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NUMERICAL ANALYSIS OF ENTREPRENEURIAL POLICY

by

RIFAT OZAN ŞENTÜRK

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APPROVED BY:

Assist. Prof. Dr. Eren İNCİ . . . .

(Dissertation supervisor)

Assist. Prof. Dr. Fırat İNCEOĞLU . . . .

Assist. Prof. Dr. Burcu TAŞOLUK . . . .

DATE OF APPROVAL . . . .

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ABSTRACT

NUMERICAL ANALYSIS OF ENTREPRENEURIAL POLICY

Rıfat Ozan Şentürk

M.A. in Economics

Supervisor: Assistant Professor Eren İnci

Entrepreneurship, wealth distribution, occupational choice, comparative statics, mean-preserving spread.

It is commonly criticized that some international organizations prescribe similar policies to countries with similar wealth levels. This paper shows the importance of the differences in the distribution of wealth in the design of policies. I focus on an occupational choice model developed by Inci (2008). After establishing the existence of a general equilibrium for a specific wealth distribution, I run numerical comparative statics exercises in order to analyze the effects of tax-subsidy policies on self-selection of entrepreneurs and welfare. The government runs under a balanced-budget regime. The base exercise considers an economy in which a tax on entrepreneurs used to subsidize workers improves self-selection and welfare. I then apply a mean-preserving spread on the wealth distribution that keeps total wealth (which is equal to the average wealth in the model) fixed. As a result of the spread in the wealth distribution, a tax on workers used to subsidize entrepreneurs becomes welfare improving.

ÖZET

GİRİŞİMCİLİK POLİTİKALARININ SAYISAL ANALİZİ

Rıfat Ozan Şentürk

Yüksek Lisans, Ekonomi

Tez Danışmanı: Yrd. Doç. Eren İnci

Girişimcilik, varlık dağılımı, mesleki seçim, karşılaştırmalı durağanlık analizi, ortalamayı koruyan yayılım.

Finansal durumu yaklaşık olarak aynı olan ülkelere, bazı uluslararası kuruluşların benzer politikaları önermesi genelde eleştiri çekmektedir. Bu tez, bu politikaların tasarımında ülkelerin varlık dağılımlarındaki farklılıkların önemini göstermektedir. İnci (2008) makalesinde kurulmuş olan bir mesleki seçim modeline odaklanılmıştır. Özel bir varlık dağılımı için genel dengenin varlığının ispatından sonra, vergi-sübvansiyon politikalarının girişimcilerin seçilimleri ve refah üzerindeki etkilerini analiz etmek için çeşitli sayıda karşılaştırmalı durağanlık analizleri yapılmıştır. Hükümet dengeli bir bütçe rejimi altında çalışmaktadır. Temel egzersiz, seçilim ve refahı iyileştirmek amacıyla işçileri sübvanse eden bir verginin girişimcilere uygulanması durumunu inceliyor. Sonrasında, varlık dağılımı üzerine toplam varlık seviyesini (modelde ayrıca bu ortalama varlık seviyesine eşittir) sabit tutan bir ortalamayı koruyan yayılım uygulandı. Bu yayılımın sonucunda girişimcileri sübvanse etmek için işçiler üzerine uygulanan bir verginin refah arttırıcı olduğu görüldü.

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CONTENTS

1. INTRODUCTION

Do tax cuts increase the level of entrepreneurial activity? Common belief, stated in Blanchflower and Oswald (1998), says it should be:

> Most Western governments provide encouragement and tax breaks to those who run small businesses. Politicians appear to believe that there are undesirable impediments to the market supply of entrepreneurship.

Meanwhile, economics literature does not seem to come to a consensus on whether tax cuts stimulate entrepreneurship. On the one hand, Carroll (2000) finds a positive correlation between tax cuts and entrepreneurship by analyzing the 1986 tax reform act. On the other hand, Parker (2003) showed that effects of taxation on the decision to participate in entrepreneurship in the first place are weak and non-robust. Moreover, Bruce and Mohsin (2006), used time-series evidence to show that in the end the results indicate that tax policies in isolation are not good instruments for generating changes in the level of entrepreneurial activity. Even if these tax policies change the number of entrepreneurs in the society, as shown in Blanchflower (2000, 2004) more number of entrepreneurs may not be better for the society. The main problem in all of these is the difficulty of identifying the real effects of such policies on the quality of entrepreneurs. As a result, one can easily ask the question that do tax cuts stimulate higher ability individuals to enter entrepreneurship? A consequent problem which will be the main question of this thesis regarding these is how to obtain country specific optimal policies. Should all governments use tax cuts in all cases or is there any room for some countries to increase taxes for improving self-selection of entrepreneurs?

This thesis is based on an occupational choice model established by Inci (2008). Using this model I run simulations to analyze the effects of tax policies in terms of encouraging or discouraging entrepreneurship. The base model is a general equilibrium model. The number of aggregate funds and the number of entrepreneurs in the society is fixed. By this way, we can exclusively analyze the effects of taxation policies on the quality of entrepreneurial activity.

At the beginning of this thesis, I mention important points of the base model. Second, by using proper parameters I numerically show the existence of an equilibrium. Third, by using the same parameters I show that it is possible to obtain a result that indicates that a tax on entrepreneurs can improve the quality of entrepreneurs in the society. My numerical exercises confirm theoretical results proved in Inci (2008). By applying a small amount of tax (i.e. 0.05 units of capital) on entrepreneurs I show that a number of rich low-ability entrepreneurs decrease with the number of 0.0011. It decreases from 0.8517 to 0.8506. And since the number of entrepreneurs are being kept fixed at 0.416, some new high-ability and low-ability agents choose to be entrepreneur. The total number of these occupation shifter is 0.006. Thus, 0.0012 high-type agents become entrepreneur. This cause to an increase in the average quality of entrepreneurs pool. Average quality changes from 0.4930 to 0.4931 according to my calculations.

Next, I change the total amount and distribution of wealth in the society. I change the parameter m which controls the slope of the wealth distribution in the society. I investigate the results for $m = -1, -0.8, -0.9, -1.1, -1.5$ and examine the effects of tax or subsidy on the occupational choice of the agents and its result in the quality of entrepreneurs. I find that when $m = -1, -0.8, -0.9$ and -1.1 it is optimal to issue a tax on entrepreneurs, however when $m = -1.5$ it becomes optimal to subsidize entrepreneurs to increase social welfare.

Finally, I apply a mean-preserving spread to the distribution of wealth while keeping the total amount of wealth fixed. This allows us to understand why two equally rich country might require different policies to improve self-selection of entrepreneurs. As a result, I show that it is not always optimal to encourage or discourage individuals from entrepreneurship via taxes or subsidies. Indeed, the exact distribution of wealth crucially matters in the final result.

Thus, this thesis concludes that when the society has a relatively balanced wealth distribution it may be optimal to tax entrepreneurs to improve average quality of them, but when there is a severely unequal wealth distribution it may be optimal to subsidize them. As it is indicated in the base model, a logical explanation of this fact is that, when there is a relatively balanced wealth distribution, outside options of the agents becomes better. Thus, low-ability agents have the tendency to choose wage-earning since the wage rates of these jobs become satisfactory for them. However, when the outside options are not well established it becomes quite hard for the agents to choose wage earning jobs. Hence, before using tax instruments to increase quality of entrepreneurial activity, governments should consider creating well-established, well-paid wage earning jobs. They should decrease the level of poverty by other instruments to make taxation instrument an efficient one. As Bruce and Mohsin (2006) also stated, taxation tools alone may not be sufficient for this purpose.

The thesis is organized in the following way: In section 2, I make a literature review regarding the entrepreneurial quality. In section 3, I describe the base model. In section 4, I construct the numerical exercises. This section also presents the mean-preserving spread exercise. Finally, I conclude in section 5. In the Appendix A, I illustrate some of the graphs related to some of the sections so as to visualize things while in Appendix B I show the Mathematica codes used for the whole process.

2. LITERATURE REVIEW

In this thesis, I use occupational choice as a main channel to investigate entrepreneurial analysis. Hence, it is a good point to start searching for previous researches linked with the occupational choice idea. This channel is quite essential since according to Parker (2004) the following occupational choice models form the foundations of entrepreneurship. There are two main canonical methods in this sense. One is based on the work of Lucas (1978) while other based on Kihlstrom and Laffont (1979). In the former one, it was claimed that individuals differ in terms of ability and largest firms are established by the most able ones. Parker (2004), Banerjee and Newman (1993), Iyigun and Owen (1998) are the ones who followed this path. While in the latter one, Kihlstrom and Laffont modelled entrepreneurial choice as a trading off risk and returns in which individuals differ in terms of their attitudes towards risk. Kanbur (1982), Grossman (1984) and many others established similar constructions. This approach was a path-breaking one since in the classical writings concerning entrepreneurship i.e. Knight (1921), Schumpeter (1939), Kirzner (1973) it was assumed mainly that

> Most individuals are not sufficiently alert or innovative to perceive business opportunities; there is no objective probability distribution governing business risks; an innovative entrepreneur may receive higher expected utility than he or she would as a regular worker; attitude to risk is not the central characteristic that determines who becomes an entrepreneur.

However, in this new approach it was stated that

> Productive business opportunities are ex-ante feasible for, and visible to, all individuals (most simply choose not to exploit them); there is an objective probability distribution governing business risk, and everyone knows that distribution; entrepreneurs receive the same expected utility as their workers; the entrepreneur is likely to be someone with unusually low risk-aversion.

Other remarkable papers that used occupational choice channel are Baumol (1990), Lazear (2000), Murphy , Schleifer and Vishny (1991).

Following a similar occupational choice path described above, in this thesis I have created simulations in which I tested numerically the necessity to give subsidies or issue taxes on entrepreneurs to improve entrepreneurial quality of the society. In these simulations main tools that I use are the changes in the distribution of wealth in the given society. This approach can be originated from the question that *"Does a person have to be* *wealthy before he/she can start a business?"* In other words, do liquidity constraints hinder people from starting their own businesses (Evans and Jovanovic,1989)? If the answer to this question become yes, then I will be able to state that tax policies of encouraging or discouraging entrepreneurship based mainly to the distribution of wealth in the society. In the following sections, I create simulations concerning this very fact. Empirical evidence shown in Blanchflower and Oswald (1995), Evans and Jovanovic (1989), Holtz-Eakin (1994) suggests that capital market constraints prevent low-wealth individuals from setting up in a business. In their paper, Evans and Jovanovic predicted a direct link between wealth and probability of choosing entrepreneurship. As an extension to them, Holtz-Eakin and Blanchflower and Oswald used inheritance instead of personal wealth. However, Hurst and Lusardi (2004) showed that there is a significant relationship between wealth and entrepreneurship participation only for top quantile of wealth distribution.

As a result of this wealth considerations, tax policies of governments become quite important. The literature investigating this issue has grown in the last decades. Classical work of Stiglitz and Weiss (1981) claimed that if there are informational asymetries in the market there would be an underinvestment in projects. This model has became one of the most important models in credit rationing. However, in another classical paper de Meza and Webb (1986) showed that in some cases there would be over investment in projects. Main difference between these models is, in Stiglitz and Weiss marginal project financed has the highest success probability while in de Meza and Webb it has the lowest. One important distinction used in this thesis, also in Inci (2008) that over or under investment is not an issue since aggregate level of investment is fixed which leads to a fixed number of entrepreneurs as well. As Inci states, the policy he propose should not be considered as the one that discourages entrepreneurship but rather a policy that improves self-selection since it is not changing the number of entrepreneurs in the economy.

Concerning the efficiencies of tax policies, Carroll examined the tax reform act of 1986 to test whether tax reductions increase the propensity of entrepreneurs to hire labor and showed that general income tax reductions might be a powerful way of stimulating employment creation and increase welfare of the society. However, Parker (2003) showed that the effects of taxation on the decision to participate in entrepreneurship in the first place are weak and non-robust in micro level. His result is consistent with mine since I also claimed that effects of taxation are heavily dependent on wealth parameters of the society.

Types of taxation which effects occupational choice decisions are examined in Gordon (2000), Cullen and Gordon (2002), Rosen (2002) and Fossen (2008).

One problem about the existing literature about entrepreneurship is that mostly partial equilibrium models are used in the papers. Few exceptions to this fact are Gruner (2003), Ghatak, Morelli and Sjostrom (2007) and Inci (2008). In their paper, Ghatak, Morelli and Sjostrom endogenize the wage rate in the model and by this way they reached to a general equilibrium setting. They reached to the result that because of negative externalities in the credit market it is always optimal to tax entrepreneurs. However, Inci (2008) endogenized interest rate in addition to the wage rate. He showed that there are cases in which it is optimal to subsidize entrepreneurs. Another difference stems from the result that the number of entrepreneurs is fixed in Inci while it may decrease in Ghatak, Morelli and Sjostrom (2007).

3. Base Model

This section briefly summarizes the model, which is based on Inci (2008). Consider a one-period closed economy with many agents and many banks. Agents are in a position to choose between entrepreneurship wage earning which are denoted by E and W, respectively. There are h high types denoted by h and $1-h$ low types denoted by l in the society. p_h is the success probability of a high-type agent and p_l is that of a low-type agent. p_h is assumed to be larger than p_l. High type agents have the option to shirk or work hard. Hard-working costs $e > 0$ units of capital. If they shirk there becomes no difference between a high-type and a low-type agent. Each agent is endowed with one divisible labor and wealth A. Wealth is observable by banks. The population is described by a continuously differentiable function $G(A)$ with its probability density function $g(A)$ with support $[0, I]$. Here I denotes the start-up cost of a firm. Then, the aggregate wealth of the society is

$$\bar{A} = \int_0^I A dG(A). \tag{1}$$

Besides one being the outside option of the other there are further links between entrepreneurs and workers. First, entrepreneurs hire the ones who decide to be workers. Second, workers deposit their wealth to the banks. These deposits are going to be the source of loans that are used by agents who become entrepreneurs. This structure is used to endogenize both the lending interest rate and the wage rate. Thus, the results expected to be obtained in the partial equilibrium setting become less clear. For example, subsidizing or taxing one occupation may have unanticipated effects on the allocation of agents to occupations. Clearly this general equilibrium setting is more general than partial equilibrium inferences.

Figure 1 in Appendix A summarizes the sequence of events. At the beginning, (i.e. at time t^-) agents decide their occupations, apply to the banks for loans, and make proper arrangements for the investments. The ones who choose to be entrepreneur hire workers, workers deposit their wealth into the banks which construct the funds that will be given to entrepreneurs as loans. At the end of the period, projects are finished, payoffs are realized, wages, loans and interests are paid accordingly.

Since the only source of bank-loans are the deposits of workers and the startup cost of a firm is fixed for everyone, the number of entrepreneurs in the society equals the aggregate wealth divided by I. Hence, it is fixed. This fact makes it possible to investigate the effects of a tax policy on entrepreneurial quality in isolation. Since the number of entrepreneurs is fixed in the society the only possible changes can be the proportional changes in the pool of entrepreneurs.

As shown in Inci (2008), in some economies taxing entrepreneurs and giving those proceeds to the workers might increase the quality of the pool of entrepreneurs in this general equilibrium setting. Intuitively, this is because some of the rich low-type entrepreneurs start to find their outside option -becoming a worker- more beneficial for them and change their occupation. This increases the supply of loans and decreases the lending interest rate. Since the number of entrepreneurs should be fixed in the equilibrium and there is a decrease in the lending interest rate, the new entrepreneurs become the poor high- and low-type agents who initially chose to be workers. The ones who switches from entrepreneurship to wage-earning are all low-type agents whereas who do the opposite are composed of both high- and low-type agents. Hence, self-selection in the society improves and as a result the new pool of entrepreneurs in the society consists of more high-type agents. This is why in some economies taxing entrepreneurs might increase the welfare in the society.

This thesis calibrates one such economy and after a careful analysis of the equilibria shows that this result is dependent on the wealth distribution. In particular, I show that a mean-preserving spread over the wealth distribution can revert the welfare improving policy from a tax on entrepreneurs to a subsidy on them (or vice versa).

Entrepreneurial technology is defined by a classical production function $f(K,L)$ where K is capital and L is labor.

$$f(K,L) = \begin{cases} f(L), & \text{with probability } p_i \\ 0, & \text{with probability } 1-p_i \end{cases} \quad if \quad K \geq I \qquad \forall i = h,l \tag{2}$$

Production function requires at least I units of capital. $f(L)$ is strictly concave and exhibits diminishing marginal returns to labor. It also satisfies Inada conditions. Production is risky in the sense that each firm generates a positive output only with probability p_i.

By using this production function and wage rate (denoted by w) we can denote the net output in the success state as

$$\pi(w) := \max_{\{L\}}(f(L) - wL). \tag{3}$$

Being an entrepreneur gives the following expected payoff. It is assumed that there exists no competition between entrepreneurs.

$$\Upsilon_i^E(R,w,A) = p_i(f(l) - wl - D_i^S(R,w,A)) - (1-p_i)D_i^F(R,w,A) - m_i \qquad \forall i = h,l, \tag{4}$$

where D_i^S is the amount of repayment to the bank in the success state while D_i^F is the amount of repayment in the failure state. Derivations of these are quite technical and can be observed from the Inci (2008). m_i represents the cost of effort and is equal to e if high-type agent works hard and 0 otherwise. On the other hand, being a worker gives the following payoff

$$\Upsilon_i^W(R,w,A) = p^e w + RA, \qquad \forall i = h,l \tag{5}$$

where p^e is the weighted average success probabilities of entrepreneurs in the economy which is assumed to be correctly anticipated by the agent in rational expectations sense and R is the lending interest rate.

Decisions of an agent between entrepreneurship and wage-earning and between working and shirking are comprised by the following three equations.

For a given R and w a high-type agent becomes an entrepreneur if

$$p_h(\pi(w) - \frac{R}{\bar{p}}(I-A)) - e > p^e w + RA, \tag{6}$$

assuming the high-type agent works hard and where $\bar{p}$ is Bayesian success probability of a random applicant with a wealth level A:

$$\bar{p} = hp_h + (1-h)p_l. \tag{7}$$

A high-type agent choose to work hard in entrepreneurship if

$$p_h(\pi(w) - \frac{R}{\bar{p}}(I-A)) - e > p_l(\pi(w) - \frac{R}{\bar{p}}(I-A)). \tag{8}$$

Similarly a low-type agent becomes an entrepreneur if

$$p_l(\pi(w) - \frac{R}{\bar{p}}(I-A)) > p^e w + RA. \tag{9}$$

Equation (6) gives us the threshold A_H over which all high-type agents become entrepreneurs:

$$A_H := \frac{p^e w - p_h(\pi(w) - \frac{R}{\bar{p}}I) + e}{R(\frac{p_h}{\bar{p}} - 1)}. \tag{10}$$

Equation (8) gives us a threshold A_e over which all high-type agents prefer providing effort if they become entrepreneurs:

$$A_e := I - \frac{\pi(w) - \frac{e}{p_h - p_l}}{\frac{R}{\bar{p}}}. \tag{11}$$

Finally, (9) gives us a threshold A_l under which all low-type agents prefer becoming entrepreneurs.

$$A_L := \frac{p_l(\pi(w) - \frac{R}{\bar{p}}I) - p^e w}{R(1 - \frac{p_l}{\bar{p}})}. \tag{12}$$

Notice that all of the these three thresholds are dependent on factor prices which are to be determined in the general equilibrium. The analytically interesting equilibrium is however the one that includes high-type agents with socially efficient projects and low-type agents with socially inefficient projects. In such an equilibrium, low-type agents are socially undesirable. The following maintained assumptions should hold in equilibrium.

The first assumption is about the NPV of Projects.

Assumption. $p_h\pi(w) - e > p^e w + RI > p_l\pi(w) > p^e w + \frac{p_l}{\bar{p}}RI$

The other interesting point here is the cost of effort is low enough so that high-type agents would like to provide it, while it is not too low so that a general equilibrium exists.

Assumption. $e > (p_h - p_l)w$

This means that opportunity cost of an entrepreneur for not hiring himself is higher when he choose to apply no effort. Inci assumes $A_e > 0$ and $A_L > A_e$. The first assumption rules out the case in which all high-type agents choose to provide effort regardless of anything, while in the second one rules out the case of perfect information.

With the help of these thresholds the society has been divided into four wealth classes. The poor class of agents are the ones between $[0, A_e]$. The high-type agents whose wealth is smaller than this threshold would not exert any effort. Since banks know this situation also (i.e. without effort high-types and low-types does not matter) they offer pooling contract to this class with a lending interest rate of R/p_l. Because this interest rate is too high no one choose to be an entrepreneur and apply for loans. The wealth class $[A_e, A_l]$ is the lower-middle class. Since high-types are now exerting effort banks cannot behave them as they behave in the poor class. Thus, they offer cross-subsidizing pooling contracts to this class. Both high and low-types choose entrepreneurship. Here low-types exploit the existence of their high counterparts as cross-subsidization in the loans. The interest rate becomes $R/\bar{p}$. For the wealth levels $[A_l, I]$ only high types want to be entrepreneur, since the low-types whose wealth is higher than A_l do not want to be entrepreneur. However, for some low-types whose wealth is slightly higher than A_l participation constraints are violated. By thinking of slightly higher wealth $A_l + \varepsilon$, Inci found that participation constraints are violated for the ones between $[A_l, \tilde{A}]$ where $\tilde{A}$ constructed by this equation.

$$p_l(\pi(w) - \frac{R}{p_h}(I - \tilde{A})) > p^e w + R \times \tilde{A}. \tag{13}$$

For the ones between $[A_l, \tilde{A}]$ i.e. the upper-middle class interest rate becomes

$$\tilde{R} = \frac{p_l\pi(w) - p^e w - R \times A - x(A)}{p_l(I - A)}. \tag{14}$$

And for the wealth levels $[A_l, \tilde{A}]$ which is called rich class banks offer seperating contracts with the interest rate above. Low-type agents become workers while high-type agents become entrepreneur. Finally, for the wealth levels between $[\tilde{A}, I]$ banks offer first-best seperating contracts with the interest rate R/p_h. Again high-type prefer to be entrepreneur while low-types become workers.

Given these assumptions a general equilibrium should satisfy the following equations:

$$E_H(R,w) = h[1 - G(A_e(R,w))], \tag{15}$$

where E_H is the number of high-type entrepreneurs.

$$E_L(R,w,p^e) = (1-h)[G(A_L(R,w,p^e)) - G(A_e(R,w))], \tag{16}$$

where E_L below is the number of low-type entrepreneurs.

Therefore, the total number of entrepreneurs in the economy is given by

$$E(R,w,p^e) = E_H(R,w) + E_L(R,w,p^e) \tag{17}$$

and the weighted average of the success probabilities of all entrepreneurs in the economy, p^e is given by

$$p^e = \frac{p_h E_H(R,w) + p_l E_L(R,w,p^e)}{E(R,w,p^e)}. \tag{18}$$

As I described above since the startup cost of a firm is same for all agents in the economy, dividing aggregate wealth to this cost gives number of entrepreneurs:

$$E = \frac{\bar{A}}{I}. \tag{19}$$

The labor demand of each entrepreneur is given by $L = L(w) = f'^{-1}(w)$. Since there is fixed number of entrepreneurs, the number of workers is also fixed which is $1-E$. The labor market clearing condition is given by

$$E(w) = \frac{1}{1+L(w)}. \tag{20}$$

Solving (19) and (20) gives the equilibrium levels of E^* and w^*. Putting these into (15) and (16) and solving for E_H we get

$$E_H(R,w) = (\frac{p^e - p_l}{p_h - p_l})\frac{\bar{A}}{I}. \tag{21}$$

$$E_L(R, w, p^e) = (\frac{p_h - p^e}{p_h - p_l})\frac{\bar{A}}{I}. \tag{22}$$

These two equations characterize the general equilibrium.

4. The Numerical Analysis

This section explains how I proceed with the numerical analysis of the theoretical model described in Section 3.

Consider the following specific functional form for the wealth distribution which is represented in Figure 3 in Appendix A.

$$g(A) := \frac{I(1-\frac{m}{2}+mA)}{I^2}. \qquad \forall m \in [-2,2] \tag{23}$$

This pdf function takes values in the interval $[0,I]$. It is parametrically dependent on m where $m \in [-2,2]$. Of course, the equation related to probability density function makes sense only when $0 < A < 1$ when $A > 1$ or $A < 0$ $g(A)$ becomes 0. The higher the m, the lower the mass of agents with lower wealth levels.

I shall further particularize this wealth distribution by assuming $I = 1$. As a result, all variables of interest will be per unit of investment. The total wealth in the society becomes:

$$\bar{A} = \int_0^I AdG(A) = \int_0^I A(\frac{3}{2} - A)dA = \frac{5}{12}. \tag{24}$$

I will also assume that $m = -1$, which describes a society with reasonably high number of poorer agents compared with the richer ones. Of course, such a selection has logical grounds. Almost all countries have right-skewed wealth distributions. Indeed, Pestieau and Possen (1979) states that lognormal wealth distribution tends to fit to real wealth distributions well. My linear density is just an approximation to such a distribution. This is trying to make the wealth distribution as close as to a Pareto Distribution. Thus, $m = -1$ gives me that kind of suitable negatively sloped $g(A)$ function. The graphs of both distribution is shown in Figure 2 and Figure 3 in the Appendix A.

I use a quite simple form for the production function.

$$f(K,L) := 2a\sqrt{L}. \tag{25}$$

Here, a is nothing but a technology shift parameter.

This functional form satisfies all requirements mentioned in Inci (2008). In particular, it satisfies the Inada conditions:

$$\lim_{K\to 0} f'(L) = \frac{a}{\sqrt{L}} = \infty. \tag{26}$$

$$\lim_{K\to \infty} f'(L) = \frac{a}{\sqrt{L}} = 0. \tag{27}$$

So, the marginal product of labor is very large when the labor stock is quite small and it becomes very small when labor stock becomes very large. Moreover,

$$f(0) = 0, f'(L) > 0, f''(L) < 0, \tag{28}$$

for all nonnegative values of L. These imply that marginal product of labor is positive but that declines as labor employed increases.

One normalization I imposed was $I = 1$. Now I need to check whether this requires a change in the interpretation of the production function. Consider the original production function $f(K,L)$ and divide all terms by the amount of capital K:

$$\frac{1}{K} \times f(K,L) = f(1, \frac{L}{K}), \tag{29}$$

where $\frac{L}{K}$ is the amount of labor per unit of capital and $\frac{f(K,L)}{K}$ is the amount of output per unit of capital. Now define $\tilde{L} = \frac{L}{K}$ and $\widetilde{f(K,L)} = \frac{f(K,L)}{K}$. Since the amount of capital is fixed in any case $\widetilde{f(K,L)}$ is a function of L only. Thus, we can write it as $\widetilde{f(L)}$.

Now we are able to write the output per unit of capital as a function of labor per capital. Given that we normalize I to 1 from now on I will not use a seperate f function with tilda sign but only itself for simplicity.

In order to find the profit function, we need to maximize $f(L) - wL$ which gives us the result

$$\pi(w) = \frac{a^2}{w}, \tag{30}$$

since $L = (\frac{a}{w})^2$ is the maximizer.

Assumptions include endogenous variables. In order to show that they are maintained assumptions, I will now show the existence of the equilibrium. I will do so by using a numerical example (Inci (2008) characterizes it theoretically). First, I need to define the parameter values I use. One point to mention here is that, although there are several other values that suits my analysis' results concerning the existence of an equilibrium, I use the ones which I will also use in obtaining results for the tax policy.

4.1. **Parametrization.** I assume that whereas a high-type entrepreneur succeeds with a probability 80 percent, a low-type entrepreneur has half the chance, 40 percent. High-type agents are assumed to be scarce in the society, which forms only 20 percent of the society, providing effort costs 13.5 units of capital and technology shift parameter is 30.4. In the notation these are $p_h = 0.8$, $p_l = 0.4$, $h = 0.2$, $e = 13.5$, $a = 30.4$, respectively.

Using a higher probability for the success probability of an high-type stems from its definition. The assumption that $h = 0.2$ also stem from the fact that number of high-type agents in any kind of society is relatively low. One justification to this fact might be Global Entrepreneurship Monitor 2004.

> Only 0.03 of all start-ups qualify as businesses with high potential. Start-ups with high potential are those that expect to have few competitors, intend to bring innovations to the market, and use state-of-the art technology.

Here only the innovative corporations and entrepreneurs are being considered. It can easily be deduced that these innovative agents are the ones who create a relatively smaller group in the whole high-type entrepreneur set. Since I only consider entrepreneurship as firm ownership I should take a significantly higher number.

As a result average success probability in each wealth level, $\bar{p}$, becomes $0.2 \times 0.8 + 0.8 \times 0.4 = 0.48$. The total number of entrepreneurs $E = \bar{A}/I = 5/12$. The wage rate paid to the labor is $\sqrt{5a/7} = 25.6927$ unit of capital and the profit of an entrepreneur in the success state is $\pi(w) = a^2/w = 35.9698$ units of capital

Having derived all of these values, we can now calculate the wealth thresholds A_e and A_l.

$$A_e = \frac{5Rw - 2.4a^2 + 6ew}{5Rw}, \tag{31}$$

and

$$A_L = \frac{2.4a^2 - 5Rw - 6p^e w^2}{Rw}. \tag{32}$$

If we put the values of a, e, and w accordingly in these equations, they will become:

$$A_e = \frac{(0.00778431(-136.875 + 128.463R))}{R}, \tag{33}$$

and

$$A_L = \frac{(0.0389216(2217.98 - 3960.69p^e - 128.463R))}{R}. \tag{34}$$

Now that we obtain A_l, A_e, we can use (15), (16), (21) and (22) and solve for equilibrium R and p^e.

Equations (15) and (21) show

$$h\int_{A_e}^{1} g(A)dA = (\frac{p^e - p_l}{p_h - p_l})\frac{\bar{A}}{I}. \tag{35}$$

Thus, if we put the values for a, e and w accordingly we reach:

(36)
$$h\int_{A_e}^{1} g(A)dA = h(1-(\frac{50R^2w^2 - 12a^2Rw + 30Rew^2 - 5.76a^4 + 28.8a^2ew - 36e^2w^2}{50R^2w^2}))),$$

i.e.

$$h\int_{A_e}^{1} g(A)dA = \frac{0.2(1-(0.0000302978(-18734.8 - 17583.5R + 33005.7R^2))}{R^2}. \tag{37}$$

Whereas (16) and (22) shows:

$$(1-h)\int_{A_e}^{A_l} g(A)dA = (\frac{p_h - p^e}{p_h - p_l})\frac{\bar{A}}{I}, \tag{38}$$

i.e.

(39)
$$(1-h)\int_{A_e}^{A_l} g(A)dA = \frac{0.2(1-(0.0000302978(-18734.8 - 17583.5R + 33005.7R^2))}{R^2}.$$

Thus, the result becomes:

$$(1-h)\int_{A_e}^{A_l} g(A)dA = (1-h)(\frac{31.2a^2wR - 40R^2w^2 - 78Rp^ew^3 - 5.76a^4 + 28.8a^2p^ew^2 - 36(p^e)^2w^4}{50w^2R^2}) -$$
$$(\frac{50R^2w^2 - 12a^2Rw + 30Rew^2 - 5.76a^4 + 28.8a^2ew - 36e^2w^2}{2R^2w^2}),$$

i.e.

$$0.8(\frac{0.00754(-4.91410^6 + 1.75610^7p^e - 1.568710^7(p^e)^2 + 74081.R - 1.322810^6p^eR - 26404.6R^2)}{R^2} -$$
$$\frac{0.0000302(-18734.8 - 17583.5R + 33005.7R^2)}{R^2}).$$

Solving (35) and (38) yields $R = 1.76319$ and $p^e = 0.493069$, which also implies $A_e = 0.395704$ and $A_L = 0.851795$.

The equilibrium must satisfy the Assumption 3, Assumption 4, $A_e > 0$ and $A_e < A_L$. It is trivial to see that the last two hold.

As for Assumption 3, we need $p_h \times \pi(w^*) - e > p^e \times w^* + RI$, $p_l \times \pi(w^*) < p^e \times w^* + RI$, $p_l \times \pi(w^*) > p^e \times w^* + RI \times p_l/\bar{p}$ be satisfied at the same time while $0 < A_e < A_L$ implies $\bar{p} \times \pi(w^*) - (\bar{p} - p_l/p_h - p_l) \times e > p^e \times w^* + R$ and $\bar{p}(\pi(w^*) - e/(p_h - p_l)) < R$

For the first requirement of Assumption 3, we have $p_h \times \pi(w^*) - e = 15.2758$ and $p^e \times w^* + RI = 14.4315$. Thus, it holds. For the second requirement, we have $p_l \times \pi(w^*) = 14.3879$ and $p^e \times w^* + RI = 14.4315$. So, it holds. And finally for the third requirement, we have $p_l \times \pi(w^*) = 14.3879$ and $p^e \times w^* + RI \times p_l/\bar{p} = 14.1376$. Again, it holds.

Then, for the first requirement of $0 < A_e < A_L$, we have $\bar{p} \times \pi(w^*) - ((\bar{p} - p_l)/(p_h - p_l)) \times e = 14.5655$ and $p^e \times w^* + R = 14.4315$. So, it holds. And for the second requirement of $0 < A_e < A_L$, we have $\bar{p}(\pi(w^*) - e/p_h - p_l) = 1.06549$ while $R = 1.76319$. Thus, it holds.

Hence, the equilibrium that we found satisfies all assumptions of the base model.

4.2. **Policy Exercises.** This section investigates the effects of a small tax on entrepreneurs on the risk-free interest rate R and average success probability p^e.

The tax is issued only when the entrepreneur is successful and the tax revenue is distributed to workers as subsidies. Thus, the government runs under a balanced budget scheme. The tax policy modifies the agents' problem in the following way.

$$p_h \times (\pi(w) - t - \frac{R}{\bar{p}}(I - A)) - e \lesseqgtr p^e \times (w + s) + RA. \tag{40}$$

$$p_l \times (\pi(w) - t - \frac{R}{\bar{p}}(I - A)) - e \lesseqgtr p^e \times (w + s) + RA. \tag{41}$$

where t denotes the tax imposed on entrepreneurs and s denotes the subsidy given to workers. Since the government operates under a balanced-budget regimes these taxes and subsidies should be equal to each other in the aggregate level. This allows us to obtain the following equation.

$$s = \frac{\bar{A}}{I - \bar{A}} \times t. \tag{42}$$

After substituting these s and t to the previous equations in the base model, the implicit functions became $\phi_H(R, p^e, t)$ and $\phi_L(R, p^e, t)$. So, they depend on the tax rate as well.

In addition to the same parametrizations above, I need to define a value for tax. Let the tax be $t = 0.05$ from now on. The effects of the this tax policy can be observed from the following table 1.

$-$	$Before\ Tax$	$After\ tax$
R	1.76	1.72
p^e	0.4930	0.4931
A_e	0.3957	0.3951
A_l	0.8517	0.8506
$wage$	25.69	25.72
$profit$	35.969	35.919

Table 1: Effects of the tax policy

When the government issues a new tax on entrepreneurship as it can be seen from the Table 2, first it has a net effect on expected profit of an entrepreneur. After the tax, the net profit decreases with the same amount of the tax (i.e. 0.05). The subsidies which is basically based on the value of the tax distributed to the workers. Its effect is approximately 1.2 percent of the previous wage of the worker. As the model states when a new tax issued some rich low-types choose to be a worker, as a result the threshold A_l moves to the left, it moves to 0.85 from 0.851 . They deposit their wealth to the banks which decrease the cost of loanable funds, and as a result it decreases the risk-free lending interest rate. Some poor high-types who suffer from cross-subsidization and high interest rate decide to be exert effort and this moves the A_e threshold to the left (i.e. from 0.3957 to 0.3951), thus these high-types and their low-type counterparts become new members of lower-middle class. Since banks do not observe ability they offer pooling contracts to these new participants. Equal number of rich low-type agents exchanged with poor high and low-type agents. Hence, the average quality of entrepreneurs in the society increases from 0.4930 to 0.4931. as illustrated in Table 1.

Only to give an insight to the reader, one possible situation regarding these new locus is shown in Figure 4 in Appendix A.

The intuition for this result is the following, higher taxes make it harder for all agents to start a business. As shown in Table 1, the tax policy decreases the risk-free interest rate, which also means a decrease in the lending interest rate as risk-free interest rate is nothing but the cost of loanable funds.

The agents who change their occupation from being an entrepreneur to being a worker are closer to the thresholds, A_h, A_e and A_l that are given in the equations, $(8), (9)$ and (10). From these equations, it can be deduced that a low-type agent choose to be an entrepreneur only if a considerable portion of his project is financed by banks provided that he is given a pooling contract. By this way, he can benefit from the cross-subsidization in a greater extent. As a result, wealthier low-types who use small amounts of bank loans do not become entrepreneur. It is shown in the base model that richer low-type agents become workers since banks offer seperating contracts to them. Thus, an increase in the start-up costs followed by a decrease in the risk-free interest rate makes the low-type agents whose wealth is closer to the A_l threshold exploit less cross-subsidization and as a result change their occupation.

Since the number of entrepreneurs in this model is always the same in the equilibrium, there has to be other adjustments in the society. Consider the high-type agents in the society. The base model shows that all high-type agents provide effort in the equilibrium. As it is shown in (9), high-type agents whose level of wealth is larger than A_e chose entrepreneurship in the equilibrium. Since banks also know this situation they do not offer contracts to the agents below that threshold. High-type agents below this threshold, i.e. poor agents do not apply for loans since they cannot afford to cross-subsidize their low-type counterparts while they provide effort at the same time.

When the risk-free interest rate decreases, the amount of cross-subsidization required for pooling contracts also decreases. This allows for some more high-type agents whose level of wealth is closer to the A_e threshold to change their occupation. Thus, A_e moves down. However, as a result of the fact that pooling contracts are offered for those wealth levels, low type agents can also become entrepreneur.

As a result p^e increases. This is because low-type agents who are relatively rich (i.e. their wealth level is closer to the A_l) become workers while an equal number of agents composed of both high and low-types become entrepreneurs. Hence, some rich low-type entrepreneurs are swapped with an equal number of poor low and high-types workers. This clearly increases the average quality of the entrepreneur pool. One possible reason for this is the ones who became workers are relatively richer than the ones who become entrepreneurs. This increases the credit supply to the banks, which decrease will then cost of loanable funds and hence decrease the lending interest rate for loan applicants. The overall effect of the tax policy is an increase in the quality of entrepreneur pool of the society. This result is of course dependent on the parametrical and technological specifications of the model.

Then, a natural question is what happens, for example, if we change the wealth distribution. I will proceed in steps here and analyze the effects of a change in parameter m. A change in m involves changes in both the aggregate wealth and the distribution of wealth. Aggregate wealth which is also average the wealth is basically the expected value of the area under the pdf of the wealth distribution. So, when we change m we clearly change the aggregate wealth. Moreover, this also changes the distribution. Thus, it captures the effects of two simultaneous changes. However, it is still going to be a useful exercise since the change in m can be interpreted as analyzing different economies. The results are summarized in Table 2. The quick intuition is because m differ in different societies, the same policies would not give the same results in all economies. The wealth distribution and aggregate wealth matters in design of the policies. International agencies such as IMF or World Bank, on the other hand, suggest nearly the same policy to all countries. These suggestions often include changes in the tax system. As I show below numerically, issuing a new tax in one economy might have some desirable effects while at the same time it might makes even worse in the other. Varying m involves changes in both the distribution and the aggregate wealth. Thus, the exact reason that lead to these differences cannot be identified seperately in this exercise. In order to isolate the effects of a change in the wealth distribution I am going to design a mean-preserving spread exercise over the wealth distribution while keeping the total wealth unchanged.

The aim of this section is to point out some of the difficulties when applying a prescribed tax system to a specific country.

I worked out several simulations by varying m around -1 and reach to different conclusions. Table 1 reports the results.

m	$\bar{A}$	$wage$	$wage+subsidy$	$profit$	$profit-tax$
-0.8	0.433	26.58	26.62	34.76	34.71
-0.9	0.425	26.13	26.17	35.36	35.31
-1	0.416	25.69	25.72	35.96	35.91
-1.1	0.40	25.25	25.28	36.59	36.54
-1.5	0.375	23.54	23.57	39.24	39.19

Table 2a: First Part of the Results for different m values

m	R_1	R_2	p_1^e	p_2^e	A_e^1	A_e^2	A_l^1	A_l^2
-0.8	0.80	0.76	0.493346	0.493353	0.39849	0.398464	0.86207	0.86201
-0.9	1.28	1.23	0.4933	0.4934	0.3962	0.3960	0.8557	0.8551
-1	1.76	1.72	0.4903	0.4931	0.3957	0.3951	0.851	0.85
-1.1	2.28	2.23	0.4913	0.4918	0.40	0.39	0.86	0.85
-1.5	4.07	4.03	0.50159	0.50152	0.3525	0.3528	0.7234	0.7239

Table 2b: Second Part of the Results for different m values

There are five different cases for five different values of m in the table. I have already discussed the case $m=-1$ in detail before. Here I add four other values (two larger than $m=-1$ and two smaller than that).

It can be seen that the tax policy works well in all but the last one m values in the table. For the first four m values, when the government issue a tax on entrepreneurs the quality of entrepreneurs increase. The whole results are consistent with the findings of Inci (2008). When agents observe a new tax on entrepreneurship if their outside options are well-established enough some of the rich low-type agents become worker. The A_l threshold moves to the left. These low-type agents deposit their wealth to the banks and cost of loanable funds decrease. This leads to a decrease in the interest rate. This fact can also be seen from the table. Thus, some of the agents whose wealth are closer to A_e threshold choose to become an entrepreneur and exert effort. Thus, A_e threshold moves to the left. This can be seen in the table also. In all of the four rows A_e threshold decreases.

Then, since banks offer pooling contracts to that wealth level (i.e. lower-middle class) these high-type agents with their counterparts get loan. Equal number of rich low-type agents exchanged with both relatively poor high and low-types agents. Thus, as the model predicted average quality of entrepreneurs increase in the first four rows.

How can we explain the results intuitively? One observation is that when m gets larger, wealth inequality decreases and aggregate wealth increases. This leads to higher wages. As Inci (2008) and de Meza (2000) suggest increasing the quality of entrepreneurs by increasing taxes works well if outside options of the agents get better. Focus for example, on the wage rates in Table 2. First of all, since the amount of subsidies do not change the overall behavior of the wages severely we can consider wages solely in the Table 2. It can be seen from the table that the wage rate gets smaller when the value of m gets smaller. It has the smallest value when $m = -1.5$ and the largest value when $m = -0.8$. In the $m = 0.8$ case the wage rate is 26.58 which is the highest among all while the expected profit of an entrepreneur is 34.76 which is the lowest among all. Thus, we can state that in this economy individuals have well-established outside options (i.e. higher wages), and more individuals find it profitable to work in a wage-earning. Moreover, the expected profit of an entrepreneur is also relatively smaller than the others in the $m = -0.8$ case. This is also consistent, since this results in more rich low-types choosing wage-earning.

Now consider the cases in which m is smaller than -1. For values of m closer to $m = -1$ taxing entrepreneurs moves both A_e and A_l to the left and thus improves average quality of entrepreneurs. While m gets smaller, the aggregate wealth decreases and wealth distribution becomes more unequal. After some point (i.e. $m = -1.5$) the policy starts to affect the economy in the opposite way and makes subsidizing entrepreneurs desirable from a social perspective. The reason for this is similar to my explanation above. Briefly, in these economies outside options are relatively bad (i.e. the wage is so small) while expected profit of entrepreneurs is quite higher among the others. As a result, more and more people including the low-type agents find it profitable to become an entrepreneur rather than becoming a worker. As a result the average quality of entrepreneur pool decreases as we impose a tax on entrepreneurs. For example in the case in which $m = -1.5$. Although these results are useful in understanding the workings of the model in response to changes in the shape of the wealth distribution, they cannot identify the effects of changes in wealth distribution solely. The next section, aimed at identifying this effect in isolation by designing a mean-preserving spread over the wealth distribution while keeping the aggregate wealth unchanged.

4.3. **Effects of a Change in the Distribution of Wealth.** This section constructs a mean-preserving spread exercise to show that distribution of wealth in the society in and of itself can change the optimal tax policy.

In particular, I first start with a parametrical specification in which taxing entrepreneurs improves the quality of entrepreneurs and thus welfare. Then, I apply a mean-preserving spread over the wealth distribution and move some mass from the center of the distribution to its tails. By definition, this keeps total wealth, which is nothing but average wealth in this model, fixed. However, I show that a subsidy to entrepreneurs instead of a tax on them improves the average quality and welfare this time.

Here is how I construct the mean-preserving spread.

In order to change the distribution of wealth and not change the aggregate wealth I need two equations holding at the same time. One of them is to keep the distribution as a pdf. That is, the area under the density function must be equal to 1 before and after the spread. Second, the aggregate wealth which is also the average wealth must remain unchanged after the spread. Figure 5 in Appendix A illustrates this basic idea.

By applying a mean preserving spread to the wealth distribution, I decrease the number of people whose wealth are possibly contained in lower-middle and upper-middle wealth classes. And increase the relatively poorer and richer agents in the society. Thus, I obtained a new unequal wealth distribution.

The first requirement is expressed in the following equation. The left hand side is expected value of the new distribution function after the spread, which gives us total wealth while the right hand side is the aggregate wealth that was originally set to $5/12$.

$$\int_0^k A(\frac{3}{2} - A + d)dA + \int_k^y A(\frac{3}{2} - A - b)dA + \int_y^1 A(\frac{3}{2} - A + c)dA = \frac{5}{12}, \tag{43}$$

and the second requirement is expressed in the following equation, which states that the density function stays as a proper density function after the spread. That is the area under it must sum up to 1.

$$\int_0^k (\frac{3}{2} - A + d)dA + \int_k^y (\frac{3}{2} - A - b)dA + \int_y^1 (\frac{3}{2} - A + c)dA = 1. \tag{44}$$

Solving these equations for y and k by assuming $c = d$ yields

$$k = \frac{b}{2(d+b)}, \tag{45}$$

and

$$y = \frac{2d+b}{2(d+b)}. \tag{46}$$

For any d value we can find a $b$value. For the case in which $d = c$, b must satisfy $b = 2d$. Now I am going to explain the logical grounds of the equation $c = d$

Consider a simpler case where I choose $k = 1/3$ and $y = 2/3$. Then I have three trapezoid with same height. If I put $k = 1/3$ and $y = 2/3$ in the equation above I reached to this equation.

$$\int_0^{\frac{1}{3}} A(\frac{3}{2} - A + d)dA + \int_{\frac{1}{3}}^{\frac{2}{3}} A(\frac{3}{2} - A - b)dA + \int_{\frac{2}{3}}^{1} A(\frac{3}{2} - A + c)dA = \frac{5}{12}. \tag{47}$$

Which is basically the same equation as equation (28). That equation should be equal to the aggregate wealth (i.e. $5/12$) since by applying a mean-preserving spread to the distribution I did not change the aggregate wealth. To get this equality we should have this following equation holds. Since if we sum up the first two terms in each integral we get $5/12$. So the remaining parts should equal to 0.

$$\int_0^{\frac{1}{3}} A(d)dA + \int_{\frac{1}{3}}^{\frac{2}{3}} A(-b)dA + \int_{\frac{2}{3}}^{1} A(c)dA = 0, \tag{48}$$

i.e.

$$\frac{dA^2}{2}\Big|_0^{\frac{1}{3}} + \frac{5cA^2}{2}\Big|_{\frac{1}{3}}^{\frac{2}{3}} - \frac{3bA^2}{2}\Big|_{\frac{2}{3}}^{1} = 0. \tag{49}$$

As a result I get,

$$d + 5c - 3b = 0. \tag{50}$$

By a similar logic, I can rewrite (29) with $k = \frac{1}{3}$ and $y = \frac{2}{3}$. This assumes that the new wealth distribution is again a pdf. By the same arguments that I have used above I reached to this one.

$$d + c - b = 0. \tag{51}$$

If these two equations are solved together one can reach to the result that $2c = b$ and $d = c$ as I claimed above. This result has logical grounds since the added area and the removed area should be the same so as not to destroy pdf property.

Thus I have the desired distribution of wealth without changing aggregate wealth.

4.3.1. *Results of Issuing a Tax on Entrepreneurs.* With the same parameters before i.e.

- $p_h = 0.8$
- $p_l = 0.4$
- $h = 0.2$
- $e = 13.5$
- $a = 30.4$

and the new ones

- $d = 0.14$
- $b = 0.28$

Where these d and b values are constructed arbitrarily. Of course they have to have the desired properties found in the previous equations.

By this parametrization I have found these results:

–	m	$\bar{A}$	$wage$	R	p^e	A_e	A_l
Before the tax	-1	$\frac{5}{12}$	25.69	1.56	0.5008	0.321	0.815
After the tax	-1	$\frac{5}{12}$	25.72	1.53	0.5005	0.322	0.817

Table 3: Results for MPS

The situation is the same as I claimed in the previous subsection. Without changing the aggregate wealth I changed the distribution of wealth i.e. I make the economy's wealth more unequally distributed and rather than the result in which I found taxing entrepreneurs for efficiency, I found the opposite result. So as to make the wealth to be distributed unequally, I decrease the number of agents who have medium level of wealth and increase the number of relatively poorer and richer agents. When the government issues a tax on the entrepreneurs the thresholds A_e and A_l move to the right. A_e moved from 0.321 to 0.322 while A_l moved from 0.815 to 0.817. Thus, there are more rich low-types and less poor high-types in the society. Clearly this cause the average quality of the entrepreneurs in the society decrease from 0.5008 to 0.5005. So, an optimal policy for such economy is to subsidize entrepreneurs instead of taxing them. This result is consistent with the suggestions of Inci (2008) such that the efficiency of taxation depends on the economy. Previously, I have found that taxing entrepreneurs would be beneficial for the society while at this point I have found the opposite result. The difference is based on solely the distribution of wealth in the society. I have supported this result by the numerical values in Table 3. Although I used the same parameters by which I showed taxation of entrepreneurs may be welfare improving, this time I found that when we change only the distribution of wealth in the economy the opposite result hold.

5. Conclusion

In this thesis, I have sought an answer to the question whether governments should apply tax cuts to stimulate entrepreneurial quality in the society and does it work regardless of the differences among countries. Although common belief dictates that entrepreneurship should be encouraged, there are important articles that show empirically that more entrepreneurs in a society does not mean an increase in their quality.

In a simple model established by Inci (2008), I have used numerical simulations to make some policy exercises so as to find an answer to the question that should we encourage entrepreneurs via taxation or not. I have explained the base model in details above.

After the explanation of the base model, by using proper parameters I have shown the existence of the equilibrium which sustained the consistency of the claims made in the base model numerically. Next, by using the same parameters I have shown that it might be welfare improving to issue a tax on entrepreneurs in order to improve the quality of entrepreneurs in the society. When a government issues a small amount of tax on entrepreneurs it has been shown that a number of rich low-ability entrepreneurs will decrease while same number of new high-ability and low-ability agents chose to be entrepreneur since the number of entrepreneurs are being kept fixed. Clearly, this had caused to an increase in the average quality of entrepreneurs pool.

After that, by changing the total amount and distribution of wealth in the society I have examined the effects of taxation policy in the quality of entrepreneurs.

Finally, while keeping the total amount of wealth fixed I have applied a mean-preserving spread to the distribution of wealth. As a result, I have shown that via a taxation policy it is not always optimal to encourage or discourage individuals from being an entrepreneur. Distribution of wealth matters in determining whether we should encourage them or not. By this way, I would be able to observe pure efficiency results of taxation between equally rich societies differing the distribution of wealth.

To put in a nutshell, I have found that it may be optimal to tax entrepreneurs a bit in order to increase average quality when the society has a relatively balanced wealth distribution. However, when there is a severely unequal wealth distribution it may be optimal to subsidize potential entrepreneurs. When there is a relatively balanced wealth distribution outside options for agents become highly preferable. Thus low-ability agents have the tendency to choose safer jobs since the wage rates of these jobs become satisfactory for them. However, when the outside options are not well established it becomes quite hard for the agents to choose wage earning jobs. Hence, taxation tools alone may not be sufficient for the quality improving purposes. Before using tax instruments to increase quality of entrepreneurial activity governments should consider creating well-established, well-paid wage earning jobs. They should decrease the level of poverty by other instruments to make taxation instrument an efficient one. Thus, not only the local governments but also the international agencies such as IMF or World Bank should consider other variables rather than considering the level of GDP or similar instruments when they decide on tax policies on entrepreneurs.

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APPENDIX A

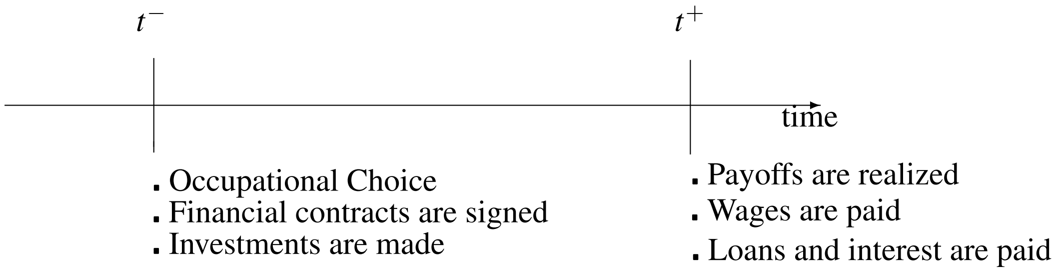

Figure 1: The Sequence of Events

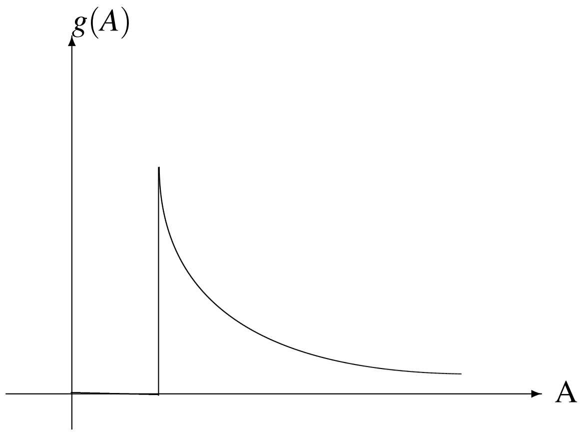

Figure 2: Pdf of a Generic Pareto Distribution

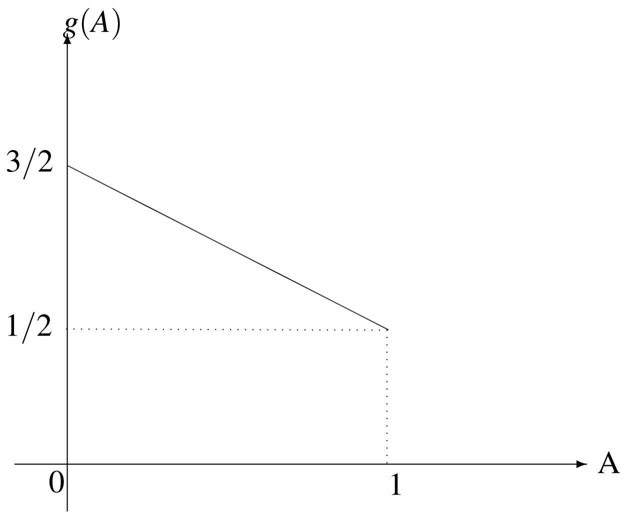

Figure 3: Linear Density $g(A)$

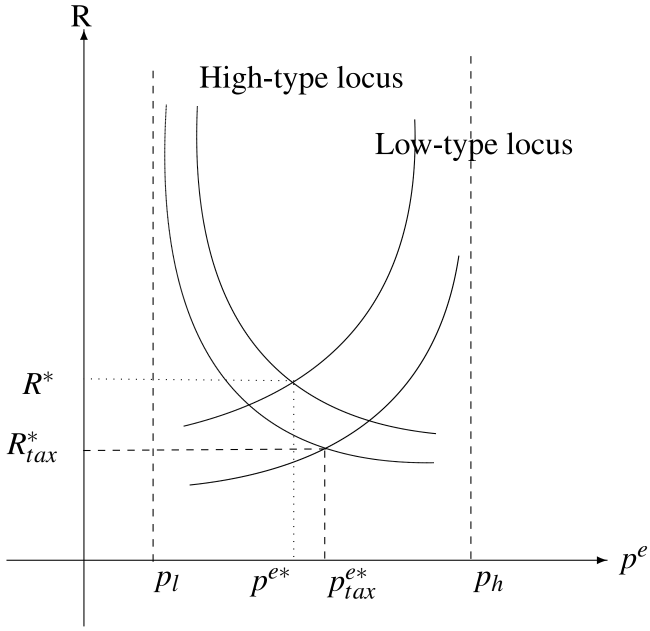

Figure 4: High-Type and Low-Type Loci Before and After Taxes

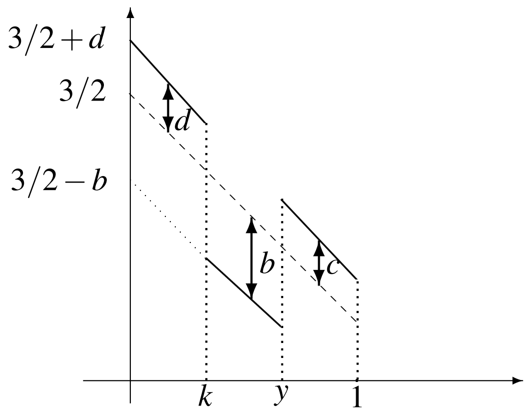

Figure 5: The Mean Preserving Spread