Wealth tax, entrepreneurship and market power*

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Abstract

This paper studies how the distortionary and redistributive effects of top wealth taxation change when, beyond productivity, entrepreneurial returns capture their firms' market power. To do so, I develop a model in which entrepreneurs accumulate wealth investing in their firm, face capital income risk and set markups. Consistently with U.S. data, wealthier entrepreneurs operate larger firms and charge higher markups. As a result, the burden of a top wealth tax falls onto the entrepreneurs imposing the largest markups, reducing the aggregate markup and raising the labor share of income accruing to poor workers. I then show that entrepreneurs imposing larger markups feature lower production and capital elasticities to the tax. Thus, when observed market power heterogeneity is neglected, a wealth tax raising 1% of GDP imposed on the wealthiest 1% of U.S. households overestimates wage losses induced by the tax by 1.4 pp. and output losses by 1.1 pp.

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

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1 Introduction

Wealth in the United States is highly concentrated and this concentration has steadily increased over recent decades (Saez and Zucman, 2020). Furthermore, empirical studies show that the wealthiest Americans earn the highest returns on their wealth. This is because they hold large portfolio shares in high-yield entrepreneurial activities (Xavier, 2021; Smith et al., 2023). In light of this evidence, scholars and policymakers have extensively debated the desirability of taxing the wealth of these rich individuals for redistributive purposes. The answer to this question crucially depends on whether the redistributive gains from such policies outweigh the distortionary effects on the entrepreneurial activities owned by these wealthy households. Existing studies typically address this issue under the assumption that the high returns to entrepreneurship - and as a consequence, the high returns to wealth - earned by affluent households *fully* reflect the productivity of their entrepreneurial investments. If this is the case, a top wealth tax would primarily fall on the households investing in the most productive activities in the economy, with potentially severe consequences for output, employment, and wages.

The contribution of this paper is to examine how the distortionary and redistributive effects of top wealth taxation change when this one-to-one relationship between returns and productivity breaks. In particular, I study the effects of a top wealth tax when the heterogeneous returns that entrepreneurs earn from their businesses not only reflect their firm productivity but also the firms' market power. Indeed, American entrepreneurs own firms with sizable and heterogeneous product market power, with some firms imposing exceptionally high markups that they exploit to boost their profits and returns (De Loecker et al., 2020; Autor et al., 2020; Edmond et al., 2023). This paper studies how the equity-efficiency trade-off of top wealth taxation changes when accounting for the observed market power heterogeneity across American entrepreneurs' businesses.

To address this question, I develop a dynamic general equilibrium model that captures wealth inequality, the concentration of entrepreneurial activity at the top of the wealth distribution and the distribution of firm markups observed in U.S. data. To this goal I assume that entrepreneurs face capital income risk, a crucial ingredient for replicating the fat upper tail of the empirical wealth distribution (Benhabib et al., 2015; Benhabib and Bisin, 2018). Consistently with standard models of monopolistic and oligopolistic competition (Atkeson and Burstein, 2008; Edmond et al., 2023), I further assume that firms' market power increases with their market share. Together, these elements yield a novel framework in which to study wealth taxation when en-

trepreneurs' returns imperfectly reflect their productivity.
Consistently with evidence from the U.S. Survey of Consumer Finances showing that wealthier entrepreneurs manage larger firms, in this framework wealthier (and more skilled) entrepreneurs operate firms producing at a larger scale and charging higher markups. Within this economy, I examine the effects of a progressive top wealth tax whose revenues are lump-sum redistributed across workers and entrepreneurs. I then compare the tax policy outcomes to those arising in a counterfactual scenario in which heterogeneity in market power across entrepreneurs is shut down.
The main result of the analysis is that 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, the considered wealth tax induces higher redistribution from rich entrepreneurs to poor workers, at the cost of lower losses in terms of forgone production. This is because when taking into account market power heterogeneity, taxing the wealthiest entrepreneurs means taking away resources from the entrepreneurs imposing the largest markups. These are not only the most productive agents, but also the ones imposing the largest production distortions and featuring the lowest production and capital elasticities with respect to the tax. 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 onto 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.

As first step of the analysis, I document the relationship between American entrepreneurs' wealth, their firm size, and the markups they charge. To this end, I employ data from the Survey of Consumer Finances and Compustat. First, I show that American entrepreneurs are concentrated at the top of the wealth distribution and that their entrepreneurial investment is mainly directed toward a single business, from which they earn heterogeneous returns that increase with wealth. I then document that entrepreneurs' firms display substantial heterogeneity in size: firm capital stock, employment and revenues all rise sharply across the entrepreneurs' wealth distribution.

Finally, using Compustat data, I show that larger firms in terms of revenues and employees exhibit higher markups.
As a second step, I develop a simple static model to illustrate how entrepreneurs' production elasticities with respect to capital - and hence with respect to wealth taxation - depend on the assumptions on their market power. To study the shape of production elasticities under several market power assumptions, I consider entrepreneurs operating in monopolistic competition and facing Kimball (1995) demand for their products. This modeling choice allows me to obtain demand curves for entrepreneurs' varieties with either constant or variable price elasticity of demand. Within this framework, I analytically show that an entrepreneur's production elasticity with respect to capital positively depends on the price elasticity of demand faced and negatively on the rate at which that elasticity declines. Intuitively, a reduction in available capital raises an entrepreneur's marginal cost and reduces output. However, this "production pass-through" is low when demand elasticity is low, as most of the cost increase is transmitted to prices. This result implies that both the level and the distribution of entrepreneurs' markups - and hence of the demand elasticities they face - are key determinants of the aggregate production elasticity of the economy with respect to the tax. This constitutes a novel insight for the public finance literature.
As a third step I show that, not only the production elasticity with respect to the tax depends on the market power of entrepreneurs, but also the capital elasticity with respect to the tax. To make this point I build a rich dynamic, stochastic, general equilibrium model which I employ to quantify the distortionary and redistributive wealth tax effects under different market power assumptions. In this dynamic setting, entrepreneurs choose not only production and markups but also the amount of capital to allocate to their own business through consumption-saving and portfolio decisions. Each entrepreneur invests a fraction of wealth in his privately owned business - whose return depends on his idiosyncratic entrepreneurial productivity - and allocates the remainder in a mutual fund - conveying capital to a "corporate" sector and yielding a risk-free return. While privately-owned businesses have no access to capital market and entirely rely on entrepreneurs' capital supply as source of financing, firms in the corporate sector have unlimited access to capital markets[1]. In this dynamic economy, I assume that, in addition to entrepreneurs, there are workers who supply labor, receive stochastic labor income, and invest only in the same risk-free asset available to

[1]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.

entrepreneurs.
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 and the concentration of entrepreneurs at the top of the wealth distribution are matched. In this setting I implement a *permanent* wealth tax policy on the wealth in excess of the 99% percentile of the wealth distribution, which raises 1% of GDP and whose tax-revenues are uniformly lump-sum redistributed across workers and entrepreneurs in the economy. I then compare the steady-states of the model with and without the tax, both when entrepreneurs impose variable markups (increasing in firm's market share) and constant (homogeneous) markups.
First, I show that the wealth tax reduces wealth accumulation of the wealthiest entrepreneurs and the drop in steady-state aggregate capital is 2.6 percentage points smaller in the economy with markups heterogeneity. This is because in the economy with markups heterogeneity the top wealth tax primarily hits high-markup entrepreneurs, that I show feature low capital elasticity to the tax[2]. The finding that entrepreneurs' markups distribution matters for shaping the aggregate capital elasticity to the tax is a novel contribution of this paper.
Combining this result with the lower production elasticity to the tax in the heterogeneous markup economy, I find that GDP losses due to the tax are 1.1 percentage points smaller in the economy with markup heterogeneity. The smaller GDP losses also reflect a reduction in markup-induced distortions generated by the tax. In particular, the tax burden falls disproportionately on high-markup entrepreneurs, leading to a decline in the economy's aggregate markup. This reduction, in turn, exerts a positive effect on equilibrium output.
I then show that when accounting for market power heterogeneity across entrepreneurs the redistributive wealth tax effects are larger. In the steady-state with wealth taxation implemented the policy generates larger revenues in the setting with markups heterogeneity across entrepreneurs. Hence, in this economy poor workers benefit from a larger transfer. Second, the smaller drop in production the economy with markups heterogeneity is associated with a smaller drop in labor demand and hence in equilibrium wage. In the economy with markups heterogeneity, hence, the wealth

[2]The reason is that the elasticity of marginal profits to capital - and hence the sensitivity of capital accumulation choices to taxation - depends on the demand elasticity entrepreneurs face.

tax reduces equilibrium wage 1.4 percentage points less than in the economy with no markups heterogeneity. Finally, the reduction in the aggregate markup previously highlighted determines an increase in the labor share of income accruing to workers by 0.4%, a redistributive effects that would be neglected if we studied the wealth tax effects under constant markups.

Contribution to the literature: this paper is the first to examine how imperfect competition shapes the effects of top wealth taxation. While Guvenen et al. (2023) also study wealth taxation in a setting with imperfect competition, their framework assumes homogeneous and constant markups across entrepreneurs. Similarly to Boar and Midrigan (2023), their focus lies in comparing wealth and capital income taxation rather than in exploring the role of market power in determining tax outcomes. Existing studies on top wealth taxation emphasize its distortionary effects on capital accumulation (Jakobsen et al., 2020) and on entrepreneurial effort and productivity (Chari et al., 2025). This paper shows that the magnitude of these distortions crucially depends on entrepreneurs' market power. In particular, while the wealthiest entrepreneurs are the most productive, they also exhibit the lowest elasticities of capital and output with respect to taxation.

This paper also contributes to the literature studying cases where tax policies can generate efficiency gains. Piketty et al. (2014), Rothschild and Scheuer (2016), Scheuer and Slemrod (2021), and Gaillard and Wangner (2021) show that taxing the income or wealth of rent-seeking agents can improve overall efficiency. I explore a novel mechanism through which wealth taxation produces such gains: by reducing the aggregate markup in the economy, the tax mitigates the production distortions associated with market power.

Furthermore, this work connects to the recent literature on optimal policy design in the presence of heterogeneous markups across entrepreneurs. Boar and Midrigan (2022) and Edmond et al. (2023) focus on optimal firm subsidies, while Eeckhout et al. (2025) study optimal profit and labor income taxation in a static Mirrleesian framework with entrepreneurs operating in oligopolistic competition. In contrast, I analyze a dynamic economy to highlight and quantify how market power heterogeneity shapes the aggregate elasticities of capital and production in response to taxation.

Finally, this paper relates to the literature showing that the Pareto tail of the wealth distribution arises naturally in models with return heterogeneity (Benhabib et al., 2015; Benhabib and Bisin, 2018). A contribution of this work is to demonstrate that even when heterogeneous returns stem not only from stochastic productivity but also from entrepreneurs' endogenous markup choices, the resulting wealth distribution is consistent with the empirically observed Pareto tail.

Layout: the Manuscript is structured as follows. Section 2 presents the empirical evidence, Section 3 introduces the static framework and discusses the relationship between entrepreneurs' production elasticity with respect to capital and their market power. Section 4 simulates the static model showing how the elasticity of aggregate production with respect to the tax and equilibrium wage depend on entrepreneurs' market power assumptions. Section 5 presents tax simulations in the quantitative dynamic model, highlighting the role of market power assumptions in shaping the aggregate capital elasticity with respect to the tax. Section 6 concludes.

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. Using Compustat data I then document a positive relationship between firms' size and the markups they impose.

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 U.S. 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)[3].

2.2 Entrepreneurial activity across the wealth distribution

Table 1 shows that net wealth in the U.S. is extremely unequally distributed, with around 37% of total wealth accruing to the wealthiest 1% of households. Noticeably, entrepreneurial wealth (i.e. the wealth held 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.

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 held in these businesses, compared to other investment opportunities.

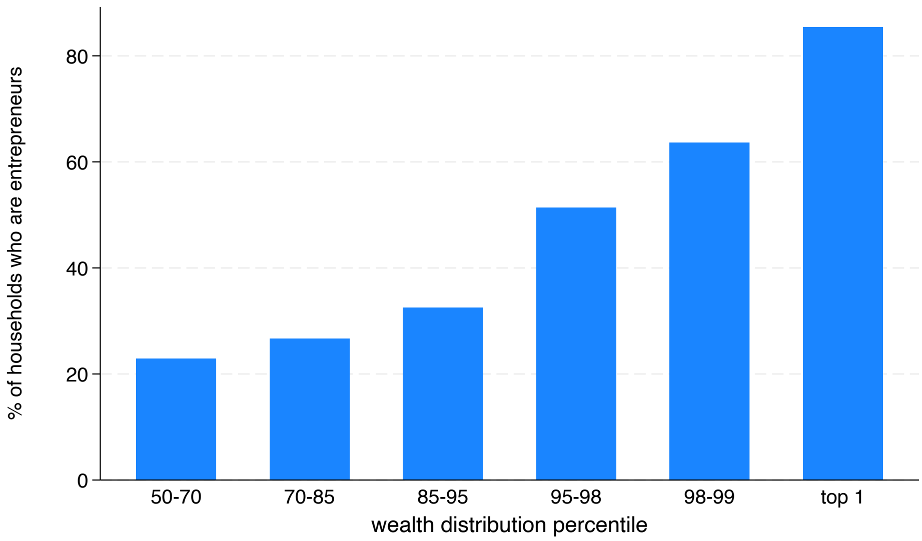
[3]Alternative definitions of entrepreneur employed by the literature consider as an entrepreneur an household responding affirmatively to 1., or 1. and 2. (e.g. Boar and Midrigan (2022)). In any case, the empirical findings I will present do not significantly change when employing alternative definitions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

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 U.S. households belonging to different percentiles of the wealth distribution. Column 3, instead, reports the share of wealth held in directly managed private businesses by the wealthiest x% of U.S. entrepreneurs. For details on the definition of entrepreneur see Section 2.1. Data from 2019 Survey of Consumer Finances.*

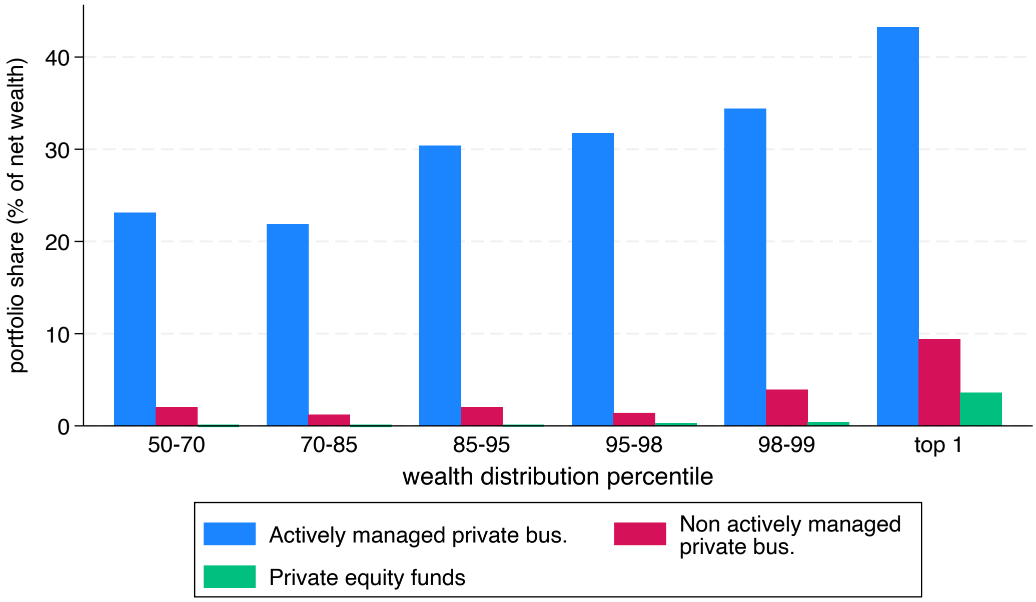
FIGURE 1. *Fraction of US households defined as entrepreneurs across the wealth distribution*



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 fills this gap by reporting the portfolio share (i.e. fraction of net wealth) that U.S. entrepreneurs hold in actively managed private businesses (blue columns). Notice that the fraction of net wealth held 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

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*

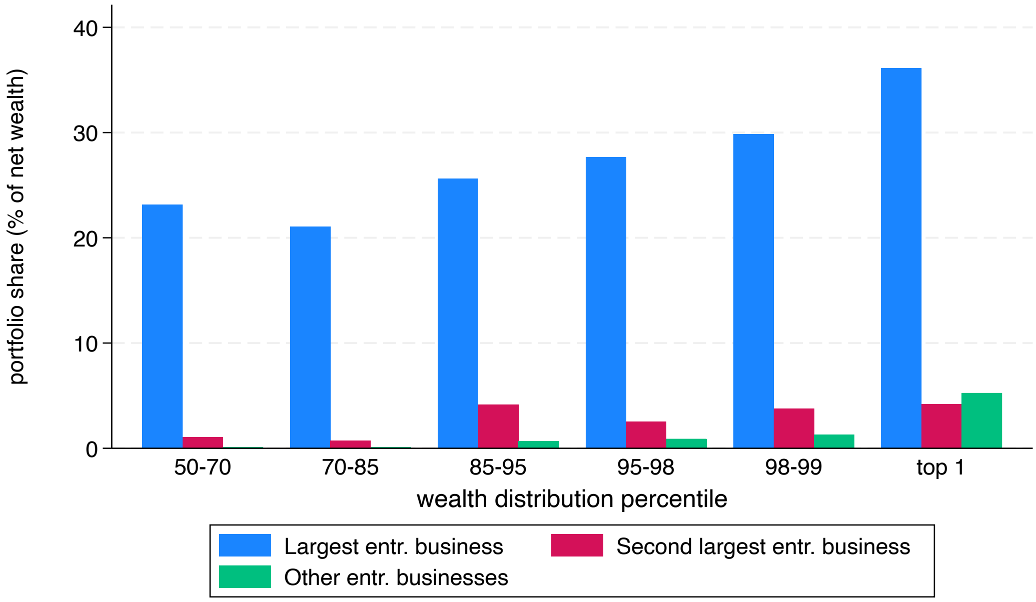
wealth he confers to his own entrepreneurial activities, suggesting that the size of the entrepreneurs' firms, in terms of capital endowment, increases across the wealth distribution. One potential concern on the previous statement is that capital conferred by each entrepreneur is diluted across many entrepreneurial activities. As shown in Figure 3, this is not the case.

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.

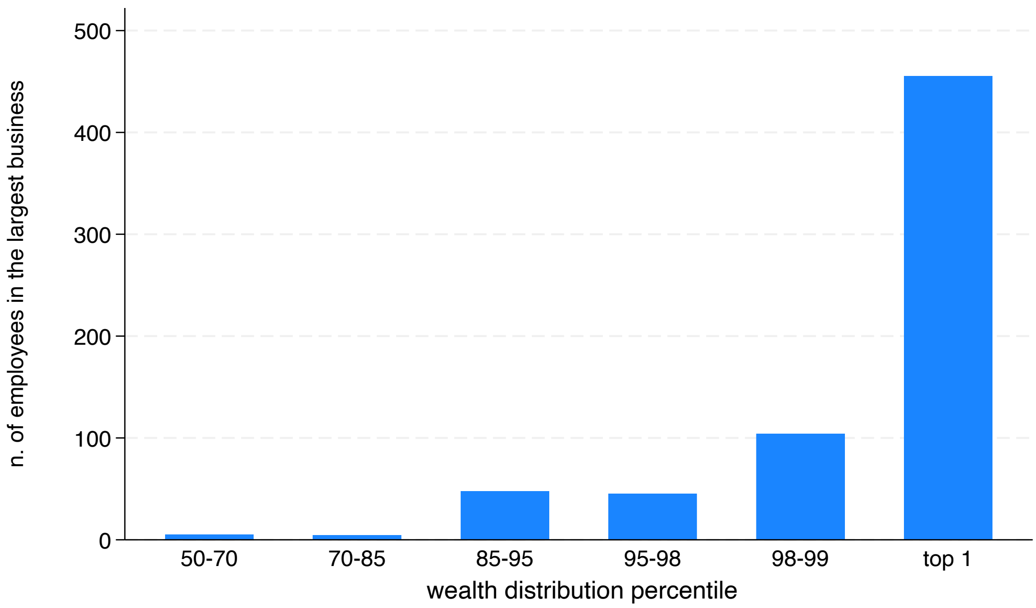
This pattern is reported in Figure 4, which plots the average number of employees in the largest business of each entrepreneur, for several wealth percentiles bins. A similar pattern could be observed when analyzing the number of employees working in the second largest business owned by each entrepreneur, as well as in further businesses. As Figure 16 (Appendix C) shows, a similar result holds for firms' revenues, i.e. the firms owned by entrepreneurs at the top of the wealth distribution have much larger

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*

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* revenues than firms owned by entrepreneurs at lower percentiles.

2.3 Returns to entrepreneurship

Entrepreneurs at the top of the wealth distribution not only own larger firms than poorer entrepreneurs (both in terms of capital endowment, employees and revenues), but they also receive larger returns to their entrepreneurial investment.
To estimate returns to entrepreneurship the following variables of the SCF data 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[4]. 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

[4]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

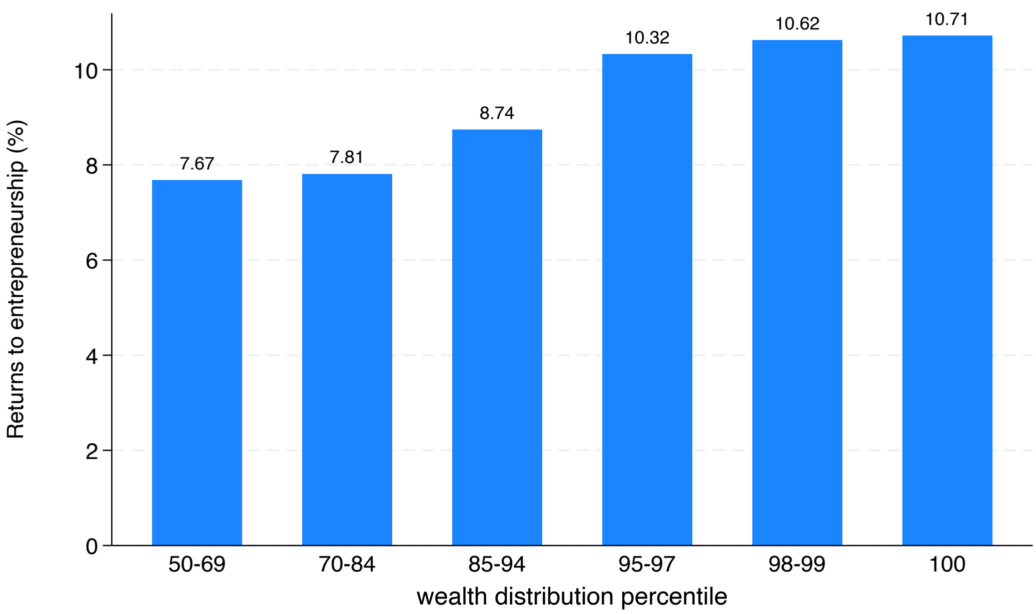
for graduating college and a dummy for gender. I then use the estimated coefficients to compute the fitted wage for those entrepreneurs not reporting any salary. Finally, I obtain the imputed yearly salary by multiplying the wage rate for the total hours worked in a year. This imputation procedure is 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, I compute:

$$R^i = \left(1 + \frac{3NI^i}{EV^i}\right)^{\frac{1}{3}} - 1$$

Notice that this is the same measure of annualized returns (SCF is a triennial survey) to private equity investment computed by Moskowitz and Vissing-Jørgensen (2002), Kartashova (2014), Xavier (2021) using the SCF data. By averaging R^i 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 R_p. The returns estimated through this procedure are reported in Figure 5.

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*

Figure 5 shows that returns to entrepreneurship are increasing across the wealth distribution. In particular, the wealthiest 5% of U.S. 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 U.S. 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 U.S. 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 U.S.

2.4 Firm size and product market power

The previous empirical evidence shows that wealthier entrepreneurs own larger firms in terms of capital, revenues and employees. Do larger firms also possess greater market power? To address this question, I focus on the relationship between firm size and their product market power, measured by firms' markups. In the standard Cournot model, as well as in more recent frameworks of monopolistic and oligopolistic competition with variable markups, a positive relationship between firm size and markups generally holds (Autor et al., 2020; De Loecker and Syverson, 2021; Edmond et al., 2023). Breaking this relationship requires very restrictive assumptions on the demand function faced by entrepreneurs for their products (Biondi, 2022). However, the SCF data do not allow for a direct test of this relationship, as they lack information on firms' production costs necessary to estimate firm-level markups. To overcome this limitation, I use Compustat data (1980-2019), which provide financial statements for all listed U.S. firms. Following the production approach of De Loecker et al. (2020), I estimate firm-level markups and regress them on firm size, measured by both employment and revenues. The results are reported in Table 2. Columns (1) and (2) show regressions of firm-level markups (as measured by De Loecker et al., 2020) on firms' employment shares (defined as a firm's employees divided by total employment in a given year), including year and sector fixed effects. Columns (3) and (4) instead report regressions of firm-level markups on firms' revenue shares (revenues of a firm over aggregate firms' revenues in a given year), again controlling for year and sector fixed effects. The results indicate a positive and significant within-sector relationship between markups and firm size among listed U.S. firms.

The main limitation of this approach is that Compustat includes only listed firms, which are different - and on average larger - than the privately owned businesses in the SCF data. Nonetheless, Autor et al. (2020) show that a positive relationship between firm size (measured by total assets) and markups also holds in the U.S. Census of Manufactures data, which cover both listed and unlisted firms.

TABLE 2. *Markups - firm size correlation*

	log(markup) (1)	log(markup) (2)	log(markup) (3)	log(markup) (4)
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.*

Overall, in light of this suggestive evidence and consistently with standard models of oligopolistic and monopolistic competition, it is then reasonable to expect that wealthier American entrepreneurs manage larger firms imposing larger markups.

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 elasticities to the tax 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[5].

Workers: are identical and they all inelastically supply a unit of labor. All workers receive the same wage, 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[6]. 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-

[5]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".

[6]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:

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

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:

$$C(Y, \{p_i\}_{i\in[\omega,1]}) = YC(1, \{p_i\}_{i\in[\omega,1]})$$

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

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 price 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 demand of entrepreneur i to produce $\mathcal{Q}_i^*(z_i, k_i, w, P, Y)$:

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

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[7]. 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 $\Upsilon_i(\cdot)$[8].

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

[7]Notice that if $\mathcal{E}_i^d(q) \leq 1$ then equation (4) admits no solution
[8]Assumption 2 will be satisfied by the functional forms for $\Upsilon_i(\cdot)$ that I will employ in the following Sections of the paper.

are:

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

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. As showed in Lemma 3 (Appendix A) under Assumptions 1 and 2 profits are increasing in entrepreneurs' skills z_i and wealth k_i.

3.3 Production elasticities

How do entrepreneurs' production elasticities depend on the assumptions on entrepreneurs' market power? The answer to this question is of crucial importance to study how wealth taxation (or any other policy which redistributes capital across entrepreneurs) affects entrepreneurial choices and as a consequence economic aggregates. 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. Finally, denote as $\epsilon^{\mathcal{E}_i^d} = \left| \frac{\partial \mathcal{E}_i^d}{\partial q_i} \frac{q_i^*}{\mathcal{E}_i^q} \right|$ the super-elasticity of demand, i.e. the rate at which the elasticity of demand varies with relative production. The following Proposition summarizes the properties of the elasticity of relative production with respect to capital:

Proposition 1. *Let Assumption 1 hold. For all entrepreneurs $i \in [\omega, 1]$ the relative production elasticity with respect capital is:*

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

Hence, the relative production elasticity with respect to capital positively depends on the demand elasticity $\mathcal{E}_i^d(q_i^*)$ and negatively on the super-elasticity of demand $\epsilon^{\mathcal{E}_i^d}(q_i^*)$.

Proof: see Appendix A

To get intuition on this result consider the following two cases:

- First, suppose 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 positive capital shock because of the rapid fall of his marginal revenues. In other words, when the entrepreneurs' marginal revenues decline very steeply, he finds optimal to "pass through" his decrease in marginal costs (due to the increase in capital) to prices, rather than on higher quantities produced.

Since $\sigma_i > 1$[9], it holds $\nu < \epsilon^{q_i^*,k_i} < 1$, and the production elasticity takes its maximum value when the entrepreneur has no market power ($\sigma_i \to \infty$) and the minimum when the entrepreneur has the largest degree of market power ($\sigma_i \to 1$).

- Now suppose entrepreneur i faces a demand curve with *variable elasticity of demand* 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) shows that his production elasticity is lower than the production elasticity of an entrepreneur facing a *constant* elasticity of demand curve with demand elasticity at the same level $\mathcal{E}_i^d(q_i^*)$. Intuitively, when the elasticity of demand declines with quantity, marginal revenue falls more steeply as output expands. Consequently, the entrepreneur's incentive to raise production in response to a positive capital shock is weaker, leading to a lower elasticity of production.

This result suggests that the assumptions on entrepreneurs' market power critically shape how entrepreneurs change their production in response to a wealth tax that reduces their capital availability. The simulations of this simple model in Section 4 will illustrate the implications for aggregate production and general equilibrium effects induced by the tax.

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) $(c_i^*)_{i\in[0,1]}$, rela-

[9]If $\sigma_1 < 1$ the problem of the entrepreneur would not admit a solution.

tive quantity functions $(\mathcal{Q}_i^*(z_i, k_i, w, P, Y))_{i\in[\omega,1]}$, labor demand functions $(\mathcal{N}_i^*(z_i, k_i, w, P, Y))_{i\in[\omega,1]}$, profit functions $(\Pi_i^*(z_i, k_i, w, P, Y))_{i\in[\omega,1]}$ 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

I now identify the production distortions induced by markups in this economy, so to study, in the next section, how wealth taxation affects them. The aggregate production Y can be written 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 weight is given by the relative quantity produced by each entrepreneur i.

In this setting aggregate production Y is distorted by markups imposed by entrepreneurs through two channels: the *level* of markups (captured by 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:

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

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

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

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 of production times a markup. If markups are increasing in firm size (i.e. when $\partial\mathcal{E}_i^d(q)/\partial q < 0$) 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 and hence production Y.

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 production 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[10] (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[11]. 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 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):

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

[10] 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: $\{50-70p., 70-85p., 85-95p., 95-98p., 98-99p., top\ 1\}$

[11] 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.

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.*

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[12]. 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 17 (Appendix C) shows that the calibrated model closely replicates the observed returns to entrepreneurial investment.

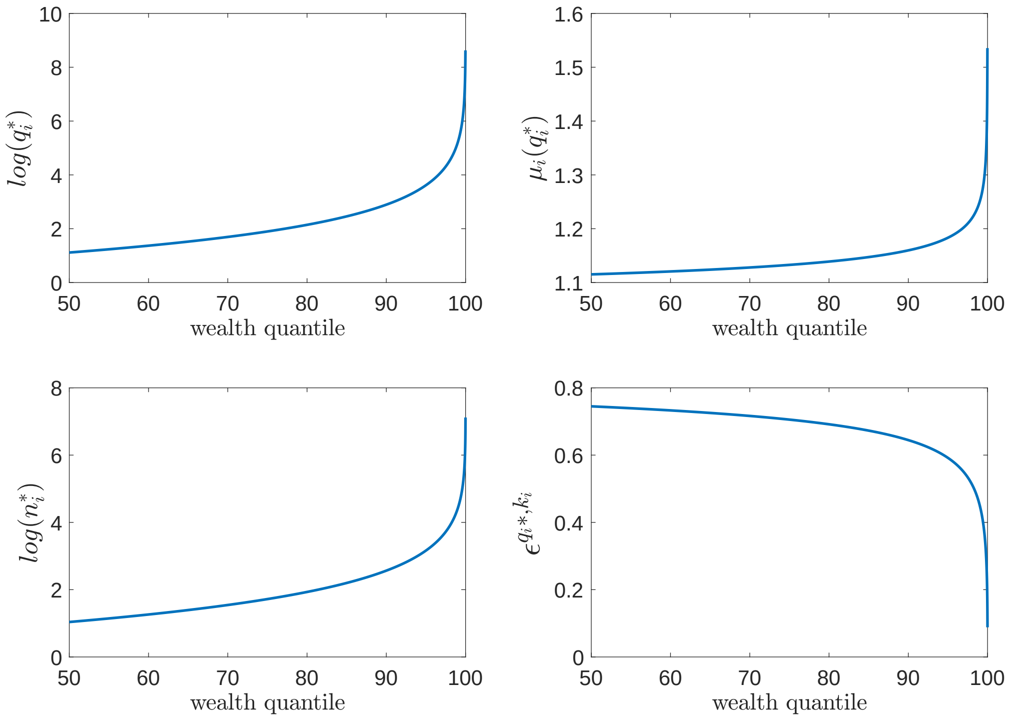
TABLE 4. *Distribution of markups (cost-weighted)*

	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.*

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

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.*

Simulation results: Figure 6 shows the simulated relative quantities, markups, labor demand and production 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 of Manufacturers data. This includes both listed and unlisted firms - and hence it is more representative of the entire American firm population - although it captures less firms at the very top of the size (and hence markups) distribution.

The bottom-right panel of the Figure shows the production elasticities of entrepreneurs with respect to capital. Notably, entrepreneurs at the top of the wealth distribution feature lower production elasticities than poorer entrepreneurs. This is because wealthier entrepreneurs produce at a larger scale and hence face demand curves with lower price elasticities[13] (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 imposed 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:

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

and the lump sum transfer T satisfies:

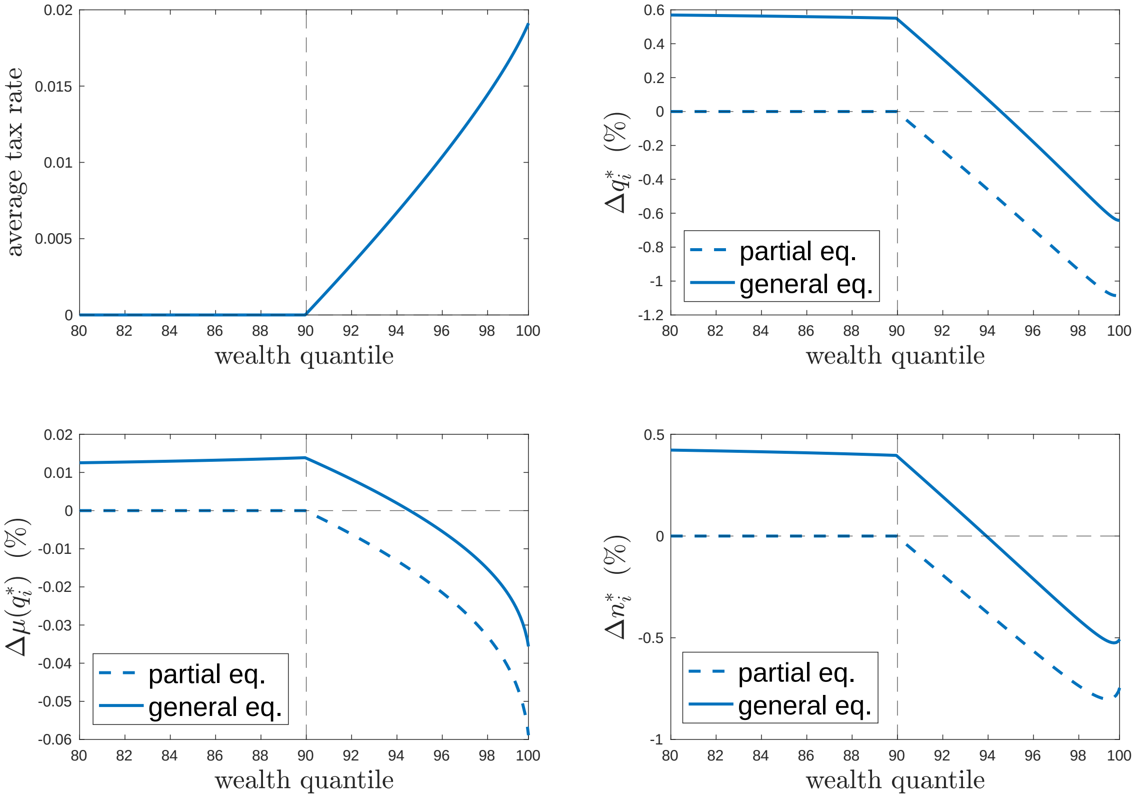
$$
T = \int_{\omega}^{1} \tau \max\{k_i - \underline{k}, 0\} di
$$

Just for illustrative purposes I 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).

Effects on entrepreneurial choices: Figure 7 illustrates the effects of the aforementioned wealth tax policy on entrepreneurial decisions across the wealth distribution.

[13] Notice that the super-elasticity of demand under this model parametrization is $\epsilon^{\mathcal{E}_i^d}(q) = \frac{\psi}{\sigma}$ for all q and for all entrepreneurs $i \in [\omega, 1]$

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 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 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)). Now consider the effect of the wealth tax on the 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 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 ($\Delta Y = -0.25\%$ and

$\Delta w = -0.21\%$[14]).

4.2 Taxing wealth with constant market power

I now study how the distortionary and redistributive effects of the wealth tax change when entrepreneurs are assumed to impose the same heterogeneous, yet constant, markups. The analysis is conducted within an economy matching the same moments of 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 $\sigma_i > 1$ 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

[14]These figures will be useful to compare the strength of general equilibrium effects under different market power assumptions in the next section.

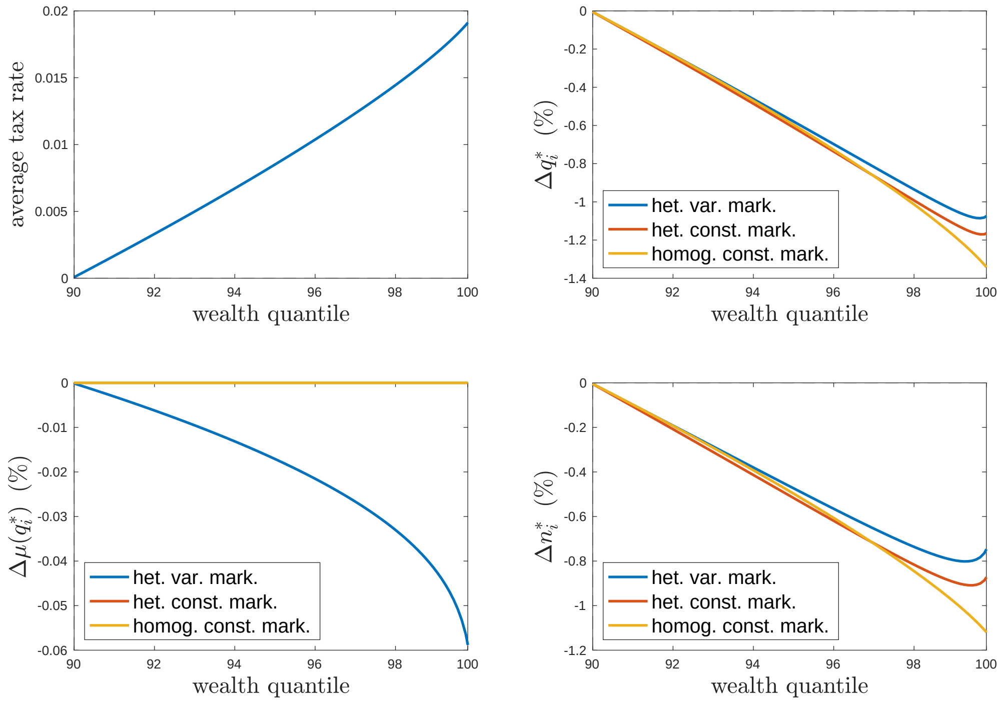
at the same quantile in the variable markups model. In this way I perfectly replicate the markup distribution across entrepreneurs obtained in the variable markups model. I then re-parametrize this model so to match the same targets matched in the economy with variable markups. In particular, to match the observed returns to entrepreneurship distribution I need to suitably change the parameters of the entrepreneurial skills distribution x_z, η_z. The remaining parameters, instead, remain unchanged. Table 9 (Appendix C) summarizes the chosen parameter values. Figure 18 (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 entrepreneurs i. Again, the parameters of the entrepreneurial skills distribution $Pa(x_z, \eta_z)$ are adjusted so to match the observed return distribution. Table 10 (Appendix C), summarizes the parameter choices and Figure 19 (Appendix C) shows that the calibrated model is able to closely replicate the observed return distribution.

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 8 and 9.

Let's begin by examining the partial equilibrium effects of the wealth tax, as shown in Figure 8. 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 (Proposition 1). 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 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.

FIGURE 8. *Wealth tax effects comparison: partial equilibrium*

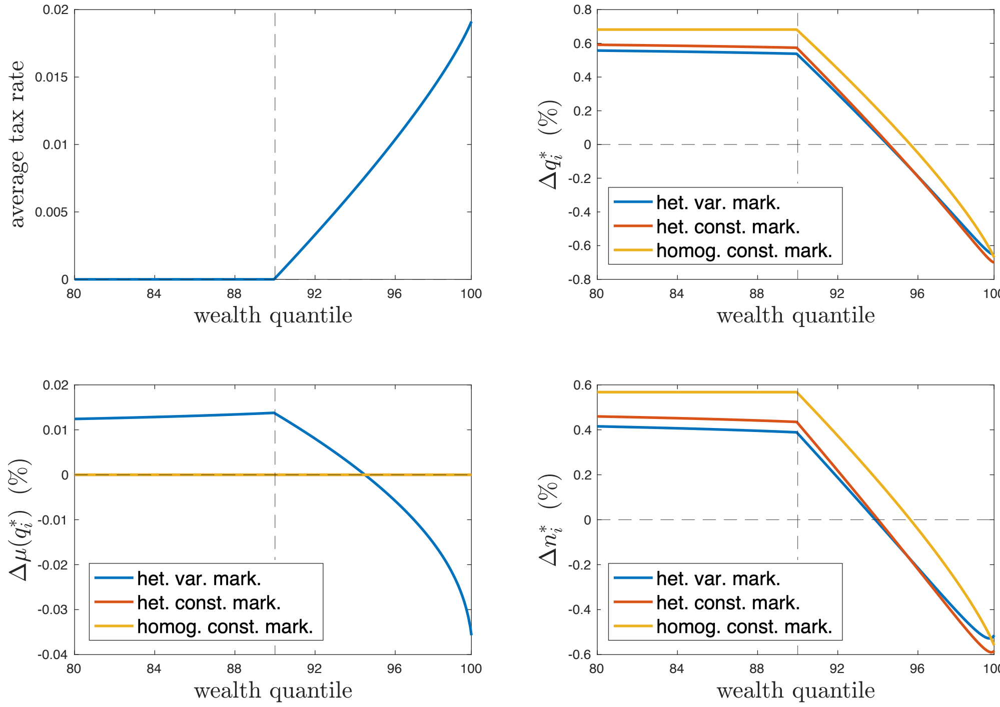


Notes: *Figure represents the partial equilibrium effects (i.e. keeping w, Y, P fixed) of the wealth tax described in Section 4.2 with $\tau = 0.02$ on entrepreneurs' production choices. Blue lines represent the effects of the wealth tax in the economy in which market power positively depends on firm's 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.*

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 is the one in the economy with homogeneous markups, and the smallest in the

FIGURE 9. *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.*

economy with variable and heterogeneous markups.

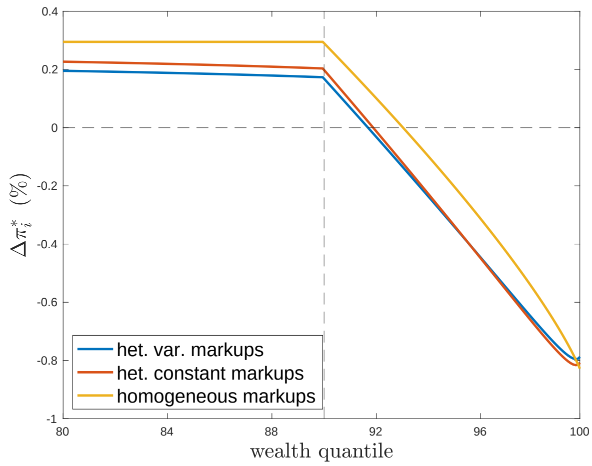
Hence workers, although receiving the same transfer in the three economies, experience the lowest reduction in their equilibrium wage in the economy where entrepreneurs impose heterogeneous and variable markups. The redistributive effect of the wealth tax is thus the largest in that case. Figure 9 reports 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 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 10 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 10. *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 quantitative model

In this section I develop a dynamic, stochastic, general equilibrium model with workers and entrepreneurs. The objective of the Section is twofold. First, this framework allows me to study how the top wealth tax distorts entrepreneurs' capital accumulation under different assumptions about their market power. In particular, I compare the effects of a top 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. Then, appropriately calibrating the model, I quantify how much the steady-state wealth tax effects differ in the two considered scenarios. Through this exercise I show that accounting for the observed market power heterogeneity across American businesses, reduces the drop in production and wages induced by the tax by 40%.

In this model I assume 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 privately owned entrepreneurial businesses (credit constrained) in this economy coexist corporations with unlimited access to the capital market and perfectly diversified ownership. This production structure allows me to capture the distortionary effects of wealth taxation that go through lower capital availability for entrepreneurs - and hence for their privately owned businesses - but also through higher cost of financing for corporations[15].

5.1 Setup

The model is infinite horizon and 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 by investing either in their own risky business - earning profits - or in a mutual fund that pays the risk-free rate r_t. To capture the heterogeneity in entrepreneurs' portfolio choices observed in the data (see Section 2), I assume that each entrepreneur i with skill level z_t^i invests a fraction $\phi_t^i = \phi(z_t^i)$ of his wealth in his own business. The remaining share, $1-\phi_t^i$, is invested in a mutual fund that channels capital to the economy's "corporate sector" (more details about this sector will follow). The portfolio choice ϕ_t^i is assumed to depend solely on entrepreneurial skill, allowing the model to reproduce in a simple reduced-form way the empirical pattern whereby the wealthiest (and most productive) entrepreneurs hold a larger fraction of their wealth as equity in their own firms. Entrepreneurs'

[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

businesses, 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. This modeling assumption allows to capture that these privately owned businesses heavily rely on entrepreneurs' savings and on some collateralized borrowing as the main source of financing (Dyrda et al., 2018).

The timing of each entrepreneur's choices is the following. Let x_t^i denote the cash-on-hand of entrepreneur i, that is his wealth, net of depreciation plus capital income. 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 mutual fund. At the beginning of period $t+1$ his new productivity level z_{t+1}^i realizes, and given this information - and the pre-determined capital - 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 mutual fund $r_{t+1}(1-\phi(z_t^i))a_t^i$. 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, each worker is assumed to supply labor inelastically to the two sectors of the economy: ℓ^E units to the firms owned by entrepreneurs and ℓ^C units to the "corporate" sector. Workers do not own firms; hence, apart from supplying labor each period, they choose only how much to consume and how much to invest in the same risk-free asset available to entrepreneurs.

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 the mutual fund 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:

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

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. 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 and P_t is the aggregate price index.

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 a given state vector (x, e, z).
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:

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

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

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

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

The recursive problem of each entrepreneur is instead:

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

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 mutual fund.
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:

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

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 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 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

[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 $z = z' = 0$.

economy 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. 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.

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 repli-

[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,*

cate 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 object. 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 20 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 11 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 11 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 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

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

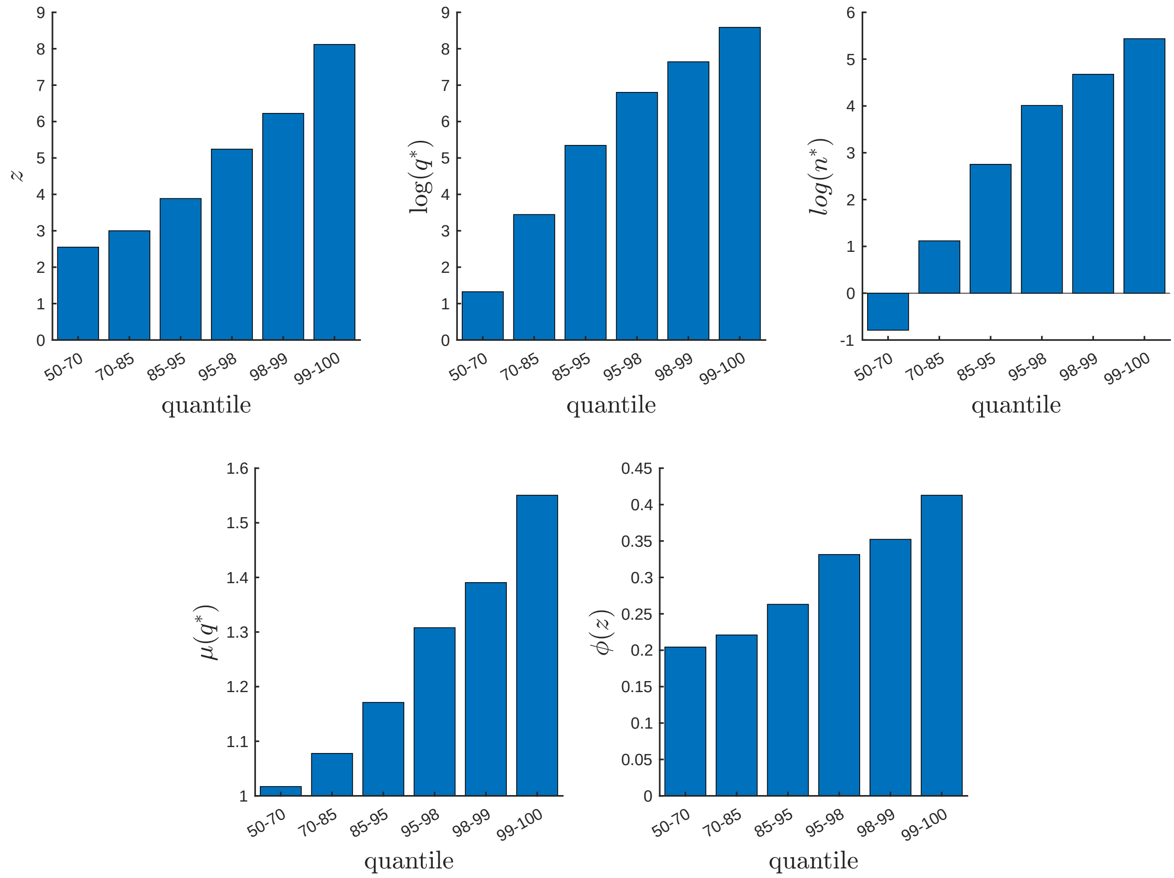
Notes: *the Table summarizes key moments of the U.S. wealth distribution, comparing empirical estimates with the model's steady-state counterpart. The second column reports wealth shares by percentile bins computed from the 2019 SCF. The third and fourth columns present the corresponding simulated moments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

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 12-13 (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 skill distribution is less skewed than the one employed in

FIGURE 11. *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*

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 entrepreneurs replicate those described in Figure 11 with the only difference that now all entrepreneurs impose the same constant markup. Fur-

[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.

thermore, 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

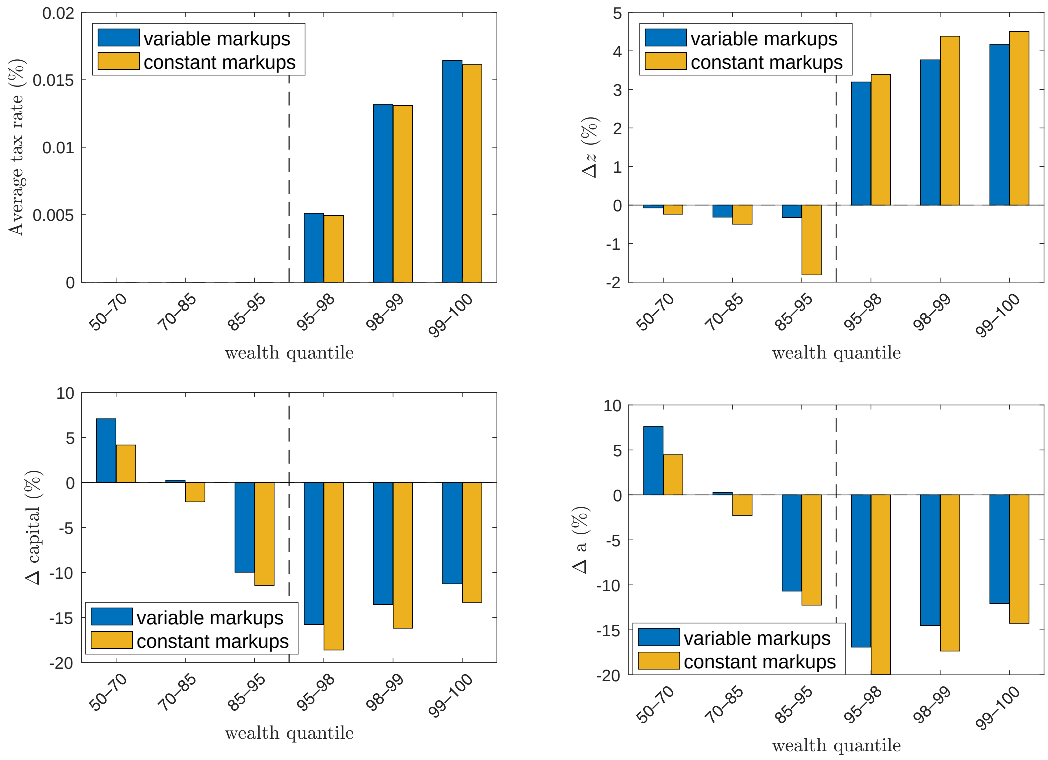
Suppose that the economy is at the previously calibrated steady-state. Let's implement a *permanent* top wealth tax policy identical to the one analyzed in Section 4 of the paper. In every period t, the tax function which associates to an household i (both workers and entrepreneurs) with wealth a_t^i 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 12 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 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.

FIGURE 12. *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.*

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 12). 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 12 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.

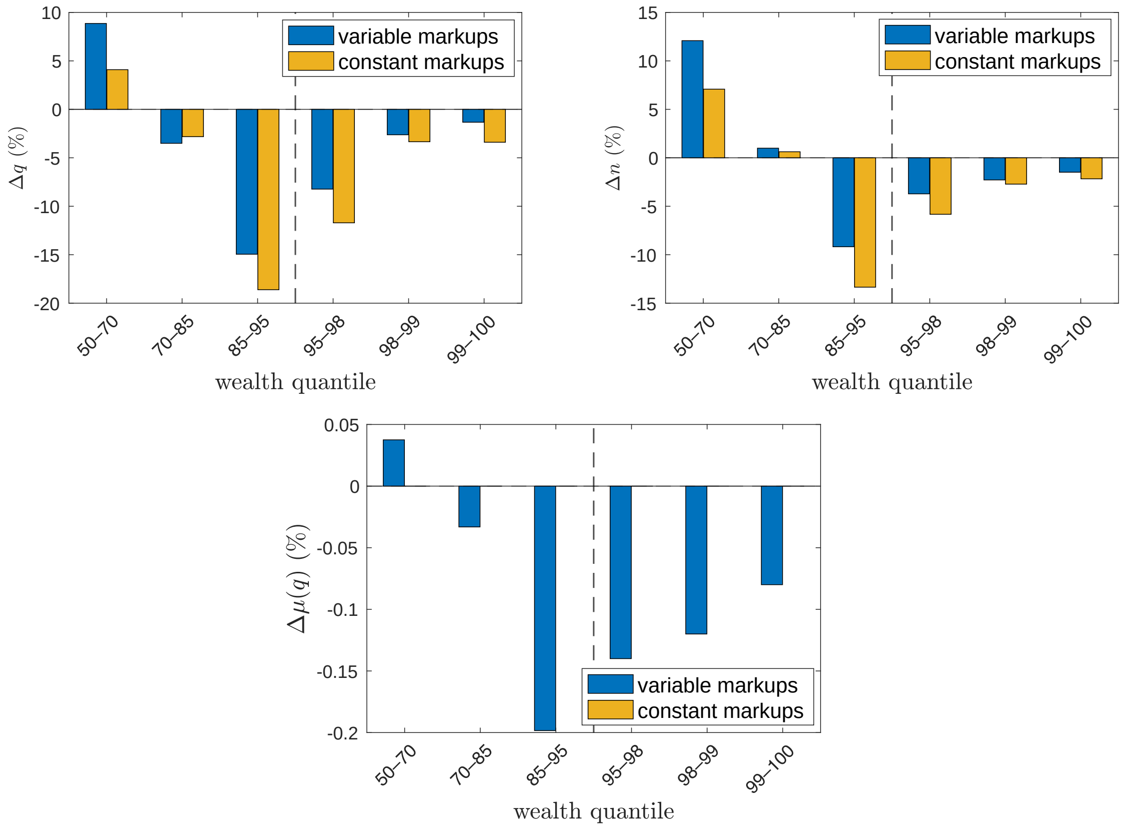
Finally, the fourth panel of Figure 12 shows the effect of the wealth tax on the overall wealth held by entrepreneurs at the steady state. Notice that the displayed patterns closely follow these of entrepreneurs' capital choices. This is simply because of the chosen exogenous portfolio rule linking capital and wealth of all entrepreneurs $k = \phi(z)a$.

Figure 13 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 12. 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 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,

FIGURE 13. *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.*

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 12) 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).

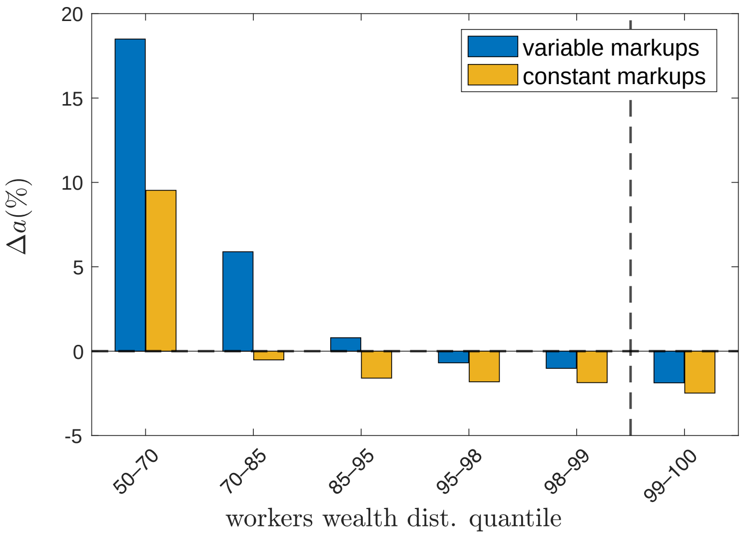
Since in this economy the equilibrium wage received by workers is a weighted average between the salaries in the two sectors in which they work, i.e. entrepreneurial and corporate, the workers in the economy with no-markups heterogeneity experience a reduction in average equilibrium wage which is 1.4 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 14 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.

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 $\mathcal{M}$*

FIGURE 14. *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 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.

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Appendices

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:

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

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:

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

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:

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

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 $q_i^* = \mathcal{Q}_i^*(z_i, k_i, w, P, Y)$ □

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 of Proposition 1: Consider equation (4) and re-write it as:

$$F_i(q_i) = P\Upsilon_i'(q_i) q_i^{-\frac{\nu}{1-\nu}} \Lambda (z_i k_i^{\nu})^{\frac{1}{1-\nu}} - \mu_i(q_i) = 0$$

where $\Lambda = \left(\frac{wY^{\frac{1}{1-\nu}}}{1-\nu}\right)^{-1}$ and we employed q_i rather than q_i^* to lighten notation. To use the Implicit function theorem compute:

$$\begin{aligned}
\frac{\partial F_i}{\partial q_i} &= (z_i k_i^{\nu})^{\frac{1}{1-\nu}} P\Lambda \left[\Upsilon_i''(q_i) q_i^{-\frac{\nu}{1-\nu}} - \frac{\nu}{1-\nu}\Upsilon_i'(q_i) q_i^{-\frac{\nu}{1-\nu}-1}\right] - \frac{\partial \mu_i(q_i)}{\partial q_i} \\
&= -(z_i k_i^{\nu})^{\frac{1}{1-\nu}} P\Lambda\Upsilon_i'(q_i) q_i^{-\frac{\nu}{1-\nu}-1}\left[\left(\mathcal{E}_i^d(q_i)\right)^{-1} + \frac{\nu}{1-\nu}\right] - \frac{\partial \mu_i(q_i)}{\partial q_i}
\end{aligned}$$

Now compute:

$$\frac{\partial F_i}{\partial k_i} = P\Upsilon_i'(q_i) q_i^{-\frac{\nu}{1-\nu}} \Lambda (z_i k_i^{\nu})^{\frac{1}{1-\nu}} \frac{\nu}{1-\nu}\frac{1}{k_i}$$

First, notice that $\frac{\partial \mu_i(q_i)}{\partial q_i} = -\frac{1}{(\mathcal{E}_i^d(q_i)-1)^2}\frac{\partial \mathcal{E}_i^d(q_i)}{\partial q_i}$. Using the implicit function theorem and simplifying:

$$\frac{\partial q_i}{\partial k_i}\frac{k_i}{q_i} = \frac{\nu}{1-\nu}\left[\left(\mathcal{E}_i^d(q_i)\right)^{-1} + \frac{\nu}{1-\nu} - \frac{1}{(\mathcal{E}_i^d(q_i)-1)^2}\frac{\partial \mathcal{E}_i^d(q_i)}{\partial q_i}\frac{q_i}{P\Upsilon_i'(q_i)q_i^{-\frac{\nu}{1-\nu}}\Lambda(z_i k_i^{\nu})^{\frac{1}{1-\nu}}}\right]^{-1}$$

Using again equation (4) notice that: $P\Upsilon_i'(q_i)q_i^{-\frac{\nu}{1-\nu}}\Lambda(z_i k_i^{\nu})^{\frac{1}{1-\nu}} = \mu_i(q_i)$. Using this result into the previous equation delivers:

$$\begin{aligned}
\epsilon^{q_i,k_i} &= \frac{\nu}{1-\nu}\left[\left(\mathcal{E}_i^d(q_i)\right)^{-1} + \frac{\nu}{1-\nu} - \frac{\partial \mathcal{E}_i^d(q_i)}{\partial q_i}\frac{q_i}{\mathcal{E}_i^d(q_i)}\frac{\mathcal{E}_i^d(q_i)-1}{(\mathcal{E}_i^d(q_i)-1)^2}\right]^{-1} \\
&= \frac{\nu}{1-\nu}\left[\left(\mathcal{E}_i^d(q_i)\right)^{-1} + \frac{\nu}{1-\nu} + \frac{\epsilon^{\mathcal{E}_i^d}}{\mathcal{E}_i^d(q_i)-1}\right]^{-1}
\end{aligned}$$

which is the required expression for the elasticity of production with respect to capital.

□

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:

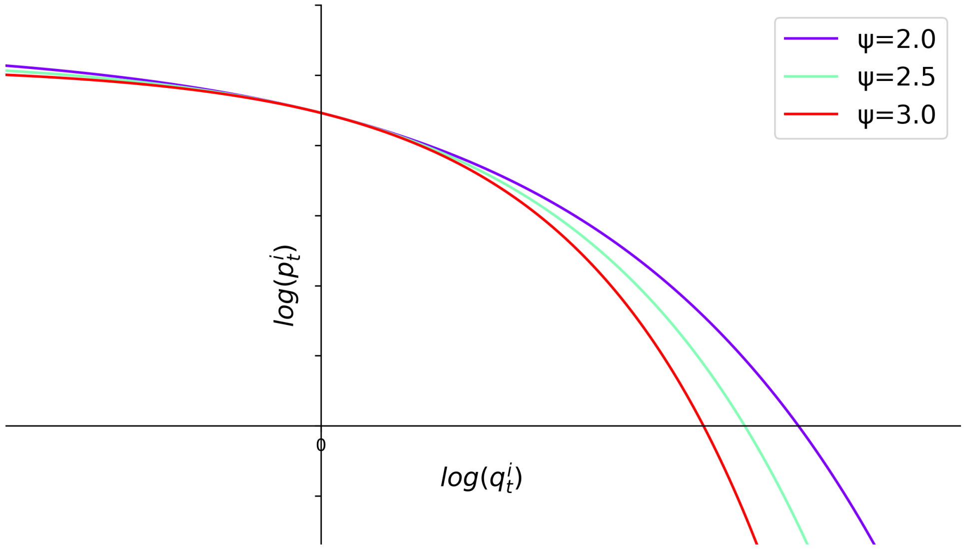
$$\Gamma(s,x) := \int_x^{\infty} t^{s-1}e^{-t}dt$$

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

FIGURE 15. *Demand for the intermediate goods with Klenow and Willis functional form for $\Upsilon(\cdot)$, $\sigma = 6$ and varying values for ψ*



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:

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

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. *Model with const. and homogeneous 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	location par. entr. ability dist.	0.15	observed returns to entrepreneurship
η_z	scale par. entr. ability dist.	5.5	observed returns to entrepreneurship
σ	demand elasticity	6	$\mathcal{M} = 1.2$
α_0	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	186	min. wealth = 1
α_1	$k_i = k(z_i) = \alpha_0 z_i^{\alpha_1}$	3.96	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 11. *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 12. *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 13. *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 14. *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

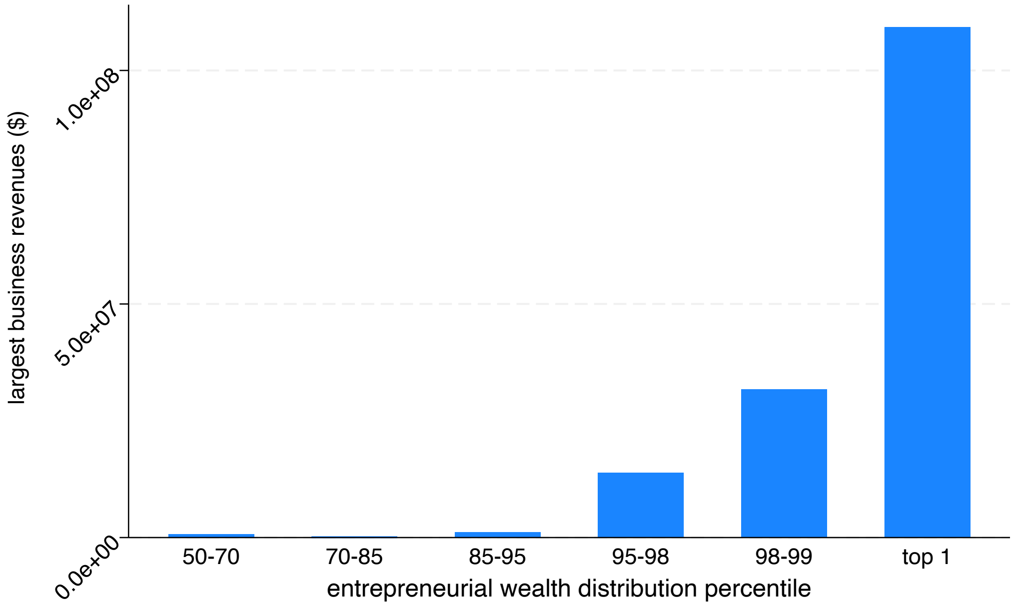
Notes: *the Table summarizes the calibrated parameters values of the model with endogenous occupational choice and entrepreneurs facing demand function for their own variety with variable elasticity of demand. The first column indicates the symbol used to identify the parameter in the model, the second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

TABLE 15. *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)

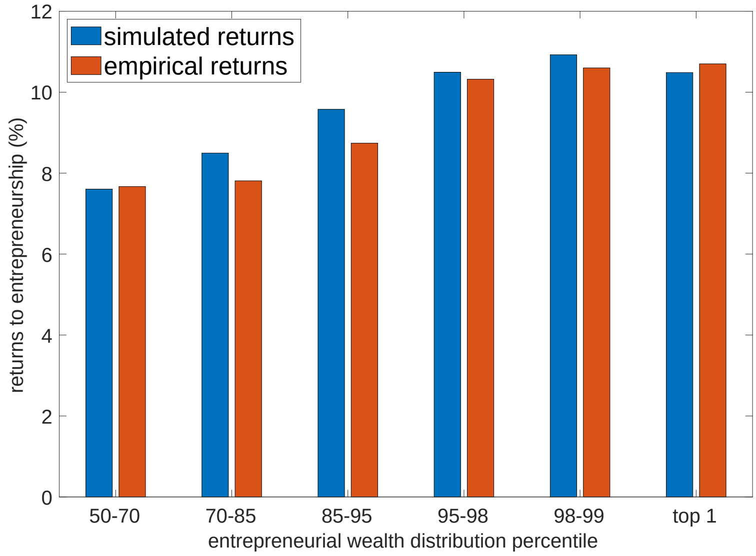
Notes: *the Table summarizes the calibrated parameters values of the model with endogenous occupational choice and entrepreneurs facing demand function for their own variety with constant elasticity of demand. The first column indicates the symbol used to identify the parameter in the model, the second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

FIGURE 16. *Revenues in largest (private) actively managed business*



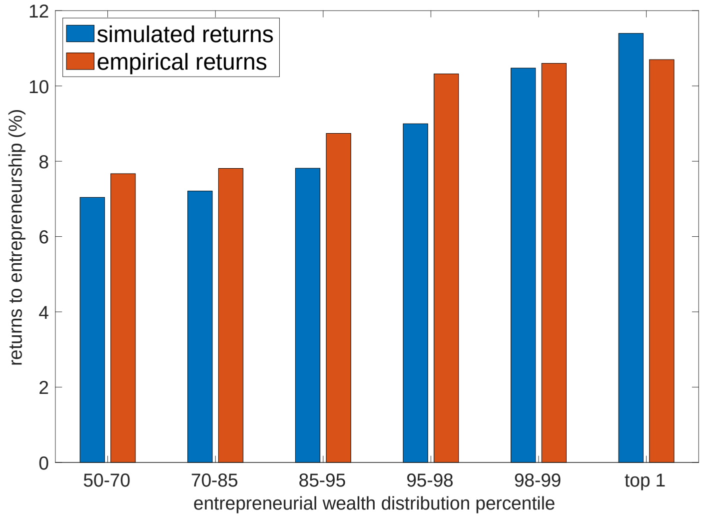
Notes: *the Figure reports the average revenues in the largest private actively managed business across the wealth distribution. The value of each column is computed by averaging the number of employees in the largest actively managed business across entrepreneurs belonging to the same wealth percentile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

FIGURE 17. *Simulated vs empirical returns to entrepreneurship: markups increasing with firm's market share model*



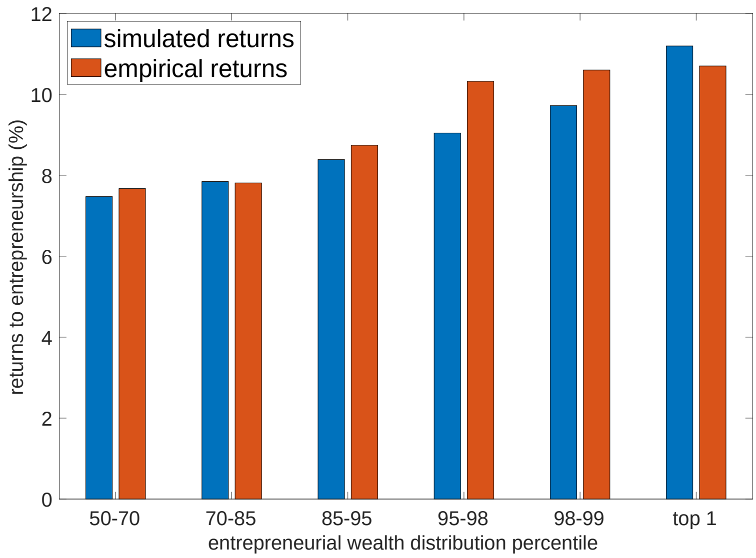
Notes: *the Figure reports the simulated returns to entrepreneurship (blue) and the estimated returns to entrepreneurship (orange). The simulated returns are computed by averaging across wealth percentiles bins the average returns π_i/k_i (for calibration details see Table 3). The estimated returns are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

FIGURE 18. *Simulated vs empirical returns to entrepreneurship: heterogeneous and constant markups model*



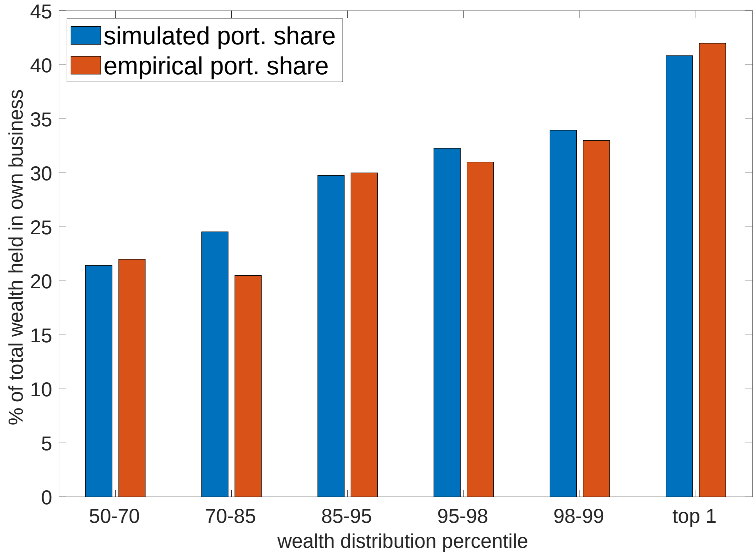
Notes: *the Figure reports the simulated returns to entrepreneurship in the model in which entrepreneurs impose heterogeneous but constant markups (blue) and the estimated returns to entrepreneurship (orange). The simulated returns are computed by averaging across wealth percentiles bins the simulated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

FIGURE 19. *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 20. *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

[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.

(2016) 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:

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

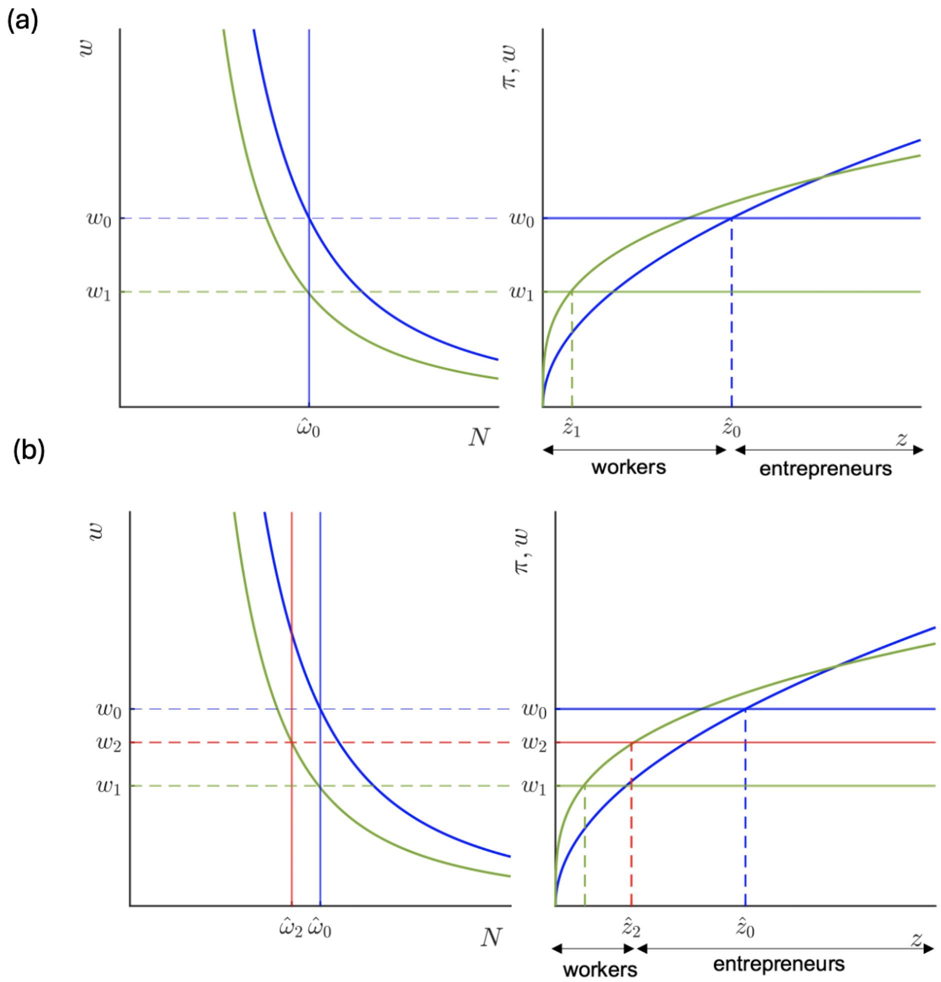
- Kimball aggregator is satisfied:

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

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 14 and 15.

D.2 Wealth tax experiment with occupational choice

FIGURE 21. *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.*

Figure 21 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 10 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 21 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 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 16. 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 3-4 of Table 16.

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) re-

TABLE 16. *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*

duces 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.