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Wealth Taxation and Entrepreneurship

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Abstract

This paper studies wealth taxation in a heterogeneous agent economy with entrepreneurship. Entrepreneurs face borrowing constraints and stochastically receive the opportunity to sell their firm to outside investors. With the help of a novel panel dataset on household wealth, I show that this possibility for entrepreneurs to sell their firm is crucial to simultaneously account for both the stylized facts of the wealth distribution and year-to-year changes in wealth. In a subsequent policy experiment, I show that the effects of a wealth tax depend on how frequently entrepreneurs receive the opportunity to sell their firm. In an economy where this probability is low, taxing wealth reduces output by affecting the capacity of entrepreneurs to invest in their firm. In an economy where entrepreneurs can easily sell their firm, taxing their wealth has little aggregate effect. The policy implication is that improving financial markets reduces the output losses due to a wealth tax.

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1 Introduction

The main facts of the U.S. wealth distribution are that in 2003 the net income and wealth Gini indexes are 0.38 and 0.78 and the top 5% and 1% own resp. 58% and 33% of all household wealth. Entrepreneurs, although representing only ca. 11% of households, hold about 41% of total household wealth, and they represent 50% and 62% of households in the top 5% and 1%.

What are the effects of a wealth tax in an economy where entrepreneurs are overrepresented among the wealthy? In economic models without entrepreneurs, the effects of taxing wealth are straightforward and well known. It raises the interest rate and reduces investment. However, this approach misses an important empirical fact: the burden of a wealth tax is mainly borne by a very specific and small subgroup of households, the wealthy, among which there are many entrepreneurs. Suppose for instance that, due to imperfect financial markets, entrepreneurs rely on their personal wealth when creating and growing their firms. Then taxing wealth would diminish entrepreneurial investment and firm-creation. Since entrepreneurial firms contribute directly to the overall productivity level of the economy, the negative effects of a wealth tax would then go much further than the well-known effect on the capital level. Suppose now to the contrary that the wealthy are in fact retired entrepreneurs who "cashed in" and sold their firm. In that case a wealth tax has very little distortive effects, since it is mainly borne by agents whose wealth is not vital to the growth of credit-constrained entrepreneurial firms, and therefore has no positive external effects on productivity.

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2 Theoretical approach

"Simple" saving behavior cannot explain the skewness of the wealth distribution. Models that try to replicate the US wealth distribution using as sole source of heterogeneity idiosyncratic non-insurable shocks to labor income (in layman terms: variable income) fail quantitatively. The reasons for the quantitative failure of these type of models reveals the inherent difficulty of a quantitative replication of the wealth distribution: the "rich" have very little incentive to save. The only motivation for saving in such a setting is consumption smoothing and precautionary saving (i.e. staying away from your credit limit). The latter does not apply to the rich and the former, driven by a simple risk tradeoff, is not enough to replicate the existing wealth inequalities under reasonable assumptions, given the low interest rate in these models. Simply put, to replicate the US Lorenz curve, the rich have to save much more that would be rational for them from a consumption-smoothing viewpoint. There are essentially three ways out of this problem: (1) changing the income process of the rich, (2) changing the saving behavior of the rich and (3) changing the return to investments of the rich.

The first two option are not so promising. One can implement the first option by making the upper incomes hugely variable so as to induce high saving rates by the rich for consumption-smoothing reasons. The issue is that the conditional variance in income needed to match the data is implausibly high. In layman terms: the variations in income needed to make such a model quantitatively relevant are not realistic. One can implement the second option by making some agents (the eventual rich) more patient. Taken at face value, the resulting wealth inequality would then be the consequence of the optimal saving behavior of a few very patient agents, leaving no role for entrepreneurship. Again, this is in contradiction with the facts.

The third option can be implemented by adding varying entrepreneurial talent and bequests to an otherwise standard model. Specifically, one constructs a simplified life-cycle model with young and old agents where entrepreneurs are defined by the fact that they can create their own firm, i.e. they are lucky enough to be born with a high-yield diminishing-returns individual-specific technology. They are withheld from exploiting their entrepreneurial ability to the fullest extend (i.e. before diminishing returns kick in) by a borrowing constraint and need to put up a fraction of the capital required for their firm. Thus entrepreneurs save in order to increase the capital in their own firm and exploit its high returns. Properly calibrated, this model replicates both the extreme wealth concentration in the US and the entrepreneurial wealth distribution very well.

In the context of such a model, several authors have studied taxation. In particular, one paper looks specifically at estate taxation in a carefully calibrated quantitative model with inheritable entrepreneurial talent. The authors show that lowering the estate tax would have a positive effect out the capital level and on output by affecting the investment capacity of larger firms. However, their sobering conclusion is that, although output and capital are unambiguously increased, a repeal of the estate tax would yield a welfare loss, most agents (the non-super rich) loose slightly more from the new taxes than they gain from the repeal of the estate tax and its consequences on investment and wages. The driving force in this

(and other) results is that interfering with the capacity of entrepreneurs to reinvest their accumulated wealth has non-negligible effects on aggregate productivity since it reduces the size of the entrepreneurial sector. Simply put: taxing capital tightens the borrowing constraint of those who are the best investors. No papers considers the possibility that entrepreneurs with sufficiently large firms may "cash-in" and retire, leaving the firm to an outside, non credit-constrained, investor.

In my research funded by the Kauffman Foundation, I study the quantitative effects of a wealth tax on aggregate productivity by constructing a quantitative heterogeneous-agent general-equilibrium model that explicitly allows for the wealthy to be of two types: active entrepreneurs, who crucially need their wealth to grow their firms, and the inactive wealthy, ex-entrepreneurs or their offspring, who have "made it" and who simply manage their wealth but play no direct role in production. In my model, as in real-life, entrepreneurs are credit-constrained and can only borrow a multiple of their own assets. I introduce a probabilistic opportunity for entrepreneurs to sell their firm and "cash in" on their accumulated equity. If they do so, they sell their firm to an outside investor who is not financially constrained and runs the firm at its efficient scale. At the intuitive level I argue that this second mechanism is a key determinant of the effects of a wealth tax: in a model where entrepreneurs cannot sell their firm, a wealth tax would by construction be particularly detrimental since personal wealth is the only means for entrepreneurs to grow their firm. Thus a wealth tax would affect aggregate productivity and wages by slowing down the rate of growth of entrepreneurial firms.

3 Data

Of course, such a model requires "empirical discipline", i.e., a reality check from real-world data. When calibrating the model, I provide empirical discipline by exploiting a new panel dataset of household wealth that I have constructed from high-quality Dutch administrative tax data covering the years 2005-2007. This allows me to construct a period-to-period wealth transition matrix showing the frequency of households transferring from one wealth-quantile to another. I show that the possibility for entrepreneurs to sell their firm allows me to account for a so-far overlooked dimension of the data, wealth mobility, that simpler models built solely on the patient accumulation of wealth by entrepreneurs cannot explain.

The Dutch Statistical Office[1] (CBS) provides an income panel dataset, the IPO. The IPO follows about 100,000 households through time at a yearly frequency and contains income and socio-demographic data on each individual. There is no attrition except for emigration and death (about 1.5% per year) and each year, the IPO is replenished with newborns and a representative sample of new immigrants. If a household changes composition from one year to another, say a child leaves the home or a couple divorces, these ex-household members drop out of the database. Only "core persons" are followed through time. I merge this dataset with the CBS dataset on household wealth statistics for the years 2005-2007. This dataset has 9 wealth components for each household: bank and savings account(s),

[1] Centraal Bureau voor de Statistiek, www.cbs.nl.

financial assets (except ownership of "substantial control"-shares[2]), owner-occupied home, other real estate, objects of value, two types of entrepreneurial wealth (unincorporated firms and substantially controlled incorporated firms), mortgage debt and other debt. With the exception of both forms of entrepreneurial wealth, all the data comes from the Dutch tax administration. I thus have a 3-year panel dataset on household wealth. Its strong point, aside from being a panel dataset, is that it contains only administrative and tax data, there is no survey data or self-reporting. I therefore avoid the usual biases associated with survey data such as errors in self-reporting, attrition bias, participation bias etc.

The Dutch tax authority keepa track of individuals' investment wealth and reappraise its value each year. This is done as follows. All individuals are assigned a "citizens number" at birth. This is the functional equivalent of a US Social Security number and uniquely identifies them and links them to their assets and debt. Investment wealth is defined as bank and savings account(s), financial assets (except ownership of "substantial control"-shares), real estate (except if owner-occupied), objects of value and, on the negative side, mortgage and other debt. Entrepreneurial wealth is defined as ownership of an unincorporated firms or substantial control of an incorporated firms, and, as explained above, is excluded from the wealth tax since entrepreneurial income is already taxed. It is straightforward to estimate the value of the components of investment wealth. Bank accounts, financial assets and all debt are directly reported by the financial institutions to the tax authority, using market values for stocks and bonds. Real estate values are reappraised every year by the municipality, which also taxes them separately. This is done by using the sale prices of real estate transactions nearby. Durable belongings such as cars and household electronics are not recorded with the exception of valuable art and antiquities, the so-called objects of value. These are self-reported by individuals (and cross-checked with insurance records during tax audits).

Entrepreneurial wealth is estimated and not directly taken from tax data. The proper economic estimate of the value of an entrepreneurial firm for which there is no obvious market value would be the net present value of future profits, using an appropriately risk-adjusted discount factor. Such a valuation is not possible in practice. If the entrepreneurial firm is unincorporated, the CBS uses the book value (i.e., the equity) of the firm. If the firm is incorporated, the CBS makes an estimate based on past dividends and, if possible, the market value of shares.

3.1 Main findings

Entrepreneurial households are defined as households with either entrepreneurial wealth or entrepreneurial income exceeding 20% of total net income. I use this low threshold since

[2]The Dutch income tax makes a distinction between labor income and investment income. Since entrepreneurial income is taxed differently from dividend income, there is an obvious tax optimization scheme for entrepreneurs who own an incorporated firm. They can either pay themselves a wage or a (tax free) dividend. To avoid this, dividend received from a company over which an individual has "substantial control" is taxed at a rate similar to the top bracket of the labor income tax and the value of these substantial-control shares is excluded from investment wealth for tax purposes. An individual is said to have substantial control over a firm if he or his family own more than 5% of all outstanding shares.

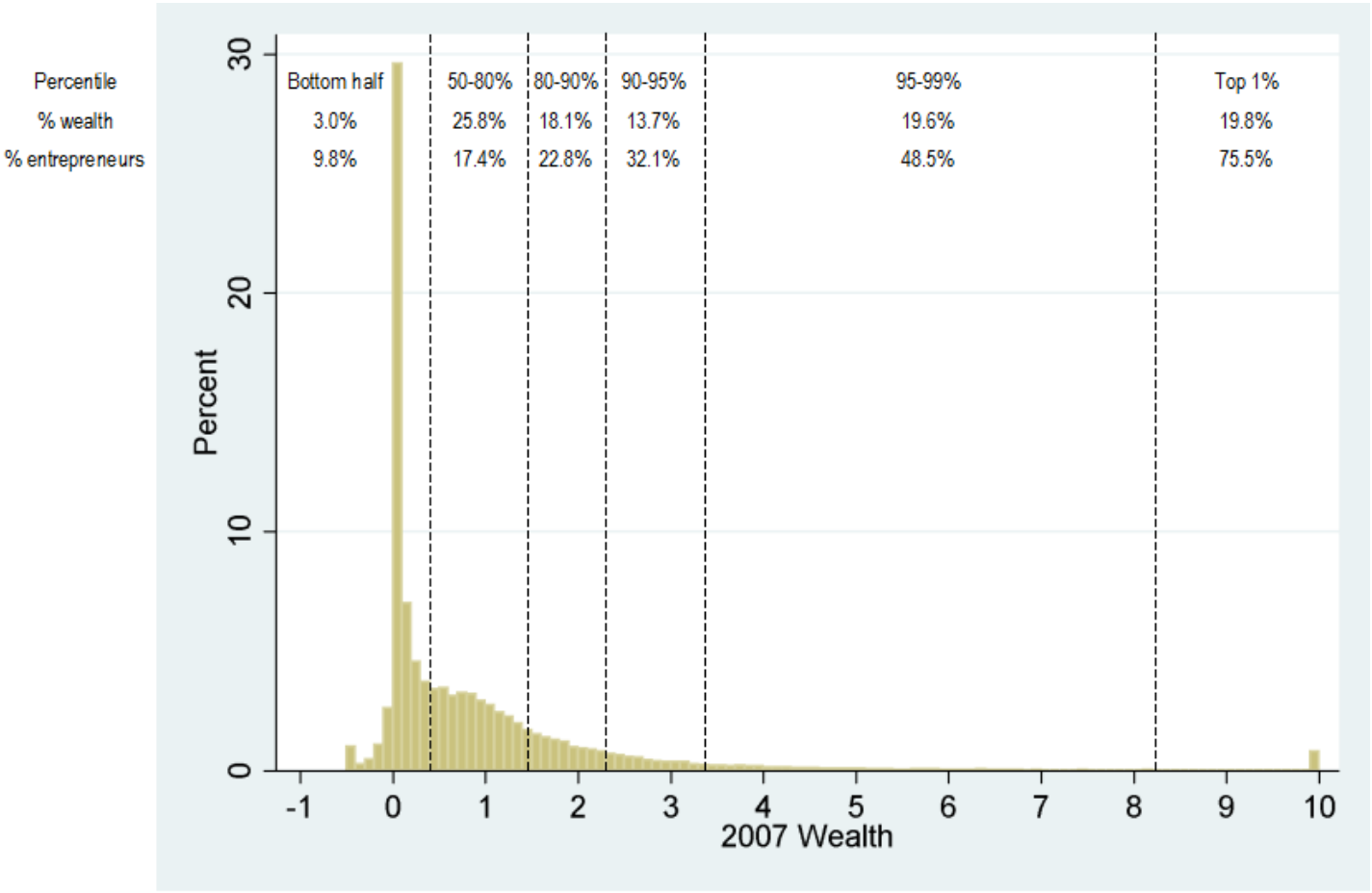

Figure 1. Distribution of net household wealth in The Netherlands on 12/31/2007. The x-axis is normalized by mean wealth (205,841€)

Percentile	max wealth		% of wealth	% entrepreneurs
0-50%	k€	80	3.0%	9.8%
50-80%	k€	296	25.8%	17.4%
80-90%	k€	471	18.1%	22.8%
90-95%	k€	693	13.7%	32.1%
95-99%	k€	1,777	19.6%	48.5%
99-100%			19.8%	75.5%

Table 1. Quantile characteristics of the distribution of net household wealth in The Netherlands on 12/31/2007.

households can have non-entrepreneurial income produced by other members, or one of the members can receive a wage from the entrepreneurial firm. With this definition, the number of entrepreneurial households in my dataset in 2007 is 16.7%. This definition, the only possible with the data at hand, has one drawback compared to the one usually used when working with U.S. survey data: it is too broad. When using U.S data, to fit the definition entrepreneurs must play a managing role in their firm and the self-employed are not counted. This implies that my count of entrepreneurs will be higher than the U.S. count and I won't observe status changes from one year to the next: entrepreneurs who sell out usually retain a fraction of their firm as an investment, which still identifies them as entrepreneurs in my dataset. As a reference point, when using my broader definition, the U.S. also has 16.7% of entrepreneurial households. With the standard, more narrow definition, that percentage is 7.6.

Graph 1 illustrates the household wealth distribution for 2007 for the Netherlands and Table 1 summarize the main distributional facts. Compared to the U.S., the usual stylized facts are qualitatively true for the Netherlands, albeit with less skewness. The Gini indexes for after-tax-and-transfers income and wealth are 0.31 and 0.74, and the top 5% and 1% own 39.4% and 19.8%, respectively, of total household wealth. Entrepreneurs own 38% of total Dutch wealth and Table 1 shows clearly that they are vastly overrepresented at the top of the wealth distribution. This is confirmed by Table 2, which shows the composition of wealth per quantile. Housing wealth is an important component of household wealth up to the 95^{th} percentile, but above that investment wealth and entrepreneurial wealth together are more important.

Next I turn towards wealth mobility. The question is to see by what extent household wealth changes each year. I exploit the panel structure of the dataset to follow households through time. As explained previously, the panel structure is built around "core" individuals, not households. If a core individual has a substantial change in household composition from one year to the next, a large spurious change in wealth could potentially show up in the dataset. Examples would be a marriage or a divorce, where a wealthy partner leaves or enters the dataset, or an 18-year old core-member leaving a wealthy family behind when leaving home to study. These observed changes in wealth are artifacts, since they correspond to

Percentile	0-50%	50-80%	80-90%	90-95%	95-99%	99-100%
Average wealth (2007 k€)	12.5	177	372	562	1,008	4,077
Bank account/savings (net)	86.1%	19.3%	18.0%	19.1%	17.8%	10.4%
Financial assets	14.1%	5.0%	5.6%	7.9%	13.4%	18.1%
Owner-occupied house (net)	−9.1%	70.3%	67.7%	58.5%	40.9%	14.6%
Other real estate (gross)	21.7%	6.7%	8.5%	12.5%	19.1%	13.5%
Entrepreneurial wealth (not incorporated)	19.4%	1.2%	1.7%	2.9%	5.4%	1.1%
Entrepreneurial wealth (incorporated)	0.4%	0.3%	0.6%	1.6%	7.3%	47.4%
Other wealth	2.1%	0.7%	1.0%	1.7%	3.0%	4.1%
Other debt	−34.7%	−3.5%	−3.2%	−4.2%	−6.9%	−9.2%

Table 2. Composition of wealth per quantile in The Netherlands on 12/31/2007.

wealth entering or leaving the dataset due to the structure of the dataset, not real changes in asset values. In order to correct for this, I drop these two cases (i.e., couples divorcing and students) from my dataset. Relative mobility in the wealth distribution, i.e., the wealth transition matrix, is summarized in Table 3.

2006/2007	0-50%	50-80%	80-90%	90-95%	95-100%
0-50%	91.1%	7.3%	**1.1**%	**0.3**%	**0.2**%
50-80%	9.2%	83.5%	5.8%	**1.1**%	**0.4**%
80-90%	2.3%	17.1%	71.0%	7.8%	**1.9**%
90-95%	1.9%	4.7%	16.0%	66.7%	10.5%
95-100%	0.8%	1.6%	3.2%	10.3%	84.1%

Table 3. Frequency of transition from one quantile to another.

The main two facts to take away from this Table are how different the diagonal is from 1 (which would mean perfect immobility of households in the wealth distribution) and the upper triangle. Although these percentages may seem low, it is important to stress that they apply to large quantiles and high levels of wealth, so in absolute terms they matter. The upper six percentages (in bold), for instance, represent 18% of all upwardly mobile households and 44% of all upwardly mobile wealth.

4 Results

A described in the introduction, I build a quantitative model that aims to replicate these facts. In my dissertation, I show that previous models are unable, by far, to replicate the wealth mobility as shown in the data. Table 4 shows how my model does in matching the wealth transition matrix from the data.

$n/n+1$	0-50%	50-80%	80-90%	90-95%	95-100%
0-50%	97.2%	2.4%	0.0%	0.0%	0.4%
50-80%	4.7%	92.7%	1.5%	0.0%	1.1%
80-90%	0.0%	9.5%	86.5%	2.3%	1.7%
90-95%	0.0%	0.0%	17.6%	78.4%	4.0%
95-100%	0.0%	0.0%	0.0%	16.8%	83.2%

Table 4. Frequency of transitions from one quantile to another for the main model.

I first compare the steady state output of my baseline model economy with and without a wealth tax. The conclusion is that a 1.2% wealth tax diminishes output by 1.5%, which puts the cost of 1€ of wealth tax income at 0.45€ of lost output. This is sometimes called the (marginal) cost of public funds. Furthermore, entrepreneurial output is reduced by more than total output through the negative effect of the wealth tax on the capacity of entrepreneurs to raise capital for their firms: the number of entrepreneurs is reduced by 1.9% and their output by 6.7%. Moreover, wages drop by 1.9%. It is important to notice that, since the interest rate is constant, all this is solely the effect of the wealth tax on entrepreneurs: in a model with no entrepreneurs (i.e., $\pi_\epsilon = 1.00$ in my model), there is no output lost at all due to the tax. Actually, the output lost by entrepreneurs accounts for 199% of total output lost, since the publicly-owned sector increases production due to the decrease in wages. This decrease in output can be attributed to two effects: fewer entrepreneurs and less entrepreneurial production. There are fewer entrepreneurs since more potential entrepreneurs have an initial asset level that does not make it profitable for them to start a firm. This accounts for 23% of the drop in entrepreneurial production. Second, entrepreneurs produce less, since they have less capital to run their firms. This accounts for the remaining 77% of the output drop. Lastly, the Gini index goes up since fewer entrepreneurs become rich by growing their own firm, but the same number still sells its firm.

I then conduct the following policy experiment. I assume the model economy is a small open economy with an interest rate fixed by the outside world. I make this assumption for two reasons. First, I use Dutch data to calibrate the model and The Netherlands are indeed a small open economy. Furthermore, a wealth tax affects domestic households but not foreign households. Therefore any upwards effects of a wealth tax on the interest rate would simply be a costless gain for foreign households: they would face the same risks as before when investing in the domestic economy but obtain a higher return. As long as there are no capital controls, the effects of this gain would be to attract more foreign investment until the interest rate is back to its previous equilibrium level. I introduce a wealth tax of $\tau_w = 1.2\%$ and compare the results for different values of π_ϵ, which is the yearly probablity for an entrepreneur to to sell his firm to an outisde investor (i.e., a proxy for well functioning financial markets). The results are summed up in Table 5.

The first observation is that economies with a higher π_ϵ have higher output, higher wages and less entrepreneurs. This is a direct consequence of the firm-selling mechanism: with

higher π_ϵ, more firms are run by outside investors who are not credit constrained. Hence at $\pi_\epsilon = 1.00$ the economy is fully efficient, all firms are run at their optimal size. Secondly, the effects on output of a wealth tax diminish when π_ϵ goes up. For a low π_ϵ, we have a 1.9% loss of output and a cost of 0.56€ per euro. For a high π_ϵ, these numbers are 0.3% and 0.10€. Of course, for $\pi_\epsilon = 1.00$ there is no output loss nor cost. This leads to the conlusion that improving the access of entrepeneurs to outside investors has two effects: it improves the allocative efficiency of capital (higher output), in the sense that entrepreneurial firms are farther from their efficient scale that publicly owned firms, and reduces the detrimental effects of wealth or capital taxation (lower drop of output when taxed), since firm size is less dependent on the personal wealth of entrepreneurs. Quantitatively, the first effect is 2-4 times larger than the second (depending on the starting value of π_ϵ).

In conclusion, the more entrepreneurs can sell their firm, the lower the negative effects of the wealth tax. In model economies with better financial markets output is higher and less affected by a wealth tax. In the context of my model, this leads to the policy conclusion that improved financial markets both increase output, by allowing more firms to be run at their efficient scale, and decrease the distortive effects of capital taxation by making aggregate investment less reliant on the personal wealth of entrepreneurs.

5 Conclusion

In my research, I make three contributions. First, I construct a quantitative model of entrepreneurship that includes a novel mechanism, namely entrepreneurs selling their firm. Secondly, I show the relevance of this mechanism by exploiting a new panel dataset that allows me to construct a matrix of wealth mobility, i.e., the frequency of households moving up or down the wealth distribution from one year to the next. I show that my model matches these new facts well whereas previous models of entrepreneurship do not. Thirdly, I study the effects of a wealth tax in my model concentrating on a small open economy. I compute an estimate of the output cost of a 1.2% wealth tax and show that the channel through which this wealth tax affects output is the drop in entrepreneurial capital, and thus of entrepreneurial firm size.

In a subsequent policy experiment, I study the effects of this wealth tax by letting the ease with which entrepreneurs meet an outside investor vary. I show that the easier it is for an entrepreneur to cash in on his accumulated equity and retire from his firm, the less a wealth tax diminishes output. In the extreme case where all entrepreneurs can immediately sell their idea, a wealth tax has no effect on output. Again, the channel of this effect (or lack thereof) is the role personal wealth plays in the capacity of entrepreneurs to grow their firm. In an economy where entrepreneurs can hardly find an outside investor, they are solely dependent on their own wealth to obtain credit for investments. In a world where investors are easy to find, personal wealth plays a much smaller role and hence its taxation has no effect on output.

For future research, it would be interesting to explore the role entrepreneurs could play in the growth rate of an economy. If one believes that entrepreneurs play a crucial role in

	$\pi_\epsilon = 0.05$			$\pi_\epsilon = 0.10$			$\pi_\epsilon = 0.25$			$\pi_\epsilon = 0.50$			$\pi_\epsilon = 1.00$		
tax rate (in %)	0.0	1.2		0.0	1.2		0.0	1.2		0.0	1.2		0.0	1.2	
output	0.963	0.945	(−1.9%)	1.000	0.985	(−1.5%)	1.056	1.045	(−1.0%)	1.099	1.095	(−0.3%)	1.138	1.138	(−0.0%)
wage	0.939	0.916	(−2.4%)	1.000	0.981	(−1.9%)	1.072	1.062	(−1.0%)	1.118	1.113	(−0.5%)	1.153	1.153	(−0.0%)
% of entrepreneurs	9.03	8.91	(−1.3%)	7.56	7.42	(−1.9%)	4.98	4.88	(−2.0%)	3.12	3.02	(−3.3%)	1.96	1.96	(−0.0%)
% of output produced by entrepreneurs	55.0	52.6	(−4.2%)	37.9	35.4	(−6.7%)	16.8	14.9	(−11.2%)	6.1	5.2	(−15.1%)	0.0	0.0	(−0.0%)
Gini index (in %)	77.8	80.2		74.2	77.2		69.4	72.9		66.1	70.2		64.1	68.4	
Cost (in €, see text)		0.56			0.45			0.28			0.10			0.00	

Table 5. Effects of a 1.2% wealth tax in function of π_ϵ (with constant r). Output and wage are given relative to the baseline case (i.e., $\tau_w = 0.0\%$ and $\pi_\epsilon = 0.10$). The cost of the tax is in €'s of output lost for 1€ raised by the wealth tax.

expanding the technological frontier, then this paper suggests a link between the growth rate of an economy, its wealth inequality and the functioning of its financial markets. Furthermore, one might then explore the effects of a wealth tax, or more general forms of capital taxation, on the growth rate of the economy through the effects such a tax might have on entrepreneurs' capacity to implement technological innovations.