

# *Entrepreneurship, Economic Risks, and Risk-Insurance in the*

## *Welfare State\**

by

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### ***Abstract***

We find strong evidence in the OECD country panel data to support the Knightian view that non-diversifiable economic risks shape the equilibrium entrepreneurship in an occupational choice model. Differential social insurance of entrepreneurial and labor risk is found to be statistically significant and detrimental to entrepreneurship. The crowding-out effect of public production of private goods on entrepreneurship dominates the crowding-in effect of public production of public goods. Evidence is found for the proposition that the rate of entrepreneurship is positively related to the degree of income inequality and negatively to the union power in the economy. The results suggest that a high living standard also has a detrimental effect on entrepreneurial risk-taking.

## 1 Introduction

In any economy, however organized its economic institutions, it is enterprises and the entrepreneurs, whether self-employed only or those also employing hired labor, whether privately or collectively owned, which create most of the economic value-added. Although the organizational structures of firms vary greatly among countries at different stages of development, it is entrepreneurship which is the jobs, growth and welfare creation engine.

Empirical data (OECD Labor Force Statistics) point to the striking finding that the rate of entrepreneurship (entrepreneurs and those working on their own account relative to the total labor force) varies greatly between different economies. In 1990, Norway (5.4%), Austria (5.6 %) and Denmark (5.9 %) were examples of countries with a below average rate of entrepreneurship. Belgium (11.4 %), Ireland (10.2 %), the UK (10.6 %) and Australia (11.9 %) were examples of countries with a much higher rate. Between those cases fell most central European countries, while the Mediterranean countries typically have even higher rates of entrepreneurship resulting from their rather high rate of self-employment. It is possible that one may point out issues related to construction of comparable data in various countries. Our presumption in the current study, however, is that the regularities detected in the *measured* rate of entrepreneurship are largely real and not explained by how the data are created.<sup>1</sup>

Economic theory has largely left unexplained why such a cross-country variation in the rate of entrepreneurship arises and persists among industrial economies and how it is related to economic structures and national economic policies. This is rather striking not least because of the bald fact that it is entrepreneurship which is the key driving force in economic development. Understanding the incentive mechanisms in formation of enterprises is by far the most necessary input in building up an understanding of why economic performance, efficiency and job creation-ability are so diverse among industrialized countries. Such a research task seems rather urgent, not least in the light of the high and persistent unemployment, especially in Europe, which is linked to the symptom more generally known as Eurosclerosis. Are there just too few enterprises? Why don't the existing ones grow so as to employ more people?

In considering the evolution of economic institutions and public policies over recent decades, one cannot but notice the quite substantial expansion of public sectors in industrialized economies. We may well ask whether such an expansion in general and the emergence of the Welfare

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<sup>1</sup> Moreover, some of the differences in data can be controlled by dummy variables in the econometric analysis.

State in particular is beneficial or detrimental to enterprise formation and hence for the future of the Welfare States. The focus of the theory of the Welfare State has been on analysis of the production of public goods and in evaluating the operation of tax systems. We will have a different focus: the Welfare State as an insurance mechanism. Such a theory is much more limited. Sinn's recent influential papers (Sinn (1995, 1996)) considered the allocative implications of redistributive taxation in the context of risk-taking and moral hazard effects. He found that redistributive taxation can be efficiency enhancing in that it creates a social insurance mechanism which stimulates risk-taking. Recently, Bird (1998) found empirical support for such propositions. He used seven-country panel data to explore the level of income risk, relating it to various country characteristics, including redistributive spending. He found that the variance of log annual income correlates positively with indicators of redistribution which he takes as an indication that the Welfare State can indeed induce risk-taking.

There is, however, little analysis of the impact of public policy and the social risk-sharing institutions on *entrepreneurship*, the key test of risk-taking subject to limited diversification opportunities. The only exception appears to be the work by Fölster and Trofimov (1997). They introduced a life-cycle model of entrepreneurial choice where agents have a preference ordering over the future society, having the choice between voting for an entrepreneurial society or a welfare state. Such a choice was assumed to result in low or high taxation respectively. They find evidence in favor of a multiple politico-economical equilibrium in cross-country data.

The current paper raises the question of the extent to which the differences in private enterprise formation are related to economic risks and how the institutions of the Welfare State interact with entrepreneurship. In Section 2, we survey some of the existing theoretical models of determinants of entrepreneurship. We proceed to formulate a *stylized* model of the equilibrium rate of entrepreneurship in an economy subject to risks and we introduce the Welfare State. Our approach belongs to the family of models of *risky occupational choice*. It highlights the fundamental difference between the labor and the entrepreneurial risks: production of safety will never eliminate the genuine entrepreneurial risk. Though for obvious reasons, neither private nor social institutions provide insurance against entrepreneurial risks.

In section 3, we test the propositions arising from our model using cross-country panel data among 20 OECD countries over four years, 1978, 1983, 1988 and 1993. Our findings should not be taken as evidence against the Welfare State, rather as indicating that there is a trade-off between differential social insurance and incentives. Such a message ought not to be a surprise. In the final section, we discuss briefly some normative implications.

## **2 Theoretical Framework**

## 2.1 The Theory of the Entrepreneur: A Brief Taxonomy

Entrepreneurship, including self-employment, results from risky occupational choice by individuals. The theory of entrepreneurship goes back at least to Knight (1921) who viewed entrepreneurs as ultimately bearing the economic risk of failure.<sup>2</sup> After a long diffussion on this matter, the economic profession reintroduced the role of entrepreneurial risk-bearing in the theory of the firm, but not before the late 1970s. The economic underpinnings of this issue have been the subject of analysis by a few pioneering papers including Lucas (1978), Kanbur (1979, 1981), Kihlstrom and Laffont (1979), Fölster and Trofimov (1996), Blanchflower and Oswald (1998) and Boadway et al. (1998).<sup>3</sup> The determinants of entrepreneurship have also been extensively empirically studied since the late 1980s. These studies have utilized both longitudinal, time-series and cross-section data.<sup>4</sup>

Fundamentally, the key contribution of the theoretical literature over the past two decades has been in its ability to endogenize the determination of the rate of entrepreneurship in an occupational choice framework. The ingenious paper by Lucas (1978) was the first to introduce ability differences to explain enterprise size distribution and growth in his work on Gibrat's law. The theoretical literature has ever since suggested that individuals differ in their ability to produce economically valuable ideas or in their ability to organize production successfully. In Kihlstrom and Laffont (1979), less risk-averse agents will become entrepreneurs; moreover, the lower the rate of risk aversion is, the bigger the size of the firm will be in their model. In Kanbur (1979) entrepreneurs are self-selected prior to knowledge of their entrepreneurial ability. In Boadway et al. (1998), differences in ability (to sell the product) give rise to different success probabilities. While Lucas (1978),

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<sup>2</sup> The view of entrepreneurs as primary risk-takers is deeply rooted in the Knightian tradition. Such risks show up in the unpredictability of entrepreneurial earnings, risky capital income, and in the bankruptcy rates. The data reported by Eurostat (see *Enterprises in Europe*, Fourth Report (1995)) suggests that the failure rate of new firms in the European Union is substantial in the early years of an enterprise. After the first year, 20 % of new firms close down and 35 % have disappeared within the first three years. After five years, only 50 % remain in the market. The well-known Schumpeterian view (cf. Schumpeter (1942)) highlights entrepreneurs as innovators, the heroes of economic progress. Our framework below is consistent with both these classical views though it will test only the relevance of the former explicitly.

<sup>3</sup> The literature up to the early 1990s has been reviewed by de Wit (1993).

<sup>4</sup> For a representative sample, see Blau (1987), Evans and Leighton (1989), Evans and Jovanovic (1989), Holtz-Eakin, Joulfaian and Rosen (1994a, 1994b), Van Praag and Van Ophem (1995), Lindh and Ohlsson (1996). For a survey, see Lindh and Ohlsson (1997).

Kihlstrom and Laffont (1979) and Kanbur (1979) abstracted from financial issues,<sup>5</sup> Boadway et al. (1998) introduced capital and thereby the financial issues arising from informational asymmetries. Indeed, it is a frequently reported empirical regularity in the econometric literature on entrepreneurship that finance and liquidity interfere with formation of new enterprises.<sup>6</sup> Boadway et al. (1998) focused on the effects of liquidity constraints on the entry of new firms with no equity under private information about the success probability (adverse selection). They also considered endogenous effort by the employees while the earlier models of entrepreneurship abstracted from such issues. In all models, risk-sharing between the entrepreneurs and the labor force is rather limited, though the equilibrium wage rate is not fully immune to market risks. Unfortunately, the analysis of the Welfare State and the social risk-sharing institutions on entrepreneurship is overly limited.<sup>7</sup>

## 2.2 A "Stylized" Model of Occupational Choice in the Welfare State

While the existing literature has correctly emphasized the fundamental difference between the entrepreneurial risk and labor risk, it has not produced a theory of their role in the Welfare State. Therefore, and in the light of lack of sharp, testable predictions on the relationship between public policy and enterprise formation, it is an appealing research agenda to formulate a rather "stylized model" for the purposes of organizing the discussion and laying the foundations for econometric analysis with aggregate country data. Such an analysis can best be viewed as complementary to, and not a substitute for the previous empirical work.

Our stylized model is closely related to the earlier models on entrepreneurship as resulting from risky occupational choice, extending and qualifying these models in several directions. When introducing such a framework, one should notice that there indeed are a number of mechanisms which interact with the market entry of new enterprises (not to mention their optimal size or the size distribution which we will not discuss). In the spirit of the Knightian view, we want to introduce the

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<sup>5</sup> Kihlstrom and Laffont (1979) assume that agents are endowed with a strictly positive stock of wealth with no default risk. In Kanbur (1979), revelation of the entrepreneurial ability before production will take place is reflected in the optimal scale and employment of the firm but again in the absence of default risk.

<sup>6</sup> See Evans and Jovanovic (1989), Black, De Meza and Jeffreys (1993), De Wit (1993a), Holtz-Eakin, Joulfaian and Rosen (1994a,1994b), Blanchflower and Oswald (1997), Lindh and Ohlsson (1996). Industry-level panel data has been successfully used by Ilmakunnas and Topi (1999), who found statistically significant financial effects on entry of new enterprises.

<sup>7</sup> Kanbur (1979,1981) introduced progressive taxes arriving at an ambiguity result: such a tax may or may not increase enterprise formation, depending on the nature of risk aversion.

risk of default. From such a perspective and unlike the models reviewed above, our model highlights the key aspect that market entry typically requires some costly *ex ante* commitment.<sup>8</sup> This can be viewed as the *ex ante* cost of developing the idea, carrying out the necessary investment in human capital, or allocating private assets into productive use. *Ex post*, such a cost is sunk and cannot be recouped in the case of default. The personal cost of default is most concrete in the case of outside finance. Equity markets typically abstain from financing new firms with no reputation or history because of the lemon risk. Creditors face the very same informational problem under limited collateral. To avoid the lemon problem, contracts with full liability may be signed, resulting in inefficient risk-sharing. Such contracts impose a substantial risk on those entrepreneurs who resort to debt financing.<sup>9</sup> The saved or inherited wealth of a potential entrepreneur is then subject to default while non-entrepreneurial agents will typically not face such a risk.<sup>10</sup> Neither private nor social institutions provide - apparently for good reason - insurance against such risks.<sup>11</sup> Instead, and viewing the occupational choice of a potential entrepreneur as an option with an entry premium, the social insurance for labor may actually raise the entrepreneurial threshold by raising the reservation income.<sup>12</sup> This follows from the fact that it becomes more costly to give up the alternative income which is safe. The implication is that private and collective risk-sharing tend to become substitutes instead of being complements.<sup>13</sup> Sinn (1995,1996) has recently drawn attention to the government's superior ability to insure risks in the form of redistributive taxation. However, Sinn assumes that both the entrepreneurial

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<sup>8</sup> One can think that such a cost implicitly enters Kanbur (1979) where the occupational choice cannot be reversed after observing the ability.

<sup>9</sup> Survey data on Finnish firms (Borg and Borg (1997)) shows that for 32 per cent of all entrepreneurs (for 21 per cent of their families) 100 per cent of personal wealth was tied up as collateral in 1994. The corresponding figure in 1996 was only slightly lower, i.e. 29 and 19 per cent. For more than half of all entrepreneurs, 25-100 per cent of total personal wealth was tied up as collateral both in 1994 and in 1996.

<sup>10</sup> In contrast, the privilege of limited liability protects the shareholders of the companies quoted on the stock exchange. Though such risk-sharing between the claimants (creditors) cannot be a free lunch, the point is that such risk insurance is typically not available for entrepreneurs either through private or public insurance.

<sup>11</sup> The default risk has currently been analyzed in the context of real options by Alvarez and Kanniainen (1998) who have generalized the idea of the Pratt-Arrow risk premium to the context of non-trivial risks including default.

<sup>12</sup> Note that the reverse implication arises from the pioneering paper by Domar and Musgrave (1944), the first study suggesting that taxation of risky income when associated with full loss offsets (i.e. social insurance) leads to increased investment in risky assets relative to safe assets.

<sup>13</sup> For an earlier proposal along these lines, cf. Kanniainen (1993).

risk and the labor risk are equally insured by society. Once this assumption is relaxed, the implications of the Welfare State need to be reconsidered.

In building a positive theory of the entrepreneur, we note that if the market demand in a particular industry is elastic, the entry of a new enterprise tends to crowd out rents of the intramarginal enterprises. Such a crowding-out effect will, however, also arise in more competitive circumstances as a result of bidding for labor, a mechanism to be built in our stylized model below. With a given entrepreneurial input or ability combined with labor input, the feasible technology tends ultimately to exhibit diminishing returns on the variable input. The outcome of this mechanism is to restrict the optimal size of an enterprise, which then will have an indirect impact on the number of enterprises in equilibrium. Moreover, given that the fixed population of agents will in all equilibria be allocated between labor input and entrepreneurs, the marginal entrepreneur tends to face increasing cost of variable inputs, thereby creating a barrier to other potential entrepreneurs both by raising the value of the outside option and the cost of production. Finally, the theory of entrepreneurship has not provided us with an understanding of the overall effects of the public sector. We will establish these effects in our model in terms of public and private goods produced by the public sector.

There are thus several reasons why we want enough structure in our model. We want to analyze (i) the role of risks (ii) the role of the public sector (iii) the effects of the nature of markets in general (say, demand elasticity). We will introduce a general equilibrium model of risky occupational choice with the condition that the market for entrepreneurs will clear. To formalize, we consider a pool of potential entrepreneurs in a population of individuals with the population size normalized to unity,  $N = 1$ , all having an option for a simultaneous market entry to a non-existent industry at the first stage. We assume for a moment that all agents are born as "lucky lottery winners" in that they face no financial constraints. The entrepreneurs have access to technology

$$(1) \quad q = ef(x,p) = ex^{\hat{\alpha}} p^{\hat{\alpha}} \quad 0 < \hat{\alpha}, \hat{\alpha} < 1,$$

where  $x$  = labor input and  $e = \{0,1\}$  is the entrepreneurial effort, the necessary input. Variable  $p$  stands for the public infrastructure. There are high ( $H$ ) and low ( $L$ ) ability types such that the low-ability types face a higher fixed cost of production  $c^H < c^L$ . Ability differences are taken to be exogenous; they are, for example, culturally inherited as a within-family human capital. The decision to enter at the first stage is interpreted as an *ex-ante* commitment to irreversible fixed investment  $k > 0$  under uncertainty about the state of the future market. The lottery prize is assumed to be sufficient to cover such a commitment. Investment  $k$  is an industry-specific constant. After commitment in stage 1, the state is revealed to be  $\perp = (g,b)$  with probabilities  $(\circ, 1-\circ)$ . The good state is characterized by  $g = 1$ , the bad by

$0 < b < g$ . The market demand is taken to be of constant elasticity form

$$(2) \quad P_{\bar{o}} = \bar{\sigma} Q_{\bar{o}}^{-\zeta} p^{\alpha}, \quad \zeta > 0, \alpha < 0.$$

The public sector thus affects entrepreneurship via various channels (we will exclude analysis of grants, subsidies or profit taxes). First, the public sector produces public goods (infrastructure, education, etc.) which make the firms' production more efficient. We have modelled this effect in (1), treating the public production of public goods as an input in the production function of the private sector. Such a complementarity of private and public inputs gives rise to a positive crowding-in effect. Second, the public sector also produces private goods, which can crowd out private production by decreasing the demand for private goods. Such an effect is modelled in the demand function (2). When  $\alpha < 0$ , public production crowds out private sector demand at the rate  $\alpha/\zeta$  because  $Q = \bar{\sigma}^{-1/\zeta} P^{-1/\zeta} p^{\alpha/\zeta}$ . Third, labor is needed for the production of public goods (see below). Finally, social risk insurance (also introduced below) interacts with firm formation.

We denote  $n = n^H + n^L$  = the *ex-ante* entry, where the number of high-quality types  $n^H$  is exogenous. While the high-quality types will always enter as entrepreneurs, the low types will rationally optimize their entry in a forward-looking way, making total entry  $n$  endogenous.  $1-n-m$  stands for the share of population not acting as entrepreneurs, with  $m$  denoting the labor demand by the public sector. Introducing the public sector production function as  $p = m^{\bar{o}}$ ,  $\bar{o} > 0$ ,  $m = p^{\bar{o}}$  is thus the degree to which public production crowds out labor from the private sector. The state-dependent production condition is given by

$$(3) \quad \bar{\sigma}_i = P_{\bar{o}} x_{\bar{o}}^{\alpha} p^{\alpha} - w x_{i\bar{o}} - c^i \geq 0 \quad i = H, L.$$

In the good state, the number of producers is  $n = n^H + n^L$ . It is easy to see that all produce the same amount (with labor demands  $x_g^H = x_g^L$ ); the high-ability types earn greater rents than the low-ability types. In the bad state, only the high-ability types produce. The low-ability types and their labor enter the unemployment pool. It remains to solve for the equilibrium wage rate  $w$ , the state-dependent outputs,  $Q_g = n x_g^{\alpha} p^{\alpha}$ ,  $Q_b = n^H x_b^{\alpha} p^{\alpha}$ , price  $P_{\bar{o}}$  and the equilibrium *ex-ante* entry,  $n^*$ .

As to the labor market, we assume that the wage rate will be determined *ex ante* before the state is observed. Workers take competitive bids from firms without knowing the type of firms. Hence, the wage rate will be the same across firms. After the state is revealed, the wage will not be renegotiated and there is no inter-firm mobility of labor. From the *ex-ante* perspective, firms are assumed to be risk-neutral expected profit maximizers who contract on the wage under uncertainty.



Each of them takes the market price and labor cost as given. The employment decision will take place after resolution of uncertainty and the state-dependent labor demands will therefore be given from (3) as  $x_o^H = (w/\hat{a}P_o p^{\hat{a}})^{1/(\mathbb{E}-1)}$ ,  $x_b = g, b$ ;  $x_g^L = (w/\hat{a}P_g p^{\hat{a}})^{1/(\mathbb{E}-1)}$ ,  $x_b^L = 0$ . The employment per firm will thus be given by

$$(4) \quad x_g = (n^{\zeta} w/\mathbb{E})^{\hat{a}} p^{\hat{a}}, \quad x_b = ((n^H)^{\zeta} w/\hat{a}b)^{\hat{a}} p^{\hat{a}}; \quad \hat{\alpha} = 1/(\mathbb{E}(1-\zeta)-1), \quad \hat{\alpha} = -(\hat{\alpha}(1-\zeta)+\alpha)/(\mathbb{E}(1-\zeta)-1).$$

The parameter  $\hat{\alpha}$  summarizes the impact of the public sector on private labor demand; it can take either sign depending on the favorable productivity effect ( $\hat{\alpha}$ ) and the unfavorable crowding-out effect ( $\alpha$ ). Public labor demand raises the wage cost for private firms in that the labor market equilibrium requires *ex ante* that

$$(5) \quad n^H [{}^o x_g^H + (1-{}^o) x_b^H] + n^L \ddot{e} x_g^L = 1-n-m.$$

In the good state, there is no unemployment. Rewriting (5) as the relationship between the endogenous wage and entrepreneurship

$$(5b) \quad n^{H \circ} [n^{\zeta} w/\mathbb{E}]^{\hat{a}} p^{\hat{a}} + n^H (1-{}^o) [(n^H)^{\zeta} (w/\hat{a}b)]^{\hat{a}} p^{\hat{a}} + (n-n^H) {}^o [n^{\zeta} w/\mathbb{E}]^{\hat{a}} p^{\hat{a}} = 1-n-m$$

allows us to solve for the market wage rate as a function of the market entry  $n$  and the public sector as

$$(6) \quad w^*(n, p) = [(1-n-p^{\ddot{o}})/\hat{\wedge}(n) p^{\hat{a}}]^{1/\hat{\alpha}}.$$

We have denoted  $\hat{\wedge}(n) = {}^o n(n^{\zeta}/\mathbb{E})^{\hat{a}} + (1-{}^o) n^H ((n^H)^{\zeta}/\mathbb{E}b)^{\hat{a}} > 0$ . We show first

**Lemma.** *If demand is elastic (inverse demand elasticity  $\zeta < 1$ ) or of unitary elasticity, the equilibrium wage will rise with the rate of entrepreneurship,  $w^*/\partial n > 0$ .*

*Proof.* Evaluating  $w^*/\partial n$ , one can see that  $\text{sgn}(w^*/\partial n) = \text{sgn}[(-1/\hat{\alpha})(\hat{\wedge}(n) + \hat{\wedge}'(n)(1-n-p^{\ddot{o}}))]$ . With elastic demand,  $\zeta < 1$ ,  $\hat{\wedge}'(n) > 0$ ,  $\hat{\alpha} < 0$ ; hence  $w^*/\partial n > 0$ . With unitary demand elasticity,  $\zeta = 1$ ,  $\hat{\wedge}'(n) = 0$ ,  $\hat{\alpha} = -1$ ; hence  $w^*/\partial n > 0$ .<sup>14</sup> QED

<sup>14</sup> With inelastic demand,  $\zeta > 1$ ,  $\hat{\wedge}'(n) < 0$ ,  $\hat{\alpha} < 0$  and the result is at least in principle ambiguous.

In order to solve for the equilibrium entry,  $n^*$ , we introduce the non-insurable risk of defaulting  $k$ , a form of failure of the risk markets, and we introduce the differential social risk insurance in terms of differential unemployment compensation for non-producing entrepreneurs ( $\dot{w}_e$ ) and for labor ( $\dot{w}$ ). Such a differential social insurance will be parametrized as  $\dot{w}_e < \dot{w}$ . We now write the occupational choice for potential  $L$ -type entrepreneurs as indifference between expected profit over the two stages and the outside option as

$$(7) \quad E[\check{\pi}^L] = \check{\pi}_g^L + (1-\alpha)\dot{w}_e - k = \alpha w^* + (1-\alpha)\dot{w}.$$

We do not model risk aversion explicitly. We note, however, that by choosing not to become an entrepreneur, an employee avoids the non-insurable risk of losing  $k$ . One should also pause a moment to pay attention to the double role played by the market wage  $w^*$  both as the opportunity cost and the production cost for the entrepreneur. Market entry can be viewed as representing a test of the economic value of an entrepreneurial idea. The *ex-ante* equilibrium number of entrepreneurs *under the risk of default*<sup>15</sup> has to be consistent with the required equilibrium profit, say  $\tilde{e}(n,p)$ ,

$$(8) \quad \check{\pi}_g^L \geq \tilde{e}(n,p) = \alpha^{-1}[\alpha w^* + (1-\alpha)(\dot{w} - \dot{w}_e) + k].$$

Making use of the condition that the amount of labor per firm in the good state has to satisfy  $x_g = (1-n-m)/n$ , one can rewrite (3), the expression for profit, as

$$(9) \quad \check{\pi}_g^L(n,p) = ((1-n-m)/n)(1-n-m)^{1/\alpha} [n^{-(\zeta+1/\alpha)} p^{\hat{a}(1-\zeta)+a} - (\hat{n} p^{\hat{a}})^{-1/\alpha}] - c^L.$$

In equilibrium,  $F(n,p) - \check{\pi}_g^L(n,p) - \tilde{e}(n,p) = 0$ . With a general demand function, (9) is rather involved.

In the case of unitary elasticity (with  $\zeta = 1$ ,  $\alpha = -1$ ,  $\hat{a} = a$ ), it simplifies radically to

$$(9b) \quad \check{\pi}_g^L(n,p) = (1/n)[1 - \hat{n}] p^{\hat{a}} - c^L$$

where  $0 < \hat{n} < 1$  when  $\zeta = 1$ . We confine our analytic proposition to this case. Based on (9b),

$\check{\pi}_g^L(n,p) / n < 0$ . Consulting (8), we can state some key comparative static results concerning the entry:  $n^*/\alpha > 0$ ,  $n^*/(\dot{w} - \dot{w}_e) < 0$ ,  $n^*/\partial k < 0$  to be summarized as

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<sup>15</sup> Such a risk is not included in the Kanbur (1979) or Kihlstrom-Laffont (1979) models.

**Proposition.** *Under unitary demand elasticity, the equilibrium rate of entrepreneurship is positively related to the success probability of the firm but negatively to the differential social insurance faced by labor and entrepreneurs and to the required ex-ante commitment.*

Like the previous theoretical work, our stylized model suggests that entrepreneurial risks reduce the equilibrium rate of entrepreneurship.<sup>16</sup> We will have a chance in the econometric analysis below to test the hypotheses of the impact of aggregate risks and social insurance, while no measures are available for potential differences in the cost of commitment.

It is of substantial interest to ask how the public sector output interacts with the enterprise formation. We used our model to solve for the effect of public sector production on entrepreneurship  $n^*/\partial p = -F_p/F_n$ . The details of such an analysis are available in a separate technical appendix. It turned out in the case of unitary elasticity (and even with fully segmented labor markets,  $p^{\circ}$  thus ignored), that the effect is ambiguous. We will thus leave it for the econometric analysis to determine whether it is the crowding-in or crowding-out effect which dominates.

For the econometric analysis, we will extend our framework, but only informally, in two further directions. We notice that there are a variety of different labor market institutions in various countries. The departure of the labor market from the competitive setting potentially interacts with the incentives for enterprise formation. The degree of exogeneity of the outside option (wage rate) is affected in particular by the labor unions having an impact on the equilibrium entry of entrepreneurs. A test of such an effect will be introduced in the econometric part.

Finally, recall that so far we have formally analyzed a model of "lucky lottery winners" facing no financial constraints. Such constraints arise most naturally when there are informational asymmetries. As a consequence, they may operate like barriers to entry in the presence of differences in the quality of potential entrepreneurs. Financial institutions do have monitoring technologies which help to screen between various risky projects. Such technologies, however, provide imperfect signals about the quality of the projects and the financial institutions will be subject to two types of decision error (some high-ability project-holders will not be financed while some with lower ability will). Given that access to finance<sup>17</sup> may interact with enterprise formation, it is appropriate to test its impact

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<sup>16</sup> Empirical support for such a proposition has been previously obtained by Parker (1996) in the UK time-series data.

<sup>17</sup> Over any given time period, market entry tends to be reduced under financial constraints. Such an effect reduces demand for labor but increases its supply. Entering firms will be more profitable and their bargaining power relative to labor enhanced. The equilibrium wage tends to be reduced. The effects of financial constraints are, however, complicated and subject to some controversial issues. In Boadway et al. financial constraints lead to credit contracts which boost the number of enterprises.

empirically. Many studies report significant financial effects (Evans and Jovanovic (1989), Black, de Meza and Jeffreys (1996), Blanchflower and Oswald (1998), Holtz-Eakin, Joulfaian and Rosen (1994a, 1994b), Lindh and Ohlsson (1996), de Wit (1993a)). The results have been derived from time-series regressions or from indirect asset effects or the income distribution effect. Estimates obtained by Blanchflower and Oswald (1998), for example, imply that the probability of self-employment depends positively upon whether the individual ever received an inheritance or gift.

We will only briefly elaborate the role of financial effects on entry. Equity markets do not finance projects in the absence of the reputation or personal history of an entrepreneur. However, credit markets may provide finance with collateral or based on *ex-ante* screening. It is crucial to ask how the project risk will be shared between the project-holders and the creditor. This determines whether and to what extent the market for new entrepreneurs can be a market for lemons. Indeed, the documented entry rate is substantial (cf. Geroski (1995) for the stylized facts) but the failure rate is also high. Implicitly therefore, such evidence speaks against the common interpretation that finance restricts new entry and also indicates that some entrants are lemons. Under restricted liability, the opportunist incentive to test new ideas is substantial; entry represents a call option for a project-holder and there may be too much entry as Boadway et al. (1998) suggest. They were the first to point to the possibility of excess entry under debt contracts. They implicitly use the assumption of limited liability, but abstract from the sunk cost of entry, hence underestimating the true entrepreneurial risk. Moreover, under full liability, the incentive is the reverse. It is plausible that effectively the liability is often partially limited, but not fully eliminated. Ultimate risk-sharing, however, may remain uncertain *ex ante* due to contract incompleteness. In the light of the complexity of the issue, it is advisable to let the data speak for itself.

### **3. Testing the Implications of the Model: The Econometric Analysis**

#### **3.1 Model Specification**

We will carry out the econometric analysis using cross-country panel data on 20 OECD countries (see below) for 1978, 1983, 1988, 1993, i.e. in five-year intervals. The econometric model on entrepreneurship to be estimated can be cast as

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One of the implications of outside financing under informational asymmetry is that the quality of entrepreneurs may become more heterogenous. If the liability is limited, it is not the case that only firms with positive net present value projects have an incentive to enter.

$$(10) \quad n_{it} = \hat{\alpha}_o + \hat{\alpha}_j z_{ijt} + \hat{\alpha}_{j,h} z_{ijt} z_{iht} + \hat{\alpha}_d D_d + \hat{\alpha}_{it}$$

where  $n_i$  stands for the rate of entrepreneurship in the country  $i$ ,  $i=1, \dots, 20$ ;  $t = 1978, 1983, 1988, 1993$ . This variable represents the empirical counterpart of our theoretical  $n$ -variable. To allow for structural differences between countries in the panel, fixed country effects could be added. However, one of the explanatory variables (replacement ratio, see below) is time-invariant, though subject to inter-country differences, i.e.  $z_{ikt} = z_{ik}$  and would be perfectly multicollinear with country dummy variables. Also, some other variables have much more variation across countries than over time. Therefore, we prefer not to introduce fixed country effects. However, we include some country group dummy variables and year dummies,  $D_d$ . The cross-products  $z_{ijt} z_{iht}$  measure the interaction effects to be used to test the effects of social insurance. In our estimation procedure, the risk, the public sector and the union density variables introduced as the explanatory variables will be *lagged* by 3 years relative to the variable to be explained, to eliminate the problem of reversed causality. Variable  $\hat{\alpha}_{it}$  stands for the error term with  $E[\hat{\alpha}_{it}] = 0$ ,  $E[\hat{\alpha}_{it}^2] = \hat{\sigma}^2$ ,  $E[\hat{\alpha}_{it} \hat{\alpha}_{it-\hat{a}}] = E[\hat{\alpha}_{it} \hat{\alpha}_{jt}] = 0$ . The following country-specific variables enter the econometric analysis:

$n_i = \text{rate of entrepreneurship}$  is measured as the ratio of people working on their own account relative to the total labor force.

$z_{i1} = \text{national economic risks (s)}$  are measured by the conditional standard deviation of log GDP around the trend. For each country, we estimated a linear trend equation for log GDP with GARCH(1,1) error process over the period 1970-1992, and divided the square root of the conditional variance by the average GDP. (The risk variable will be lagged by three years). We thus work with the assumption that local (within-country) risks are perfectly correlated but there is no cross-country correlation in risks.<sup>18</sup> While Parker (1996) used the number of strikes to proxy the risk faced by entrepreneurs, measuring the turbulence of industrial relations, we note that our risk measure is analogous to that in Bird (1998).<sup>19</sup>

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<sup>18</sup> Though such a specification could be generalized to allow for sectoral or internationally correlated risk, it is the most natural first step. One can also legitimize the analysis using a measure of national risks in that the export markets amount to at most a quarter or a third of total demand in the typical OECD countries.

<sup>19</sup> One can perhaps raise the counterargument that our risk variable may not be truly exogenous if a high rate of entrepreneurship means a large share of non-labor income in the functional income distribution. It is not clear, however, whether such an effect is important.

$z_{i2}$  = *public sector and welfare state variables* ( $r, p, f, t$ ) are measured alternatively by the following variables: the replacement ratio i.e. unemployment compensation relative to labor income on average ( $r$ ), the share of total public sector expenditure (public investment, public consumption and transfers) in the total GDP ( $p$ ), transfer payments as a percentage of GDP ( $f$ ), and the total tax rate (taxes as a percentage of GDP) ( $t$ ). We thus use the  $r$ -variable as a proxy for differential social insurance for entrepreneurial risks and labor risks. We also use some interaction variables to test whether the social risk insurance affects the overall risk effect.

$z_{i3}$  = *financial variable* ( $d$ ), measured by domestic credit expansion, and alternatively by the nominal lending rate.

$z_{i4}$  = *inequality of income distribution* will be measured by the Gini coefficient calculated from household (pre-tax) income data. It has been suggested in some studies (Jenkins (1995), Lindh and Ohlsson (1996)) that in the light of the redistributive effects of public policy, the required asset accumulation facilitating enterprise formation may be too limited. Such effects will be tested in the current paper.

$z_{i5}$  = *union membership ratio* ( $u$ ), is used to measure the effect of union power on enterprise formation through labor market mechanisms. In countries with strong labor unions, the opportunity cost effect can be expected to be higher than on average.

$x_{i6}$  = *stage of development of the economy* will be measured by the real GDP per capita. We note that Acs, Audretsch and Evans (1994) have previously found a negative relationship between entrepreneurship and economic development.

$z_{i72}$  = *interaction effect between risk-taking and the public sector* is tested by introducing the product terms  $ps, ts, fs$ . If the favorable social insurance effect dominates, the coefficient is expected to be positive, hence reducing the risk effect, which is negative.

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Another point is related to the role of fiscal policy as an automatic stabilizer in an economy. If it manages to reduce the overall income volatility, it may have one more channel between the public sector and enterprise formation. Our model, however, is an equilibrium model and we do not endogenize the determination of income risks.

$z_7 = \textit{Mediterranean dummy}$  to account for differences between the industrial structures of the Mediterranean countries and the other countries in the data set.

$z_8 = \textit{US dummy}$  to account for the exclusion of owner-managers from the definition of an entrepreneur.

$z_9 = \textit{Finland-Sweden dummy}$  to account for a change in the construction of statistics in 1988 and 1993 relative to the earlier years.

$z_{10}-z_{12} = \textit{year dummy}$  variables.

### 3.2 Estimation Results

#### *Diagnostic checks of the model*

In testing the predictions of the theory, we have organized the data as a panel, country-by-country. We introduce the following diagnostics to check the model specification:

(i) We use White's (1980) heteroscedasticity test of residuals and we report the corrected  $t$ -statistics from the heteroscedasticity-consistent covariance matrix. (ii) To test the normality of the error term, we use the Jarque-Bera test. (iii) We also introduce Ramsey's RESET test in order to test the adequacy of the model specification, including omitted variables, incorrect functional form, and correlation between the regressors and the residuals.

#### *Results*

We introduce the following *step-wise testing* procedure. In *the first stage*, we test the risk effect, essentially the Knightian view, allowing at the same time for structural differences between countries. We then proceed to test the effects of the public sector on entrepreneurship in a number of ways. Here we distinguish between the social insurance effect and the crowding-in/crowding-out effects. With these results to hand, *in the second stage* we test the financial, income inequality, union, and development stage effects.

The results are reported in tables 1-2. It turns out that the explanatory power of the model is relatively high even allowing for the risk effect and the structural effects only. There appears to be some heteroscedasticity in some models. We therefore report the White's adjusted  $t$ -values throughout. It turns out that the Finland-Sweden dummy is not significant and it will be dropped from other estimations; the Mediterranean and US dummies, however, are both significant and will be included. The Jarque-Bera tests do not typically alarm over deviations from the normality of residuals.

The RESET test accepts the specification, the  $p$ -value in the  $F$ -test being only 0.380 in the first equation. However, as an additional test, we also estimated our model using cross-sectional data on country averages in our sample. These "between" estimates were quite similar to those reported below.

(i) *Risk effect.*

The coefficient estimate of the risk variable appears to be negative and statistically significant in all our regression equations. Such a finding supports the basic theory of the negative impact of aggregate risks on entrepreneurship. Thus, given the public sector variables, an increase in aggregate risk reduces the equilibrium entrepreneurship.

(ii) *Public sector: social risk insurance.*

In equations (II) and (III), we report our tests for the effects of social insurance. Our variable for the differential social insurance ( $r$ ) obtains a regression coefficient which is negative and statistically significant with a  $t$ -value of -4.277. Such a finding strongly supports the proposition of our model that given the risk level, an increase in social risk insurance in the Welfare State reduces entrepreneurship. We also find that the variable for transfer payments ( $f$ ) also obtains a negative regression coefficient with a significant  $t$ -value of -3.00. These are direct effects, but the overall effects, including the indirect ones are also negative.

We then tested the *indirect* impact of social risk insurance on entrepreneurship through its impact on the risk effect by including the interaction variables. The interaction between the risk effect and social unemployment insurance measured by the product variable  $r*s$  (not reported in our tables), obtained a coefficient with a non-significant  $t$ -value of 0.332. The test is not informative about Sinn's proposition. The finding, however, is consistent with the implication of our model.

We then introduced interaction between the aggregate public sector variables and risk effect in terms of the interaction variables  $f*s$ ,  $p*s$  and  $t*s$ , reported in test equations III-V. Such a test is obviously not ideal in that the fiscal policy variables *also* reflect the infrastructure and crowding-out effects. It turned out that the coefficients of these interaction terms are positive which indicates that an expansionary public sector indeed reduces the risk effect. This is a somewhat impure measure of the social insurance effect. The overall effects turn out to be systematically negative, thus speaking against the Sinn's proposition. The overall effects can be found as follows. The total impact of transfer payments on entrepreneurship (on average) can be obtained from  $dn/df = -0.295 + 0.747*0.393 = -$



0.001 where  $0.393 =$  the mean of the risk variable. Similarly, the overall effects of the public sector expenditure can be calculated from equation IV as  $-0.043$  and that of taxes from equation V as  $-0.072$ .

The fact that some studies (including Parker (1996)) have reported positive and significant effects from unemployment on self-employment suggests that the unemployment compensation, though generous, does not fully eliminate the desire to change civil status. We did not test for such an effect. However, our study appears to be the first one to use the replacement ratio in testing the effects of social insurance.

(iii) *Public sector: crowding-in, crowding-out.*

Next, we look into the *direct* public sector effects (equations (IV) and (V)). Without interaction effects, the public sector variables  $p$  and  $t$  obtain negative and significant coefficients with  $t$ -values  $-2.378$  and  $t = -2.138$ . Taken together, these results suggest that it is the crowding-out effect which dominates the crowding-in effect in the OECD data from the 1970s to the 1990s.

(iv) *Financial effects.*

The coefficient of the domestic credit expansion variable is statistically insignificant (equation (VI)). Such a weak result is somewhat at variance with the earlier findings which have identified stronger impacts. It is, however, consistent with the ambiguity view concerning whether financial factors limit entry or attract lemons. However, this result may also have to do with our financial variable. It was not possible to create a measure for credit expansion, say over several years, because of changed procedures in construction of financial statistics available to us. Credit expansion had to be measured over one year only while the dependent variable is a stock rather than a flow of entry to entrepreneurship. We also carried out testing experiments with the market interest rate but this turned out not to be significant, either. Our results are thus somewhat at variance with those of Parker who found significant negative effects for the (real) interest rate variable but no role for personal net wealth.

(v) *Income inequality.*

A measure of income inequality (the Gini coefficient) was used to provide another and independent test of the financial effect. In equation (VII), its coefficient had the predicted positive sign with a rather high  $t$ -value of  $1.964$ . Because the Gini variable was negatively correlated with the  $r$ -

variable, we ran this test without the latter one.

(vi) *Union effect.*

We next introduced the union density to measure the exogenous union effect on the wage rate and thereby on entrepreneurship. We again had to exclude the  $r$ -variable due to multicollinearity, obtaining a negative coefficient estimate with a  $t$ -value of -1.787.

(vii) *Stage of development.*

The stage of development measured by the real GDP per capita had a significant coefficient with a  $t$ -value of -2.734. Its negativity invites the interpretation that a high living standard may have a detrimental effect on entrepreneurship.

#### **4. Conclusions**

There are a number of insightful results reported by our study which suggests that economic risks shape the allocation of human capital between entrepreneurs and labor supply. Among its many dimensions, the main focus of the current paper has been the interaction between private enterprise formation, entrepreneurship and the public sector. We introduced a rather stylized model which, however, is rich enough to organize the discussion and form the theoretical foundation for aggregate econometric analysis. Such an analysis was carried out by resorting to international panel data on a set of OECD countries. Several complementary tests were introduced. In the light of those findings, the Knightian view of entrepreneurs as risk-takers re-emerges as an empirically valid paradigm. The Welfare State does not provide insurance to share the failure risk of entrepreneurs. Tests of the effects of differential social risk insurance based on the replacement ratio in unemployment compensation for labor and on the effects of transfer payments point to the conclusion that the Welfare State creates detrimental incentive effects on risk-taking in the form of entrepreneurship. Moreover, it is the case that the crowding-out effects of public production of private goods on entrepreneurship dominate the crowding-in effects of public production of public goods. Public goods are complementary to private inputs but large public sectors tend to limit the expansion of the sector consisting of private enterprises. Unlike many earlier studies, the findings do not provide strong support for the view that financial constraints limit the equilibrium entrepreneurship. Instead, support is found for the proposition that the rate of entrepreneurship is positively related to the degree of income

inequality and negatively to the union density in the economy. The results also indicate that a high living standard may have a detrimental effect on entrepreneurship.

The efficiency of market allocation of occupational choice is of substantial interest. Do market forces guarantee that the right number of people and those with the right skills choose to enter as entrepreneurs? Is the equilibrium efficient? Are there dynamic externalities from entrepreneurship, for example, in the form of providing learning-by-doing? Do the costs of information create welfare losses in terms of unoptimal entry? Is it possible to improve the operation of the risk markets in their task of evaluating untested ideas? It is also important to raise a number of other normative issues, like the optimal size and industry distribution of enterprises and their efficient growth rate. Moreover, one might inquire whether the economic policies have created mechanisms which have primarily supported operations of existing large incumbent firms. Before addressing these issues, it is clear that the research target has to be more focused initially. It is hoped that our paper serves that purpose.

### **Appendix. Data Sources**

The data we use has been constructed as reported below and includes the following countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, the USA. After preliminary estimation, Iceland was dropped from the data set because the values of many of its variables clearly represented outliers.

\* *The rate of entrepreneurship* is measured by the ratio of people working on their own account (excluding farmers), source: Labour Force Statistics, OECD 1997. There are some classification differences. For example, the US data do not include owner-managers among entrepreneurs. Such differences will be taken care of by national dummies. Moreover, definitional changes in data (cf. Sweden and Finland) will be taken care of by a year dummy for these countries. The panel consists of 1978, 1983, 1988, 1993, i.e. five year intervals for of 20 OECD countries. In many European countries some services like health care are produced by the public sector instead of the private one. For this reason, there will be some differences in the rate of entrepreneurship in the data.

\* *National economic risk* will be measured by the relative trend deviations of the real GDP over the period 1970-1992 (the ratio of the conditional standard deviation in a regression of the logarithmic GDP with the time trend and GARCH(1,1) error, relative to the average of the log GDP). Data source: Penn World Tables.

\* *Public sector effect and variables of collective risk-sharing* will be measured alternatively by the following variables: the share of total public expenditure (including transfer payments) in the total GDP, income transfers as percentage of GDP, and the total tax rate (taxes as a percentage of GDP). Data Source: Mäki (1995).

\* *The replacement ratio* is obtained from Layard, Nickel and Jackman (1991). Its value at the beginning of the 1990s is used for each country; it is not possible to obtain reliable comparable data from all years.

\* *The stage of economic development* will be measured by the real GDP per capita in constant dollars adjusted for changes in the terms of trade (1985 international prices for domestic absorption, current prices for exports and imports). Data source: Penn World Tables.

\* *Credit expansion* will be measured by the growth rate of bank credit over the preceding year relative to the observation of the rate of entrepreneurship (i.e. 1977-1978, 1982-1983, 1987-1988, 1992-1993). The data are drawn from the IMF Financial Statistics Yearbook 1997.

\* *Interest rate* will be measured by the lending rate for the years 1978, 1983, 1988, 1993; it is derived from IMF Financial Statistics Yearbook, 1992, 1997.

\* *The inequality of income distribution* will be measured by the Gini coefficient calculated from household (pre-tax) income data. Source: Deininger and Squire Data Set, The World Bank.

\* *Union density*. Source: OECD Employment Outlook, 1991, 1997.

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