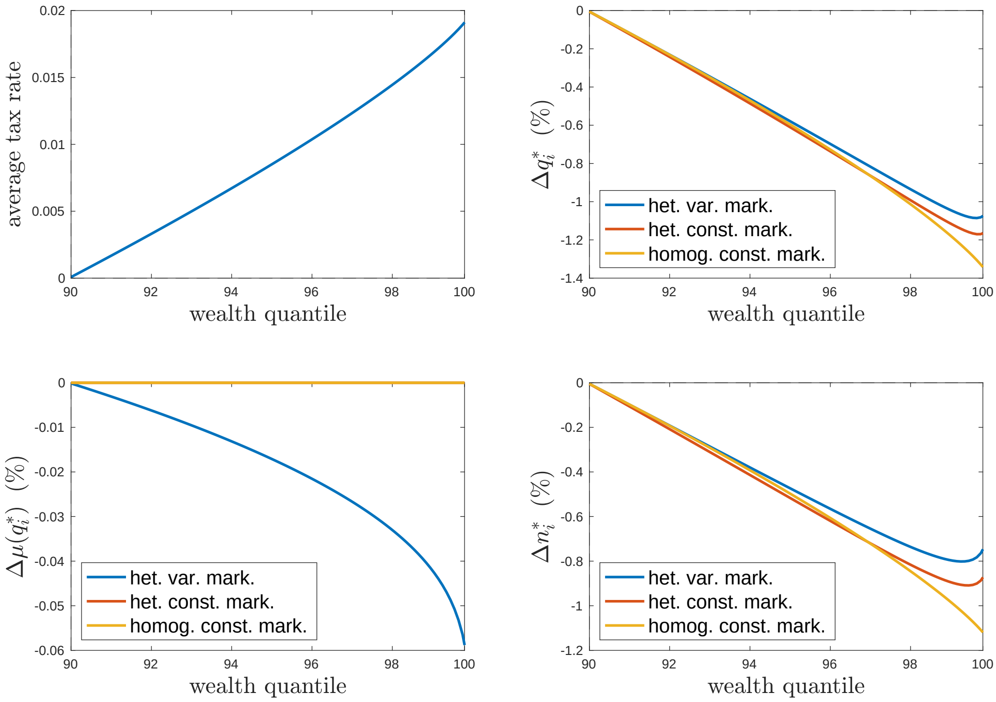
Notes: *the Figure reports the simulated relative quantities q_i^*, markups $\mu_i(q_i^*)$ and labor demand n_i^* for entrepreneurs at different quantiles of the wealth distribution. The curves in red are derived from the simulated model when entrepreneurs have heterogeneous and constant markups and the yellow lines when entrepreneurs have homogeneous and constant markups. Calibration details in this Section.*

schedule for their own variety in the economy with heterogeneous markups. As equation (6) shows, when the price elasticity of demand for the entrepreneur's variety is constant, the lower the elasticity of demand, the lower the production elasticity of the entrepreneur with respect to capital. This explains why the reduction in labor demand and production of taxed entrepreneurs beyond the 97^{th} wealth percentile is smaller in the economy with heterogeneous (constant) markups than in the economy with homogeneous (constant) markups.

Now consider the difference between the two economies with heterogeneous markups (constant and variables). In the two economies entrepreneurs across the wealth distribution impose the same markups. However, in the economy in which markups depend on firm's production scale the reduction in quantity produced by the taxed entrepreneurs is associated with a reduction in their firm's markup. This induces a counterbalancing effect which limits the reduction in production and labor demand of taxed entrepreneurs with respect to the case in which markups are constant.

As a result, the largest drop in aggregate labor demand and hence in equilibrium wage

FIGURE 9. *Wealth tax effects comparison: partial equilibrium*



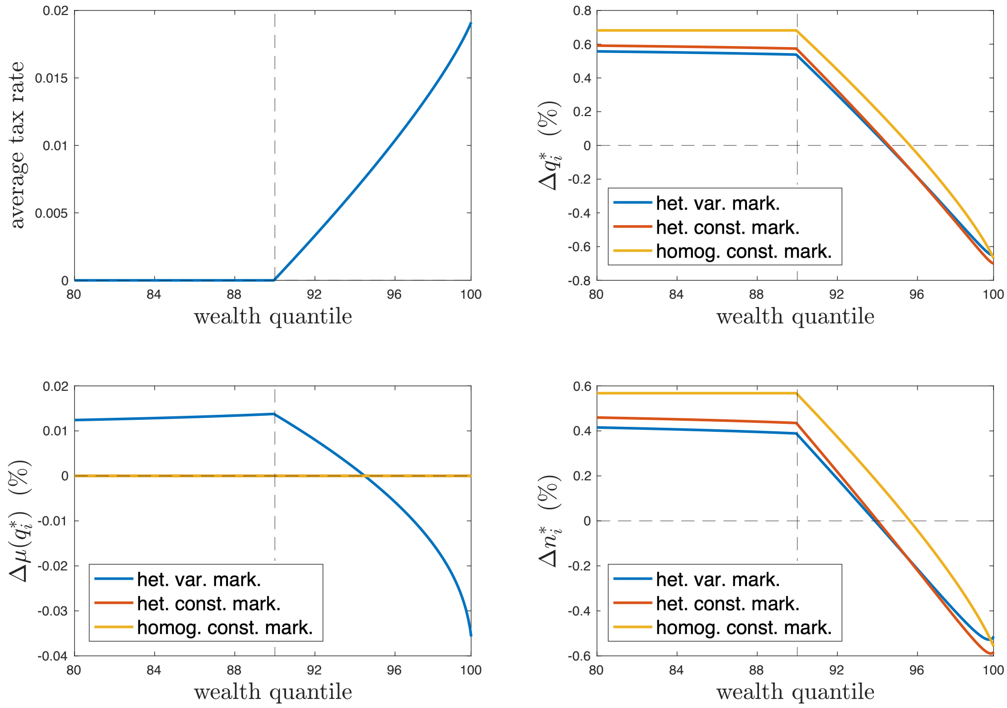
Notes: *Figure represents the partial equilibrium effects (i.e. keeping w, Y, P fixed) of the wealth tax described in Section 4.2 with $\tau = 0.02$ on entrepreneurs' production choices. Blue lines represent the effects of the wealth tax in the economy in which market power positively depends on firm's market share. Orange lines represent the effects of the wealth tax in the economy in which markups are heterogeneous but constant. Yellow lines represent the effects of the tax when entrepreneurs impose homogeneous and constant markups. The first panel indicates the average tax rate. The other panels represent the differences between entrepreneurs' choices (relative quantities, markups, labor demand) when the tax policy is implemented and the same quantities when the tax policy is not in place.*

is the one in the economy with homogeneous markups, and the smallest in the economy with variable and heterogeneous markups.

Hence workers, although receiving the same transfer in the three economies, experience the lowest reduction in their equilibrium wage in the economy where entrepreneurs impose heterogeneous and variable markups. The redistributive effect of the wealth tax is thus the largest in that case. The reduction of equilibrium wage is simulated to be -0.21% in the economy with heterogeneous and variable markups, -0.24% in the economy with constant and heterogeneous markups and -0.28% in the economy where entrepreneurs impose homogeneous and constant markups.

Figure 10 reports how the wealth tax affects entrepreneurs' choices in the three economies in general equilibrium. The output loss in the economy with heterogeneous and variable markups is the lowest (-0.25% in the economy with heterogeneous variable markups, -0.27% in the economy with heterogeneous and constant markups and -0.28% in the economy with homogeneous markups). The reason is that in spite of the same drop in

FIGURE 10. *Wealth tax effects comparison: general equilibrium*



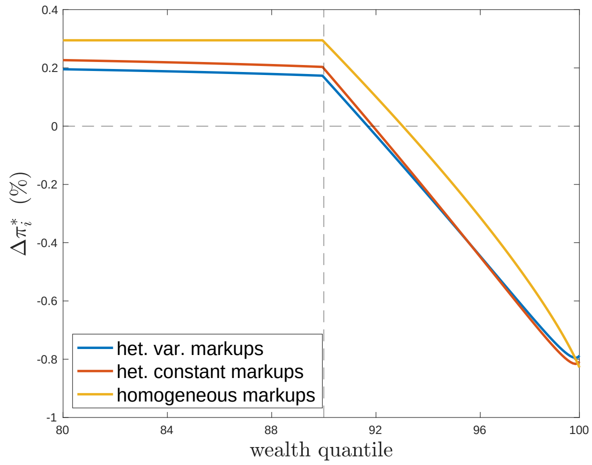
Notes: *Figure represents effects of the wealth tax described in Section 4.3 with $\tau = 0.02$ on entrepreneurs' production choices in general equilibrium. Blue lines represent the effects of the wealth tax in the economy in which market power positively depends on firm's market share. Orange lines represent the effects of the wealth tax in the economy in which markups are heterogeneous but constant. Yellow lines represent the effects of the tax when entrepreneurs impose homogeneous and constant markups. The first panel indicates the average tax rate. The other panels represent the differences between entrepreneurs' choices (relative quantities, markups, labor demand) when the tax policy is implemented and the same quantities when the tax policy is not in place.*

capital stock, aggregate productivity falls the least in the economy with variable markups. Indeed, in this economy the wealth tax induces the smallest reallocation of production from wealthy and more productive entrepreneurs to poorer and less productive ones.

Overall, in the economies where wealthier (and more productive) entrepreneurs impose larger markups the equity-efficiency trade-off of the wealth tax is relaxed with respect to the case in which all entrepreneurs impose the same (constant) markups. Indeed, for any desired level of tax revenues the wealth tax in the economies with heterogeneous markups induces lower losses in terms of aggregate production and equilibrium wage paid to poor workers.

Figure 11 illustrates the tax's redistributive effects among entrepreneurs. In all three economies, the wealth tax reduces inequality among entrepreneurs by decreasing the profits of the wealthiest entrepreneurs while increasing those of the poorest. However, the most significant redistribution across entrepreneurs occurs in the economy with no market power heterogeneity across them. While the negative effects on the wealthiest entrepreneurs' profits are similar across all three economies, the larger wage drop in the economy with homogeneous market power induces a greater expansion of profits for the poorest entrepreneurs.

FIGURE 11. *Wealth tax effects comparison: profits*



Notes: *Figure represents the effects of the wealth tax described in Section 4 with $\tau = 0.02$ on entrepreneurs' profits in general equilibrium. Blue lines represent the effects of the wealth tax in the economy in which market power positively depends on firm's market share. Orange lines represent the effects of the wealth tax in the economy in which markups are heterogeneous but constant. Yellow lines represent the effects of the tax when entrepreneurs impose homogeneous and constant markups.*

5 Dynamic model

I now develop a dynamic, stochastic, general equilibrium model with workers and entrepreneurs. Differently from the static framework entrepreneurs not only decide how much to produce and which markups to impose, but also how much capital supply to their own business, by making consumption-saving and portfolio choices. Together with these privately owned entrepreneurial businesses in this economy coexist corporate firms with unlimited access to the capital market. This production structure allows me to capture the distortionary effects of wealth taxation that go through lower capital availability for private entrepreneurs' firms but also through higher cost of financing for corporations that obtain funds in the capital market[15].

The objective of the Section is twofold. First of all, this framework allows me to study

[15] I will assume these firms will operate a Cobb-Douglas production function operating in perfect competition. Thus, the ownership structure of these firms is irrelevant since they make zero profits

how the top wealth tax distorts entrepreneurs' capital accumulation under different assumptions about their market power. In particular, I compare the effects of the wealth tax when entrepreneurs impose markups that increase with their firm's market share against the scenario where all entrepreneurs impose constant and homogeneous markups. Furthermore, once the model is appropriately calibrated, I quantify how much the steady-state wealth tax effects differ in the two considered scenarios. This exercise allows me to assess whether it is quantitatively relevant to take into account market power heterogeneity across entrepreneurs when simulating the redistributive and distortionary effects of taxing the wealth of American households.

5.1 Setup

The model is infinite horizon. Assume there is a continuum of households indexed by $i \in [0, 1]$. There is no occupational choice: a fraction ω of households are workers and the remaining households are entrepreneurs. There is no aggregate uncertainty.

Entrepreneurs: are heterogeneous in their *stochastic* entrepreneurial skills z_t^i which follow a stationary AR(1) process:

$$\log(z_{t+1}^i) = (1-\rho_z)\bar{z} + \rho_z \log(z_t^i) + \varepsilon_{t+1}^i \quad \text{where} \quad \varepsilon_t^i \sim N(0, \sigma_z^2) \tag{11}$$

Entrepreneurs accumulate wealth either by investing in their own risky entrepreneurial activity or in the capital market through a risk-free asset providing the interest rate r_t. To capture in a parsimonious way the heterogeneity in portfolio choices across entrepreneurs observed in the data (see Section 2), I assume that each entrepreneur i with skill level z_t^i invests a fraction of his wealth $\phi_t^i = \phi(z_t^i)$ in his entrepreneurial business from which he receives profits. The remaining wealth fraction $1 - \phi_t^i$ is instead invested in the capital market. In other words, the portfolio choice of each entrepreneur is assumed to exogenously depend on his "type". This allows to capture in a simple, reduced form way the empirical pattern of the wealthiest entrepreneurs (on average the most productive ones in my setting) to have largest shares of their wealth held as equity in their own business.

Firms owned by entrepreneurs, as in the static model, compete in monopolistic competition and employ the constant return to scale production technology $y_t^i = z_t^i (k_t^i)^\nu (n_t^i)^{1-\nu}$ to produce differentiated intermediate goods. Notice that now, differently from the static

model, there is a distinction between overall wealth of the entrepreneur a_t^i and capital used for production in the entrepreneur's firm: $k_t^i = \phi(z_t^i)a_t^i$. Furthermore, I still assume that entrepreneurs' firms are unable to borrow, hence they only employ the capital provided by the entrepreneur for producing.
Let x_t^i denote the cash-on-hand of entrepreneur i, that is his wealth, net of depreciation plus capital income. The timing of each entrepreneur's choices is the following. At the end of every period t the entrepreneur i knows his cash-on-hand level, x_t^i, and his current productivity level z_t^i. Given this information he decides how much to consume out of his cash on hand, c_t^i. Let $a_t^i = x_t^i - c_t^i$ be the level of entrepreneur's i wealth at the end of period t. He then employs his fraction of wealth $\phi(z_t^i)$ as capital for his entrepreneurial activity and the remaining fraction is instead invested in the capital market. At the beginning of period $t+1$ his new productivity level z_{t+1}^i realizes, and given this information he chooses his optimal production y_{t+1}^i and how much labor n_{t+1}^i to hire from the market at wage w_{t+1}. Production then takes place and each entrepreneur i receives the profits π_{t+1}^i of his own firm. Furthermore, each entrepreneur also receives capital income from investment in the capital market $r_{t+1}(1-\phi(z_t^i))a_t^i$. Finally, the wealth used as capital for production depreciates at a rate $0 < \delta < 1$.

Workers: are heterogeneous in their stochastic skills: each worker i in every period t has working skills e_t^i, following a stationary AR(1) process:

$$\log(e_{t+1}^i) = \rho_e \log(e_t^i) + \varepsilon_{t+1}^i \quad \text{where} \quad \varepsilon_t^i \sim N(0, \sigma_e^2) \tag{12}$$

Furthermore, every worker is assumed to supply labor inelastically to two sectors: ℓ^E units of labor to entrepreneur' firms and ℓ^C units to the "corporate" sector.
Workers do not own firms, so beside supplying labor in every period they can only decide how much to consume and how much to invest in the (risk-free) capital market asset.

Final good producers: this economy is composed by two sectors: an "entrepreneurial" sector and a "corporate" one. Goods produced in the two sectors are assumed to be perfectly substitutable so that final production at time t, Y_t, writes: $Y_t = Y_t^C + Y_t^E$ where Y_t^C indicates the total production of the corporate sector and Y_t^E indicates the total production of the entrepreneurial sector.
I assume that in the corporate sector operates a continuum of perfectly competitive identical producers employing capital and labor to produce with a standard Cobb-Douglas

technology. Capital is rented from households investing in the capital market and its aggregate is denoted by K_t^C. The problem solved by producers operating in the corporate sector is:

$$\max_{K_t^C, N_t^C} \quad A(K_t^C)^\alpha (N_t^C)^{1-\alpha} - r_t K_t^C - w_t^C N_t^C$$

where A indicates the (time invariant) aggregate productivity of this sector and the associated optimality conditions are:

$$w_t^C = (1-\alpha)\left(\frac{K_t^C}{N_t^C}\right)^\alpha \qquad r_t = (1-\alpha)\left(\frac{N_t^C}{K_t^C}\right)^{1-\alpha} \tag{13}$$

The second sector of this economy is the "entrepreneurial sector": in this sector operates a continuum of perfectly competitive producers who combine intermediate goods produced by entrepreneurs to produce the good Y_t^E. To do that they employ the Kimball (1995) aggregator analyzed in Section 3 (see (1)). The problem that each final good producer operating in this sector solves is:

$$\max_{Y_t^E, \{y_t^i\}_{i\in[\omega,1]}} Y_t^E - \int_\omega^1 p_t^i y_t^i di \qquad \text{s.t.} \quad \int_\omega^1 \Upsilon\left(\frac{y_t^i}{Y_t^E}\right) di = 1$$

which, as showed in Section 3, when solved delivers the demand curve for each entrepreneur's variety: $p(q_t^i, P_t) = P_t\Upsilon'(q_t^i)$ where q_t^i now indicates y_t^i/Y_t^E, that is the relative production of entrepreneur i with respect to the aggregate production of the entrepreneurial sector.

5.2 Recursive stationary equilibrium

Assume that all households have the same CRRA preferences for final good consumption. I now write the recursive formulation of the dynamic problems of both workers and entrepreneurs.

To simplify notation let's drop individual indices i. The individual state vector for any household (worker or entrepreneur) is $(x,\ e,\ z)$, i.e. their cash-on-hand (x), their labor market skills (e) and their entrepreneurial productivity (z)[16]. Let $\lambda((x, e, z))$ indicate the density of households at the given states vector.

[16] I assume that an entrepreneur has labor market skills $e = 0$, while a worker has entrepreneurial productivity $z = 0$

Furthermore, notice that each household's decision problem not only depends on his idiosyncratic states, but also on some current and future aggregate variables which are determined by the current and future distribution of agents over states. To compute these aggregates, households need to know the current period density function $\lambda(\cdot)$ and its associated law of motion $H(\cdot)$, so to obtain the future density as well: $\lambda' = H(\lambda)$.

Recursive problems: the recursive problem of each worker writes:

$$
\begin{aligned}
V(x, e, z, \lambda) = & \max_{c,a,x'} \; c^{1-\theta}/(1-\theta) + \beta \mathbb{E}\left(V(x', e', z', \lambda')|e\right) \\
\text{s.t.} \quad & x' = (1 + r(\lambda'))a + e'(\ell^M w^C(\lambda') + \ell^E w^E(\lambda')) \\
& a = x - c \\
& \log(e') = \rho_e log(e) + \varepsilon \\
& z = z' = 0 \\
& \lambda' = H(\lambda) \\
& c \geq 0 \quad a \geq 0
\end{aligned}
$$

The worker's optimal intertemporal consumption-saving choices can be characterized by the standard Euler equation:

$$
(c^*)^{-\theta} = \beta \mathbb{E}\left((1 + r(\lambda'))(c^{'*})^{-\theta}|e\right)
$$

The recursive problem of each entrepreneur is instead:

$$
\begin{aligned}
V(x,e,z,\lambda) = \max_{c,a,x',p',y',n'} \quad & c^{1-\theta}/(1-\theta) + \beta \mathbb{E}\left(V(x',e',z',\lambda')|z\right) \\
\text{s.t.} \quad & x' = (1-\delta)\phi(z)a + (1+r(\lambda'))(1-\phi(z))a + \pi' \\
& a = x - c \\
& \pi' = p'y' - w^E(\lambda')n' \\
& y' = z'(\phi(z)a)^{\nu}(n')^{1-\nu} \\
& p' = P(\lambda')\Upsilon'\left(\frac{y'}{Y^E(\lambda')}\right) \\
& \log(z') = (1-\rho_z)\bar{z} + \rho_z \log(z) + \varepsilon \\
& e = e' = 0 \\
& \lambda' = H(\lambda) \\
& c \geq 0 \quad a \geq 0
\end{aligned}
$$

By combining the FOCs of the entrepreneur's problem it is possible to obtain two equations which characterize the optimal entrepreneurial choices. The first one is a static condition, pinning down the entrepreneur's production decisions given the available capital for production. The second one, instead, is the Euler equation, which captures the intertemporal trade-off of the entrepreneur between consuming today and investing in his own firm and in the capital market.

Let's start from the static optimality condition. To save on notation let's denote capital used for production as $k = \phi(z)a$ and, as in the static framework, $q = y/Y^E$:

$$
\underbrace{P(\lambda')\Upsilon'\left(q^{*'}\right)}_{p'} = \underbrace{\frac{\mathcal{E}^d(q^{*'})}{\mathcal{E}^d(q^{*'})-1}}_{\text{markup}} \times \underbrace{\frac{w^E(\lambda')\left(Y^E(\lambda')\right)^{\frac{\nu}{1-\nu}}}{(1-\nu)}\left(\frac{(q'^{*})^{\nu}}{z'(k^*)^{\nu}}\right)^{\frac{1}{1-\nu}}}_{\text{marginal cost}} \tag{14}
$$

notice that this condition is identical to (4), which characterizes the entrepreneurial production choices in the static model. Hence, given any optimal level of capital employed for production k^*, productivity z' and aggregates $(w^E(\lambda'), P(\lambda'), Y^E(\lambda'))$ the optimal relative quantity produced, labor demand and profits of each entrepreneur can be computed through the functions $\mathcal{Q}^*(z', k^*, w^E(\lambda'), P(\lambda'), Y^E(\lambda'))$, $\mathcal{N}^*(z', k^*, w^E(\lambda'), P(\lambda'), Y^E(\lambda'))$, $\Pi^*(z', k^*, w^E(\lambda'), P(\lambda'), Y^E(\lambda'))$ whose properties have been analyzed in Lemma 1-2-3.

The Euler equation of the entrepreneur's problem is:

$$(c^*)^{-\theta} = \beta \mathbb{E}\Bigg[(c'^*)^{-\theta} \left(\phi(z) \left(1 - \delta + \frac{\partial \Pi^*(z', \phi(z)a^*, Y^E(\lambda'), w^E(\lambda'), P(\lambda'))}{\partial(\phi(z)a^*)} \right) + \right.$$
$$\left. + (1 - \phi(z))(1 + r(\lambda')) \right) \Bigg| \, z \Bigg]$$

which shows that in equilibrium the intertemporal marginal rate of substitution between consumption across two periods is equated to the marginal return to investment. The latter is equal to a weighted average between marginal return to investment in the entrepreneurial activity (net of depreciation) and in the capital market asset.

Stationary equilibrium definition: let $\mathbf{s} = (x, e, z) \in \mathcal{S}$ denote the vector of individual states and $\{a^j(\mathbf{s}, \lambda),\ c^j(\mathbf{s}, \lambda), x'^j(\mathbf{s}, \lambda)\}_{j=W,E}$ the policy functions for workers and entrepreneurs that solve the previous recursive problems. Denote as $f((e', z')|(e, z))$ the conditional density of an household with skills (e, z) to have in the following period the skills (e', z')[17]. Now define as $H(\cdot)$ the aggregate law of motion, which, given the current states distribution λ, delivers the measure of agents in the state $\mathbf{s}' \in \mathcal{S}$ in the following period:

$$H(\mathbf{s}', \lambda, f, \{x'^j(\mathbf{s}, \lambda)\}_{j=W,E}) = \begin{cases} \int_{\mathbf{s} \in \mathcal{S}: x' = x'^W(\mathbf{s}, \lambda)} f((e', z')|(e, z)) \lambda(\mathbf{s}) d\mathbf{s} & \textit{if } z' = 0 \\ \int_{\mathbf{s} \in \mathcal{S}: x' = x'^E(\mathbf{s}, \lambda)} f((e', z')|(e, z)) \lambda(\mathbf{s}) d\mathbf{s} & \textit{if } e' = 0 \end{cases}$$

From now on, my focus will be on the stationary equilibrium of this economy, i.e. an equilibrium in which the density function $\lambda(\cdot)$ is time-invariant, that is the function $\lambda(\cdot)$ satisfies:

$$\lambda(\mathbf{s}') = H(\mathbf{s}', \lambda, f, \{x'^j(\mathbf{s}, \lambda)\}_{j=W,E}) \quad \forall\ \mathbf{s}' \in \mathcal{S} \tag{15}$$

To shorten the notation employed in defining the stationary equilibrium of this econ-

[17]Entrepreneurs and workers are assumed never to change occupation in their own life, and an household is *either* a worker *or* an entrepreneur, not both. Because of that we either have $e = e' = 0$ or $z = z' = 0$.

omy denote:

$$q^*(\mathbf{s},\lambda) = \mathcal{Q}^*(z,\phi(z)a^E(x,e,z),Y^E(\lambda),w^E(\lambda),P(\lambda))$$
$$n^*(\mathbf{s},\lambda) = \mathcal{N}^*(z,\phi(z)a^E(x,e,z),Y^E(\lambda),w^E(\lambda),P(\lambda))$$

Definition 1 (Stationary equilibrium)**.** *The stationary equilibrium of this economy consists of a value function for workers and entrepreneurs:* $\{V^j(\mathbf{s},\lambda),\, V^j(\mathbf{s},\lambda)\}_{j=E,W}$ *and the associated policy functions for workers and entrepreneurs:* $\{a^j(\mathbf{s},\lambda),\, c^j(\mathbf{s},\lambda),\, x'^j(\mathbf{s},\lambda)\}_{j=E,W}$*, a tuple of prices* $(w^E(\lambda),w^C(\lambda),r(\lambda))$ *and aggregates* $(K^C(\lambda),N^C(\lambda),Y^E(\lambda),\,Y^C(\lambda),Y(\lambda))$ *such that:*

- *The density of individual states* λ *is stationary, that is satisfies equation* (15)
- *Given* λ*, workers' policies solve recursive problem (W) and entrepreneurs' policies solve recursive problem (E)*
- *Price functions* $w^C(\lambda)$ *and* $r(\lambda)$ *satisfy profit maximization condition of producers in corporate sector* (13)
- *Labor market clearing in "entrepreneurial" sector:*

$$\int_{\mathcal{S}} n^*(\mathbf{s},\lambda)\lambda(\mathbf{s})d\mathbf{s} = \int_{\mathcal{S}} \ell^E e\lambda(\mathbf{s})d\mathbf{s}$$

- *Labor market clearing in "corporate" sector:*

$$N(\lambda) = \int_{\mathcal{S}} \ell^C e\lambda(\mathbf{s})d\mathbf{s}$$

- *Capital market clearing:*

$$K(\lambda) = \int_{\mathbf{s}\in\mathbf{S}:e=0} (1-\phi(z))a^E(\mathbf{s},\lambda)\lambda(\mathbf{s})d\mathbf{s} + \int_{\mathbf{s}\in\mathbf{S}:z=0} a^W(\mathbf{s},\lambda)\lambda(\mathbf{s})d\mathbf{s}$$

- *Kimball aggregator holds:*

$$\int_{\mathcal{S}} \Upsilon\left(q^*(\mathbf{s},\lambda)\right)\lambda(\mathbf{s})d\mathbf{s} = 1$$

- *Price aggregator definition:*

$$P(\lambda) = \int_{\mathcal{S}} \Upsilon'\left(q^*(\mathbf{s},\lambda)\right) q^*(\mathbf{s},\lambda)\lambda(\mathbf{s})d\mathbf{s}$$

- *Corporate sector and aggregate production:*

$$Y^C(\lambda) = A(K(\lambda))^\alpha (N(\lambda))^{1-\alpha} \qquad Y(\lambda) = Y^C(\lambda) + Y^E(\lambda)$$

Numerical solution: the model is solved numerically and the details of the procedure are reported in Appendix (to be completed). I start the procedure by guessing some of the steady-state aggregate state variables. The choice of which variables to guess depends on the features of the demand function for the varieties produced by entrepreneurs. Given the guessed variables, I obtain the policy functions for workers and entrepreneurs using iteration on the Euler equation and the endogenous grid method (Carroll (2006)). I now simulate the stationary distribution of the economy. To do that I draw a sufficiently long history of shocks and using the policy functions obtained I compute the consumption-saving and production choices of workers and entrepreneurs[18]. At this point I recompute the same aggregate variable guessed at the beginning of the procedure and check the distance between the guessed and computed aggregate variables. I iterate this procedure until convergence between actual and guessed aggregate variables.

5.3 Steady-state calibration

I next calibrate the model under two alternative assumptions regarding entrepreneurs' market power. The first one is assuming variable market power, with entrepreneurs setting markups that increase with their firms' market shares. The second is the assumption commonly employed in models used to study wealth taxation effects, namely that market power is constant and homogeneous across entrepreneurs. The two economies will be calibrated so to yield equivalent steady-state wealth distributions and entrepreneurial production choices (apart from markups imposed).

Calibration with variable markups: the model is calibrated assuming that the economy is at the steady-state in 2019, so the statistics are targeted for that year. The calibration choices are summarized in Tables 5-6.

[18]There is no result guaranteeing that a stationary distribution of states $\lambda(\cdot)$ exists and is unique. Hence, to check that the obtained states distribution is stationary I repeat the simulation exercise for history of shocks of various (large) length. I then check that the moments of the stationary distribution $\lambda(\cdot)$ do not depend on the chosen length of the shock history

Table 5. *Variable markups steady-state: externally calibrated parameters*

Par.	Description	Value	Target
ω	fraction of workers	0.88	fraction of non-entr.
γ	CRRA par. utility	1	-
ν	capital exponent entr. prod.	0.28	Labor share entr. sect. $= 0.6$
α	capital exponent mkt sector prod.	0.4	Labor share mkt. sector $= 0.6$
ψ	super-elast. demand	3.24	$\sigma/\psi = 0.162$

Notes: *the Table summarizes the parameter choices to calibrate the steady state of the dynamic model presented in Section 5. The first column indicates the symbol used to identify the parameter in the model, the second column the parameter description, the third column the chosen value for the parameter, the fourth column the moment targeted to calibrate each parameter.*

Table 6. *Variable markups steady-state: internally calibrated parameters*

Par.	Description	Value	Target	Data	Model
β	discount factor	0.91	wealth / output	4	4.6
δ	depreciation rate	0.015	entr. wealth fract.	0.44	0.39
σ	elas. demand when $q = 1$	20	av. markups	1.2	1.18
A	TFP market sector	0.35	Y^M/Y	0.43	0.49
$\bar{z}$	av. entrep. skills	0.5	workers in top 1%	0.17	0.2
ρ_e	persistence worker skills	0.95	top 1% wealth	0.36	0.33
σ_e^2	var. innovation worker skill	0.25	top 5% wealth	0.65	0.59
ρ_z	persistence entr. skill	0.95	top 10% wealth	0.77	0.74
σ_z^2	var. innovation entr. skills	0.44	Gini wealth	0.88	0.83
			top 1% capital	0.42	0.46
			top 5% capital	0.71	0.75
			top 10% capital	0.83	0.87

Notes: *the Table summarizes the parameter choices to calibrate the steady state of the dynamic model presented in Section 5. The first column indicates the symbol used to identify the parameter in the model, the second column the parameter description, the third column the chosen value for the parameter, the fourth column the moment targeted to calibrate each parameter, the fifth column the value of the targeted moment in the data, the sixth column the value of the targeted moment in the simulated model,*

Most of the parameters are calibrated similarly to what done for the static model: ω captures the fraction of entrepreneurs in the SCF data, ν and α are chosen to replicate a labor share of income of 60% in both the corporate and entrepreneurial sector. The functional form for $\Upsilon(\cdot)$ is again assumed to be the Klenow and Willis (2016) one, with the parameter σ set so to match the aggregate markup $\mathcal{M} = 1.2$ and the parameter ψ so to capture the empirically estimated relationship between firm level markups and market shares (for details see Section 4). Differently from the static model the steady-state wealth distribution is now an endogenous objects. Hence the AR(1) processes for workers' skills (12) and entrepreneurial productivity (11) are calibrated so to match the top 1%, top 5% and top 10% wealth shares of the overall wealth distribution and same moments for the distribution of wealth that entrepreneurs hold as capital in their own firms. Furthermore, the Gini coefficient of the overall wealth distribution is also targeted. Finally the average of the entrepreneurial productivity process $\bar{z}$ is chosen so to match the observed fraction of entrepreneurs at the top 1% of the wealth distribution. In the following section I will be studying the effects of a wealth tax policy on the wealthiest 1% of American household. Thus, carefully matching the fraction of workers and entrepreneurs at the top of the wealth distribution is particularly important because it determines how much the top wealth tax burden falls onto the wealthiest workers and how much onto the wealthiest entrepreneurs of the economy.

Now consider the function $\phi(\cdot)$, which associates to an entrepreneur with skills z the fraction of his overall wealth he holds as equity in his own business $\phi(z)$. This is assumed to be a power function $\phi(z) = bz^c$, where the parameters $b = 0.23$ and $c = 0.21$ are chosen so that the steady-state relationship between wealth and fraction of wealth held as equity in the entrepreneur's business replicates the one observed in the data (Figure 2). Figure 21 in Appendix C shows that the chosen functional form allows to fit well the targeted portfolio choices of entrepreneurs across the wealth distribution.

The discount factor β is calibrated so to match the wealth output ratio of the US economy and the depreciation rate δ to target the fraction of wealth owned by entrepreneurs (44%). Finally, the TFP, A, of the corporate sector is chosen to match the relative production of the corporate sector with respect to that of the privately owned businesses directly managed by the entrepreneurs.

Entrepreneurs' choices and wealth distribution - variable markups: Figure 12 reports the simulated entrepreneurs' choices at the calibrated steady-state. In the first panel notice a monotonic increasing relationship between entrepreneurial productivity and wealth, i.e. the wealthiest entrepreneurs are on average the most productive ones. Since the fraction of net wealth $\phi(z)$ held by the entrepreneur in his own business is increasing in z (and hence in wealth too), at the steady-state there is a monotonic increasing relationship between skills of the entrepreneur and the amount of wealth invested in his own business. Entrepreneurs' production choices across the wealth distribution are similar to the ones analyzed in the static model: the more productive the entrepreneur is, the more wealth he invests in his business, the more produces, the larger the markup he imposes. Table 10 in Appendix C compares the simulated steady-state distribution of markups with the corresponding distribution estimated from Compustat data (Edmond et al. (2023)). The two distributions exhibit similar overall patterns, although the simulated one is less right-skewed than its Compustat counterpart. To rationalize this, let's

TABLE 7. *Steady-state wealth distribution: model vs data*

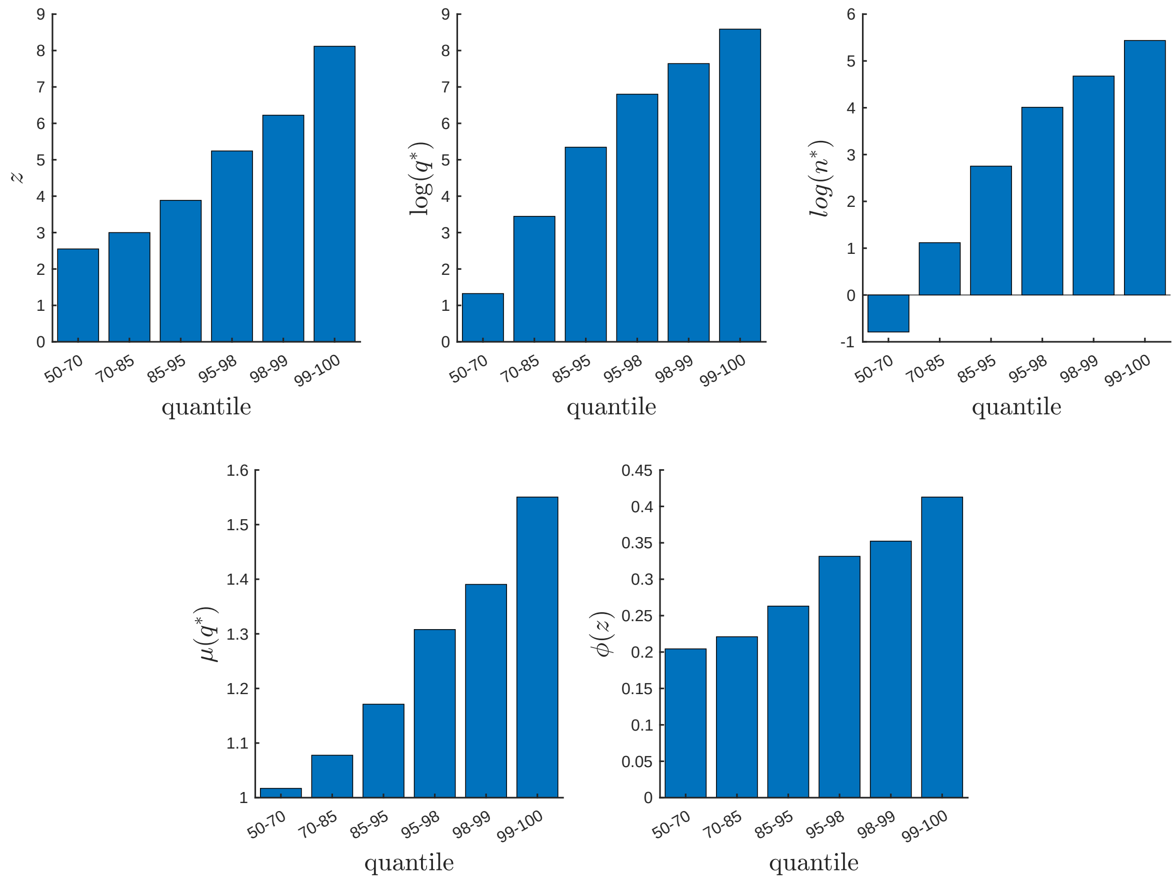
Percentile	Wealth share (data)	Wealth share (het. markups)	Wealth share (hom. markups)
0–20	−0.001	0.001	0.001
20–40	0.002	0.001	0.001
40–60	0.039	0.065	0.059
60–80	0.105	0.118	0.101
80–90	0.138	0.163	0.154
90–95	0.117	0.148	0.152
95–99	0.246	0.204	0.199
99–99.5	0.092	0.066	0.061
99.5–99.8	0.116	0.095	0.089
99.8–99.9	0.042	0.056	0.055
99.9–100	0.122	0.120	0.118

Notes: *the Table summarizes key moments of the U.S. wealth distribution, comparing empirical estimates with the model's steady-state counterpart. The second column reports wealth shares by percentile bins computed from the 2019 SCF. The third and fourth columns present the corresponding simulated moments under the model with variable markups and with constant, homogeneous markups, respectively*

remember that the overall production (and hence size) of firms owned by entrepreneurs is calibrated so to match the production of entrepreneurs' privately owned businesses in the US data. These, on average, tend to be smaller (imposing smaller markups) than the publicly traded ones represented in Compustat.
The third column of Table 7 shows the performance of the model in capturing the shape of the wealth distribution observed in the Survey of Consumer Finances data. The chosen calibration performs well in capturing the shape of the entire wealth distribution and particularly within the top 1%, where the top wealth tax will be implemented. The shape of the wealth distribution at the top is mainly driven by the wealth accumulation of entrepreneurs, while the wealth distribution at the middle-bottom is instead shaped by workers' choices.

Constant and homogeneous markups calibration: all model parameters are calibrated to match the same targeted moments as in the variable-markups model, except for heterogeneity in markups across entrepreneurs. The calibration choices are summarized in Tables 11-12 (Appendix C). To have constant elasticity of demand curves for the entrepreneurs' varieties (and hence constant markups) I assume $\Upsilon(q) = q^{\frac{\sigma-1}{\sigma}}$. The elasticity of demand parameter σ is chosen so to match the same aggregate markup $\mathcal{M} = 1.2$. To obtain the same steady-state wealth and capital distribution I retrieved in the model with heterogeneous markups, the parameters of the entrepreneurs' skill process (11), i.e. $\rho_z, \sigma_z^2, \bar{z}$ are suitably recalibrated. In particular, the resulting entrepreneurial

FIGURE 12. *Simulated entrepreneurs' choices at the steady-state*



Notes: *the first panel reports the average productivity of entrepreneurs at different quantiles of the entrepreneurial wealth distribution (i.e. considering entrepreneurs only). The other four panels report simulated relative quantities* $\log(q^*)$*, markups* $\mu(q^*)$*, labor demand* $\log(n^*)$ *and fraction of wealth held as capital in the business* $\phi(z)$ *for entrepreneurs at different quantiles of the steady-state wealth distribution when the dynamic model is calibrated as in Table 5-6*

skill distribution is less skewed than the one employed in the model with heterogeneous markups.[19] Furthermore, since the average productivity of entrepreneurs is changed, the TFP of the corporate sector A, has to be adjusted so to keep Y^E/Y unchanged. All remaining parameters remain unaffected.[20] Again, the steady-state choices of en-

[19]The reason is that in the model with homogeneous markups all entrepreneurs have marginal profits (which determine the steady-state wealth and capital level) decreasing at the same constant rate. Instead, in the model with variable markups marginal profits decrease at an increasing rate. In particular, entrepreneurs producing at a very large scale (imposing above the average markups) face a marginal profits curve decreasing at a higher rate than the one in the homogeneous markups model. This effect dampens wealth accumulation at the top of the wealth distribution. Hence, in the constant and homogeneous markups model a less skewed skill distribution is needed so to match the observed wealth distribution moments.

[20]For completeness notice that the parameters of the polynomial function $\phi(z) = bz^c$ are appropriately re-calibrated so to replicate the same steady-state portfolio choices of the variable markups model.

trepreneurs replicate those described in Figure 12 with the only difference that now all entrepreneurs impose the same constant markup. Furthermore, as the fourth column of Table 7 shows, the steady-state wealth distribution closely replicates the one observed in the SCF data.

5.4 Wealth tax experiment: steady-state comparison

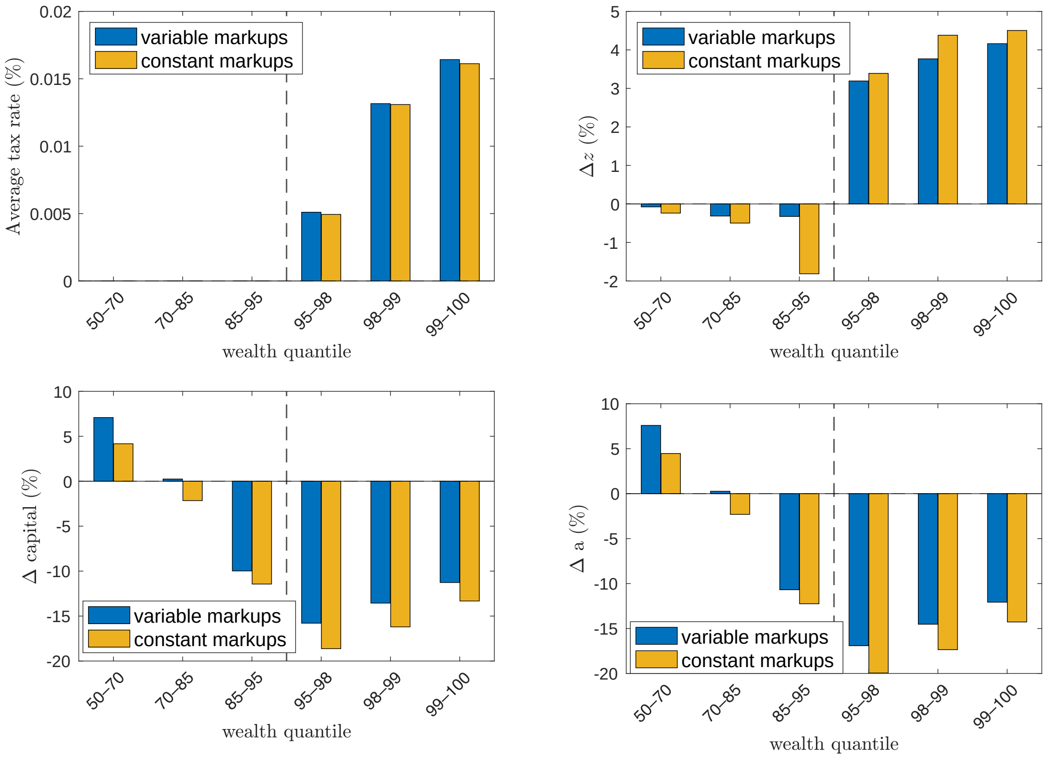
Suppose that the economy is at the previously calibrated steady-state. Let's implement a *permanent* top wealth tax policy identical to the one analyzed in Section 4 of the paper. In every period t, the tax function which associates to an household i (both workers and entrepreneurs) with wealth a_t^i the tax to be paid is:

$$\mathcal{T}(a_t^i) = \begin{cases} 0 & \text{if} \quad a_t^i \leq \underline{a} \\ \tau(a_t^i - \underline{a}) & \text{if} \quad a_t^i > \underline{a} \end{cases}$$

where the threshold $\underline{a}$ corresponds to the 99^{th} percentile of the initial steady-state wealth distribution. Furthermore, the tax rate is set to $\tau = 2\%$ so that the tax revenues at the initial steady-state amount to approximately 1% of GDP (a reasonable figure for wealth tax revenues absent tax elusion effects, Saez and Zucman (2022)). Finally, the tax revenues are lump sum redistributed across workers and entrepreneurs through the lump sum transfer T_t, which amounts to: $T_t = \tau \int_0^1 \max(a_t^i - \underline{a}, 0)di$
How does the new steady state, in which the wealth tax is permanently in place, differ from the initial no-tax steady state? To answer this question, I compare the steady states with and without the tax under the two considered scenarios of entrepreneurs setting variable and constant markups.

Entrepreneurial production choices: Figure 13 compares how entrepreneurs' average productivity, business capital and wealth vary between the no-tax steady state and the steady state with a wealth tax, at different percentiles of the wealth distribution. The first panel reports the average tax rate faced by entrepreneurs in the steady state with a permanent wealth tax. The second panel plots, for each wealth-percentile bin, the change in entrepreneurs' productivity between the wealth-tax and no-tax steady states. The third and fourth panels do the same but for the business capital and wealth of entrepreneurs. Blue bars capture these effects in the economy with variable markups, while yellow bars in the economy with constant markups. Notice that on the x-axis it's

FIGURE 13. *Wealth tax effects on entrepreneurs' capital and productivity: steady-states comparison*



Notes: *the first panel represents the average tax rate faced by entrepreneurs in the steady-state where the wealth tax is implemented. The remaining panels represent the difference between entrepreneurs' capital/productivity at the steady-state with no wealth tax and at the steady-state in which the permanent wealth tax is in place.*

reported the quantile of the wealth distribution including entrepreneurs *only*. Hence, the first panel shows that at the steady state with wealth taxation only the wealthiest 5% of American entrepreneurs pay a positive wealth tax.

First of all, notice that the wealth tax changes the average productivity of entrepreneurs across the wealth distribution with respect to the no-wealth tax steady state (second panel of Figure 13). In particular, at the steady state with wealth taxation, top-quantile entrepreneurs display higher average productivity than their counterparts in the no-tax steady state. This is because of a selection effect induced by top wealth taxation. To understand this effect, consider two entrepreneurs with the same wealth level but different productivities. The one with higher productivity has higher returns to wealth than the low productive entrepreneur, hence, once hit by the wealth tax he is relatively less affected and dissaves at a lower rate. This pushes less productive entrepreneurs downward in the wealth distribution rank, keeping only the most productive ones at the very top of the distribution. Hence, in the steady state with wealth taxation, entrepreneurs at the top of the wealth distribution are more productive, receive higher returns to wealth and hold higher fractions of their wealth as capital in their own business with respect to entrepreneurs at the top of the wealth distribution in the steady state with no-wealth tax.

Now focus on the third panel and notice that both under constant and variable markups, the entrepreneurs at the top of the wealth distribution reduce the capital they supply to their own business (as a result of reduced wealth accumulation induced by the tax). Notice however, that the capital reduction for the entrepreneurs after the 98^{th} wealth percentile is of smaller magnitude than that of entrepreneurs at lower percentiles of the wealth distribution ($95^{th} - 98^{th}$), although the higher average tax rates faced. This is due to the *selection* effect of the tax previously described. Indeed, the average productivity of entrepreneurs beyond the 98^{th} wealth percentile increases more than that of taxed entrepreneurs below the 98^{th} percentile. This dampens the reduction in capital supply at the top of the wealth distribution, with respect to what happens at lower quantiles. Hence, at the very top of the wealth distribution (beyond 98^{th} wealth percentile) the wealth tax reduces capital supplied to entrepreneurs' businesses, but in a lower extent with respect to what happens at lower percentiles of the wealth distribution ($95^{th} - 98^{th}$ percentiles), notwithstanding the higher average tax rates.

Now, let's compare the size of these effects between the two economies with variable and constant markups. The third panel of Figure 13 shows that taxed entrepreneurs reduce their steady-state capital (and wealth) in a larger extent in the economy with homogeneous and constant markups. The intuition is the following. Taxed entrepreneurs in the model with heterogeneous markups impose above the average markups and have marginal profits curves steeper than the ones faced by taxed entrepreneurs in the constant markups model. Hence, in the economy with heterogeneous markups entrepreneurs reduce their capital accumulation because of the tax, although in a lower extent, since their marginal profits immediately raise very quickly, much more than in the economy with homogeneous markups.

On the other hand, in the economy with no markups heterogeneity the selection effect at the very top of the wealth distribution is stronger, namely the average productivity of the wealthiest entrepreneurs raises more than in the economy with variable markups. However, the strength of this latter effect is not large enough and the capital drop at the top of the wealth distribution is the largest in the economy with no-markups heterogeneity.

Furthermore, notice that at lower quantiles of the wealth distribution (even below the

50^{th}) entrepreneurs experience an increase in the capital they are able to accumulate in both economies with either homogeneous or heterogeneous markups. This is due to several effects. First, the reduction in equilibrium wage in the entrepreneurial sector induced by the tax allows entrepreneurs to expand production, hence profits and capital accumulation. Furthermore, for poor entrepreneurs the lump-sum transfer T they receive is sizable, allowing them to increase investment in their own business. When these effects overcome the negative selection effect at the middle of the wealth distribution (i.e. average productivity of entrepreneurs decreases), then entrepreneurs experience a wealth (and hence capital) increase. For entrepreneurs experiencing a capital increase in a given quantile of the wealth distribution, the increase is larger in the economy with markups heterogeneity. The reason is twofold: in the economy with markups heterogeneity the negative selection effect at the middle-bottom of the wealth distribution is smaller and also the size of the transfer collected in the steady state is larger than the one collected in the economy with no markups heterogeneity.

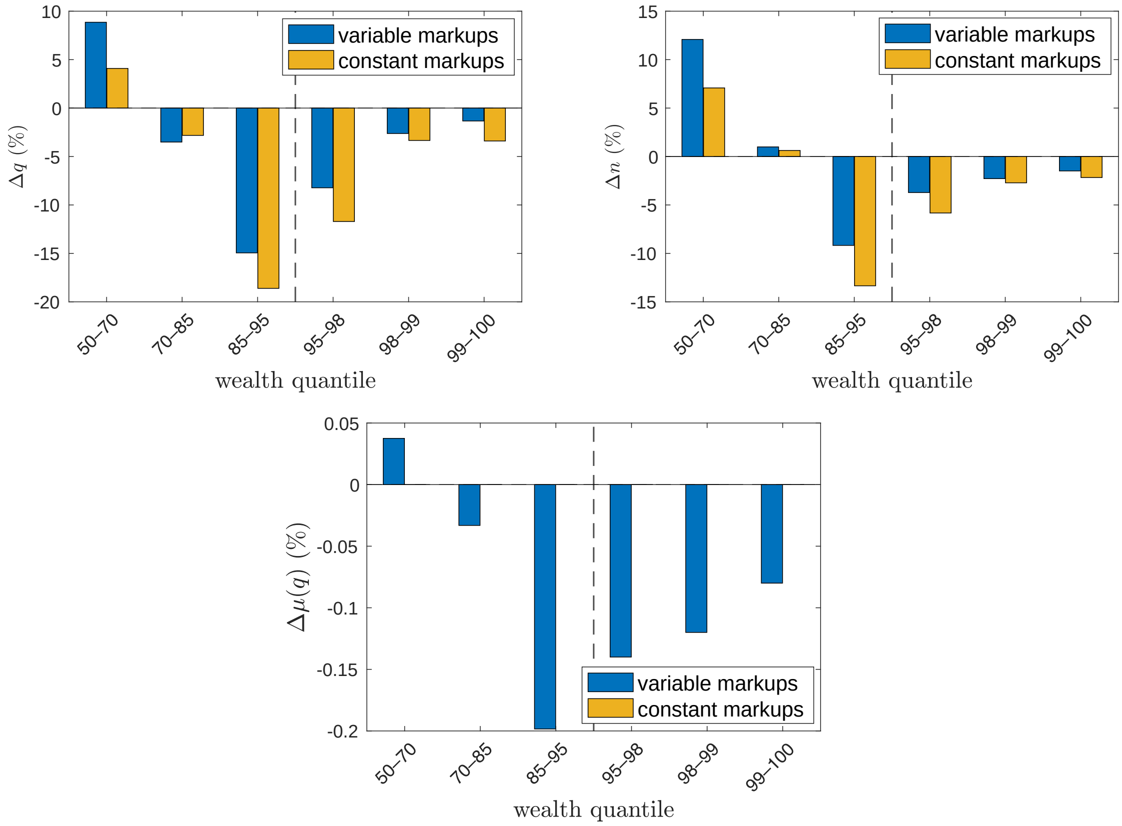
Overall, aggregating entrepreneurs' positive and negative capital responses to the wealth tax yields a net decline in aggregate steady state capital employed by entrepreneurs. The reason is that wealthiest entrepreneurs operate the largest firms, so their reduction in available capital more than offsets the capital increases among smaller firms owned by poorer entrepreneurs.

Finally, the fourth panel of Figure 13 shows the effect of the wealth tax on the overall wealth held by entrepreneurs at the steady state. Notice that the displayed patterns closely follow these of entrepreneurs' capital choices. This is simply because of the chosen exogenous portfolio rule linking capital and wealth of all entrepreneurs $k = \phi(z)a$.

Figure 14 shows how the production choices of entrepreneurs change from the steady state with no wealth taxation to the steady steady where wealth taxation is in place. These changes closely track those of capital reported in Figure 13. Similarly to what was happening in the static model, the wealth tax induces a re-shuffling of production from high to low productive entrepreneurs, which is larger in the economy with no-markups heterogeneity. Notice however, that the reallocation is dampened by the selection effect induced by the tax which increases average productivity of entrepreneurs at the top of the wealth distribution.

As in the static framework (in the variable markups model), the wealthiest entrepreneurs, who set the highest markups, reduce their markups, whereas poorer entrepreneurs raise theirs when production of their firms expands. Overall, the wealth tax lowers the aggregate markup among entrepreneur-managed firms by 0.8%, with a corresponding increase

FIGURE 14. *Wealth tax effects on entrepreneurial choices: variable vs constant markups*



Notes: *Figure represents the difference between entrepreneurs' choices at the steady-state with no wealth tax and at the steady-state in which the permanent wealth tax is in place. The blue columns represent these differences in the model simulated with variable markups and the yellow bars in the case of entrepreneurs imposing homogeneous and constant markups. The first panel indicates the average tax rate. The other panels represent the differences in relative quantities, markups, labor demand in the steady states with and without the tax.*

in the sector's labor share of income.

Aggregate effects and redistribution: the wealth tax generates both direct and indirect redistributive effects. The direct effect operates through the lump-sum transfer that redistributes, uniformly across the population, the revenues collected from the wealthiest 1% of households. The indirect effect operates through price adjustments, namely the changes in the equilibrium wages w^E, w^C and the interest rate r. I now compute these price changes between the steady state with and without wealth taxation. I then compare the magnitude of these effects in the economy with and without markups heterogeneity.

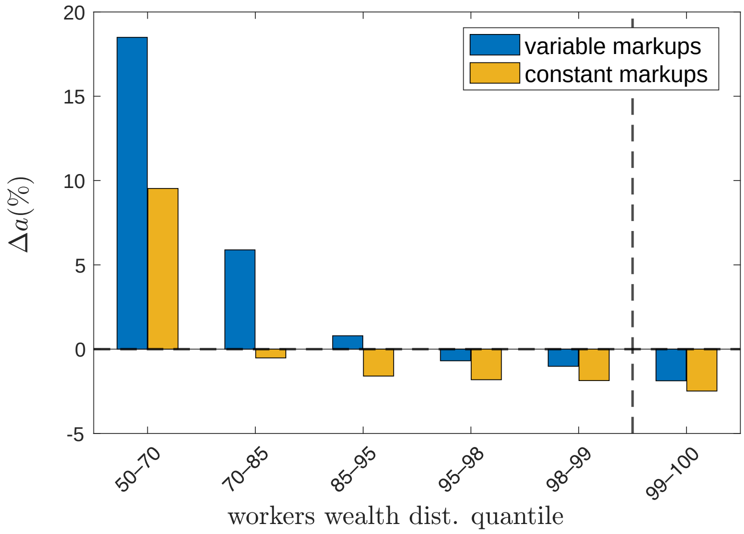
First, the wealth tax raises more revenues, and therefore finances larger transfers, in the economy with heterogeneous markups. Revenues are mainly collected from entrepreneurs, who make up most of the households at the top 1% of the wealth distribution. Consistently with the above discussion on entrepreneurs' choices (see fourth panel of Figure 13) entrepreneurs at the top of the wealth distribution reduce their steady state wealth in a larger extent under the assumption of homogeneous markups. Hence the wealth tax base, and so the transfer, is smaller in this economy, a difference which is estimated to be around 4% of the transfer raised in the economy with homogeneous markups.

Now, let's consider the effects of the tax on wages. Table 8 summarizes the aggregate effects of the wealth tax under the two considered scenarios of constant and variable markups across entrepreneurs. Aggregating the changes in entrepreneurs' capital and production choices described above, we observe a larger drop in equilibrium wage in the "entrepreneurial" sector (w^E) in the economy with homogeneous markups. This result is due to two effects: first of all the larger reduction in capital used for entrepreneurial production in the economy with homogeneous markups (see Table 8). Furthermore, as highlighted in the static framework, even if the changes in steady-state capital used for production across entrepreneurs had been been the same in the two economies, the reduction in aggregate labor demand would have been larger in the economy with homogeneous markups. This is due to larger production and labor demand elasticities at the top of the wealth distribution in the economy with homogeneous markups (see Section 4 for the detailed discussion). This effect is further amplified in the dynamic framework by the changes in the steady-state capital distribution across entrepreneurs previously described.

Now, consider the wealth tax effects on the representative firm of the "corporate" sector. The wealth tax downward distorts the amount of wealth that households accumulate, thereby reducing capital supplied not only to the "entrepreneurial" sector, but also to the "corporate" one. The drop in capital supply in the "corporate" sector is lower than that in the "entrepreneurial" sector. However, the drop in capital supply is still of larger magnitude in the economy with homogeneous markups across entrepreneurs (-12.3% and -13.7% respectively). This induces a decrease in equilibrium wage w^C and an increase in the interest rate r of stronger magnitude in the economy with no markups heterogeneity (see Table 8).

Since in this economy the equilibrium wage received by workers is a weighted average between the salaries in the two sectors in which they work, i.e. entrepreneurial and corporate, the workers in the economy with no-markups heterogeneity experience a reduction in average equilibrium wage which is 1.4 p.p. larger than in the economy with heterogeneous markups across entrepreneurs. On the other hand, the increase in the interest rate received by workers is stronger in the economy with homogeneous markups. Hence, given these opposite effects, in which of the two economies will workers benefit the most from the wealth tax? Figure 15 answers this question showing the change in workers' wealth across the wealth distribution of workers *only*. The larger transfer and the lower wage losses for workers in the economy with heterogeneous markups more than compensate the larger increase in interest rate in the economy with no markups heterogeneity. Hence, workers will increase their wealth accumulation, and ultimately consumption, in a larger extent in the economy in which entrepreneurs impose heterogeneous markups.

FIGURE 15. *Wealth tax effects on workers' steady state wealth*



Notes: *Figure represents the difference between workers' wealth at the steady state with no wealth tax and at the steady-state in which the permanent wealth tax is in place. The blue columns represent these differences in the model simulated with variable markups and the yellow bars in the model with entrepreneurs imposing homogeneous and constant markups.*

Finally, let's compare the effects of the considered wealth tax policy on total production in the two economies we studied. When we analyzed entrepreneurial production choices we already highlighted that the decrease in production of the most productive entrepreneurs is not compensated by the production increase of the poorest and least productive ones, thus leading to a drop in production in the entrepreneurial sector. This effect is stronger in the economy with no markups heterogeneity, leading to a production loss of 3.1%, versus a loss of 2% only in the economy featuring markups heterogeneity across entrepreneurs. Furthermore, notice that the drop in corporate sector production is of smaller magnitude than the production drop in entrepreneurial sector (Table 8). The reason is that the lower investment in the corporate sector of wealthy entrepreneurs

TABLE 8. *Steady-state wealth tax aggregate effects: comparison*

	Heterogeneous variable mark.	**Homogeneous constant markups**
ΔK^E	-14.2%	-16.8%
ΔK^C	-12.3%	-13.7%
ΔY^E	-2.0%	-3.1%
ΔY^C	-1.0%	-2.1%
ΔY	-1.5%	-2.6%
Δw^E	-1.8%	-3.3%
Δw^C	-1.6%	-2.6%
Δr	0.6%	0.9%
$\Delta \mathcal{M}$	-0.8%	0%

Notes: *Table reports the percentage changes of the following aggregates and prices between the steady states with and without wealth taxation. The symbols employed are: capital used for entrepreneurial production K^E and in the corporate sector K^C, entrepreneurial production Y^E, corporate sector production Y^C, aggregate production Y, wages in entrepreneurial and corporate sector w^E, w^C, interest rate r, aggregate markup $\mathcal{M}$*

who are taxed, is partly compensated by an increase of wealth of middle class and poor workers who mainly invest in the corporate sector of the economy. This effect is stronger in the economy with markups heterogeneity across entrepreneurs. This explains why, even in the corporate sector we observe a drop in production which is smaller in the economy with markups heterogeneity. Thus, aggregating the production losses induced by the tax in the two sectors we obtain a GDP loss which is 1.1 p.p. larger in the economy with markups heterogeneity across entrepreneurs.

To sum up, these results suggest that neglecting the role of market power heterogeneity across entrepreneurs in studying the effects of top wealth taxation would have led to overestimate its distortionary effects and underestimate its redistributive power.

In particular, under the considered wealth tax, neglecting market power heterogeneity would have led to overestimate GDP losses by 1.1% percentage points and overestimate the wage losses suffered by workers by 1.4% percentage points.

6 Conclusion

The contribution of this paper is to study the distortionary and redistributive effects of top wealth taxation when heterogeneous returns that entrepreneurs receive from their businesses not only reflect the entrepreneurs' productivity but also their market power. To do this I build a dynamic stochastic general equilibrium model in which wealthier (and more productive) entrepreneurs manage firms that produce at a larger scale, have more market power and impose larger markups. This setting is consistent not only with the evidence in the Survey of Consumer Finances data of wealthier entrepreneurs managing larger firms, but also with the models and empirical evidence supporting a positive relationship between firm size and markups in the US.

When a progressive top wealth tax is implemented in this setting, the tax burden falls onto the wealthiest entrepreneurs who impose the largest markups. Thus, the tax reduces the aggregate markup in the economy, increases the labor share of income accruing to poor workers and reduces the markups dispersion, thereby decreasing production distortions induced by misallocation of labor in the economy. However, by taxing the most productive entrepreneurs, the tax still reduces GDP and wages received by workers.

How do these effects change when instead market power heterogeneity across entrepreneurs is neglected, and all entrepreneurs impose homogeneous and constant markups equal to the average one in the heterogeneous markups case?

To answer this question I calibrate the model under both assumptions on entrepreneurs' market power, fitting the shape of the observed wealth distribution of American households and the concentration of entrepreneurial activity at the top of the wealth distribution.

Taking into account that wealthier entrepreneurs own firms with larger market power, relaxes the equity-efficiency trade-off of top wealth taxation with respect to the case in which this market power heterogeneity is neglected. Indeed, top wealth taxation induces smaller losses in capital accumulation, steady state production and wages in the economy where entrepreneurs impose heterogeneous markups. The reason is that in this case, the wealthiest entrepreneurs feature lower production elasticities and lower elasticities of savings with respect to the tax, compared to those of the wealthiest households in the model with homogeneous markups.

In the economy with homogeneous markups, furthermore, the wealth tax reduces wealth accumulation of the wealthiest households in a larger extent than in the economy with markups heterogeneity, shrinking more the tax base and hence the tax revenues to be employed for redistributive purposes.

Hence, neglecting the role of market power heterogeneity in shaping entrepreneurs' profits and returns leads to overestimate production and wage losses induced by the tax (respectively by 1.1 p.p. and 1.4 p.p.) and underestimate its tax revenues.

Although the focus of this paper has been on the role of *product* market power heterogeneity in shaping the outcomes of top wealth taxation, several contributions have shown that in the US firm heterogeneity is also associated with sizable *labor* market power heterogeneity (Yeh et al. (2022)) across them. Exploring whether *labor* market power distortions would dampen or amplify my results is thus a natural extension of this framework. This, would allow me to explore in a more comprehensive way the role of firms' market power in shaping top wealth taxation outcomes.

A Proofs

Proof of Lemma 1

Consider equation (4). Using the expression for the elasticity of demand of intermediate good produced by entrepreneur i reported in (3):

$$\mathcal{E}_i^d(q_i) = -\frac{\Upsilon_i'(q_i)}{q_i \Upsilon_i''(q_i)}$$

it is possible to re-write equation (4) as:

$$P\left(\Upsilon_i'(q_i^*) + q_i^* \Upsilon_i''(q_i^*)\right) q_i^{*-\frac{\nu}{1-\nu}} - \frac{wY^{\frac{\nu}{1-\nu}}}{1-\nu}\left(\frac{1}{z_i k_i^{\nu}}\right)^{\frac{1}{1-\nu}} = 0$$

Define the left hand side of the previous equation as the function $F_i(q_i^*, z_i, k_i, P, Y)$ which allows to re-write it as:

$$F_i(q_i^*, z_i, k_i, P, Y) = 0$$

Now, let's use the Implicit Function Theorem to show that $\frac{\partial q_i^*}{\partial z_i} > 0$ and $\frac{\partial q_i^*}{\partial k_i} > 0$. The proof to obtain the sign of the other partial derivatives reported in Lemma 1 is analogous. It is possible to show that:

$$\frac{\partial F_i(\cdot)}{\partial q_i^*} = P\left(2\Upsilon_i''(q_i^*) + q_i^* \Upsilon_i'''(q_i^*)\right) q_i^{*-\frac{\nu}{1-\nu}} - P\frac{\nu}{1-\nu}\left(\Upsilon_i'(q_i^*) + q_i^* \Upsilon_i''(q_i^*)\right) q_i^{*-\frac{\nu}{1-\nu}-1} < 0 \tag{16}$$

The reason why the previous derivative is negative is that both terms are negative. Indeed, using Assumption 1 it is possible to show that $2\Upsilon_i''(q_i^*) + q_i^* \Upsilon_i'''(q_i^*) \leq 0$ for all $q_i^* \geq 0$. Furthermore, $\Upsilon_i'(q_i^*) + q_i^* \Upsilon_i''(q_i^*) > 0$. The way to show it is the following. Equation (4) guarantees that a profit maximizing entrepreneur will always choose q_i^* which satisfies $\mathcal{E}_i^d(q_i^*) > 1$. Using the formula for the elasticity of demand (3), $\mathcal{E}_i^d(q_i^*) > 1$ rewrites as: $\Upsilon_i'(q_i^*) + q_i^* \Upsilon_i''(q_i^*) > 0$. Now let's compute the following partial derivatives:

$$\frac{\partial F_i(\cdot)}{\partial z_i} = \frac{wY^{\frac{\nu}{1-\nu}}}{(1-\nu)^2}\left(\frac{1}{z_i k_i^{\nu}}\right)^{\frac{1}{1-\nu}} \frac{1}{z_i} > 0 \qquad \frac{\partial F_i(\cdot)}{\partial k_i} = \frac{\nu wY^{\frac{\nu}{1-\nu}}}{(1-\nu)^2}\left(\frac{1}{z_i k_i^{\nu}}\right)^{\frac{1}{1-\nu}} \frac{1}{k_i} > 0 \tag{17}$$

Hence, the implicit function theorem guarantees that:

$$\frac{\partial q_i^*}{\partial z_i} = -\frac{\frac{\partial F_i(\cdot)}{\partial z_i}}{\frac{\partial F_i(\cdot)}{\partial q_i^*}} > 0 \qquad\qquad \frac{\partial q_i^*}{\partial k_i} = -\frac{\frac{\partial F_i(\cdot)}{\partial k_i}}{\frac{\partial F_i(\cdot)}{\partial q_i^*}} > 0$$

$\square$

Proof of Lemma 2

First of all, I show that $\frac{\partial \mathcal{N}_i^*(\cdot)}{\partial z_i} > 0$ if Assumption 1 and Assumption 2 hold. The way of showing that $\frac{\partial \mathcal{N}_i^*(\cdot)}{\partial k_i} > 0$ is analogous. Notice that:

$$\frac{\partial \mathcal{N}_i^*(\cdot)}{\partial z_i} > 0 \quad \Longleftrightarrow \quad \frac{\partial}{\partial z_i}\left(\left(\frac{\mathcal{Q}_i^*(\cdot)}{z_i k_i^{\nu}}\right)^{\frac{1}{1-\nu}}\right) Y^{\frac{1}{1-\nu}} > 0 \quad \Longleftrightarrow \quad \frac{\partial \mathcal{Q}_i^*(\cdot)}{\partial z_i}\frac{z_i}{q^*(\cdot)} > 1$$

where $\mathcal{Q}_i^*(\cdot)$ is the optimal relative quantity function whose arguments are (z_i, k_i, w, Y, P). To shorten notation let $q_i^* = \mathcal{Q}_i^*(z_i, k_i, w, P, Y)$. Using equations (16) and (17) is it possible to show that:

$$\frac{\partial q_i^*}{\partial z_i}\frac{z_i}{q_i^*} = -\frac{\Upsilon_i'(q_i^*) + q_i^*\Upsilon''(q_i^*)}{(2\Upsilon_i''(q_i^*) + q_i^*\Upsilon_i'''(q_i^*))q_i^*(1-\nu) - \nu(\Upsilon_i'(q_i^*) + q_i^*\Upsilon_i''(q_i^*))}$$

which is positive if:

$$-\frac{\Upsilon_i'(q_i^*)}{q_i^*\Upsilon_i''(q_i^*)} > 3 + \frac{q_i^*\Upsilon_i(q_i^*)}{\Upsilon_i''(q_i^*)}$$

which holds under Assumption 2. Using the expression for the function $\mathcal{N}_i^*(\cdot)$:

$$\mathcal{N}_i^*(z_i, k_i, w, P, Y) = \left(\frac{\mathcal{Q}_i^*(z_i, k_i, w, P, Y)\cdot Y}{z_i k_i^{\nu}}\right)^{\frac{1}{1-\nu}}$$

it is immediate to show that $\frac{\partial \mathcal{N}_i^*(\cdot)}{\partial w} < 0$ and $\frac{\partial \mathcal{N}_i^*(\cdot)}{\partial P} < 0$ since Lemma 1 shows that $\frac{\partial \mathcal{Q}_i^*(\cdot)}{\partial w} < 0$ and $\frac{\partial \mathcal{Q}_i^*(\cdot)}{\partial P} < 0$.
Now, let's show that $\frac{\partial \mathcal{N}_i^*(\cdot)}{\partial Y} > 0$. To see that, first of all notice that:

$$\frac{\partial \mathcal{N}_i^*(\cdot)}{\partial Y} = \left(\frac{1}{k_i^{\nu} z_i}\right)^{\frac{1}{1-\nu}}\left(\frac{\partial q_i^*}{\partial Y}Y + q_i^*\right)^{\frac{1}{1-\nu}}(q_i^* Y)^{\frac{1}{1-\nu}}\frac{1}{1-\nu} > 0 \quad \Longleftrightarrow \quad \frac{\partial q_i^*}{\partial Y}\frac{Y}{q_i^*} > -1$$

where, again, to shorten notation, $q_i^* = \mathcal{Q}_i^*(z_i, k_i, w, P, Y)$. Using equation (16) it is possible to compute:

$$\frac{\partial q_i^*}{\partial Y}\frac{Y}{q_i^*} = \left(\frac{2\Upsilon_i''(q_i^*) + q_i^*\Upsilon_i''(q_i^*)}{\Upsilon_i'(q_i^*) + q_i^*\Upsilon_i''(q_i^*)} q_i^* \frac{1-\nu}{\nu} - 1\right)^{-1}$$

Hence, to have $\frac{\partial q_i^*}{\partial Y}\frac{Y}{q_i^*} > -1$, rearranging the previous expression, it must hold:

$$-\frac{2\Upsilon_i''(q_i^*) + q_i^*\Upsilon_i''(q_i^*)}{\Upsilon_i'(q_i^*) + q_i^*\Upsilon_i''(q_i^*)} > 0$$

which under Assumption 1 is true since, as the proof of Lemma 1 shows, we both have that $2\Upsilon_i''(q_i^*) + q_i^*\Upsilon_i''(q_i^*) < 0$ and $\Upsilon_i'(q_i^*) + q_i^*\Upsilon_i''(q_i^*) > 0$ for every $q_i^* = \mathcal{Q}_i^*(z_i, k_i, w, P, Y)$ □

B Klenow and Willis function

The Klenow and Willis (2015) functional form for $\Upsilon(\cdot)$ is:

$$\Upsilon(q) = 1 + (\sigma - 1)e^{1/\psi}\psi^{\frac{\sigma}{\psi}-1}\left[\Gamma\left(\frac{\sigma}{\psi}, \frac{1}{\psi}\right) - \Gamma\left(\frac{\sigma}{\psi}, \frac{(q)^{\frac{\psi}{\sigma}}}{\psi}\right)\right]$$

with $\sigma > 1$ and $\psi \geq 0$, and where $\Gamma(s, x)$ denotes the function:

$$\Gamma(s, x) := \int_x^\infty t^{s-1}e^{-t}dt$$

It is possible to show that the first derivative of $\Upsilon(\cdot)$ takes the form:

$$\Upsilon'(q) = \frac{\sigma - 1}{\sigma}\exp\left\{\frac{1 - q^{\psi/\sigma}}{\psi}\right\}$$

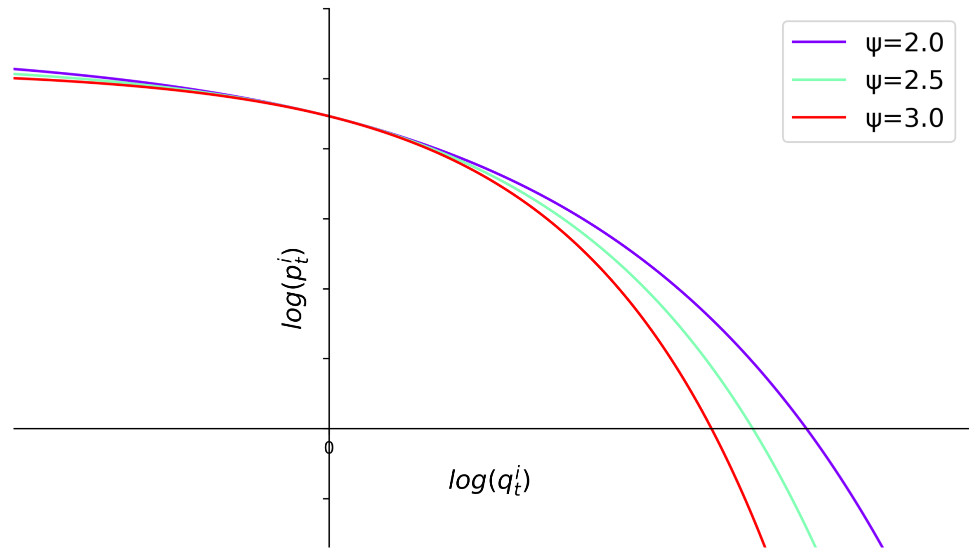
starting from $\Upsilon'(q)$, standard algebra also delivers the expression for $\Upsilon''(q)$. Those expressions can be plugged into the formula for the elasticity of demand derived in (3):

$$\mathcal{E}^d(q_i) = -\frac{\Upsilon'(q_i)}{q_i\Upsilon''(q_i)}$$

delivering:

$$\mathcal{E}^d(q_i) = \sigma(q_i)^{-\frac{\psi}{\sigma}}$$

FIGURE 16. *Demand for the intermediate goods with Klenow and Willis functional form for $\Upsilon(\cdot)$, $\sigma = 6$ and varying values for ψ*



Finally, using the markup definition:

$$\mu(q_i) = \frac{\mathcal{E}^d(q_i)}{\mathcal{E}^d(q_i) - 1} = \frac{\sigma}{\sigma - q_i^{\frac{\psi}{\sigma}}}$$

The following Figure plots an instance of the shape of the demand function for the entrepreneur's $i \in I$ good: $p_i = P\Upsilon'(q_i)$ when $\Upsilon'(\cdot)$ takes the Klenow and Willis (2016) functional form. The demand function is plotted for $\sigma = 6$ (employed in the calibration of Section 4.2) and several values of ψ, showing how this parameter regulates the concavity of the demand function.

C Additional Tables and Figures

TABLE 9. *Model with const. and heterogeneous markups calibration: summary*

Par.	Description	Value	Target
ω	fraction of workers	0.88	non-entrepreneur households in SCF 2019
ν	capital exponent prod.	0.28	labor share = 0.6
x_z	scale par. entr. ability dist.	0.12	observed returns to entrepreneurship
η_z	shape par. entr. ability dist.	4.1	observed returns to entrepreneurship
α_0	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	868	min. wealth = 1
α_1	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	3.25	tail parameter entrepreneurial wealth 1.25

Notes: *the Table summarizes the calibrated model's parameters values. The first column indicates the symbol used to identify the parameter in the model, the second column the parameter description, the third column the chosen value for the parameter, the fourth column the moment targeted to calibrate each parameter.*

TABLE 10. *Steady-state distribution of markups (cost-weighted)*

	Compustat - Edmond et al. (2023)	Simulated model
aggregate markup $\mathcal{M}$	1.26	1.20
p25	0.97	1.11
p50	1.12	1.18
p75	1.31	1.25
p90	1.69	1.45

Notes: *the Table reports some descriptive statistics of the markups distribution estimated in the data by Edmond et al. (2023) (first column) and simulated at the steady-state of the model (second column). The statistics have been obtained computing the cost-weighted percentiles of the steady-state markups distribution, where the weight associated to each observation is given by the share of labor employed by each firm n_i/N.*

TABLE 11. *Constant markups steady-state: externally calibrated parameters*

Par.	Description	Value	Target
ω	fraction of workers	0.88	fraction of non-entr.
γ	CRRA par. utility	1	-
ν	capital exponent entr. prod.	0.28	Labor share entr. sect. = 0.6
α	capital exponent mkt sector prod.	0.4	Labor share mkt. sector = 0.6
σ	elasticity of demand	6	markups = 1.2

Notes: *the Table summarizes the parameter choices to calibrate the steady state of the dynamic model presented in Section 5 with constant and homogeneous markups across entrepreneurs. The first column indicates the symbol used to identify the parameter in the model, the second column the parameter description, the third column the chosen value for the parameter, the fourth column the moment targeted to calibrate each parameter.*

Table 12. *Constant markups steady-state: internally calibrated parameters*

Par.	**Description**	**Value**	**Target**	**Data**	**Model**
β	discount factor	0.91	wealth / output	4	3.5
δ	depreciation rate	0.015	entr. wealth fract.	0.44	0.49
A	TFP market sector	2.5	Y^M/Y	0.43	0.47
$\bar{z}$	av. entrep. skills	1	workers in top 1%	0.17	0.13
ρ_e	persistence worker skills	0.95	top 1% wealth	0.36	0.37
σ_e^2	var. innovation worker skill	0.25	top 5% wealth	0.65	0.59
ρ_z	persistence entr. skill	0.9	top 10% wealth	0.77	0.73
σ_z^2	var. innovation entr. skills	0.4	Gini wealth	0.88	0.86
			top 1% capital	0.42	0.39
			top 5% capital	0.71	0.75
			top 10% capital	0.83	0.87

Notes: *the Table summarizes the parameter choices to calibrate the steady state of the dynamic model presented in Section 5 with constant and homogeneous markups across entrepreneurs. The first column indicates the symbol used to identify the parameter in the model, the second column the parameter description, the third column the chosen value for the parameter, the fourth column the moment targeted to calibrate each parameter, the fifth column the value of the targeted moment in the data, the sixth column the value of the targeted moment in the simulated model,*

Table 13. *Model with occupational choice and heterogeneous markups calibration*

Par.	**Description**	**Value**	**Target**
ν	capital exponent prod.	0.28	labor share = 0.6
x_z	scale par. entrepreneurial ability dist.	0.2	observed returns to entrepreneurship
η_z	shape par. entrepreneurial ability dist.	5	observed returns to entrepreneurship
σ	demand elasticity when $q = 1$	10.6	$\mathcal{M} = 1.2$
ψ	shape par. demand elasticity	1.74	$\psi/\sigma = 0.16$
α_0	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	157	min wealth = 1
α_1	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	3.97	tail parameter entrepreneurial wealth 1.25
f	fixed cost	0.011	fraction of entrepreneurs

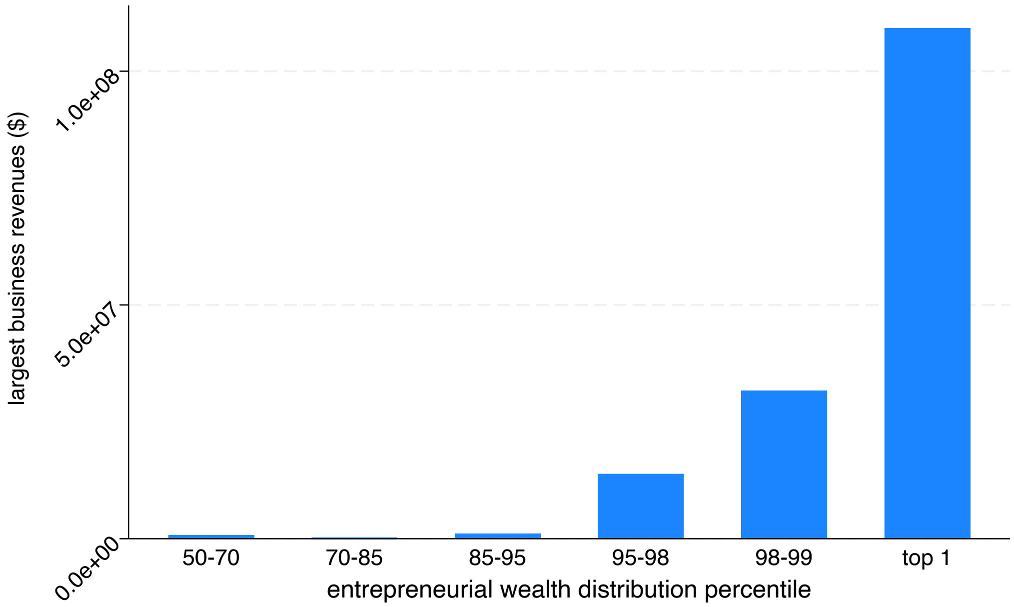
Notes: *the Table summarizes the calibrated parameters values of the model with endogenous occupational choice and entrepreneurs facing demand function for their own variety with variable elasticity of demand. The first column indicates the symbol used to identify the parameter in the model, the second column the parameter description, the third column the chosen value for the parameter, the fourth column the moment targeted to calibrate each parameter.*

Table 14. *Model with occupational choice and constant markups calibration*

Par.	**Description**	**Value**	**Target**
ν	capital exponent prod.	0.28	labor share = 0.6
x_z	scale par. entr. ability dist.	0.28	observed returns to entrepreneurship
η_z	shape par. entr. ability dist.	5.4	observed returns to entrepreneurship
σ	demand elasticity	6	$\mathcal{M} = 1.2$
α_0	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	157	min wealth = 1
α_1	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	3.97	tail parameter entrepreneurial wealth 1.25
f	fixed cost	0.0515	fraction of entrepreneurs in SCF (2019)

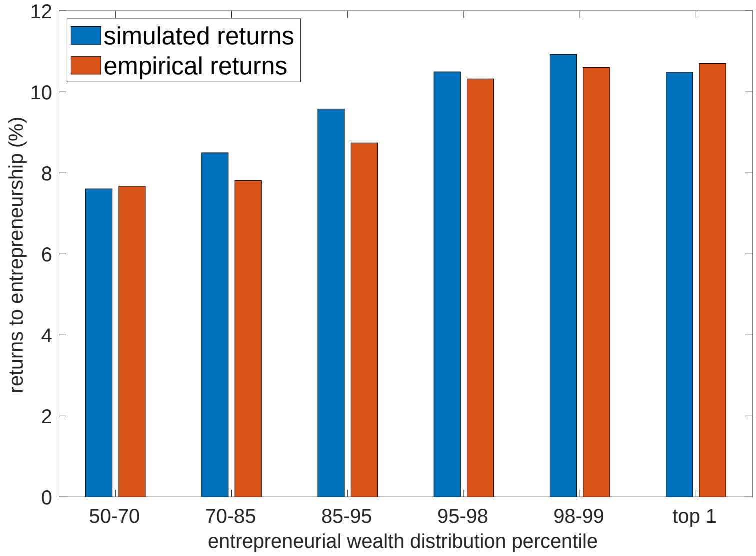
Notes: *the Table summarizes the calibrated parameters values of the model with endogenous occupational choice and entrepreneurs facing demand function for their own variety with constant elasticity of demand. The first column indicates the symbol used to identify the parameter in the model, the second column the parameter description, the third column the chosen value for the parameter, the fourth column the moment targeted to calibrate each parameter.*

Figure 17. *Revenues in largest (private) actively managed business*



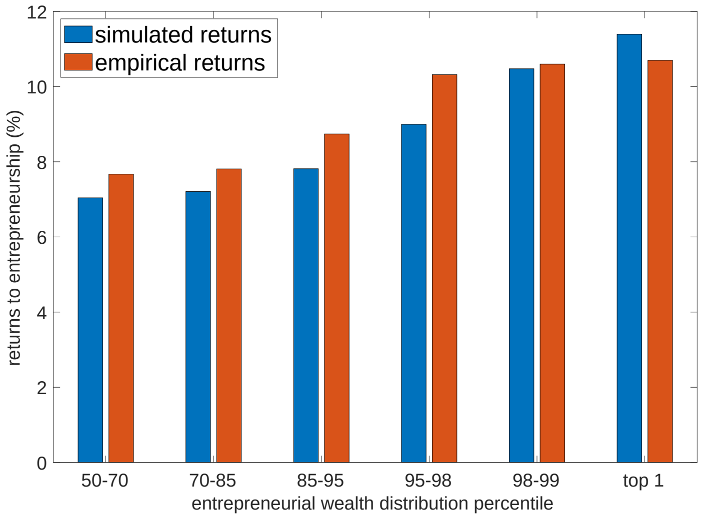
Notes: *the Figure reports the average revenues in the largest private actively managed business across the wealth distribution. The value of each column is computed by averaging the number of employees in the largest actively managed business across entrepreneurs belonging to the same wealth percentile bin. The definition of entrepreneur is reported in Section 2.1. Data from 2019 Survey of Consumer Finances*

Figure 18. *Simulated vs empirical returns to entrepreneurship: markups increasing with firm's market share model*



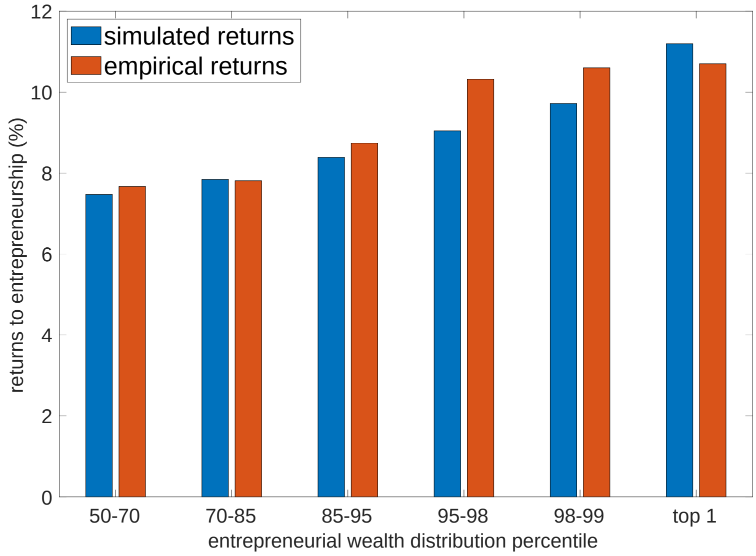
Notes: *the Figure reports the simulated returns to entrepreneurship (blue) and the estimated returns to entrepreneurship (orange). The simulated returns are computed by averaging across wealth percentiles bins the average returns π_i/k_i (for calibration details see Table 3). The estimated returns are those reported in Figure 5.*

FIGURE 19. *Simulated vs empirical returns to entrepreneurship: heterogeneous and constant markups model*



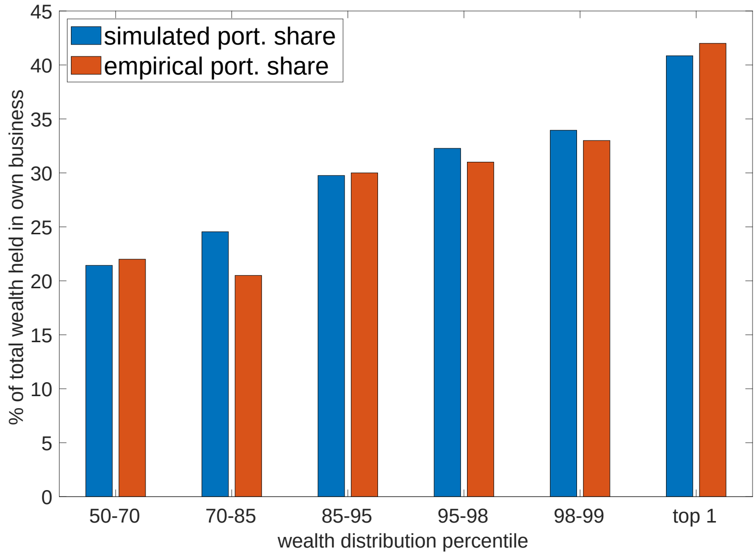
Notes: *the Figure reports the simulated returns to entrepreneurship in the model in which entrepreneurs impose heterogeneous but constant markups (blue) and the estimated returns to entrepreneurship (orange). The simulated returns are computed by averaging across wealth percentiles bins the simulated returns (for calibration details see Table* **??***). The estimated returns are those reported in Figure 5.*

FIGURE 20. *Simulated vs empirical returns to entrepreneurship: constant markups model*



Notes: *the Figure reports the simulated returns to entrepreneurship in the model in which entrepreneurs impose constant markups (blue) and the estimated returns to entrepreneurship (orange). The simulated returns are computed by averaging across wealth percentiles bins the simulated returns (for calibration details see Table* **??***). The estimated returns are those reported in Figure 5.*

Figure 21. *Simulated vs empirical portfolio shares at the steady-state*



Notes: *the Figure reports the simulated fraction of net wealth ($\phi^i = \phi(z^i)$) that entrepreneurs hold in their business at the steady-state (blue) and the estimated portfolio shares (orange, see Figure 2). The simulated portfolio shares are computed by averaging across wealth percentiles bins the simulated portfolio shares.*

D Static model with occupational choice

How does the endogenous occupational choice affect wage and output losses in the two economies studied in Sections 4? This Section argues that even when endogenous occupational choice is allowed, the same revenue equivalent wealth tax induces larger output and wage losses in the economy in which entrepreneurs impose constant markups.

D.1 Model and calibration

I now suitably modify the model studied in Section 3 to allow for endogenous occupational choice. Assume that all households $i \in [0,1]$ are endowed with entrepreneurial skills z_i drawn from a Pareto distribution with cdf $F(z)$ and support $[\underline{z}, \infty)$ (with $\underline{z} > 0$) and wealth $k_i = k(z_i)$. Each household can now choose between becoming a worker or an entrepreneur:

- A worker receives the wage w. For simplicity all households, when workers, are assumed to inelastically supply a unit of labor. Furthermore, when a household is a worker he invests his wealth k_i in a risk-free investment opportunity with zero return. Hence, the consumption of each household $i \in [0,1]$ who decides to be a worker is: $c_i = w$.
- An entrepreneur receives profits from his entrepreneurial activity. Each entrepreneur solves the profit maximization problem (E)[21]. Furthermore, to become entrepreneur an household has to pay the fixed cost $f > 0$.[22]

Each household $i \in [0,1]$ makes his occupational choice comparing his consumption when he decides to be a worker with consumption in the entrepreneurial occupation. Formally, each household $i \in [0,1]$ becomes entrepreneur if:

$$\pi^*(z_i, k(z_i), w, P, Y) - f \geq w$$

where $\pi^*(\cdot)$, see equation (5), denotes the optimal profits made by entrepreneur i when solving problem (E). If the function $\Upsilon(\cdot)$ takes either the Klenow and Willis (2016)

[21] When I will study the effects of wealth taxation in the economy in which entrepreneurs impose constant markups the problem to be solved will be (E').

[22] A fixed cost is needed since without it the model would not able to replicate all the calibration targets matched in the previous analysis without occupational choice, *plus* the fraction of workers and entrepreneurs observed in the SCF data (which before was exogenous). More details about calibration will follow.

functional form (see (9)) or $\Upsilon(q) = q^{\frac{\sigma-1}{\sigma}}$ (which will be the two functional forms used when calibrating the model) it is possible to show that $\pi^*(\cdot)$ is monotonically increasing in z_i while labor income w is independent of z_i. Thus, it is possible to define an occupational choice threshold $\hat{z}$ such that:

$$\pi^*(\hat{z}, k(\hat{z}), w, P, Y) - f = w$$

and all households with skills $z_i \geq \hat{z}$ become entrepreneurs, while all households with skills $z_i < \hat{z}$ become workers.

Equilibrium: The equilibrium of this static economy with occupational choice is a set of aggregates $\{w^*, Y^*, P^*\}$, an occupational choice threshold $\hat{z}$, a vector of quantities consumed by each household (workers and entrepreneurs) $\{c_i^*\}_{i\in[0,1]}$, relative quantity function $q^*(z_i, k(z_i), w^*, P^*, Y^*)$, labor demand function $n^*(z_i, k(z_i), w^*, P^*, Y^*)$, profit function $\pi^*(z_i, k(z_i), w^*, P^*, Y^*)$ such that:

- Each worker i consumes his labor income $c_i^* = w^*$
- Given the aggregates $\{w^*, Y^*, P^*\}$ the functions $q^*(z_i, k_i, w^*, P^*, Y^*)$, $n^*(z_i, k_i, w^*, P^*, Y^*)$, $\pi^*(z_i, k_i, w^*, P^*, Y^*)$ solve the entrepreneur's i problem (E)
- The occupational choice threshold $\hat{z}$ is such that:

$$\pi^*(\hat{z}, k(\hat{z}), w^*, P^*, Y^*) - f = w^*$$

- Labor market clears:

$$\int_{\underline{z}}^{\hat{z}} F(z)dz = \int_{\hat{z}}^{\infty} n^*(z, k(z), w^*, P^*, Y^*)F(z)dz$$

- Kimball aggregator is satisfied:

$$\int_{\hat{z}}^{\infty} \Upsilon\left(q^*(z, k(z), w^*, P^*, Y^*)\right) F(z)dz = 1$$

Calibration: the model with occupational choice is calibrated so to match the same targets of the models without occupational choice presented in the previous Sections (observed returns, observed wealth distribution, aggregate markup $\mathcal{M} = 1.2$, labor share). The only difference in the calibration procedure of the model with occupational choice is that the fixed cost f is calibrated so to have the fraction of households who decide to be entrepreneurs equal to the fraction of households defined as entrepreneurs in the SCF 2019 data (0.12). Furthermore, notice that to study the economy in which entrepreneurs impose markups increasing in their market shares, the Klenow and Willis (2016) functional for for $\Upsilon(\cdot)$ will be used (see equation 9). Instead, to study the economy in which entrepreneurs impose constant markups the functional form chosen for $\Upsilon(\cdot)$ will be $\Upsilon(q) = q^{\frac{\sigma-1}{\sigma}}$. Details on the calibrated parameters are reported in Appendix C, Tables 13 and 14.

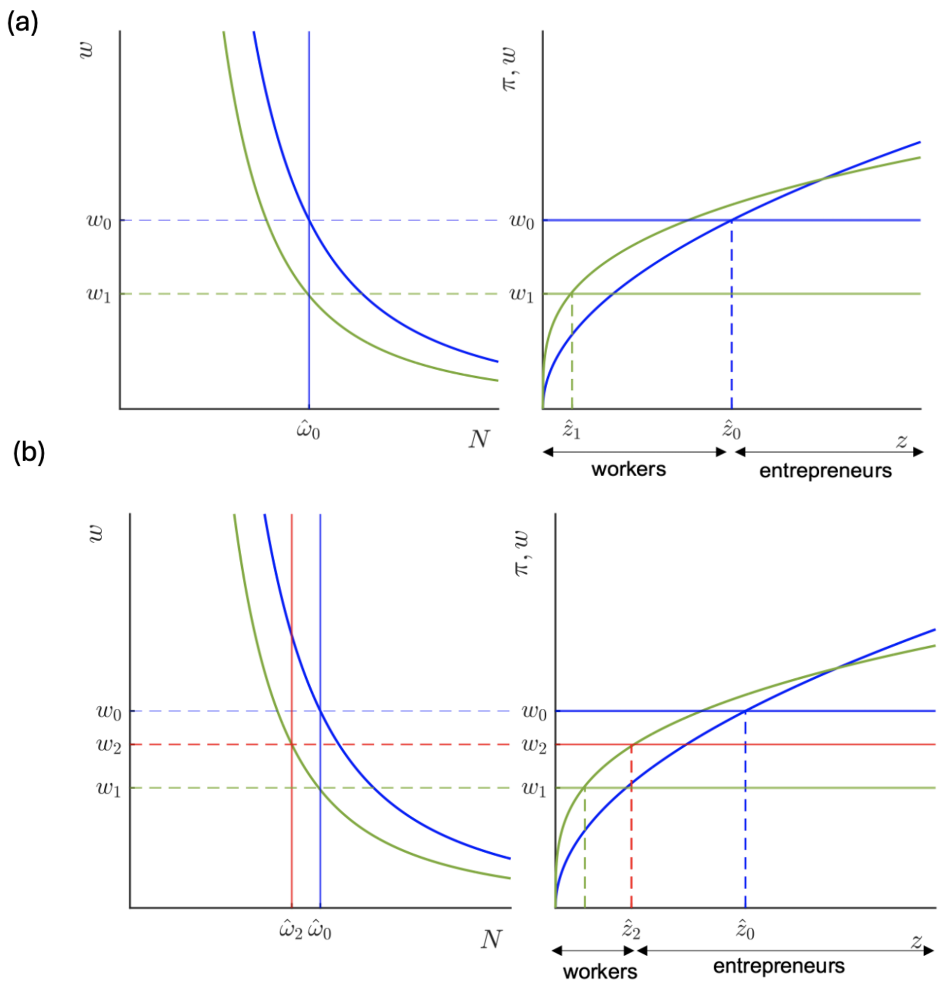
D.2 Wealth tax experiment with occupational choice

Figure 22 shows how allowing for endogenous occupational choice changes the aggregate effects of wealth taxation. First of all consider panel (a). The concave blue line in the right hand plot represents profits as a function of entrepreneurial skills and the horizontal line equilibrium wage. Their intersection at $(w_0, \hat{z}_0)$ identifies the equilibrium wage and occupational choice threshold in the initial equilibrium of the economy, when no tax is implemented. The blue lines in the left plot, instead, represent aggregate labor supply and labor demand functions. Notice that while labor demand is downward sloped, the labor supply curve is vertical. Indeed, when the measure of workers in the economy is $\hat{\omega}_0$, for any wage offered the aggregate labor supply will just be the measure of workers available for production $\hat{\omega}_0$.

As I showed in Figure 11 the introduction the wealth tax reduces profits for wealthiest entrepreneurs and increases profits for poorer entrepreneurs, thus the profits function after the wealth tax is implemented becomes the one in green. Furthermore, the wealth tax reduces aggregate labor demand, which shifts to the left (green curve in the left plot, panel (a)). Suppose just for the moment that the measure of workers is exogenously fixed at $\hat{\omega}_0$ (as if there was no occupational choice). The intersection between labor supply and labor demand at $(\hat{\omega}_0, w_1)$ determines the new equilibrium wage, w_1, once the tax is implemented. Furthermore, notice that all workers between $\hat{z}_1$ and $\hat{z}_0$ now would like to become entrepreneurs but they cannot since the number of workers has been exogenously fixed.

Now let's look at panel (b) of Figure 22 which plots in red the new labor supply and equilibrium wage once I allow households to freely choose their occupation. The workers willing to become entrepreneurs induce a reduction in labor supply (labor supply shifts to the left) and the intersection with labor demand at $(w_2, \hat{\omega}_2)$ determines the new

FIGURE 22. *Wealth tax effects on occupational choice threshold and wage*



Notes: *Panel (a): the left plot reports aggregate labor supply and labor demand curves of the analyzed economy. The right plot reports equilibrium wage and profits as a function of productivity. Blue lines represent these curves before the wealth tax is implemented. Green lines represent these curves after the wealth tax is implemented but keeping labor supply fixed at the initial level. Panel (b): the curves in red represent the same curves in panel (a) but once the wealth tax is implemented and labor supply is allowed to vary.*

equilibrium wage w_2. Hence, notice that, once I allow occupational choice the reduction in equilibrium wage due to the wealth tax is lower and there are more entrepreneurs producing: $\hat{z}_2 < \hat{z}_0$.

The model simulations allow to quantify the previously described effects. They are reported in Table 15. The first two columns report how the wealth tax affects several aggregates when the model in which entrepreneurs impose heterogeneous markups is simulated, first keeping the occupational threshold $\hat{z}$ fixed and then allowing $\hat{z}$ to change once the wealth tax is implemented. The same exercise is repeated for the economy in which all entrepreneurs impose the same markups and the results are reported in columns

Table 15. *Wealth tax aggregate effects in the model with occupational choice: simulation results*

	Heterogeneous markups		**Constant markups**	
(%)	fixed $\hat{z}$	end. $\hat{z}$	fixed $\hat{z}$	end. $\hat{z}$
Δw	-0.16	-0.13	-0.22	-0.148
ΔN	0	-0.032	0	-0.046
ΔK	-0.613	-0.50	-0.613	-0.474
ΔZ	-0.023	-0.025	-0.034	-0.038
$\Delta \mathcal{M}$	-0.025	-0.031	0	0
ΔY	-0.18	-0.18	-0.22	-0.194

Notes: *the Table summarizes the effects of the wealth tax policy described in 4.2 on equilibrium wage, aggregate employment, aggregate capital, aggregate productivity, aggregate markup, aggregate production. These effects are obtained simulating the model with occupational choice calibrated in 6.1. The wealth tax effects are computed first keeping the occupational choice threshold $\hat{z}$ fixed, and then letting $\hat{z}$ vary after the tax implementation*

3-4 of Table 15.

Notice that in both economies allowing $\hat{z}$ to change once the tax is implemented reduces the drop in equilibrium wage and aggregate capital used for production, with respect to the case in which the measure of workers is fixed. Furthermore, in both economies, the entry of new entrepreneurs (who have low productivity) reduces aggregate productivity and also aggregate markup in the economy in which entrepreneurs impose heterogeneous markups. The reason is that the newly entered entrepreneurs have low productivity, produce at a small scale and hence apply small markups. Finally, notice that the magnitude of all these affects is larger in the economy where entrepreneurs impose constant markups. The reason for this is the larger increase of profits of poorer entrepreneurs and the larger reduction of wage in the economy with constant markups. However, even when allowing households to make an occupational choice the considered wealth tax reduces aggregate production and equilibrium wage more in the economy where entrepreneurs impose constant markups.

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