

ENTREPRENEURSHIP AND THE STIGMA OF FAILURE

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Abstract

Entrepreneurial activity varies substantially across regions and sectors and appears to be related to the stigma of failure. To understand this phenomenon, I present a multiple-equilibrium model based on endogenous stigma of failure. Using private information, entrepreneurs choose whether to continue a project or to abandon it and raise funds to undertake a new project. Project outcomes depend on luck and ability, and the cost of capital for failed entrepreneurs is determined by the market's expectations about their ability. In the conservative equilibrium failed entrepreneurs face a high cost of capital and thus good entrepreneurs are reluctant to terminate a project. The resulting low quality of the pool of failed entrepreneurs justifies in turn the high cost of capital. The reverse is true in the experimental equilibrium where good entrepreneurs are more willing to start again and the cost of capital for failed entrepreneurs is low. The experimental equilibrium is not always efficient: The conservative equilibrium dominates in low-risk and capital intensive sectors. I study in this context the efficiency of institutions such as bankruptcy rules and fresh start policy. I show that policies aimed at increasing the survival of start-ups can have important counterproductive effects.

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“In Europe, a serious social stigma is attached to bankruptcy. In the USA bankruptcy laws allow entrepreneurs who fail to start again relatively quickly and failure is considered to be part of the learning process. In Europe those who go bankrupt tend to be considered as “losers”. They face great difficulty to finance a new venture.”

Communication by the European Commission, 1998.

1 Introduction

The entrepreneurial dynamism of the US economy is in sharp contrast to the relatively low levels of firm creation in Western Europe and Japan. A survey on entrepreneurship conducted in 2005 reports that while an estimated 12.4% of a representative sample of the US working population stated that they were “currently engaged in early-stage entrepreneurial activity,” this figure is below 5.4% in Germany and France, and below 2.5% in Japan.¹ Within the US, striking differences in entrepreneurial activity are also observed: while Route 128 and Silicon Valley had very similar technological potentials in the early 80’s, the level of start-up investment in the latter area during the last two decades has been much higher.²

How can such large discrepancies exist and persist between economies at similar levels of development? One possible type of explanation for the difference in entrepreneurial regimes is the existence of exogenous cultural differences such as different levels of risk aversion or different institutional constraints (e.g. taxes, labor market regulation or administrative costs). However this type of explanation does not explain variations within a country or across periods of time where institutions do not change. As empirical and anecdotal evidence suggests that the stigma of failure is an important determinant of entrepreneurship, I offer an economic explanation based on the endogeneity of social norms. In my model, multiple equilibria can arise, corresponding to different attitudes of entrepreneurs and the capital market towards liquidation and exhibiting different levels of entrepreneurial activity. Does a lower level of entrepreneurial activity always induce a welfare cost? The model shows that,

¹Global Entrepreneurship Monitor (2000 Executive Report).

²AnnaLee Saxenian (1994) describes the divergent entrepreneurial path of both regions.

perhaps contrary to a widespread intuition, a regime of high entrepreneurial activity can be welfare-decreasing.

The model's features are as follows. Entrepreneurs raise funds to finance projects, the outcomes of which depend on two factors: entrepreneurial ability and luck. Entrepreneurs receive a private signal about the quality of their current project and decide whether to continue the project or abandon it in favor of a new one. Their decision depends on the cost of starting a new venture and, in particular, on the cost of capital after failure.

I show that several equilibria can arise. Suppose that the cost of capital for failed entrepreneurs is high. In this case, entrepreneurs only abandon projects with very poor prospects. This makes it less likely that good entrepreneurs fail, and decreases the quality of the pool of failed entrepreneurs. This in turn justifies a high cost of capital for failed entrepreneurs. In such an equilibrium – which I call conservative – the probability that a project will be liquidated (conditional on ability) is low and accordingly, the average value of new ventures is also quite low because mediocre projects persist.

By contrast, assume that the cost of capital for failed entrepreneurs is relatively low. Because financing a new project is cheap, entrepreneurs only continue projects with high prospects. As a consequence, the the pool of failed entrepreneurs is of higher quality, which justifies a low cost of capital for the new projects of failed entrepreneurs. In such an equilibrium, which I call experimental, entrepreneurs fail more often and this higher level of experimentation leads to the creation of more firms with high prospects.

In other words, the two types of equilibria are characterized by different levels of stigmatization of failure. In “conservative equilibria”, an entrepreneur is highly stigmatized for his failure, to the detriment of his credit conditions whereas in “experimental equilibria”, the perception of an entrepreneur by the credit market (or the job-market) is only slightly worsened by failure.

This formalization of endogenous social norms allows us to analyze several dimensions of entrepreneurship.

First, the model allows us to compare the social efficiency of the two equilibria. Depending on parameters, each type of equilibrium can dominate the other. Contrary to a common intuition praising "serial entrepreneurs", we show that it can be welfare diminishing to have entrepreneurs create multiple start-ups. The conservative equilibrium dominates the experimental one in sectors that are less risky or less capital intensive. The virtue of the experimental equilibrium, compared to the conservative equilibrium, is that good entrepreneurs are willing to experiment, which increases their chances of creating a high value venture. However, this also increases the cost of capital for first-time entrepreneurs (as they are more likely to abandon their project) as well as the number of projects undertaken by bad entrepreneurs. Due to this lower sorting out of bad entrepreneurs, the experimental equilibrium can be the less efficient one. Near the technological frontier, the value of entrepreneurial projects lies more in outcomes that are both high and improbable and experimentation is therefore socially efficient. For sectors in which good entrepreneurial projects have low risk (so that success depends more on ability than luck), the conservative equilibrium is the most efficient: A policy aimed at encouraging failed entrepreneurs to start again can therefore be inefficient by provoking a switch to the experimental equilibrium.

Second, the model explains how the characteristics of projects differ in the two equilibria. Entrepreneurs are willing to undertake more aggressive growth strategies in the experimental equilibrium because failure is less costly whereas they favor safe projects in the conservative equilibrium. This endogenous risk conservatism distinguishes the nature of entrepreneurial activity in the two equilibria.

Third, I show that the level of entrepreneurial activity is maximized if the efficient equilibrium obtains, be it the conservative or the experimental. If the conservative equilibrium is not efficient, it is also characterized by a smaller number of workers choosing to become entrepreneurs. For example, the leadership of the US economy in the high-technology sectors might be due to the experimental nature of entrepreneurial activity in this country, contrasting with Europe's conservative equilibrium, which is more adapted to less risky sectors. This result also provides a criterion based on

entrepreneurial migrations to test empirically whether an economy is in the efficient equilibrium.

Finally, I discuss how institutions such as bankruptcy laws and fresh start policy, affect the likelihood of each equilibrium and efficiency. First, I show in particular that softer bankruptcy rules make the experimental equilibrium more likely and discuss the implications for the choice of optimal rules. Second, I show that policies aimed at increasing the survival rate of start-ups make the conservative equilibrium more likely (since they increase the reputational cost of failure). I discuss in this perspective the move towards more "chapter 11" types of bankruptcy rules observed in Europe.

This paper is related to the career concern literature initiated by Holmstrom (1982, 1999) where managers take into account the impact of their decisions on their reputation. Boot (1992) presents a model of divestitures and takeovers where managers are concerned by the way in which the market will interpret the termination of investments they have initiated. As in our model, this can lead to the inefficient continuation of projects. The novelty of our model is to endogenize the outside option of the entrepreneur in general equilibrium, which leads to multiple equilibria. Our effect is related to earlier contributions in labor economics such as Acemoglu and Pishke (1998). In their model, due to asymmetric information, workers care about what separation from their employer signals to potential future employers about their ability. Gromb and Scharfstein (2001) have a model of entrepreneurship where managerial incentives are determined by the career prospects in the event of a project's failure which in turn depends on the type of organization where the project failed (intrapreneurial vs. entrepreneurial). Managers who fail an internal venture can be redeployed by their firms into other jobs which has costs in terms of incentives whereas failed entrepreneurs must seek employment at other firms. While their focus is on organizational choice, ours is on capital markets for start-up finance.

The paper is organized as follows. Section 2 presents the basic model and section 3 finds the possible equilibria. Section 4 compares the two equilibria and section 5 describes results on welfare. Section 6 discusses the effect of bankruptcy law and subsidies for survival. Section 7 shows how preferences over projects differ in the

two equilibria. Section 8 studies the level of entrepreneurship and entrepreneurial migrations and provides an empirical criterion to test efficiency. Section 9 discusses the effect of the legal and institutional environment. Section 10 provides an empirical motivation for the theory. Section 11 concludes. All mathematical proofs are in the appendix.

2 The Model

The model has three dates, $t = 0, 1, 2$. All agents are risk-neutral and the risk-free rate is normalized to zero.

At $t = 0$, there is a continuum of entrepreneurs, each with a project requiring an investment outlay I and generating a single cash flow at $t = 2$, that can take two values, 0 or $X > 0$. The project's outcome depends on entrepreneurial ability, which is good with probability θ , and bad otherwise, and on luck as will be described shortly. Each entrepreneur's ability is unknown to all agents, including himself. Entrepreneurs are wealthless and thus need to raise I from competitive investors. Their reservation value is normalized to zero along all periods.

At $t = 1$, each entrepreneur observes privately a signal allowing him to reassess his project, i.e., the probability p that it will generate the cash flow X . Good entrepreneurs reassess their project's prospects as high ($p = p_H$) with probability π_H , mediocre ($p = p_M < p_H$) with probability π_M , and low ($p = 0$) otherwise ($\pi_L = 1 - \pi_M - \pi_H$). Bad types always observe $p = 0$.

Each entrepreneur can run only one project at a time. However, entrepreneurs can choose to abandon their initial project after reassessing its prospects and start a new project, i.e. become a second-time entrepreneur. In that case, the initial project is terminated and its liquidation value is normalized to 0. The new project is as before: it requires an investment outlay I at $t = 1$ and has the same distribution of outcomes (over 0 and X) at $t = 2$.

Finally, we need to describe the financial contracting environment. We exclude contracts involving more than one project, in the following sense: an investor financing

a first-time entrepreneur has no claim on the cash-flows of this entrepreneur’s future projects³, nor can the investor commit to the terms of financing of future projects.

This market imperfection, which we take as given, arises for several reasons. When a fresh start policy exists, the entrepreneur cannot pledge his future cash-flows. Conversely, commitment from the investor for unknown future projects are likely to generate large moral hazard problems.⁴

Given this restriction on the possible contracts and the binary structure of outcomes, contracts can be described with one variable: the repayment conditional on success. If the project is abandoned or generates cash flow 0 at $t = 2$, the repayment is 0.⁵ Therefore, we will only need to characterize the repayment for the first-timers and second-timers (an entrepreneur who abandoned his first project and starts again), R and R' . Finally, I assume that the average project has a positive net present value at $t = 0$.

Assumption 1 $I < \theta(\pi_{HPH} + \pi_{MPM})X$.

3 Entrepreneurship and the Stigma of Failure

In this section I show that two pure strategy equilibria are possible and determine under what conditions they coexist. I discuss the main intuitions, leaving a more complete treatment for the appendix.

³This is akin to the so-called “fresh-start” rule, which guarantees to entrepreneurs the right to start again, free from previous debt claims. As an extension, we discuss fresh start vs. other arrangements in section 6.

⁴Overconfidence can also be at the root of this market imperfection. Entrepreneurs who underestimate the risk of failure are reluctant to pay today for the option of a better post-failure rate.

⁵These contracts can be interpreted as debt or equity. We extend the model to discuss differences in section 6. More generally, we can consider a transfer $\alpha \geq 0$ from the financier to the entrepreneur in case of default. α has to be positive or zero, since the entrepreneur doesn’t have personal wealth. Under risk-neutrality, $\alpha = 0$ is not restrictive. In particular, we show later that α can not be used to separate between different types in our set-up. When the entrepreneur abandons a project, whether the investor can seize it or not is irrelevant since it has a zero liquidation value. We relax this assumption later. Control rights will be an issue in this context.

As a benchmark, consider the first-best situation, which would arise if the entrepreneur were self-financed or if there were no credit market imperfections. An entrepreneur with high prospects ($p = p_H$) continues his initial project, since prospects cannot be higher. An entrepreneur with mediocre prospects ($p = p_M$) continues if the expected value of continuing exceeds that of starting again, i.e., if $p_M X > (\pi_H p_H + \pi_M p_M) X - I$. An entrepreneur with bad prospects ($p = 0$) stops his initial project. From his own perspective, the probability to be of the good type is $\frac{\pi_L \theta}{\pi_L \theta + (1-\theta)}$. Therefore, he starts again only if the expected value of continuing is positive, i.e., if $\frac{\pi_L \theta}{\pi_L \theta + (1-\theta)} (\pi_H p_H + \pi_M p_M) X - I > 0$.

In our set-up – characterized by the need to raise external finance in an imperfect capital market – the entrepreneur’s decisions can differ from the first-best case in equilibrium.

Consider a first-time entrepreneur’s decision to continue or abandon his initial project at $t = 1$. If the entrepreneur observes $p = 0$, he will abandon his project.⁶ If he observes $p = p_H$, he continues in any equilibrium.⁷ As we have seen, these two decisions are first-best.

The continuation abandonment decision when $p = p_M$, is more complex, as it depends on the cost of capital for failed entrepreneurs, R' . An entrepreneur who observes $p = p_M$ knows he is good (he would otherwise observe $p = 0$), but cannot credibly transmit this information to investors.

For a given R' , the entrepreneur continues if the expected value from continuation is larger than that of starting again, i.e., if $p_M (X - R) > (\pi_H p_H + \pi_M p_M) (X - R')$. The higher R' , the more likely this inequality is to hold.

In turn, R' depends on the decision rule of entrepreneurs who observe $p = p_M$. If they abandon their initial projects, more good entrepreneurs are in the pool of failed entrepreneurs, the prospects of second timers are better, and therefore R' is smaller.

⁶To be more precise, this strategy is strictly dominant only when the market is willing to finance projects of failed entrepreneurs. Otherwise, the entrepreneur is indifferent between continuing or not. An arbitrarily small (opportunity) cost of continuation makes it dominant to abandon.

⁷Otherwise, a first-time project never delivers positive cash flows and therefore won’t be financed in the first place.

Therefore, an equilibrium is determined by the strategy (continuation or abandon) of a “first-time” entrepreneur when $p = p_M$, and by the cost of capital, R and R' , to first time and second time entrepreneurs.⁸ There are only two potential equilibria: a conservative equilibrium in which entrepreneurs with $p = p_M$ continue, and an experimental equilibrium in which they choose to terminate the first project and restart. I now turn to the existence and characterization of each equilibrium.

Conservative Equilibrium

Let us first consider the “conservative equilibrium”, in which entrepreneurs with mediocre prospects ($p = p_M$) continue. In this case, good types fail only when $p = 0$, and the fraction of good types among failed entrepreneurs is:

$$\theta'_C = \frac{\pi_L \theta}{\pi_L \theta + (1 - \theta)}.$$

The numerator is the proportion of entrepreneurs who fail despite being good, and the denominator is the total proportion of entrepreneurs who fail. Naturally, θ'_C is less than θ and increases with θ and π_L : a higher proportion of good entrepreneurs at $t = 0$, or a higher probability for them to draw a low prospect project both increase the presence of good types in the pool of failed entrepreneurs.

The probability of success of a second-timer’s project is $\theta'_C(\pi_H p_H + \pi_M p_M)$. Therefore, in a competitive financial market, risk-neutral investors break even by setting:

$$R'_C = \frac{I}{\theta'_C(\pi_H p_H + \pi_M p_M)}.$$

Similarly, the repayment R_C required for first-timer is:

$$R_C = \frac{I}{\theta(\pi_H p_H + \pi_M p_M)}.$$

Note that $R_C < X$ from Assumption 1. The incentive compatibility constraint ensuring that good entrepreneurs with mediocre prospects choose not to fail is:⁹

$$p_M(X - R_C) > (\pi_H p_H + \pi_M p_M)(X - R'_C).$$

⁸We give a more formal definition of an equilibrium in the appendix and show that the equilibrium has to be pooling (i.e., all failed entrepreneurs face the same interest rate).

⁹This constraint implies a fortiori that entrepreneurs with high prospects will continue, which is needed for equilibrium.

In equilibrium, second-timers can finance their projects only if $R'_C < X$. Otherwise, no feasible repayment allows the investor to break even. If $R'_C > X$, failed entrepreneurs are not refinanced and the incentive compatibility constraint can then be written as: $p_M(X - R_C) > 0$, which holds from Assumption 1. The market does not allow failed entrepreneurs to start again. This form of the conservative equilibrium arises when the expected value of the project of a failed entrepreneur is negative, i.e. $\theta'_C(\pi_H p_H + \pi_M p_M)X < I$, so that there is simply no credit supply for post failure projects. I will refer to this case through the notation $R'_C = +\infty$.

Lemma 1 *A conservative equilibrium exists if*

$$p_M(X - R_C) > (\pi_H p_H + \pi_M p_M)(X - R'_C).$$

If $R'_C > X$, failed entrepreneurs do not start a new project at $t = 1$.

Experimental Equilibrium

Consider now the case where good entrepreneurs fail when prospects are mediocre ($p = p_M$). The proportion of good entrepreneurs in the pool of failed entrepreneur is:

$$\theta'_E = \frac{(\pi_M + \pi_L)\theta}{(\pi_M + \pi_L)\theta + (1 - \theta)}.$$

The numerator is the proportion of entrepreneurs who fail despite being good – only those with $p = p_H$ do not – and the denominator is the total proportion of entrepreneurs who fail. The repayment required from second timers is still given by:

$$R'_E = \frac{I}{\theta'_E(\pi_H p_H + \pi_M p_M)},$$

while for first-timers, it is now given by:

$$R_E = \frac{I}{\pi_H p_H \theta},$$

The incentive compatibility constraint ensuring that good entrepreneurs with mediocre prospects, abandon and try again is:

$$p_M(X - R_E) < (\pi_H p_H + \pi_M p_M)(X - R'_E).$$

For the experimental equilibrium to exist, it is also necessary that an entrepreneur with high prospects does not prefer to start again:

$$p_H(X - R_E) > (\pi_H p_H + \pi_M p_M)(X - R'_E).$$

Note that this incentive constraint automatically holds in the conservative case because the interest rate is higher for second-timers than for first-timers. Here, it does not always hold and must therefore be kept among the conditions that ensure that the experimental equilibrium exists. Also note that this inequality combined with $R'_E < X$ implies that $R_E < X$. This leads to the following conditions for the existence of an experimental equilibrium:

Lemma 2 *An experimental equilibrium exists if:*

$$\left\{ \begin{array}{l} R'_E < X, \\ \frac{\pi_H p_H + \pi_M p_M}{p_H} < \frac{X - R_E}{X - R'_E} < \frac{\pi_H p_H + \pi_M p_M}{p_M}. \end{array} \right.$$

Discussion

Our initial motivation was the large variations of entrepreneurial activity across regions and sectors. From the model I have fleshed out, the notion emerges that two distinct regimes of entrepreneurial activity (experimental and conservative) exist. The analysis provides the condition for the existence of these two regimes and one of the important consequence is that for given parameters, the two equilibria can coexist.

Proposition 1

- *There are two possible equilibria: the conservative equilibrium characterized by a high stigma of failure (i.e., a high cost of capital for failed entrepreneurs) and the experimental equilibrium, characterized by a low stigma of failure (i.e., a low cost of capital for failed entrepreneurs).*
- *For some parameter values, the conservative and experimental equilibria coexist.*

- *A sufficient condition for at least one equilibrium to exist is:*

$$p_H(X - R_E) > (\pi_H p_H + \pi_M p_M)(X - R'_E).$$

The third point means that an equilibrium exists, unless, a first-timer with high outcomes has an incentive to start again, so that first-time projects do not get financed.

In this section, I have developed a model of entrepreneurship and shown that two regimes of entrepreneurship – conservative and experimental – can exist in similar economies. A superficial look at these two regimes might suggest that they result from differences in culture or social norms. But in our model, the stigma of failure is endogenous and determined in equilibrium by purely economic factors. In the next section, I compare the two equilibria in more detail.

4 Comparison

In this section, I describe qualitative differences between the two equilibria, determine what type of countries or industries are likely to be in one equilibrium rather than the other, and propose testable implications of the model.

4.1 Failed Entrepreneurs and the Credit Market

The fraction of good types in the pool of failed entrepreneurs is higher in the experimental equilibrium than in the conservative one: θ'_E is higher than θ'_C because in the experimental equilibrium, good entrepreneurs fail when $p = p_M$, not only $p = 0$. These differences in composition of the pool of failed entrepreneurs have implications for the cost of capital.

In the experimental equilibrium, investors anticipate at $t = 0$ that more first-timers will abandon their project. Therefore, for investors to break even, the cost of capital for first-timers is higher in the experimental equilibrium.

Result 1 *Relative to the experimental equilibrium, the conservative equilibrium is characterized by:*

- *a lower cost of capital for first-time entrepreneurs, $R_C < R_E$,*
- *a higher cost of capital for second-time entrepreneurs, $R'_C > R'_E$.*

A testable implication of this result is as follows.

Corollary 1 *The elasticity of the cost of capital with respect to credit history is smaller in the experimental than in the conservative equilibrium, i.e.,*

$$R'_E/R_E < R'_C/R_C.$$

This equation implies that in the conservative equilibrium, the cost of capital rises sharply when the credit history of an entrepreneur includes a failure, while it should be flatter in the experimental equilibrium.

4.2 Firm Creation and Destruction

The two equilibria also differ in the level of firm creation and destruction. The average number of firms created per entrepreneur is $2 - \theta\pi_H$ in the experimental equilibrium (1 at $t = 0$ and $1 - \theta\pi_H$ at $t = 1$), which is more than in the conservative equilibrium, where the number is $2 - \theta(\pi_H + \pi_M)$ (and simply 1 if $R_C = \infty$). This reflects a higher degree of “serial-entrepreneurialism” in the experimental case. The number of failures at $t = 1$ is also higher in the experimental than in the conservative equilibrium: $(1 - \theta\pi_H)$ vs. $(1 - \theta(\pi_H + \pi_M))$.

Result 2 *Relative to the conservative equilibrium, the experimental equilibrium is characterized by:*

- *a higher rate of creation and destruction of firms,*
- *a higher probability for a firm to fail at $t = 1$,*

- *a lower probability for a firm to fail at $t = 2$ conditional on survival at $t = 1$.*

The first prediction seems in line with cross-country anecdotal evidence – the Schumpeterian dynamism of the US economy, characterized by a high level of creation/destruction is often highlighted. It would however deserve more empirical scrutiny. The Global Entrepreneurship Monitor (2005) shows that Italy has 6.4% of established business owners (companies that have paid wages for more than 42 months) in the active population but only 2.3% of new business owners (businesses younger than 42 months), while the US has 4.7% of established business owners and 5.2% of new business owners. The same pattern is true when comparing most European countries to the US and suggests very different dynamics of creation/destruction across countries, the US being characterized by high creation/destruction levels.

The prediction also sheds light on the large variance of survival rates across industries (e.g. Audretsch (1991, 1995)). Following Winter (1984), Audretsch describes his findings in term of the coexistence of two technological regimes. In the “entrepreneurial regime”, small firms have an innovative advantage and therefore undertake risky innovative projects which leads to a high mortality rate. In the “routine regime”, innovation is undertaken by large firms and new firms have a higher survival rate. Our model provides an explanation for why such a polarization in distinct regimes could arise even if the underlying heterogeneity in the sectors’ characteristics is continuous rather than binary.

Assuming that “innovative sectors” are more likely to be in the experimental equilibrium (we will show in section 6 that the experimental equilibrium tends to be more efficient and more likely in these sectors), the two other predictions are consistent with the empirical results of Audretsch (1995), who reports that:

“In industries where innovative activity, and especially the innovative activity of small firms, plays an important role, the likelihood of new entrants’ surviving over a decade is lower than in industries where innovative activity is less important. At the same time, those entrants that are able to survive exhibit higher growth rates. In addition, the conditional likelihood of surviving an additional two years for entrants that have already

survived the first few years is actually greater, and not lower, in highly innovative industries”.

Consider now the cross-section of firms after $t = 1$. These firms can take three values: $V^H = p_H X$, $V^M = p_M X$, or $V^L = 0$. The distribution of firms in the experimental equilibrium exhibits fatter tails, i.e., a larger fraction of firms of value V^H and 0. This reflects higher risk-taking by entrepreneurs: mediocre projects are abandoned and replaced by random draws.

Result 3 *Relative to the conservative equilibrium, the experimental equilibrium is characterized by:*

- *a higher variance in the value of firms created, with more high-value firms and more low-value firms.*
- *a higher expected value of a firm at $t = 2$ conditional on survival at $t = 1$.*
- *a higher expected value of a representative firm at $t = 2$ if $R_E < R'_E$.*

If we think to Europe as being in the conservative equilibrium, contrary to the US, the technological leadership of the US can be seen as the result of an intense experimentation process where entrepreneurs abandon mediocre projects until they create “something big”. Cisco, Intel, Microsoft, Dell, 3Com, Palm are among the numerous examples of entrepreneurial ventures grown into giants. They have few European counterparts.

These results are also consistent with empirical evidence on the distribution of the firms by size. Even though much fewer firms are created in Europe, the proportion of very small firms in the stock of existing firms is much higher in Europe than in the US. For example, the OECD Small and Medium Enterprise outlook reports that in the late 90’s, 31.7% (resp. 29.7%) of French employees worked in an enterprise of less than 20 employees (resp. 500), vs. 19.5% (resp. 47.5%) for their American counterparts. One interpretation is in terms of the conservative equilibrium. Many (mediocre) projects survive that will never grow into large firms.

4.3 Likelihood of the Two Equilibria

I now discuss which sectors are more likely to be in one type of equilibrium or the other.

Keeping other parameters constant, an increase in θ or X or a decrease in π_M make the experimental equilibrium more likely (in the sense that it exists for a larger set of the other parameters) and the conservative equilibrium less likely. Moreover, starting from a set of parameters for which the two equilibria exist, it is possible, by increasing X or θ or by decreasing π_M , to make the conservative equilibrium disappear and, by varying one of these parameters in the other direction, to make the experimental equilibrium disappear. The intuition is that when the proportion of good entrepreneurs is high enough, the stigma associated to failure diminishes and thus experimentation becomes more attractive. Similarly, if the returns to success increase, the option to start again becomes more attractive, relative to the continuation of a mediocre prospects project.

Result 4 *Keeping other parameters constant, there exist p_M^* , p_M^{**} and θ^* with $0 < p_M^* < p_M^{**} < p_H$ such that :*

- *For $p_M < p_M^*$ the conservative equilibrium does not exist and for $p_M > p_M^{**}$, the experimental equilibrium does not exist.*
- *If $\frac{p_M}{p_H} < \frac{\pi_H}{1-\pi_M}$, for $\theta > \theta^*$, the conservative equilibrium does not exist.*
- *An increase in p_H and a simultaneous decrease in p_M , leaving $\pi_M p_M + \pi_H p_H$ constant makes the conservative (experimental) equilibrium less (more) likely.*

The first point means that when mediocre prospects become bad enough, the incentive to continue these projects vanishes. On the contrary if the difference between mediocre and good prospects is small, the incentive to start again weakens.

The second point illustrates that when the expected outcome of the intermediary project is less than the expected outcome of a new project (i.e., $p_M X < (p_H \pi_H + p_M \pi_M) X$), the entrepreneur always starts again if the proportion of good

entrepreneurs, θ , is close enough to 1. This arises because the interest rate difference $R' - R$ can be made smaller than any positive number for θ high enough.

The meaning of the third point is that for a given expected value of first-time project, the experimental equilibrium is more likely when the prospects are skewed on the right: when the gap between mediocre and high prospects projects increases. This property is characteristic of innovative sectors, such as high tech, where expected outcomes have a very large scope and the option value to start again in case of mediocre prospects is therefore higher.

5 Welfare Analysis

I now turn to the question of the relative efficiency of the equilibria. A first result is that the expected utility of an entrepreneur who has failed (whatever his prospects on the first project) is higher in the experimental than in the conservative equilibrium. But this increased cost of failure does not mean that the experimental equilibrium is more efficient. To answer this question, we need to characterize the potential sources of inefficiency.

The source of inefficiency is the misalignment between the private value of the option to abandon and restart projects and its social value. The decision of entrepreneurs with mediocre prospects to continue or not affects the composition of the pool of failed entrepreneurs. This can lead to an inefficient pricing of the cost of capital. Consider an entrepreneur with $p = p_M$. Instead of comparing V^M to $(\pi_H V^H + \pi_M V^M - I)$, the entrepreneur decides whether to continue by comparing $V^M - R$ to $\pi_H(V^H - R') + \pi_M(V^M - R')$. That means that the difference between the individual and social option value of starting again is $R + (I - (\pi_M + \pi_H)R')$. Three pecuniary externalities can be distinguished.

The first one is a debt overhang effect (Myers (1977)) and is related to the cost of capital for first-timers. If R is large, the option to continue is unattractive. If first-timers fail often, the interest rate is high, which makes continuation less attractive.¹⁰

¹⁰Usually debt overhang prevents you from financing new projects. Here, it induces you to start

Second, entrepreneurs do not internalize the impact of their abandon/continue decisions on the quality of the pool of failed entrepreneurs, and therefore on the cost of capital R' faced by other entrepreneurs. Conservatism worsens the quality of the pool of failed entrepreneurs, making abandonment less attractive to entrepreneurs.

Third, entrepreneurs with $p = 0$ can be tempted to start again, even if their project's expected value is negative. This can lead to two types of adverse effects. First, in the experimental equilibrium, excessive financing of negative value projects can occur, an externality that good entrepreneurs with $p = p_M$ do not internalize when they choose to restart. Second, the extreme case of conservatism ($R'_C = +\infty$) alleviates this cost by preventing any restart. However, entrepreneurs with $p = p_M$ cannot restart either, even if it is optimal.

Perhaps contrary to immediate intuition, the experimental equilibrium need not Pareto-dominate the conservative one. The experimental equilibrium allows for more successful projects but at the cost of a high level of destruction. Which of the two equilibria dominates the other depends on the parameters, in a way that reflects this trade-off. We compute the aggregate value generated by entrepreneurship.¹¹ In the conservative equilibrium it is:

$$\begin{cases} W_C &= \theta[\pi_H V^H + \pi_M V^M + \pi_L(\pi_H V^H + \pi_M V^M - I)] - (2 - \theta)I & \text{if } R_C \leq X \\ W_C^\infty &= \theta(\pi_H V^H + \pi_M V^M) - I & \text{if } R_C = +\infty \end{cases}$$

In the experimental equilibrium it is:

$$W_E = \theta[\pi_H V^H + (\pi_M + \pi_L)(\pi_H V^H + \pi_M V^M - I)] - (2 - \theta)I$$

Proposition 2 *The difference in the value of entrepreneurial activity between the experimental and conservative equilibrium is:*

$$\begin{cases} W_E - W_C = & \pi_M \theta [(\pi_H V^H + \pi_M V^M - I) - V^M] & \text{if } R'_C \leq X \\ W_E - W_C^\infty = & W_E - W_C + \theta \pi_L (\pi_H V^H + \pi_M V^M - I) - (1 - \theta)I & \text{if } R'_C = +\infty \end{cases}$$

new projects.

¹¹Investors make zero profit. Therefore, we do not have to consider them when we perform welfare analysis.

It follows that in efficiency terms, the equilibria can be ranked one way or the other, depending on parameters. When V^H is high, the experimental equilibrium dominates the other one. This is not the case anymore when $(\pi_H V^H + \pi_M V^M - I)$ – which is the expected total value of a new draw – becomes smaller than V^M – the social value of continuation. As long as the two equilibria coexist, with $R'_C \leq X$, their relative efficiency depends only on the structure of payoffs in the industry and not in the proportion of good entrepreneurs, θ . This reflects the fact that in this case, efficiency depends only on what the first-best continuation decision is for entrepreneurs with $p = p_M$. We discuss efficiency in the light of the first-best:

Lemma 3 *Assume that both equilibria exist.*

- *If it is socially optimal for entrepreneurs with $p = p_M$ to continue, then the conservative equilibrium dominates the experimental one.*
- *If it is socially optimal for entrepreneurs with $p = p_M$ and with $p = p_L$ to start again, then the experimental equilibrium dominates the conservative one.*
- *If it is socially optimal for entrepreneurs with $p = p_M$ to start again and for entrepreneurs with $p = p_L$ not to start again, then*
 - *if $R'_C < X$ the experimental equilibrium dominates*
 - *if $R'_C = \infty$ equilibria can be ranked one way or the other.*

Corollary 2 *Within the parameter region in which the two equilibria coexist, the relative efficiency of the experimental equilibrium,*

- *increases with X if $R'_C \leq X$ and $p_H > (1 + \frac{\pi_L}{\pi_H})p_M$.*
- *decreases with I .*
- *increases with p_H .*

If most of the value of entrepreneurship lies in large uncertain outcomes, i.e., if V^H is large, experimentation is optimal. For innovative sectors such as the high-tech

industry, the experimental equilibrium is likely to dominate the other. But in more traditional forms of business, for which ability is more important than luck, the conservative equilibrium dominates. If we think to Europe as being on the conservative equilibrium, the model predicts that this is likely to represent a loss in efficiency for sectors with high V^H such as high-tech. Other sources of inefficiencies could easily be incorporated in our model, such as job creations, technological spillover or learning effects.¹²

6 Institutions and Legal Environment

6.1 Bankruptcy Law

Bankruptcy law affects the possibility for a bankrupt entrepreneur to start again. In certain countries (e.g. the UK), an entrepreneur that went bankrupt cannot legally incorporate a new firm during a certain period. The period of time during which creditors retain claims on a bankrupt's assets varies across countries. This too can impede new business creation by failed entrepreneurs. In that respect, the legal provisions in the US are more favorable than in most European countries. The UK is considering a substantial reduction of the penalties that bankrupt entrepreneurs face. The purpose of this reform is to help building a culture of US style entrepreneurship and promoting risk-taking. The trend is the reverse in the US, where personal bankruptcy rules are becoming less debtor-friendly.

These features can be incorporated in our model. Assume that a failed entrepreneur still owes βR to his previous creditors, where $\beta \in [0, 1]$. In the “fresh-start” environment that I have considered so far, $\beta = 0$. A “tougher” bankruptcy rule corresponds to a higher β . For simplicity, I assume that prior debt is senior to new claims. The future pledgeable cash flows of the second project are therefore $X - \beta R$ times the probability of success. It can be shown that for any value of $\beta \in (0, 1]$, there exists values of the parameters for which the two equilibria coexist.

¹²The idea that failure can enhance entrepreneurial skills is often mentioned by practitioners. It tends to make experimentation more efficient.

Result 5 *Tougher bankruptcy rules (i.e., an increase in β) make the conservative equilibrium more likely and the experimental equilibrium less likely.*

An increase in β has two effects. First, investors who lend at $t = 0$ are more likely to get a positive repayment. This lowers the interest rate R and therefore continuation becomes a relatively more attractive option for entrepreneurs with mediocre prospects, $p = p_M$. Second, starting a new project becomes less attractive as previous debt imposes a tax on future projects. Both forces make the entrepreneur more likely to continue the first project.

Our model provides a framework for thinking about the welfare effects of bankruptcy rules. In a situation where experimentation behavior is socially optimal, decreasing the toughness of bankruptcy rules (decreasing β) can be beneficial. Conversely, if the conservative equilibrium is socially optimal, it can be attained through tough bankruptcy rules at no welfare cost.

Result 6 *By making bankruptcy rules tough enough (setting β high enough), it is possible to make the experimental equilibrium disappear, while the conservative remains.*

The European Community prescribes more entrepreneur-friendly bankruptcy laws to foster entrepreneurship in Europe. Our model shows why this measure is likely to be efficient in innovative sectors but might be damaging in more traditional sectors. Note that in sectors where the experimental equilibrium is the most efficient, it may be optimal to set a negative β , meaning that entrepreneurs who fail, restart and eventually succeed would receive a premium. Another possibility is just a subsidy for restarters. Interestingly, such a scheme has been implemented in Singapore recently (the “phoenix award”) and is part of the European Commission’s policy recommendations (“the best re-starter award”).

6.2 Subsidies for survival

Political analysts and regulators (e.g. the European Commission) often claim that subsidies or institutions aimed at increasing firm’s survival might be a good way

to foster entrepreneurship. In this spirit, an amendment to bankruptcy laws introduced in France in 2005¹³ aims at fighting the fear of failure by making failure a less likely outcome. Our model shows why and when this approach might be highly counterproductive: Moving towards an experimental equilibrium requires favoring the liquidation of “mediocre projects” rather than their survival. By making survival of mediocre projects a more attractive option, one reinforces the conservative equilibrium and does not relax the stigma of failure. To see this more formally, consider the following policy: Entrepreneurs with the mediocre outcome get a negative tax subsidy, so that their after-tax cash flow is $(1 + t_M)X_M$ with $t_M > 0$. However the cash-flows are unchanged for entrepreneurs with the zero or high outcomes.

Such a policy unambiguously makes the conservative equilibrium more likely, as it increases incentives for entrepreneurs with a mediocre outcome to stick to their first project. It follows that a policy that “subsidizes” survival might trigger a change from the experimental to the conservative equilibrium, but never the reverse. As many European countries try to move towards a more “chapter 11” type of bankruptcy procedure, this result provides the following warning: policies aimed at increasing survival tend to increase the reputational cost of being a failed entrepreneur. In sectors where the experimental equilibrium is optimal, such policies discourage, not encourage, entry into entrepreneurship.

7 Project Choice: Growth vs. Risk

The stigma of failure affects the continuation decision of entrepreneurs. It is also likely to affect the type of project that they undertake in the first place. Intuitively, when failure is highly stigmatized, entrepreneurs are likely to favor projects that are less likely to fail.

This can be formalized as follows. We start from parameters where the two equilibria coexist (we will refer to them as the reference parameters). I note U_E (U_C) the expected utility of a good type entrepreneur who fails at $t = 1$ in the ex-

¹³“Loi de Sauvegarde des Entreprises”, Journal Officiel, jul 27 2005

perimental (conservative) equilibrium. We know that $U_E > U_C$ (because the cost of capital is smaller in the experimental equilibrium). Consider a small change in (π_H, π_L, p_H) with p_H increasing, π_H decreasing, and $\pi_H + \pi_L$ remaining constant. This change can be described as a move towards a more aggressive growth strategy. For simplicity, I assume that there is no change for second-timers. The indifference curve of an entrepreneur over this type of change in equilibrium i is described by: $[p_H(X - R_i) - U_i]d\pi_H + \pi_H(X - R_i)dp_H = 0$ where $i \in \{E, C\}$.

Therefore the elasticity of substitution reflecting project preferences is:

$$\epsilon_i = \frac{dp_H/p_H}{d\pi_H/\pi_H} = -\left[1 - \frac{U_i}{p_H(X - R_i)}\right] < 0$$

Since $U_E > U_C$ and $R_C < R_E$, in absolute value, this elasticity is higher in the conservative equilibrium (ϵ_C) than in the experimental one (ϵ_E).

Result 7 *In the experimental equilibrium, entrepreneurs tend to prefer more aggressive projects than in the conservative equilibrium.*

$$\epsilon_C < \epsilon_E$$

Therefore, in the two equilibria, the same agents look as having different preferences over risk. This is in fact the consequence of the fact that similar projects differ in the two equilibria, due to different continuation values in case of failure.

Suppose now that entrepreneurs face a menu of two possible projects, at $t = 0$, indexed by $i \in \{0, 1\}$, and that the lender cannot control which one is chosen.¹⁴ The two projects are characterized by $p_{H,0} < p_{H,1}$, $\pi_{H,1} < \pi_{H,0}$, and $\pi_{H,0} + \pi_{L,0} = \pi_{H,1} + \pi_{L,1}$. Projects are similar to the reference project with regard to other parameters. Project 0 is therefore safer and project 1 is more aggressive.

Result 8 *There exist $\delta > 0$, and a neighborhood of the reference parameters such that if the two projects belong to it and*

$$\epsilon_C + \delta < \frac{1 - p_{H,1}/p_{H,0}}{1 - \pi_{H,1}/\pi_{H,0}} < \epsilon_E - \delta,$$

then project choice leads to two equilibria:

¹⁴Either the type of project cannot be asserted at $t = 0$ or the entrepreneur can affect the project after the funding has been contracted.

- *a conservative equilibrium where project 0 is chosen,*
- *and an experimental equilibrium where project 1 is chosen.*

In the conservative equilibrium, entrepreneurs choose the safest project, at the expense of growth. The project choice dimension creates an externality that reinforces the multiplicity of equilibria. Because the entrepreneur chooses less risky projects in the conservative equilibrium good entrepreneurs are less likely to fail at $t = 1$, which increases the cost of capital for second-timers. Similarly, in the experimental equilibrium, that entrepreneurs choose projects that are more likely to fail at $t = 1$ reduces further the cost of capital for second-timers.

An interesting consequence is that project choice can per se create multiplicity of equilibria and can therefore induce inefficiencies, by making the wrong type of equilibrium appear, or the good equilibrium disappear. For example, even if it is socially optimal for entrepreneurs to take more risks, individual choice might lead to risk-conservatism and therefore to a conservative equilibrium. When empire building is detrimental to aggregate welfare, risk conservatism is a good thing. But it is perverse for the society when large opportunities lie in the highest outcomes. This is a Schumpeterian view of entrepreneurship. Positive externalities associated to the high outcome of projects, such as technological complementarities or job creation would reinforce the point. In particular, the risk conservatism induced by the stigma of failure can be costly in high-tech sectors, by reducing the speed at which the technology frontier moves.

In a recent interview, Eric Benhamou, a French engineer who became an entrepreneur in the Silicon Valley and is the current CEO of 3Com said: “Twenty years ago, as a student at Stanford, I realized how naive I had been to believe I could start a business in France.[...]in France, you keep all your life the stigma of a failure. Here [in Silicon Valley] it is the mark of your entrepreneurial spirit.” Benhamou also added: “In France, it is common practice to give up on growth in order to limit risk. Here, when you start a venture, your goal is to become number one of your sector.”

This risk-conservatism can be illustrated in the biotech industry. Europe had a

technological advantage in this sector in the early 80's. Now, the US domination of the industry is overwhelming. A survey of Ernst&Young (Annual European Life and Sciences Report 2001) reports that European firms are slightly more numerous than US firms (1570 vs. 1273) but that they have remained very small. The comparison of number of employees is 61104 in Europe vs. 162000 in the US. The disparity in the level of investment is striking as well. For instance, American companies spend more than twice as much as the European in R&D. Currently, the top-ten US biotech companies outcapitalise the top ten European companies by almost three to one. US biotech company Amgen is about comparable to all Europe's publicly quoted biotechs. Scarpetta&al. using micro data establish that in the U.S., conditional on survival, entrant firms expand much more rapidly than in Europe. All this seems to indicate that small companies choose relatively safe business plans in Europe, at the expense of growth options.

8 Endogenizing the Number of Entrepreneurs

Compared to Europe, the US has more startups per entrepreneur but also more entrepreneurs per capita. I extend the model to endogenize the number of new entrepreneurs. First, I establish a link between efficiency and the level of start-up activity. Second, I propose a test to determine whether an economy lies in the efficient equilibrium or not. This test is based on the observation of migration flows of entrepreneurs.

Assume that a continuum of agents choose initially between becoming employees for a wage w_0 (received at $t = 2$) or becoming entrepreneurs. This decision is irreversible. We restrict our analysis to parameter values such that the two equilibria coexist. We assume that the wage w_0 is drawn at $t = 0$ from an exogenous draw of cumulative distribution F which is the same for all individuals: w_0 is uncorrelated with entrepreneurial ability¹⁵

Since agents choose entrepreneurship if the wage they are offered is less than the expected returns of entrepreneurship, i.e. $w_0 < W$, the flow into entrepreneurship is

¹⁵Otherwise w_0 would be a signal on ability and therefore adverse selection would occur at $t = 0$.

proportional to $F(W)$. This implies that the most efficient equilibrium should exhibit more entry into entrepreneurship. This also implies that in this extension of the model (i.e. with endogenous entry), the ranking of equilibria (in terms of efficiency) is preserved.

Proposition 3 *When the wage w_0 is uncorrelated with entrepreneurial ability, more agents become entrepreneurs in the most efficient equilibrium.*

This effect amplifies the inefficiency result discussed previously. As discussed above, Europe seems to be in a conservative equilibrium while in a sector like high-tech, the experimental equilibrium is more efficient. This also implies that fewer people choose to become entrepreneurs in these sectors in Europe, and indeed, several empirical studies document this fact (c.f. Entrepreneurship Global Monitor 2000).

An indirect test of the theory can be based on entrepreneurial migration. Consider two countries, 1 and 2. For a given sector the expected return of entrepreneurial activity is W_i in country i . There is a continuum of mass 1 of potential entrepreneurs in each country. Migrating to the other country involves a mobility cost $c > 0$ drawn from the same distribution g . Entrepreneurs have an outside option wage $w_0 > 0$ in their country of origin, drawn as before from distribution with c.d.f. F .

Proposition 4 *When the mobility cost and the wage are uncorrelated with entrepreneurial ability:*

- *The mass of individuals migrating from country 1 to become entrepreneurs in country 2 is*
 - *zero if $W_1 > W_2$.*
 - *$\int_0^{W_2 - W_1} F(W_2 - c)g(c)dc$, if $W_1 < W_2$. This mass increases with the efficiency gap between the two economies ($W_2 - W_1$).*
- *The mass of individuals from country 1 becoming entrepreneurs in their country of origin is,*

- $F(W_1)$ if $W_1 > W_2$
- and $(1 - G(W_2 - W_1))F(W_1)$ if $W_2 > W_1$.

This proposition captures the stylized fact that many entrepreneurs in innovative sectors in Silicon valley come from other countries. Saxenian (2002) reports that more than one-third of the engineers and scientists in this region’s technology workforce are now foreign-born. In 1996, 1786 Silicon Valley technology companies with \$12.5 billion in sales and 46,000 employees were run by Indian or Chinese executives.

Flows of high-tech entrepreneurs from the US to Europe are virtually inexistent. The “entrepreneurial brain-drain”, defined as the mass of emigrants from country 1 who would have been entrepreneurs in country 1 if there was no mobility is $G(W_2 - W_1)F(W_1)$.

9 The Stigma of Failure: Some Evidence

The premise of our analysis is that the stigma associated with failure is an important determinant of entrepreneurial activity. It influences not only the decision to become an entrepreneur, but also the choice of projects and the decision to terminate a project. A large body of anecdotal evidence suggests that failure is highly stigmatized in Europe and in certain Asian countries, whereas the American social norms are more forgiving: failing is just a step in a process of experimentation. Within the US, substantial differences also exist. Saxenian (1994) shows that Silicon Valley’s entrepreneurship is characterized by an exceptional climate of tolerance for failure, while New England is more conservative for that matter.

In a companion paper, I compare quantitatively the stigma of entrepreneurial failure on the French and American labor markets and show that it is much more important on the French market. While two studies based on US data, Evans and Leighton (1989) and Hamilton (2000), establish that American entrepreneurs returning to employment earn slightly higher wages than other workers with similar characteristics¹⁶,

¹⁶Evans and Leighton (1989), relies on the National Longitudinal Survey of Young Men (1966-

I show that the reverse holds in France: individuals who leave entrepreneurship for paid employment during the 90s earn on average 13% less than other employees with similar demographic characteristics. In contrast with the US labor market, the French labor market penalizes heavily those who quit self-employment for employment.

Policymakers in Asia and Europe, worrying about the ways to foster entrepreneurship frequently mention the “stigma of failure” as a major impediment to entrepreneurship. Moreover, the view that the stigma is due to social norms and not only laws is often asserted in government reports, political speeches and journal articles. A few extracts are worth mentioning.

“An important factor underlying Europe’s poor record on entrepreneurship is the stigma of failure. Many would-be entrepreneurs and good ideas are put-off by the fear that if you fail once, you will lose everything. This must change. Failure can be regarded as part of the learning curve. We must change mentalities. Failure is not accepted in Europe. An entrepreneur must have a second chance. Changing business culture is the toughest challenge”.

E.A. Liikanen, Commissioner for Enterprise and Information Society at the European Commission, June 2000.

Within the US, failure stigmatization is said to vary across regions:

“The culture in Southeastern Virginia is that there is still a lot of stigma attached to failure. Business people in this area are very conservative.”

W. Donaldson, President of Strategic Venture Planning, 1999.

Saxenian (1994) provides evidence that the business climate in Silicon Valley is much more tolerant towards failure than Massachusetts’ Route

1981) and finds that “workers who fail at self-employment return to wage work at roughly the same wages they would have received had they not tried self-employment”. Each additional year of self-employment experience increases the mean wages of males aged 29-39 by 4.5%, as compared with an increase of 3.1% for an extra year of wage experience. Hamilton (2000) uses the Survey of Income and Program Participation (1984) and finds that “entrepreneurs returning to paid employment actually earn a higher wage than employees with the same observed characteristics”.

128. In conclusion, empirical and anecdotal evidence both suggest massive differences in the stigma of failure across regions.

The stigma of failure is not only reflected in restarters wages but also in their ability to refinance a business.

“If you fail in Britain, you carry the tag with you always. This attitude stifles people from going out a second time.”

Sunday Times, Londod, march 2000.

Evidence suggests that the US credit market does not penalize heavily failed entrepreneurs. Two studies have addressed quantitatively the question of the proportion of individuals able to start a new business after failure. A first pilot study of the Small Business Administration shows that among the owners of a representative sample of business owners who filed for Chapter 7 between 1989 and 1993, about 50% had resumed a new business in 1993. Another study funded by the National Endowment of the National Conference of Bankruptcy Judges runs a survey that shows that the vast majority of a cohort of self-employed filing for Chapter 7 start new ventures within five years.

10 Conclusion

The creation of new ventures is a key determinant of innovation, employment and growth. It is therefore crucial to understand what drives the large sectorial and regional variations in the levels and nature of entrepreneurial activity. This paper develops a model of entrepreneurship in which different equilibria of entrepreneurial activity arise. In the conservative (experimental) equilibrium, the cost of capital for failed entrepreneurs is high (low), therefore good entrepreneurs will be reluctant (less reluctant) to fail, which in turn justifies the high (low) cost of capital. Rather than invoking cultural differences, this model offers a theory where distinct social norms can emerge as a result of the complementarity between entrepreneurs' actions, and makes several testable empirical predictions.

The two equilibria are characterized by different levels of the creation/destruction of firms and different costs of capital. I discuss the relative efficiency of the two equilibria and show how it relates to the aggregate level of entrepreneurial activity. Perhaps counter-intuitively, the conservative equilibrium can be more efficient than the experimental one. This happens in relatively less risky or more capital-intensive sectors. Due to an endogenously higher cost of failure, entrepreneurs choose more secure projects in the conservative equilibrium rather than aggressive growth strategies. The two equilibria lead to different distributions of firms' value. In the framework of the model, I study the role of bankruptcy rules: relaxing (tightening) bankruptcy rules is a policy tool to select the experimental (conservative) equilibrium. The model predicts the sectors in which such reforms are suitable.

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11 Appendix

11.1 Equilibria

An equilibrium is characterized by:

1. the strategy of "first-time" entrepreneurs -failure or continuation- conditional on $V = V^M$: $d \in \{\text{failure, continuation}\}$.

2. the menu of debt contracts offered in period 0 to the inflow of entrepreneurs and in period 1, to failed entrepreneurs.

The following result is going to considerably simplify the range of possible equilibria: only pooling equilibria exist in our set-up.

Proposition 5 1. *There is no competitive screening equilibrium.*

2. *"Failed entrepreneurs" are offered a single debt contract where they get nothing in case of bankruptcy in period 2.*

This means that in any equilibrium, the market will not be able to differentiate between entrepreneurs who were failed because the project was totally worthless ($p = 0$) and those who chose to renounce to a project of intermediate value ($p = p_M$) in order to get a new chance to create a high value firm (V^H). The proof is provided in appendix. The assumption that entrepreneurs don't have collateral to invest is crucial here¹⁷.

proof of prop. 5:

First, notice that we can restrict the analysis to $\pi_M = 0$, replacing π_H by $\frac{\pi_H V_H + \pi_M V_M}{V_H}$, because both types have the same preferences on risk-neutral reallocations between states M and H .

Consider a menu of contracts taking the form $\{(\alpha_1, D_1), (\alpha_2, D_2)\}$ where $\alpha_i \geq 0$ is what the entrepreneur gets when he defaults and $D_i > 0$ is the face value of debt.

¹⁷The result remains true if the probability for "bad types" to get a positive outcome is small enough or if the distribution of their outcomes conditional on them being positive is close to the one of "good types".

Suppose the contracts screen entrepreneurs, good types choosing (α_1, D_1) .

The competition imposes a zero profit condition on each types. Noting $p = \pi_H p_H$:

$$\begin{cases} pD_1 - (1-p)\alpha_1 = I \\ \theta'pD_2 - (1-\theta'p)\alpha_2 = rC \end{cases}$$

$$\theta'p(X - D_2) + (1 - \theta'p)\alpha_2 = \theta'pX - I < \theta'pX - I + (1 - \theta')p(\alpha_1 + D_1) =$$

$$[\theta'pX - (pD_1 - (1-p)\alpha_1)] +$$

$$(1 - \theta')p(\alpha_1 + D_1) = \theta'p(X - D_1) + (1 - \theta'p)\alpha_1.$$

This violates incentive compatibility for the second group. So there is no separating equilibrium.

In the pooling equilibrium, $\alpha_1 = \alpha_2 = 0$ (it is otherwise possible to introduce a contract that will attract only good types and make positive profits).

Proof of the coexistence of the two equilibria:

Select a value of X and θ such that $\pi_H\theta V_H > I$ and $V_M < \pi_H V_H + \pi_M V_M - I$. From the last inequality, we can be sure that for θ close enough to 1, the conservative equilibrium will not exist. Now, let's pick a value of π_H small enough, such that the conservative equilibrium exists. (increasing π_M does not affect the previous inequalities). Suppose the experimental equilibrium does not exist for this set of parameters. Let's increase θ . There is a θ^* upon which the conservative equilibrium would disappear: at this threshold, the IC just binds (entrepreneurs with $p = p_M$ are indifferent between failing or not). The experimental equilibrium exists at this level of θ for the following reason: since $R_E > R_C$ and $R'_E < R'_C$, the IC holds, while $\pi_H\theta V^H > I$ insures that $R_E < X$.

Sufficient condition for the existence of one equilibrium:

assume that the conservative equilibrium does not exist. Then, it must be that $R'_C < X$ and $p_M(X - R_C) < (\pi_H p_H + \pi_M p_M)(X - R'_C)$. Given that $R'_E < R_E$ and $R'_C > R_C$, it is true a fortiori that $R'_E < X$ and $p_M(X - R_E) < (\pi_H p_H + \pi_M p_M)(X - R'_E)$. Therefore, it must be the case that one of the two remaining inequalities of lemma 2 doesn't hold.

Proof of result 8:

let $\Omega \subset \mathbb{R}^{\neq}$ be a compact neighbourhood of the vector of reference parameters, $\bar{\omega} = (\pi_H, \pi_L, p_H)$ such that for any $\omega \in \Omega$, the two types of equilibria exist. Such a neighborhood exists because the two equilibria exist in $\bar{\omega}$ and the coexistence condition is a set of strict inequalities.

The elasticity functions $\epsilon_i(\omega, \omega') = -[1 - \frac{U_i(\omega)}{p_H(\omega')(X-R_i(\omega))}]$ are well defined and continuous on Ω^2 . Using their continuity, there exists $\Omega' \subset \Omega$ a compact neighbourhood of $\bar{\omega}$ such that for any $\omega, \omega' \in \Omega'$, $|\frac{\pi_H(\omega)}{\pi_H(\omega')} \frac{p_H(\omega')}{p_H(\omega)} \epsilon_E(\omega, \omega') - \epsilon_E(\bar{\omega}, \bar{\omega})| < \delta$ and $|\frac{\pi_H(\omega)}{\pi_H(\omega')} \frac{p_H(\omega')}{p_H(\omega)} \epsilon_C(\omega', \omega) - \epsilon_C(\bar{\omega}, \bar{\omega})| < \delta$.

Now, consider two projects $\omega_0, \omega_1 \in \Omega'$ such that $\pi_{H,0} + \pi_{L,0} = \pi_{H,1} + \pi_{L,0}$. In the conservative regime project ω_0 is preferred to ω_1 if:

$$p_{H,1} - p_{H,0} < \int_{\pi_{H,0}}^{\pi_{H,1}} \epsilon_C(\omega_0, \omega(\pi_H)) \frac{p_H(\omega(\pi_H))}{\pi_H} d\pi_H \text{ (we integrate along the indifference curve with } \pi_H + \pi_L = \text{cste}).$$

$$\text{This condition can be rewritten: } \frac{p_{H,0} - p_{H,1}}{p_{H,0}} \pi_{H,0} > \int_{\pi_{H,0}}^{\pi_{H,1}} -\epsilon_C(\omega_0, \omega(\pi_H)) \frac{p_H(\omega(\pi_H))}{\pi_H} \frac{\pi_{H,0}}{p_{H,0}} d\pi_H$$

$$\text{Using the definition of } \Omega', \text{ a sufficient condition for this is } \frac{p_{H,0} - p_{H,1}}{p_{H,0}} \pi_{H,0} > (\epsilon_C(\bar{\omega}, \bar{\omega}) + \delta)(\pi_{H,0} - \pi_{H,1}).$$

By the same arguments, in the experimental regime project ω_1 is preferred to ω_0 if:

$$\frac{p_{H,1} - p_{H,0}}{p_{H,0}} \pi_{H,0} < (\epsilon_E(\bar{\omega}, \bar{\omega}) - \delta)(\pi_{H,0} - \pi_{H,1}).$$

Different Levels of Cash-Flows:

In our benchmark model, there are only two possible outcomes. It is naturally possible to consider the case where more than two outcomes can arise. For example, assume that the final outcome can take three values, $X \in \{0, X_M, X_H\}$ and that at $t = 1$, the entrepreneur privately observes X . All the previous results go through. The difference is that it is now possible to give predictions in term of the relative growth of firms and not only survival. A relatively higher X_H makes the experimental equilibrium both more likely and more efficient relative to the conservative. Different payoffs also allow for more complex contracts than debt. Even with state-contingent contracts, multiple equilibria arise.

In the case of three cash-flows levels $(X_H, X_M, 0)$ proposed as a possible extension, the allocation of cash-flows across states of nature becomes an important issue. In what follows, we focus on the cash-flows differences of debt vs. equity (not control rights or monitoring differences, as discussed above). If τ is the equity share of the investor in the project, the payoff of the investor are zero if the project gets abandoned, $\tau V^M, \tau V^H$, in the high value and intermediate value cases respectively. In a given equilibrium, the transfer to the investor is smaller in the intermediate value case when the project is financed by equity than when it is financed by debt. This is due to the fact that whatever the modality of financing, the investor gets the same in expected value and equity imposes that the transfer is higher in the best state than in the intermediate state. Mechanically, since debt financing pays the same in both states, it must be that debt finance pays more than equity finance in the intermediate case (for a given equilibrium and conditional on project's continuation). Consequently,

Result 9 *If entrepreneurial projects are financed by regular equity, the conservative equilibrium is more likely than it is under debt financing. Conversely, debt finance makes the experimental equilibrium more likely relative to equity finance.*