

# The Economics of Entrepreneurship: What We Know and What We Don't

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## **Abstract**

This introductory, non-technical, text offers a reflective overview of what economics adds to our understanding of entrepreneurship. It is designed primarily to showcase to young entrepreneurship scholars several interesting research questions and a toolbox of methods to answer them. First, I will illustrate the kinds of questions that can be posed and answered using economics. Then I will present and discuss a selective list of “canonical” theoretical and empirical models that form the intellectual bedrock of the Economics of Entrepreneurship. After that, I present and discuss some well established theoretical contributions and empirical findings that have been generated by the approach. I conclude by discussing aspects of “What we don’t know” – and should. This part of the text identifies several ideal future trends in research that build on and complement the foundations of entrepreneurship that are delineated in the main body of the text.

# 1

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## Introduction

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Entrepreneurship is a multidisciplinary field of scholarly enquiry. There is broad agreement among those who research entrepreneurship that no single subject discipline has a monopoly of wisdom about what entrepreneurship is, or how entrepreneurs behave.

The present text is not intended to challenge this aspect of the “received wisdom”. Instead, it presents a “shop window” of what one can achieve if one uses economics to study entrepreneurship. My aim is to provide an overview of both the foundations of the Economics of Entrepreneurship – the theoretical underpinnings and empirical regularities uncovered by previous research – and possible future trends in this branch of research, by proposing fruitful topics of enquiry that extend the boundaries of what we currently know.

A lament that is sometimes heard within business and management schools is that the field of entrepreneurship lacks theoretical rigour – or even, indeed, any clearly defined theories at all. However true that claim might be of some methodological perspectives, it surely cannot be levelled at the economics approach. Economics brings a large set of versatile and powerful theories and methods to the study of entrepreneurship. They are usually but not always quantitative, are often based on models of optimizing behaviour under uncertainty, and utilize

empirical approaches founded on the econometric analysis of large and representative data samples. The present text aims to provide details of the salient theoretical and empirical approaches that have been applied to entrepreneurship. These details will be provided in a deliberately non-technical way, in order to make the text as accessible to as wide an audience as possible. References will be given to more detailed technical treatments of the issues which the interested reader can pursue if they wish.

It is hoped that this text will dispel some misperceptions about the economics approach; and may perhaps even convince non-economists that the Economics of Entrepreneurship furnishes a solid theoretical backbone to entrepreneurship research. That many non-economists still entertain myths and misconceptions about the role and potential of economics surely cannot be denied. Let me give just three instances. First, contrary to what some non-economists appear to believe, it is simply not true that neoclassical economics ceased to progress once competitive general equilibrium theory was completed in the 1960s and 1970s. Neither does modern economic theory assume the economy continually moves into equilibrium; and nor does it ignore the entrepreneur, as we will see below. Second, just because modern economic theory is rooted in optimization does not mean that those theories break down altogether if entrepreneurs do not consciously optimize. In Friedman's [68] famous example, billiards players do not calculate the angles of incidence and reflection when they prepare a stroke, yet they behave *as if* they are optimizing. And, even in cases when this argument ceases to apply, it remains the case that optimization remains a useful benchmark in entrepreneurship; while alternatives to optimization are often unpalatably *ad hoc* [24]. Third, one sometimes hears a complaint that economics is of limited use because it cannot explain aspects of human behaviour such as the psychology of an entrepreneur or the origins of trust that underpins social relations. I would agree that economists should defer in such matters to experts in psychology and sociology. But using incomplete applicability as a metric to judge a discipline seems unfair. The same "limitation" obviously applies to all subjects; and surely only an aggressive economic imperialist would assert the contrary [96].

It seems fair to acknowledge that the economics approach focuses on a few aspects of entrepreneurship rather than the totality of this complex phenomenon [27]. Nevertheless, as I hope this text will demonstrate, the approach can still make a valuable contribution. Rather than content itself with nebulous assertions about the inherent unpredictability and complexity of entrepreneurship, economics develops testable hypotheses based on sound micro-foundations. The present text will also emphasize theories that are testable, either directly or at least in principle. For this reason, it will not cover entrepreneurial theories of the firm which, while interesting, seem to elude ready empirical characterization [45]. Nor will I start the text by offering a definition of entrepreneurship. Instead, I will let this text reveal what economists understand this phenomenon to involve. It will turn out to be broader than merely venture creation or opportunity recognition and exploitation, though as we will see it encompasses aspects of these.

The text is structured in the following way. Section 2 discusses what economics can bring to the study of entrepreneurship, in terms of the kinds of practical questions it can answer. Section 3 outlines several “canonical” models in the Economics of Entrepreneurship that I believe all researchers who adopt this approach should be aware of. That section contains a summary of the principal theoretical economic models of entrepreneurship, an overview of the essential techniques underpinning empirical work, and a discussion of some recent theoretical and methodological developments. Some of the latter might evolve into “canonical models of tomorrow”. Section 4 then summarizes some well-established empirical findings that have been generated by the Economics of Entrepreneurship. This comprises the empirical “What we know” part of the text. Section 5 concludes by discussing “What we don’t know”, by way of motivating future research.

# 2

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## The kinds of questions asked in the Economics of Entrepreneurship

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What follows below is not intended to be an exhaustive list. Instead it is illustrative, being designed essentially to highlight some of the more interesting and policy-relevant questions that can be addressed by the approach. “Answers” to these ten questions appear in Section 4.

- How many jobs do entrepreneurs create?
- Are small entrepreneurial firms more innovative than large corporations?
- Do tax cuts stimulate entrepreneurship?
- Why are blacks and females less likely to be entrepreneurs in Britain and America?
- Do banks ration credit to new enterprises, and do capital constraints significantly impede entry into entrepreneurship?
- How successful are loan guarantee schemes in providing credit to new enterprises?
- Which entrepreneurial ventures are most likely to survive and grow?

- Why do entrepreneurs work so hard for so little pay?
- Does entrepreneurship cause economic growth?
- Should governments encourage or discourage entrepreneurship?

The last question might sound like heresy to some readers, who are accustomed to regard entrepreneurship as always unambiguously a “good thing”. Unlike the others on this list, it is also one on which the evidence is far from clear-cut. I include it here because it exemplifies the kind of questioning and radical thinking that underlies the economist’s approach to entrepreneurship.

# 3

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## Canonical models in the Economics of Entrepreneurship

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Section 3.1 lists and briefly discusses some canonical theoretical models in the Economics of Entrepreneurship. Space limitations permit only a brief overview of each; technical details can be found in the relevant chapters of [115] signposted below. Section 3.2 provides a non-technical overview of the canonical empirical models used by economists working in this field. I call the models in these two sections “canonical” because they form essential and commonly used building blocks for thinking about, and answering, the kinds of questions listed above. In Section 3.3 I describe some new theoretical developments that might furnish some of the canonical models of tomorrow.

### 3.1. Canonical theoretical models

#### 3.1.1. Occupational choice under uncertainty

One of the canonical theoretical models in the Economics of Entrepreneurship is of occupational choice. Individuals do not have to be entrepreneurs; and those who select into it tend to have different characteristics to those who do not. Occupational choice models partition the

workforce between individuals who do best by becoming entrepreneurs, and those who do best by choosing an alternative occupation, usually taken to be either safe investment or paid employment.

Three classic occupational choice models form the foundations of entrepreneurship as an occupational choice: Lucas [101], Holmes and Schmitz [81], and Kihlstrom and Laffont [91]. Lucas argued that individuals differ in terms of their innate entrepreneurial ability. He assumed that ability is distributed continuously across the workforce; that agents operate under certainty; and that there is no separation of ownership and control. Utility maximizing agents choose their occupation; the most able choose to become entrepreneurs, all the way down to a “marginal entrepreneur” who has an ability which makes him or her just indifferent between entrepreneurship and paid employment. Lucas also showed that the most able entrepreneurs end up running the largest firms. Wages adjust until the labour market clears, i.e., when entrepreneurs hire all the workers. The interest rate adjusts in a similar way to clear the capital market. Lucas’ model has formed the basis for dozens of subsequent occupational choice models (see [115, Chap. 2], for an overview).

One interesting insight to emerge from Lucas’ model concerns the impact of economic development on the scale of entrepreneurship. Under various simplifying assumptions, Lucas showed that as economies accumulate capital, they are likely to witness a shift of workers from entrepreneurship to paid employment. That is, over time average firm size rises with small-scale entrepreneurs increasingly replaced by larger chain stores. It is instructive to note that this replacement does not occur because entrepreneurs are driven out of the market by unfair competition. Instead, in dynamic general equilibrium the average wage rises which makes paid employment more attractive to owners of the smallest firms. These entrepreneurs quit voluntarily. Subsequently, several other economists have extended the analysis to explore the implications of economic development and political institutions for entrepreneurship. For example, Banerjee and Newman [19] investigated the implications of heterogeneous wealth endowments in the context of imperfect capital markets; and Iyigun and Owen [86] asked what happens to entrepreneurship when the productivity of human capital



can differ between entrepreneurship and paid employment. In a different vein, Murphy *et al* [107] discussed what happens when entrepreneurs can use their ability in unproductive rent seeking as an alternative to productive entrepreneurship (see also [23]).

The second classic occupational choice model was developed by Holmes and Schmitz [81]. In this model, the economy is assumed to be in a permanent state of *disequilibrium*. Individuals are continually exposed to new opportunities, which are spawned by exogenous technological progress; but they differ from each other in the probability that their new ventures will survive. Holmes and Schmitz investigated the circumstances under which entrepreneurs decide either to continue operating a venture, or to transfer it to a possibly less able entrepreneur in order to release time and resources to explore new opportunities. They showed that the least able types will only manage existing firms, while the most able individuals specialize in setting up new businesses. Those with intermediate ability optimally either manage the businesses they started, or they replace them with higher quality businesses purchased from the able entrepreneurs. The Holmes–Schmitz model has been influential for several reasons. One is that it seems to incorporate and extend the key ideas of Schumpeter and Kirzner about opportunity recognition that goes to the heart of their conceptions of entrepreneurship. Another is that this model provides a basis for understanding why some individuals are “portfolio” entrepreneurs, while others become “serial” entrepreneurs or simply rely on buying businesses created by others.

The third model, developed by Kihlstrom and Laffont [91], built on an early insight by Knight [93], by modelling entrepreneurial choice as trading off risk and returns. Individuals in this model differ according to how risk averse they are. It is assumed that a parameter representing risk aversion is distributed continuously across the workforce. Now the least risk-averse choose entrepreneurship and run the largest firms. Effectively, entrepreneurs provide income insurance to workers, and are rewarded by being residual profit claimants. As in Lucas [101], the model is able to explain the coexistence of firms of different sizes. Kihlstrom and Laffont showed that there is a welfare loss caused by a lack of risk-sharing, and that in general the “wrong” (from a social

welfare standpoint) number of individuals become entrepreneurs. This includes the case of too few entrepreneurs, which as Grossman [72] pointed out can be exacerbated if domestic entrepreneurs have to compete with more efficient foreigners. Efficiency losses of this kind are best addressed by creating risk-sharing mechanisms, such as a stock market (if feasible).

Subsequently, I [110] analysed how income risk itself affects the decision to become an entrepreneur, when individuals can mix time between occupations. I showed that optimal time allocation in entrepreneurship is greater the higher is relative income there, and lower the more risky is entrepreneurial income and the more risk-averse the agent. [111] extended the analysis to the case where individuals make an all-or-nothing choice, as in Lucas and Kilhstrom-Laffont; while [118] analyses the impact of income risk on entrepreneurs' work effort.

### **3.1.2. Credit rationing, efficient investment, entrepreneurship and public policy**

There are three highly influential theoretical models of credit rationing that have shaped our understanding of small business lending, and the potential role of governments to intervene in credit markets to assist entrepreneurial start-ups. These are the models of Stiglitz and Weiss [141], de Meza and Webb [57] and Evans and Jovanovic [63].

Both the Stiglitz–Weiss and de Meza–Webb models assume asymmetric information, whereby entrepreneurs are better informed about their projects than banks are. Banks therefore have to offer the same (“pooled”) debt contract to all loan applicants. Where the two models differ is in their assumption about the nature of the heterogeneity of entrepreneurs and their projects. Stiglitz and Weiss assumed that projects (or equivalently entrepreneurs) differ from each other in terms of risk, with some entrepreneurs operating risky, and others relatively safe, investment projects. Entrepreneurs running projects that turn out to be undesirably risky from the bank's point of view cannot be detected at the time loans are extended. It turns out that this gives banks an incentive to set interest rates below market clearing levels and to ration loan applicants rather than to raise interest rates since the latter action would cause the bad risks to dominate the pool of

borrowers. This is the essence of the famous “credit rationing” result. Quite separately from the incidence of any rationing, another implication of the Stiglitz–Weiss model is that banks necessarily under-invest in entrepreneurial activities relative to the social optimum. These findings are all the more powerful because they are based on a well-founded model with optimizing agents, where the market failure emanates not from *ad hoc* assumptions but from an ostensibly realistic feature of credit markets – namely asymmetric information. This model has undoubtedly helped to shape the intellectual climate of support for government intervention in credit markets.

In contrast, de Meza and Webb assumed that entrepreneurs differ from each other in terms of expected returns (rather than risk), with the ablest entrepreneurs having the greatest probabilities of success. Ability is unobserved by banks, which again have to offer a pooled interest rate. This means that the ablest entrepreneurs end up cross-subsidizing the least able, which entices into entrepreneurship individuals with socially inefficient investment projects. De Meza and Webb showed that neither credit rationing nor under-investment hold in this set-up. But there is always *over-investment* in the sense that too many entrepreneurial projects are undertaken. Everyone could be made better off if the least able entrepreneurship were discouraged from becoming entrepreneurs, something that can be achieved by taxing bank deposits. By making credit more expensive to obtain, only the ablest entrepreneurs (with socially efficient projects) will be willing to pay for it. Technical details and proofs of the results of both models can be found in [115, Chap. 5].

Evans and Jovanovic [63] developed a third canonical theoretical model, of borrowing constraints. This model, which has a much simpler structure than either of the previous two just discussed, assumes (but does not explain why) entrepreneurs’ wealth limits the amount of funds they are given. Therefore it is intellectually less satisfactory than the other models. It is also vulnerable to other criticisms, relating to the sharpness of its empirical testing methodology: see e.g., [53]. Evans and Jovanovic predicted a direct link between wealth and the probability that a given individual enters entrepreneurship. This relationship

continues to be hotly debated and subjected to ongoing testing by empirical researchers (see Section 4.5).

### **3.1.3. Innovation, entry, exit and the evolution of industry**

Innovation has been highlighted as a key aspect of entrepreneurship ever since the contribution of Schumpeter [137]. Innovation is an integral aspect of industry evolution. Industrial organization theorists have developed several models for explaining observed evolutionary patterns, both with and without innovation, placing particular emphasis on the trajectories of the births and deaths of new firms.

Two theoretical models have been particularly influential. Their success can be gauged in terms of the number of citations they have attracted, which in turn reflects their ability to explain several stylized facts. One, by Jovanovic [89], has become indispensable for understanding the industry effects of entrepreneurial learning about (initially unknown) entrepreneurial abilities. Entrepreneurs learn from a series of stochastic draws that come in from the market. Based on constantly arriving new information, entrepreneurs adjust their beliefs and their market strategies. Able entrepreneurs survive and grow, while the less able (or unlucky) exit the market. Jovanovic's model is not only elegant but also rich in theoretical predictions, many of which have been borne out by independent evidence. Among these are predictions that newer and smaller firms will have higher and more variable growth rates, and also higher exit rates than older and larger firms. Technical details about the model and further elucidation of its predictions can be found in [115, Chap. 9].

Second, Klepper [92] analysed the product life cycle and the evolution of industries in which different types of innovation are performed at different stages of firm maturity. Not only does Klepper's model bear on new firm entry and exit rates, but it also seeks to explain the temporal pattern of innovations and market concentration as industries evolve. It can also explain why the pace and importance of major product innovations and new firm entries slow down as industries age, and the increasing importance of process innovations at later stages of the industry's life. Klepper's article is essential reading for researchers interested in the broad sweep of the evolution of innovative industries.

Schumpeter’s insights continue to be developed by modern economists. A formal literature on “patent races” has emerged that pits established firms against each other in the drive to discover new innovations that yield monopoly profits while rendering previous products obsolete (e.g., [139], [138], [7], [8], [122]). But as Bianchi and Henrekson [27] point out, this literature does not capture the existence of Schumpeter’s “extraordinary individual” (the entrepreneur) who is responsible for the innovation, instead it focuses on firms that devote resources to large-scale “routinized” R&D activities. From an entrepreneurship perspective, Bianchi and Henrekson [27] argue that these models lack micro foundations in entrepreneurial choice and do not really make a distinction between entrepreneurs and inventors. Acs *et al* [6] respond to this criticism by introducing the entrepreneur as a conduit for transforming new knowledge into new economically valuable business opportunities. Growth is enhanced through individual entrepreneurs exploiting knowledge by creating new ventures even though they are not contributing to the production of knowledge. As we will see below in Section 4.9, Acs *et al*’s treatment of knowledge spillovers and innovation carries implications for the relationship between entrepreneurship and economic growth.

### 3.2. Canonical empirical models

One of the strengths of the Economics of Entrepreneurship is that its empirical applications are rooted in careful econometric modelling. There are two important aspects of economists’ empirical rigour. One is an avoidance of asking entrepreneurs or other agents what they think they will do in various situations. Responses to these kinds of questions are known to be prone to self-serving bias, and “cheap talk”. Instead, the “revealed preference” principle trains economists to distrust individuals’ declared intentions and forces them to undertake the harder but more objective task of inferring their preferences from their actual behaviour.

Second, economists frequently apply advanced and sometimes innovative statistical techniques to overcome thorny empirical problems

that might otherwise vitiate empirical estimates. Examples of such problems, which often arise in entrepreneurship, include:

- Sample selection bias (whereby membership of individuals or firms in the sample is not random but is generated by some at least partially observable systematic process);
- Unobserved heterogeneity (whereby some important unmeasured idiosyncratic variables are missing from a regression model);
- Endogeneity (whereby an “independent” variable is itself codetermined within the structural model of interest); and
- Non-stationarity (whereby time series variables follow unit root processes that violate a key assumption of the classical linear regression model and lead to invalid statistical inference).

As the discussion below reveals, the major canonical empirical models in the Economics of Entrepreneurship address all of the problems on this list. The set of models I will discuss will *not* include regression analysis, which is far and away the most commonly used empirical method employed by economists, including in the Economics of Entrepreneurship. Applications of regression analysis are too numerous to summarize. Instead, I will take knowledge of it as given, and concentrate on the important but slightly less “standard” tools that nevertheless have now become (or, in the case of those in subsection 3.2.6 below, are becoming) canonical empirical models in the Economics of Entrepreneurship.

### 3.2.1. Discrete choice models

*What they are.* When a dependent variable takes one of a distinct number of values, a discrete choice model is appropriate. For example, when the dependent variable takes the value of one or zero, a *binary choice model* is needed. Instead of writing  $y$  as a linear function of  $x$  with a normally distributed error term (as in regression analysis) a binary choice model writes  $y$  as a non-linear “link” function of  $x$ . This function is chosen to map the predicted values of the model into the

unit interval, so enabling the dependent variable to be treated on a probabilistic basis. Binary choice models have a rationale based on utility maximizing choices between (two) discrete occupations. The two most popular non-linear link functions in practice are the logit and probit functions. Logit or probit models should *always* be used instead of regression techniques when the dependent variable is binary: see [71, Chap. 21] for details.

*What they are used for.* Logit and probit models are commonly used to explain the selection into, or survival in, entrepreneurship. So  $y$  might be the outcome “whether an individual chooses to be an entrepreneur or an employee”, or “whether an entrepreneur survives in entrepreneurship or exits the industry“. And  $x$  would be a vector of covariates such as human capital or personal characteristics. In the case when occupational participation is an all or nothing choice, these models can be regarded as empirical counterparts of the canonical theoretical occupational choice models outlined in Section 3.1.1. Well-known applications where  $y$  is participation in (or entry into) entrepreneurship include Evans and Leighton [64] and Blanchflower and Oswald [30]. Well known examples where  $y$  indicates survival in entrepreneurship include Bates [21] and Cressy [52].

*Extensions.* Several important extensions to “standard” logit and probit models have been proposed. One incorporates fixed or random effects in panel data settings (e.g., [80]). The advantage of this approach is that it allows the researcher to control for unobserved heterogeneity among entrepreneurs. A second extension by van Praag and van Ophem [150] distinguishes between opportunity and willingness to participate in entrepreneurship. This distinction has since been emphasized in the GEM project of Paul Reynolds and co-authors (see, e.g., [129]), while the original contribution of van Praag and van Ophem has been rather unjustly overlooked. A third extension is to the case where there are three or more occupations. Then the *multinomial choice model* is applicable. This model uses a vector of covariates  $x$  to predict the probability that a particular case ends up in one of the discrete occupations,  $y$ . Like binary choice models, this discrete choice model also has a basis in utility maximization. The most popular multinomial choice model is the *multinomial logit*: see [71, Chap. 21.7] for further

details. The multinomial logit model has been used, for example, to predict choice between own-account self-employment, employer self-employment and wage & salary status (see, e.g., [61]). It has also been used to predict the determinants of three kinds of performance in entrepreneurship, namely failure, survival or high growth [49]. And Van Gelderen *et al* [149] and Parker and Belghitar [118] used it to identify the initial factors associated with the success, failure, or continuation of “nascent” entrepreneurs.

### 3.2.2. Sample selection (Heckman) models

*What they are.* Suppose that one is interested in explaining or predicting entrepreneurs’ profits. If one does not control for the fact that entrepreneurs are not a random sample of individuals but have special characteristics that made them select into entrepreneurship in the first place, then a simple regression model of entrepreneurs’ profits on a set of covariates could generate misleading parameter estimates and interpretations of behaviour. Sample selection corrections to regression models are needed to solve this problem. The most common correction, first popularized by Heckman [78], has a two-stage structure. In the first stage, a logit or probit model is used as a basis for predicting participation in the sample. Transformed predictions are then included as an additional independent variable in the second stage (regression) model. Technical details can be found in [71, Chap. 22.4].

*What they are used for.* As its name suggests, a correction enables unbiased estimates of the regression coefficients to be obtained, though sometimes the sample selectivity results are also of interest in their own right. Applications of this method include correcting estimates of entrepreneurs’ incomes [144], entrepreneurship programme performance [153], and entrepreneurs’ work hours [121].

*Extensions.* The empirical occupational choice framework can be extended to obtain selectivity-corrected estimates of wages for entrepreneurs and non-entrepreneurs. One can then include the relative wage (defined as the difference between the occupations’ predicted wages) in a final “structural probit” equation that conditions participation in entrepreneurship on predicted relative wages and several other covariates. The structural probit model has become quite popular in



entrepreneurship research, starting with Rees and Shah [126] and continuing with Dolton and Makepeace [60], Taylor [144], and Parker [113], among others.

### 3.2.3. Hazard models

*What they are.* Hazard models identify the covariates that determine how long (rather than whether) individuals remain in entrepreneurship, or how long their ventures survive in the market. The conditional probability of surviving to the next period given that an entrepreneur has survived in business to the present period can be represented by a flexible parametric, semi-parametric, or non-parametric function of time. If exit is to a single destination, hazard models are called “single risk”. If several destinations are possible, a “competing risks” model is used. One of the most popular single-risk hazard models is the Cox proportional hazard model. Typically, data are *right censored*, because at the time the researcher analyses the data some cases in the sample are likely to continue beyond the current time. Technical details about hazard models can be found in [71, Chap. 22.5].

*What they are used for.* These models are used to understand the temporal pattern of survival in a cohort of entrepreneurs or entrepreneurial ventures; and to identify the covariates that are significantly related to survival. Applications are numerous: see, for example, [17], [145], [41], [103] and [123].

*Extensions.* Extensions have been relatively uncommon in entrepreneurship applications, though an application by Wren and Storey [153] to entrepreneurship-support programmes combined hazard analysis with programme treatment effects and Heckman sample-selectivity corrections.

### 3.2.4. Cointegration estimators for time series entrepreneurship data

*What they are.* Time series data can be used to determine how multiple aggregate variables covary over time. However, standard regression analysis can be vulnerable to the “spurious regression” problem. If variables evolve as independent random walks over time, regression

analysis can wrongly suggest that they are significantly related. To avoid this problem, and the danger of making incorrect inferences, it is absolutely necessary to use an appropriate cointegration estimator. There are several such estimators in common use: see [71, Chap. 20] for further details.

*What they are used for.* Time series data are needed to identify trends in rates of entrepreneurship within countries. For example, the effects of temporal variations in tax policy and macroeconomic factors cannot be identified using static cross-section data: time series data must be used instead. Examples of cointegration estimators used to explain temporal variations in aggregate self-employment rates include [110], [51], [131] and [39].

*Extensions.* In the last decade new techniques have been developed that allow the researcher to explain differences in rates of entrepreneurship between as well as within countries over time. Parker and Robson [119] have used so-called “panel data cointegration estimators” to isolate the factors that explain the substantial variations in self-employment rates across OECD countries. Parker and Robson’s results suggest that national tax-benefit policies partly explain these variations, with higher taxes and benefits resulting in lower rates of entrepreneurship. The advantage of panel cointegration estimators is that they possess greater power than standard time series cointegration estimators.

### 3.2.5. Decomposition techniques

*What they are.* Decomposition techniques use regression results to explain different  $y$  outcomes between different socio-economic groups in terms of (a) different values of explanatory variables,  $x$ , and (b) different coefficients which map  $x$  into  $y$ . Several regression-based decomposition techniques are available, one of the most popular being that of Oaxaca [108]. See [71, Chap. 4.7.3] for details.

*What they are used for.* One common application of decomposition techniques is to identify the causes of lower rates of participation in entrepreneurship among females and blacks. It is fairly well established that members of these socio-economic groups receive lower incomes in entrepreneurship and have less favourable survival rates in business

(see [115, Chap. 4]). Borjas and Bronars [33] proposed a decomposition technique based on a probit model to determine whether it is different personal characteristics, or different returns given the same personal characteristics, that account for the observed differences in self-employment rates between ethnic groups. The latter might be taken as evidence of different preferences or racial discrimination, possibly in the credit or product markets. Decomposition techniques have also been applied to explain ethnic entrepreneurship rates by [46], [34], [65], [66] and [83], among others. Hundley [84] used decomposition techniques to shed light on female entrepreneurship outcomes, and Borjas [32] applied them to self-employed immigrants. Section 4.4 below summarizes some key findings from these investigations.

### 3.2.6. Earnings functions, IV estimation, and quantile regression

*What they are.* Earnings functions originated in human capital theory to explain log earnings of employees in terms of several covariates, including schooling and other dimensions of human capital. It has since been recognized that simple regression techniques yield biased estimates of the coefficient on at least one of the covariates – years of schooling (the coefficient itself is known as the “rate of return to schooling”) – because years of schooling are *endogenous*. Schooling decisions are endogenous because they are jointly determined with performance, and because they may be contaminated with unobserved factors that simultaneously affect performance. Instrumental Variables (IV) methods must be used to purge endogenous variables of errors that may be correlated with errors in the regression of interest (see [71, Chap. 15.5]). In this way, unbiased estimates can be obtained. Quantile regression methods estimate regressions at different parts of the distribution of a variable of interest (e.g., income), in order to obtain more information about the responsiveness of a specific part of the distribution of individuals. See [71, Chap. 16.3.2].

*What they are used for.* Earnings functions are being increasingly estimated in entrepreneurship research to explain entrepreneurial “success” as measured by profits. Relatively few studies have used IV to date but the number is beginning to grow. Examples in the context of earnings functions are [148] and [120]. Hamilton [76] applied quantile

regression methods to American self-employed income data. Hurst and Lusardi [85] have used IV estimation to explore the Evans–Jovanovic wealth-entrepreneurship participation relationship (see Sections 3.1.2 above and Section 4.5 below).

### 3.3. Recent theoretical and methodological contributions

I conclude by taking a look at some recent theoretical contributions to the Economics of Entrepreneurship which represent new lines of thinking – and that might eventually include some of the canonical models of tomorrow. For brevity I will focus on just five interesting (and very different) contributions.

#### 3.3.1. Social entrepreneurship

There is growing interest in social entrepreneurship. This is the name commonly given to Not-For-Profit (NFP) enterprises that have a social mission. According to Steuerle and Hodgkinson [142, p.77], NFPs accounted for roughly 7 per cent of US GDP in the 1990s.

A challenge for economic theorists is to explain why entrepreneurs would wish to start a social rather than a profit-maximizing enterprise. Simple explanations based on altruism and tax relief are unconvincing. The former does not explain why more efficient profit-maximizers do not enter the market and drive social enterprises out of the market; and the latter is unsatisfactory because social enterprises existed long before tax relief on contributions to social enterprises became available.

Glaeser and Shleifer [70] proposed an elegant answer to this question based on a profit non-distribution constraint (NDC). A NDC is a legal restriction that prevents owners receiving any surpluses in the form of equity shares. NDCs can help explain the survival and competitive edge of social enterprises. The reason is that an NDC protects investments made by donors, volunteers, consumers and employees from *ex post* appropriation by the entrepreneur. It signals a credible commitment to outside stakeholders that an entrepreneur running a social enterprise will not exploit their donations by, for example, cutting back on their own investment. Because profit-maximizers cannot make this commitment, they are at a competitive disadvantage compared

with NFPs. A social enterprise can attract customers for whom product quality matters, because its NDC eliminates the incentive to compromise on quality, which is not the case for profit-maximizers. Social enterprises can therefore command a higher market price, and can out-compete profit-maximizers.

Glaeser and Shleifer [70] also pointed out that social enterprises are well placed to attract donations. They show that donations do not change a profit-maximizer's marginal conditions for the production of quality. But donations to a social enterprise reduce the marginal utility of revenues, and so further soften incentives to compromise on quality. Francois [67] has also observed that the NDC ensures that labour effort donated by motivated workers will not be converted by the social enterprise into profit (or lead to cuts in wages or perquisites), something that cannot be guaranteed by profit-maximizers. The latter are out-competed because if workers care about the social mission, social enterprises can attract worker effort with lower wages than profit-maximizers can.

To conclude, models of market competition with non-distribution constraints seem well placed to explain the ubiquity and durability of social enterprises. It is likely that subsequent models of social entrepreneurship will build on these insights.

### **3.3.2. Venture capital, entrepreneurship and public policy**

In an extensive series of recent articles (many of which are referred to in [90]), Christian Keuschnigg and Soren Bo Nielsen have developed a novel occupational-choice-based framework to understand venture-capital-backed entrepreneurship. Following the usual economics tradition [96], these authors assume optimizing agents (entrepreneurs and venture capitalists); analyse the efficiency of market equilibrium; and discuss the potential role for public policy to improve on competitive equilibrium outcomes and to thereby increase social welfare. Keuschnigg and Nielsen investigate the effectiveness of interest and R&D subsidies in promoting start-up investments, and the impact of taxes applied to entrepreneurial incomes, capital gains and corporate profits on VC activity. Among their findings they highlight a quality-quantity tradeoff in new VC-backed firms; and they argue that it is preferable to use

resources to improve the quality of start-ups rather than to increase their crude number.

It is impossible to do justice to the large crop of articles by these authors in the space available here. Suffice it to say that their evolving research agenda is equipping the researcher with a clearer understanding of public policy directed at venture-capital-backed enterprises – a topic of undisputed policy relevance.

### **3.3.3. Human capital and entrepreneurship**

An important recent theoretical contribution by Lazear [97], [98] suggests that entrepreneurial selection and performance are guided by the mix or balance of skills held by individuals, rather than by specialized expertise. Lazear claims that entrepreneurs are “jacks of all trades” rather than specialized experts as are generally found in wage and salary work. Lazear [97], [98] and Wagner [151] have adduced evidence in support of this theoretical position.

Two interesting predictions follow from Lazear’s model. One is that if entrepreneurs have balanced skills sets, then industries, like art (which requires disparate skills including artistic talent and business management), are less likely to be populated by entrepreneurs than insurance, for example, where the required skill set is more homogeneous. Second, if technological progress demands additional skills requirements, then this is bound to decrease the number of suitably equipped individuals and therefore also the equilibrium number of entrepreneurs. Of course, it can be objected that technological change might also increase individuals’ ability to acquire skills, which would weaken this second prediction.

There is growing recognition of the importance of human capital to entrepreneurship. For example, recent theoretical work on entrepreneurs’ human capital by Polkovnichenko [125] helps to resolve a puzzle about selection into entrepreneurship originally identified by Moskowitz and Vissing-Jorgensen [106]. Moskowitz and Vissing-Jorgensen had observed that entrepreneurs earn similar average returns to those obtained from publicly traded equity, yet with a much riskier profile (reflecting the fact that entrepreneurial risk is not easily diversified). Polkovnichenko pointed out that human capital is not put at risk when

one becomes an entrepreneur, because future labour earnings are unaffected by the risk of the *current* business. Hence the risk of *total* net worth (which includes the present value of human capital) is much lower than of financial wealth alone. Calibration of Polkovnichenko's model revealed that only small non-pecuniary benefits (equal to just 1.5 per cent of average returns) are sufficient to induce individuals to turn entrepreneur despite the greater risk they face in this occupation.

Parker and van Praag [120] have proposed a theoretical extension of Bernhardt's [26] credit rationing model to unify the human capital and borrowing constraint literatures. Parker and van Praag predict that more highly educated entrepreneurs will face lower borrowing constraints, which endows human capital with both a direct and indirect effect on entrepreneurial performance. The direct effect is the "rate of return" to education; the indirect effect is enhanced performance via lower capital constraints that enable more productive capital to be obtained. These authors estimated that the combined rate of return for entrepreneurs exceeds the average rate of return for employees, suggesting that highly educated individuals are well placed to become among the most successful entrepreneurs.

To conclude, an increasing number of researchers are now developing theories of entrepreneurship that assign a central role to human capital. We are also seeing an emerging unification of human and financial capital influences in the domain of entrepreneurship. These efforts complement earlier (mainly empirical) work that emphasized the importance of experience, especially industry and business experience, for explaining variations in entrepreneurs' performance (see [115, Chapter 3.1]).

#### **3.3.4. Entrepreneurial learning**

Recent research has argued that learning and knowledge creation are among the most important strategic activities of the firm (e.g., [140]). A recent model proposed by the author [116] measures entrepreneurial learning via dynamic labour supply adjustment by entrepreneurs. Parker's theoretical model combines two ingredients: costly but productive effort, and adaptive expectations about unobserved (and possibly time-varying) productivity of effort. Optimization by the entre-

preneur gives rise to a regression equation whose dependent variable is entrepreneurs' work hours at time  $t$ , with independent variables comprising entrepreneurs' work hours at  $t-1$ , their current entrepreneurial "wage", and a constant. The coefficient on lagged work hours can be used to identify the extent to which entrepreneurs adjust their beliefs in response to new information rather than relying on their prior beliefs.

In an application of this theoretical model, Parker estimated that entrepreneurs rely mainly (84%) on their past beliefs about unobserved productivity, and respond only to a limited extent (16%) to new information about market conditions. And, older entrepreneurs adjust significantly slower than their younger counterparts. An attractive feature of this model is that it can be easily estimated using data from any country and using any definition of entrepreneurship. All that is needed is data on two consecutive periods of effort and current profits for any given sample of "entrepreneurs". It will be interesting to see whether other researchers find similar evidence of limited entrepreneurial learning, or whether there are cultural differences in this aspect of entrepreneurial behaviour.

### 3.3.5. Location and new venture creation

Recent research has begun to suggest that spillovers of knowledge are important in generating innovative output, and that universities are an important source of knowledge spillovers [74]. Although Krugman [95] argued that knowledge spillovers diffuse easily and do not respect national boundaries, this does not rule out advantages deriving from geographical proximity, promoting spillovers and other benefits to small entrepreneurial ventures. These include networking, trust and co-operation, and social capital that all facilitate exploitation of new opportunities ([135], [146]). In fact, several authors have convincingly linked geographical proximity of university and corporate research to innovative performance: see, e.g., [87], [88] and [14]. Most recently, Audretsch and Lehmann [16] have provided evidence that knowledge- and technology-based new ventures in Germany have a high propensity to locate close to universities – presumably in order to access knowledge spillovers. Audretsch and Lehmann investigate the source of these



spillovers. They find that firms locate closer to universities the more graduates they produce, and the greater is the production of social science knowledge. The latter contains a greater proportion of tacit knowledge than natural science, which is more codified and hence can cross national boundaries more easily (in line with Krugman's argument). Moreover, Audretsch and Lehmann find that proximity is economically valuable too. Using hazard analysis, the greater the geographic proximity of the new venture to a university, the quicker the venture progresses from start-up to a stock market listing.

Research into the geography of entrepreneurship in general and new venture creation in particular continues to develop. Part of the attraction of this field of enquiry is that it brings together several interesting topics, including innovation, human capital, spatial structure, entrepreneurship, growth-enhancing spillovers, and of course public policy.

# 4

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## What we “know”

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Rather than attempt to provide an exhaustive overview of empirical findings emerging from the Economics of Entrepreneurship – which would occupy too much space – I shall instead use this section to document several interesting, topical and policy-relevant results. Fuller details on these and other results can be found in the author’s book [115].

The “answers” given below correspond exactly to the questions posed in Section 2, and follow the order in which they were asked. I will flag the canonical theories and empirical methods of Section 3 as we proceed.

### **4.1. How many jobs do entrepreneurs create?**

One reason why small entrepreneurial firms are believed to be so important for domestic economic performance is that they are supposed to create a disproportionate number of jobs, in some cases growing into the industrial giants of tomorrow.

David Birch [28] first highlighted the superior job creation performance of small firms. Birch claimed that between 1969 and 1976, small firms employing fewer than 20 workers generated 66% of all new US

jobs, and firms with less than 100 employees accounted for 82% of net job gains. The implication was that the small firm sector was the primary engine of job creation. Subsequent researchers have confirmed these findings for the US and other countries, with Acs and Audretsch [4] highlighting a distinct and consistent shift away from employment in large firms and towards small enterprises in the 1980s in every major western economy.

Davis *et al* [55] challenged the claim that small entrepreneurial firms are the engines of job creation, claiming that previous researchers gave misleading interpretations of the data based on fallacious inferences. Davis *et al* claimed instead that *larger* US manufacturing plants and firms create (and destroy) most manufacturing jobs. In addition, Davis *et al* found no clear relationship between rates of *net* job creation and employer size. However, subsequent research that uses a more inclusive industry definition and which corrects for the statistical problems identified by Davis *et al* has refuted these objections, and reinforced Birch's original claim (see, e.g., [77], [54]).

As the OECD [109] observed, there is now "general agreement" that the share of jobs accounted for by small firms has increased since the early 1970s in most developed economies. This message has not been lost on policy-makers concerned about economic flexibility and employment, who increasingly shifted their attention from large to small enterprises in the latter half of the last century.

## 4.2. Are small entrepreneurial firms more innovative than large corporations?

As Josef Schumpeter pointed out long ago, innovation is a key aspect of entrepreneurship. Another reason to encourage entrepreneurship might arise if small entrepreneurial firms are more innovative than large firms.

Measuring innovation and technological change at the level of the firm or industry is not a straightforward matter [5]. And theory (see 3.1.3 above) gives us little guidance on this matter. Acs and Audretsch [3, Chap. 2] argued that peer-reviewed "important" technological changes and innovations are probably better measures of innovation

than R&D and patents. Regression analyses by those authors (e.g., [2], [3]) convincingly showed that smaller and younger firms are relatively more innovative than larger and older firms (see also [136]). For example, according to Acs and Audretsch [3], small firms contributed around 2.4 times as many innovations per employee as large firms did. They also noted that innovation in small entrepreneurial firms has different causes than those in large firms, responding more to the availability of skilled labour. These and similar findings are consistent with some of the theoretical predictions of the innovation literature (see 3.1.3 above).

Entrepreneurs not only innovate, they also exploit innovations. In fact, new research increasingly suggests that exploitation is more economically valuable than knowledge creation. We return to this issue in the context of growth in Section 4.9 below.

### 4.3. Do tax cuts stimulate entrepreneurship?

Changes in tax policy are especially interesting to study because this instrument set is under the direct control of government. Since governments sometimes motivate tax cuts partly on the grounds of stimulating entrepreneurship (recall, for example, the Thatcher and Reagan administrations in the 1980s) it is interesting to see what the evidence tells us in this regard.

Carroll *et al* [42] used US IRS data from 1985 and 1988 (which enclose the “tax cutting” Tax Reform Act year of 1986) to test whether income tax reductions increased the propensity of entrepreneurs to hire labour. Carroll *et al* estimated a probit model (Section 3.2.1) in which the dependent variable indicated whether an entrepreneur hired labour. This was related to changes in the log marginal tax rate between these years. Carroll *et al* estimated that cutting an entrepreneur’s marginal income tax rate by 10% would increase the mean probability of hiring by about 12%. The implied elasticity of 1.2 suggests that general income tax reductions might be a powerful way of stimulating employment creation. However, other research has shown that the effects of taxation on the *decision to participate in entrepreneurship in the first place* are weak and non-robust at the micro level [113] though not apparently

at the macro level (see the time series studies referred to in Section 3.2.4 above).

Carroll *et al* [43], [44] also estimated that lower marginal income tax rates are significantly and substantially associated with both small firm growth rates (measured in terms of business receipts) and investment expenditures. Therefore, while it is true that more evidence on this issue is sorely needed, the available evidence does indeed generally support the notion that tax cuts stimulate entrepreneurship.

#### **4.4. Why are blacks and females less likely to be entrepreneurs in Britain and America?**

It is now well established that white Britons and Americans have rates of participation in entrepreneurship that are between two and three times higher than those of their black compatriots [46], [65]. And a similar ratio applies to males' rate of participation in entrepreneurship relative to that of females in these countries [9], [59]. Furthermore, lower participation rates of blacks and females are not just a recent phenomenon [12]. If entrepreneurship is to serve as an exit route from poverty and social exclusion, it would help to know more about what underlies these stylized facts.

One of the canonical empirical techniques outlined in Section 3.2.1 was the binary choice model. This has been used to link ethnic and female participation in entrepreneurship with a range of covariates. For example, Borjas [32] conditioned self-employment participation on the proportion of individuals' local populations who belong to the same ethnic group. The aim was to identify an "enclave" effect, i.e., a mechanism whereby ethnic ties and networks within a community can help to support ethnic businesses. While Borjas found evidence of an "enclave effect", subsequent research has yielded mixed results [33], [154], [46]. So enclave effects do not seem to be a satisfactorily robust explanation of black self-employment rates.

Another of the canonical empirical techniques outlined earlier was decomposition analysis (see Section 3.2.5 above). Several researchers have used this method in an attempt to explain ethnic and gender differences in entrepreneurship participation. For example, Borjas and

Bronars [33] estimated what average minority self-employment rates would have been if the coefficients from a self-employment probit regression based on a white sub-sample (i.e., imposing the same returns to characteristics) were applied to non-whites. Borjas and Bronars found that, given their own characteristics, blacks and Hispanics would have had the same self-employment rates as whites, and that Asians would have had a higher self-employment rate than whites. This implies that unobserved (and unexplained) differences in the entrepreneurial “productivity” of personal characteristics, rather than differences in the characteristics themselves, account for the ethnic variation in self-employment rates. Likewise, Fairlie and Meyer [66] and Hout and Rosen [83] were unable to explain black-white self-employment rate differentials in terms of observable factors such as family background variables and industry structure. Unfortunately, it currently remains unclear whether discrimination, cultural factors, or unobserved characteristics are responsible for these different ethnic rates of participation in entrepreneurship. One possibility is discrimination in the credit markets: see [31].

Slightly greater success has attended efforts to explain lower rates of female participation in entrepreneurship. Binary choice models have revealed that several covariates are strongly associated with female participation. They include being married, having infants or school-age children in the household, and having a husband who is self-employed or who has self-employment experience ([102], [40], [38]). These factors are also associated with a greater incidence of home-based working in entrepreneurship among females [62]. Lower earnings in self-employment may also play a role. According to a decomposition analysis by Hundley [84], greater involvement in housework, shorter work hours devoted to the business, and caring for young children together accounted for between 30% and 50% of the American annual self-employment earnings gender differential. This suggests that women earn less than men do because they spend less time managing and developing their businesses. Therefore entrepreneurship might be less attractive for females than for males, the enhanced benefits of entrepreneurial work-schedule flexibility notwithstanding.

#### **4.5. Do banks ration credit to new enterprises, and do capital constraints significantly impede entry into entrepreneurship?**

The canonical credit rationing model of Stiglitz–Weiss (Section 3.1.2) is hard to test directly. To date, only indirect tests have been performed (see [112]). Of these, one of the best known is by Berger and Udell [25], who exploited cross-sectional and time series variations in “commitment loans”, which are loans that banks guarantee to extend to entrepreneurs in the future. In times of credit market tightness, the proportion of “commitment loans” should increase if credit rationing exists. But Berger and Udell found the opposite using a large sample of US commercial loans. They concluded that there is little evidence of credit rationing in the US business loans market. This is borne out by Levenson and Willard’s [99] observation that at most 2% of entrepreneurs fail to obtain finance from banks, only some of whom presumably had viable investment proposals in any case.

So overall the answer to the first question seems to be “no”: there is little or no evidence of credit rationing of the Stiglitz–Weiss type. That does not mean that it does not exist, or that loan guarantee programmes are a waste of money (see below). But it does mean that the applicability of “pure” credit rationing theory is limited.

The second question asks whether banks offer less finance to entrepreneurs than they request, and if so whether this might impede entry into entrepreneurship. Dutch evidence from the mid-1990s indicates that one fifth of start-up entrepreneurs obtained less finance than they required [120]. The most popular empirical approach for measuring the impact of this phenomenon builds on Evans and Jovanovic’s [63] suggestion (see 3.1.2 above) of interpreting a significant positive coefficient on personal assets in logit/probit self-employment models as evidence of borrowing constraints. Much subsequent work has replicated the Evans–Jovanovic findings, including articles where wealth is replaced with inheritances ([82], [30]) and lottery windfalls [100]. Nevertheless, the most recent research based on more robust instrumental variable estimation (see 3.2.6 above) casts doubt on the importance of wealth as a determinant of entrepreneurship participation. Hurst and Lusardi [85], for example, found a significant relationship between wealth and entrepreneurship participation only for the top

quintile of the wealth distribution. But this is the group that would presumably be the least affected by any borrowing constraints.

In any case, a positive relationship between anticipated or unanticipated wealth and entrepreneurship participation does not necessarily imply borrowing constraints. Many alternative explanations that are not based on borrowing constraints can also explain such a relationship, including decreasing absolute risk aversion [53]; a preference for self-finance; over-optimism; and over-investment [58]. A complete list and rationale appears in [115, Chap. 7]. In any case, there are now extensive sources of start-up finance in modern developed economies, including credit cards, to which most borrowers have access; and many start-ups require little or no capital anyway [85]. In short, neither recent evidence nor economic logic supports the notion that borrowing constraints seriously impede entry into entrepreneurship in the early 21st century.

#### **4.6. How successful are loan guarantee schemes in providing credit to new enterprises?**

Loan guarantee schemes (LGS) are the primary way that governments intervene in the credit markets of developed countries to support entrepreneurial start-ups. Loan guarantee schemes are well established in many developed countries, including the UK, the US, Canada, France, and Germany. They work in the following way. Banks nominate investment projects to the LGS that they do not wish to fund (perhaps because the entrepreneur lacks collateral) but which appear to have the potential to succeed. The LGS administrators assess the quality of the proposed project and if it looks promising they agree to underwrite a percentage of the loan (usually between 70% and 85%).

The primary rationale of a LGS is to release capital from lenders who would otherwise refuse to lend. That might be because loan applicants lack the net worth, collateral, and cash flow that banks demand; or because of credit rationing (despite the evidence against this possibility mentioned above). Several distinct socioeconomic groups are often perceived as being especially prone to having limited collateral, net worth and cash flow, including blacks and women. Indeed, the US



Small Business Administration (SBA) LGS explicitly targets these groups for support.

It seems reasonable to make the following three assumptions about banks. First, because they can spread their risks across a large portfolio of loans, they are more or less risk-neutral when it comes to evaluating an individual loan. Second, banks do not turn down obviously good investment projects. Third, in line with their obligations they do not recommend any obviously bad projects to LGS administrators. On the basis of these three assumptions, one would on average expect guaranteed projects to perform no better, and probably to perform worse, than those that are funded; and therefore to be quite costly to the Exchequer. Broadly speaking, this supposition is borne out by the evidence, according to evaluations of the American [36] and British [94] schemes. Failure rates are a little higher for guaranteed projects than for non-guaranteed projects; scheme costs are substantial, amounting to GBP 100 million in 1998 for the SBA LGS; and net job creation is marginal, partly because of substantial displacement effects (see [115, Chap. 10.1], for details). These schemes do however succeed in leveraging some funds from banks that would otherwise not be forthcoming; and they do result in a marginal increase in entrepreneurial activity. It should be borne in mind however that the scale of guaranteed loans is small relative to the size of the sector as a whole, accounting for only about 1% by value in both the US and the UK.

#### **4.7. Which entrepreneurial ventures are most likely to survive and grow?**

The stylized facts based on applications of the canonical empirical models of discrete choice and hazard analysis (see 3.2.3 above) indicate the following. Enterprises are more likely to survive if they are relatively large; have been running for a long time; are operated by an older entrepreneur with previous business experience; have substantial initial capitalization; and are formed in a benign economic climate (see [115, Chap. 9.3], for details). Regarding employment growth, numerous regression analyses have shown that smaller and younger firms tend to have higher average growth rates than larger and older companies,

as do enterprises operated by entrepreneurs who are well educated, experienced and located in low unemployment environments. Several of these findings are consistent with the canonical theoretical model of Jovanovic [89] mentioned in Section 3.1.3 above.

Other possible influences on venture survival and growth have also been explored, including specific marketing strategies [127], sources of finance [22], social capital [35], and organizational structure [104]. But so far, findings for these variables have not proven to be as consistent or robust as for the ones listed above.

#### **4.8. Why do entrepreneurs work so hard for so little pay?**

The empirical methods outlined in Section 3.2.6 have been applied to answer this question. To date, Hamilton [76] has conducted one of the most thorough studies of entrepreneurs' relative incomes, using data from the US Survey of Income and Program Participation. Quantile regression methods showed that only members of the top quartile of the self-employed income distribution earn more in self-employment than in paid employment. Hamilton also found that, even after controlling for personal characteristics, individuals who enter self-employment earn less and have lower earnings growth rates on average than they could have achieved in wage and salary work. This finding is unlikely to reflect selection effects, since the prior wage distribution of switchers into self-employment appears to be similar to that of those who remained employees.

Hamilton estimated earnings functions for all individuals in the sample and thereby imputed their earnings in the other occupation. While several measurement issues make valid comparisons between self-employment and paid employment incomes hazardous (see [115, Chap. 1.5]), other American studies also report lower average incomes in self-employment than in paid employment. The British and European results on this issue are more mixed.

What nobody denies is that the self-employed work longer weekly hours on average than employees do. This is true both of full-time workers and of all workers taken together. Evidence from Ajayi-obe and Parker [9] suggests that, like employees, entrepreneurs dislike

working for its own sake. So it seems puzzling why so many people are willing to turn entrepreneur and work long hours for relatively low financial returns. It is certainly possible that a non-pecuniary benefit (e.g., the love of “being one’s own boss”) makes entrepreneurship more attractive than paid employment. But while this might help to explain why entrepreneurs hold excessively risky portfolios relative to the market ([106]; [125]), it cannot explain the long work hours phenomenon. Recently, IV estimation by Parker *et al* [118] has proposed a possible resolution of this puzzle. Entrepreneurs bear greater income risk, and so “self-insure” by working longer hours to make the deterministic part of their incomes larger despite receiving lower average wages.

#### 4.9. Does entrepreneurship cause economic growth?

As noted in 4.7 above, cross-sectional regressions reveal that smaller and newer enterprises tend to have systematically higher growth rates than average (see, e.g., [73], [128] and [77]). Hence entrepreneurship and growth appear to be positively related at the level of the individual firm. Interestingly, independent evidence also suggests that entrepreneurship and growth are linked at the industry level. There is, for example, evidence that industries with higher rates of entry by small firms have above average rates of productivity growth and innovation [69], [50]. At the same time, smaller and younger firms appear to be more innovative than their larger counterparts (see 4.2 above). And studies in the field of economic geography indicate that regions with higher new firm formation rates tend to enjoy higher rates of economic growth (see, e.g., [15], [130]).

At the national level, evidence bearing on a relationship between entrepreneurship and economic growth is patchier, although this issue is beginning to attract more attention. For example, Audretsch and Thurik [18] and Acs *et al* [1] recently regressed economic growth rates from a range of OECD countries on several measures of entrepreneurship, including the self-employment rate and the economic share of small firms. Their results also point to a positive relationship between economic growth and entrepreneurship. These results buttress earlier

cross-sectional findings from Thurik [147] that business ownership rates are associated with employment growth at the country level in the OECD; and they are also consistent with simple positive correlations between “total entrepreneurship activity” and national growth rates [129].

In the case of [1], the key empirical determinant of aggregate growth appears to be an *interaction* between entrepreneurship and R&D. Acs *et al* interpret this in terms of entrepreneurship diminishing the “knowledge filter” between the creation and exploitation of knowledge. That is, entrepreneurs found new firms in order to exploit opportunities created by knowledge spillovers. This story is attractive because it is consistent with the now-dominant macroeconomic growth paradigm of endogenous growth theory [133], [134], in which knowledge spillovers drive economies on to ever-increasing growth. As Acs *et al* explain, both knowledge creation and exploitation are crucial ingredients of growth. Innovation, entrepreneurship and growth come together with the opportunity creation and recognition literature at this juncture.

As other researchers have shown, one cannot assume that the unchecked market economy will always find the right balance between knowledge creation by scientists and knowledge exploitation by entrepreneurs [105]. There might therefore be a role for government intervention to promote entrepreneurship as a growth-enhancing strategy. Here a crucial question is whether new small firms are best placed to exploit knowledge spillovers (“entrepreneurship”) or whether incumbents can do as well or better (“intrapreneurship”). The evidence about the role of small and new firms cited above suggests that entrepreneurship may indeed be an important vehicle for generating innovations and stimulating growth.

#### **4.10. Should governments encourage or discourage entrepreneurship?**

The general presumption among small business and entrepreneurship practitioners is invariably that entrepreneurship is a “good thing”, and that we ought to have more of it. Economists are suspicious of unqualified assumptions of this kind. Some of them have gone so far

as to argue that, if anything, there is probably too much entrepreneurship; and that the balance of government policy ought perhaps to swing the other way towards discouraging entrepreneurship.

The arguments for promoting entrepreneurship are so familiar that they barely need repeating. Entrepreneurship is held to stimulate competition; create innovation and jobs; generate positive externalities; and provide a route out of poverty and discrimination. A corollary is that, if credit rationing and under-investment exist, the free market will generate too little entrepreneurship. Therefore, government ought generally to intervene to correct market failures and increase involvement in entrepreneurship to everyone's benefit.

In fact, despite the evidence, we still lack sufficiently firm evidence of positive spillovers from entrepreneurship. It is one of several important things that "We don't know" (see Section 5 below). Consequently, it is helpful to take a look at anti-entrepreneurship arguments, which are perhaps less familiar to the general reader, having to date been pretty much confined within the economics community.

One of the canonical start-up finance models discussed in Section 3.1.2, by de Meza and Webb [57], showed that there can be *too much* investment by entrepreneurs, in the sense that competitive equilibria can arise in which some entrepreneurs undertake projects whose social benefits do not cover their social costs. Weak entrepreneurs are effectively cross-subsidized by more able entrepreneurs because of asymmetric information. Everyone can be made better off if governments tax interest-bearing deposits to make capital more expensive. The effect of this policy is of course to reduce the number of entrepreneurs.

It might be objected that this policy recommendation is sensitive to the assumptions of de Meza and Webb's model. To some extent this is no doubt true; though it is also true of all models in this area [112]. But having said this I was myself surprised to find that, in a more general occupational choice model that nests over-investment, under-investment and credit rationing outcomes as special cases, the de Meza and Webb case often emerges as the most reasonable one [114]. Furthermore, the over-investment problem is exacerbated if entrepreneurs are over-optimistic, of which there is a growing body of evidence ([11],

[56], [13], [48], [47]). Many entrepreneurs end up ruining themselves and their families by what Adam Smith referred to as the “overweening conceit which the greater part of men have of their abilities” – particularly that they are uniquely well placed to spot and exploit opportunities that others have ignored. Families often bear the brunt of business failure and bankruptcies, rates of which are known to be very high generally [124]. And relationships often fracture under the strain of extremely long work hours that many entrepreneurs have to devote to their businesses. These are all tangible and deeply felt personal costs arising from the ill-judged pursuit of entrepreneurship by some individuals. Furthermore, vulnerable groups with few assets, including blacks and women, stand to lose the most from business failure. Ironically, these are the groups with the highest failure rates, and yet which are nonetheless the most commonly targeted by entrepreneurship promotion policies.

All of this should make us pause before supporting the self-interested (or well-meaning but ill-informed) practitioners who claim that the economy needs more entrepreneurship. The opposite might well be the case. It is interesting to speculate that economists might do more good by increasing awareness of the dangers of over-optimistic entry into entrepreneurship than by training gullible starry-eyed MBA students to write business plans that help to lure them to their ruin. Of course, this depends on the balance of costs and benefits of entrepreneurship. This is something that the Economics of Entrepreneurship is in principle well positioned to assess, but which in practice is an extremely ambitious research agenda containing major gaps in our knowledge. On this note, I now conclude the text by focusing in greater detail on what we don’t know and what we might do to rectify this.

# 5

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## Topics for further research: What we don't know

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There are still many interesting questions to which we do not have complete answers, or even yet perhaps the theoretical tools necessary to tackle them. I conclude this text by outlining a few questions that seem particularly fecund for future research, not only because of their policy importance and applications, but also because of their own intrinsic interest. I have arranged them in descending order of subjective importance. Readers may no doubt disagree with my ordering; but they can of course re-order them as they see fit.

- **Spillovers from entrepreneurship to the rest of the economy and society.** It is commonly alleged that entrepreneurship generates substantial benefits to the rest of the economy and society, by intensifying competition, promoting innovation and knowledge spillovers, and reducing social exclusion. The positive spillover argument is invariably used when making the case for pro-entrepreneurship government policies. As earlier sections of this text have shown, evidence about the importance of human capital spillovers and industrial clusters for entrepreneurial innovation is growing. While much has already been achieved in this fast-moving literature, further evidence is needed to quantify specific externalities. Direct evidence about

what the externalities are, how they are generated, who generates them, what is their value, and how they can be nurtured, are all needed to enable a cost-benefit analysis of entrepreneurship to be performed. It goes without saying that opening up the black box of entrepreneurship spillovers is likely to pose a major challenge and constitutes a highly ambitious research agenda.

- **The effects of regulation on entrepreneurs.** Despite the famous study of Brock and Evans [37], there has been only a handful of other articles dealing with this important issue (see [132], [29]). As governments around the world seek to relax regulations in order to promote entrepreneurship, the precise impact of regulation on entrepreneurs remains unclear and largely anecdotal. A combination of fine-grained data and innovative theoretical modelling is probably needed to make progress in this important area. In particular, it would be valuable to have quantitative impact studies and cost-benefit analyses of particular regulations. Above all, we need a constructive guide to *better* regulation, on the grounds that regulation is unlikely to go away, supported by firm empirical evidence wherever possible.
- **Policy evaluation.** To date, cost-benefit analysis (CBA) has not been widely used to evaluate government entrepreneurship policies. CBA is a tool with which economists have particular expertise and which, with a few exceptions (the British and American loan guarantee schemes, for example: see 4.64.6 above), has not been fully exploited. In view of the arguments against as well as in favour of government intervention to promote entrepreneurship (see 4.10 above), better and more widespread programme evaluations are needed. These might build on the discussion in [143] and [153], or apply the sort of micro-econometric evaluation methods that are now well established in labour economics (see, e.g., [79]). A recent example by Almus [10], which uses a non-parametric matching approach, is a rare exception that hopefully others will soon begin to emulate.



- **Discrimination in credit markets against members of ethnic minorities.** Racial discrimination is illegal in most countries, but there is some evidence that it may nevertheless exist in US credit markets [31]. It is probably unrealistic to expect banks to co-operate with researchers in identifying sources of discrimination, a phenomenon that they (unsurprisingly) vehemently deny; but unquestionably further research is needed to dig deeper into this important phenomenon.
- **Imperfect competition.** Most theoretical models in the Economics of Entrepreneurship assume perfect competition. There are good reasons for this assumption, and in many cases it is innocuous and greatly simplifies the analysis. But there would seem to be scope for investigating the implications of imperfectly competitive market structures in several areas in entrepreneurship. One example is the credit market for small business lending. For if small business lenders collude and act as a joint monopoly, then credit might be restricted for reasons other than those proposed by Stiglitz–Weiss; and a different basis for government intervention might also be warranted. Even more relevant might be the asymmetric relationship between entrepreneurs and a handful of powerful customers. To the best of my knowledge, the theory of monopsony has not yet been applied to understand the ramifications of this problem for entrepreneurs, and the knock-on effects it might have for other aspects of their business, including the commonly observed phenomena of late payment, cash flow problems, and trade credit. Evidence is also needed about whether large firms possess and abuse market power over their smaller suppliers and competitors.
- **Labour demand.** Empirical labour demand models have been widely applied to large firms, but so far there have been virtually no applications to small entrepreneurial ventures (see [75]). No doubt data limitations have been partly to blame for this lacuna. This is unfortunate, because labour demand models have the potential to substantially enhance our understanding of the structure of entrepreneurial ventures. They promise to

tell us what types of technologies entrepreneurs use, and why; the freedom entrepreneurs have to substitute capital, labour and other inputs in small firms; the scope entrepreneurial ventures have for adjusting capital and labour inputs; and the likely sensitivity of these ventures to variations in minimum wages, regulation, and general changes in factor prices.

- **Labour supply.** The number of articles on self-employed labour supply is slowly increasing, but the literature is still sparse compared with that for employees. It is desirable to improve our understanding of this topic because issues of work-life balance are becoming increasingly prominent concerns in all types of workplace, including in entrepreneurship. And there is a need for reliable estimates of the responsiveness of entrepreneurs' effort to changes in their pecuniary returns, and their sensitivity to variations in income tax rates. Even more strikingly, the interface between entrepreneurship and welfare benefits has barely been tackled at all, despite the fact that many entrepreneurs earn low incomes (see 4.8 above), and have limited benefit entitlement. Other areas where further work is needed include the intersection between female entrepreneurship, collective household labour supply, and wealth; and the role of family labour, family businesses, trust, and succession planning.
- **Entrepreneurial learning.** Jovanovic's canonical theory of Bayesian entrepreneurial learning has been very useful for characterizing certain aspects of industry evolution, but many questions still remain unanswered at the micro level. For example, how exactly do entrepreneurs learn in practice? Are they subject to bounded rationality, and if so, which algorithms do they use to assist their decision making? Models of bounded rationality have begun to spread elsewhere in economics; it might be time to extend these insights to the Economics of Entrepreneurship. Also connected to learning is a policy question concerning the effectiveness of entrepreneurship education programmes. For example, it would be helpful to know whether

these programmes succeed in improving entrepreneurs' skills and receptiveness to new ideas, and if so by how much.

- **Explaining substantial and persistent regional variations in entrepreneurship.** One well known but little understood fact is that rates of entrepreneurship exhibit pronounced and persistent variations across regions and countries [115, Chap. 3]. Some possible explanations are beginning to emerge. They include
  - Role models derived from working in small businesses [152];
  - Knowledge spillovers concentrated in particular localities [1]; and
  - Multiple equilibria based on self-reinforcing human capital investment decisions [117].
  - But research on this topic is still in its infancy, despite ongoing interest among researchers and policy-makers.
- **Non-standard forms of start-up finance.** We still know relatively little about the economics behind the use of alternative forms of start-up finance, including family lending, mutual guarantee schemes, and credit card finance. It is possible that these can be useful alternative sources of funds that can help entrepreneurs bypass credit rationing – but presently we do not know the precise extent to which this is the case. To date, economic research on these issues has been sporadic (see, e.g., [20], [115, Chap. 6]).
- **Medium enterprise development.** Entrepreneurship is often taken to be synonymous with small firms. But medium-sized and large firms can also be entrepreneurial. Relatively little is known about the medium-sized sector in this regard, despite its economic importance in most developed economies.

In addition to the specific issues listed above, a further suggestion is that economists who study entrepreneurship should in the future begin to borrow a little more freely from other disciplines where appropriate. For example, sociologists can tell us a lot about trust, and

the basis for social relationships within teams. While the study of trust is beginning to make itself felt in economics, the Economics of Entrepreneurship is yet to incorporate it in any serious way. Other examples abound. The key point here is that the Economics of Entrepreneurship has nothing to lose and much to gain from occasionally looking over the fence to learn from other disciplines.

## References

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- [1] Z. J. Acs and C. Armington, "The impact of geographic differences in human capital on service firm formation rates," *Journal of Urban Economics*, vol. 56, pp. 244–78, 2004.
- [2] Z. J. Acs and D. B. Audretsch, "Innovation in large and small firms: An empirical analysis," *American Economic Review*, vol. 78, pp. 678–90, 1988.
- [3] Z. J. Acs and D. B. Audretsch, *Innovation and Small Firms*, MIT Press, Cambridge, MA, 1990.
- [4] Z. J. Acs and D. B. Audretsch, *Small Firms and Entrepreneurship: An East-West Perspective*, Cambridge University Press, Cambridge, 1993.
- [5] Z. J. Acs and D. B. Audretsch, "Innovation and technological change," In: *Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction*, Acs, Z. J. and Audretsch, D. B., Kluwer, Boston, pp. 55–79, 2003.
- [6] Z. J. Acs, D. B. Audretsch, P. Braunerhjelm, and B. Carlsson, "The missing link: The knowledge filter and entrepreneurship in endogenous growth," *CEPR Discussion Paper No. 4783*, 2004, [www.cepr.org/pubs/dps/DP4783.asp](http://www.cepr.org/pubs/dps/DP4783.asp).
- [7] P. Aghion and P. Howitt, "A model of growth through creative destruction," *Econometrica*, vol. 60, pp. 323–51, 1992.
- [8] P. Aghion and P. Howitt, "A Schumpeterian perspective on growth and competition," In: *Advances in Economics and Econometrics: Theory & Applications*, Kreps, D. M. and Wallis, K. F., Cambridge University Press, Cambridge, vol. 2, pp. 279–319, 1997.
- [9] O. Ajayi-obe and S. C. Parker, "The changing nature of work among the self-employed in the 1990s: Evidence from Britain," *Journal of Labor Research*, forthcoming, 2005.

- [10] M. Almus, "Job creation through public start-up assistance?," *Applied Economics*, vol. 36, pp. 2015–24, 2004.
- [11] G. Arabsheibani, D. de Meza, J. Maloney, and B. Pearson, "And a vision appeared unto them of a great profit: Evidence of self-deception among the self-employed," *Economics Letters*, vol. 67, pp. 35–41, 2000.
- [12] R. L. Aronson, *Self-employment: A Labour Market Perspective*, ILR Press, Ithaca, NY, 1991.
- [13] T. Åstebro, "The return to independent invention: evidence of risk-seeking, extreme optimism or skewness loving?," *Economic Journal*, vol. 113, pp. 226–39, 2003.
- [14] D. B. Audretsch and M. P. Feldman, "R&D spillovers and the geography of innovation and production," *American Economic Review*, vol. 86, pp. 630–40, 1996.
- [15] D. B. Audretsch and M. Fritsch, "Growth regimes over time and space," *Regional Studies*, vol. 36, pp. 113–24, 2002.
- [16] D. B. Audretsch and E. Lehmann, "Location and new venture creation," In: *Handbook of Entrepreneurship Research*, Parker, S. C., vol. III, Kluwer, forthcoming, 2006.
- [17] D. B. Audretsch and T. Mahmood, "New firm survival: New results using a hazard function," *Review of Economics & Statistics*, vol. 77, pp. 97–103, 1995.
- [18] D. B. Audretsch and R. Thurik, "Linking entrepreneurship to growth," *OECD STI Working Paper 2081/2*, 2001.
- [19] A. V. Banerjee and A. F. Newman, "Occupational choice and the process of development," *Journal of Political Economy*, vol. 101, pp. 274–98, 1993.
- [20] A. Basu and S. C. Parker, "Family finance and new business start-ups," *Oxford Bulletin of Economics & Statistics*, vol. 63, pp. 333–58, 2001.
- [21] T. Bates, "Entrepreneur human capital inputs and small business longevity," *Review of Economics & Statistics*, vol. 72, pp. 551–59, 1990.
- [22] T. Bates, *Race, Self-employment and Upward Mobility: An Illusive American Dream*, John Hopkins University Press, Baltimore, 1997.
- [23] W. J. Baumol, "Entrepreneurship: productive, unproductive and destructive," *Journal of Political Economy*, vol. 98, pp. 893–921, 1990.
- [24] W. J. Baumol, "Formal entrepreneurship theory in economics: Existence and bounds," *Journal of Business Venturing*, vol. 8, pp. 197–210, 1993.
- [25] A. N. Berger and G. F. Udell, "Some evidence on the empirical significance of credit rationing," *Journal of Political Economy*, vol. 100, pp. 1047–77, 1992.
- [26] D. Bernhardt, "Credit rationing?," *American Economic Review*, vol. 90, pp. 235–39, 2000.
- [27] M. Bianchi and M. Henrekson, "Is neoclassical economics still entrepreneurless?," *SSE/EFI Working Paper No. 584*, Stockholm School of Economics, 2005.
- [28] D. L. Birch, "MIT Programme on Neighbourhood and Regional Change," *The Job Generation Process*, , Cambridge, MA, 1979.
- [29] S. E. Black and P. E. Strahan, "Business formation and the deregulation of the banking industry," In: *Public Policy and the Economics of Entrepreneurship*, Holtz-Eakin, D. and Rosen, H. S., MIT Press, Cambridge, MA, 2004.
- [30] D. G. Blanchflower and A. Oswald, "What makes an entrepreneur?," *Journal of Labor Economics*, vol. 16, pp. 26–60, 1998.

- [31] D. G. Blanchflower, P. B. Levine, and D. J. Zimmerman, "Discrimination in the small-business credit market," *Review of Economics & Statistics*, vol. 85, pp. 930–43, 2003.
- [32] G. J. Borjas, "The self-employment experience of immigrants," *Journal of Human Resources*, vol. 21, pp. 485–506, 1986.
- [33] G. J. Borjas and S. G. Bronars, "Consumer discrimination and self-employment," *Journal of Political Economy*, vol. 97, pp. 581–605, 1989.
- [34] V. K. Borooah and M. Hart, "Factors affecting self-employment among Indian and black Caribbean men in Britain," *Small Business Economics*, vol. 13, pp. 111–29, 1999.
- [35] N. Bosma, M. Van Praag, R. Thurik, and G. de Wit, "The value of human and social capital investments for the business performance of startups," *Small Business Economics*, vol. 23, pp. 227–36, 2004.
- [36] B. P. Bosworth, A. S. Carron, and E. Rhyne, *The Economics of Government Credit*, Brookings Institution, Washington DC, 1987.
- [37] W. A. Brock and D. S. Evans, *The Economics of Small Businesses: Their Role and Regulation in the US Economy*, Holmes and Meier, New York, 1986.
- [38] D. Bruce, "Do husbands matter? Married women entering self-employment," *Small Business Economics*, vol. 13, pp. 317–29, 1999.
- [39] D. Bruce and M. Mohsin, "Tax policy and entrepreneurship: new time series evidence," *Mimeo, University of Tennessee*, 2003.
- [40] R. K. Caputo and A. Dolinsky, "Women's choice to pursue self-employment: The role of financial and human capital of household members," *Journal of Small Business Management*, vol. 36, pp. 8–17, 1998.
- [41] R. Carrasco, "Transitions to and from self-employment in Spain: An empirical analysis," *Oxford Bulletin of Economics & Statistics*, vol. 61, pp. 315–41, 1999.
- [42] R. Carroll, D. Holtz-Eakin, M. Rider, and H. S. Rosen, "Income taxes and entrepreneurs' use of labour," *Journal of Labor Economics*, vol. 18, pp. 324–51, 2000.
- [43] R. Carroll, D. Holtz-Eakin, M. Rider, and H. S. Rosen, "Entrepreneurs, income taxes and investment," In: *Does Atlas Shrug? The Economic Consequences of Taxing the Rich*, Slemrod, J. B., Russell Sage, New York, pp. 427–55, 2000.
- [44] R. Carroll, D. Holtz-Eakin, M. Rider, and H. S. Rosen, "Personal income taxes and the growth of small firms," In: *Tax Policy and the Economy*, Slemrod, J., vol. 15, MIT Press, Cambridge, MA, pp. 121–47, 2001.
- [45] M. Casson, *The Entrepreneur: An Economic Theory*, 2nd Edition, Edward Elgar, Cheltenham, 2003.
- [46] K. Clark and S. Drinkwater, "Ethnicity and self-employment in Britain," *Oxford Bulletin of Economics & Statistics*, vol. 60, pp. 383–407, 1998.
- [47] M. P. Coelho, "Unrealistic optimism, entrepreneurship and adverse selection," *Unpublished PhD Dissertation, London School of Economics*, 2004.
- [48] M. P. Coelho, D. de Meza, and D. Reyniers, "Irrational exuberance, entrepreneurial finance and public policy," *International Tax and Public Finance*, vol. 11, pp. 391–417, 2004.
- [49] A. C. Cooper, F. J. Gimeno-Gascon, and C. Y. Woo, "Initial human and financial capital as predictors of new venture performance," *Journal of Business Venturing*, vol. 9, pp. 371–95, 1994.

- [50] A. D. Cosh, A. Hughes, and E. Wood, "Innovation in UK SMEs: causes and consequences for firm failure and acquisition," In: *Entrepreneurship, Small and Medium Sized Enterprises and the Macro Economy*, Acs, Z. and Carlsson, B., Cambridge University Press, Cambridge, 1999.
- [51] M. Cowling and P. Mithcell, "The evolution of UK self-employment: A study of government policy and the role of the macroeconomy," *Manchester School*, vol. 65, pp. 427–42, 1997.
- [52] R. C. Cressy, "Are business start-ups debt-rationed?," *Economic Journal*, vol. 106, pp. 1253–70, 1996.
- [53] R. C. Cressy, "Credit rationing or entrepreneurial risk aversion? An alternative explanation for the Evans and Jovanovic finding," *Economics Letters*, vol. 66, pp. 235–40, 2000.
- [54] P. Davidsson, L. Lindmark, and C. Olofsson, "The extent of over-estimation of small firm job creation – An empirical examination of the regression bias," *Small Business Economics*, vol. 11, pp. 87–100, 1998.
- [55] S. J. Davis, J. C. Haltiwanger, and S. Schuh, *Job Creation and Destruction*, MIT Press, Cambridge, MA, 1996.
- [56] D. de Meza, "Overlending?," *Economic Journal*, vol. 112, pp. F17–F31, 2002.
- [57] D. de Meza and D. C. Webb, "Too much investment: A problem of asymmetric information," *Quarterly Journal of Economics*, vol. 102, pp. 281–92, 1987.
- [58] D. de Meza and D. C. Webb, "Wealth, enterprise and credit policy," *Economic Journal*, vol. 109, pp. 153–63, 1999.
- [59] T. J. Devine, "Characteristics of self-employed women in the United States," *Monthly Labor Review*, vol. 117, pp. 20–34, 1994.
- [60] P. J. Dolton and G. H. Makepeace, "Self-employment among graduates," *Bulletin of Economic Research*, vol. 42, pp. 35–53, 1990.
- [61] J. S. Earle and Z. Sakova, "Business start-ups or disguised unemployment? Evidence on the character of self-employment from transition economies," *Labor Economics*, vol. 7, pp. 575–601, 2000.
- [62] L. N. Edwards and E. Field-Hendrey, "Home-based work and women's labour force decisions," *Journal of Labor Economics*, vol. 20, pp. 170–200, 2002.
- [63] D. S. Evans and B. Jovanovic, "An estimated model of entrepreneurial choice under liquidity constraints," *Journal of Political Economy*, vol. 97, pp. 808–27, 1989.
- [64] D. S. Evans and L. S. Leighton, "Some empirical aspects of entrepreneurship," *American Economic Review*, vol. 79, pp. 519–35, 1989.
- [65] R. W. Fairlie, "The absence of the African-American owned business: An analysis of the dynamics of self-employment," *Journal of Labor Economics*, vol. 17, pp. 80–108, 1999.
- [66] R. W. Fairlie and B. D. Meyer, "Trends in self-employment among white and black men during the twentieth century," *Journal of Human Resources*, vol. 35, pp. 643–69, 2000.
- [67] P. Francois, "Not-for-profit provision of public services," *Economic Journal*, vol. 113, pp. C53–C61, 2003.
- [68] M. Friedman, *Essays in Positive Economics*, University of Chicago Press, Chicago, 1953.



- [69] P. A. Geroski and R. Pomroy, "Innovation and the evolution of market structure," *Journal of Economics*, vol. 38, pp. 299–314, 1990.
- [70] E. L. Glaeser and A. Shleifer, "Not-for-profit entrepreneurs," *Journal of Public Economics*, vol. 81, pp. 99–115, 2001.
- [71] W. H. Greene, *Econometric Analysis*, Fifth Edition, Prentice-Hall, New Jersey, 2003.
- [72] G. M. Grossman, "International trade, foreign investment, and the formation of the entrepreneurial class," *American Economic Review*, vol. 74, pp. 605–14, 1984.
- [73] B. H. Hall, "The relationship between firm size and firm growth in the US manufacturing sector," *Journal of Industrial Economics*, vol. 35, pp. 583–606, 1987.
- [74] B. H. Hall, A. N. Link, and J. T. Scott, "Universities as research partners," *Review of Economics & Statistics*, vol. 85, pp. 485–91, 2003.
- [75] D. S. Hamermesh, *Labor Demand*, Princeton University Press, Princeton, 1993.
- [76] B. H. Hamilton, "Does entrepreneurship pay? An empirical analysis of the returns to self-employment," *Journal of Political Economy*, vol. 108, pp. 604–31, 2000.
- [77] P. E. Hart and N. Oulton, "Growth and size of firms," *Economic Journal*, vol. 106, pp. 1242–52, 1996.
- [78] J. J. Heckman, "Sample selection bias as a specification error," *Econometrica*, vol. 47, pp. 475–92, 1979.
- [79] J. J. Heckman, R. J. LaLonde, and J. A. Smith, "The economics and econometrics of active labour market programs," In: *Handbook of Labor Economics*, Ashenfelter, O. and Card, D., Elsevier, Amsterdam, pp. 1865–2097, 1999.
- [80] A. Henley, "Self-employment status: the role of state dependence and initial circumstances," *Small Business Economics*, vol. 22, pp. 67–82, 2004.
- [81] T. J. Holmes and J. A. Schmitz, "A theory of entrepreneurship and its application to the study of business transfers," *Journal of Political Economy*, vol. 98, pp. 265–94, 1990.
- [82] D. Holtz-Eakin, D. Joulfaian, and H. S. Rosen, "Sticking it out: entrepreneurial survival and liquidity constraints," *Journal of Political Economy*, vol. 102, pp. 53–75, 1994.
- [83] M. Hout and H. S. Rosen, "Self-employment, family background, and race," *Journal of Human Resources*, vol. 35, pp. 670–92, 2000.
- [84] G. Hundley, "Why women earn less than men in self-employment," *Journal of Labor Research*, vol. 22, pp. 817–29, 2001.
- [85] E. Hurst and A. Lusardi, "Liquidity constraints, household wealth, and entrepreneurship," *Journal of Political Economy*, vol. 112, pp. 319–47, 2004.
- [86] M. F. Iyigun and A. L. Owen, "Entrepreneurs, professionals and growth," *Journal of Economic Growth*, vol. 4, pp. 213–32, 1999.
- [87] A. B. Jaffe, "Real effects of academic research," *American Economic Review*, vol. 79, pp. 957–70, 1989.
- [88] A. B. Jaffe, M. Trajtenberg, and R. Henderson, "Geographic localisation of knowledge spillovers as evidenced by patent citations," *Quarterly Journal of Economics*, vol. 63, pp. 577–98, 1993.

- [89] B. Jovanovic, "Selection and the evolution of industry," *Econometrica*, vol. 50, pp. 649–70, 1982.
- [90] C. Keuschnigg and S. B. Nielsen, "Public policy, start-up entrepreneurship, and the market for venture," In: *Handbook of Entrepreneurship Research*, Parker, S. C., vol. III, Kluwer, forthcoming, 2006.
- [91] R. E. Killstrom and J. J. Laffont, "A general equilibrium entrepreneurial theory of firm formation based on risk aversion," *Journal of Political Economy*, vol. 87, pp. 719–49, 1979.
- [92] S. Klepper, "Entry, exit, growth and innovation over the product life cycle," *American Economic Review*, vol. 86, pp. 562–83, 1996.
- [93] F. H. Knight, *Risk, Uncertainty and Profit*, Houghton-Mifflin, New York, 1921.
- [94] KPMG, *An Evaluation of the Small Firms Loan Guarantee Scheme*, HMSO, DTI, London, 1999.
- [95] P. Krugman, *Geography and Trade*, MIT Press, Cambridge, MA, 1991.
- [96] E. P. Lazear, "Economic imperialism," *Quarterly Journal of Economics*, vol. 115, pp. 99–146, 2000.
- [97] E. P. Lazear, "Entrepreneurship," *NBER Working Paper No. 9109*, Cambridge, MA, 2002.
- [98] E. P. Lazear, "Balanced skills and entrepreneurship," *American Economic Review, Papers & Proceedings*, vol. 94, pp. 208–11, 2004.
- [99] A. R. Levenson and K. L. Willard, "Do firms get the financing they want? Measuring credit rationing experienced by small businesses in the US," *Small Business Economics*, vol. 14, pp. 83–94, 2000.
- [100] T. Lindh and H. Ohlsson, "Self-employment and windfall gains: Evidence from the Swedish lottery," *Economic Journal*, vol. 106, pp. 1515–26, 1996.
- [101] R. E. Lucas, "On the size distribution of business firms," *Bell Journal of Economics*, vol. 9, pp. 508–23, 1978.
- [102] D. A. Macpherson, "Self-employment and married women," *Economic Letters*, vol. 28, pp. 281–84, 1988.
- [103] T. Mahmood, "Survival of newly founded businesses: A log-logistic model approach," *Small Business Economics*, vol. 14, pp. 223–37, 2000.
- [104] J. Mata and P. Portural, "Life duration of new firms," *Journal of Industrial Economics*, vol. 42, pp. 227–45, 1994.
- [105] C. Michelacchi, "Low returns in R&D due to the lack of entrepreneurial skills," *Economic Journal*, vol. 113, pp. 207–25, 2003.
- [106] T. J. Moskowitz and A. Vissing-Jorgensen, "The returns to entrepreneurial investment: A private equity premium puzzle?," *American Economic Review*, vol. 92, pp. 745–48, 2002.
- [107] K. M. Murphy, A. Shleifler, and R. W. Vishny, "The allocation of talent: Implications for growth," *Quarterly Journal of Economics*, vol. 106, pp. 503–30, 1991.
- [108] R. Oaxaca, "Male-female wage differentials in urban labour markets," *International Economic Review*, vol. 14, pp. 693–708, 1973.
- [109] OECD, *Fostering Entrepreneurship*, OECD, Paris, 1998.
- [110] S. C. Parker, "A time series model of self-employment under uncertainty," *Economica*, vol. 63, pp. 459–75, 1996.

- [111] S. C. Parker, "The effects of risk on self-employment," *Small Business Economics*, vol. 9, pp. 515–22, 1997.
- [112] S. C. Parker, "Do banks ration credit to new enterprises? And should governments intervene?," *Scottish Journal of Political Economy*, vol. 49, pp. 162–95, 2002.
- [113] S. C. Parker, "Does tax evasion affect occupational choice?," *Oxford Bulletin of Economics & Statistics*, vol. 65, pp. 379–94, 2003.
- [114] S. C. Parker, "Asymmetric information, occupational choice and government policy," *Economic Journal*, vol. 113, pp. 861–82, 2003.
- [115] S. C. Parker, *The Economics of Self-employment and Entrepreneurship*, Cambridge University Press, Cambridge, 2004.
- [116] S. C. Parker, "Learning about the unknown: How fast do entrepreneurs learn about their beliefs?," *Journal of Business Venturing*, forthcoming, 2005.
- [117] S. C. Parker, "Explaining regional variations in entrepreneurship as multiple equilibria," *Journal of Regional Science*, forthcoming, 2005.
- [118] S. C. Parker and Y. Belghitar, "What happens to nascent entrepreneurs? An econometric analysis of the PSED," *Paper presented to the Babson-Kaufman conference, Babson College; and USASBE, Palm Springs*, 2005.
- [119] S. C. Parker and M. T. Robson, "Explaining international variations in self-employment: Evidence from a panel of OECD countries," *Southern Economic Journal*, vol. 71, pp. 287–301, 2004.
- [120] S. C. Parker and C. M. Van Praag, "Schooling, capital constraints and entrepreneurial performance: the endogenous triangle," *Discussion Paper No. 04-106/3, Tinbergen Institute, University of Amsterdam*, <http://www.tinbergen.nl/scripts/papers.pl?paper=04106.rdf>, 2004.
- [121] S. C. Parker, Y. Belghitar, and T. Barmby, "Wage uncertainty and self-employed labour supply," *Economic Journal*, vol. 115, pp. C190–207, 2005.
- [122] P. F. Peretto, "Technological change, market rivalry, and the evolution of the capitalist engine of growth," *Journal of Economic Growth*, vol. 3, pp. 53–80, 1998.
- [123] F. Pfeiffer and F. Reize, "Business start-ups by the unemployed – An econometric analysis based on firm data," *Labor Economics*, vol. 7, pp. 629–63, 2000.
- [124] B. D. Phillips and B. A. Kirchoff, "Formation, growth and survival: Small firm dynamics in the US economy," *Small Business Economics*, vol. 1, pp. 65–74, 1989.
- [125] V. Polvoknichenko, "Human capital and the private equity premium," *Review of Economic Dynamics*, vol. 6, pp. 831–45, 1989.
- [126] H. Rees and A. Shah, "An empirical analysis of self-employment in the UK," *Journal of Applied Econometrics*, vol. 1, pp. 95–108, 1986.
- [127] G. C. Reid, "Staying in business," *International Journal of Industrial Organisation*, vol. 9, pp. 545–56, 1991.
- [128] G. C. Reid, *Small Business Enterprise: An Economic Analysis*, Routledge, London, 1993.
- [129] P. D. Reynolds, *Global Entrepreneurship Monitor Executive Report*, 2002, [www.gemconsortium.com](http://www.gemconsortium.com).

- [130] P. Reynolds, B. Miller, and W. R. Maki, "Explaining regional variations in business births and deaths: US 1976–1988," *Small Business Economics*, vol. 7, pp. 389–407, 1995.
- [131] M. T. Robson, "The rise in self-employment amongst UK males," *Small Business Economics*, vol. 10, pp. 199–212, 1998.
- [132] M. T. Robson, "Does stricter employment protection legislation promote self-employment?," *Small Business Economics*, vol. 21, pp. 309–319, 2003.
- [133] P. Romer, "Increasing returns and economic growth," *American Economic Review*, vol. 94, pp. 1002–37, 1986.
- [134] P. Romer, "Endogenous technical change," *Journal of Political Economy*, vol. 98, pp. 71–102, 1990.
- [135] A. Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Harvard University Press, Cambridge, MA, 1994.
- [136] F. M. Scherer, "Changing perspectives on the firm size problem," In: *Innovation and Technological Change*, Acs, Z. J. and Audretsch, D. B., University of Michigan Press, Ann Arbor, 1991.
- [137] J. A. Schumpeter, *The Theory of Economic Development*, Harvard University Press, Cambridge, MA, 1934.
- [138] P. Segerstrom, "Innovation, imitation and economic growth," *Journal of Political Economy*, vol. 99, pp. 190–207, 1991.
- [139] P. Segerstrom, T. C. Anant, and E. Dinopoulos, "A Schumpeterian model of the product life cycle," *American Economic Review*, vol. 80, pp. 1077–1091, 1990.
- [140] J.-C. Spender, "Making knowledge the basis of a dynamic theory of the firm," *Strategic Management Journal*, vol. 17, pp. 45–62, 1996.
- [141] J. Stiglitz and A. Weiss, "Credit rationing in markets with imperfect information," *American Economic Review*, vol. 71, pp. 393–410, 1981.
- [142] C. E. Steuerle and V. Hodgkinson, "Meeting social needs: Comparing the resources of the independent sector and government," In: *Nonprofits and Government*, Boris, E. and Steuerle, C. E., Urban Institute Press, Washington DC, 1999.
- [143] D. J. Storey, "Entrepreneurship, small and medium sized enterprises and public policies," In: *Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction*, Acs, Z. J. and Audretsch, D. B., Kluwer, Boston, pp. 473–511, 2003.
- [144] M. P. Taylor, "Earnings, independence or unemployment: Why become self-employed?," *Oxford Bulletin of Economics & Statistics*, vol. 58, pp. 253–66, 1996.
- [145] M. P. Taylor, "Survival of the fittest? An analysis of self-employment duration in Britain," *Economic Journal*, vol. 109, pp. C140–C155, 1999.
- [146] P. H. Thornton and K. H. Flynn, "Entrepreneurship, networks and geographies," In: *International Handbook of Entrepreneurship Research*, Acs, Z. J. and Audretsch, D. B., Kluwer Academic, Dordrecht, 2003.
- [147] R. Thurik, "Entrepreneurship, industrial transformation and growth," In: *The Sources of Entrepreneurial Activity*, Libecap, G. D., JAI Press, Stamford, CT, 1999.

- [148] J. Van der Sluis, C. M. Van Praag, and A. Witteloostuijn, *The returns to education: A comparative study between entrepreneurs and employees, Paper presented to the BKERC Conference, University of Strathclyde*, 2004.
- [149] M. Van Gelderen, N. Bosma, and R. Thurik, "Setting up a business in the Netherlands: Who starts, who gives up, who is still trying," *Unpublished report*, 2001, <http://ssrn.com/abstract=370874>.
- [150] C. M. Van Praag and H. van Ophem, "Determinants of willingness and opportunity to start as an entrepreneur," *Kyklos*, vol. 48, pp. 513–40, 1995.
- [151] J. Wagner, "Testing Lazear's jack-of-all-trades view of entrepreneurship with German micro data," *Applied Economics Letters*, vol. 10, pp. 687–89, 2003.
- [152] J. Wagner, "Are young and small firms hothouses for nascent entrepreneurs? Evidence from German micro data," *Working Paper No. 301, University of Lüneburg*, 2004.
- [153] C. Wren and D. J. Storey, "Evaluating the effect of "soft" business support upon small firms performance," *Oxford Economic Papers*, vol. 54, pp. 334–65, 2002.
- [154] A. M. Yuengert, "Testing hypotheses of immigrant self-employment," *Journal of Human Resources*, vol. 30, pp. 194–204, 1995.

