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ENTREPRENEURSHIP, ECONOMIC RISKS, AND RISK INSURANCE IN THE WELFARE STATE: RESULTS WITH OECD DATA 1978-93

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Abstract

We find evidence in the OECD cross-country data to support the Knightian view that non-diversifiable economic risks shape 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 in the OECD data. Weak evidence is found for the proposition that the rate of entrepreneurship is related to the degree of income inequality and to the union power in the economy. The results also suggest that a high living standard has a detrimental effect on self-employment.

Keywords: Entrepreneurship, risks, the welfare state, social risk insurance, crowding-out

JEL Classification: D2, G3, H1, L2

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1. Introduction

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

Empirical data (OECD Labor Force Statistics) point to the striking finding that the rate of entrepreneurship (measured by entrepreneurs and those working on their own account as a share of 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 higher rates of entrepreneurship resulting from their high rate of self-employment.

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. Yet, understanding the incentive mechanisms in formation of enterprises can be argued to be by far the most necessary contribution to a better understanding of why economic performance, efficiency and ability to create jobs are so diverse among industrialized countries. Such a research task seems rather urgent also 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? Or why don't the existing ones grow so as to employ more people?

More recently, there has been revival of interest in exploring the determinants of entry into or survival in entrepreneurship.[1] Our study introduces the economy-wide equilibrium perspective. In particular, it addresses the role of the public sector and the Welfare State. Expansion of public sectors and the emergence of the Welfare State is one of the key developments in post-war industrialized economies. 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

[1] Cf. references in footnote 4 below.

tax systems. The impact on enterprise formation has not been previously addressed. Apart from this question, the current paper will in particular focus on the effects of public infrastructure and the Welfare State as an insurance mechanism. We argue in this paper that the Welfare State insures entrepreneurial and labor risks differently. We explain in section 2.2 why this is the case. Then we formulate an analytic model to work out the effects of risks, the public sector and the Welfare State on the occupational choice. Such an analysis has not been undertaken previously. We then as whether the implications of the model on enterprise formation survive the econometric testing using OECD data.

Sinn's recent influential papers (Sinn (1995, 1996)) have 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, in general, stimulates risk-taking. More recently, Bird (1998) has 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, very little analysis of the impact of public policy and the social risk-sharing institutions on *entrepreneurship*, the key test of risk-taking but 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 and a welfare state. Such a choice was assumed to result in low or high taxation, respectively. They found evidence in favor of multiple polito-economical equilibrium in cross-country data.

In Section 2, we briefly survey the existing models of determinants of entrepreneurship. We proceed to formulate a 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 distinction between labor and entrepreneurial risk: production of safety can never eliminate genuine entrepreneurial risk. For obvious reasons, neither private nor social institutions provide insurance against entrepreneurial risk.

In section 3, we test the propositions arising from our model using cross-country data

from 19 OECD countries over four years, 1978, 1983, 1988 and 1993. We explain the choice of data in section 3 and we document the sources of data in the appendix. Our findings could be taken as evidence that there may be a trade-off between the degree of social insurance and incentives for risk-taking in terms of entrepreneurship. The findings include regularities between the *measured* rate of entrepreneurship and the factors derived from the model. As always, it is possible that one can identify problems related to construction of cross-country data. Our findings, however, suggest that the detected regularities are largely real and not explained by the manner in which the data are created.

2. Theoretical Framework

2.1 The Theory of the Entrepreneur: A Brief Taxonomy

Entrepreneurship, including self-employment, results from a risky occupational choice. The view of entrepreneurs as primary risk-takers is deeply rooted in the Knightian tradition, c.f. Knight (1921), which vies entrepreneurs as ultimately bearing the economic risk of failure.[2] After a long digression, the economic profession has reintroduced entrepreneurial risk-bearing into the theory of the firm, starting in the late 1970s. The economic underpinnings have been the subject of analysis in 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).[3] The determinants of entrepreneurship have also been studied extensively since the late 1980s, utilizing both longitudinal, time-series and cross-section data.[4]

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[2] Such risks show up in the unpredictability of entrepreneurial earnings, risky capital income, and in bankrutpcy rates. The data reported by Eurostat (see *Enterprises in Europe*, Fourth Report (1996)) suggest 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 heros of economic progress. Our framework below is consistent with both these classical views, though it will test only the relevance of the former explicitly.

[3] The literature up to the early 1990s has been reviewed by de Wit (1993b).

[4] 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), Lindh and Ohlsson (1998), Blanchflower (2000) and

The literature has been successful in endogenizing the determination of the rate of entrepreneurship. 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 literature has ever since adopted the view that individuals differ in their ability to produce economically valuable ideas or in their ability to organize production. In Kihlstrom and Laffont (1979), less risk-averse agents will become entrepreneurs; moreover, the lower the rate of risk aversion is, the bigger is the size of the firm. In Kanbur (1979), entrepreneurs are self-selected prior to knowledge of their ability. In Boadway et al. (1998), differences in ability (to sell the product) give rise to different success probabilities. While Lucas (1978), Kihlstrom and Laffont (1979) and Kanbur (1979) abstracted from financial issues,[5] 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 the formation of new enterprises.[6] 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). In all models, risk-sharing between the entrepreneurs and the labor force is rather limited, though the equilibrium wage rate is not completely immune to market risks.

While the existing literature has noticed the fundamental difference between the entrepreneurial risk and labor risk, it has not produced a theory of the role of the public sector and the Welfare State and the effects of social risk-sharing institutions.[7] Our model fills this gap. In the spirit of the Knightian view, we introduce the risk of default. We highlight that

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Johansson (2000).

[5] 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 entrepreneurial ability before production is reflected in the scale and employment of the firm but again in the absence of default risk.

[6] 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 have been successfully used by Ilmakunnas and Topi (1999), who found statistically significant financial effects on entry of new enterprises.

[7] 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.

market entry typically requires some costly *ex ante* commitment.[8] This can be viewed as the *ex ante* cost of developing the idea or carrying out the necessary investment in human capital. It can also arise in the form of an asset risk, i.e. from allocation of private assets into risky productive use. *Ex post*, such costs are sunk and cannot be recouped in the case of default. Alternatively, the personal cost of default can arise from a failure under outside finance. Creditors face an information problem under limited collateral. To avoid the lemon problem, contracts with full liability may be signed. Such contracts impose a substantial risk on those entrepreneurs who resort to debt financing.[9] The saved or inherited wealth of a potential entrepreneur is then subject to default while non-entrepreneurial agents will typically face no such risk.[10]

Neither private nor social institutions provide - apparently for good reason - insurance against default risks. 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.[11] 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 risk and the labor risk are *equally* insured by society. Once this assumption is relaxed, the implications for the Welfare State need to be reconsidered.

2.2 A Model of Occupational Choice in the Welfare State

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[8] One can think that such a cost implicitly enters Kanbur's (1979) analysis, where occupational choice cannot be reversed after observing ability.

[9] Survey data on Finnish firms (Borg and Borg (1997)) show 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.

[10] In contrast, the privilege of limited liability protects the shareholders of companies quoted on a stock exchange.

[11] 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.

We introduce a general equilibrium model of risky occupational choice with the condition that the market for entrepreneurs (or labor) will clear. To formalize, consider a pool of potential entrepreneurs in a population of individuals with the population size normalized to unity, $N = 1$. They all have an option for a simultaneous market entry at the first stage. There are high (H) and low (L) ability types such that the low-ability types face a higher fixed cost of production $c^H < c^L$. These costs are taken to dictate that in the good state, both types are active while in the bad state, low-ability types are driven out of the market. Ability differences are exogenous; they are, for example, culturally inherited as a within-family human capital. We denote $n = n^H + n^L$ = the entrepreneurial entry, where the number of high-quality types n^H is exogenous. We assume in our formal model that all agents are born as "lucky lottery winners" in that they face no financial constraints.

The decision to enter at the first stage is interpreted as an *ex-ante* commitment to an irreversible fixed investment $k > 0$ under uncertainty about the state of the future market. Investment k is an industry-specific constant. After commitment at stage 1, all entrepreneurs sign labor contracts with labor. Then, the state is revealed to be $s = (g,b)$ with given probabilities $(\lambda, 1-\lambda)$. Variable s tells the future demand or price. The good state is characterized by $g = 1$, the bad by $0 < b < g$. The time line is given in Figure 1. The equilibrium will be solved by backward induction.

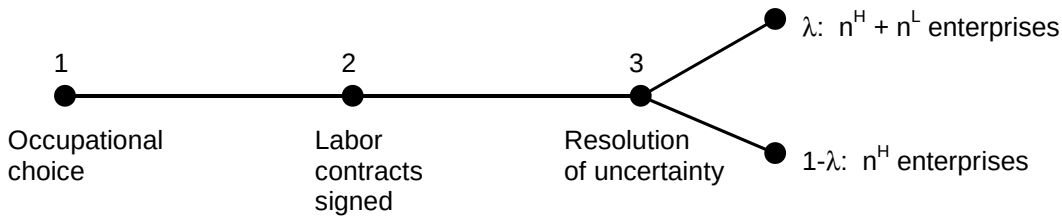

Figure 1: Time line of the model

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 terms of public and private goods produced by the public sector, including social insurance. The public sector thus affects entrepreneurship via various channels. First, the public sector produces public goods (infrastructure) which make the firms' production more efficient. Second, the public sector also produces private goods, which tends to crowd out private production by reducing private

profitability. Third, labor is needed for the production of public goods. Finally, social risk insurance interacts with firm formation.[12]

After entry, the entrepreneurs have access to technology

(1) $$q = eL^{\alpha}p^{\beta} \qquad 0 < \alpha,\beta < 1,$$

where L = labor input and $e = \{0,1\}$ is the entrepreneurial effort, the necessary input. In (1), the public sector variable p accounts for public infrastructure, resulting in a positive effect on private productivity and hence crowding-in of entrepreneurship.

With a given entrepreneurial input and ability combined with labor input, the feasible technology tends ultimately to exhibit diminishing returns on the variable input, L. The outcome of this mechanism is to restrict the optimal size of an enterprise, which will then have an indirect impact on the number of enterprises in equilibrium. The state-dependent future market price is taken to be

(2) $$P_s = sp^{\gamma} \qquad \gamma < 0,\ s = g,b,\ b < g,$$

with $P_g > P_b$. To the extent that the public sector produces private goods, there will be a negative impact on private demand, measured by γ, and hence crowding-out of entrepreneurship. Public production of private goods is exogenous and an imperfect substitute for the private production, scaling the price that private producers can charge. We consider private producers as price-takers, abstracting from, say Cournot output competition, as this simplifies the algebra considerably with no loss of generality for the theory of market entry.

While high-quality types will always enter as entrepreneurs, low-quality types will rationally optimize their entry in a forward-looking way, making total entry n endogenous. The state-dependent condition for active enterprises is given by

(3) $$\pi_s^i = P_s L_s^{\alpha} p^{\beta} - w^* L_s - c^i \geq 0 \qquad i = H,L,$$

[12] We exclude the analysis of grants, subsidies and profit taxes, not because they are irrelevant but because we focus on other mechanisms in the current paper.

where w^* is the contract wage. In the good state, the number of active producers is $n = n^H + n^L$; in the bad state, it is n^H. It is easy to see that all active enterprises have the same size and produce the same amount (with labor demands $L_g^H = L_g^L$). The high-ability types earn greater rents than the low-ability types. In the bad state, the low-ability types and their labor enter the unemployment pool. It remains to solve for the state-dependent market outputs, the contract wage w^*, and the equilibrium *ex-ante* entry, n^*.

Enterprises are assumed to be risk-neutral expected profit maximizers contracting on the wage under uncertainty. At the final stage and given the contract wage w^*, each of them takes the realized market price after resolution of uncertainty and labor cost as given. The employment decision, i.e. the state-dependent labor demands, will therefore be given from (3) as

$$(4) \qquad L_g^i = [\alpha g p^{\beta+\gamma}/w^*]^{1/(1-\alpha)}, \quad L_b^L = 0, \quad i = H,L.$$

At the second stage and after irreversible entry, labor markets open. Entering entrepreneurs will *ex ante* evaluate their employment in both states. Labor faces asymmetric information and is uninformed as to which of the enterprises is of type H and which is of type L. Entrepreneurs have no history and hence no means of signalling their type. Workers thus take competitive wage bids from entrepreneurs. The resulting contract wage rate has to be the same across firms: *only pooling contracts* are available. After the state is revealed, both types of enterprises would like to hire more in the good state but they would have to bid against each other, resulting in wage drift. Total labor is fixed. It will be assumed that the contracts cannot be renegotiated and that there is no inter-firm mobility of labor *ex post.*[13] From the *ex-ante* perspective, contract wage w^* is assumed to satisfy the condition that the aggregate labor demand under uncertainty over the two states equals labor supply, which is a constant, $1-n-m$. With m denoting the labor demand by the public sector, $1-n-m$ stands for the share of population not acting as entrepreneurs. Introducing the public sector production function as $p = (m/a)^{1/\varphi}$, $a > 0$, $\varphi > 0$, $m = ap^{\varphi}$ thus measures the degree to which public production crowds out labor from the private sector. Given the assumptions introduced, the contract wage w^* satisfies

[13] This is only a simplifying assumption. It will affect the algebraic expression of the solution

(5) $$n^H[\lambda L_g^H(w^*) + (1-\lambda)L_b^H(w^*)] + n^L\lambda L_g^L(w^*) = 1-n-m.$$

In the good state, there is no unemployment; in the bad state there is. Introducing (4) into (5) allows one to solve for the contract wage

(6) $$w^*(n,\lambda,p) = \alpha p^{\beta+\gamma}[\Gamma(n)(1-n-ap^{\varphi})^{-1}]^{1-\alpha},$$

where we have adopted a notation $\Gamma(n) = n\lambda g^{1/1-\alpha} + n^H(1-\lambda)b^{1/1-\alpha}$, $\Gamma'(n) > 0$. We find

Lemma 1. *The equilibrium contract wage is an increasing function in the rate of entrepreneurship and in the probability of the good state,* $\partial w^*/\partial n > 0$, $\partial w^*/\partial \lambda > 0$. *The sign of the public sector effect* $\partial w^*/\partial p$ *is ambiguous.*

Proof. The results follow from (6).

QED

It remains to introduce risk insurance and solve for the equilibrium entry, n^*. There is a fundamental difference between labor risks and entrepreneurial risks: production of safety can never eliminate genuine entrepreneurial risk. For *moral hazard reasons*, neither private nor social institutions can provide insurance against entrepreneurial risk. Too many low-quality types would enter under expected bailing-out by the government would the bad state occur. Instead, and viewing the occupational choice of a potential entrepreneur as an option with an entry threshold, social insurance for labor may actually raise the entrepreneurial threshold by boosting up the reservation income. There is no need to model risk aversion explicitly in the current context, as stochastic dominance is sufficient. *In the framework of risk neutrality, where an agent is faced with two risky income flows, it is rational to choose the one with higher expected income.* Given that entrepreneurial profit is the residual income, it is more risky than labor income. It is therefore sufficient to focus on the income effect of social risk insurance.

The non-insurable risk of defaulting k tends to make it costly to give up access to alternative income. The social insurance in terms of unemployment compensation for labor risk

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for the contract wage in (5) but not the qualitative aspect of the analysis.

is expected to raise the entry threshold. This holds regardless of whether a failing entrepreneur is eligible for unemployment compensation or not. To allow for social risk insurance in terms of unemployment compensation, we introduce potentially different compensation rates for inactive L-type entrepreneurs (μ_e) and for labor (μ). Those who choose to be employed as labor obtain w^* with probability $\lambda + (1-\lambda)n^H/n$ and μ with probability $(1-\lambda)n^L/n$. We abstract from the government budget constraint. One can think that the unemployment insurance benefits are financed by lump-sum taxes or taxes from the positive rents earned by the high-quality types.

We now write the occupational choice for potential L-type entrepreneurs as indifference between expected profit over the two stages and the outside option (labor contract)

$$(7) \qquad \lambda\pi_g^L + (1-\lambda)\mu_e - k = [\lambda + (1-\lambda)n^H/n]w^* + (1-\lambda)[n^L/n]\mu.$$

By choosing not to become an entrepreneur, an employee avoids the non-insurable risk of losing k. One should pause a moment also to pay attention to the double role played by the market wage w^* as opportunity cost and as production cost to the entrepreneur.

In *ex-ante* equilibrium *under the risk of default,* entry thus has to be consistent with the required good-state profit, solved from (7) as

$$(8) \qquad \Pi_g^L(n) = \lambda^{-1}[(\lambda + (1-\lambda)n^H/n)w^* + (1-\lambda)((n^L/n)\mu - \mu_e) + k].$$

Making use of the condition that the size of each enterprise in the good state measured by the employed labor has to satisfy $L_g = (1-n-m)/n$, one can rewrite (3), the expression for the actual good-state profit of an L-type, as

$$(9) \qquad \pi_g^L(n) = p^{\beta+\gamma}(1-n-ap^{\varphi})^{\alpha}[gn^{-\alpha} - \alpha\Gamma^{1-\alpha}n^{-1}] - c^{L.}$$

Entry of a marginal L-type pushes up the wage rate as stated in Lemma 1, providing a solution for the equilibrium n^L. Defining $F(n,p) \equiv \pi_g^L - \Pi_g^L$ as the difference between the actual and required good state profits, the equilibrium entry n^* is determined from the condition

$$(10) \qquad F(n,p) \equiv \pi_g^L(n) - \Pi_g^L(n) = 0,$$

written implicitly as

(11) $n^* = n(\lambda,\mu,\mu_e,p,k,c^L)$.

We now derive the key comparative static results concerning the equilibrium entry.[14]

Lemma 2. $F_n < 0$.

Proof. It makes economic sense to focus on the case where the parameter g and the function Γ are such that an increase in the number of enterprises reduces the actual profit, $\partial\pi_g^L(n)/\partial n < 0$. This follows from the wage mechanism. The impact on the required profit, $\partial\Pi_g^L(n)/\partial n$, may be positive or negative depending on the magnitude on the impact on wages $\partial w^*/\partial n$. However, the requirement of stability of equilibrium dictates that if $\partial\Pi_g^L(n)/\partial n < 0$, i.e. that $\Pi_g^L(n)$ is declining in n, it has to decline less fast than $\pi_g^L(n)$. This is because at low n, say $n < n^*$, it is the case that $F(n,p) \equiv \pi_g^L(n) - \Pi_g^L(n) > 0$, calling for increased entry of additional L-types. When $n > n^*$, it must be the case that $F(n,p) \equiv \pi_g^L(n) - \Pi_g^L(n) < 0$ with too many L-types in the market. Therefore, $F_n < 0$. The intersection provides a stable equilibrium (for a numerical illustration, see Figure 2[15]).

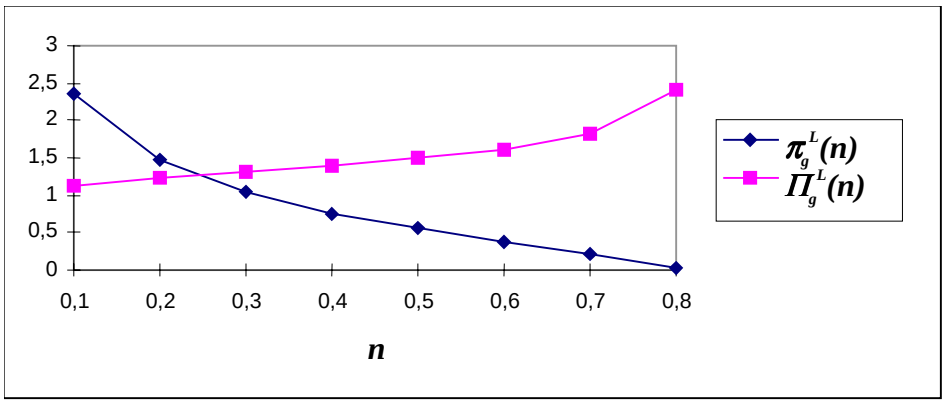

Figure 2: Profits as a function of the number of entrepreneurs

[14] Albegraic expresssions for F_n and $F\lambda$ are presented in Technical Appendix.

[15] The figure is based on parameter values $\alpha = 0.5$, $\beta = 0.3$, $\gamma = -0.4$, $g = 1$, $b = 0.5$, $n^H = 0.1$, $\lambda = 0.5$, $\varphi = 0.5$, $p = 2$, $a = 0.1$, $c^L = 0.2$, $\mu = 0.2$, $\mu_e = 0.15$, and $k = 0.5$.

Lemma 3. $F_\mu = (1-\lambda/\lambda)(n-n^H/n) < 0$, $F_{\mu e} = (1-\lambda/\lambda) > 0$, $F_k = -1/\lambda < 0$, $F_c^L = -1 < 0$.

Proof. Straightforward.

Lemma 4. $F_\lambda < 0$ *(most likely).*

We note that if the negative impact on realized profit through increased wage cost exceeds the (negative) impact on required profit, we have $F_\lambda < 0$. This condition is likely to hold because the latter effect consists of two offsetting mechanisms, i.e. wage effect and the direct effect of the adjustment of λ.

Lemma 5. *Under segmented labor markets* ($m = 0$), $F_p < 0$ *if* $|\gamma| > |\beta|$, $F_p > 0$ *if* $|\gamma| < |\beta|$. *Under non-segmented labor markets* ($m = ap^{\varphi} > 0$), *for* $F_p < 0$ *it is sufficient that* $\beta+\gamma < 0$.

Proof. The result follows from evaluating F_p.

Using these lemmas, we can state results concerning the equilibrium rate of entrepreneurship:

Proposition 1.
(i) $\partial n^*/\partial\lambda = -F_\lambda/F_n > 0$ *(price uncertainty)*
(ii) $\partial n^*/\partial k = -F_k/F_n < 0$ *(risk of default)*
(iii) $\partial n^*/\partial\mu = -F_\mu/F_n < 0$ *(unemployment compensation for labor)*
(iv) $\partial n^*/\partial\mu_e = -F_{\mu e}/F_n > 0$ *(unemployment compensation for entrepreneurs)*
(v) $\partial n^*/\partial p = -F_p/F_n$ *ambiguous (public sector: crowding-in, crowding-out).*

Increased confidence thus reduces the entry threshold: the equilibrium rate of entrepreneurship thus is positively related to the success probability of the enterprise, $\partial n^*/\partial\lambda > 0$. It is of substantial interest to ask how the public sector output interacts with the enterprise formation. The net effect of public sector production on entrepreneurship, $\partial n^*/\partial p = -F_p/F_n$, consist of several counteracting mechanisms leaving it for empirical work to determine the sign of the net effect. In practice, the unemployment compensation for failing entrepreneurs and

unemployed labor is based on different schemes. The entrepreneurs typically insure themselves while labor is subject to social insurance. As we have cross-country data on insurance for labor only, the former effect cannot be tested. Unemployment insurance shielding labor from income risk raises, ceteris paribus, entry threshold.

3. Testing the Implications of the Model: An Econometric Analysis

3.1 Estimation procedure and the principles in data decisions

(i) Cross-country differences in economic institutions and in the role of the public sector suggest that one should focus on the cross-country variation when testing the theoretical predictions of the model. Given the limited number of countries which we could include in the study because of limitations of available data, we chose to include data on the same countries over time. We thought that a five-year interval in data is sufficiently long to implement this approach. Annual data were not considered appropriate for an additional reason: one should interpret the rate of entrepreneurship as a long-run structural property of an economy, whereby short-run changes in entrepreneurship cannot be of particular interest. (Our data sources are documented at the end of the paper.) Formally, we have a panel data set, but our testing goes in terms of cross-country differences. Moreover, one is not able to obtain full panel data on all variables required.

(ii) The available data set does not allow for differentiating those who are purely self-employed from those who employ also other people. Whether these groups respond differently to our explanatory variables, is a topic for future research if non-pooled data become available.

(iii) The estimates presented in the tables are from OLS estimation of the model without fixed country effects. Instead, the two country group variables explained below are included. The main reason for estimating the model in this way is that there is only one observation for each country on one of the variables, namely the replacement rate. This variable would therefore be perfectly correlated (linearly dependent) with the country dummy variables. One could also argue that in this kind of setting, where most of the variation in the data comes from the cross-sectional variation rather than from variation over time, fixed-effect estimation may purge much

of the interesting variation in the data and actually increase the problems created by measurement errors.[16] This problem arises often e.g. in firm panels (see Griliches and Mairesse, 1995) and country panels (see Temple, 1999). One solution, suggested by Temple (1999), is to use carefully selected country group variables. We have chosen to use this approach. Moreover, to test the sensitivity of the results, we have also estimated the model in two other ways. Firstly, we used "between" estimation, using the average for each country in a cross section estimation. The "between" estimation was run as follows. We calculated the over time averages of the data set and ran single cross-section regressions across countries, having thus 19 observations. Even such a more limited data set gave support for the hypotheses derived.

Secondly, the model was estimated including country fixed effects (and excluding country group variables and the replacement rate). In a second step, the estimated country effects were explained by the replacement rate in a cross-section estimation. Both of these approaches led to results that were fairly similar to those presented in the enclosed tables.

(iv) To avoid any potential simultaneity problems, the problem of reversed causality, we allow for a three-year lag between entrepreneurship and those explanatory variables which are subject to time variation (risk, public sector and union density).

(v) Our model suggests that entrepreneurial risks reduce the equilibrium rate of entrepreneurship.[17] We will take the opportunity below to test the hypotheses of the impact of aggregate risks and social insurance in a cross-country data set. While no direct measures are available for potential differences in the cost of commitment, we introduce a measure of the risk of facing such a cost. It can be thought of as a proxy for the default risk under uncertainty (the joint effect of k and λ). See page 17 for the proxy of the risk variable.

(vi) The Welfare State effects are tested using a number of variables, including unemployment compensation, transfer payments, government expenditures and taxes. The

[16]Carrying out the analysis of variance shows that 91.3 % of the variation in the explanatory variable comes from variation between countries while only 8.7 % comes from variation within countries over time.

[17] Empirical support for such a proposition has been previously obtained by Parker (1996) in UK time-series data.

interaction terms of the public sector variables and the risk variable are used to test the effects of social insurance.

(vii) In our econometric analysis, we will allow for an extension to our analytic framework in two directions. We notice that there are various 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 outside option (wage rate) is affected in particular by the labor unions interacting with the equilibrium entrepreneurial entry. A test of such an effect will be introduced in the econometric part. Moreover, 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 and may operate as barriers to entry in the presence of differences in the quality of potential entrepreneurs. Given that access to finance may interact with enterprise formation,[18] it seems appropriate to test its impact 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 income distribution effects. 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.

Theoretically, however, the financial effects are ambiguous. The documented entry rate is substantial (cf. Geroski (1995)) but the failure rate of new firms is also high. Implicitly therefore, such evidence speaks against the common interpretation that financing restricts new entry and also indicates that some entrants may be lemons. Under restricted liability, the

[18] Over any given time period, market entry tends 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. 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.

opportunist incentive to test new ideas is substantial; entry represents a call option for a project-holder pointing to the possibility of excess entry under debt contracts. Under full liability, the incentive is the reverse. In the light of conflicting effects, it seems advisable to let the data speak for itself.

(viii) We introduce a *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 crowding-in/crowding-out effect and the social insurance effect. With these results at hand, we test *in the second stage* the financial, income inequality, union, and development stage effects. Another estimation strategy would have been to estimate the model first with all explanatory variables included. However, multicollinearity between some variables precluded this approach.

3.2 Model Specification

We will carry out an econometric analysis to test the hypotheses of Proposition 1 using cross-country data on 20 OECD countries (see below and the Appendix) for 1978, 1983, 1988, 1993, i.e. in five-year intervals. The econometric model on entrepreneurship to be estimated can be cast as

$$(12) \qquad n_{it} = \beta_o + \Sigma_j \beta_j z_{ijt} + \Sigma_{j,h} \beta_{jh} z_{ijt} z_{iht} + \Sigma_d \beta_d D_d + \varepsilon_{it}$$

where n_i stands for the rate of entrepreneurship in country i, i=1,...,20; t = 1978, 1983, 1988, 1993. Subscripts j and h refer to the expalanatory variables. The variable for entrepreneurship represents the empirical counterpart of our theoretical n-variable. Country group dummy variables are denoted by D_d, d = 1-3; year dummies (fixed time effects) are denoted by D_d, d = 4-6. The cross-products $z_{ijt}z_{iht}$ measure the interaction effects to be used to test the effects of social insurance. Variable ε_{it} stands for the error term with $E[\varepsilon_{it}] = 0$, $E[\varepsilon_{it}]^2 = \sigma^2$, $E[\varepsilon_{it}\varepsilon_{it-\delta}] = E[\varepsilon_{it}\varepsilon_{jt}] = 0$. The following country-specific variables enter the econometric analysis:

n_i = *rate of entrepreneurship* is measured as the ratio of people working on their own account (who potentially employ other people) relative to the total labor force.

z_{i1} = *national economic risk* (*s*) is measured by the conditional standard deviation of detrended log GDP. For each country, we estimated a linear trend equation for log GDP with a 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.[19] 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), though with the qualification that we have introduced a Garch process.[20]

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*), is measured by domestic credit expansion, and alternatively by the nominal lending rate.

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[19] 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 typically amount to at most a quarter or a third of total demand in OECD countries.

[20] One can perhaps raise the counterargument that our risk variable may not be truly exogenous if a high rate of entrepeneurship means a large share of non-labor income in the functional income distribution. It is not clear, however, whether such an effect is important. Another point is related to the role of fiscal policy as an automatic stabilizer in an economy. If it manages to reduce 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_{i4} = *inequality of income distribution* will be measured by the Gini coefficient calculated from household (pre-tax) income data. The idea of testing the effects of income inequality comes from some earlier studies, as they suggest that liquitity constraints are less severe in countries with large income inequality. It has been suggested (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.

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 average.

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

z_1z_2 = *interaction effect between risk-taking and the public sector* is tested by introducing the product terms $p*s$, $t*s$, $f*s$. For example, in the case of public expenditutes, the total effect of risk is captured by the sum $\beta_1 s+\beta_{12} p*s$. If the favorable social insurance effect dominates, the coefficient β_{12} is expected to be positive, hence reducing the risk effect given by β_1, which is negative.

D_1 = *Mediterranean dummy* accounts for differences between the industrial structures of the Mediterranean countries and the other countries in the data set.
D_2 = *US dummy* accounts for the exclusion of owner-managers from the definition of an entrepreneur.
D_3 = *Finland-Sweden dummy* accounts for a change in the construction of statistics in 1988 and 1993 relative to previous years.
D_4-D_6 = *year dummy* variables.

3.3 Estimation Results

Diagnostic checks of the model

In testing the predictions of the theory, we have organized the data like 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

The results are reported in tables 1-2. Results from "between and fixed effects" estimation are not reported separately but they were very similar to the results reported here. 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 about 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.

(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.

Table 1. Testing for risk, social insurance and crowding-in/crowding out effects

Regression Coefficient of the Variable*	I	II	III	IV	V
constant (c)	0.088	0.122	0.162	0.182	0.173
	(13.606)	(11.945)	(9.243)	(7.174)	(7.158)
risk (s)	-0.040	-0.032	-0.135	-0.157	-0.123
	(-4.250)	(-3.057)	(-4.086)	(-2.953)	(-2.490)
replacement ratio (r)		-0.060	-0.054	-0.044	-0.040
		(-4.277)	(-3.340)	(-2.324)	(-1.887)
transfer payments (f)			-0.295		
			(-3.001)		
interaction of risk and			0.747		
transfers (s*f)			(3.220)		
public expenditure				-0.157	
as share of GDP (p)				(-2.378)	
interaction of risk and				0.291	
public exp. (s*p)				(2.480)	
total tax rate (t)					-0.174
					(-2.138)
interaction of risk and					0.259
tax rate (s*t)					(2.064)
Mediterranian dummy	0.079	0.073	0.077	0.076	0.073
(MED)	(9.618)	(8.328)	(8.656)	(7.560)	(7.274)
USA dummy (US)	-0.017	-0.023	-0.028	-0.030	-0.033
	(-4.063)	(-5.869)	(-5.628)	(-5.388)	(-4.596)
Diagnostic tests:					
Adjusted R-squared	0.646	0.704	0.733	0.731	0.728
S. E. of regression	0.023	0.021	0.020	0.020	0.020
F-statistic	23.763	26.454	23.918	23.678	23.264
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
White-test for HS	18.95	37.477	59.042	60.942	61.305
(p-value)	(0.332)	(0.039)	(0.027)	(0.018)	(0.017)
Ramsey's RESET-test	0.982	2.229	2.545	2.618	2.393
(p-value)	(0.380)	(0.116)	(0.086)	(0.081)	(0.099)
Jarque-Bera test	0.717	6.530	3.637	2.747	1.488
(p-value)	(0.699)	(0.038)	(0.162)	(0.253)	(0.475)

*White´s t-values in parenthesis; coefficients of year dummies not reported

Table 2. Testing for financial, income inequality, union and development stage effects.

Regression Coefficient of the Variable*	VI	VII	VIII	IX
constant (c)	0.118	0.044	0.100	0.154
	(9.464)	(1.891)	(10.568)	(9.406)
risk (s)	-0.032	-0.040	-0.039	-0.035
	(-3.083)	(-3.732)	(-4.158)	(-3.179)
replacement ratio (r)	-0.058			-0.060
	(-3.964)			(-4.539)
credit expansion (d)	0.019			
	(0.617)			
income inequality (g)		0.135		
		(1.964)		
union coverage (u)			-0.026	
			(-1.787)	
stage of development				-0.030
				(-2.734)
Mediterranian dummy	0.072	0.078	0.076	0.061
(MED)	(8.538)	(10.236)	(9.117)	(7.376)
USA dummy (US)	-0.023	-0.024	-0.024	-0.012
	(-5.611)	(-4.681)	(-4.072)	(-2.252)
Diagnostic tests:				
Adjusted R-squared	0.701	0.661	0.653	0.720
S. E. of regression	0.021	0.022	0.023	0.020
F-statistic	22.944	21.934	21.164	25.079
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)
White-test for HS	44.064	23.546	37.733	42.409
(p-value)	(0.076)	(0.488)	(0.037)	(0.103)
Ramsey's RESET-test	1.849	2.390	0.676	0.591
(p-value)	(0.166)	(0.099)	(0.512)	(0.557)
Jarque-Bera test	6.423	0.601	0.531	4.503
(p-value)	(0.040)	(0.740)	(0.767)	(0.105)

*White´s t-values in parenthesis. Coefficients of year dummies not reported.

(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.

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, i,e, that risk insurance would enhance risk-taking. The finding, however, is consistent with the implication of our model.

We then introduced the 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 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 public sector expenditure can be calculated from equation IV as -0.043 and that of taxes from equation V as -0.072. The overall effects turn out to be systematically negative though not statistically significant. That they are not positive speaks against Sinn's proposition about enhanced risk-taking.

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 of -2.378 and -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 financial impacts. It is, however, consistent with the ambiguity view concerning whether financial factors limit entry or attract lemons. Our 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 in methods of compiling the 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, 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 self-employment.

Having accomplished the testing as reported above, we also ran the rtegressions where we included all the relevant explanatory variables at the same time. With public expenditures measuring the public sector, risk, replacement ratio, interaction of risk and public expenditure, the US dummy and the Mediterranean dummy all show up as statistically significant (at least at 10 % level). Collinearity with the public sector reduce the significance of the other variables, like the gini coefficient, union density and the credit variable. The results are essentially the same, when we use transfer payments or taxes instead of public expenditures.

4. Conclusions

There are a number of insightful results reported by our study which suggest that economic risks shape the allocation of human capital between entrepreneurs and labor supply. In the light of our findings, the Knightian view of entrepreneurs as risk-takers re-emerges as an empirically valid paradigm. Desire for stabilization is the most important policy implication.

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 on the basis of cross-country data on a set of OECD countries. Several complementary tests were introduced. The Welfare State does not provide insurance to share the entrepreneurs' risk of failure. 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 private 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 private enterprise sector. Our results do not deny the fundamental role of the public sector, but seems to point to "optimal" public sector size! Unlike many earlier studies, the findings do not provide strong support for the view that financial constraints limit the equilibrium entrepreneurship. Moreover, some 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? These are important normative issues and there are many more, like the optimal size and industry distribution of enterprises and their efficient growth rates. Moreover, one might inquire whether economic policies have created mechanisms which have primarily supported the operations of large established firms instead of entry of new ones to strengthen the competitive forces. Before addressing these issues, it is obvious 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, and 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 into account 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 20 OECD countries. In many European countries some services like health care are produced by the public sector instead of the private sector. For this reason, there will be some differences in the rate of entrepreneurship in the data.

* *National economic risk* is measured by the relative trend deviations of 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* is measured alternatively by the following variables: the share of total public expenditure (including transfer payments) in 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 for all years.

* *The stage of economic development* is 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* is 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* is 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* is 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.

Technical Appendix. Algebraic expressions for F_n and $F\lambda$ in Lemma 2 and Lemma 4

$F_n = \partial\pi_g^L(n)/\partial n - \partial\Pi_g^L(n)/\partial n$ with

$\partial\pi_g^L(n)/\partial n = p^{\beta+\gamma}(1-n-m)^{\alpha}[-\alpha(1-n-m)^{-1}(gn^{-\alpha}-\alpha n^{-1}\Gamma^{1-\alpha})-\alpha gn^{-\alpha-1}+\alpha n^{-2}\Gamma^{1-\alpha}-\alpha(1-\alpha)n^{-1}\Gamma^{-\alpha}\lambda g^{1/(1-\alpha)}]$
(most likely positive)
$\partial\Pi_g^L(n)/\partial n = -(1-\lambda)n^H w^*/\lambda n^2+(1+(1-\lambda)n^H/\lambda n)\partial w^*/\partial n+(1-\lambda)n^H\mu/\lambda n^2$;
with $\partial w^*/\partial n = (1-\alpha)w^*(\Gamma'/\Gamma+1/(1-n-m)) > 0.$

$F\lambda = -[(1-m-n^H)/n+n^H/\lambda n]\,\partial w^*/\partial\lambda + [n^H(w^*-\mu)/n+\mu-\mu_e+k]/\lambda^2$
with $\partial w^*/\partial\lambda = (1-\alpha)\alpha p^{\beta+\gamma}(\Gamma/(1-n-m))^{-\alpha}(ng^{1/(1-\alpha)}-n^H b^{1/(1-\alpha)}) > 0.$

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