

Revealing Entrepreneurial Talent

Francesco Ferrante*

ABSTRACT. A society's allocation of working time to entrepreneurial, organizational and learning activities is the main factor behind technical change and economic growth. Building on Lucas (1978) and Kihlstrom and Laffont (1979), in this paper I offer evidence that the amount of working time spent by small business owners in entrepreneurial activities affects the performance of the business and reveals their entrepreneurial talent. The intuition is that it is reasonable to allocate more of our time to those activities where we realize we are more productive. As actual consumption choices reveal consumer preferences, the varying entrepreneurial content of the activities performed is a signal of an individual's ability as entrepreneur. The results obtained suggest that the allocation of working time by small business owners: (a) throws light on their behavioral patterns; (b) is related to the owner's human capital and to firm size; and (c) has a significant correlation with business performance. The main finding of my analysis, confirming previous studies on this topic, is that education is an important part of entrepreneurial human capital. Moreover, the latter is the main factor that can sustain small firms' competitiveness in a globalizing economy.

The entrepreneur is at the same time one of the most intriguing and one of the most elusive characters in the cast that constitutes the subject of economic analysis (Baumol, 1965, p. 64).

1. Introduction

The use of time is the main determinant of income and welfare over an individual's entire life. Analogously, a society's choices on how to allocate time among leisure, education and work and the distribution of working time in applications characterized by different returns are

the main factors behind technical change and economic growth.

Individual preferences dictate how much time we wish to devote to leisure, to improving our innate ability through education and training, to working as an employee or for oneself. The resulting allocation of time determines the demand and supply for different categories of commodities and human capital, the returns to various occupations and, among the latter, the reward to entrepreneurial human capital, i.e. entrepreneurial talent.

Analytical interest in the entrepreneur and the nature of his reward dates back, at least,¹ to Schumpeter (1936) and Knight (1965). Since then, the debate on the social function of entrepreneurs in market economies and the nature of entrepreneurial talent has attracted the interest of many scholars in different fields.² The emphasis has varied across authors and over time, focusing either on entrepreneurs' social role or on their individual characteristics. More recently, the theory of endogenous growth has stressed the essential role of entrepreneurship in economic development (Iyigun and Owen, 1999) and the possible distortions of inefficient allocation of entrepreneurial talent (Murphy et al., 1991; Baumol, 1990).

Yet, this interest has not translated into an equivalent ability to consider, within the micro-economic models, the specific role of entrepreneurship. According to Baumol (1968), this is not surprising in that within the cast of the neoclassical firm there is no room for the entrepreneur, the stage being wholly occupied by mechanical profit-maximizing managers: "The theoretical firm is entrepreneurless – the Prince of Denmark has been expunged from the discussion of *Hamlet*" (Baumol, 1965, p. 66).

A tangible sign of the problematic relationship

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Università di Cassino
Facoltà di Economia
via Mazzaroppi 03043
Cassino (FR)
Italia
E-mail: f.ferrante@caspur.it

between neoclassical theory of the firm and the entrepreneur is that, in the vast majority of labor economics text-books, the occupational choice between self-employment and wage labor is left out, as if it were a residual that does not warrant inquiry.

As a result, the formal analysis of the fundamental factors determining occupational choice and the resulting supply of entrepreneurs³ is quite recent, rooted in the work of Lucas (1978) and Kihlstrom and Laffont (1979). Building on previous analyses, these authors explain why individuals become employees or self-employed by stressing either their function of coordinator/supervisor (Lucas) or of risk-bearer (Kihlstrom and Laffont). In the context of the latter interpretations, entrepreneurial talent is measured either in terms of productivity of individuals in coordinating and supervising employees within a firm or, alternatively, in terms of risk aversion. Along the same lines as Lucas, interesting insights on the links between the productivity of managerial time and the supply of entrepreneurship are found in Oi (1983) and Otani (1996).

From a different perspective, Jovanovic (1989) and Evans and Jovanovic (1989) develop a model of entrepreneurial choice with liquidity constraint based on the idea that the choice of becoming an employee or an entrepreneur depends on wealth. Here the incentive to become an entrepreneur has more to do with objective conditions, i.e. the ability to finance a business venture, than with subjective qualities of individuals. In such a context, the interest in and the practicability of measures of entrepreneurial talent are questionable.

Due to the lack of a common conceptual framework, the available empirical evidence is scattered and, in general, not particularly strong. The main issues investigated have been the demographic characteristics and socio-economic background of the self-employed *vis à vis* the employees, and the factors affecting the probability of survival of businesses run by the former⁴ (Evans and Leighton, 1989; Schiller and Crewson, 1997). Other empirical studies⁵ directly investigate the contribution of entrepreneurial characteristics (education, experience, family background) to a set of performance indicators such as firms' growth and innovation (Roper, 1998; Storey, 1994; Barkham et al., 1996).

Building on Lucas (1978) and Kihlstrom and Laffont (1979) and Gifford (1992), in this paper I argue that the allocation of working time by self-employed persons in activities characterized by differing returns may reveal their entrepreneurial talent. Just as actual consumption choices should reveal people's preferences, the amount of working time spent by self-employed persons in activities characterized by different entrepreneurial content and productivity should signal their ability as entrepreneurs.

The aim of this paper is threefold: (a) to speculate on the opportunities to use data on the allocation of time in the specific context of small business economics; (b) to offer preliminary empirical evidence on behalf of this methodological strategy; (c) to discuss the main implications of this preliminary evidence for the design of training policies.

The conceptual and statistical frameworks adopted here are very simple; indeed, I am aware that this choice will undoubtedly attract reasonable criticism from advocates of a more formal modeling structure.⁶ Although the final aim of economics is to reveal structural properties, at the present stage I do not intend to interpret the statistical correlation in terms of causal links among the variables. Nevertheless, the results are provocative, since they suggest that (a) it is possible to discern different behavioral strategies from data on the allocation of working time by small business owners; (b) the allocation of small business owners' time bears some relationship to their complement of human capital and to the size (number of employees) of the business; and (c) the allocation of working time has a significant impact on a business's performance (or the other way around, perhaps).

The reason for addressing this issue is twofold. First, although entrepreneurship is considered a main engine of economic growth, systematic efforts to measure it are still lacking.⁷ The step to be made in this direction requires the development of consistent analytical frameworks⁸ according to which researchers can select, collect and process statistical data. The conceptual framework developed here provides some insights in the latter direction and suggests that, in order to derive meaningful indicators of the supply of entrepreneurship in the economy, the quantitative⁹

measures ordinarily used should be adjusted for the quality of the entrepreneurial stock. Secondly, a poor entrepreneurial culture is considered to be the main factor behind the weak position of small European firms in low-tech industries in the face of new competition stemming from globalization and the ICT revolution.¹⁰ Unfortunately, entrepreneurial culture is an empty box that needs to be filled if one aims to implement cost-effective industrial policies to sustain these firms. In this paper, I stress that entrepreneurs' and workers' human capital should be seen as complementary and I discuss the main implications of this conclusion for the design of training policies.

The choice of a sample¹¹ considering small subcontracting Italian firms in textiles and clothing is not casual in that (a) in small firms the identification of the person in charge of taking decisions (the entrepreneur) as opposed to those executing them (the managers) is simpler; (b) studies on subcontracting¹² (see e.g. Lyons, 1996) suggest that the comparative analysis of the actual strategies chosen by the subcontractors may reveal useful information about their entrepreneurial capabilities; (c) in the recent past and still now, in Italy and in Europe, the textile and clothing industries have been under strong competitive pressure, thus requiring the activation of those entrepreneurial capabilities required to implement non-price-competition strategies.

The paper is organized as follows. Section 2 draws heavily on Baumol (1968) and deals with the economic analysis of entrepreneurship. Section 3 presents the empirical evidence on the allocation of working time by Italian small business owners in textiles and clothing and its use to reveal entrepreneurial talent. Section 4 draws some implications on the role of education and training as sources of entrepreneurial talent in a globalizing economy. Section 5 sums up the main conclusions.

2. The economic analysis of entrepreneurial talent

The analysis of entrepreneurial talent and of the contribution of entrepreneurship to economic growth is at the root of the study of the physiology of market economies. "He [the entrepreneur] has long been recognized as the apex of the hierarchy

that determines the behavior of the firm and thereby bears a heavy responsibility for the vitality of the free enterprise society. In the writings of classical economists his appearance was frequent, though he remained a shadowy entity without clearly defined form and function" (Baumol, 1968, p. 64).

One main feature of the debate on entrepreneurship¹³ is the unclear distinction between managerial and entrepreneurial functions. Indeed, among the various attempts to clarify this essential point, the view that entrepreneurs pursue *allocative* efficiency whereas managers, given resources and allocative targets, are responsible for *technical* efficiency seems the most appropriate, although it lacks a clear operative content: "Given an arrangement in which calculations, experience or judgment indicate to constitute a reasonable approximation to the current optimum, it is a manager's task to see that this arrangement is in fact instituted to a reasonable degree of approximation. The entrepreneur (whether or not he in fact doubles as a manager) has a different function. It is his job to locate new ideas and to put them into effect. He must lead, perhaps even inspire; he cannot allow things to get in a rut and for him today's practice is never good enough for tomorrow. In short, he is the *Schumpeterian* innovator and some more. He is the individual who exercises what in the business literature is called 'leadership'. And it is he who is virtually absent from the received theory of the firm" (Baumol,¹⁴ 1968, p. 65). Unfortunately, if one is interested in conducting empirical studies, these indications are not very helpful in that they do not provide ready-to-use methodological indications on how to measure and classify different behaviors as managerial or entrepreneurial.

Until the '60s, the abundance of ideas flowering out of the debate was contrasted with the substantial poverty of formal models on occupational choice and entrepreneurial behavior. In the '70s and '80s, the first attempts to close this analytical gap generated a few models providing a benchmark on the analysis of the supply of entrepreneurship. The main issues addressed by these contributions are: (a) factors affecting occupational choice, the supply and demand of entrepreneurship and the link between the distribution of entrepreneurial talent and the size distribution of

firms (Lucas, 1978; Kihlstrom and Laffont, 1978; Oi, 1983; Otani, 1996); (b) the occupational choice and the supply of entrepreneurship in the presence of liquidity constraints (Evans and Jovanovic, 1989). Following this, in the '90s advances in the analysis of the factors generating economic growth led to a stress on the link between occupational choice and economic growth and on the contribution of entrepreneurship to economic development (Murphy et al., 1991; Banerjee and Newman, 1993; Iyigun and Owen, 1999).

The models of Kihlstrom and Laffont (1979) and Lucas (1978) share, in Lucas' words, common features: "Richard Kihlstrom and Jean-Jacques Laffont developed an equilibrium theory in which agents differ in their attitude toward risk with the relatively least risk averse becoming entrepreneurs. I am here adopting exactly their formulation, with 'attitudes toward risk' replaced by 'talent for managing'" (Lucas, 1978, p. 510). This warrants a restriction of our discussion to the former model. Kihlstrom and Laffont assume that the distribution of labor force between self-employment and employment depends on the distribution of risk aversion within the population. Notably, given the production technology and the usual behavioral assumptions, all individuals with risk aversion below a certain threshold become entrepreneurs and hire the rest as employees. Under reasonable assumptions on the nature of uncertainty, the authors suggest that the size of firms decreases with the degree of risk aversion of the entrepreneur and that the distribution of risk aversion within the population also determines the size distribution of firms. The model can be interpreted in two ways: either by saying that individuals have different utility functions, hence preferences, or that individuals have the same preferences over risky prospects but different initial wealth. Indeed, in the latter case the implications of the model for development and growth can be very different (Banerjee and Newman,¹⁵ 1993).

Following Lucas (1978), Oi (1983) focuses on an individual's productivity in performing the entrepreneurial function as an explanatory variable in the choice between self-employment and wage work, in entrepreneurs' allocation of time between coordination and supervision, and in the size of

firms. In particular, Oi's model is based on the idea that individuals are endowed with different managerial abilities in coordinating workers and suggests that, given the amount of time required to monitor the work of others, abler individuals become entrepreneurs while those below a cut-off ability level become employees. More talented individuals, whose shadow price for managerial time is higher, are also able to supervise larger groups of workers and hence to coordinate larger firms. So, given the distribution of ability among individuals and the available technologies, the model determines both the supply of entrepreneurs and the size distribution of firms.

More recently, in line with Nelson and Phelps (1966), Otani (1996) has stressed the link between technical change and the supply of entrepreneurship and developed a model where entrepreneurial talent is partly endogenous and is treated as a specific form of human capital acquired through experience. The object of the learning process, which bears an apprenticeship cost, is assumed to be knowledge of the firm's constituent elements: "The cost of learning about the components of a firm explains why firms do not expand infinitely, while the scale economy in learning explains why firms exist, in other words, why firms do not break down into even smaller parts" (Otani, 1996, p. 274).

In contrast with the Schumpeterian view and in line with Knight's approach, Evans and Jovanovic (1989) developed a static model rooted in the literature on information failures, where, given innate talent and initial wealth, entrepreneurial choice is determined by the cogency of the liquidity constraint. Their estimated model provides evidence in favor of the thesis that liquidity constraints affect the choice to start a business, not only the amount of capital to invest. Moreover, a reasonable dynamic interpretation of the econometric results suggests that size of a firm is not a good proxy for entrepreneurial talent, since liquidity-constrained individuals must start their business venture with a sub-optimal level of capital and need more time to grow.¹⁶ Indeed, this may well imply that, in the survival race, unconstrained less-talented entrepreneurs may prevail over talented but liquidity-constrained ones.

On the whole, these contributions offer a rich interpretative tapestry that will be used, with

eclecticism, to develop a simple conceptual framework based on the idea that the allocation of entrepreneurial working time is a crucial theoretical and empirical issue.

3. The allocation of working time by small business owners as a proxy for entrepreneurial talent

Time is an essential input in economic activity and, as the day is 24 hours long, it is also the most evenly distributed resource. Its allocation among alternative uses determines the relative price of goods and services in the short term and the wealth of nations in the long term. Indeed, the productivity of working time is an essential indicator of economic development. Whereas a high level of economic development is associated with a high productivity of the time dedicated to learning and investment activities, underdevelopment can be depicted as a condition where, due to technological backwardness and institutional failures, the productivity of working time is so low that not enough time remains¹⁷ for learning and developing better technologies.

In the context of small business economics, the reason for relying on data on the allocation of working time to analyze entrepreneurs' behavior and to reveal their talent is twofold. First, following Lucas (1978) and Oi (1983), one should expect that individuals prefer to allocate more time to more rewarding managerial activities and that the reward is increasing in the productivity of the time spent in those activities. So, on the grounds that the firm is the organization where entrepreneurial talent is best rewarded, one should expect that more talented (productive) individuals will allocate relatively larger shares of their time to those managerial activities characterized by relatively higher entrepreneurial content. Second, following Kihlstrom and Laffont (1979), one should expect that less risk-averse individuals will allocate relatively larger shares of their time to activities characterized by relatively more uncertain returns, namely, those activities that have greater entrepreneurial content. Moreover, by adopting an equivalent perspective and substituting the expression 'risk aversion' with 'myopia', more talented individuals should be expected to allocate more of their working time

to activities characterized by deferred returns. Hence, talent would be measured by the time profiles of the returns associated with different allocations of working time.

In fact, these different interpretations lead to the same conclusion, namely that the allocation of working time among activities characterized by different entrepreneurial content should reveal the entrepreneurial talent (in terms of entrepreneurial productivity, risk aversion and myopia) of the agent who decided the allocation.

Whereas data on the allocation of non-working time are systematically collected and processed (Juster and Stafford, 1991), empirical evidence on the use of working time, in particular by the self-employed, is scanty at best. To my knowledge there are no empirical papers on the allocation of working time by entrepreneurs. The lack of models of entrepreneurial behavior based on time allocation presumably reflects the lack of reliable data and the absence of empirical research experience in this field. Indeed, in this respect, one should agree with the more general contention that "While the importance of time allocation as an analytic construct is close to being self-evident, the use of data on time allocation either to model economic behavior or to understand the dynamics of economic change over time has only recently began to attract the interest and attention of economics" (Juster and Stafford, 1991, p. 471).

Small firms appear to be natural candidates for an empirical analysis on the use of entrepreneurial time – which is deeply rooted in the *household production* approach: notably, in small firms, the usual problems stemming from the separation of ownership and control do not arise, and consumption and production activities are almost indistinguishable.¹⁸

In line with that approach, in the analysis that follows I make the substantially harmless assumptions that (a) the total amount of work is fixed exogenously and the decision concerns only its allocation and (b) the shadow price of diverting working time from direct production to entrepreneurial activities is well approximated by the cost of labor, i.e. the equilibrium wage or, equivalently, the marginal value produced by non-entrepreneurial labor. As a consequence, in equilibrium, the shadow value of working time would be the same across different applications. It is worth

TABLE I
The size distribution of firms in the sample

No. of employees	Share of firms (%)
0–9	37.5
10–19	30
20–49	30
50–99	2.5

remarking here that all firms in my sample were managed directly by their owners and that many of these entrepreneurs devoted a significant portion of their working time to direct production.

The data presented below refer to a sample of 40 Italian family-run subcontracting firms in the clothing and textile business, located in the province of Frosinone.¹⁹ The size distribution of the firms in the sample (Table I) reflects a typical feature of the Italian industrial structure, namely the large share of output and employment that is accounted for by small firms.²⁰

The advantage of studying subcontracting²¹ firms is they provide a continuum of self-employment organizational forms and behavioral patterns, ranging from Schumpeterian entrepreneurial firms pursuing highly autonomous competitive strategies²² to business units that are highly dependent on their main contractors and that therefore replicate the typical employment relationship. The main disadvantage of this sample choice is that the empirical findings cannot readily be extended to other sectors and firms.

In the survey, conducted through interviews – to avoid misinterpretation – owners were asked to assess the distribution of their working time among different activities. A distinction was drawn between two main groups of activities

according to their entrepreneurial content: (a) entrepreneurial and managerial activities *strictu sensu*, which are assumed to absorb entrepreneurial time and (b) direct participation in production (PT). PT can be considered the typical use of time with a known return. In a competitive equilibrium, the return is given by the marginal product of labor in value; indeed, this is the entrepreneurial activity characterized by the least entrepreneurial content. Conversely, entrepreneurial time has uncertain and deferred returns, which depend on the productivity of entrepreneurial and managerial time in those specific applications.

In our sample, on average 35% of working time was devoted to production and 63% to entrepreneurial and managerial activities. However, cross-firm differences in the allocation of working time were significant and need explanation. The distribution of firms with respect to the percentage shares of time allocated to entrepreneurial activities (ET) is shown in Figure 1.

One eighth of our entrepreneurs devoted no time at all to entrepreneurial activities, and two-fifths allocated less than 50%. As a result of the first step, building on the previous assumptions, I was able to distinguish firms on the basis of the entrepreneurial talent of their owners, measured by the share of working time devoted to truly entrepreneurial activities.

3.1. Small business owners' allocation of working time and firms' strategies and performance

The first empirical question here is whether firms' strategies and performance are related to the amount of time spent by their owners on entre-

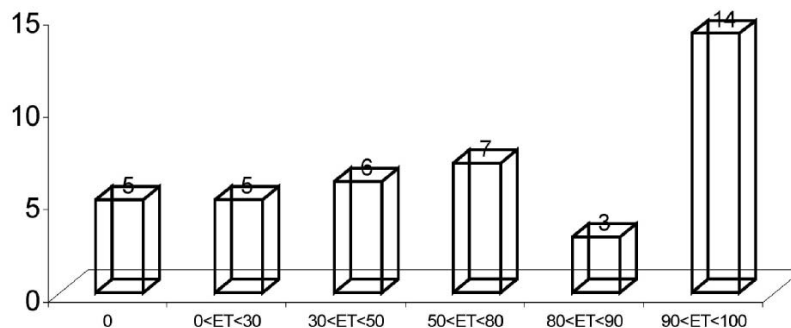


Figure 1. The distribution of firms with respect to time devoted to entrepreneurial activities.

preneurial activities proper. The expectation is that more talented entrepreneurs will devote more time to marketing, production investment and pricing strategies revealing low discount rates and autonomy from the main contractors, and that as a result of this, more talented entrepreneurs achieve better overall performance.

In order to assess the existence of systematic relationships, I run the mean-difference test between the average ET of groups of firms showing different strategies and performance measures (Table XXI). I considered the following qualitative measures of firms' strategies and performance: (i) whether the investments of the firm in the previous two years were innovative; (ii) the propensity to acquire information through systematic use of market analysis; (iii) the quality-segment of the market; (iv) the competitive advantages of the firm. Moreover, as all firms in the sample are subcontractors, the nature of bargaining with the main contractors and its outcome are important dimensions of entrepreneurial behavior. So I checked whether bargaining power and ability to obtain satisfactory *terms of trade* were related to talent as revealed by the allocation of working time. In order to test this conjecture, I considered, (v) the concentration of sales, which should provide a measure of *outside* options; (vi) the nature of the bargaining process, i.e. the greater or lesser passivity of the subcontractor;²³ (vii) the sign of the output price change experienced in the previous three years (considering the substantial homogeneity of the firms' technologies and output); and finally (viii) the number of days of delay in receiving the amounts due, on the assumption that *weaker firms* are obliged to accept late payments.

On the whole, although the *t-ratio* is not significant for all the tests, the data show that *owners allocating more time to ET have more entrepreneurial strategies and perform better in the market*; moreover, *when they bargain with their main contractor, they get better results* in that (i) they are likely to be more innovative (Table II), (ii) they are more active in acquiring information (Table III); (iii) they are more likely to be in the high-quality segments of the market (Table IV); (iv) they rely more on product quality or human capital than on low price as their competitive edge (Table V); (v) they have a more diversified port-

TABLE II
Type of investment and ET

Type of investment	Average ET
Non-innovative investment	27
Innovative investment	68

TABLE III
Analysis of the markets

Behavior	Average ET
Market analysis	94
No market analysis	51

TABLE IV
Quality segment of the market and ET

Quality segment of the market	Average ET
High	70
Medium	57

TABLE V
Competitive advantages and ET

Type of competitive advantage	Average ET
Product quality	58
Workers' human capital	70
Low price	49

folio; (Table VI); (vi) they are more active in the bargaining process (Table VII); (vii) they experienced a positive or zero output price change in the last three years (Table VIII); (viii) they experienced shorter delays in payments (Table IX).

As a further indicator of organizational strength, entrepreneurs were asked to say what kind of services they needed most. The answers indicate that less talented entrepreneurs are likely to have a weaker organization in that they most need services that businesses normally produce in-house (such as real and financial services) whereas talented entrepreneurs need only services that normally are provided externally (training and infrastructure) (Table X).

Finally, in order to verify business owners' expectations about future prospects, it was asked whether they intended to hire new workers in the near future. Their answers revealed that more

TABLE VI
Portfolio diversification

Share of revenues from largest customer	Average ET
R < 40	78
40 ≤ R < 60	61
60 ≤ R < 80	61
80 ≤ R ≤ 100	58

TABLE VII
Bargaining process and ET

Mechanisms of price determination	Average ET
Fixed by the subcontractors on the basis of the terms of payment	100
Bargained by the parties on the basis of the terms of payment	78
Fixed by the main contractor	47

TABLE VIII
Sign of output price changes in the last three years and ET

Sign of the price change	Average ET
=	62
+	80
–	53

TABLE IX
Average days of delay in receiving payments and ET

Days of delay	Average ET
≤ 30	59
≤ 60	52
Total	57

TABLE X
Type of services most needed and ET

Type of services most needed	Average ET
Real services	50
Financial services	64
Training	71
Infrastructure	85

talented entrepreneurs had better prospects, were relatively more willing to hire (Table XI).

All in all, this preliminary analysis constitutes fair *prima facie* evidence that the amount of time spent on entrepreneurial activities affects firms'

TABLE XI
Future prospects and ET

Hiring prospects	Average ET
Will not hire workers	53
Will hire workers	64

strategies and performance and that the latter should be considered a reliable proxy for entrepreneurial talent.

3.2. Entrepreneurial talent, human capital and the size of the firm

Entrepreneurial talent is based on innate and acquired abilities to deal with uncertainty and to benefit from disequilibria (Schultz, 1990). Innate abilities are such qualities as low risk aversion and self-confidence (absence of fatalism),²⁴ and a low rate of time preference. Given these innate abilities, individuals can improve their effectiveness in dealing with uncertainty by investing in human capital. In particular, the psychological literature provides evidence that the cognitive abilities acquired through education and these innate traits of personality interact in affecting people's aptitude to cope with disequilibria²⁵ in market activities (Bowles et al., 2001).

Hence, the second step aimed to check for the existence of a significant correlation between the allocation of working time, i.e. our measure of talent, and, respectively, firm size and the amount of entrepreneurial human capital. The theoretical expectation is that size should be correlated with talent and, since human capital affects entrepreneurial ability, with entrepreneurial human capital as well. As far as the link between entrepreneurial talent (as measured by the share of ET) and size is concerned, Table XII shows that, as expected, the ET share is lowest (28%) in the smallest firms (1 to 5 employees) and increases with firm size.

This evidence can be interpreted in two ways. The first interpretation is that more talented entrepreneurs are able to coordinate more workers and run larger firms. The alternative interpretation – which does not rely on the supervisory and monitoring functions – is that better entrepreneurs make more profits, reinvest and expand.²⁶

TABLE XII
The size distribution of firms according to ET

Size (employees)	Share of firms (%)	Average ET
1–5	17.5	28
6–9	20	50
10–19	30	68
20–50	32.5	71

A closer look at the data on the size distribution of firms whose owners allocate at least 75% of their working time to ET does not result in so neat a picture (Table XIII). Although micro firms (1–9 employees) are under-represented, 50% of the remaining larger firms are excluded from the sub-sample. Hence, I tested whether the difference in the average ET for firms with ET, respectively, lower and higher than 75%, was significantly different from zero, and the *t*-test led us accept this hypothesis at 95% (see Table XXI).

On the other hand, if one follows the interpretative route suggested by Evans and Jovanovic (1989), this result could be explained in terms of liquidity constraints that limit the initial size and the rate of growth of talented entrepreneurs. I tested the latter hypothesis but did not find evidence that, in this specific context, credit rationing had any explanatory power.

Alternatively, one may hypothesize that this result is due to the inability of ET to capture entrepreneurial functions *strictu sensu*. In fact, ET includes activities that at least in part can and

should be delegated to managers and should thus be considered as an *inferior* use of entrepreneurial time.

The link, albeit weak, between size and entrepreneurial talent is confirmed by the computation of the simple correlation coefficients between size and ET in that, the latter yielded a positive but not significant coefficient (Table XIV).

A reasonable explanation of these results rests on the presence of scale effects. Namely, as the size of the firm increases, the time devoted to coordinating and monitoring should not rise proportionally, because the entrepreneur can and must delegate part of these functions.

A second set of results that is neater and more interesting concerns the link between entrepreneurial talent and entrepreneurial human capital. In this context (Schultz, 1990), human capital is assumed to depend on the level of education (EHC) (Table XV) and experience (L), for which a good proxy is the number of years spent by the entrepreneur in running the same business or working in the same field (Table XVII). This preliminary evidence on the role of education confirms the intuitions of Schultz (1990) and Otani (1996) and the results in Evans and Leighton (1989), Bates (1993) and Schiller and Crewson (1993), Storey (1994), Berkham et al. (1996) on the role of human capital in entrepreneurship.

Simple correlation coefficients between the level of education, measured as the number of

TABLE XIII
The size distribution of firms with ET ≥ 75%

Size class	Number of firms with ET ≥ 75%	Share of firms with ET ≥ 75% over the total	Share of firms with ET ≥ 75% over the class total
1–9	4	23.5%	26.7% (15)
10–19	6	35.3%	50.0% (12)
20–50	7	41.2%	53.8% (13)
Total	17	100.0%	42.5% (40)

TABLE XIV
Simple correlation coefficient $r(ET, S)$ (S = number of employees)

	Mean	Std. dv.	$r(X, Y)$	R^2	t	p	n
ET	58.325	36.51722					
S	13.7	12.06648	<u>0.253184</u>	0.064102	1.613295	0.114956	40

TABLE XV
Education and ET

Education level	Average ET	Cases
B.A. (17–19 years)	90	3
High school (13 years)	73	6
Technical school diploma (10–12 years)	49	8
Lower secondary (8 years)	63	14
Elementary school (5 years)	35	8

years of school attendance necessary to attain a given degree, and our measure of entrepreneurial talent is positive and significant at 5% (Table XVI).

This outcome is consistent with human capital theory (Becker, 1965) and in particular with the thesis that education increases the productivity of entrepreneurial time by enhancing innate abilities. Indeed, this relationship may hide a more fundamental mechanism that deserves further investigation. Given the cost of education, and leaving aside the psychological cost of its acquisition,²⁷ one should expect that educational choice depends on (i) the degree of risk aversion²⁸ and (ii) the rate of time preference, i.e. the two main factors that should be correlated with entrepreneurial talent. The reason is that investment in education, like the entrepreneurial use of working time, is characterized by uncertain and deferred returns. Hence, if one consistently follows human capital theory, the *true* underlying correlation is between the “structural” factors – which, I suggest, should directly reveal entrepreneurial talent – and entrepreneurial time.²⁹

As we see in Table XVII, entrepreneurs with a technical school diploma (vocational training corresponding to 10–12 years of education) allocated, on average, less time to entrepreneurial activities than those with 8 years of schooling. A reasonable explanation of this somewhat surprising result is that technical education improves practical skills,

hence increases the productivity of time devoted to direct production.

As for experience (Table XVII) the results obtained show no positive and statistically significant correlation with ET.³⁰

The idea that work experience might not matter is consistent, for instance, with the empirical evidence provided by Evans and Leighton (1989) and Roper (1998), suggesting that *learning by doing* is more relevant to employees than the self-employed. According to this thesis, one should think that the central role that is commonly attributed to practical experience in business management is more a piece of conventional wisdom than a conclusion based on hard evidence. Of course, I would not suggest here that experience is not important but rather that its function may be less relevant than factors such as innate talent and education.³¹

The final step is to consider the joint impact of size and entrepreneurial human capital on ET. Assuming that education and entrepreneurial time are positively related and that in larger firms the entrepreneur allocates more time to entrepreneurial activities, I estimated a simple statistical model for ET, which includes education (HC), size (S) and size squared:

$$ET = \alpha + \beta HC + \gamma S + \delta S^2$$

Multiple regression produced the results shown in Table XVIII.

By excluding the intercept and then the squared terms the final results shown in Table XIX were obtained.

The data confirm that firm size and the level of education are correlated with entrepreneurial talent, as revealed by the allocation of working time. They suggest that at least as a first approximation education and size should be included in a micro-econometric model of entrepreneurial behavior and firm performance. However, whereas

TABLE XVI
The simple correlation coefficient $r(ET, EHC)$

	Mean	Std. Dv.	$r(ET, EHC)$	R^2	T	p	n
ET	58.325	36.51722					
EHC	9.55	3.456321	<u>0.344111</u>	0.118412	2.259216	0.029688	40

TABLE XVII
Experience and ET

	Years of activity of the firm	
	≤ 15	> 15
Average ET	62	46

TABLE XVIII
Estimates and tests for ET(HC, S)

	Estimate	<i>t</i> (33)	<i>p</i> -level
α	13.82061	0.829159	0.412971914
β	3.618924	2.396555	0.022373931
γ	1.852317	1.519737	0.138101384
δ	-0.03383	-1.23327	0.226188049

$R = 0.47746712$, $R^2 = 0.22797485$, Adjusted $R^2 = 0.15779074$, $F(3,33) = 3.2482$, $p < 0.03412$, Std. error of estimate: 30.961.

TABLE XIX
Estimates and tests for ET(HC, S, S²)

	Estimate	<i>t</i> (33)	<i>p</i> -level
β	4.311963	5.110547	0.00001
γ	1.48392	2.55631	0.015367

$F(2,33) = 57.077$, $p < 0.00000$, Std. error of estimate: 33.103.

the role of education appears to be clear-cut, size may not be such a good explanatory variable.

4. Entrepreneurial culture, education and training policy

This paper provides insights on three different issues. One is the likely impact of technical change and globalization on the nature of entrepreneurial talent in small firms and on the demand for entrepreneurial human capital. Second is the much-debated empirical question of how to measure *entrepreneurial culture* and the stock of entrepreneurship. In the light of the recent tendency to take the contribution of entrepreneurship to economic growth into account this is indeed a key issue (Audretsch and Thurik, 2001; Thurik, 1999). The third issue is methodological, being on the design of training policies for small firms.

What we call entrepreneurial talent, basically,

is the ability to discover, select, process, interpret and use the data necessary to take decisions in an uncertain world and, then, to exploit market opportunities. The main factors affecting this ability are certain innate traits (i.e. creativity, imagination, degree of risk aversion, myopia, alertness), and competence acquired through formal education (codified knowledge) and by means of on-the-job experience. A secondary but important element is tacit knowledge embedded in the environment and available to individuals, e.g. knowledge generated within an industrial district.³²

One should expect that, in large populations, the distribution of innate characteristics is the same, and that they depend on factors that are not in the domain of economic analysis and that change only over a very long time span. Hence, leaving aside the role of tacit knowledge embedded in the environment, geographical and temporal variations in the stock of entrepreneurial talent that might be relevant to economics are mostly due to abilities acquired through formal education, training and experience.

The importance of these sources of knowledge reflects the complexity of the data to be processed and of the technological and social environment in which firms are embedded. With economic globalization and the ICT revolution, in recent decades the technological and social environment has grown more complex and the amount of skill and knowledge required to take strategic decisions has increased both quantitatively and qualitatively.³³

On the other hand, it is evident that the faster technology and the competitive environment change, the faster the value of specific knowledge acquired through experience decays while that of codified knowledge, acquired through formal education and training,³⁴ increases: "The comparative advantage of schooling rises relative to that of learning from experience as technology becomes more complex and as a consequence of increases in specialization" (Schultz, 1990, p. 98). In short, the change in the demand for entrepreneurial human capital can be described as (a) an increase in the minimum amount of codified knowledge necessary to generate a unit of information and (b) a reduction in the degree of substitutability between codified and non-codified knowledge.

These conclusions shed light on how *entrepre-*

neurial culture may be improved to help create a more dynamic economy. There is now broad consensus that human capital, and specifically entrepreneurial human capital, is an important factor in economic growth (Lucas, 1988; Barro e Sala-i-Martin, 1995; Mankiw et al., 1992; Benhabib and Spiegel, 1994). Crucial questions in growth theory are whether market failures affect the accumulation of entrepreneurial human capital and the selection of entrepreneurs (Redding, 1996; Acemoglu, 1996). While it may not be possible to specify exactly how to increase the supply of *actual* entrepreneurs³⁵ and their average talent, there is every reason to suppose that appropriate education and training policies can increase the quality of *potential* entrepreneurs.

Let us now turn to the second question, namely how to measure the supply of entrepreneurship in the economy. For if entrepreneurial capital matters, quantitative measures such as the stock of self-employed persons do not provide an accurate picture. Any such gauge needs to be properly adjusted for the quality of this stock. Drawing on the results of this paper, one way to do so is to measure entrepreneurial human capital primarily in terms of educational attainment and then as the training and experience of the men and women in charge of entrepreneurial functions within the firms.

Finally, in addition to these general insights on education and training as sources of entrepreneurial human capital, the analysis developed here provides more specific methodological indications for the design of training policies for small business owners. First of all, inadequate levels of skill and training among employees could be just a sign of poor entrepreneurial culture among the owners. That is to say, entrepreneurs' and workers' human capital appear to be complementary inputs.³⁶

This conclusion implies that, more than in the past, training programs for small businesses should be addressed to both workers and employers. Secondly, the postulate that the allocation of working time reveals the owner's cost of diverting time from non-entrepreneurial activities carries important implications for managerial training to *less talented* business owners. Given the high revealed opportunity cost of taking time away from production and related managerial

activities, training should consist of on-the-job tutorships rather than through outside activities such as seminars, conferences and other traditional teaching tools.

5. Conclusions

Building on Lucas (1978) and Kihlstrom and Laffont (1979), this papers provide empirical evidence that the allocation of working time by self-employed persons between activities characterized by differing returns may reveal their entrepreneurial talent. Just as actual consumption choices should reveal people's preferences, I suggest that the self-employed use of working time in activities characterized by a different entrepreneurial content should signal individual ability as entrepreneur.

The results are provocative. They suggest that (a) it is possible to discern different behavioral patterns from data on the allocation of working time by small business owners; (b) the allocation bears some relationship to the owner's complement of human capital and to the size of the business (number of employees); and (c) the allocation of entrepreneur's working time has a significant impact on the performance of a business (or perhaps, the other way round). Of course, this study is intended as an example in the use of data on the allocation of working time to reveal behavioral patterns. I hope that more will come in the future.

The most robust empirical finding of this paper is the positive link between entrepreneurial ability and the level of formal education, whereas experience, in contrast with the conventional wisdom, does not seem to play any role. The fact is that entrepreneurial ability is only partly innate and also depends on education, which gives people the tools to take informed decisions and to face an uncertain future with greater confidence: in a word, to perform the allocative function conventionally assigned to entrepreneurs. It is legitimate to conclude that, taking the amount of innate entrepreneurial talent as given, investment in education should be used to increase the supply of entrepreneurship in the economy and to improve entrepreneurial culture.

Appendix

TABLE XX
Descriptive statistics

	Valid N	Mean	−95%	95%	Sum	Min	Max	Range	Variance	Std.Dev.	Error
HC	40	9.550	8.445	10.655	382	5	17	12	11.946	3.456	0.546
S	40	13.700	9.841	17.559	548	0	48	48	145.600	12.066	1.908
ET	40	58.325	46.646	70.004	2333	0	100	100	1333.507	36.517	5.774
WT	40	41.675	29.996	53.354	1667	0	100	100	1333.507	36.517	5.774

TABLE XXI
Results of the test of the difference between the means

Test	<i>p</i> -level 5% sign., <i>p</i> < 0.05
<i>Average ET and market analysis</i>	0.002
<i>Average ET and price bargaining</i>	0.002
<i>Average ET and innovative investments</i>	0.014
<i>Average ET and size</i>	0.022
<i>Average ET and education</i>	0.038
Average ET and number of buyers	0.10
Average ET and the price change in the last three years	0.14
Average ET and the decision to hire new workers	0.18
Average ET and product quality	0.20
Average ET and price vs. quality competition	0.22
Average ET and age	0.24
Average ET and the type of most needed services	0.27
Average ET and investments in the last three years	0.29

Notes

* I would like to acknowledge valuable comments from T. Cameron, G. Gagliani and two anonymous referees. The usual disclaimer applies.

¹ Contributions include Cantillon (1979), Say (1971), Marshall (1930). For a historical perspective, see Herbert and Link (1988).

² See Baumol (1968, 1990) and Schultz (1990).

³ Of course, there is non-coincidence between the two, entrepreneurs being a subset of the self-employed.

⁴ On the other hand, in order to test the predictions of their model, Evans and Jovanovic (1989) looked at the effects of liquidity constraint on the choice of becoming self-employed.

⁵ The number of explanatory variables that are included in the statistical models is, in general, very large. As a result, most of the available empirical studies fail to provide clear insights or reveal the fundamental forces. Indeed, overview of these contributions suggests that the level of education is a fundamental factor explaining the performance of individuals as entrepreneurs and an element deserving further investigation.

⁶ Even though, in addition to Lucas (1978) and Laffont and Kihlstrom (1979), I draw on a large body of theoretical literature on human capital.

⁷ A related empirical issue is how to distinguish entrepre-

neurs from non-entrepreneurs within the group of small businesses owners.

⁸ The main drawback of the empirical studies in this field is that, as a rule, they are not based on consistent behavioral models that can distinguish between endogenous and exogenous variables. From a statistical point of view, this generally leads to lengthening the list of exogenous variables, thus increasing the risk of multicollinearity.

⁹ For example, a quantitative measure of entrepreneurship often used is the share of self-employed as a percentage of labor force.

¹⁰ The main features of this change are related to the increase in the degree of uncertainty and the growth in market fragmentation (Acs and Audretsch, 1993; Wennekers and Thurik, 1999).

¹¹ These indicators are computed for a sample of small sub-contracting firms that are representative of a large number of Italian and European firms facing the challenges of globalization. The original motivation of this research was to evaluate the ability of entrepreneurs to deal with this new competitive pressure. I do not present all the results of the research here. On the whole, they suggest that a large share of firms do not have adequate entrepreneurial resources to compete, through technical change and product quality, on a global scale. On the other hand, in contrast with conventional wisdom, within this group of small firms, size did not appear

to be the most significant discriminating factor between entrepreneurial (competitive) and non-entrepreneurial (non-competitive) firms.

¹² About two-thirds of final business sales in Europe consists of the value of purchased intermediate inputs (materials, components, machinery etc.) that involve inter-firm exchanges requiring transaction-specific investments. These exchanges are effected under a variety of contractual agreements known generally as "outsourcing" or "subcontracting".

¹³ Schumpeter (1936) was the first to envisage the central role of the entrepreneur as an engine of economic change. According to him, the process of creative destruction induced by new innovative ventures is the main factor in the expansion of consumption opportunities, and ultimately, the increase in the economy's wealth depends on how fast entrepreneurs are in introducing innovations. By generating disequilibria, entrepreneurs create the opportunities for arbitration that induce further entrepreneurial activities. For Schumpeter, the financing of innovation is not a typically entrepreneurial function and the entrepreneur is not necessarily the director or the owner of the firm. Moreover, profits are not the only motivation for becoming an entrepreneur and there are other psychological reasons behind the choice of acting as an innovator in a society. Building on these ideas, entrepreneurial talent is then viewed as something related on the one hand to individual characteristics, notably to creativity and imagination in discovering new ways of doing things, and to the willingness and ability to carry out innovative projects, on the other. Knight (1965) focuses on the uncertain nature of entrepreneurial activity and innovation and stresses the role of the entrepreneur as a risk-bearer. In this context, basically, entrepreneurial talent is related to the ability to process information necessary to deal with uncertainty. The neo-Austrian approach is close to Schumpeter in that it underlines that economic disequilibrium is a natural condition of the system and that the role of entrepreneurs as *arbitrators* can be conceived only within a disequilibrium framework and a world of uncertainty (Kirzner, 1997), where the concept of allocative efficiency is deprived of any normative value. Entrepreneurial talent is viewed as the ability to create and discover business opportunities, and alertness is the main personal attitude required of entrepreneurs.

¹⁴ On this view, see also Schultz, 1990, p. 94.

¹⁵ They show that, with liquidity constraint, the initial distribution of wealth affects the evolution of the economy, finally suggesting that *history matters*.

¹⁶ This also implies that liquidity-constrained entrepreneurs will show a greater tendency to reinvest earnings (Evans and Jovanovic, 1989, p. 821).

¹⁷ Given the amount of time required to produce the subsistence level of output.

¹⁸ Of course, the same analysis can be carried out in larger organizations by considering and *averaging* the allocation of time of the individuals in charge of the managerial functions.

¹⁹ The total number of textile and clothing firm in the province was 483 (1998).

²⁰ In particular, in 1996 about 66% of total textile and clothing employment in Italy was in firms with fewer than 50 employees; 25% in firms with fewer than 10.

²¹ Subcontracting can be defined as an arrangement whereby

one business (subcontractor) manufactures all or part of a product of another business (main contractor) in accordance with plans and technical specifications supplied by the main contractor.

²² Production, organizational, investment, marketing and pricing strategies.

²³ In informal talks with some entrepreneurs we learned that some firms used to let the buyer set the price after delivery of the product!

²⁴ Absence of fatalism corresponds to self-confidence in the ability to achieve one's goals. A way of measuring is the Rotter's scale, assessing the extent to which one perceives success or failure as being dependent on one's actions or on external factors. On the importance of self-confidence as a trait affecting labour market success and the returns to education, see Bowles et al. (2001).

²⁵ Strong empirical evidence is available on the joint role played by education and these personal traits in determining the success of immigrants (Bowles et al., 2001).

²⁶ Going a step further, one should expect that given talent, size and ET are jointly determined by efficiency conditions in the allocation of entrepreneurial time.

²⁷ Which depends mainly on innate learning abilities and socio-economic background.

²⁸ Shaw (1996) provides empirical support for this conclusion.

²⁹ Indeed, such an interpretation is appropriate as long as the decision to invest in education is taken by the individuals concerned, or at least in agreement with them, not by their parents who may bear the financial burden

³⁰ One may question whether this result depends on the measure of experience used and whether it might not be useful to collect other data that allow accounting for the actual amount of time spent by the entrepreneur running any business.

³¹ On the other hand, the empirical evidence provided by Roper (1998) supports the opposite view that experience may generate behavioral inertia and barriers to organizational and technical change.

³² This type of knowledge is considered an important factor explaining the international success of small Italian businesses in low and medium-tech sectors.

³³ The new competition due to globalization requires new entrepreneurial strategies based on internationalization and continuous product and process innovation. One can no longer survive by just replicating established behavioral routines.

³⁴ The difference between experience and formal education is the fact that the former generates specific, non-transferable individual knowledge, the latter codified knowledge generated through a long-term process of systematic observation and elaboration of transferable information collected by many individuals.

³⁵ According to Baumol (1965, p. 64) "theory can say a great deal that is highly relevant to the subject of entrepreneurship even if it fails to provide a rigorous analysis of the behavior of the entrepreneur or of the supply of entrepreneurship".

³⁶ Inadequate levels of entrepreneurial human capital can lead to two observationally equivalent outcomes: (a) inefficient selection of personnel and (b) insufficient on-the-job training.

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