Entry and Post-entry Performance of Newborn Firms

Marco Vivarelli

Routledge Studies in Global Competition
Entry and Post-entry Performance of Newborn Firms

Entry and Post-entry Performance of Newborn Firms focuses on newborn firms, analysing determinants of entry, survival and post-entry performance.

This volume also examines the policy implications of the differing and sometimes opposite motivations underlying the decision to start a new firm. This is particularly important in the Eurozone, where public subsidies in support of the formation of new firms are among the most frequently used instruments of industrial policy.

This ground-breaking book will be of use to economists with an interest in Europe as well as students and researchers across industrial economics, management and entrepreneurial studies.

Marco Vivarelli has a PhD in Economics and PhD in Science and Technology Policy and is full professor of Economic Policy at the Catholic University (Milano) and Research Fellow at IZA (Bonn), the Max Planck Institute of Economics (Jena) and CSGR (Warwick University).
<table>
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<th>Volume 12</th>
<th>MIT and the Rise of Entrepreneurial Science</th>
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<td><em>Henry Etzkowitz</em></td>
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<th>Volume 13</th>
<th>Technological Resources and the Logic of Corporate Diversification</th>
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<td><em>Brian Silverman</em></td>
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<th>Volume 14</th>
<th>The Economics of Innovation, New Technologies and Structural Change</th>
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<td><em>Cristiano Antonelli</em></td>
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<th>Volume 15</th>
<th>European Union Direct Investment in China</th>
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<tr>
<td></td>
<td>Characteristics, challenges and perspectives</td>
</tr>
<tr>
<td></td>
<td><em>Daniel Van Den Bulcke, Haiyan Zhang and Maria do Céu Esteves</em></td>
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<tr>
<th>Volume 16</th>
<th>Biotechnology in Comparative Perspective</th>
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<td><em>Edited by Gerhard Fuchs</em></td>
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<th>Volume 17</th>
<th>Technological Change and Economic Performance</th>
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<td><em>Albert L. Link and Donald S. Siegel</em></td>
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<th>Volume 18</th>
<th>Multinational Corporations and European Regional Systems of Innovation</th>
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<td><em>John Cantwell and Simona Iammarino</em></td>
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<th>Volume 19</th>
<th>Knowledge and Innovation in Regional Industry</th>
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<td></td>
<td>An entrepreneurial coalition</td>
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<td><em>Roel Rutten</em></td>
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<th>Volume 20</th>
<th>Local Industrial Clusters</th>
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<td>Existence, emergence and evolution</td>
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<td><em>Thomas Brenner</em></td>
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<th>The Emerging Industrial Structure of the Wider Europe</th>
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<td><em>Edited by Francis McGowen, Slavo Radosevic and Nick Von Tunzelmann</em></td>
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<th>Volume 22</th>
<th>Entrepreneurship</th>
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<td>A new perspective</td>
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<td></td>
<td><em>Thomas Grebel</em></td>
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<tr>
<th>Volume 23</th>
<th>Evaluating Public Research Institutions</th>
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<td>The U.S. advanced technology program’s intramural research initiative</td>
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<td><em>Albert N. Link and John T. Scott</em></td>
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<th>Volume 24</th>
<th>Location and Competition</th>
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<th>Entrepreneurship and Dynamics in the Knowledge Economy</th>
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<td><em>Edited by Charlie Karlsson, Börje Johansson and Roger R. Stough</em></td>
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<th>Volume 26</th>
<th>Evolution and Design of Institutions</th>
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Edited by Cornelia Storz and Andreas Moerke

Volume 32
Entry and Post-entry Performance of Newborn Firms
Marco Vivarelli
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Marco Vivarelli
## Contents

*List of tables*  
xix

*Preface*  
xi

1 **Introduction: the entrepreneurial foundations of firms’ entry, survival and growth**  
1

2 **The birth of new enterprises**  
17

3 **Determinants of new-firm startups in Italy**  
30  
WITH DAVID B. AUDRETSCH

4 **Start-up size and industrial dynamics: some evidence from Italian manufacturing**  
44  
WITH DAVID B. AUDRETSCH AND ENRICO SANTARELLI

5 **The relationship between size and growth: the case of Italian newborn firms**  
62  
WITH FRANCESCA LOTTI AND ENRICO SANTARELLI

6 **Does Gibrat’s Law hold among young, small firms?**  
68  
WITH FRANCESCA LOTTI AND ENRICO SANTARELLI

7 **Is subsidizing entry an optimal policy?**  
89  
WITH ENRICO SANTARELLI
8 The link between the entry decision and post-entry performance: evidence from Italy 102
WITH DAVID B. AUDRETSCH

9 The role of innovation in the postentry performance of new small firms: evidence from Italy 116
WITH ALESSANDRO ARRIGHETTI

10 Are all the potential entrepreneurs so good? 131

Index 144
Tables

2.1 Economic determinants 23
2.2 Main barriers to entry 24
2.3 Qualifications in the previous dependent job 25
2.4 Dimension of the firm of origin 25
2.5 Personal motivations 26
3.1 Firm formation in Italy: descriptive statistics 34
3.2 Regressors, related theories and expected signs 35
3.3 Covariance tests for regression – coefficient homogeneity over time 36
3.4 Econometric results (LSDV) 38
3.5 Econometric results with regional dummies (LSDV) 39
4.1 Survival and hazard rates of new firms in Italian manufacturing: 1987–1993 48
4.2 New firm entry (absolute value), average start-up size (employment), and survival rates compared across manufacturing industries: 1987–1993 50
4.3 Tobit model estimates: duration (in months) on start-up size for new firms in selected manufacturing industries: 1987–1993 52
4.4 The relationship between final and initial firm size in selected manufacturing industries: 1987–1993 55
4.5 The relationship between final and initial firm size in selected manufacturing industries: 1987–1993 56
5.1 OLS and sample selection model (SSM) estimates of Gibrat’s Law: instruments industry (Italy) 65
6.1 Selected empirical studies on Gibrat’s Law 70
6.2 Average size, growth rate and corresponding standard deviations (SD): firms still alive at the end of each period 78
6.3 Quantile regression (θ[0.50]) estimates: all industries with industry dummies, electrical and electronic engineering, instruments, food 81
6A.1 Quantile regression estimates (θ[0.10], θ[0.25], θ[0.50], θ[0.75], θ[0.90]): β₁ values 84
x Tables

6A.2 Persistence in firms’ patterns of growth 85
7.1 Survival and hazard rates 93
7.2 The relationship between start-up size and survival 94
7.3 Average employment size, growth rates and their standard deviations: firms still alive at the end of each period 96
7.4 OLS and sample selection model (SSM) estimates of Gibrat’s Law 96
7A.1 Persistence in firms’ patterns of growth 99
8.1 Mean importance in start-up decision 107
8.2 Linear correlation coefficients 109
8.3 Regression results 110
8A.1 Linear correlation coefficients among independent variables 112
9.1 Ranking of factors influencing new firm formation 122
9.2 Factor analysis of motives for founding the new firm 124
9.3 Ranking of level of competence accrued within the mother firm 125
9.4 Factor analysis of competence accrued in the mother firm 126
9.5 Dependent variable: postentry performance 127
10.1 Variables and descriptive statistics 135
10.2 Determinants of post-entry performance 139
This book is a collection of nine previously published articles of mine (from 1991 to 2004) preceded by an introduction, the purpose of which is to position the book in the context of contemporary debate about new firm formation and entrepreneurship.

My first acknowledgements go to my friends and co-authors who have made these 15 years of research particularly challenging and stimulating: David Audretsch, Enrico Santarelli, Francesca Lotti and Alessandro Arrighetti.

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1 Introduction

The entrepreneurial foundations of firms’ entry, survival and growth

1.1 Aggregate outcomes of industrial dynamics

Entrepreneurship has recently been proposed as an additional factor in explaining economic growth within developed countries. While endogenous growth theories (see Romer, 1986, 1990; Lucas, 1988; Grossman and Helpman, 1991) highlighted the important role of human capital and R&D as additional explanations of increasing returns in the aggregate production function, more recently different scholars have put forward entrepreneurship as a third component of a new ‘new-growth theory’ (see Acs et al., 2005; Audretsch, Keilbach and Lehmann, 2006).

But what is entrepreneurship? A common way of measuring entrepreneurship is to look at new firm formation, that is, at entry rates. The idea is that new entrants can displace obsolescent firms in a process of ‘creative destruction’ (Schumpeter, 1934, 1943; for an account in an endogenous growth framework, see Aghion and Howitt, 1992) which can eventually be considered an important microdeterminant of economic growth. For instance, according to OECD (2003), industrial dynamics, that is, the entry and exit of firms, would account for between 20% and 40% of total productivity growth in eight selected OECD countries (see also Audretsch and Keilbach, 2004a).

In more general terms, different studies argue that new firm formation can be beneficial for economic growth (at least in developed countries, see Van Stel, Carree and Thurik, 2005), employment generation and unemployment reduction (see Hart and Oulton, 2001; Thurik, 2003). All these beneficial effects of entrepreneurship and new firm start-ups would be particularly obvious at the regional level (see Lee, Florida and Acs, 2004) where it has been found that ‘entrepreneurship capital’ may be an important determinant of differences in regional output, knowledge spillovers and productivity (Audretsch and Keilbach, 2004b; Varga and Schalk, 2004).

However, macroeconomic empirical evidence also casts great doubt on the progressive potentialities of new firm formation and business start-ups.

First, survival rates of new firms are strikingly low: according to Bartelsman, Scarpetta and Schivardi (2005), who worked on data for ten OECD countries, about 20–40% of entering firms fail within the first two years of life, while only 40–50% survive beyond the seventh year (OECD, 2003, p. 145).
Second, entry and exit rates are significantly correlated and this is one uncontroversial ‘stylized fact’ of the entry process according to Geroski (1995) (see also Baldwin and Gorecki, 1987, 1991). Recent evidence has confirmed that entry and exit rates are positively correlated across industries in different OECD countries (Bartelsman, Scarpetta and Schivardi, 2005). This macroeconomic evidence opens the way to important considerations about the alleged role of entry as a vehicle for technological upgrading, productivity growth and employment generation. In fact, if entry were driven mainly by technological opportunities, growing sales and profit expectations, one should observe a negative cross-sectional correlation between entry and exit rates. On the contrary, entry and exit rates are positively and significantly correlated and market ‘churning’ emerges as a common feature of industrial dynamics across different sectors and different countries. In other words, many sectors are characterized by a fringe of firms operating at a suboptimal scale where the likelihood of survival is particularly low and where ‘revolving door’ firms are continuously entering and exiting the market. Therefore, in many sectors new firm start-ups may simply originate what has been correctly called ‘turbulence’ (a term first introduced by Beesley and Hamilton, 1984; see also Caves, 1998).

Obviously, new firm formation may be more or less conducive to technological change and economic growth according to the different sectors in which it occurs. For instance, ‘new technology-based firms’ (NTBFs; see Acs and Audtresh, 1990; Colombo, Delmastro and Grilli, 2004) in advanced manufacturing and ICT services surely play a different role compared with small-sized start-ups in traditional sectors. Therefore, in some sectors the ‘creative destruction’ role of new firm formation may be dominant compared with simple ‘turbulence’, while the opposite may be true in other sectors.

However, Schumpeter (1934) informs us that the entry of new firms is due to a large majority of ‘imitators’ and by a tiny minority of leaders (innovators). According to Baumol (2005), ‘replicative’ entrepreneurs are those who start a firm similar to previously started businesses. Accordingly, one has to recognize that when dealing with gross entry across all economic sectors, we face a huge multitude of ‘followers’ and very few real entrepreneurs (innovators).

These considerations make it extremely interesting to look at the microeconomic variety which characterizes new entrants. As in many other fields of industrial organization literature, ‘heterogeneity’ (see Dosi, 1988; Dosi et al., 1995) is a crucial feature in explaining the start-up of new firms, their extremely diverse chances of survival and their very different post-entry performances.

The purpose of this book is to provide a contribution by mapping out the different determinants of new firm formation, the relationship between ex ante characteristics and post-entry performance and possible scope for economic policy addressed to singling out entrepreneurship from market ‘churning’ and ‘turbulence’.

As a first step, in the remaining three sections of this Introduction, I will discuss: (1) the determinants of the foundation of a new firm; (2) the patterns of learning, survival and growth of newborn firms and the possible links between ex ante entrepreneurial features and post-entry performance; (3) possible policy implications.
1.2 From macroeconomic outcomes to microfoundations of new firm formation

The literature in industrial organization has devoted much attention to the study of the entry process and its determinants. In the textbook view, a queue of well-informed potential entrepreneurs is supposed to be waiting outside the market, and the expected level of profit is considered the ‘trigger’ factor determining entry, once discounted by taking barriers to entry into account (see Mansfield, 1962; Orr, 1974; Khemani and Shapiro, 1986).

According to more recent studies in this stream of literature, new firm formation may be triggered by favourable economic conditions such as economic growth, innovative potentialities and profit expectations, and hindered by both exogenous and ‘endogenous barriers to entry’ such as innovation and advertising expenditures (see Acs and Audretsch, 1989a,b; Geroski and Schwalbach, 1991; Arauzo-Carod and Segarra-Blasco, 2005).

However, the IO approach focuses on the market and may obscure the decision-making process at the level of the individual (see Winter, 1991), thus underestimating the factors behind the entrepreneur’s motivation in starting a new business. Indeed, in the past Schumpeter (1934), Knight (1921) and Oxenfeldt (1943) drew attention to the subjective features of the actual founder of a new firm. Important individual determinants may act as ‘push factors’ and are related both to the environmental characteristics of the potential founder and to his/her personal characteristics.

For instance, the specific local/sectoral labour market plays an important role because the vast majority of new founders – about two/thirds – come from the same sector and the same geographical area, the rest being young people at their first job experience, previously ceased entrepreneurs and founders coming from an outside region (see Cooper, Woo and Dunkelberg, 1989; Vivarelli, 1991; Garofoli, 1994; Storey, 1994; Arrighetti and Vivarelli, 1999; Shane, 2000; Klepper, 2001; Helfat and Lieberman, 2002).

In this framework, new firm formation can be modelled as a ‘self-employment’ choice based on the comparison between wage in previous jobs and expected profit as an entrepreneur (see Creedy and Johnson, 1983; Vivarelli, 1991; Foti and Vivarelli, 1994; Audretsch, 1995; Geroski, 1995; Reynolds, 1997; Vivarelli, 2004). Contrary to the textbook approach, in the self-employment theory the foundation of a new firm is not fostered by absolute profitability, but by the difference between expected profits and current local wages in the same sector. This means that entry may have a counter-cyclical component and may well be induced by industrial restructuring and decreasing real wages rather than by buoyant demand expectations (see Highfield and Smiley, 1987; Hamilton, 1989; Foti and Vivarelli, 1994).

Similarly, founding a new firm may be an alternative to uncertain future career perspectives or even an ‘escape from unemployment’ (see Oxenfeldt, 1943; Evans and Leighton, 1990; Storey, 1991, 1994). The empirical evidence suggesting the important role of job losses in fostering entry is indeed quite robust (see Storey and Jones, 1987; Audretsch and Vivarelli, 1995, 1996a). While unemployment is
never the main driver of new firm formation, it often plays a role, particularly significant during economic downturns (for instance, a recent study reveals that in the UK the incidence of people starting a firm not because of a market opportunity but just because they have no better choice is about 22%; see Small Business Service, 2001, p. 6).

Thus, entry may be determined by a set of different factors among which one can find some ‘progressive’ determinants such as good economic perspectives and technological opportunities, and also ‘regressive’ determinants such as low wages and the actual condition of being (or the fear of becoming) unemployed.

In addition, founders differ with regard to personal characteristics such as previous work experience, family tradition, financial situation, age, gender, education, motivations. For example, the founder of a new firm is heavily influenced by his/her own background, with particular reference to his/her previous job experience (see Storey, 1982; Johnson, 1986; Bates, 1990; Reynolds et al., 2001). Among personal characteristics of the founder, family backgrounds are also singled out as key factors by econometric estimates which explain new firm formation as an act of self-employment (see De Wit and Van Winden, 1989; Evans and Leighton, 1989; Blanchflower and Oswald, 1998; Reynolds et al., 2001).

An important stream of literature has investigated the impact of financial constraints on business start-ups. For instance, Evans and Jovanovic (1989) find that the initial level of assets of individuals influences the probability of self-employment (see also Blanchflower and Oswald, 1998; Cabral and Mata, 2003). Other studies have examined the probability of transition to self-employment after an unexpected financial gain, such as a lottery winning, a windfall gain or a job bonus. Interestingly, these studies almost invariably found that the exogenous arrival of new financial resources increased the probability of starting up a company (see Holtz-Eakin, Joulfaian and Rosen, 1994; Lindh and Ohlsson, 1996; Taylor, 1999).

Other studies show that non-economic factors may turn out to be even more important than variables such as profit expectations, entry barriers, local labour and capital markets. For instance, the potential entrepreneur seems to be strongly influenced by particular psychological attitudes such as a strong desire to be independent, the search for autonomy in the workplace, aspiration to full exploitation of previous job experience and acquired ability, the desire to be socially useful and to acquire a better social status (see Creedy and Johnson, 1983; Evans and Leighton, 1990; Vivarelli, 1991, 2004; Blanchflower and Meyer, 1994; Blanchflower and Oswald, 1998). With regard to social status, entrepreneurship as a signal of self-sufficiency and individualism has been traditionally highly valued in the US (see Zacharakis, Bygrave and Shepherd, 2000, p. 14), but it is increasingly appreciated in European countries as well (see Minniti and Venturelli, 2000).

Hence, the overall rate of new firm formation is actually an aggregate indicator which puts together very heterogeneous initiatives characterized by different motivations and chances of survival. In this context, it is not surprising that new firms exhibit a very high rate of early failure at the aggregate level (see previous section). The econometric evidence at the sectoral and microeconomic levels is
largely consistent with this outcome: studies on different countries and different sectors reveal that more than 50% of new firms exit the market within the first five years of activity (see Dunne, Roberts and Samuelson, 1988, 1989; Reid, 1991; Audretsch and Mahmood, 1995; Geroski, 1995; Mata, Portugal and Guimaraes, 1995; Audretsch, Santarelli and Vivarelli, 1999; Johnson, 2005).

Since new firms are based both on progressive and regressive push factors and entrepreneurs are very heterogeneous as far as their motivations, capabilities and innovativeness are concerned, some new initiatives survive and grow, while others are comparable to ‘revolving doors’.

Consistently with this evidence, one can suggest that much of the observed entry process may simply be due to ‘entry mistakes’ (see Cabral, 1997; Geroski and Mazzuccato, 2001), thus causing turbulence, whereas a true Schumpeterian displacement–replacement effect (‘creative destruction’) can be detected only in a minority of cases. While entry mistakes conflict with a textbook approach where potential entrants are driven by rational expectations based on expected profits, they can easily be understood when bounded and procedural rationality is assumed (see Simon, 1982; Heiner, 1983; Dosi and Egidi, 1991). Accordingly, potential entrepreneurs may well be affected by ‘overconfidence’, generating excess of entry, which in turn leads to infant mortality and entrepreneurial disillusion (see Dosi and Lovallo, 1998; for an experimental economics exercise see Camerer and Lovallo, 1999).

If one takes into account the (sometimes dominant) psychological attitudes mentioned earlier (desire to be independent, fear of becoming unemployed, frustration in previous job), entry mistakes and excess entry can be further justified. In fact, the observed occurrence of these entry mistakes suggests a kind of attitude which can be defined as a ‘try and see’ bet. In this view, new founders ‘visit’ a sectoral niche searching for business chances; later, they discover whether their entry decision has been right or wrong and may decide to exit. Accordingly, market churning, turbulence and early failure should be considered as normal features of industrial dynamics or even a necessary price to pay in order to allow ‘exploration’ of new technological and entrepreneurial possibilities (according to Dosi and Lovallo, 1998, pp. 57 and ff., entry mistakes and early failures at the microeconomic level may be consistent with an increasing social benefit at the aggregate level).

On the whole, the Schumpeterian hypothesis of creative destruction and replacement of old, unproductive firms by new and innovative ones has been challenged by the theory and the evidence in favour of the ‘churning’ hypothesis of entry mistakes and turbulence (for an interesting discussion on the alternative implications of the two models, see Manjón-Antolín, 2004).

These findings lead to the conclusion that several heterogeneous entry processes are simultaneously at play in the economy and that real entrepreneurs bringing about innovation and economic growth should be distinguished from ‘revolving door’ firms causing sub-optimality, early failures, and precarious and temporary job creation.
Together with great heterogeneity at the level of individual founders, sectoral variety should also be taken into account. Indeed, patterns of entry may differ in different industrial sectors both with regard to the weight of ‘revolving door’ firms (entry mistakes are obviously less frequent in sectors with high sunk costs; see Sutton, 1991, 1997; Cabral, 1995, 1997; Audretsch, Santarelli and Vivarelli, 1999) and with regard to the relative importance of the different determinants of a firm’s foundation (for instance, a progressive innovative attitude may be dominant in fostering entry in the ‘science-based sectors’, but not so crucial in the traditional sectors; see Pavitt, 1984; Audretsch, 1991; Breschi, Malerba and Orsenigo, 2000; Marsili, 2002).

Finally, the presence of substantially different geographical environments further increases the variability in the determinants and post-entry impact of new firm formation. In fact, the theoretical and empirical literature in regional economics points to the relative importance of progressive and regressive factors such as local industrial restructuring, unemployment, demand growth, agglomeration, availability of financial resources in fostering new firm formation at the local level (see Armington and Acs, 2002; Shane, 2003). On the same ground, a local economy composed mainly of small-sized firms may be seen as an incubator of new entrepreneurs (see Cathcart and Johnson, 1979; Storey, 1982; Johnson, 1983; Storey and Johnson, 1987; Storey, 1994), but may well also cause excess of entry, early failures and turbulence.

As far as the progressive and locally bounded determinants of new firm formation are concerned, interesting developments in this stream of literature point to the existence of local spillovers of non-tradable knowledge (see Audretsch and Feldman, 1996, 2004; Audretsch and Vivarelli, 1996b) as a fostering mechanism for firm start-ups in new and growing sectors. In this view, the availability of a pool of workers with industry-specific skills that embody high-level human capital and informational spillovers is a valuable support for clustered start-ups, as opposed to isolated producers. Firm formation – especially in high-tech sectors – is therefore hypothesized as being spurred by industry density and industrial specialization (see Krugman, 1991; Audretsch and Vivarelli, 1995, 1996a; Armington and Acs, 2002).

Obviously, and in accordance to what has been discussed earlier, different regional determinants such as economic growth and knowledge spillovers on the one hand, or unemployment rates and restructuring of local companies on the other, may play opposite roles in favouring the start-up of either ‘revolving door’ firms (merely increasing local turbulence) or promising enterprises (fostering local economic growth).

All in all, individual, sectoral and geographical heterogeneities do not permit the treatment of new firm formation as a ‘unicum’ and make it impossible to use entry and entrepreneurship as synonyms. Moreover, since new firm formation is an aggregate where innovators and escapers from unemployment, rational entrepreneurs and over-optimists, experienced and committed founders and ‘try and see’ gamblers are all mixed-up together, post-entry performance of newborn firms may greatly vary. To give an extreme example, imagine the substantially
different likelihoods of survival and satisfactory post-entry performance of a firm founded by an unemployed immigrant with little job experience, no family entrepreneurial tradition and affected by credit constraints, in comparison with a newborn firm funded by a rational and innovative entrepreneur with no financial constraints and former managerial experience in a local incumbent firm within the same industrial sector. As a consequence, the observed overall positive macroeconomic impacts discussed in the previous section are affected by a compositional effect which has to be disentangled. With this purpose in mind, the post-entry evolution of new firms deserves our attention.

1.3 Heterogeneous entrants are leading to very divergent post-entry performance

From a theoretical point of view, Lucas (1978) put forward the first theory of the size distribution of firms based on the relative endowment of entrepreneurial talents. However, the first author who represented the post-entry evolution of newborn firms was Boyan Jovanovic in his well-known and important contribution in *Econometrica* (1982). The author proposed a Bayesian model of noisy selection, according to which efficient firms grow and survive, whereas inefficient firms decline and fail. In particular, in Jovanovic’s model of passive learning, firms are initially endowed with unknown, time-invariant characteristics (i.e. *ex ante* efficiency parameters); *ex post* the prior distribution is updated as evidence comes in and some firms discover that they are more efficient than others. Thus, each firm has to decide its strategy: whether to exit, continue at the same size, grow in size, or reduce its productive capacity.

One can easily see that Jovanovic’s model is perfectly consistent with a world where founders are quite heterogeneous, entry mistakes can easily occur, entry can be originated by a ‘try and see’ bet and early failures are rather common (see Section 1.2). The same line of argument applies to more recent models of active learning. While Hopenhayn (1992) first introduced innovation as an exogenous process, Richard Ericson and Ariel Pakes (1995) assumed that all the decisions taken by firms were meant to maximize the expected discounted value of the future net cash flow, conditional on the current information set. In their model, a firm knows its own characteristics and those of its competitors, along with the future distribution of industry structure, conditional on the current structure. Jovanovic’s assumptions concerning small industry size and product homogeneity are relaxed in Ericson and Pakes’ model, in which new entries may either adjust their size to the minimum efficient scale (MES) level of output of the ‘core’ of the industry or choose/find a niche within which the likelihood of survival is relatively high even though the firm does not grow fast. In a subsequent work, Pakes and Ericson (1998) examined two cohorts of firms from Wisconsin belonging to the retail and the manufacturing industries, and found that the structure of the former industry was compatible with Jovanovic’s passive learning model, while that of the latter was compatible with their model of active exploration.
In both models optimal behaviour generates a set of stopping states which can imply early exit from the market.

Characterized by either passive or active learning, founders in these theoretical models are heterogeneous as far as their capabilities and beliefs are concerned, and committed to recursive decisions where early exit is always an available rational option. Either because of entry mistakes or failures in learning or wrong differentiating strategies, newborn firms may cease in the early phases of their life cycles.

From an empirical perspective, a recent stream of literature has focused on the post-entry performance of firms and has investigated survival, growth and early exit of newborn firms (see, for instance, Reid, 1991; Boeri and Cramer, 1992; Baldwin and Rafiquzzaman, 1995). Within this field, it is possible to analyse the relationship between *ex ante* features of entry, survival and – conditional to survival – post-entry performance of newborn firms, which can be measured in terms of employment growth, profitability or market penetration.

For instance, some of these studies discovered a positive relationship between start-up size and survival (see Audretsch and Mahmood, 1995; Mata, Portugal and Guimaraes, 1995; for more controversial results, see Audretsch, Santarelli and Vivarelli, 1999; Agarval and Audretsch, 2001), and a negative relationship between start-up size and post-entry growth (so rejecting Gibrat’s Law; see Gibrat, 1931; Evans, 1987; Hall, 1987; Dunne and Hughes, 1994; Hart and Oulton, 1996; Sutton, 1997; Lotti, Santarelli and Vivarelli, 2001, 2003). These results can be interpreted in the light of the theories of Dixit (1989) and Hopenhayn (1992) who both argue that post-entry performance may be affected by the level of sunk costs in the industry: in their view higher sunk costs (larger start-up size) should reduce the likelihood of early exit since precommitment can be seen as a signal of superior entrepreneurial capabilities. In contrast, smaller entrants with a sub-optimal size – well below the MES – are at high risk of early failure and they must grow in order to survive a dramatically stringent market selection (so empirically implying both higher failure rates and growth rates for smaller entrants).

In contrast, credit rationing should limit both the likelihood of survival and the rate of growth of newborn firms (see Xu, 1998; Becchetti and Trovato, 2002; Carpenter and Petersen, 2002). However, other recent studies have shown that credit rationing has been over-emphasized and that entrepreneurial saving plans may be able to overcome borrowing constraints (Cressy, 1996, 2000; Parker, 2000, 2002).

Not surprisingly, it has also been demonstrated that education and human capital have an important role in increasing the likelihood of survival of new firms and in improving economic post-entry performance (see Bates, 1990; Brüderl, Preisendörfer and Ziegler, 1992; Gimeno et al., 1997). Particularly, specific rather than generic education and skills (Becker, 1964) are better predictors of a superior post-entry performance, especially as far as NTBFs are concerned (see Almus and Nerlinger, 1999; Colombo and Grilli, 2005). In this context, specificity refers to
education in economic/managerial and technical/scientific fields and to previous work experience in technical and commercial functions within the same industry.

Other works have tried to single out whether the *ex ante* personal characteristics of the founder may be seen as ‘predictors’ of an above-average post-entry performance. For example – and according to the discussion put forward in the previous section – if the underlying motivation to start a new firm is explicitly linked to innovative projects, then a better post-entry performance may be expected than if a new firm is started on the basis of a purely ‘defensive’ motivation, such as the fear of becoming unemployed (for statistically significant evidence supporting these predictions, see Vivarelli and Audretsch, 1998; Arrighetti and Vivarelli, 1999).

Similarly, deeply rooted psychological motivations, such as the search for autonomy or the aspiration to a higher rank in one’s social status, can obscure the objective consideration of the actual economic chances of the new initiative and jeopardize either survival or business success (e.g. in Vivarelli, 2004, the desire to be socially useful turns out to be negatively and significantly correlated with post-entry profitability).

Finally – from a managerial perspective – new founders who were previously employed as top managers in the same sector, who had better access to relevant information or had previous start-up experience (the so-called ‘sequential entrepreneurs’), are expected to exhibit better post-entry business performance (for an empirical validation of these relationships, see Cooper, Gimeno-Gascon and Woo, 1994; Arrighetti and Vivarelli, 1999; Bruderl and Preisendörfer, 2000; Lee and Tsang, 2001; Shane, 2001; Vivarelli, 2004). Some of these ‘predictors’ may be effectively revealed through the filing of a well-articulated and stringent business-plan.

### 1.4 Conclusions and policy implications

The discussion put forward so far makes it possible to derive some conclusive considerations.

First, notwithstanding overall positive macroeconomic and regional impacts (see Section 1.1), new firm formation is an extremely controversial phenomenon. Far from being solely the entrepreneurial ‘creative destruction’ proposed by Schumpeterian advocates, the entry of new firms is a rather heterogeneous aggregate where innovative entrepreneurs are to be found together with passive followers, over-optimist gamblers and even escapers from unemployment.

Second, since founders are heterogeneous and may make ‘entry mistakes’, most new firms are doomed to early failure; this type of entry is not conducive to technological renewal and economic growth, but simply to excess of entry, market churning and turbulence (this is well mirrored by the revealed statistically significant association between entry and exit at the firm, sectoral and macroeconomic levels).

Third, determinants of entry vary from progressive factors such as demand and profit expectations, innovative potentialities, entrepreneurial human capital built
through education, family environment and previous job experience, to misleading and regressive factors such as overconfidence, the desire to be independent, the fear of unemployment.

Fourth, *ex ante* ‘genetic’ features of the founder may be predictors of the post-entry survival chance and business performance. For instance, a larger size, the absence of credit constraints, and a larger informational set allowing ‘active learning’ can be considered as positive predictors of a higher likelihood of survival, while a previous status of unemployment or the absence of an adequate incubator background can be seen as predictors of early failures. By the same token, a higher endowment of human capital, the importance of innovative motivation and a previous experience in managerial and entrepreneurial roles have been shown to be correlated with above-average post-entry business performance.

In this framework, industrial policy is characterized by an important trade-off. On the one hand, one would be tempted to allow market selection to do its own job fully. Since new firm formation is affected by entry mistakes and churning, market selection can efficiently single out real entrepreneurs from ‘revolving door’ founders and so pick up those newborn firms which can really contribute to technological upgrading and economic growth.

In this context, an entry subsidy represents either a ‘deadweight’ or a ‘substitution’ effect. The first occurs when the beneficiary from the subsidy is a newborn entrepreneurial firm which would have survived and grown in any case; the second when the incentive supports a ‘revolving door’ firm which would have exited the market without the subsidy. In the latter case the distortion is larger since the incentive is not only a social waste but also implies the substitution of a potentially more efficient entrant by a subsidized inefficient firm.

On the other hand, economic policy might provide ‘guidelines’ to make market selection more efficient. For example, new firm formation might be stimulated in those sectors and regions where the technological and incubator conditions are more likely to generate real entrepreneurial activities rather than ‘revolving door’ firms (see Section 1.2). Likewise, pre-market selection might be carried out through interviews, examination of business plans and provision of incentives intended to select those potential founders (‘nascent entrepreneurs’) characterized by a dominance of ‘good predictors’ instead of regressive individual features and motivations (see Section 1.3).

Unfortunately, most local, national and international authorities seem to have favoured *erga omnes* policies. Yet the discussion put forward in this introduction and the much more detailed analyses carried out in the following chapters of this book cast severe doubts on the advisability of developing a generic industrial policy devoted to fostering new firm formation. On the contrary, incentives should be highly selective, favouring nascent entrepreneurs endowed with progressive motivations and promising predictors of better business performance, leading to the lowest possible distortion of the post-entry market selection of the most efficient entrepreneurs.
References


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2 The birth of new enterprises

2.1 Introduction

The goal of this paper is to deal with a phenomenon which can be considered crucial to economic development: the generation of new enterprises. In spite of its importance in real economic life and its crucial role in economic modelling, the birth of new firms has rarely been studied in depth by theoretical economists. More frequently, the entry of new firms is merely assumed to be a direct consequence of the presence of excess profits. In other words, actual entry in competition models or the threat of entry in oligopolistic and ‘price limit’ models are simply considered characteristics of the economic environment and thus do not merit an explanation in themselves.

In Section 2.2 the conventional view assumed in most of the current economic models will be compared with some more complete approaches. If the latter are taken into account, the question of new firm entry – far from being only an effect of increasing expected profits – becomes a much more complex matter. Rival theories stress the importance of different factors able to explain new firm formation and open the way to empirical approaches devoted to testing the explanatory power of different determinants in the causes of the generation of new enterprises. In Section 2.2 some empirical tests are compared and discussion is focused both on methodological issues and the relevance of the results obtained from these estimates.

This paper is indeed based on a more direct approach to studying the determinants of the foundation of new firms: employing the largest sample ever used in Italian studies on this subject, founders have been asked directly about the reasons which led them to start a new independent activity. In Section 2.3 the characteristics and the methodology of our questionnaire analysis are described while Section 2.4 is devoted to a discussion of the outcomes of the research.

The general hypothesis of this study is that conventional ‘pull factors’ underlined by theoretical models are insufficient in explaining new firm formation. Far from denying their importance, our results stress the necessity of taking into account
‘push factors’, as well. This outcome is largely consistent with the approach of recent applied studies in industrial organization (surveyed in Section 2.2).

A more specific aim of the paper concerns the appraisal of the relative explanatory powers of the different variables put forward by these more complete models. Some relationships are decisively confirmed by our results, while others are not. In the concluding section, consistencies and inconsistencies with regard to previous literature will be singled out in detail. Finally, the questionnaire analysis offers an opportunity to shed light on some sociological and psychological motivations.

2.2 Previous studies: models and econometric tests

The cornerstone of economic theory is still the traditional competitive model. In this framework, the equalization of the sector price with the minimum long run average cost is assumed by the free entry of new firms into the sector. If excess profits occur (caused by an increase in demand or by a cost-saving innovation or by a differentiation of products, and so on), additional agents are attracted into the market. This concourse of firms causes an increase in supply, a decrease in the price of goods and finally the elimination of excess profits (see Varian, 1984). In this view, a queue of well-informed entrepreneurs is assumed to be waiting outside the market. When the possibility of profits above the average occurs in one of the markets, these entrepreneurs are immediately informed and they enter the sector. The current level of profit (or the expectations of future profits) is the ‘trigger’ factor of the whole process. The entry is ‘pulled’ by market conditions and no subjective or environmental factor is investigated. Localization models are very similar to the competitive ones in describing the distribution of firms in a linear or circular space (see, for instance, Salop, 1979). Also in this case entry is driven only by profit conditions.

In more sophisticated models the maximization of expected profits takes into account barriers to entry which hinder the free concourse of firms into a specific market. Since the seminal works of Bain (1956) and Sylos Labini (1956), consideration of these factors, which do not permit entirely free competition, has made theoretical analyses more realistic. Thus, oligopolistic models compound now different forms of barriers to entry (financing costs, minimum efficient size of the plant, promotion costs, patent protection, and so on) and can be developed in more accurate models with ‘strategic barriers to entry’ (see Tirole, 1989, Ch. 8).

However, both ‘price limit’ models and strategic models put forward with the help of game and supergame theories are still concerned with the ‘pull’ factors affecting the potential entrepreneurs. The latter are attracted (excess profits) or deterred (barriers to entry) in relation to the market conditions and the strategic behaviour of competitors. Of prime importance in these models are the internal objective conditions of the market known to everybody.

The conventional view of entry driven by expected profits and hindered by barriers to entry has been largely tested in econometric studies. Edwin Mansfield (1962) put forward a regression comprising profits and the cost of capital needed to reach the ‘minimum efficient size’ as a proxy of the barriers to entry.
Coefficients showed the expected signs, a degree of significance of 5% and a correlation coefficient of $R = 0.70$. On the other hand, the $R$ coefficient is rather low and – more importantly – estimated values showed a high degree of dispersion around actual values, suggesting the lack of some other explanatory variables (see later the discussion about the ‘push’ factors).

The relative importance of different barriers to entry has also been singled out. Orr (1974) found negative and significant coefficients relating the rate of entry with: (1) initial capital requirements; (2) minimum efficient size; (3) high degree of industry concentration; (4) advertisement expenditures. Less significant were the negative correlations with (5) R&D expenditures; and (6) the degree of risk characterizing the sector. More recently, other studies based on Canadian data (Gorecki, 1976; Khemani and Shapiro, 1986; Baldwin and Gorecki, 1987) turned out to be consistent with the six Orr results mentioned earlier with the additional specification of the presence of multiplant operations as an effective deterrent to entry (see, in particular, Duetsch, 1984).

Moreover, these works not only confirmed the ‘pulling’ function of profit expectations but also underlined the positive and significant correlation between entry and rate of growth within the industry. Thus actual opportunities attract new firms but potentialities are crucial, as well.

As a complement of the simplified view of entry discussed so far, a different tradition can be singled out in the history of economic thought: namely, Schumpeter (1912) and Knight (1921) underlined the subjective qualities of the founder of a new firm. Their well known definitions of entrepreneurship can lead to the proposing of a more general framework where the objective conditions of the market are studied together with some ‘push’ factors concerning the environment and the subjective condition of the potential founder.

The first complete contribution in this direction was put forward by Oxenfeldt (1943) in a seminal book dealing with those determinants of the birth of new firms which are the ingredients of modern studies in industrial organization. These researches try to take into account other factors as well as profit expectations and barriers to entry. Following a terminology introduced by Kilby (1971), these studies address both the ‘demand for entrepreneurship’ (pull factors) and the ‘supply of entrepreneurship’ (push factors). The former have been discussed in the first part of this section, attention will now be turned towards push factors. Recent contributions can be classified according to the following taxonomy.

### 2.2.1 Background factors

According to the results of the surveys carried out in the outstanding contributions of Storey (1982) and Johnson (1986), the founder of a new enterprise is strictly linked to his own background, with particular reference to his previous job experience. Far from the universal choice that characterizes theoretical models, entrepreneurial action is relatively constrained. Instead of looking around to seek the most profitable opportunity, the potential entrepreneur concentrates his attention on a familiar sector (60% of new founders emerge from the same sector,
according to Storey, 1982) and generally in a familiar geographical area. His view is limited by previous job experience where the potential founder acquired his technical and managerial capabilities. According to this view, managers have a higher incentive to start an independent activity because of their keener organizational capabilities in comparison with blue-collar workers. (In Johnson (1986) 52.5% of founders were involved in previous managerial or supervisory functions.)

Moreover, educational and family backgrounds are underlined as key factors by econometric tests devoted to explaining new firm formation as an act of self-employment. Particularly, higher education and the presence of family traditions in the field of entrepreneurship correspond to a higher probability of choosing a self-employment activity (de Wit and van Winden, 1989; Evans and Leighton, 1989).

2.2.2 Incubator factors

While related to the previous argument, this view underlines the importance of the environmental factors which can facilitate the emergence of new firms. It has been argued that the presence of a small firm network can be an effective incubator for new entrepreneurs because of easier opportunities to acquire a general management capability within a small firm. More generally, the presence of an ‘industrial district’ (Brusco, 1986; Garofoli, 1990) with its ‘external economies’ – according to Marshall’s terminology – may be an important push factor in stimulating the creation of new enterprises. In addition, the existence of a particular ‘flexible specialization’ in a specific geographical area can involve multiplicative effects (Piore and Sabel, 1984).

From an econometric point of view, different studies have taken into account the influence of the presence of a well established network of small firms (Gudgin, 1978; Cathcart and Johnson, 1979; Storey, 1982; Storey and Johnson, 1987). Generally, the positive correlation between the birth of new firms and the presence of small firms has been confirmed in cross-sectional analyses. Indeed, the discovered relationship can simply disguise the presence of low barriers to entry which leads to a large presence of small enterprises. Thus, these regressions are distorted by sectoral characteristics and they may reflect the conventional negative link between entry and an industry’s barriers. On the other hand, the simple addition of another regressor approximating the barriers to entry involves even worse problems of multicollinearity. The way out of the problem is to test cross-country equations, that is, to a study the same sectors in different areas characterized by different diffusion of small firms. Adopting this kind of approach, Storey also finds a confirmation of the relation supposed by the theory (Storey, 1982, p. 68).

More rare are the econometric contributions about the influence of sectoral and regional specialization on birth rates; as far as the Italian case is concerned, Revelli and Tenga (1989) and Garofoli (1990) found out positive and significant correlations between regional specialization and local new firm formation.
2.2.3 The 'self-employment' choice

Put forward, once again, by Oxenfeldt (1943), the theory of self-employment has recently experienced a revival (Johnson, 1981; Storey, 1982; Blau, 1987). This theory tries to combine pull and push factors with regard to the income choice of the potential founder. This has to compare his present income and perspectives as employee and the expected income from the independent activity; if this difference is more than a given threshold the new firm will be founded. So, in this model profit expectations become a comparative variable and the subjective situation of the entrepreneur is directly taken into account. In addition, the self-employment approach can explain some situations where choice of an independent activity is induced by unemployment or threat of unemployment (the surveys by Johnson (1986) and Storey and Jones (1987) discovered a percentage of founders previously unemployed varying between 25% and 50%).

Creedy and Johnson (1983) put forward a clear specification of the income choice supposed by the self-employment theoretical models. In their estimation coefficients are positive or negative as expected and significant while regression presents a satisfactory value of $R^2$ (0.791).

More recently, Storey and Jones (1987) discovered a positive relationship between job losses and creation of new enterprises which turned out to be much more significant than the relationship between profits and entry rates. Finally, Evans and Leighton (1990) put forward estimated results where the choice of self-employment turns out to be more likely when previous job experience has been characterized by either low wages, or frequent changes of job (uncertainty about perspectives as employee) or unemployment. These results are consistent with the ‘opportunistic scenario’ proposed by Highfield and Smiley (1987): the authors found some evidence for a counter-cyclical feature of new firm formation.

2.3 Data and sample characteristics

The questionnaire analysis concerned the strongly industrialized province of Milan and was carried out in early 1988. The identification of sample and data conformed to the following steps:

1. Only entirely new firms were singled out in order to avoid misspecification of the entry phenomenon which has to be studied separately from diversification and merger activities.
2. These firms belonged to 22 manufacturing sectors and to the sector of services directed to production (financing, insurance, software houses, and so on) according to ISTAT classification.
3. Two sub-periods (1977–1979 and 1982–1984) were chosen with the aim of avoiding distortions due to the economic cycle.
4. With the help of the local Chamber of Commerce’s data files, 15,000 firms founded in 1977–1979 and 1982–1984 were randomly selected. The original sample composition reflected sectoral and size composition of the actual population and was equally weighted over the two periods.
The 15,000 firms (about 42% of the population of firms created in the two periods) were sent mail questionnaires; about 500 of them answered completely fulfilling the questionnaire. The original symmetry in the relative composition of population and sample was obviously compromised at the end of this step.

Direct interviews were put forward in order to reproportion the sample according to the temporal and sectoral percentages characterizing the population. This procedure stopped where the differences between these percentages were considered reasonably low.

At the end, a sample of 720 firms was obtained, 568 of which belonged to the manufacturing sectors. The final composition of the sample turned out to be slightly distorted in favour of the more recent subperiod (56%); it represented 5% of the original sample (response rate) and about 2% of the actual population.

The 720 questionnaires were completely filled out and they represent the largest questionnaire data base existing in Italy on the topic of the establishment of new firms.

The random selection of new firms led to an important qualification of the sample. Given the very fragmented industrial structure in the province of Milan and the dominant presence of individual and small firms in the process of new entry, the sample showed a strong bias towards the very small dimension: 87.5% of the sample concerns firms with fewer than 5 employees at the birth date, 10.2% firms with fewer than 19 employees, 1.6% firms with fewer than 49 employees, and only 0.7% firms with more than 50 employees.

As Acs and Audretsch (1989a,b) have correctly pointed out, determinants in the generation of new enterprises can be different if we look at either small or big firms. Assuming a looser definition of what constitutes a small firm (fewer than 500 employees) the two authors found out the following econometric relationships (in comparison with the general results discussed in the previous section): (1) a significant correlation with the industrial rate of growth but not with the rate of profit; small firms seem to be more attracted by sub-market niches rather than by average profitability (see also MacDonald, 1986); (2) a significant negative correlation with some barriers to entry (R&D expenditures, degree of industrial concentration), a weaker correlation with some other barriers (initial capital requirements, advertisement expenditures).

The final part of this section will briefly deal with the general features of the questionnaire sent to the recently generated firms.

Although necessarily simplified in order to facilitate the understanding of the entrepreneur interviewed, questions were chosen to cover most of the theoretical issues discussed in the previous section. As far as ‘pull’ determinants are concerned, questions tried to specify in detail both the attractive power of profits and growth opportunities and the more insuperable barriers to entry (financial or marketing or innovation drawbacks).

Looking at the background factors (see Section 2.2.1), founders were asked about their previous position in the workforce and their qualifications in order to
test the theoretical hypotheses concerning ‘sectoral inertia’ and the better incubator performance of managerial experience. Educational and family backgrounds were also investigated.

Turning attention to the ‘incubator factors’ (see Section 2.2.2), founders were asked about the dimensions of the firm of their previous employer and about the persistence of relationships with the previous firm (network externalities). With regard to the validity of the self-employment framework (see Section 2.2.3) some tentative indicators can be deduced by the answers concerning previous position in the workforce.

Finally – in addition to collecting some empirical results with regard to theoretical relationships – the questionnaire tried to take into account other social or psychological determinants which push the potential founder to create a new firm.

### 2.4 Pull and push factors: determinants and motivations

This section will be devoted to discussing the results of the research, following the theoretical stimuli surveyed in Section 2.2 and finally discussing extra-economic motivations.

Aspiration to a higher income – underlined by conventional and self-employment models – is confirmed to be a powerful determinant of the foundation of a new firm; 47.1% of entrepreneurs interviewed indicate the desire for a higher income as a determinant of the choice to start an independent activity. More precisely, the opportunity to get extra income is deduced from favourable demand expectations rather than factors affecting the supply conditions. On the one hand 50.2% claim to have been attracted by the supposed existence of a market niche and 44.3% from an unsatisfied demand; on the other hand only a minority think that profit opportunities are correlated with supply factors as the possibility to apply a technical innovation (20.7%) or to exploit a favourable localization (18.4%) or a splitting off from the parent company (17.7%), see Table 2.1.

In other words, the answers permit a specification of the most important pull factor – income expectations – as a determinant mainly linked with demand conditions and growth potentialities. Hence – as Acs and Audretsch (1989a, p. 262)

<table>
<thead>
<tr>
<th>Table 2.1 Economic determinants</th>
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</thead>
<tbody>
<tr>
<td>Supposed existence of a market niche</td>
</tr>
<tr>
<td>Supposed presence of an unsatisfied demand</td>
</tr>
<tr>
<td>Opportunity to apply a technological innovation</td>
</tr>
<tr>
<td>Favourable localization</td>
</tr>
<tr>
<td>Split off from the parent company</td>
</tr>
<tr>
<td>Financial opportunities</td>
</tr>
<tr>
<td>Others</td>
</tr>
</tbody>
</table>

Note
Tables report all the alternatives offered to the founders interviewed: they could choose more than one answer (this also applies in Tables 2.2 and 2.5).
stated—small firms turn out to be attracted by particular market opportunities and commercial niches.

As far as barriers to entry are concerned, our questionnaire analysis confirms their important role as a hindrance to the birth of new firms. More specifically, financing problems appear to be the most powerful deterrents; this result is consistent with econometric estimates which put forward proxies of capital costs or stress the necessity for a minimum efficient size. On the other hand, skill shortage and organizational troubles seem to be as important as the financing difficulties (see Table 2.2).

Therefore, policies devoted to facilitating the generation of new enterprises have to intervene: (1) on the credit side (87.5% of the sample relied on personal or family financing and only 18.5% on bank loans); (2) on the consultancy side in order to help the founder to organize each firm function and coordinate the functions with each other; (3) on the training of the labour force in order to control skill shortage. Finally, neither R&D (12.1%) nor advertising drawbacks (17.8%) turn out to be barriers to entry comparable to the financial constraint (46.4%).

In summary, income expectations as well as tangible and intangible barriers to entry play an important role in explaining the entrance of new firms. On the other hand, according to the theoretical approaches sketched in Section 2.2, other factors merit consideration.

Concerning the importance of the founder’s background, ‘sectoral inertia’ is confirmed; 68.8% of entrepreneurs declare themselves to have come from the same sector. As we already noted earlier, this is an important refutation of ideal theoretical models. Founders are attracted by high profits but they do not consider all the possibilities offered by different markets; indeed they focus their attention on the familiar sector.

Most of the new entrepreneurs were employed in the firm of origin as dependent workmen (68.0%), while only 24.4% were independent professionals and 6.8% started as entrepreneurs. As stated by other empirical studies, managerial background seems to be a better training for future independent activity (see Table 2.3).

Table 2.2 Main barriers to entry

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing</td>
<td>46.4%</td>
</tr>
<tr>
<td>Skill shortage</td>
<td>40.3%</td>
</tr>
<tr>
<td>Institutional hindrances</td>
<td>19.6%</td>
</tr>
<tr>
<td>Need for external services</td>
<td>15.8%</td>
</tr>
<tr>
<td>Localization problems</td>
<td>12.3%</td>
</tr>
<tr>
<td>Organizational troubles in administration</td>
<td>18.6%</td>
</tr>
<tr>
<td>production</td>
<td>17.9%</td>
</tr>
<tr>
<td>marketing</td>
<td>17.8%</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>12.1%</td>
</tr>
<tr>
<td>management</td>
<td>10.5%</td>
</tr>
<tr>
<td>Others</td>
<td>6.1%</td>
</tr>
</tbody>
</table>
As far as educational and family backgrounds are concerned, founders show a degree of education higher than the average: 62.4% have a diploma or graduated (respectively, corresponding to 13 and 17 years of education in the Italian school system). On the other hand, only 14.1% of the founders included family tradition among the motivations of the entrepreneurial choice.

Our research confirms the importance of personal as well as environmental background; Table 2.4 shows empirical evidence of the crucial role played by small firms in ‘bringing out’ new entrepreneurs.

Some evidence about the opportunities of specialization and network externalities is given by the rate of founders who kept productive or commercial links with the parent firm (15%).

To verify the self-employment model is more difficult and our results appear to be controversial.

The correlation between unemployment and creation of new firms is disproved by our data: only 0.8% declare themselves to have been unemployed in the period before starting the new activity. However, this fact is not sufficient to deny the validity of the theory of self-employment. In fact, the actual condition of unemployment is not necessary to induce the choice of an independent activity; as discussed in Section 2.2, the threat of unemployment or perhaps mere concern about the future possibility of keeping one’s job can be sufficient. Indeed, only 78.2% of interviewees declared they deliberately interrupted their previous job experience. This result, apparently in contrast to the absence of correlation between unemployment and foundations, can be interpreted in the light of previous considerations. Thus, our results do not strongly contradict the self-employment theory, but suggest rather the necessity of taking into account more flexible theoretical formulations instead of putting forward a rigid correlation between unemployment and the birth of new enterprises.

<table>
<thead>
<tr>
<th>Table 2.3 Qualifications in the previous dependent job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerk                                      30.5%</td>
</tr>
<tr>
<td>Director                                  24.9%</td>
</tr>
<tr>
<td>Skilled workman                            21.8%</td>
</tr>
<tr>
<td>Foreman                                   6.6%</td>
</tr>
<tr>
<td>Workman                                   6.1%</td>
</tr>
<tr>
<td>Technician                                4.2%</td>
</tr>
<tr>
<td>Others                                    5.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2.4 Dimension of the firm of origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–9 employees                             30.9%</td>
</tr>
<tr>
<td>10–19 employees                           16.2%</td>
</tr>
<tr>
<td>20–49 employees                           11.1%</td>
</tr>
<tr>
<td>50–99 employees                           9.7%</td>
</tr>
<tr>
<td>100–499 employees                        13.0%</td>
</tr>
<tr>
<td>&gt;500 employees                            19.1%</td>
</tr>
</tbody>
</table>
enterprises. Just the fear of a recession or concern about job security can induce ‘escape from unemployment’.

So far theoretical relationships have been discussed; now attention will be turned to extra-economic motivations neglected by pure theory and econometric tests because of their ‘qualitative’ nature. In Table 2.5 some of these push factors are reported.

The most powerful personal aspiration is to be independent; almost 80% of the sample consider this factor an important determinant of their entrepreneurial choice. Very important too is the desire to turn to use one’s own technical and managerial capabilities. These personal motivations appear to be more deep seated among former manual workers rather than in former clerks or managers, who are more concerned about economic opportunities. At any rate, the relevance of these psychological and social factors is obvious and theory has to take them into account. For instance, some situations can be imagined where personal aspirations are so strong as to push the creation of new firms in spite of the absence of economic attractors. On the other hand, good economic conditions may be insufficient to guarantee the development of new activities because of low levels of motivation. Therefore economic policy has to adopt complete explanatory schemes in order to stimulate entrepreneurship.

As a last stage of our inquiry, the relationship between the birth of new firms and innovative activity was investigated. A broad definition of innovation was adopted, including the application and development of new products or new processes tested and patented elsewhere. Notwithstanding this broad definition, Schumpeterian entrepreneurs are a minority; 20.7% of the founders declare technological opportunities as determinants of their choice and a similar percentage (20.3%) of the newly created firms has been particularly dynamic in the introduction of process innovations. Therefore to speculate any correlation between the creation of new firms and economic and technological development seems to be, at the least, rather risky.

### Table 2.5 Personal motivations

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desire to be independent</td>
<td>78.9%</td>
</tr>
<tr>
<td>Better exploitation of own technical capabilities</td>
<td>53.6%</td>
</tr>
<tr>
<td>Aspiration to a higher income</td>
<td>47.1%</td>
</tr>
<tr>
<td>Better exploitation of own managerial capabilities</td>
<td>36.6%</td>
</tr>
<tr>
<td>Better exploitation of own commercial capabilities</td>
<td>31.3%</td>
</tr>
<tr>
<td>Family tradition</td>
<td>14.1%</td>
</tr>
<tr>
<td>Others</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

2.5 **Principal findings and conclusions**

The questionnaire analysis, the results of which have been presented earlier, is a further confirmation in favour of multicausal explanatory frameworks. As we have seen, ‘pull’ determinants are crucial in explaining the birth of new firms but they are not sufficient to give account of the entire phenomenon.
‘Push’ factors concerning personal and environmental backgrounds as well as psychological motivations turn out to be variables of high explanatory power in the generation of new firms. To be more specific, the results of this study can be summarized in the following statements:

1. Income expectations are confirmed to be an important determinant of the foundation of firms. Particularly, income opportunities are related to the presence of market niches and the opportunity of growth in demand.

2. Barriers to entry do matter for small firms. In comparison with other studies, financial constraint is confirmed as a powerful hindrance, whilst advertisement and R&D drawbacks appear to be only complementary problems. In addition, skill shortage and other organizational troubles emerge as important difficulties in the early stages of a firm’s ‘life cycle’.

3. Turning attention to ‘push’ factors, ‘sectoral inertia’ and superiority of managerial background in determining self-employment choice are largely confirmed. Higher education increases the probability of becoming a new founder, whereas family tradition does not seem to be very important.

4. The role of small firms as more suitable incubators of new firms is confirmed. Network externalities with the parent firm, however, are not so crucial.

5. This research offers little support for self-employment models. Yet, it is true to say, the theoretical views which stress the uncertainty of the dependent-job perspective as a determinant of new firm formation are not rejected by this study.

6. Dealing with personal motivations and innovative attitude, the new founders are shown to be driven by a strong desire for independence and they do not reveal a strong propensity towards innovation.

Acknowledgements

I would like to thank Andrea Fumagalli, Giuliano Mussati, Luigi Orsenigo and two anonymous referees for their useful comments on previous drafts of this paper; a special acknowledgement goes to Luca Vinciguerra for his statistical elaborations. The usual caveats apply.

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3 Determinants of new-firm startups in Italy

With David B. Audretsch

3.1 Introduction

As we show in this paper, the startup activity of new firms is not evenly spatially and temporally distributed, but rather varies considerably, at least in Italy. What accounts for this distribution of new economic activity? According to Carlton (1983, p. 440), ‘Despite all the interest, economists know very little about the factors influencing new business location.’

The purpose of this paper is to explain why the decision to start a new firm varies so greatly across Italian provinces and over time. In the second section we identify four distinct approaches in the literature which, seen through the lens of the general model of ‘income choice’ – dating back at least to Knight (1921), and more recently extended by Lucas (1978), Kihlstrom and Laffont (1979), Holmes and Schmitz (1990) and Jovanovic (1994) – can be used to predict why the pattern of new-firm startups should vary spatially and over time. In the third section issues involving the measurement of new-firm startups in Italy are discussed, and data sources are introduced. Using a pooled cross-section time series model, a testable specification is proposed in Section 3.4. Regressions estimating the new-firm startups are presented in the fifth section. Finally, in Section 3.6 a brief summary and conclusions are provided.

In particular, we find evidence that characteristics of the labour market, and specifically the degree of employment dislocation, along with the wage rate and environmental factors – such as the extent to which an entrepreneurial environment already exists in the form of a relatively high share of small enterprises – account for at least some of the spatial and temporal variation in new-firm startups in Italy.

3.2 New-firm startups in a model of income choice

In his seminal work, Frank Knight (1921) argued that individuals are confronted with a choice of earning their income either from wages earned through
employment in an incumbent enterprise or else from profits accrued by starting a new firm. The essence of this income choice is made by comparing the wage an individual expects to earn through employment, $W^*$, with the profits that are expected to accrue from a new-firm startup, $\Pi^*$. Thus, the probability of starting a new firm, $\Pr(s)$, can be represented as:

$$\Pr(s) = f(\Pi^* - W^*)$$

(3.1)

This model of income choice has been extended by Kihlstrom and Laffont (1979) to incorporate aversion to risk, and by Lucas (1978) and Jovanovich (1994) to explain why firms of varying size exist, and has served as the basis for empirical studies of the decision to start a firm by Blau (1987), Evans and Leighton (1989a,b, 1990), Evans and Jovanovic (1989), Blanchflower and Oswald (1990) and Blanchflower and Meyer (1994).

Four different strands of literature have emerged, each emphasizing a distinct set of forces influencing and shaping the income choice described in Equation (3.1). The first focuses on personal characteristics with respect to labour market conditions. For example, Evans and Leighton (1989a,b, 1990) link personal characteristics, such as education, experience and age, as well as employment status, of almost 4,000 white males to the decision to start a new firm. This approach places particular emphasis on the employment status of individuals in making the income choice. While certain ambiguities exist in linking unemployment to the decision to start a new firm (Storey, 1991), Evans and Leighton (1990) found unequivocal evidence that, at least for US young white males, the probability of starting a new firm tends to rise as a worker loses his job.

A second strand in the literature dates back at least to Schumpeter (1911), who focused on diverging beliefs regarding the value of new ideas, or innovations, as a reason why the expected profitability for starting a new firm might be higher than the wages expected to be earned by working in an incumbent enterprise. Acs and Audretsch (1989, 1990, chapter five) found evidence linking highly innovative markets to higher rates of entry, and Audretsch (1991) linked the survival rates of new firms to innovative environments.

A third approach emphasizes environmental factors or forces external to the firm in influencing the income choice. For example, Blau (1987) links changes in the US self-employment rate to changes in environmental factors such as tax rates, social security retirement benefits, and the minimum wage. One environmental factor of particular interest in this paper is the existence of ‘network externalities’, or the extent to which supplier and buyer networks exist, upon which new firms can rely. These network externalities compound both productive externalities such as the opportunity of local supply and local demand, skilled workers, a developed market for second-hand machinery and information externalities, as well. The latter are particularly important since the availability of information might be a crucial factor in determining the startup of a new firm and its subsequent performance in the early stages of a firm’s life-cycle. The absence of such networks is presumably a strong deterrent against the decision to start a new firm.
Taking into account that the vast majority of new firms are either firms with no employees (i.e. self-employed people) or very small firms, such network externalities can be represented by the relative density of existing small firms in a given area. In addition, there is empirical evidence that most of the new founders come from small firms where they were dependent workers and where they learnt about how to run a firm (Evans and Leighton, 1990 and Vivarelli, 1991).

A final strand of the literature focuses on agglomeration factors such as the presence of a big city and a high population density. The theory that agglomerations are conducive to a greater provision of nontraded inputs dates back at least to Alfred Marshall (1920), who suggested that a pooled labour market yields increasing returns at a spatial level. More recently, Krugman (1991, p. 484) argues that, ‘The concentration of several firms in a single location offers a pooled market for workers with industry-specific skills, ensuring both a lower probability of unemployment and a lower probability of labor shortage. Second, localized industries can support the production of nontradeable specialized inputs. Third, informational spillovers can give clustered firms a better production function than isolated producers.’

These four strands of the literature have been applied to the underlying model of income choice to emphasize the different aspects involved in the decision to start a new firm. For example, the first approach, or the focus on personal characteristics with respect to the labour market, suggests that

\[ W* = W* (W, JL) \]  

(3.2)

where \( W \) is the actual wage and \( JL \) is the extent to which job losses have occurred. Just as an increase in the actual wage leads to an elevated expected wage, higher job losses will reduce \( W* \), or \( \partial W*/\partial W > 0 \) and \( \partial W*/\partial JL < 0 \).

Similarly, the expected level of profitability accruing from a new firm, \( \Pi* \), is positively influenced by the actual level of profitability, \( \Pi \), the relative importance of knowledge producing activities (from the second approach), \( RD \), the degree to which a network of small entrepreneurial firms already exists (from the third approach), \( S \), and the degree to which a geographic area is agglomerated (from the fourth approach), \( A \), so that:

\[ \Pi* = \Pi* (\Pi, RD, S, A) \]  

(3.3)

where

\[ \frac{\partial \Pi*}{\partial \Pi} > 0, \quad \frac{\partial \Pi*}{\partial RD} > 0, \quad \frac{\partial \Pi*}{\partial S} > 0, \quad \frac{\partial \Pi*}{\partial A} > 0. \]

Substituting in Equation (3.1) suggests that the decision to start a new firm will be influenced by:

\[ \Pr(s) = f(\Pi, W, JL, RD, S, A) \]  

(3.4)
where \( II, JL, RD, S \) and \( A \) all exert a positive influence on \( \Pr(s) \), and \( W \) exerts a negative effect.

It should be pointed out that the general framework represented in Equation (3.4) and the expected signs of the relationships are consistent with the traditional model within the industrial organization literature relating entry to the level of profitability relative to the extent of barriers to entry.\(^8\) However, while the bulk of studies have analysed the relationships between profitability, barriers to entry and extent of entry for a unit of observation at the level of disaggregated four-digit or three-digit industries, the unit of observation implicit in Equation (3.4) links all industries together within a common province. For example, just as \( II \) represents the weighted profitability of all industries operating within a province, \( S \) can be viewed as reflecting the ease of entry (or an inverse index of barriers to entry) exhibited by the particular constellation of industries within a province. In fact, such industry constellations form the basis for one of the most particular features of the industrial structure in Italy, the well known ‘industrial districts’, or clusters of specific complementary industries grouped within a small localized area (cf. Becattini, 1987).

3.3 Measurement issues

Perhaps the greatest impediment for linking the startup of new firms in Italy to the six types of influences represented in Equation (3.4) has been the lack of a comprehensive, reliable source of data. However, recently two major data bases have become available enabling the measurement of new-firm startups. The first of these is provided by the Italian Social Security System (INPS). An important qualification of the INPS data base is that it does not include the self-employed, or firms with no employees. Alternatively, the Network of Italian Chambers of Commerce (CER VED) includes firms with no employees as well as those with employees in its comprehensive data base. While the INPS identifies startup activity in all 95 Italian provinces, the CER VED provides reliable observations only for 78 provinces since 1985.\(^9\) Combining this limitation with additional constraints in the data sources for the independent variables, our panel data analysis is based on 78 Italian provinces over the period 1985–1988, resulting in a total sample size of 312 observations.

A second measurement issue involves the scope of new business activity. Both of these data bases distinguish between new-firm startups for the entire economy, as well as restricted to the manufacturing sector.

The third measurement issue involves standardizing the number of startups by the size of a given geographic area to create natality rates (NR). That is, ceteris paribus, a province containing more people or potential entrepreneurs would be expected to generate a higher number of new firms. The number of potential entrepreneurs can be alternatively proxied by the resident population, or for the measure restricting startup activity to the manufacturing sector, as the number of manufacturing employees.\(^{10}\) These two different data bases measuring new-firm startups for the entire economy and for the manufacturing sector, combined with
alternative measures used to standardize the size of a province, yield six different natality rates:

\[
\begin{align*}
NRE &= \frac{\text{New Firms}}{\text{Resident Population}} \quad \text{(INPS)} \\
NRM &= \frac{\text{New Manufacturing Firms}}{\text{Resident Population}} \quad \text{(INPS)} \\
NRMM &= \frac{\text{New Manufacturing Firms}}{\text{Manufacturing Employment}} \quad \text{(INPS)} \\
NREC &= \frac{\text{New Firms}}{\text{Resident Population}} \quad \text{(CER VED)} \\
NRMC &= \frac{\text{New Manufacturing Firms}}{\text{Resident Population}} \quad \text{(CER VED)} \\
NRMMC &= \frac{\text{New Manufacturing Firms}}{\text{Manufacturing Employment}} \quad \text{(CER VED)}
\end{align*}
\]

As Table 3.1 shows, these six alternative measures reflect different aspects of startup activity. The annual mean natality rate varies from 12.69 new manufacturing firms per thousand manufacturing employees (CER VED source), to 0.69 new manufacturing firms per thousand people (in the resident population, INPS source). Table 3.1 also indicates that there is considerable variation in startup activity across the 78 Italian provinces. For example, using the NRE measure, the number of new firms per thousand people (in the resident population) varies across provinces from a high of 6.49 to a low of 0.33.

The explanatory variables included in Equation (3.4) are also measured over the period 1985–1988. Gross profits, $G$, are defined as value added per employee minus the average wage per employee, and are measured in real terms using the national implicit deflator for GNP. New-firm formation activity is expected to be positively related to the mean profits in a province.

The mean wages, $W$, are measured as a weighted average of manual workers’ and clerks’ wages per employee, also in real terms (but are deflated by the national consumer price index). Wages are expected to be negatively related to startup activity.

The relative impact of job losses, $JL$, is measured as the number of people laid off due to plant closures and contractions divided by the resident population.

### Table 3.1 Firm formation in Italy: descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRE</td>
<td>2.71</td>
<td>0.85</td>
<td>6.49</td>
<td>0.33</td>
</tr>
<tr>
<td>NRM</td>
<td>0.69</td>
<td>0.36</td>
<td>2.02</td>
<td>0.00b</td>
</tr>
<tr>
<td>NRMM</td>
<td>7.01</td>
<td>2.47</td>
<td>26.59</td>
<td>2.00</td>
</tr>
<tr>
<td>NREC</td>
<td>6.11</td>
<td>1.61</td>
<td>10.05</td>
<td>0.63</td>
</tr>
<tr>
<td>NRMC</td>
<td>1.21</td>
<td>0.60</td>
<td>3.17</td>
<td>0.15</td>
</tr>
<tr>
<td>NRMMC</td>
<td>12.69</td>
<td>4.46</td>
<td>30.89</td>
<td>3.42</td>
</tr>
</tbody>
</table>

Notes
- Each mean value is defined in terms of thousands of people.
- Due to rounding.
New-firm startups are expected to be positively influenced by the degree of job layoffs.

The importance of knowledge and innovative activity, \( RD \), is measured as research and development (R&D) expenditures by private and public firms, in real terms using the GNP implicit price deflator, divided by the resident population.\(^{14}\) The R&D data are not available at the disaggregated level of provinces but are only available at the level of more highly aggregated regions.\(^ {15}\) We repeat these values at the level of the region across the provinces common within each region. The relative importance of R&D innovative activity is expected to influence startup activity positively.

\( S \) is measured as the number of firms with fewer than ten employees divided by the resident population.\(^ {16}\) New-firm formation is expected to be greater in those provinces where small entrepreneurial firms play an important role.

Finally, \( A \) is a dummy variable taking on a value of one in those provinces in which the capital of a region is located, and zero otherwise. New-firm startups are expected to be greater in those provinces containing a regional capital city, since they are more highly agglomerated and should be attractive for better infrastructures and central institutions.

The explanatory variables, the associated theories motivating their inclusion in Equation (3.4), and the expected signs of the regression coefficients are summarized in Table 3.2.

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Hypothesis</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profits (( \Pi ))</td>
<td>Income choice</td>
<td>+</td>
</tr>
<tr>
<td>Wages (( W ))</td>
<td>Income choice and labour market</td>
<td></td>
</tr>
<tr>
<td>Job losses (( JL ))</td>
<td>Labour market</td>
<td>+</td>
</tr>
<tr>
<td>Innovations (( RD ))</td>
<td>Schumpeter</td>
<td>+</td>
</tr>
<tr>
<td>Small firms (( S ))</td>
<td>Environmental factors</td>
<td>+</td>
</tr>
<tr>
<td>Capital cities (( A ))</td>
<td>Agglomeration effects</td>
<td>+</td>
</tr>
</tbody>
</table>

3.4 A testable specification

Using the panel data which have been described in the previous section, a straightforward specification based on Equation (3.4) is:

\[
\ln NR_{it} = \alpha_i + \beta_{it} \ln \Pi_{it} + \gamma_{it} \ln W_{it} + \delta_{it} \ln JL_{it} + \theta_{it} \ln RD_{it} + \lambda_{it} \ln S_{it} + \psi_{it} \ln A_{it} + \epsilon_{it}
\]

\( i = 1, 2, \ldots, 78 \quad t = 1985, \ldots, 1988 \)

All of the variables – but the dummy \( A \) – are taken in logarithms and \( \epsilon_{it} \) are assumed to be independently and normally distributed over the province, \( i \), and the year, \( t \), with a mean of zero and constant variance, \( \sigma^2_\epsilon \).
To attain a testable model specification, we follow Hsiao (1986, pp. 16–18) and assume that the parameters are constant across provinces, but can vary over time (cf. also Judge et al., 1980, pp. 338–341). Thus, our unrestricted model becomes:

\[
\begin{align*}
\ln NR_i t &= \alpha_i + \beta_i \ln PI_i + \gamma_i \ln W_i + \delta_i \ln JL_i + \epsilon_i \ln RD_i + \lambda_i \ln S_i + \\
&\quad + \psi_i A_i t + \epsilon_i t \\
i &= 1, 2, \ldots, 78 \quad t = 1985, \ldots, 1988
\end{align*}
\]

This unrestricted model could be tested through a set of four separate cross-section regressions. However, such a procedure leads to a relevant loss of information. In order to facilitate pooling specification (3.6) into a pooled cross-section time-series model, two alternative hypotheses have been tested: the \(H1\) hypothesis of overall regression coefficient homogeneity and the \(H2\) hypothesis of heterogeneous intercepts, but homogeneous slopes:

\[
\begin{align*}
H1: &\quad \alpha'_s = \alpha'_r = \alpha'_8 = \alpha'_8, \quad \beta'_s = \beta'_r = \beta'_8 = \beta'_8; \ldots; \\
&\quad \psi'_s = \psi'_r = \psi'_8 = \psi'_8.
\end{align*}
\]

\[
H2: \quad \alpha'_s \neq \alpha'_r \text{ at least for some } s \text{ and } r \text{ with: } s, r = 85, 86, 87, 88
\]

and \(s \neq r; \beta'_s = \beta'_r = \beta'_8 = \beta'_8; \ldots; \psi'_s = \psi'_r = \psi'_8 = \psi'_8.\)

In Table 3.3 the results of the covariance tests are reported for each of the six equations which can be tested using our panel data. While the hypothesis of overall regression coefficient homogeneity cannot be rejected, the hypothesis of intercept homogeneity is rejected at the 95% level of confidence.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Degrees of freedom</th>
<th>(F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall test</td>
<td>Numerator</td>
<td>Denominator</td>
</tr>
<tr>
<td>NRE</td>
<td>21</td>
<td>284</td>
</tr>
<tr>
<td>NRM</td>
<td>21</td>
<td>284</td>
</tr>
<tr>
<td>NRMM</td>
<td>21</td>
<td>284</td>
</tr>
<tr>
<td>NREC</td>
<td>21</td>
<td>284</td>
</tr>
<tr>
<td>NRMC</td>
<td>21</td>
<td>284</td>
</tr>
<tr>
<td>NRMMC</td>
<td>21</td>
<td>284</td>
</tr>
</tbody>
</table>

| Slope homogeneity | Numerator | Denominator | |
| NRE | 18 | 284 | 1.55 |
| NRM | 18 | 284 | 1.87* |
| NRMM | 18 | 284 | 2.13** |
| NREC | 18 | 284 | 1.71* |
| NRMC | 18 | 284 | 1.19 |
| NRMMC | 18 | 284 | 0.85 |

Notes
* Significant at the 95% level of confidence.
** Significant at the 99% level of confidence.
homogeneity is always rejected, the less restrictive hypothesis of heterogeneous intercepts but homogeneous slopes can be retained in three cases out of the six.

Thus, in three cases regressions can be estimated using the semi-pooled specification:

\[
\ln NR_{it} = \alpha_i' + \beta' \ln \Pi_{it} + \gamma' \ln W_{it} + \delta' \ln JL_{it} + \vartheta' \ln RD_{it} + \lambda' \ln S_{it} + \psi_i A_{it} + \epsilon_{it}
\]

\[i = 1, 2, \ldots, 78 \quad t = 1985, \ldots, 1988 \quad (3.7)\]

Equation (3.7) is especially suitable for our purposes, since we can use all the available information to estimate the relevant parameters. In particular, we estimate the least-squares dummy-variable (LSDV) parameters of the following final testable specification:

\[
\ln NR_{it} = \alpha_8 D_{85} + \alpha_{86} D_{86} + \alpha_{87} D_{87} + \alpha_{88} D_{88} + \beta' \ln \Pi_{it} + \gamma' \ln W_{it} + \delta' \ln JL_{it} + \vartheta' \ln RD_{it} + \lambda' \ln S_{it} + \psi_i A_{it} + \epsilon_{it}
\]

\[i = 1, 2, \ldots, 78 \quad t = 1985, \ldots, 1988 \quad (3.8)\]

where \(D_{85}, D_{86}, D_{87}, D_{88}\) are dummy variables taking on the value of one in the 78 positions corresponding to the year under consideration and zero elsewhere.\(^{17}\)

Equation (3.8) turns out to be affected by heteroscedasticity (cf. Breusch and Pagan, 1979) when the natality rate is NRE;\(^{18}\) in this case a heteroscedasticity-consistent covariance matrix has been used for estimation.

### 3.5 Results

The results from the least squares dummy variable estimation of the three viable alternative measures of new-firm formation activity are reported in Table 3.4. The first column reports the results using the NRE measure, the second column uses the NRMC measure and the third column uses the NRMMC measure.

As the positive coefficient on the measure of gross profits suggests, startup activity tends to be greater in provinces exhibiting a higher level of profitability.\(^{19}\) The negative coefficient of the measure of wages suggests that higher wage rates tend to be associated with less new-firm formation activity. Both these results are consistent with the general theory of income choice.

The results concerning the impact of job losses are somewhat more ambiguous. While a greater degree of employment dislocation is significantly associated with more startup activity when the NRE and NRMC measures are used, when the NRMMC measure is used the coefficient still is positive as expected but cannot be considered statistically significant.\(^{20}\)

On the other hand, the impact of small firms is unambiguous. Provinces containing a greater presence of small firms tend to generate a higher propensity to start a new firm. This result is consistent both with the theories which underline the importance of the environmental factors and with the tradition of studies focusing on barriers to entry. The significance of regressor \(S\) turns out to be
higher in manufacturing; this result suggests that productive and information externalities seem to be more obvious in manufacturing rather than in the entire economy. Indeed, those complementarities which are so crucial in Italian ‘industrial districts’ and in the so-called ‘flexible manufacturing systems’ are generally referred to a network of manufacturing firms (see Piore and Sabel, 1984; Milgrom and Roberts, 1990).

There is no evidence supporting the hypothesis that a higher degree of knowledge and R&D activity tends to result in a greater degree of startup activity. One explanation may be that, while we have aggregated all economic activity and manufacturing activity together within a province, the spillover effect of R&D into the generation of new firms may be much more restricted in the dimension of the specific product class. Similarly, there is no evidence of any significant agglomeration effect from provinces containing a capital city.21

One concern with the results presented in Table 3.4 is that at least some of the exogenous variables may be spuriously related to broader regional tendencies.

Table 3.4 Econometric results (LSDV)a

<table>
<thead>
<tr>
<th></th>
<th>NRE</th>
<th>NRMC</th>
<th>NRMMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>0.169*</td>
<td>0.089*</td>
<td>0.173***</td>
</tr>
<tr>
<td></td>
<td>(1.464)</td>
<td>(1.517)</td>
<td>(2.753)</td>
</tr>
<tr>
<td>W</td>
<td>-0.363***</td>
<td>-0.276*</td>
<td>-0.518***</td>
</tr>
<tr>
<td></td>
<td>(-2.524)</td>
<td>(-1.624)</td>
<td>(-2.965)</td>
</tr>
<tr>
<td>JL</td>
<td>0.281***</td>
<td>0.101***</td>
<td>0.034</td>
</tr>
<tr>
<td></td>
<td>(3.158)</td>
<td>(2.501)</td>
<td>(0.884)</td>
</tr>
<tr>
<td>RD</td>
<td>-0.015</td>
<td>-0.002</td>
<td>-0.021**</td>
</tr>
<tr>
<td></td>
<td>(-1.211)</td>
<td>(-0.164)</td>
<td>(-1.691)</td>
</tr>
<tr>
<td>S</td>
<td>0.435**</td>
<td>0.718***</td>
<td>0.602***</td>
</tr>
<tr>
<td></td>
<td>(2.221)</td>
<td>(11.667)</td>
<td>(8.246)</td>
</tr>
<tr>
<td>A</td>
<td>-0.017</td>
<td>-0.017</td>
<td>-0.026</td>
</tr>
<tr>
<td></td>
<td>(-0.537)</td>
<td>(-0.402)</td>
<td>(-0.618)</td>
</tr>
<tr>
<td>$D_{85}$</td>
<td>0.208</td>
<td>0.813</td>
<td>3.244</td>
</tr>
<tr>
<td></td>
<td>(0.058)</td>
<td>(0.293)</td>
<td>(1.197)</td>
</tr>
<tr>
<td>$D_{86}$</td>
<td>0.056</td>
<td>0.734</td>
<td>3.160</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.264)</td>
<td>(1.166)</td>
</tr>
<tr>
<td>$D_{87}$</td>
<td>0.144</td>
<td>0.666</td>
<td>3.098</td>
</tr>
<tr>
<td></td>
<td>(0.040)</td>
<td>(0.239)</td>
<td>(1.140)</td>
</tr>
<tr>
<td>$D_{88}$</td>
<td>0.089</td>
<td>0.557</td>
<td>2.986</td>
</tr>
<tr>
<td></td>
<td>(0.025)</td>
<td>(0.200)</td>
<td>(1.098)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.51</td>
<td>0.74</td>
<td>0.42</td>
</tr>
<tr>
<td>$F$</td>
<td>35.08***</td>
<td>94.257***</td>
<td>24.075***</td>
</tr>
</tbody>
</table>

Notes
a T-statistics in parentheses.
* Significant at 90% level of confidence.
** Significant at 95% level of confidence.
*** Significant at 99% level of confidence.
which are not included in our specification such as institutional, cultural and social differences specific to a given broad geographical area. Thus, in Table 3.5, we report the same regression models as in Table 3.4, but with the inclusion of three dummy variables, representing three Italian broad areas which can be considered internally homogeneous from a sociological point of view (cf. Bagnasco, 1977): the heavily industrialized area (taking on the value of one in the provinces belonging to the North West, NW); the so-called ‘Third Italy’ (taking on the value of one in the provinces belonging to the North East and Centre, NEC) and the least developed area (taking on the value of one in the provinces belonging to the South of Italy, SO). The inclusion of these regional dummy variables only marginally

Table 3.5 Econometric results with regional dummies (LSDV)

<table>
<thead>
<tr>
<th></th>
<th>NRE</th>
<th>NRMC</th>
<th>NRMMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>$0.185^{**}$</td>
<td>$0.087^*$</td>
<td>$0.190^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(1.784)$</td>
<td>$(1.491)$</td>
<td>$(2.991)$</td>
</tr>
<tr>
<td>W</td>
<td>$-0.324^{***}$</td>
<td>$-0.400^{***}$</td>
<td>$-0.613^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(-2.374)$</td>
<td>$(-2.353)$</td>
<td>$(-3.382)$</td>
</tr>
<tr>
<td>JL</td>
<td>$0.289^{***}$</td>
<td>$0.085^{**}$</td>
<td>$0.012$</td>
</tr>
<tr>
<td></td>
<td>$(3.533)$</td>
<td>$(2.141)$</td>
<td>$(0.309)$</td>
</tr>
<tr>
<td>RD</td>
<td>$0.000^b$</td>
<td>$-0.001$</td>
<td>$-0.020^*$</td>
</tr>
<tr>
<td></td>
<td>$(0.023)$</td>
<td>$(-0.756)$</td>
<td>$(-1.352)$</td>
</tr>
<tr>
<td>S</td>
<td>$0.401^{**}$</td>
<td>$0.621^{***}$</td>
<td>$0.553^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(2.031)$</td>
<td>$(9.458)$</td>
<td>$(7.326)$</td>
</tr>
<tr>
<td>A</td>
<td>$-0.028$</td>
<td>$0.004$</td>
<td>$0.001$</td>
</tr>
<tr>
<td></td>
<td>$(-0.890)$</td>
<td>$(0.085)$</td>
<td>$(0.023)$</td>
</tr>
<tr>
<td>NW</td>
<td>$-0.187^{***}$</td>
<td>$0.203^{**}$</td>
<td>$0.176^{**}$</td>
</tr>
<tr>
<td></td>
<td>$(-2.720)$</td>
<td>$(2.238)$</td>
<td>$(1.952)$</td>
</tr>
<tr>
<td>NEC</td>
<td>$-0.105^{**}$</td>
<td>$0.228^{***}$</td>
<td>$0.228^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(-2.030)$</td>
<td>$(2.682)$</td>
<td>$(2.662)$</td>
</tr>
<tr>
<td>SO</td>
<td>$-0.094^*$</td>
<td>$0.024$</td>
<td>$0.152^{**}$</td>
</tr>
<tr>
<td></td>
<td>$(-1.387)$</td>
<td>$(0.277)$</td>
<td>$(1.800)$</td>
</tr>
<tr>
<td>$D_{85}$</td>
<td>$-0.656$</td>
<td>$2.122$</td>
<td>$4.111^*$</td>
</tr>
<tr>
<td></td>
<td>$(-0.204)$</td>
<td>$(0.766)$</td>
<td>$(1.460)$</td>
</tr>
<tr>
<td>$D_{86}$</td>
<td>$-0.811$</td>
<td>$2.041$</td>
<td>$4.024^*$</td>
</tr>
<tr>
<td></td>
<td>$(-0.252)$</td>
<td>$(0.737)$</td>
<td>$(1.429)$</td>
</tr>
<tr>
<td>$D_{87}$</td>
<td>$-0.723$</td>
<td>$1.982$</td>
<td>$3.965^*$</td>
</tr>
<tr>
<td></td>
<td>$(-0.225)$</td>
<td>$(0.714)$</td>
<td>$(1.405)$</td>
</tr>
<tr>
<td>$D_{88}$</td>
<td>$-0.783$</td>
<td>$1.881$</td>
<td>$3.855^*$</td>
</tr>
<tr>
<td></td>
<td>$(-0.242)$</td>
<td>$(0.677)$</td>
<td>$(1.364)$</td>
</tr>
<tr>
<td>$R^2$</td>
<td>$0.52$</td>
<td>$0.75$</td>
<td>$0.43$</td>
</tr>
<tr>
<td>$F$</td>
<td>$27.03^{***}$</td>
<td>$75.27^{***}$</td>
<td>$19.04^{***}$</td>
</tr>
<tr>
<td>Sample size</td>
<td>$312$</td>
<td>$312$</td>
<td>$312$</td>
</tr>
</tbody>
</table>

Notes
a $T$-statistics in parentheses.
b Due to rounding.
* Significant at 90% level of confidence.
** Significant at 95% level of confidence.
*** Significant at 99% level of confidence.
affects the coefficients of the other exogenous variables and their significance. Thus, there is little evidence that the relationships exhibited in Table 3.4 are attributable to spurious correlation with broader regional tendencies.

3.6 Conclusions

One of the most striking features of Italian industrial organization is the presence of the ‘industrial districts’ which are characterized by networks of small firms and by a considerable degree of firm turbulence (high natality and mortality rates). Our finding that a relatively high presence of small firms leads to higher startup activity seems to be consistent with this notion of industrial districts serving as an incubator for new-firm startups.

In addition, we find that the new-firm formation tends to be higher in Italian provinces where profits are higher but wages and employment prospects are less favourable. These last findings are consistent with the general theory of income choice, which is the cornerstone on which many studies are based (as far as previous studies on the Italian case are concerned, see Foti and Vivarelli (1994) and Santarelli and Sterlacchini (1994)). An important qualification of our findings is the degree of aggregation within each province incorporating all economic activities, or at least all manufacturing economic activities. Thus, even if R&D spillovers have a positive influence on new-firm formation within innovative industries, the broad level of aggregation may tend to obscure such a relationship. Future research needs to link the spatial and temporal dimensions to the industry dimension of new-firm location.

Notes

1 Due to data limitations, Carlton (1983) was constrained to analysing the opening of new branch and subsidiary plants by incumbent firms, despite introducing a model to predict the startup of new firms.
2 Other studies, such as Bates (1990) and Blanchflower and Meyer (1994), emphasize human capital in the income choice.
3 Schumpeter (1950, p. 13) wrote in *Capitalism, Socialism and Democracy*: ‘The function of entrepreneurs is to reform or revolutionize the pattern of production by exploiting an invention, or more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way.’
4 As far as these aspects are concerned, there are no differences among Italian provinces, since all of these policy variables are set by law at the national level.
5 In Italy, more than 90% of new firms consist of either a single individual or else employ fewer than ten workers.
6 Marshall (1920) pointed out that ‘Subsidiary trades grow up in the neighborhood, supplying it with implements and materials, organizing its traffic.... For subsidiary industries devoting themselves each to one small branch of the process of production, and working it for a great many of their neighbors, are able to keep in constant use machinery of the most highly specialized character, and to make it pay its expenses.’
7 In fact, from the viewpoint of a single worker living in an area, higher job losses within that area mean either actual redundancy or a higher likelihood of future redundancy.
While the literature linking profitability and entry barriers to entry dates back at least to Mansfield (1962) and Orr (1974), more recent studies spanning a broad spectrum of countries are contained in Geroski and Schwalbach (1991).

The 17 excluded provinces are: Como, Milano, Sondrio, Trento, Bolzano, Udine, Pordenone, Gorizia, Trieste, Roma, Rieti, Napoli, Catania, Siracusa, Caltanissetta, Messina and Ragusa; as can be noticed, very large provinces like Milano, Roma and Napoli are excluded from our database. This is a drawback, but it should not involve a selection bias since other provinces with big cities are included (Torino, Venezia, Genova, Bari, Palermo).

Unfortunately, annual data on either the labour force or the working age population are not available at the disaggregated level of provinces. At any rate, resident population and labour force can be assumed to be highly correlated. As far as manufacturing is concerned, a second standardization by employment is used since there is evidence that new founders in manufacturing generally come from incumbent firms within the same manufacturing sector (Vivarelli, 1991).

When startup activity for the manufacturing sector is analysed, profits are measured only for the manufacturing sector. The measure of gross profit has been computed as the difference between the value added per employee (source: Italian Industrials’ Association) and per capita wage (source: INPS).

The relative weights which have been used are the proportions of workers and clerks within the total employment in a single province; when startup activity for the manufacturing sector is estimated, only wages for the manufacturing sector are used. The source is INPS.

When manufacturing startups are estimated only job losses in manufacturing are taken into account and are divided alternatively by the resident population and the manufacturing employment. The source of INPS.

When manufacturing startups are estimated, only R&D expenditures from the manufacturing sector are used and are divided alternatively by the resident population and the manufacturing employment. The source is the National Statistical Institute (ISTAT).

There are 20 regions in Italy.

When manufacturing startups are analysed, only manufacturing small firms are included and are divided alternatively by the resident population and the manufacturing employment. The data source is INPS.

It has to be noticed that the annual dummies sweep out from the estimations some factors which are not considered by the income choice theory such as the financial and credit variables. In this way, temporal effects which are common to the different provinces – such as the average national rate of interest – are captured by the annual dummies and do not influence the other relationships.

The actual values of Breusch-Pagan’s tests in the three cases are: NRE: $X^2(9) = 33.38$; NRMC: $X^2(9) = 8.42$; NRMMC: $X^2(9) = 11.24$.

The significance of the supposed relationship is really satisfactory only in the third estimate, yet controlling estimates (not reported) give support to the plausibility and robustness of this result. On the one hand, the single 12 cross-section estimates confirm the expected sign in all cases but one; on the other hand, once omitted the very significant variable $S$, significant of coefficient $\beta$ reaches in all three cases the 99% level of confidence.

This result may be partially explained by a certain degree of correlation between the variable $JL$ and the very significant variable $S$ (linear correlation coefficient $= 0.54$). Estimating the regression with $S$ omitted yields a coefficient for $JL$ of 0.188 with a $t$-value of 5.104.

One concern with this result can be related with the very simple way in which agglomeration has been measured. Indeed, the purpose for introducing the dummy variable $A$ was twofold: on the one hand, provinces with capital cities are generally more intensively populated; on the other hand, capital cities can be attractive also for institutional
reasons and infrastructures (communications, services, more skilled labour and so on). At any rate, a controlling estimate – not reported – with the regressor DENS (population density) instead of A leaves the results virtually unchanged.

22 The covariance tests for these new three specifications are consistent with the results from Table 3.3 in two out of three cases. As far as NMRC is concerned, the $F$ value is on the edge of the 95% level of significance. The actual values of the slope-homogeneity tests in these three cases are: NRE: $F(27, 272) = 1.01$; NRMC: $F(27, 272) = 1.54$; NRMMC: $F(27, 272) = 0.96$.

References


4 Start-up size and industrial dynamics

Some evidence from Italian manufacturing

With David B. Audretsch and Enrico Santarelli

4.1 Introduction

The last two decades have witnessed an explosion in studies on the economic role of entry and the determinants of new firm formation. Entry was viewed as important to economics, because a level of profitability in excess of equilibrium would induce entry into an industry. The new entrants performed an equilibrating function in the market, in that the levels of profitability and price should be restored to their long-run competitive levels. Under this view, outputs and inputs in an industry were assumed to be homogeneous. That is, the entry of new firms was about business as usual: only that with the new entrant there was more of it. For example, in the country studies on the dynamics of company profits conducted by Dennis Mueller (1990), entry was viewed as the mechanism by which profits in excess of the long-run equilibrium were eroded.

However, entry and new firm formation are not always synonymous, since in most cases the rates of new firm formation are far higher than those of market penetration, and, as a consequence, new firms give rise to a higher degree of market turbulence rather than to an expansion of the market. This implies that a significant increase in the business birthrate does not necessarily result in an equally significant increase in either the stock of businesses or in the market share accounted for by new firms in a given industry. In this respect, after reviewing a series of studies conducted in various countries and which applied a standardised methodology in analysis of the determinants of entry (Geroski and Schwalbach, 1991), Geroski (1991b, p. 282) concluded that ‘Scholars have had some trouble in reconciling the stories told about entry in standard textbooks with the substance of what they found in their data.’ Most studies consistently found that new firms account for a substantial share of the total number of enterprises, employment and sales in an industry. However, just as identifying a consistent set of industry-specific structural characteristics imposing a strong deterrent upon entry has proven to be surprisingly elusive, so only ‘modest effects of entry on market performance’ have been found (Geroski, 1991b, pp. 294–295).

The impact of new firm formation on an industry is apparently not so obvious as the numbers and share of economic activity accounted for by new businesses would suggest. A solution to the paradox was suggested by Audretsch (1995) and Geroski (1995): entry may be less interesting in the sense of profitability and price in the market, but more interesting and important because of its disequilibrating influence. That is, rather than representing business as usual, a new entrant may represent an agent of change. As Geroski (1991a, p. 7) concludes, ‘Entry is, then, one of several methods by which markets restructure themselves [. . .]. The market dynamics associated with entry are not, it appears, so much those associated with changes in the size of the population of firms or products in a market as they are those associated with changes in the population of firms or products.’ In response to these insights, a new literature focusing on the post-entry performance of firms has emerged in the last few years. In particular, these studies focus on what happens to new firms subsequent to their entry, both in terms of their likelihood of survival and their growth patterns.

While a number of important studies have been undertaken on industry dynamics in the United States (Dunne et al., 1988, 1989; Audretsch, 1991, 1995; Audretsch and Mahmood, 1995), United Kingdom (Dunne and Hughes, 1994), Portugal (Mata and Portugal, 1994; Mata et al., 1995), Germany (Boeri and Cramer, 1992; Wagner, 1992, 1994), and Canada (Baldwin, 1995), very little is known about the post-entry performance of new firms in Italy (with the main exceptions – to our knowledge – of Brusco et al., 1979; Solinas, 1995; Giunta and Scalera, 1997; Santarelli, 1997, 1998), or about the process by which new firms either survive and grow, or else exit from the industry.

After reviewing, in Section 4.2, the recent literature on post-entry performance of new firms, the purpose of this paper is therefore to shed some light on industry dynamics in Italy. It does so by using a large and comprehensive longitudinal data base, identifying the start-up of new manufacturing firms and their subsequent post-entry performance. This enables us to link the survival and growth of firms in each manufacturing industry specifically to start-up size. While we find no evidence to suggest that the likelihood of survival is influenced by start-up size (Section 4.3), it turns out that the post-entry performance of new firms is similar to that found in other countries, in that Gibrat’s Law fails to hold (Section 4.4).

4.2 The post-entry performance of new firms

A body of literature has emerged recently which deals with the post-entry performance of new firms, thereby refocusing attention on the traditional division between a ‘Deterministic’ (or ‘Empiricist’) and a ‘Stochastic’ approach in the theory of the size distribution of firms (cf. Marris, 1979). The ‘Deterministic’ school tended to explain the growth of a firm and the process of concentration by firm behaviour and observable industry characteristics, along with ‘particular historical chains of cause and effect’ (Marris and Mueller, 1980, p. 47). The ‘Stochastic’ school contended that, in a world in which there are no initial interfir differences in profitability, size and market share, ‘if the magnitude of the successes
actually realized on different investment bundles is distributed randomly, we infer that future values of measures of different firms profit rates, size, market share, and past growth will differ solely because of chance’ (Mancke, 1974, p. 182). In particular, what Mancke (1974) asserts is that received empirical tests do not take the possibility that firm size differences are due to chance, so they cannot be seen as rejecting it.

As regards recent developments in the ‘Stochastic’ approach, the theoretical model of noisy selection introduced by Jovanovic (1982) suggests that the likelihood of survival should be random across all firms. Jovanovic presents a model in which the new entrants, which he terms entrepreneurs, face costs that are not only random but also differ across firms. A central feature of his model is that a new firm does not know what its cost function is – that is, its relative efficiency – but rather discovers it through the process of learning from its actual post-entry performance. In particular, Jovanovic (1982) assumes that entrepreneurs are unsure about their ability to manage a new-firm start-up and are therefore uncertain about their prospects of success (Jovanovic, 1994). Although entrepreneurs may launch a new firm based on a vague sense of expected post-entry performance, they only discover their true ability – in terms of managerial competence and of having based their firm on an idea viable in the market – once their business is established. Those entrepreneurs who discover that their firm is, in fact, efficient will survive and grow. Those who discover that their firm is inefficient will tend to exit from the industry. The firm will typically have a small start-up size, since actual experience in the industry is necessary for the entrepreneur to discover whether the new firm is able to gain a significant share in the market or not. But the salient feature of Jovanovic’s theory is that, *a priori*, a new firm has no expectation about its post-entry performance, which suggests that the likelihood of survival is simply stochastically distributed across firms. Similarly, according to Jovanovic’s model, the post-entry growth rates of new firms should be stochastically distributed across firms, and independent of both (observable) firm and industry specific characteristics.

A different set of recent theories – belonging in a broad sense to the ‘Deterministic’ tradition – suggest that the post-entry performance is not random across firms, but rather shaped by characteristics specific to the firm. Dixit (1989) and Hopenhayn (1992) both argue that the post-entry performance of firms will be influenced by the amount of sunk costs in the industry. A greater degree of sunk costs should reduce the likelihood of exit and lead to lower observed growth rates of surviving firms. Empirical evidence linking the extent of sunk costs to a lower likelihood of exit and lower observed growth rates of surviving firms has been provided by Audretsch (1991 and 1995).

Following a similar approach, other theories suggest that the post-entry performance of firms will be influenced by the degree of scale economies in an industry (Audretsch, 1995). In industries where the minimum efficient scale (MES) is high, it follows from the observed general small size of new-firm start-ups that the post-entry growth rates of the surviving firms will presumably also be high. However, those new firms not able to grow and to approach the MES level
of output will presumably be forced to exit from the industry, resulting in a relatively low likelihood of survival. In industries characterised by a low MES, neither the need for growth, nor the consequences of its absence are as severe, so that relatively lower growth rates but higher survival rates would be expected. Empirical evidence for the United States (Audretsch, 1991; Audretsch and Mahmood, 1995), United Kingdom (Dunne and Hughes, 1994), Portugal (Mata and Portugal, 1994) and Germany (Wagner, 1994) supports the theory that the likelihood of survival tends to be lower in industries characterised by a greater degree of scale economies.

The innovative environment of the industry has also been hypothesised to influence the post-entry performance of firms. The underlying argument is that, on average, less risk-averse entrepreneurs would be attracted to enter high-innovation opportunity industries. In such industries, one would expect the growth of successful enterprises to be greater, but the likelihood of survival would be correspondingly lower. Empirical evidence for the United States (Audretsch, 1991, 1995; Amirkhalkhaly and Mukhopadhyay, 1993) suggests that the likelihood of survival tends to decrease as the degree of innovative activity in an industry increases. But the growth rates of those firms that do survive tend to be positively related to the degree of innovative activity in the industry.

Several theories in the ‘Deterministic’ tradition have also argued that characteristics specific to the firm influence its post-entry performance (Audretsch, 1995). For example, a greater start-up size of the firm increases the likelihood of survival, since the cost disadvantage confronting a firm operating at a sub-optimal scale level of output will be reduced. At the same time, the greater the size of the firm, the less it will need to grow in order to exhaust potential scale economies and ultimately survive. That is, if the start-up size of the firm is large enough relative to the MES of the industry, the firm need not grow at all and will still be viable in the long run. Both a positive relationship between firm size and the likelihood of survival and a negative relationship between firm size and post-entry growth rates have been found in the United States (Hall, 1987; Dunne et al., 1988, 1989; Audretsch, 1991, 1995; Audretsch and Mahmood, 1995), United Kingdom (Dunne and Hughes, 1994), Portugal (Mata and Portugal, 1994; Mata et al., 1995), Germany (Wagner, 1994) and Canada (Baldwin, 1995). In addition, other studies (Doms et al., 1995) show that firm-specific factors such as capital intensity and the use of specific advanced manufacturing technologies influence the post-entry performance of new firms. Taken together, the wave of recent empirical studies therefore provides systematic evidence that post-entry performance is not stochastic across firms and industries, but is in most cases specific to factors particular to the firm and industry.

Indeed, the supporters of the Stochastic’ interpretation by no means imply that the growth of a firm is a totally chance phenomenon. In their turn, advocates of the ‘Deterministic’ view do not exclude that in some cases the growth of a firm may not be episodic in character. In this respect, Sutton (1995) has attempted to build a bridge between such apparently contrasting approaches. He stressed that each industry contains several clusters of products or firms that compete closely,
thereby exhibiting both some strategic interdependence and some degree of independence across submarkets. Combining these two features is, in Sutton’s view, a task to be addressed by those who intend to develop a theory leading to testable predictions as regards the impact of ‘strategic factors’, while simultaneously taking into account a ‘null hypothesis’ based on the descriptions of what happens in the industry when such strategic factors are absent and the only sources of skewness are represented by statistical ‘independence effects’ and cost differences between firms. From a purely theoretical viewpoint, Sutton (1995) develops a model of the size distribution of businesses related to a single market in which all active firms produce similar substitute goods. In his model, a bound is placed on the degree of skewness that might be generated by ‘independence effects’, and testable predictions are thus obtained for certain industries in which the ‘least skew distribution’ defined by the model is rarely violated.

4.3 The survival of new firms in Italian manufacturing

The greatest obstacle to the direct measurement and analysis of the post-entry performance of firms has been the lack of panel data sets tracking the evolution of firms subsequent to their birth. In this paper we use for Italy a data set from the National Institute for Social Security\(^5\) (INPS) which identifies new manufacturing firms (with at least one paid employee\(^6\)) born in January 1987 and tracks their post-entry performance at monthly intervals until the beginning of January 1993. The original INPS file has been subject to a cleaning procedure aimed at a correct identification of entry and failure times and at detecting inconsistencies in individual tracks due to administrative reasons, problems related to file truncation in January 1993, cancellations due to firm transfers and take-overs. This cleaning procedure has led to the reduction of the total number of firms included in the database from 1889 to 1570. Table 4.1 shows the new-firm survival and hazard rates for 1570 new manufacturing firms identified in the INPS data base in January 1987. The survival rate

<table>
<thead>
<tr>
<th>Month</th>
<th>Surviving firms</th>
<th>Survival rate(^a) (%)</th>
<th>Exiting firms</th>
<th>Hazard rate(^b) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/87</td>
<td>1570</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/88</td>
<td>1435</td>
<td>91.1</td>
<td>141</td>
<td>9.4</td>
</tr>
<tr>
<td>1/89</td>
<td>1286</td>
<td>81.6</td>
<td>149</td>
<td>11.0</td>
</tr>
<tr>
<td>1/90</td>
<td>1183</td>
<td>75.1</td>
<td>103</td>
<td>8.3</td>
</tr>
<tr>
<td>1/91</td>
<td>1077</td>
<td>68.3</td>
<td>106</td>
<td>9.4</td>
</tr>
<tr>
<td>1/92</td>
<td>988</td>
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<td>89</td>
<td>8.6</td>
</tr>
<tr>
<td>1/93</td>
<td>932</td>
<td>59.1</td>
<td>56</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Notes
\(a\) Share of new firms started up in January 1987 still in existence as of January of each subsequent year.
\(b\) Ratio of firms escaping from operation in each year following start-up to the average number of firms surviving during that year (mean of the absolute values at the beginning and the end of the relevant year).
is defined as the share of new firms started up in January 1987 still in existence as of January of each subsequent year. Thus, 1 year subsequent to start-up, 91% of the new firms still existed, whereas this value decreases to 59% at the end of the sixth year.

The hazard rate is defined as the risk of failure at each point in time, on the condition that the firm had survived up to the previous time period. The 1 year hazard rate is 9.4%, and then rises to 11% for the 2 year hazard rate, before falling to 5.8% for the 6 year hazard rate. As in previous studies dealing with other industrialised countries (Wagner, 1994; Audretsch, 1995; Audretsch and Mahmood, 1995; Mata et al., 1995), also in the case of Italian manufacturing hazard rates increase markedly during the first 2 years and tend to decrease non-monotonically (with a slight increase in the 4 year hazard rate) afterwards.

Table 4.2 shows the number of new entrants, the average start-up size (employment) and the survival rates for each disaggregated manufacturing industry. As Audretsch (1991, 1995) has found for the United States, Mata and Portugal (1994) for Portugal, and Wagner (1994) for Germany, the survival rates for Italy vary considerably across industries, ranging from 37.5% for the 6 year survival rate in office machinery and computers to 81.3% in mining and transformation of metals.

However, there is no clear evidence that the probability of survival tends to be higher in those sectors in which the start-up size is larger, and there are some sectors (like mining and transformation of metals and rubber and plastics) where a very small start-up size is associated with high survival rates. The substantial variations in survival rates across manufacturing industries are instead consistent with the findings of previous studies that characteristics specific to each industry shape the post-entry performance of firms in that industry. For instance, if one looks at the traditional consumer good industries one notes that these are characterised by survival rates which are around or below the manufacturing average (59.1%). In particular, this is true of the footwear and clothing industry, where 48.5% of the new firms started up in January 1987 had not exited the market by January 1993, and the food industry (47.6%). These are respectively industries of traditional and recent specialisation of Italian manufacturing, which are also characterised by low barriers to entry, low market concentration and a negligible level of sunk costs. The rate of entry is therefore remarkably high in such industries, but most firms exit the market before reaching the MES level of output, as a result of a ‘try and see’ entry process. The case of mechanical engineering and electrical and electronic engineering is different. These too are industries in which Italy holds a competitive advantage, and which are characterised by higher barriers to entry and sunk costs, although market concentration is still low. Survival rates equal respectively to 70.3% and 64.3% confirm that in these industries market selection is stronger and more effective at the pre-entry stage, whereas the entry process involves only those firms with a relatively higher probability of survival, namely those approaching the MES level of output.

Thus, in order to test the hypothesis that the likelihood of survival is shaped by what the literature has identified as the most important observable characteristic specific to the firm – its size – we must control for industry-specific factors. While
Table 4.2 New firm entry (absolute value), average start-up size (employment), and survival rates compared across manufacturing industries: 1987–1993

<table>
<thead>
<tr>
<th>Industry</th>
<th>New firm entry, January 1987</th>
<th>Average start-up size&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Survival rate, January 1993(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining and transfer of metals</td>
<td>16</td>
<td>7.9 (13.08)</td>
<td>81.3</td>
</tr>
<tr>
<td>Metal working</td>
<td>29</td>
<td>28.4 (74.86)</td>
<td>65.5</td>
</tr>
<tr>
<td>Mining and transfer of other minerals</td>
<td>20</td>
<td>6.3 (7.05)</td>
<td>60.0</td>
</tr>
<tr>
<td>Stone, clay, glass</td>
<td>73</td>
<td>13.73 (22.41)</td>
<td>57.5</td>
</tr>
<tr>
<td>Chemicals</td>
<td>49</td>
<td>65.88 (196.20)</td>
<td>55.1</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>118</td>
<td>9.11 (13.43)</td>
<td>55.9</td>
</tr>
<tr>
<td>Mechanical engineering</td>
<td>101</td>
<td>20.24 (48.46)</td>
<td>70.3</td>
</tr>
<tr>
<td>Office machinery and computers</td>
<td>7</td>
<td>7.43 (14.05)</td>
<td>37.5</td>
</tr>
<tr>
<td>Electrical and electronic engineering</td>
<td>129</td>
<td>12.43 (38.92)</td>
<td>64.3</td>
</tr>
<tr>
<td>Other means of transportation</td>
<td>20</td>
<td>19.5 (38.86)</td>
<td>55.0</td>
</tr>
<tr>
<td>Instruments</td>
<td>214</td>
<td>12.17 (30.18)</td>
<td>61.2</td>
</tr>
<tr>
<td>Food</td>
<td>82</td>
<td>11.07 (25.16)</td>
<td>47.6</td>
</tr>
<tr>
<td>Sugar, beverages and tobacco</td>
<td>27</td>
<td>14.6 (31.23)</td>
<td>66.7</td>
</tr>
<tr>
<td>Textiles</td>
<td>102</td>
<td>15.6 (29.55)</td>
<td>52.9</td>
</tr>
<tr>
<td>Leather products</td>
<td>54</td>
<td>9.74 (15.48)</td>
<td>61.1</td>
</tr>
<tr>
<td>Footwear and clothing</td>
<td>231</td>
<td>14.61 (34.62)</td>
<td>48.5</td>
</tr>
<tr>
<td>Wood and furniture</td>
<td>115</td>
<td>11.51 (24.58)</td>
<td>60.9</td>
</tr>
<tr>
<td>Paper and printing</td>
<td>109</td>
<td>10.23 (24.57)</td>
<td>55.0</td>
</tr>
<tr>
<td>Rubber and plastics</td>
<td>85</td>
<td>7.23 (9.60)</td>
<td>77.6</td>
</tr>
</tbody>
</table>

Note

<sup>a</sup> Standard deviation in brackets.

Audretsch (1991, 1995), Audretsch and Mahmood (1995); Wagner (1994); Mata et al. (1995) all control for industry specific characteristics by directly including measures reflecting various factors specific to the industry, here we follow the example of Dunne et al. (1988, 1989); Doms et al. (1995); Hall (1987), by estimating a model for new-firm survival for each manufacturing industry separately.
A specification for the start-up size/survival relationship is to measure the dependent variable in terms of months survived and to put forward a tobit estimation. In effect, the INPS data base tracks the post-entry performance of firms started in January 1987 only until January 1993. As a consequence, when testing the likelihood of survival of new manufacturing firms one may only consider the interval, named follow-up time, comprised between \( t = 1 \) (where 1 corresponds to January 1987) and \( t = T \) (with \( T \) corresponding with January 1993), during which \( N \) survived firms for each industry are observed. If a firm exited the market at any time comprised by \( t \) and \( T \) its failure time is correctly reported, otherwise one may only stress that its duration exceeds the threshold \( T \). To analyse this truncated distribution, we follow Greene (1993, pp. 691–697) in defining a new random variable, \( y \), transformed from the original one, \( y^* \), by

\[
y = T \quad \text{if} \quad y^* \geq T \\
y = y^* \quad \text{if} \quad 0 < y^* < T
\]

The regression model based on the earlier discussion is a common censored regression model, or tobit model, the general formulation of which is represented by the index function

\[
y_i = B'x_i + \varepsilon_i
\]

with

\[
y_i = T \quad \text{if} \quad y_i^* \geq T \\
y_i = y_i^* \quad \text{if} \quad 0 < y_i^* < T
\]

The results from the tobit regression (at the two-digit level), in which the dependent variable is the number of months that each new-born firm survived during the relevant period, are presented in Table 4.3. In effect, there is virtually no evidence to link firm size with survival, although 9 sectors out of 13 show the expected sign, and in three of these – mechanical engineering, textiles and leather products – the positive relationships prove to have some degree of significance (90%). Thus, irrespective of the high variability of start-up size identified for most sectors (cf. standard deviations reported in Table 4.2), the hypothesis that firm size is conducive to new firm survival is not supported by the data. This stands in contrast not only to the results found for other countries, such as Germany, Portugal, the United Kingdom and the United States, but also to the findings of Santarelli (1997, 1998) with respect to tourism services and the financial intermediation industry in Italy.

At least three explanations of this somewhat controversial result can be provided. First, it is likely that the underdeveloped and highly imperfect Italian capital market entails that barriers to entry in manufacturing industries characterised by high capital raising requirements (such as chemicals, electric and electronic
engineering, instruments, paper and printing and rubber and plastics) are comparatively higher than in other countries and in Italian tourism services and banking. Accordingly, new firms in such industries are subject to a pre-entry selection process which selects only those characterised by the choice of more capital intensive production techniques, larger availability of internal finance, and easier access to outside financing. Second, barriers to survival are instead lower within industrial districts, which are typical of the North-eastern and Central Italian regions, and in those industries (fabricated metal products, food, footwear and clothing, wood and furniture) which are characterised by low concentration, low capital and financial requirements and the presence of market niches in which competition from incumbents is less strong. Third, it might be the case that some firms registered their position for the first time in the INPS files in January 1997, after having been active for years in the informal sector of the economy.\(^7\) In this case, the ‘new firm’ identified in the

<table>
<thead>
<tr>
<th>Industry</th>
<th>Constant</th>
<th>Start-up size</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stone, clay, glass</td>
<td>81.28</td>
<td>-0.155</td>
<td>73</td>
</tr>
<tr>
<td>Chemicals</td>
<td>78.00</td>
<td>-0.03</td>
<td>49</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>73.70</td>
<td>0.210</td>
<td>118</td>
</tr>
<tr>
<td>Mechanical engineering</td>
<td>59.00</td>
<td>0.064</td>
<td>101</td>
</tr>
<tr>
<td>Electrical and electronic engineering</td>
<td>89.48</td>
<td>0.043</td>
<td>129</td>
</tr>
<tr>
<td>Instruments</td>
<td>56.63</td>
<td>0.655</td>
<td>214</td>
</tr>
<tr>
<td>Food</td>
<td>66.07</td>
<td>-0.134</td>
<td>82</td>
</tr>
<tr>
<td>Textiles</td>
<td>67.27</td>
<td>0.330</td>
<td>102</td>
</tr>
<tr>
<td>Leather products</td>
<td>66.88</td>
<td>1.580</td>
<td>54</td>
</tr>
<tr>
<td>Footwear and clothing</td>
<td>25.73</td>
<td>0.127</td>
<td>231</td>
</tr>
<tr>
<td>Wood and furniture</td>
<td>82.46</td>
<td>6.071</td>
<td>115</td>
</tr>
<tr>
<td>Paper and printing</td>
<td>72.91</td>
<td>0.11</td>
<td>109</td>
</tr>
<tr>
<td>Rubber and plastics</td>
<td>12.71</td>
<td>-0.890</td>
<td>85</td>
</tr>
</tbody>
</table>

Note
\(t\) statistics in brackets.
INPS file is in fact an established, although small and often marginal firm with a likelihood of survival comparatively higher than that of new firms in the strict sense.

Thus – due the peculiarities of some industries in Italian manufacturing and some general features of the Italian economy – firm size may prove not to affect significantly the likelihood of survival within any given industry.8

4.4 An empirical test of Gibrat’s Law

While there are various interpretations of Gibrat’s Law of Proportionate Effect (Gibrat, 1931), the most common view is that firm growth is independent of firm size, or that the ‘probability of a given proportionate change in size during a specified period is the same for all firms in a given industry – regardless of their size at the beginning of the period’ (Mansfield, 1962, pp. 1030–10319). Closer inspection, however, reveals at least three versions of Gibrat’s Law (for a recent survey, cf. You, 1995). The first version postulates that the law holds for firms that have exited out of the industry as well as for those still in existence. The second interpretation is that the law holds only for firms that have survived over the entire time period (Hart and Prais, 1956). According to this interpretation, firms that have exited from the industry should not be included in a sample used to test Gibrat’s Law statistically. The third version is that the law applies only to firms large enough to exceed the MES level of output (Simon and Bonini, 1958).10

As regards criticisms of Gibrat’s Law Lucas (1978, p. 514; cf. also Lucas, 1967) puts forward theories which are not in contrast with the Law of Proportionate Effect.11 Thus, although he rejects the theory on which Gibrat’s Law is based because it is not implied by the ‘Stochastic’ model, Lucas notes that in any case ‘there are empirical reasons for giving special attention to the special case which satisfies the law’. Nor is empirical estimation of Gibrat’s Law immune to criticism. For instance, business turnover has been shown to be highly influential on the estimated growth of firms in any given industry (Mandelbrot, 1963), whereas Audretsch and Mahmood (1995, p. 26) state that ‘although the skewed size distribution of firms persists with remarkable stability over time, it does not appear to be a constant set of small and sub-optimal scale firms responsible for this skewness’. In fact, if we take into account the processes of entry and exit, the log-normal distribution does not necessarily refer to the same firms over time, but to a constantly renewed population of firms.

These problems notwithstanding, the Law of Proportionate Effect has been widely studied over the last 40 years. Empirical studies have yielded varying results, depending upon the time period, size measure and interpretation used (Hymer and Pashigian, 1962; Mansfield, 1962; Singh and Wittington, 1975; Kumar, 1984). For example, Hart and Prais (1956) found that firm growth is roughly independent of the size of the firm, therefore providing empirical evidence consistent with Gibrat’s Law. In her turn, Hall (1987) assembled a large panel of US COMPUSTAT files and identified a 4% difference in the annual growth rates between firms in the 25th and 75th percentiles. The smaller firms
were found to grow faster than their larger counterparts. In addition, Hall found that the variance of growth rates is greater for small than for large firms. A series of studies (Dunne et al., 1988, 1989; Wagner, 1992; Audretsch, 1995; Cabral, 1995; Mata et al., 1995) have instead found, across a broad spectrum of analyses, that observed growth rates of new and small firms tend to be negatively related to their start-up size. On the basis of such results, Geroski (1995) thus concludes that Gibrat’s Law tends to hold for large firms that have attained the MES level of output, but not for firms operating at a level of output that is below MES. However, this conclusion is partly in contrast with the result recently obtained for a large sample of UK firms by Hart and Oulton (1996a,b) who show (a) that growth is negatively related to initial size, but also (b) that no significant relationship between growth and size emerges for larger firms.

Gibrat’s Law is formally expressed as:

\[ S_t = \varepsilon_t \times S_{t-1} \]  

where \( S_t \) is the size of the \( i \)th firm at time \( t \), \( S_{t-1} \) is the size of the \( i \)th firm at the previous time and \( \varepsilon \) is a random variable distributed independently of \( S_{t-1} \).

By following Chesher (1979), Gibrat’s Law can be empirically tested using the following specification:

\[ \log S_t = \alpha + \beta \log S_{t-1} + \varepsilon_t \]  

Gibrat’s Law will be confirmed if and only if \( \beta = 1 \). In the context of a regression model this implies that the estimated coefficient of \( \beta \) is not statistically different from one. By contrast, if \( \beta < 1 \) or \( \beta > 1 \) Gibrat’s Law is not accepted, since in the first case smaller firms would grow at a systematically higher rate than do their larger counterparts, whereas the opposite will be true in the second case.

Using the data base described in the previous section, we tested the first and the second interpretation of Gibrat’s Law introduced earlier. It was not possible to test the third interpretation, due – on the one hand – to the impossibility of identifying correctly the MES level of output for each of the relevant industries in Italian manufacturing, and – on the other hand – to the availability of data regarding only the growth rates of (small) new-born firms and not also those of (large) incumbent enterprises. Thus, we estimate Equation (4.3), where the start-up size in the initial period (January 1987) is taken to be \( S_{t-1} \), for all firms (i.e. those that exited from the industry and those still in existence) and for those surviving at least until January 1993 respectively. Our regression analysis consists of a series of within-industry cross-sections in which the relevant observations are represented by the number of firms in each two-digit manufacturing industry. The regression results from estimating Equation (4.3) in relation to the first interpretation are shown in Table 4.4.13

Based on the Wald Test for the hypothesis that \( \beta = 1 \), the empirical evidence is not consistent with Gibrat’s Law in 9 out of 13 industries with at least 40 new-born
firms, whereas it is not rejected for mechanical engineering, textiles, leather, and wood and furniture. Among the nine industries for which Gibrat’s Law does not hold, in four cases (fabricated metal products, electrical and electronic engineering, food, and paper and printing) the null hypothesis of $\beta = 1$ is rejected with a 95% level of confidence, and in the remaining five cases with a 99% level of confidence.

As regards the second interpretation of Gibrat’s Law (Table 4.5), this is rejected by the regression analysis in all but one of the 12 industries with at least 30 survived firms,\(^{14}\) the only exception being represented by the food industry. The empirical
evidence clearly suggests that, on the condition of firm survival, smaller new firms tend to grow faster than larger ones in all the remaining industries. All the estimated coefficients are significant and positive, but are less than one, while the null hypothesis of $H_0: \beta = 1$ is rejected in 11 cases out of 12 with a 99% level of confidence.

These results testing Gibrat’s Law for new-firm start-ups in Italy – in particular those obtained in relation to firms which survived until the end of the relevant period – are generally consistent with those found for the United States (Audretsch, 1995), United Kingdom (Dunne and Hughes, 1994), Portugal (Mata and Portugal, 1994), Germany (Wagner, 1992) and Canada (Baldwin, 1995).

<table>
<thead>
<tr>
<th>Industry</th>
<th>$\alpha$</th>
<th>$\beta$</th>
<th>$R^2$</th>
<th>$F$</th>
<th>White$^a$</th>
<th>Wald$^b$</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stone, clay, glass</td>
<td>1.47***</td>
<td>0.52***</td>
<td>0.29</td>
<td>16.17***</td>
<td>7.81***</td>
<td>11.08***</td>
<td>42</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>1.61***</td>
<td>0.45***</td>
<td>0.26</td>
<td>22.86***</td>
<td>11.63***</td>
<td>25.91***</td>
<td>66</td>
</tr>
<tr>
<td>Mechanical engineering</td>
<td>1.15***</td>
<td>0.74***</td>
<td>0.61</td>
<td>107.21***</td>
<td>1.00</td>
<td>13.37***</td>
<td>71</td>
</tr>
<tr>
<td>Electrical and electronic</td>
<td>1.36***</td>
<td>0.61***</td>
<td>0.42</td>
<td>58.80***</td>
<td>5.19*</td>
<td>16.84***</td>
<td>83</td>
</tr>
<tr>
<td>engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruments</td>
<td>1.18***</td>
<td>0.62***</td>
<td>0.46</td>
<td>108.20***</td>
<td>2.35</td>
<td>41.08***</td>
<td>131</td>
</tr>
<tr>
<td>Textiles</td>
<td>0.98***</td>
<td>0.79***</td>
<td>0.39</td>
<td>23.80***</td>
<td>1.80</td>
<td>1.64</td>
<td>39</td>
</tr>
<tr>
<td>Leather products</td>
<td>1.41***</td>
<td>0.57***</td>
<td>0.39</td>
<td>33.09***</td>
<td>6.91**</td>
<td>15.81***</td>
<td>54</td>
</tr>
<tr>
<td>Footwear and clothing</td>
<td>2.12***</td>
<td>0.28**</td>
<td>0.12</td>
<td>4.43**</td>
<td>3.08</td>
<td>30.08***</td>
<td>33</td>
</tr>
<tr>
<td>Wood and furniture</td>
<td>1.27***</td>
<td>0.64***</td>
<td>0.47</td>
<td>96.10***</td>
<td>1.05</td>
<td>29.74***</td>
<td>112</td>
</tr>
<tr>
<td>Paper and printing</td>
<td>1.42***</td>
<td>0.56***</td>
<td>0.48</td>
<td>63.01***</td>
<td>11.05***</td>
<td>32.17***</td>
<td>70</td>
</tr>
<tr>
<td>Rubber and plastics</td>
<td>1.36***</td>
<td>0.56***</td>
<td>0.24</td>
<td>19.70***</td>
<td>0.48</td>
<td>12.02***</td>
<td>65</td>
</tr>
</tbody>
</table>

Notes

i statistics in brackets.

a Null hypothesis: homoskedasticity; in the case of heteroskedasticity (at least 90% significance level) a consistent covariance matrix has been used (White’s correction).

b Null hypothesis: $H_0: \beta (start-up size coefficient) = 1$.

* Significant at the 90% level of confidence.

** Significant at the 95% level of confidence.

*** Significant at the 99% level of confidence.
Baldwin and Rafiquzzaman, 1995). As Jovanovic (1982) has argued and Audretsch (1995), Geroski (1995), Baldwin and Rafiquzzaman (1995) have shown, the process of entry involves learning. Those entrepreneurs who start a new business and learn that it is viable will tend to grow. If the firm is to survive, smaller firms must grow at a higher rate than their larger counterparts. Thus, post-entry growth rates of surviving firms are observed to be negatively related to firm size. This tendency is possibly reinforced in Italian manufacturing, where in most industries new firms operate at a level of output that is below MES and entry by (very) small firms is common, in particular within industries in which the most common organisational structure is of the ‘industrial district’ type (cf. Brusco et al., 1979; Solinas, 1995).

4.5 Concluding remarks

In this paper we have analysed industry dynamics in Italian manufacturing. The four main findings of the paper are: (1) survival patterns differ significantly across specific industries; (2) the hazard function has a bell shape with a peak at the second year of activity; (3) within each industry, start-up size is not statistically related to the likelihood of new-firm duration and (4) Gibrat’s Law does not apply to new-firm start-ups in most industries.

In view of recent theories about the links between firm size and observed growth rates of surviving firms, the issue may not be why Gibrat’s Law fails to hold among new and small enterprises, but rather why the likelihood of survival does not appear to be significantly related to firm size for new Italian manufacturing firms, as has been found to be the case in other countries and when analysing Italian tourism services and banking. The most plausible explanation is that, if Jovanovic’s model of noisy selection is correct, the inherent potential of each new-firm start-up is independent of its initial size. This independence is probably related to some peculiarities of the Italian economy, and to the inner features of most industries in Italian manufacturing.

Acknowledgements

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Notes


2 Number of new firms divided by the average number of firms operating in the relevant period.

3 Gross sales by entrants divided by total industry sales.

4 See also Hopenhayn (1992).

5 All private Italian firms are compelled to transfer to INPS national security payments for their employees; when a new firm is registered as ‘active’ in INPS files an entry can be identified, while a firm cancellation denotes a failure (this happens when a firm ultimately stops paying national security fees). Sometimes – for administrative reasons – cancellation is preceded by a period during which the firm results as ‘suspended’. In the present paper, suspended firms of this kind have been considered as exited from the market at the moment (month) of their transition from the status of ‘active’ to that of ‘suspended’ firm. Of course, firms which suspended operations only temporarily (for one or a few months) during the follow-up period and were ‘active’ in January 1993 have been considered as survived.

6 No information on firms that have zero paid employees is forthcoming from the INPS file. However, these firms usually identify self-employment and only occasionally become true entrants with positive post-entry growth rates.

7 As known, this is largely developed in some Italian industries (in particular consumer goods industries) and regions (mostly in the South).

8 In order to keep an acceptably high number of observations across sectors, this paper is organised at the two-digit disaggregation level. Analysis carried out for three-digit manufacturing industries would have allowed a more clear-cut identification of idiosyncratic industry characteristics, possibly affecting the degree of significance of the positive relationship between initial size and likelihood of survival.

9 In his study Mansfield analysed four 10-year periods in the steel and petroleum industries, and two shorter intervals in the tire industry. He found that Gibrat’s Law failed to hold in more than one-half of cases, regardless of the version tested.

10 It should be noted, however, that Simon and Bonini (1958) obtain results confirming this interpretation for a sample composed by the largest firms in United Kingdom and the United States, which by definition belong to the same size class.

11 For a discussion of the theoretical implications of different versions of Gibrat’s Law on concentration and industrial organisation, see McCloughan (1995).

12 Cf. also Geroski and Machin (1993); Geroski et al. (1997) who, for a sample of large, quoted UK firms, identify a positive, robust correlation between growth rates and profitability.

13 Taking into account firms that exited from the industry raises the problem of the logarithmic transformation of a final size which is equal to 0. To overcome this problem, and to allow the size of firms with one employee to decrease, the original series have been augmented by 0.1.

14 Chemicals were in this case excluded from analysis since only 27 firms in this industry survived until the end of the relevant period.

References


Brusco, S., Giovannetti, E., Malagoli, W., 1979. La relazione tra dimensioni e saggio di sviluppo nelle imprese industriali: una ricerca empirica. Università di Modena, Facoltà di Economia e Commercio, Studi e Ricerche dell’Istituto Economico, No. 5.


5 The relationship between size and growth

The case of Italian newborn firms

With Francesca Lotti and Enrico Santarelli

5.1 Introduction

According to Gibrat’s Law of Proportionate Effect, ‘the probability of a given proportionate change in size during a specified period is the same for all firms in a given industry – regardless of their size at the beginning of the period’ (Mansfield, 1962, p. 1031).

The purpose of this paper is to investigate whether (a) Gibrat’s Law fails to hold for new entrants in the early stage of their life cycle and (b) there is some convergence towards a Gibrat-like behaviour with the passage of time. Gibrat’s Law will therefore be tested within a subpopulation of new entrants. While failure of the Law – meaning that smaller firms have higher growth rates than their larger counterparts – has been found in most previous studies (Mansfield, 1962; Evans, 1987; Hall, 1987; Contini and Revelli, 1989; Dunne and Hughes, 1994; Hart and Oulton, 1996; Audretsch et al., 1999; for a survey, see Sutton, 1997), only a few studies have carried out longitudinal investigations of new firms during their infancy (to our knowledge, Dunne et al., 1989; Mata, 1994).

This paper is organized as follows. Section 5.2 presents the data set, while Section 5.3 discusses some methodological issues related to estimation of Gibrat’s Law and carries out the longitudinal investigation. Finally, Section 5.4 draws some conclusions.

5.2 Data

As discussed in the introduction, the peculiarity of this study is the analysis of Gibrat’s Law within a cohort of new entrants. So far, the main drawback to the empirical analysis of the post-entry behaviour of newborn firms has been the lack of longitudinal data sets tracking the evolution of firms after their birth. In this paper a unique data set is used from the Italian National Institute for Social Security (INPS), which identifies new firms in the instruments industry (with at least one paid employee) formed in January 1987 and tracks their post-entry employment performance at yearly intervals until January 1993.1

Since all private Italian firms are compelled to transfer to INPS national security payments for their employees, when a new firm is registered as ‘active’ for the first time an entry can be identified, while a firm cancellation denotes exit from the market (this happens when a firm ultimately stops paying national security fees). For the purposes of the present paper, the original INPS file has been subjected to a control aimed at correct identification of entry and failure times and at detecting inconsistencies in individual tracks for administrative reasons, problems related to file truncation in January 1993, cancellations due to firm transfers, mergers and take-overs.

5.3 Empirical model and results

The main relationship tested in this study is the original specification of Gibrat’s Law:

$$\log S_{i,t} = \beta_0 + \beta_1 \log S_{i,t-1} + \varepsilon$$

(5.1)

where $S_{i,t}$ is the size of the $i$th firm at time $t$, $S_{i,t-1}$ is the size of the same firm at the previous period and $\varepsilon$ is a random variable distributed independently of $S_{i,t-1}$. Following Chsher (1979, p. 404), if both sides of Equation (5.1) are exponentiated, it becomes clear that if $\beta_1$ is equal to unity, then growth rate and initial size are independently distributed and Gibrat’s Law is in operation. By contrast, if $\beta_1 < 1$ smaller firms grow at a systematically higher rate than do their larger counterparts, while the opposite occurs if $\beta_1 > 1$.

If one does not treat growth and exit as homogeneous phenomena, that is, assuming the disputable hypothesis that exit is equal to a minus one rate of growth, empirical estimates have to deal only with survived firms. Here the sample selection problem arises. Since growth can be measured exclusively for firms which have survived over the entire period examined and since slow-growing firms are more likely to exit, small fast-growing firms can be overrepresented in the surviving sample and this may bias the results of the empirical research. Needless to say, this observation applies in particular to new and small firms, for which the hazard rate is generally high. As discussed in Hall (1987), Evans (1987), Mata (1994), Dunne and Hughes (1994) and Sutton (1997), the appropriate econometric method to deal with this problem is the two-step procedure suggested by Heckman (1979) (see also Amemiya, 1984). Accordingly, we added to the main equation an additional explanatory variable (the inverse Mill’s ratio) obtained by a probit model (selection equation) estimating the relationship between firm’s survival and firm’s size at the beginning of the examined period:

$$P(f_i = 1) = F(\delta + \gamma \log S_{i,t-1} + \phi \log S^2_{i,t-1} + \mu)$$

(5.2)

with: $f_i = 1$ survivor; $f_i = 0$ exit; $\mu =$ disturbance.

Since the relationship between size and survival can assume a non-linear feature (as in Evans, 1987; Dunne and Hughes, 1994; Harhoff et al., 1998), a squared
term was introduced in the selection equation. While Equation 5.1 in isolation had been preliminarily estimated through OLS, the sample selection model including Equation 5.2 was estimated using a two-stage maximum likelihood method. As in most of previous empirical studies, tests for heteroscedasticity were carried out using the OLS estimations of Equation 5.1 and White’s (1980) correction introduced when necessary, both in the OLS and in the sample selection model (SSM) estimations. The possible occurrence of persistence in firms’ patterns of growth was tested (as in Kumar, 1985 and Dunne and Hughes, 1994) using annual growth rates: since no significant AR(1) process emerged, the aforementioned specification was not extended.²

The empirical test of Equation 5.1 should shed some light on the following two questions:

1. Is the overall inverse relationship between size and growth confirmed during the infancy of newborn firms?
2. Is there a process of convergence towards a Gibrat-like pattern of growth with the passage of time?

If these two hypotheses were jointly supported by the data, Gibrat’s Law would exhibit a behaviour dependent on the firm’s life cycle: the Law would fail to hold during the first years after entry and would become acceptable with the passage of time.

Table 5.1 reports the OLS and SSM results concerning the estimations of Equation 5.1. Each panel of the table is organized as follows. In the first two columns results from the estimations on the entire six-year period are reported, along with the usual statistical diagnoses (including the correlation between the selection and growth equation, \( \rho \)) and with a specific \( t \)-test of the validity of Gibrat’s Law (\( \beta = 1 \); question (1)); the final rows report the White’s test for heteroscedasticity (when significant a consistent covariance matrix has been used) and sample sizes with and without exits. In the following columns, the same estimations are repeated for each year, in order to characterize the possible convergence path with the passage of time (question (2)).

Consider first the result for the six-year period. Both the OLS and the SSM estimates of \( \beta_1 \) carried out for all firms are significantly less than unity (0.79 and 0.59 respectively) and this means that, in general, smaller firms grow faster than their larger counterparts (this result is consistent with those emerged from most of previous studies).

Yet, the departure from Gibrat’s Law tends to become less marked year after year. In effect, the value of \( \beta_1 \) in the SSM estimate is equal to 0.77 in 1988 (significantly different from 1 at the 99% level of confidence), and this suggests that, immediately after entry, smaller firms have to rush to achieve an acceptable size. Conversely, as shown by the increase of \( \beta_1 \) and by the non-significant values of \( t(\beta_1 = 1) \) for subsequent years, once smaller firms reach a size large enough to enhance their likelihood of survival, their patterns of behaviour conform to those of larger firms.
Table 5.1 OLS and sample selection model (SSM) estimates of Gibrat’s Law: instruments industry (Italy)

<table>
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<tr>
<th>All firms</th>
<th>OLS 88–93</th>
<th>SSM 88–93</th>
<th>OLS 88</th>
<th>SSM 88</th>
<th>OLS 89</th>
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<th>OLS 93</th>
<th>SSM 93</th>
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<tr>
<td>( \beta_0 )</td>
<td>0.98***</td>
<td>1.44***</td>
<td>0.67***</td>
<td>0.61***</td>
<td>0.23***</td>
<td>0.24</td>
<td>0.01</td>
<td>-0.01</td>
<td>0.13*</td>
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<td>0.05</td>
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<td>0.08</td>
<td>0.03</td>
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<tr>
<td>( \beta_1 )</td>
<td>0.79***</td>
<td>0.59***</td>
<td>0.77***</td>
<td>0.95***</td>
<td>0.96***</td>
<td>1.02***</td>
<td>0.99***</td>
<td>0.94***</td>
<td>0.94***</td>
<td>0.94***</td>
<td>0.96***</td>
<td>0.94***</td>
<td>0.94***</td>
<td>0.95***</td>
</tr>
<tr>
<td>( \rho )</td>
<td>( t(\beta_1 - 1) )</td>
<td>3.53***</td>
<td>6.53***</td>
<td>5.75***</td>
<td>6.73***</td>
<td>2.50**</td>
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<td>0.42</td>
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<td>1.33</td>
<td>1.55</td>
<td>2.00**</td>
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<td>266.44***</td>
<td>1408.94***</td>
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<td>518.73***</td>
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<td>-</td>
<td>0.88</td>
<td>-</td>
<td>0.89</td>
<td>-</td>
</tr>
<tr>
<td>Whiteb</td>
<td>1.17</td>
<td>-</td>
<td>6.17***</td>
<td>-</td>
<td>3.86**</td>
<td>-</td>
<td>3.31**</td>
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<tr>
<td>N. surv.</td>
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<td>183</td>
<td>168</td>
<td>155</td>
<td>141</td>
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<th>SSM 92</th>
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<th>SSM 93</th>
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<td>( \beta_0 )</td>
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<td>0.70**</td>
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<td>( \beta_1 )</td>
<td>0.61***</td>
<td>0.81***</td>
<td>0.74***</td>
<td>0.73***</td>
<td>0.84***</td>
<td>0.83***</td>
<td>1.01***</td>
<td>1.28***</td>
<td>0.61***</td>
<td>1.30***</td>
<td>0.84***</td>
<td>0.92***</td>
<td>0.85***</td>
<td>0.92***</td>
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<td>( \rho )</td>
<td>( t(\beta_1 - 1) )</td>
<td>1.99**</td>
<td>0.67</td>
<td>2.60**</td>
<td>1.73*</td>
<td>1.78*</td>
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<td>22.93***</td>
<td>87.93</td>
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<td>33.90***</td>
<td>19.98***</td>
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<td>-</td>
<td>0.60</td>
<td>-</td>
<td>0.57</td>
<td>-</td>
</tr>
<tr>
<td>Whiteb</td>
<td>1.24</td>
<td>-</td>
<td>2.46*</td>
<td>-</td>
<td>3.86**</td>
<td>-</td>
<td>2.01</td>
<td>-</td>
<td>1.42</td>
<td>-</td>
<td>0.74</td>
<td>-</td>
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<tr>
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<td>58</td>
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<td>64</td>
<td>52</td>
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<th>SSM 88–93</th>
<th>OLS 88</th>
<th>SSM 88</th>
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<th>OLS 93</th>
<th>SSM 93</th>
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<tbody>
<tr>
<td>( \beta_0 )</td>
<td>0.60***</td>
<td>1.24***</td>
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<td>0.48**</td>
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<td>0.99***</td>
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<td>1.06***</td>
<td>1.03***</td>
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<td>0.99***</td>
<td>0.92***</td>
<td>0.92***</td>
<td>0.92***</td>
<td>0.91***</td>
</tr>
<tr>
<td>( \rho )</td>
<td>( t(\beta_1 - 1) )</td>
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<td>1.68*</td>
<td>1.70*</td>
<td>3.46***</td>
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<td>-</td>
<td>2.00**</td>
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<td>1.60</td>
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<td>-</td>
<td>0.77</td>
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<tr>
<td>Whiteb</td>
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<td>109</td>
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<td></td>
<td></td>
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<tr>
<td>N. surv.</td>
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<td>81</td>
<td>101</td>
<td>104</td>
<td>103</td>
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</tr>
</tbody>
</table>

Notes
* Significant at 90% level of confidence; ** Significant at 95% level of confidence; *** Significant at 99% level of confidence.
a \( t \) test; null hypothesis; \( \beta_1 - 1 \); in the only case in which \( \beta_1 \) was not significantly different from 0, the \( t \) test was not carried out.
b F-statistic; null hypothesis; homoskedasticity; in case of heteroskedasticity (at least at 90% level of confidence) a consistent covariance matrix was used (White's correction).
These results on all firms capture both the dynamics within size classes and the differences between size classes. In order to control for this problem, separate estimates for micro-firms (less than five employees) and larger firms have been carried out.3

Looking at the results for micro-firms and larger firms over the entire period and year by year, one can conclude that previous results are confirmed within each of the two size classes. While in general Gibrat’s Law is not confirmed, once attention is turned to firms’ post-entry evolution a convergence – although not monotonic – towards a Gibrat-like pattern of growth can be detected.

5.4 Conclusions

The results from the OLS and SSM estimates support the hypothesis that Gibrat’s Law exhibits a behaviour dependent on the firm’s life cycle. The law fails to hold during the first years after start-up, and becomes acceptable after a given threshold in terms of age and size is reached. Thus, this empirical investigation suggests that while in their very early stages of life smaller newborn firms have to rush in order to reach the minimum efficient scale (thereby increasing their likelihood of survival), after a few years following start-up the growth rates of all new entrants seem to converge towards a Gibrat-like pattern.

Acknowledgements

Thanks are due to David Audretsch for helpful suggestions. Santarelli acknowledges financial support from MURST (quota 60%).

Notes

1 No information on firms with zero paid employees is obtainable from the INPS file; however, these firms usually identify self-employment and only occasionally become true entrants with positive post-entry employment growth rates.
2 Results about persistence and those from the selection equations are available from the authors upon request.
3 Given the characteristics of our database, including all firms born in January 1987, and the specific features of the instruments industry in Italy (dominated by small firms), most of the included firms show a very small start-up size and micro-firms (less than five employees) represent more than 50% of the initial sample. For this reason and in order to assure an acceptable number of observations over time, data have been split into two size classes: micro-firms (one to five employees) and larger firms (more than five employees).

References


6 Does Gibrat’s Law hold among young, small firms?

With Francesca Lotti and Enrico Santarelli

6.1 Introduction

A commonly accepted interpretation of the Law of Proportionate Effect identified by Robert Gibrat (1931) is that the growth rate of a given firm is independent of its size at the beginning of the period examined. In other words, ‘the probability of a given proportionate change in size during a specified period is the same for all firms in a given industry – regardless of their size at the beginning of the period’ (Mansfield, 1962, p. 1031).

Gibrat’s Law can be empirically tested in at least three different ways. First, one can assume that it holds for all firms in a given industry, including those that have exited the industry during the period examined (setting the proportional growth rate of disappearing firms equal to minus one). Second, one can postulate that it holds only for firms that survive over the entire time period. If survival is not independent of firm’s initial size – that is, if smaller firms are more likely to exit than their larger counterparts – the empirical test can be affected by a sample selection bias and estimates must take account of this possibility (this observation applies in particular to new and small firms, for which the hazard rate is generally high; see Section 6.3 below). Third, one can state that Gibrat’s Law only applies to firms large enough to have overcome the minimum efficient scale (MES) of a given industry (for instance, Simon and Bonini (1958) found that the Law was confirmed for the 500 largest US industrial corporations).

This paper investigates whether Gibrat’s Law holds for new entrants in the early stages of their life cycle. For each examined sector Gibrat’s Law will be tested only within the subpopulation of new entrants, in order to assert whether: (1) the main result obtained by previous studies – that is, that smaller firms grow faster than larger firms – still holds among young, small firms; (2) the alleged departure from Gibrat’s Law over time is confirmed by the data or, conversely, a convergence towards a Gibrat-like pattern of growth occurs with the passage of time. The paper is organized as follows. Section 6.2 surveys the rich empirical literature on Gibrat’s Law, with particular emphasis on the studies dealing with
the post-entry performance of newborn firms; Section 6.3 presents the data set and discusses some methodological issues related to estimation of Gibrat’s Law, while Section 6.4 conducts a within-industry longitudinal investigation of the second version of Gibrat’s Law. Finally, Section 6.5 summarizes the main results obtained in the present study.

6.2 Previous empirical tests of Gibrat’s Law

While early studies tended to confirm Gibrat’s Law (Hart and Prais, 1956; Simon and Bonini, 1958; Hymer and Pashigian, 1962), subsequent research began to question its overall validity. In this respect, the contribution by Edwin Mansfield (1962) is a point of departure for empirical analyses of industry dynamics.1

Mansfield (1962) investigated three industries (steel, petroleum, tires) in different time periods between 1916 and 1957. The specification used by Mansfield relates the logarithm of final size (measured in terms of capacity in steel and petroleum and in terms of employment in tires) to the logarithm of initial size and investigates whether the coefficient is equal to one (in which case Gibrat’s Law is confirmed) while an estimated coefficient less than one implies that smaller firms grow more than their larger counterparts. As far as the first version of the Law of Proportionate Effect is concerned, Mansfield found that it failed to hold in seven cases out of ten, while the second version was rejected in four of his ten samples. As correctly pointed out by Sutton (1997, p. 44), Mansfield was aware that the rejection of the Law may be a consequence of the fact that smaller firms are more likely to die; if this is the case, both versions of the Law may be incorrectly specified. In particular, the second version of the Law has its main point of weakness in not having taken into account the distribution of growth rates that would result if all firms survive.

Table 6.1 summarizes a selection of previous empirical studies that have dealt specifically with Gibrat’s Law and found that small firms grow faster than their larger counterparts.

As far as previous Italian studies are concerned, Brusco, Giovannetti and Malagoli (1979) tested Gibrat’s Law over the 1966–1977 period for about 1,250 small firms operating in the province of Modena (in the Emilia-Romagna region of Italy) and belonging to three manufacturing industries: ceramic tiles, metal working and mechanical, textiles. Using quarterly data on firms’ employees, they adopted the same method as Mansfield (1962) by regressing the logarithm of final size on that of initial size. They found the Law held in most cases when all firms were included, but they obtained the opposite results when only surviving firms were included (a coefficient less than one, revealing that smaller surviving firms tended to grow faster than their larger counterparts).

The results obtained by Brusco, Giovannetti and Malagoli (1979) prompt the following important qualification: if one assumes the reasonable hypothesis that small firms with lower growth rates are more likely to die, estimates based on surviving firms are affected by a sample censoring which tends to magnify the impact of rapidly growing small firms. Thus, the rejection of the Law, and the
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Controls</th>
<th>Data</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mansfield, 1962</td>
<td>Logarithmic specification</td>
<td>None</td>
<td>About 1,000 US firms in steel, petroleum and tires over 1916–1957.</td>
<td>Gibrat’s Law fails to hold in about 50% of cases: smaller firms grow faster.</td>
</tr>
<tr>
<td>Brusco, Giovannetti and Malagoli, 1979</td>
<td>Logarithmic specification</td>
<td>None</td>
<td>1,250 Italian firms in ceramics, mechanical and textiles over 1966–1977.</td>
<td>Gibrat’s Law fails to hold in most cases when only survived firms are included: smaller firms grow faster.</td>
</tr>
<tr>
<td>Evans, 1987a,b</td>
<td>Growth rate regression</td>
<td>Sample selection, heteroskedasticity</td>
<td>42,339 US manufacturing firms, subdivided in 100 sectors.</td>
<td>Smaller firms grow faster in 89 industries out of 100.</td>
</tr>
<tr>
<td>Wagner, 1992</td>
<td>Logarithmic specification</td>
<td>Persistence</td>
<td>About 7,000 West German manufacturing plants over 1978–1989: (only incumbents).</td>
<td>Gibrat’s law fails to hold, but no evidence that smaller firms grow faster.</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Methodology</td>
<td>Sample Description</td>
<td>Findings/Notes</td>
<td></td>
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<td>------------------------------</td>
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<td></td>
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<tr>
<td>Mata, 1994</td>
<td>Growth rate regression</td>
<td>Sample selection, heteroskedasticity, persistence</td>
<td>Smaller firms grow faster.</td>
<td></td>
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<tr>
<td>Hart and Oulton, 1996</td>
<td>Logarithmic specification</td>
<td>Heteroskedasticity, persistence</td>
<td>Smaller firms grow faster.</td>
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<tr>
<td>Almus and Nerlinger, 2000</td>
<td>Logarithmic specification</td>
<td>Persistence</td>
<td>Smaller firms grow faster.</td>
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<td>Oulton, 1996</td>
<td>Growth rate regression</td>
<td>Sample selection, heteroskedasticity</td>
<td>Smaller firms grow faster.</td>
<td></td>
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<tr>
<td>Nerlinger, 2000</td>
<td>Growth rate regression</td>
<td>Sample selection, heteroskedasticity</td>
<td>Smaller firms grow faster.</td>
<td></td>
</tr>
<tr>
<td>Heshmati, 2001</td>
<td>Growth rate regression</td>
<td>Sample selection, heteroskedasticity</td>
<td>Results very sensitive with respect to the method of estimation.</td>
<td></td>
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<tr>
<td>Lotti, Santarelli and Vivarelli, 2001</td>
<td>Logarithmic specification</td>
<td>Persistence</td>
<td>Initially, smaller firms grow faster. A few years after entry a Gibrat-like pattern of growth is detected.</td>
<td></td>
</tr>
<tr>
<td>Fotopoulos and Louri, 2001</td>
<td>Growth rate quantile regression</td>
<td>Sample selection, heteroskedasticity</td>
<td>Firm size is found to have a negative effect on firm growth, particularly in the case of fast growing firms. Gibrat's Law is not rejected for large firms; rejected for small and medium sized firms under financial constraints.</td>
<td></td>
</tr>
<tr>
<td>Becchetti and Trovato, 2002</td>
<td>Growth rate multivariate regression</td>
<td>Sample selection, heteroskedasticity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
conclusion that smaller firms tend to have growth rates higher than their larger counterparts, may be partly due to a sample selection bias. Most of the recent literature has been devoted to finding an econometric specification able to deal with this kind of problem.

In parallel to the crucial problem of sample selection, two more traditional econometric issues arise when one tries to test Gibrat’s Law. The first concerns the heteroskedasticity which may occur when the Law is not confirmed (if small firms grow faster than their larger counterparts, the variance of growth should tend to decrease with size). The second one was first discussed in a seminal paper by Chesher (1979) and concerns the fact that, when there is serial correlation in growth rates, ordinary least squares (OLS) estimators are inconsistent ‘even though estimation proceeds using cross-sectional data’ (ibid., p. 404). The studies now discussed have dealt jointly with one or more of these econometric problems.

For instance, Kumar (1985) used data on 1,747 UK quoted firms in manufacturing and services over the period 1960–1976 to measure size in terms of net assets, physical assets, equity assets, employment and sales. Following Chesher (1979), Kumar controlled for persistence in growth and found weak evidence of serial correlation; he then tested a logarithmic specification of Gibrat’s Law and found coefficients significantly less than unity, regardless of the measure adopted.

Bronwyn Hall (1987) studied 1,778 US manufacturing firms which had already reached a certain minimum size (measured in terms of employment) and belonged to two samples spanning the periods 1972–1979 and 1976–1983. Unlike Mansfield (1962), Hall directly regressed growth rates on the logarithm of the initial size and found that the observed negative relationship between size and growth was robust to corrections for both sample attrition and heteroskedasticity. The control for sample bias was carried out by means of a maximum likelihood estimation of the sample selection model, using a probit selection equation which related survival and initial size.

Evans (1987a) analysed 100 4-digit manufacturing industries using firm level data drawn from the US Small Business Data Base (42,339 firms). The novel feature of this study was its introduction of age as a possible factor – in addition to size measured in terms of employment – in explaining departure from Gibrat’s Law. Accordingly, Evans carried out separate estimates for firms six years old or younger and for firms seven years or older and he included age as an additional regressor in the econometric specification (similar to the one used by Hall, 1987). A negative relationship between growth and size was found in 89% of the industries examined, while a negative relationship between growth and age was verified in 76% of the industries. Like the previous study, the estimation procedure controlled for sample selection bias and heteroskedasticity (both in Hall, 1987 and in this study heteroskedasticity was dealt with using White’s (1980) correction). Similar results were obtained in the companion study by Evans (1987b).

Evans’s two studies suggested that the proportional rate of growth of a firm conditional on survival is decreasing both in size and age. Interestingly for the purposes of the present study, his results were confirmed by Contini and Revelli (1989)
using data from a panel of manufacturing firms located in the Northern Italian region of Piedmont (although the departures from Gibrat’s Law were considered ‘modest’ by Contini and Revelli).

The joint influence of size and age on firms’ growth patterns suggests that small and young firms must ‘rush’ in order to survive in the market, whereas more established and larger firms tend to converge towards a Gibrat-like pattern of growth. In economic terms, young firms entering the market at a sub-optimal scale may experience decreasing average costs and enjoy rapid growth, while well-established mature firms can relax along a flattening average cost curve (see Acs and Audretsch, 1990; Audretsch, 1995). Differently from Evans (1987a,b), our study focuses only on young firms (less than 6 years old) and age will not be an additional regressor but rather a longitudinal dimension (see Section 6.3).

Dunne, Roberts and Samuelson (1989) confirmed the empirical patterns found in the studies discussed earlier: within each age category, growth rates decline along employment size classes, while within each size class, growth rates decline with increases in plant age. Dunne, Roberts and Samuelson obtained these results from data on 219,754 individual plants – rather than firms as in the previous studies – collected in five US censuses of manufactures (1963–1967–1972–1977–1982). Unlike Evans (1987a,b) and Hall (1987), the authors did not use a standard sample selection model but preferred a grouping procedure which enabled them to represent 15 combinations of age and size classes by means of 15 dummy variables.

In contrast to the previous American studies, Wagner (1992) did not control for sample selection and heteroskedasticity but for autocorrelation in growth rates. Using data on around 7,000 manufacturing establishments in Lower Saxony over the period 1978–1989, he found that the validity of Gibrat’s Law was rejected in most cases, but he did not come up with systematic evidence that small firms grow faster than larger ones. In contrast with Kumar (1985) and Dunne and Hughes (1994, see later), Wagner found a ‘persistence of change’ (ibid., p. 129) whereby growth appeared to be an autocorrelated process (the presence of contrasting results on the possible persistence in firms’ growth has been pointed out by Caves, 1998, pp. 1949–1950).

Another important contribution to investigation of Gibrat’s Law has been made by Dunne and Hughes (1994), who used the original Mansfield-Chesher specification (see Section 6.3) and tested the Law of Proportionate Effect over the periods 1975–1980 and 1980–1985 using 2,149 quoted and unquoted UK companies belonging to 19 different manufacturing industries. After controlling for sample attrition and heteroskedasticity by means of standard procedures similar to those used by Hall (1987) and Evans (1987a,b), Dunne and Hughes found further confirmation that smaller companies tend to grow faster than larger ones; they also found that younger companies, for a given size, tended to grow faster than old ones. These results proved robust after controlling for autocorrelation in growth rates (very weak in this particular sample; see Dunne and Hughes, 1994, pp. 129–130).

José Mata (1994) studied the relationship between size – measured in terms of employment – and growth for 3,308 entrants into Portuguese manufacturing in 1983.
Mata did not use the Mansfield-Chesher specification, but instead made direct estimates of growth depending on size. After controlling for sample attrition and heteroskedasticity in the usual ways (sample selection model and White’s correction), he found an overall negative relationship between initial size and post-entry rate of growth. This result concerning newborn firms was consistent with previous studies on incumbent firms. Interestingly enough, over the post-entry period 1984–1987, the negative relationship between size and growth proved to be rather stable, with no indication of convergence towards a Gibrat-like pattern of growth.

More recently, Hart and Oulton (1996, 1999) have used data on 87,109 UK incumbent companies over the period 1989–1993 and tested the Chesher-Mansfield specification measuring size in terms of employment, sales and net assets. In all cases, they found an overall estimated coefficient of less than one: on average, small firms grow more quickly than larger ones. Unlike most previous studies, Hart and Oulton (1996) did not control for sample selection.

An important recent contribution has been the paper by Harhoff, Stahl and Woywode (1998). Although the purpose of this study is not direct verification of Gibrat’s Law, but rather examination of the relationship between firm’s legal form and survival and growth, it introduces initial size (in terms of employment) and age in the growth equation as controlling variables. The estimates are based on data concerning 10,902 West German firms over the period 1989–1994. After controlling for sample attrition (Heckman’s model) and heteroskedasticity (White’s correction), the authors confirm previous results on the negative correlation between employment growth and firm’s size and age.

Almus and Nerlinger (2000) focused their attention on firms younger than six years, using West German manufacturing data on start-ups in the period 1989–1996 (subdivided into five periods with the following number of observations: 1990–1992: 784 firms; 1991–1993: 1,420; 1992–1994: 2,831; 1993–1995: 3,495; 1994–1996: 4,278). The chosen logarithmic specification of Gibrat’s Law is taken from Chesher (1979) and hence controls for autocorrelation, but not for heteroskedasticity and sample selection. Almus and Nerlinger find that the Law is rejected in all cases with the estimated parameters smaller than one, and except for two cases always significantly different from one; in addition, the deviation from Gibrat’s Law decreased with increasing firm size.

Fotopoulos and Louri (2001) perform a non-parametric Kernel Density estimation, an ordinary least squares estimation and a quantile regression in dealing with a sample of 2,640 Greek manufacturing firms that were active both in 1992 and 1997, in this way escaping the problem of firms exiting before the end of the period. Firm size and firm age are found to exert a definitely negative effect on growth, in particular in the case of fastest growing firms.

Controlling for various factors characterizing the sample firms, their capital structure, performance, human capital and local labour market conditions, Heshmati (2001) shows that the relationship between the growth, size and age of firms is very sensitive with respect to the method of estimation, functional form and definition of growth and size. In a preliminary study on the post-entry
performance of newborn firms in the instruments industry, Lotti, Santarelli and Vivarelli (2001) carry out separate estimates for micro-firms (having fewer than 5 employees) and larger firms, controlling for sample attrition (Heckman’s two-step procedure), heteroskedasticity and autocorrelation. While in general Gibrat’s Law is not confirmed, once attention is focused on firms’ post-entry evolution a non-monotonic convergence towards a Gibrat-like pattern of growth is identified. Finally, Becchetti and Trovato (2002), investigating a sample of Italian firms in various industries, find that the hypothesis of independence of firm growth from the initial size is not rejected for larger firms with more than 100 employees, whereas Gibrat’s Law does not hold in the case of smaller firms with less than 100 employees.

6.3 Data and methodology

6.3.1 Data

The main hindrance to empirical analysis of the post-entry performance of newborn firms has been the lack of longitudinal data sets tracking the evolution of firms subsequent to their birth. In this paper we use a unique data set from the Italian National Institute for Social Security (INPS). This data set identifies new manufacturing firms (with at least one paid employee) born in January 1987 and tracks their post-entry employment performance at monthly intervals until January 1993. No information on firms with zero paid employees is obtainable from the INPS file; however, these firms usually identify ‘solo self-employment’ (as defined by Bögenhold, Fachinger and Leicht, 2001) which only occasionally becomes true entry with positive employment growth rates in the follow-up period. Thus, focusing on such firms is not particularly important for the purposes of this study.

All private Italian firms are obliged to pay social security contributions for their employees to INPS. Consequently, the registration of a new firm as ‘active’ signals an entry into the market, while the cancellation of a firm denotes an exit from it (this happens when a firm finally stops paying national security contributions). For administrative reasons – delays in payment of the social security contributions, for instance, or uncertainty about the actual status of the firm – cancellation may sometimes be preceded by a period during which the firm is ‘suspended’. The present paper considers these suspended firms as exiting from the market at the moment (month) of their transition from the status of ‘active’ to that of ‘suspended’, while firms which have halted operations only temporarily (for one or a few months) during the follow-up period, and which were ‘active’ in January 1993, have been treated as survivors.

In addition to the procedure described earlier, the original INPS file was subjected to a further control, in order to identify entry and failure times correctly and to detect inconsistencies in individual tracks due to administrative factors, problems related to file truncation in January 1993, cancellations due to firm transfers, mergers and take-overs. This cleaning procedure reduced the total number of firms in the database from 1,889 to 1,570.
6.3.2 Econometric methodology

The central relationship tested in this study is the original logarithmic specification of Gibrat’s Law:

$$\log S_{i,t} = \beta_0 + \beta_1 \log S_{i,t-1} + \varepsilon_{i,t}. \quad (6.1)$$

Following Chesher (1979, p. 404), if both sides of Equation (6.1) are exponentiated, it becomes clear that if $\beta_1$ is equal to unity, then growth rate and initial size are independently distributed and Gibrat’s Law is in operation. By contrast, if $\beta_1 < 1$ smaller firms grow at a systematically higher rate than do their larger counterparts, while the opposite is the case if $\beta_1 > 1$.

If – as in the majority of previous studies – growth and exit are not treated as homogeneous phenomena (i.e. assuming the disputable hypothesis that exit is equal to a minus one rate of growth), empirical estimates need to deal only with surviving firms, obtaining results conditional on survival (i.e. we have to deal with conditional objects). By using such a methodology, Audretsch, Santarelli and Vivarelli (1999) found that, for Italian manufacturing, the post-entry growth rates of surviving firms are negatively correlated with their start-up size.

In this paper we use the quantile regression as a suitable methodology to deal with conditional objects by hypothesizing the existence of an unobserved behavioural model. Normally, this leads to a deviation of the distribution of the error terms from the canonical hypotheses of normality and homoskedasticity. In such a framework, the quantile regression (QR) represents a robust alternative to the least squares estimation: it consists in a Least Absolute Deviation estimator (LAD) that fits the median to a linear function of the covariates. In this way, the estimates are robust for all the deviations from the normality of the error terms and especially for the presence of outliers. This methodology defines the conditional quantiles as a minimization problem of a non-differentiable function in $\beta$ that can be easily solved by linear programming (Buchinsky, 1995). The point of departure is the definition of the sample quantiles, which is extended then to a linear model (Koenker and Bassett, 1978).

The $\theta$th sample quantile, with $0 < \theta < 1$, is defined as the:

$$\min_{b \in \mathbb{R}} \left[ \sum_{i \in \{y_i \geq b\}} \theta |y_i - b| + \sum_{i \in \{y_i < b\}} (1 - \theta) |y_i - b| \right]. \quad (6.2)$$

Dealing with the simple linear model $y_i = \beta'x_i + \varepsilon_i$, the $\theta$th regression quantile is defined as the solution to an analogous minimization problem as the one reported in Equation (6.2).

$$\min_{b \in \mathbb{R}} \left[ \sum_{i \in \{y_i \geq x_i b\}} \theta |y_i - x_i b| + \sum_{i \in \{y_i < x_i b\}} (1 - \theta) |y_i - x_i b| \right]. \quad (6.3)$$
Solving for $b$ we have a robust estimate of $\beta$. To avoid any further restrictions about the distribution of the error terms, we use a bootstrapping technique to estimate the covariance matrix (Efron, 1979).

Finally, since the possible occurrence of persistence in firms’ patterns of growth represents in turn a violation of the Law of Proportionate Effect, we tested for this possibility by using annual growth rates (as in Kumar, 1985 and Dunne and Hughes, 1994): in the vast majority of cases no significant AR(1) process emerged, so that specification (1) was not extended (see Table 6A.2 in the Appendix).

The application of the econometric methodology described in the present section to the data set described in Section 6.3.1 in the empirical test of Equation (6.1) should shed some light on the following two questions:

1. Is the overall inverse relationship between size and growth – found by most of the studies discussed in the previous section – confirmed during the infancy of newborn firms (i.e. within the subpopulation of new entrants)?
2. Is there a convergence towards a Gibrat-like pattern of growth with the passage of time?

Whereas positive answer to the first question would provide support to the results obtained by Audretsch, Santarelli and Vivarelli (1999) in relation to surviving firms only, positive answer to the second one would shed new light on the selection and adjustment mechanisms that characterize the early stages of the firm life cycle. In fact, if both hypotheses are supported by the data, one may argue that Gibrat’s Law exhibits a behaviour strictly dependent on firm’s life cycle: it fails to hold during the first years after start-up and becomes acceptable once a certain threshold in terms of size and age is reached.

Given the characteristics of the data base, which includes all firms born in January 1987 with at least one paid employee, and the specific features of the Italian industrial system (dominated by small firms), most firms in our sample showed a small start-up size, with micro-firms having less than 5 employees representing more than 50% of the initial sample. Taking into account the cleaning procedures described in the first part of this section, and owing to problems of small sample size over time (until January 1993) for some industries, only six industries were examined (for a total of 855 firms born in January 1987, out of 1,570).

The descriptive statistics in Table 6.2 provide an overview of new firms’ patterns of growth across the six industrial sectors selected. First, both the variation in the mean value and in the standard deviation of start-up size across industries are sufficiently large, with the average entry size ranging from 7 employees (rubber and plastics) to 14 (footwear and clothing). Second, at the end of the period (six years after start-up) the average size increases fourfold in the food industry, and doubles or nearly doubles in electrical and electronic engineering, footwear and clothing, and rubber and plastics, whereas it grows less markedly in the remaining industries: 57% in instruments, 43% in wood and furniture. As regards growth rates, one notes that, in all sectors, they are very high in the first year, but lower immediately after. Moreover, we observe a strong departure from
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<tr>
<td><strong>Electrical and electronic</strong></td>
<td></td>
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<tr>
<td>Average size</td>
<td>12.40</td>
<td>15.41</td>
<td>19.84</td>
<td>20.89</td>
<td>22.23</td>
<td>23.64</td>
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<td>38.92</td>
<td>46.27</td>
<td>59.31</td>
<td>63.46</td>
<td>68.8</td>
<td>68.85</td>
<td>65.05</td>
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<tr>
<td>Average growth rate</td>
<td>—</td>
<td>87.63</td>
<td>8.35</td>
<td>7.58</td>
<td>−7.27</td>
<td>−4.27</td>
<td>−7.29</td>
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<tr>
<td>SD of growth rate</td>
<td>—</td>
<td>190.89</td>
<td>70.4</td>
<td>41.27</td>
<td>57.83</td>
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<td>Number of active firms</td>
<td>129</td>
<td>123</td>
<td>105</td>
<td>101</td>
<td>94</td>
<td>87</td>
<td>83</td>
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<td>Number of exiting firms</td>
<td>0</td>
<td>6</td>
<td>18</td>
<td>4</td>
<td>7</td>
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<td>4</td>
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<td>0.198***</td>
<td>0.150***</td>
<td>0.118*</td>
<td>0.122**</td>
<td>0.116*</td>
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<td>SD of average size</td>
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<td>34.95</td>
<td>43.25</td>
<td>42.75</td>
<td>51.33</td>
<td>40.46</td>
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<tr>
<td>Average growth rate</td>
<td>—</td>
<td>69.34</td>
<td>14.75</td>
<td>3.02</td>
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<td>−6.25</td>
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<td>—</td>
<td>175.29</td>
<td>64.65</td>
<td>50.33</td>
<td>102.97</td>
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<td>Number of active firms</td>
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<td>200</td>
<td>183</td>
<td>169</td>
<td>156</td>
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<td>131</td>
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<tr>
<td>Number of exiting firms</td>
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<td>0.249***</td>
<td>0.134***</td>
<td>0.130***</td>
<td>0.186***</td>
<td>0.180***</td>
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<td>Average size</td>
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<td>30.72</td>
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<td>173.1</td>
<td>172.54</td>
<td>160.91</td>
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<td>Average growth rate</td>
<td>—</td>
<td>47.28</td>
<td>35.19</td>
<td>2.04</td>
<td>−6.3</td>
<td>−4.98</td>
<td>−4.43</td>
</tr>
<tr>
<td>SD of growth rate</td>
<td>—</td>
<td>211.17</td>
<td>217.96</td>
<td>54.32</td>
<td>51.12</td>
<td>51.05</td>
<td>49.25</td>
</tr>
<tr>
<td>Number of active firms</td>
<td>81</td>
<td>64</td>
<td>58</td>
<td>54</td>
<td>47</td>
<td>43</td>
<td>39</td>
</tr>
<tr>
<td>Number of exiting firms</td>
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<td>17</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Kolmogorov–Smirnov normality test</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.305***</td>
<td>0.273***</td>
<td>0.227***</td>
<td>0.285***</td>
<td>0.316***</td>
<td>0.341***</td>
<td>0.385***</td>
</tr>
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</table>

Table 6.2 Average size, growth rate and corresponding standard deviations (SD): firms still alive at the end of each period
<table>
<thead>
<tr>
<th>Industry</th>
<th>Average size</th>
<th>SD of average size</th>
<th>Average growth rate</th>
<th>SD of growth rate</th>
<th>Number of active firms</th>
<th>Number of exiting firms</th>
<th>Kolmogorov–Smirnov normality test</th>
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<td>Footwear and clothing</td>
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<td>38.43</td>
<td>8.26</td>
<td>113.3</td>
<td>205</td>
<td>26</td>
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<td>53.67</td>
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<td>25</td>
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<td>22.75</td>
<td>45.24</td>
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<td>-9.98</td>
<td>66.27</td>
<td>144</td>
<td>15</td>
<td>0.177***</td>
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<td>50.75</td>
<td>-8.58</td>
<td>38.12</td>
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<td>20</td>
<td>0.206***</td>
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<td>0.213***</td>
</tr>
<tr>
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<td>0.214***</td>
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<td>74.83</td>
<td>100</td>
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<td>70</td>
<td>91</td>
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<td>0.107</td>
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<td>52.89</td>
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<td>19.37</td>
<td>74.83</td>
<td>70</td>
<td>70</td>
<td>2</td>
<td>0.019</td>
</tr>
<tr>
<td>Rubber and plastics</td>
<td>7.23</td>
<td>9.58</td>
<td>104.76</td>
<td>230.58</td>
<td>85</td>
<td>0</td>
<td>0.162**</td>
</tr>
<tr>
<td></td>
<td>10.38</td>
<td>12.38</td>
<td>43.88</td>
<td>172.33</td>
<td>79</td>
<td>6</td>
<td>0.057</td>
</tr>
<tr>
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<td>12.46</td>
<td>12.35</td>
<td>43.88</td>
<td>172.33</td>
<td>74</td>
<td>5</td>
<td>0.053</td>
</tr>
<tr>
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<td>13.72</td>
<td>14.21</td>
<td>4.07</td>
<td>35.5</td>
<td>71</td>
<td>3</td>
<td>0.069</td>
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<td>14.57</td>
<td>-3.19</td>
<td>-2.12</td>
<td>35.74</td>
<td>69</td>
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<td>0.088</td>
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<tr>
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<td>-2.12</td>
<td>38.27</td>
<td>67</td>
<td>2</td>
<td>0.107</td>
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<td>18.01</td>
<td>-2.12</td>
<td>35.14</td>
<td>67</td>
<td>2</td>
<td>0.128</td>
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</tbody>
</table>

Notes
* Significant at 90% level of confidence.
** Significant at 95% level of confidence.
*** Significant at 99% level of confidence.
normality of the logs of firms size (see the Kolmogorov–Smirnov normality test reported in Table 6.2) especially in the initial years after start-up. These results suggest the presence of a discontinuity in new firms’ patterns of growth along the early stages of their life cycle.

### 6.4 Results

We studied, for the overall period and year by year, the effects of firm size on growth at different quantiles ($\theta[0.10]$, $\theta[0.25]$, $\theta[0.50]$, $\theta[0.75]$, $\theta[0.90]$). In Table 6.3 we report the complete QR results from the estimation of Equation (6.1) in relation to the median ($\theta[0.50]$) quantile only, whereas the sole values of $\beta_1$ found from the estimates on various quantiles are reported in Table 6A.1 in the Appendix. In particular, the first column of each panel of Table 6.3 sets out the results from the estimations carried out for the entire six-year period (1987–1993), along with the usual statistical diagnostics, including a specific Wald test for the validity of Gibrat’s Law ($\beta_1 = 1$; question (1) posed in the previous section) and sample sizes with and without exits. In the following columns the same estimations are repeated for each year, in order to test the possible convergence path with the passage of time (question (2) posed in the previous section). Thus, seven estimates are presented for the entire sample (all industries) and for each industry.

Let us first consider the results for the six-year period (1987–1993). In five out of six industries (with the exception of food) and in the aggregate estimate, the QR estimates of $\beta_1$, although significantly different from zero, are significantly less than one. This confirms that, in general, smaller firms grow faster than their larger counterparts over the entire period.

Even more interesting results are yielded by the separate estimations carried out for each year and each industry. In five out of six industries (with the exception of food) and in the aggregate estimate, the QR estimates of $\beta_1$, although significantly different from zero, are significantly less than one. This confirms that, in general, smaller firms grow faster than their larger counterparts over the entire period.

As reported in Table 6A.1 in the Appendix, Equation (6.1) has been estimated also for the ($\theta[0.10]$, $\theta[0.25]$, $\theta[0.75]$, $\theta[0.90]$) quantiles. Consistently with the results obtained from estimations on the median quantile, the $\beta_1$ coefficients show a convergence towards 1 with the passage of time (although they also show, not surprisingly, a wider dispersion from the convergence value – 1.000 – that is instead a focal point for the median quantile regression).

Thus, in the five industries for which Gibrat’s Law is initially not confirmed, one finds that smaller entrants rush to achieve an acceptable size immediately after their start-ups, while once they reach (in subsequent years) a size large enough to enhance their likelihood of survival their pattern of behaviour matches that of larger entrants.

The most significant exception is the food industry, where for the entire period and for each of the six years following start-up Gibrat’s Law is never significantly
Table 6.3 Quantile regression (θ[0.50]) estimates: all industries with industry dummies, electrical and electronic engineering, instruments, food

<table>
<thead>
<tr>
<th>Industry</th>
<th>$\beta_1$</th>
<th>$\beta_0$</th>
<th>Wald test $\beta_1 = 1$</th>
<th>Pseudo $R^2$</th>
<th>Number of observations</th>
<th>Censored</th>
<th>Uncensored</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries</td>
<td>0.637*** (0.034)</td>
<td>1.246*** (0.108)</td>
<td>110.78*** (110.78)</td>
<td>0.286</td>
<td>855</td>
<td>354</td>
<td>501</td>
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<tr>
<td>Electrical and electronic engineering</td>
<td>0.602*** (0.134)</td>
<td>1.386*** (0.223)</td>
<td>8.78*** (8.78)</td>
<td>0.200</td>
<td>129</td>
<td>46</td>
<td>83</td>
</tr>
<tr>
<td>Instruments</td>
<td>0.639*** (0.062)</td>
<td>1.098*** (0.151)</td>
<td>34.03*** (34.03)</td>
<td>0.334</td>
<td>214</td>
<td>83</td>
<td>131</td>
</tr>
<tr>
<td>Food</td>
<td>0.821*** (0.197)</td>
<td>0.693* (0.373)</td>
<td>0.82 (0.82)</td>
<td>0.302</td>
<td>131</td>
<td>83</td>
<td>131</td>
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</table>

(Continued)
Table 6.3 Continued

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<td>58</td>
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<td>43</td>
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<td>4</td>
<td>7</td>
<td>4</td>
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<td>Uncensored</td>
<td>39</td>
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<td>58</td>
<td>54</td>
<td>47</td>
<td>43</td>
<td>39</td>
</tr>
<tr>
<td>Footwear and clothing</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>$\beta_1$</td>
<td>$0.655^{***}$</td>
<td>$0.811^{***}$</td>
<td>$1.009^{***}$</td>
<td>$1.000^{***}$</td>
<td>$1.000^{***}$</td>
<td>$1.000^{***}$</td>
<td>$0.998^{***}$</td>
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<td>(0.071)</td>
<td>(0.030)</td>
<td>(0.028)</td>
<td>(0.001)</td>
<td>(0.019)</td>
<td>(0.006)</td>
<td>(0.006)</td>
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<td>$0.693^{***}$</td>
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<td>$-0.001$</td>
<td>$-0.001$</td>
<td>$-0.001$</td>
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<tr>
<td>(0.136)</td>
<td>(0.100)</td>
<td>(0.095)</td>
<td>(0.002)</td>
<td>(0.063)</td>
<td>(0.008)</td>
<td>(0.007)</td>
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<td>$23.55^{***}$</td>
<td>$38.57^{***}$</td>
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<td>$0.00$</td>
<td>$0.00$</td>
<td>$0.00$</td>
<td>$0.08$</td>
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<tr>
<td>Pseudo $R^2$</td>
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<td>$0.308$</td>
<td>$0.498$</td>
<td>$0.762$</td>
<td>$0.733$</td>
<td>$0.727$</td>
<td>$0.760$</td>
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<tr>
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<td>231</td>
<td>205</td>
<td>180</td>
<td>159</td>
<td>144</td>
<td>124</td>
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<tr>
<td>Censored</td>
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<td>25</td>
<td>21</td>
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<td>20</td>
<td>11</td>
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<td>Uncensored</td>
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<td>205</td>
<td>180</td>
<td>159</td>
<td>144</td>
<td>124</td>
<td>113</td>
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<tr>
<td>Wood and furniture</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>$0.606^{***}$</td>
<td>$0.807^{***}$</td>
<td>$1.000^{***}$</td>
<td>$1.000^{***}$</td>
<td>$1.000^{***}$</td>
<td>$0.990^{***}$</td>
<td>$1.000^{***}$</td>
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<td>(0.103)</td>
<td>(0.045)</td>
<td>(0.007)</td>
<td>(0.031)</td>
<td>(0.013)</td>
<td>(0.048)</td>
<td>(0.004)</td>
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<tr>
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<td>$0.632^{***}$</td>
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<td>$0.000$</td>
<td>$0.000$</td>
<td>$0.000$</td>
<td>$0.021$</td>
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<td>(0.248)</td>
<td>(0.102)</td>
<td>(0.012)</td>
<td>(0.114)</td>
<td>(0.033)</td>
<td>(0.154)</td>
<td>(0.014)</td>
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<td>$0.00$</td>
<td>$0.04$</td>
<td>$0.00$</td>
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<td>91</td>
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<td>78</td>
<td>72</td>
<td>70</td>
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<td>Rubber and plastics</td>
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</tr>
<tr>
<td>$\beta_1$</td>
<td>$0.574^{***}$</td>
<td>$0.737^{***}$</td>
<td>$0.925^{***}$</td>
<td>$1.017^{***}$</td>
<td>$1.000^{***}$</td>
<td>$1.000^{***}$</td>
<td>$1.005^{***}$</td>
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<tr>
<td>(0.093)</td>
<td>(0.045)</td>
<td>(0.075)</td>
<td>(0.013)</td>
<td>(0.006)</td>
<td>(0.008)</td>
<td>(0.021)</td>
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<td>$0.693^{***}$</td>
<td>$0.289$</td>
<td>$-0.012$</td>
<td>$0.000$</td>
<td>$-0.001$</td>
<td>$-0.002$</td>
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<td>(0.183)</td>
<td>(0.079)</td>
<td>(0.200)</td>
<td>(0.018)</td>
<td>(0.008)</td>
<td>(0.006)</td>
<td>(0.064)</td>
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<td>$20.75^{***}$</td>
<td>$32.85^{***}$</td>
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<td>$1.72$</td>
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<td>$0.06$</td>
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<td>Pseudo $R^2$</td>
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<td></td>
<td>$0.169$</td>
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<td>$0.760$</td>
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<td>74</td>
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<td>69</td>
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<td>65</td>
</tr>
</tbody>
</table>

Notes
* Significant at 90% level of confidence.
** Significant at 95% level of confidence.
*** Significant at 99% level of confidence.
rejected. This finding suggests that some industry-specific determinants of firm growth are in operation. The regularity over time in the patterns of post-entry growth by small and larger entrants in the food industry indicates that, more than strategic interdependence within submarkets, in this case it is independence across submarkets that may be involved (see Sutton, 1997, 1998).  

### 6.5 Conclusions

With the focus specifically on new entries, the main finding of this paper is that, in some selected industries in Italian manufacturing, Gibrat’s Law of Proportionate Effect exhibits a behaviour which depends on the life cycle of the firm. In effect, for five out of six industries taken into account, we found that the Law fails to hold during the first year following start-up – when smaller entrants grow faster than their larger counterparts – whereas it becomes acceptable once a minimum threshold in terms of size and age has been reached.

In sum, the statistical regularities that emerged from the estimates carried out in Section 6.4 are such that both questions raised in Section 6.3 can be answered in the affirmative: not only is the overall inverse relationship between size and growth confirmed during the infancy of newborn firms in some industries, but these firms display a convergence towards a Gibrat-like pattern of growth with the passage of time. This means that – within the subpopulation of new entrants – smaller firms, which entered the market at a sub-optimal scale, have initially to rush in order to reach a size comparable to that of larger entrants, while subsequently they converge towards random growth rates (Gibrat-like). Of course, this evidence is not in contrast with a possible rejection of Gibrat’s Law once incumbents are taken into account together with new entrants: in this case, the test is heavily influenced by the comparison between the patterns of growth of (smaller) new entrants and (larger) incumbents. An extension of the present analysis to the consideration of the comparison between the two subpopulations might be matter of further research.

From a theoretical viewpoint, these empirical findings appear to be consistent with the model put forward by Cabral (1995): entering the market implies capacity and technology costs which can involve some degree of sunkness. Newborn firms build only a fraction of their long-run capacity and technology in the first period after entry. In a Bayesian framework (Jovanovic, 1982; Pakes and Ericson, 1998), small new firms invest a lower fraction because they may have a lower efficiency and a higher expected probability of exit than their larger counterparts. In other words, small less efficient entrants are more likely to exit than are large entrants and so – since entry costs are sunk – it is optimal for them to invest more gradually and thus experience higher growth rates immediately after start-up.

Finally, our results also implicitly corroborate John Sutton’s (1997, 1998) assumption that any industry, as conventionally defined in official statistics, usually contains several clusters of products, some of which compete closely whereas others do not compete at all. The combination of the interdependence and the independence effects determines the patterns of post-entry growth observed in each industry.
### Table 6A.1 Quantile regression estimates ($\theta[0.10]$, $\theta[0.25]$, $\theta[0.50]$, $\theta[0.75]$, $\theta[0.90]$): $\beta_1$ values

<table>
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<td>$\theta[0.10]$</td>
<td>$\theta[0.25]$</td>
<td>$\theta[0.50]$</td>
<td>$\theta[0.75]$</td>
</tr>
<tr>
<td>All industries</td>
<td>0.792</td>
<td>0.738</td>
<td>0.637</td>
<td>0.570</td>
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<td>0.686</td>
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<tr>
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<td>Footwear and</td>
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<td>0.671</td>
<td>0.574</td>
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<tr>
<td>clothing</td>
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<tr>
<td>Wood and</td>
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<td>0.960</td>
<td>1.000</td>
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<td>1.009</td>
</tr>
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</table>

**Note**

All estimates are significantly different from zero at a 0.001 confidence level. Figures are reported in italics when not significantly different from unity (Wald test).
### Table 6A.2 Persistence in firms’ patterns of growth

\[ G_{i,t} = \alpha_0 + \alpha_1 G_{i,t-1} + \eta_i \sim AR(1) \] where \( G_i \) is the growth rate of firm \( i \) at time \( t \)

<table>
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<td>–0.02</td>
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<td>0.13***</td>
<td>0.08*</td>
<td>0.05</td>
<td>–0.02</td>
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<td>0.03</td>
<td>2.08</td>
<td>0.56</td>
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<td>0.00</td>
<td>–0.01</td>
<td>–0.01</td>
<td>0.01</td>
<td>–0.01</td>
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<tr>
<td>White(^a)</td>
<td>0.30</td>
<td>1.59</td>
<td>0.06</td>
<td>1.72</td>
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<td>0.14***</td>
<td>0.16*</td>
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<td>0.00</td>
<td>0.07</td>
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<td>0.90</td>
<td>5.70***</td>
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<td>0.52</td>
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<td>White(^a)</td>
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<td>0.31</td>
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<tr>
<td>( \alpha_0 )</td>
<td>0.01</td>
<td>0.24***</td>
<td>0.07*</td>
<td>0.09**</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
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<td>0.00</td>
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<tr>
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<td>0.73</td>
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<td>0.15</td>
<td>0.45</td>
<td>0.69</td>
<td>1.61</td>
</tr>
<tr>
<td><strong>Wood and furniture</strong></td>
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<tr>
<td>( \alpha_0 )</td>
<td>0.04</td>
<td>0.04</td>
<td>0.12**</td>
<td>0.20</td>
<td>0.18*</td>
<td>0.07**</td>
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<td>0.01</td>
</tr>
<tr>
<td>White(^a)</td>
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<td>5.27***</td>
<td>0.07</td>
<td>3.33**</td>
<td>3.77**</td>
<td>3.61**</td>
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<tr>
<td><strong>Rubber and plastics</strong></td>
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<tr>
<td>( \alpha_0 )</td>
<td>0.06</td>
<td>0.59**</td>
<td>0.08**</td>
<td>0.09</td>
<td>0.03</td>
<td>0.06</td>
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<tr>
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<td>–0.01</td>
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<td>0.00</td>
<td>–0.04</td>
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<td>0.15</td>
<td>0.04</td>
<td>2.93*</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Notes

\(^a\) F-statistic; null hypothesis: homoskedasticity; in case of heteroskedasticity (at least at 90% level of confidence) a consistent covariance matrix was used (White’s correction).

* Significant at 90% level of confidence.

** Significant at 95% level of confidence.

*** Significant at 99% level of confidence.
Notes

2 Following a random walk (with drift) stochastic process.
3 Of course, the observed patterns of both average sizes and growth rates depend on the combination between employment growth in surviving firms and the exit of the slow growing ones.
4 We performed also OLS and sample selection estimates. Since the results are consistent with the reported QR ones, they have not been inserted in the paper but are available from the authors upon request.
5 The regression diagnostics from these estimates are available from the authors upon request.
6 Besides the Wald test, also unit root-like tests were carried out, with similar findings. Results from application of this procedure are available from the authors upon request.
7 Cf. the stars on the estimated coefficients $\beta_1$ reported in Table 6.3.
8 Cf. the stars on the values of the Wald test for $\beta_1 = 1$.
9 Moreover, we tested the stability of the estimated $\beta_1$ over time through a pooled regression with time dummies interacted with the log $S_{t-1}$ variable. Results confirm that in the first period the estimated $\beta_1$ significantly differ from the remaining time intervals.
10 In fact, 17 out of 81 entrants (21%) are bakeries, which by definition operate in very small markets (neighbourhoods rather than municipal areas) which in most cases are characterized by the presence of a single firm. Thus, even new entrants with a very small start-up size are likely to operate at the MES level of output of their submarkets and do not need to rush for enhancing their likelihood of survival.

References

Brusco S., Giovannetti E., Malagoli W. (1979) La relazione tra dimensione e saggio di sviluppo nelle imprese industriali: una ricerca empirica. Università degli Studi di Modena, Studi e Ricerche dell’Istituto Economico, No 5


7 Is subsidizing entry an optimal policy?

With Enrico Santarelli

7.1 Introduction

From a theoretical point of view, a useful framework for the joint study of the entry and post-entry evolution of newborn firms is the model of noisy selection originally put forward by Boyan Jovanovic (1982) (see also Frank, 1988; Jovanovic, 1994). In this model, newborn firms do not know \textit{ex ante} their cost function – that is, their relative efficiency – but rather discover it through a process of learning that occurs in the early stages of their lifecycle. In other words, entrepreneurs start new firms on the basis of a vague sense of expected profitability, but they only discover their true abilities once their businesses are established. In the periods immediately following foundation, entrepreneurs learn about their abilities and their costs and can thus update their expectations using a Bayesian rule. Those entrepreneurs who discover that their firms are, in fact, efficient will survive and grow, whilst those who discover that their firms are inefficient will tend to exit from the market.

This ‘try and see’ interpretation of the entry and post-entry behaviour of new small firms is consistent with the following stylized results (see Beesley and Hamilton, 1984; Geroski and Schwalbach, 1991; Audretsch, 1995; Geroski, 1995; Hart and Oulton, 1999):

1. high entry rates are generally associated with high exit rates (turbulence);
2. infant mortality (early exit during the first years after start-up) is a frequent phenomenon in most industrial sectors;
3. conditional on survival, small newborn firms exhibit higher growth rates than their larger counterparts (i.e. Gibrat’s Law does not hold for new entrants).

As regards the last point, numerous studies have shown that Gibrat’s Law does not hold (in the sense that small firms grow faster than larger firms) (see e.g. Mansfield, 1962; Evans, 1987a,b; Hall, 1987; Dunne and Hughes, 1994; Hart and...
Oulton, 1996; for a comprehensive survey, see Sutton, 1997), and this also applies to samples restricted to newborn firms (see Dunne et al., 1989; Mata, 1994; Audretsch et al., 1999a). According to this evidence, surviving new firms – which are generally smaller than the minimum efficient scale (MES) in a given sector – represent the ‘efficient group’ in the Jovanovic model: they are those firms which discover that they have adequate entrepreneurial abilities and thus decide to remain in the market and grow in order to close the gap between their start-up size and the MES.

In this framework, given that subsidies to support new firm creation are a quite common instrument of European industrial policy, the following question arises: are such incentives really useful or do they lead to significant substitution and deadweight effects? In the concluding section of the present paper we will try to answer this question. Our answer will be based on a representative example of the entry and post-entry evolution of newborn firms in the Italian electric and electronic engineering sector. The purpose is to collect and interpret further empirical evidence in order to characterize the survival and growth patterns of newborn firms and then discuss the possible impact of subsidies on industrial dynamics. In more detail, the paper is organized as follows.

The next section presents the data and methodology. Section 7.3 discusses patterns of survival: since most of the previous literature has found a positive link between start-up size and survival (see Acs and Audretsch, 1989; Audretsch, 1991, 1995; Wagner, 1994; Audretsch and Mahmood, 1995; Baldwin, 1995; Mata et al., 1995), and since this relationship may be of some help in guiding incentive policy, related estimates are put forward. Section 7.4 examines patterns of early growth in order to assess the degree to which Gibrat’s Law is valid during the first years of firms’ lifecycles. In microeconomic terms, young firms entering the market at a suboptimal scale may experience decreasing average costs and enjoy rapid growth, while well-established, mature firms can relax along a flattening average cost curve (see Acs and Audretsch, 1990; Audretsch, 1995). If this is the case, the departure from Gibrat’s Law should be more marked in the years immediately after start-up. The discussion in Sections 7.3 and 7.4 and in the concluding Section 7.5 will try to put forward some policy suggestions.

### 7.2 Data and methodology

The most common obstacle against empirical analysis of the survival and post-entry performance of newborn firms has been the lack of longitudinal data sets tracking the evolution of firms subsequent to their birth. In this paper we use a unique data set obtained from the Italian National Institute for Social Security (INPS). This database identifies new firms in electrical and electronic engineering (with at least one paid employee) starting-up in January 1987 and tracks their post-entry employment performance at monthly intervals until January 1993. None of the firms identified in the database benefited from national schemes aimed at supporting entry of start-up companies. Unfortunately, it was not possible to replicate the analysis on a control group of subsidized firms.
Prior to the data processing, the original INPS file was subjected to controls in order to identify entry and failure times correctly and detect inconsistencies in individual tracks due to administrative factors, problems related to file truncation in January 1993, cancellations due to firm transfers, mergers and take-overs. Problems connected to the presence in the database of firms undertaking seasonal activities have been wiped out by processing firm records containing periods of ‘suspension’. On conclusion of this cleaning process, the data set identified 129 new firms entering the market in 1987, of which 83 still survived in 1993.

The survival analysis (Section 7.3) was developed in two stages. First, survival and hazard rates were computed. Second, the possible positive correlation between start-up size and survival (see Section 7.1) was investigated. This latter analysis was conducted using first a simple logit model (with survival at the end of the period equal to 1 and early failure equal to 0), and then a tobit model which took account of the fact that the data distribution was truncated in January 1993. In this case, the dependent variable was the number of months that each newborn firm had survived during the period:

\[ y_i = \alpha + \beta s_i + \varepsilon_i \]  

logit model with \( y_i = 1 \) in case of survival at the end of the period; \( y_i = 0 \) in case of early failure; \( s_i \) = start-up size (in terms of employment); \( \varepsilon_i \) = random disturbance.

And

\[ y_i = \alpha + \beta s_i + \varepsilon_i \]  

tobit model, where \( y \) is a random variable obtained from the original one; \( y^* = \) number of months of survival, according to the following truncation rule:

\[ y_i = T \quad \text{if } y^* \geq T \]

with \( T = 72 \) months (from January 1987 to January 1993)

\[ y_i = y^* \quad \text{if } 0 \leq y^* < T \]

The growth analysis (Section 7.4) starts from observation of average size and growth rates in the relevant period. It will then be developed using the well-known logarithmic specification of Gibrat’s Law:

\[ \log S_{i,t} = \beta_0 + \beta_1 \log S_{i,t-1} + \varepsilon \]  

where \( S_{i,t} \) is the size of the \( i \)th firm at time \( t \), \( S_{i,t-1} \) is the size of the same firm at the previous period and \( \varepsilon \) is a random variable distributed independently of \( S_{i,t-1} \).

Following Chesher (1979, p. 404), if both sides of Equation (7.3) are exponentiated, it becomes clear that if \( \beta_1 \) is equal to unity, then growth rate and initial size are
independently distributed and Gibrat’s Law operates. By contrast, if $\beta_1 < 1$ smaller firms grow at a systematically higher rate than do their larger counterparts, while the opposite is the case if $\beta_1 > 1$.

If – as in the majority of previous studies (see Section 7.1) – growth and exit are not treated as homogeneous phenomena, empirical estimates need deal only with surviving firms. However, the sample selection problem arises here. Since growth can only be measured for firms that have survived over the entire period examined, and since slow growing firms are more likely to exit, small, fast-growing firms may be over-represented in the surviving sample and this may bias the results of the empirical research. The appropriate econometric method to deal with this problem is the two-step procedure suggested by Heckman (1979) (see also Amemiya, 1984). This specification introduces into the main equation an additional explanatory variable (the inverse Mill’s ratio) obtained by a probit model (selection equation) which estimates the relationship between firm survival and firm size at the beginning of the period:

$$P(f_i = 1) = F(\delta + \gamma \log S_{i,t-1} + \phi \log S_{i,t-1}^2 + \mu)$$ (7.4)

where $f_i = 1$ survivor at time $t$; $f_i = 0$ exit at time $t$; $\mu =$ disturbance.

Since the relationship between size and survival can theoretically assume a non-linear feature, a squared term has been introduced in the selection equation. While Equation (7.3) in isolation was initially estimated by means of OLS, the sample selection model including Equation (7.4) was estimated using a maximum likelihood two-stage method. Tests for heteroskedasticity were carried out using the OLS estimations of Equation (7.3), and White’s (1980) correction was introduced when necessary, both in the OLS and in the sample selection model (SSM) estimations. The possible occurrence of persistence in firms’ patterns of growth was tested using annual growth rates (as in Kumar, 1985; Dunne and Hughes, 1994): since no significant AR(1) process emerged (cf. the Appendix), specification (7.3) was not extended. This AR(1) control not only reassures on the consistency of the estimates of $\beta_1$ (cf. Chesher, 1979), but it is also an indirect indicator of the absence of significant demand or cyclical shocks influencing a pattern of growth that is likely to be affected by adjustment costs.\(^3\)

7.3 Survival analysis

Table 7.1 gives the yearly patterns of survival for the 129 newborn firms. It will be noted that there is a dramatically high incidence of early failure, especially in the very first years of firms’ lifecycles. Consistently with other studies (see Boeri and Cramer, 1992; Mata and Portugal, 1994; Audretsch and Mahmood, 1995; Mata et al., 1995; Audretsch et al., 1999b), the hazard rate reaches a peak in the second year of activity and then displays a decreasing – although not monotonic – trend. This preliminary evidence is consistent with the model put forward by Jovanovic (1982): in the early stages of a firm’s lifecycle, fewer efficient
entrepreneurs realize that their cost functions are higher than expected and decide to exit (in this particular population more than one-third of new entrants leave the market within the sixth year of activity).

Given the theoretical framework briefly summarized in Section 7.1 and the evidence reported in Table 7.1, one may question the role of subsidies in supporting the start-up of new firms. Indeed, these incentives allow the cost functions to move downwards and thus heavily interfere with the market selection of less efficient entrepreneurs; accordingly, the availability of subsidies has a twofold effect: entry rates increase, and so too do survival rates in the first years following start-up. If entry can be seen as a ‘try and see’ process, the subsidy causes severe distortions: on the one hand, increased entry rates may also involve an increased number of early failure once the effect of the subsidy is over (turbulence); on the other hand, the process of market selection is biased and delayed, so that less efficient entrepreneurs are allowed to remain in the market until the subsidy ceases to be in operation.4

In other words, if the selection process reported in Table 7.1 is the outcome of a Bayesian process of learning, a subsidy may be both useless (the more efficient entrepreneur does not need it, while the less efficient one leaves the market once the subsidy ceases to be in operation) and harmful (less efficient entrepreneurs are given an artificial seedbed, while market competition would have induced them to leave the market). If the former situation is prevalent, the industrial policy supporting entry is affected by a deadweight component; if the latter is prevalent a substitution effect arises.

In both cases overall entry subsidies bias market competition; in terms of industrial policy two possible alternatives are available. Either interventions are shifted from subsidizing entry to a post-entry policy, or incentives to entry are made conditional on some measures of efficiency. In the final section of this paper, the advantages of a post-entry policy will be discussed; here some evidence is presented which argues against the use of start-up size as an ex ante measure of efficiency.

<table>
<thead>
<tr>
<th>Year</th>
<th>Survived firms</th>
<th>Survival rate (%)</th>
<th>Exited firms</th>
<th>Hazard rate (%)</th>
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<td>1987</td>
<td>129</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1988</td>
<td>123</td>
<td>95.35</td>
<td>6</td>
<td>4.65</td>
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<tr>
<td>1989</td>
<td>104</td>
<td>80.62</td>
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<td>15.45</td>
</tr>
<tr>
<td>1990</td>
<td>101</td>
<td>78.29</td>
<td>3</td>
<td>2.88</td>
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<tr>
<td>1991</td>
<td>94</td>
<td>72.87</td>
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<td>6.93</td>
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<td>1992</td>
<td>86</td>
<td>66.67</td>
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<td>8.51</td>
</tr>
<tr>
<td>1993</td>
<td>83</td>
<td>64.34</td>
<td>3</td>
<td>3.49</td>
</tr>
</tbody>
</table>

Note
Hazard rates have been computed as the ratio of firms exiting the market in year \( t \) to the number of firms survived at the end of year \( t-1 \).
As discussed in Section 7.1, start-up size is often used as an indicator of better chances of survival: indeed, a larger start-up size can be seen as either a measure of substantial sunk costs (implying higher barriers to exit) or as a strong commitment by the entrant (and thus as a signal of a higher efficiency). If such is the case – in order not to give the subsidy to the less efficient entrepreneurs (substitution effect) – the policy intervention can make the incentive conditional on the size of the recipient. It is important to note that this policy option reduces the risk of wasting public money, but it raises the opposite problem of a possible deadweight effect: the recipient is likely to turn out to be efficient and so does not need the subsidy.

In Table 7.2, the relationship between start-up size and survival is tested using our sample and according to the methodology discussed in the previous section: no significant evidence emerges that the likelihood of survival tends to be higher for firms whose start-up size is larger.

In fact, the fit of the regressions is also rather poor, as shown by the values of the likelihood ratio index (LRI). Although this finding is in contrast to those that have emerged from previous research carried out for other countries, it is consistent with those originating from analysis of various sectors in Italian manufacturing (Audretsch et al., 1999b). Thus, at least in Italy, start-up size cannot be considered a good proxy for post-entry efficiency and the likelihood of survival. This evidence, together with the possible occurrence of deadweight effects, suggests that entry subsidies are only slightly associated with a high degree of market distortion.

### 7.4 Growth analysis

Not only does the entry subsidy imply a strong bias against natural market selection, but it may also interfere with the growth patterns of newborn firms (either efficient or inefficient). The general hypothesis tested in this section is that post-entry growth patterns may be driven by the learning process described in Section 7.1. In particular, given the minimum efficient scale of the sector, it may be that efficient smaller firms need to grow faster in order to survive, compared to larger inefficient firms.
Is subsidizing entry an optimal policy?

95
to their larger counterparts. In this context, the empirical test of Equation (7.3) may provide an answer to the following questions:

- Is the overall inverse relationship between size and growth – found by most previous studies on Gibrat’s Law – confirmed during the infancy of newborn firms (i.e. within a subpopulation of new entrants)?
- Is there convergence towards a Gibrat-like pattern of growth with the passing of time?

If these two hypotheses were jointly supported by the data, Gibrat’s Law would exhibit a behaviour dependent on firm’s lifecycle: the Law would fail to hold during the first years after entry and would become acceptable once a given threshold in terms of size and age had been reached. If such was the case, the evidence would support the idea that in the first years after entry the learning process generates two important adjustments: on the one hand, the less efficient firms exit from the market; on the other, the surviving efficient firms adjust their size in order to cope with market competition.

The descriptive statistics in Table 7.3 provide an overview of new firms’ patterns of growth in Italian electrical and electronic engineering. The upper panel of Table 7.3 reports the average employment size at the beginning of each of the six years examined and the corresponding standard deviations, whereas the lower panel documents average growth rates and the corresponding standard deviations.

The average size comprises an initial value of 12.40 ranging to a final value of 23.42, and the average growth rate is particularly marked in the first year after entry (0.97), followed by a drop in the second year (0.28) and a further monotonic decline in the years thereafter. This preliminary result suggests the presence of a discontinuity in new firms’ patterns of growth during the early stages of their lifecycles (see later).

Table 7.4 reports the OLS and SSM results from the estimations of Equation (7.3). The results from the corresponding selection equations are not given but are available from the authors upon request. The first two columns in the table report the results from the estimations carried out for the entire six-year period (1988–1993), along with the usual statistical diagnoses (including the correlation between the selection and growth equation, \( \rho \)) and a specific \( t \)-test for the validity of Gibrat’s Law (\( \beta_1 = 1 \); the first of the two hypotheses given earlier). The final rows report White’s test for heteroskedasticity (when significant a consistent covariance matrix has been used) and sample sizes with and without exits. In the following columns the same estimations are repeated for each year, in order to characterize the possible convergence path with the passing of time (the second hypothesis given earlier). Thus, 14 estimates are presented in Table 7.4.

We first consider the results for the six-year period (1988–1993). In both the OLS and the SSM models, estimates of \( \beta_1 \) are significantly less than one: the coefficient is equal to 0.61 in both the estimates, is significant at the 99% level of
### Table 7.3 Average employment size, growth rates and their standard deviations: firms still alive at the end of each period

<table>
<thead>
<tr>
<th>Size</th>
<th>Size 87</th>
<th>SD 87</th>
<th>Size 88</th>
<th>SD 88</th>
<th>Size 89</th>
<th>SD 89</th>
<th>Size 90</th>
<th>SD 90</th>
<th>Size 91</th>
<th>SD 91</th>
<th>Size 92</th>
<th>SD 92</th>
<th>Size 93</th>
<th>SD 93</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.40</td>
<td>38.92</td>
<td>15.41</td>
<td>46.27</td>
<td>20.01</td>
<td>63.46</td>
<td>22.23</td>
<td>68.80</td>
<td>23.90</td>
<td>69.22</td>
<td>23.42</td>
<td>65.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 7.4 OLS and sample selection model (SSM) estimates of Gibrat’s Law (Equation 7.3)

<table>
<thead>
<tr>
<th>OLS 88-93</th>
<th>SSM 88-93</th>
<th>OLS 88</th>
<th>SSM 88</th>
<th>OLS 89</th>
<th>SSM 89</th>
<th>OLS 90</th>
<th>SSM 90</th>
<th>OLS 91</th>
<th>SSM 91</th>
<th>OLS 92</th>
<th>SSM 92</th>
<th>OLS 93</th>
<th>SSM 93</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_0 )</td>
<td>1.36***</td>
<td>1.30*</td>
<td>0.80***</td>
<td>0.72***</td>
<td>0.40***</td>
<td>0.35*</td>
<td>0.11</td>
<td>a</td>
<td>0.06</td>
<td>0.19*</td>
<td>-0.10</td>
<td>-0.10</td>
<td>-0.10</td>
</tr>
<tr>
<td>( \beta_1 )</td>
<td>0.61***</td>
<td>0.61***</td>
<td>0.71***</td>
<td>0.73***</td>
<td>0.88***</td>
<td>0.89***</td>
<td>0.97***</td>
<td>0.98***</td>
<td>0.94***</td>
<td>1.04***</td>
<td>1.04***</td>
<td>1.04***</td>
<td>1.02***</td>
</tr>
<tr>
<td>( \rho )</td>
<td>—</td>
<td>0.12</td>
<td>—</td>
<td>1.00***</td>
<td>—</td>
<td>0.31</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>-0.93***</td>
<td>-0.93***</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>( \tau(\beta_1 = 1) )</td>
<td>4.11***</td>
<td>4.63***</td>
<td>3.63***</td>
<td>5.06***</td>
<td>+3.00***</td>
<td>1.92*</td>
<td>1.00</td>
<td>0.50</td>
<td>1.29</td>
<td>1.00</td>
<td>0.44</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>( F )</td>
<td>58.80***</td>
<td>29.04***</td>
<td>201.51***</td>
<td>108.55***</td>
<td>759.69***</td>
<td>443.18***</td>
<td>768.45***</td>
<td>577.28***</td>
<td>286.31***</td>
<td>763.13***</td>
<td>377.07***</td>
<td>1157.33***</td>
<td></td>
</tr>
<tr>
<td>( R^2 ) adj.</td>
<td>0.41</td>
<td>—</td>
<td>0.62</td>
<td>—</td>
<td>0.88</td>
<td>—</td>
<td>0.89</td>
<td>—</td>
<td>0.86</td>
<td>—</td>
<td>0.90</td>
<td>—</td>
<td>0.93</td>
</tr>
<tr>
<td>LRI</td>
<td>—</td>
<td>0.19</td>
<td>—</td>
<td>0.34</td>
<td>—</td>
<td>0.80</td>
<td>—</td>
<td>—</td>
<td>0.70</td>
<td>—</td>
<td>0.78</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Whiteb</td>
<td>2.67*</td>
<td>—</td>
<td>7.41***</td>
<td>—</td>
<td>7.11***</td>
<td>—</td>
<td>1.00</td>
<td>—</td>
<td>0.32</td>
<td>—</td>
<td>1.48</td>
<td>—</td>
<td>5.87***</td>
</tr>
<tr>
<td>( N ) tot.</td>
<td>129</td>
<td>129</td>
<td>123</td>
<td>104</td>
<td>101</td>
<td>94</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( N ) surv.</td>
<td>83</td>
<td>123</td>
<td>104</td>
<td>101</td>
<td>94</td>
<td>86</td>
<td>83</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes

- Significant at ***99%, **95%, *90% level of confidence.
- a The algorithm did not reach convergence.
- b \( F \)-statistic; null hypothesis: homoskedasticity; in case of heteroskedasticity (at least at 90% level of confidence) a consistent covariance matrix was used (White’s correction).
confidence and the \( t \)-test rejects the hypothesis of \( \beta_1 = 1 \) at the 99% level of confidence. This result confirms that, in general, smaller firms grow faster than their larger counterparts, and this is consistent with the previous empirical literature on Gibrat’s Law. More interesting results are yielded by the separate estimations carried out for each year. Indeed, Gibrat’s Law fails to hold in the two years immediately following start-up, whereas it cannot be rejected when firms approach maturity. In more detail, in the first and second year following start-up the SSM estimate yields a \( \beta_1 \) significantly less than one, with a value of 0.73 in 1988 and 0.89 in 1989; in the following years, both the SSM estimates (when available) and the OLS estimates increase almost monotonically towards 1 (and the \( t \)-test does not reject the Law).

Thus, one finds that smaller newborn firms rush to achieve an acceptable size immediately after their start-ups, but once they reach (in subsequent years) a size large enough to enhance their likelihood of survival, their pattern of behaviour matches that of larger newborn firms. Thus, Gibrat’s Law of proportionate effect exhibits a behaviour that depends on the lifecycle of the firm.

Both the questions raised earlier can be answered in the affirmative: not only is the overall inverse relationship between size and growth confirmed during the infancy of newborn firms, but there is a detectable convergence towards a Gibrat-like pattern of growth with the passing of time. This means that – within the subpopulation of new entrants – smaller firms, which entered at a suboptimal scale, must initially rush in order to reach a size comparable to that of larger entrants, while subsequently they converge towards random growth rates (Gibrat-like).

### 7.5 Conclusions and policy implications

The example of Italian electrical and electronic engineering sector shows that the early stages of a firm’s lifecycle are quite important in terms of market competition. Bayesian learning processes and market selection jointly drive less efficient firms out of the market, while the surviving ones adjust their scale towards the average and then behave following a Gibrat-like pattern of growth.

Although our analysis concerns only electrical and electronic engineering firms, these empirical findings appear to be consistent with the theoretical model put forward by Cabral (1995). In this model, entering the market implies capacity and technology costs that can involve some degree of sunkness. The point is that newborn firms build only a fraction of their long-run capacity and technology in the first period after entry. In a Bayesian framework (Jovanovic, 1982; Pakes and Ericson, 1998), small new firms invest a lower fraction because they have a lower efficiency and a higher expected probability of exit than their larger counterparts. In other words, small, less-efficient firms are more likely to exit than are large entrants and so – since entry costs are sunk – it is optimal for them to invest more gradually, and thus experience higher growth rates immediately after entry.\(^7\)

In this context, a subsidy may cancel (or at least reduce) the revealed differences between less efficient and more efficient firms and disturb both market selection
and the learning process underwent by entrepreneurs. In more detail, subsidizing entry may be risky for at least three reasons.

1. Less efficient firms are artificially supported and do not leave the market. In our sample, 36% of entrants leave the market in the first six years after entry: Indeed, these firms fail to adjust their capacity and technology and decide to exit. Although this result deals only with a particular Italian manufacturing sector, it is to some extent generalizable. In effect, Audretsch (1995, ch. 4), who analysed 11,314 firms in all industries in US manufacturing, found that survival rates in the first six years after start-up are rather homogeneous across industries, ranging from 0.618 to 0.647.

   In presence of a subsidy, less efficient firms might adjust their capacity to the long-run level; the point is that this adjustment would not be based on learning and revealed entrepreneur’s capabilities (as in Jovanovic and Cabral models), but on the artificial support of the subsidy. Once the subsidy expires, the ‘bad entrepreneur’ becomes aware of his/her inefficiency and leaves the market. If such is the case, the subsidy induces a substitution effect against more efficient potential entrants and delays the exit of less efficient newborn firms.

2. In seeking to avoid (1) – for example, by giving subsidies conditional on an above-average start-up size – a public policy aimed at supporting entry may also generate market distortions. First, a deadweight effect may arise: most of the beneficiaries (larger newborn firms) would have survived and grown even without the subsidy. Second, Table 7.2 casts some doubt on the alleged link between start-up size and efficiency. Third, the learning process about entrepreneur’s own capabilities is biased by the subsidy, and even the most efficient founders may overestimate their market chances.

3. An entry subsidy may also bias the adjustment process that takes place in the very first years after entry: in that period, efficient firms which have entered the market at a very low, suboptimal scale survive through accelerated growth, while in subsequent years newborn firms assume a Gibrat-like behaviour (this evidences represent Cabral’s (1995) post-entry adjustment to the long-run capacity’s level). In this connection, the presence of a subsidy may confuse the entrepreneur’s interpretation of the signals emitted by the market and deter him/her from entering the optimal growth pattern. In particular, the presence of a subsidy may reduce the revealed differences in performances between those efficient firms that – in absence of the subsidy – would have decided to grow and the less efficient ones that would have decided to exit.

   On the whole, entry and first years after entry do not represent either a smooth process or a random walk (in such a case the consequences of a subsidy would have been less distorting). In fact – on the contrary – the first stages of a firm’s lifecycle are characterized by important learning (Section 7.1), selection (Section 7.3) and scale adjustment (Section 7.4) processes that should be allowed to run.
Appendix

Table 7A.1 Persistence in firms’ patterns of growth

\[ G_t = \alpha_0 + \alpha_1 G_{t-1} + \eta_t \sim AR(1), \text{ where } G_t \text{ is the growth rate at time } t \]

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( \alpha_0 )</td>
<td>-0.02</td>
<td>0.31***</td>
<td>0.13***</td>
<td>0.08*</td>
<td>0.05</td>
<td>-0.02</td>
</tr>
<tr>
<td>( \alpha_1 )</td>
<td>0.00</td>
<td>-0.03</td>
<td>-0.04</td>
<td>0.02</td>
<td>-0.15</td>
<td>-0.07</td>
</tr>
<tr>
<td>( F )</td>
<td>0.00</td>
<td>1.04</td>
<td>0.56</td>
<td>0.03</td>
<td>2.08</td>
<td>0.56</td>
</tr>
<tr>
<td>( R^2 \text{ adj.} )</td>
<td>-0.01</td>
<td>0.00</td>
<td>-0.01</td>
<td>-0.01</td>
<td>0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td>White^a</td>
<td>0.30</td>
<td>1.59</td>
<td>0.06</td>
<td>1.72</td>
<td>1.45</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Notes

^a\ F\text{-statistic; null hypothesis: homoskedasticity; in case of heteroskedasticity (at least at 90% level of confidence) a consistent covariance matrix was used (White’s correction).}

Significant at ***99%, **95% and *90% level of confidence.

Acknowledgements

Previous versions of this paper have been presented at the XVI Jornadas de Economia Industrial (Madrid, 20–22 September 2000) and the 4th Annual EUNIP Conference (Tilburg, 7–9 December 2000). We thank the audiences for helpful discussion. Thanks are also due to Francesca Lotti for careful statistical computation and research assistance, David Audretsch, Maria Brouwer, Maria Callejón, Maria Paz Espinosa, Riccardo Rovelli and an anonymous referee for some useful comments. Financial support from MURST is gratefully acknowledged.

Notes

1 In the database, a code taking the value of 0 (exited firms), 1 (survivors) or 2 (suspended firms) denotes each firm in every month. A firm can be suspended for (1) administrative reasons (e.g. delays in social security payments), (2) difficulties in identification of the correct exit time (in which case code 2 changes into 0 within a few months) and (3) the seasonal nature of its business (in which case code 2 changes into 1 and shows the tendency to cyclically return to 2). In processing the original data, firms suspended for administrative reasons have been assigned code 1; suspended firms subsequently translated into exited ones have been assigned code 0; firms suspended for ‘seasonal’ reasons have been maintained as suspended and dropped from the analysis when the resulting suspension occurred in the period relevant to our econometric exercise.

2 That is, assuming the disputable hypothesis that exit is equal to a minus one rate of growth.

3 Unfortunately, the absence of balance sheet data in the INPS database means that it is not possible to carry out a direct test of the impact of demand factors on firm growth.

4 This situation is characterized by ‘entry mistakes’ and ‘excess entry’ in the sense pointed out by Cabral (1997); however, the theoretical and empirical contexts are different: in Cabral (1997) large firms are playing a game of sequential entry in oligopoly, whereas in Jovanovic (1982) a large number of small firms not engaged in a strategic game are taken into account.
5 Cf., for example, those presented in the 1995 special issue (no. 4) of the *International Journal of Industrial Organization*.

6 In all years the correction for sample selection overcomes the problem of the OLS regressions producing inconsistent estimates of $\beta_1$; in addition, in years 1988 and 1991, significant levels of $\rho$ indicate that only the SSM value of the coefficient $\beta_1$ can be taken as reliable.

7 Provided that they are able to survive, that is, they are efficient *ex post*.

**References**


8 The link between the entry decision and post-entry performance
Evidence from Italy

With David B. Audretsch

8.1 Introduction

The aim of this paper is to link together what have been until now two rather disparate subjects in the literature: the entry decision on the one hand and the post-entry performance on the other. The basic hypothesis is that the post-entry performance of newborn firms might not be neutral with respect to the specific motives that led to the decision to start a new enterprise. For example, one can argue that if the underlying motivation to start a new firm is linked to innovative projects, then a better post-entry performance may be expected than if a new firm is started on the basis of a purely defensive motivation, such as the fear of becoming unemployed. Obviously, the possible relationships between entry and post-entry have important implications for economic policy, namely for policies favouring the development of new firms either in new or existing industries.

Notwithstanding the earlier observations, something of a split has emerged in the literature focusing on industry dynamics, or the evolutionary manner in which new firms enter an industry, subsequently expand and survive, or else quit the industry. On the one hand, the literature addressing the start-up and entry decision has typically examined characteristics external to the firm, such as industry-specific characteristics or else factors specific to the geographic market within which the firm operates. Similarly, a large number of studies have linked the decision to start a new enterprise or remain an employee of an incumbent enterprise to characteristics specific to individual economic agents. A common thread running throughout this literature is that the decision-making horizon essentially is bounded by the point of entry.

On the other hand there is a growing literature focusing on the post-entry performance of firms. The starting point of most of these studies is the new firm, which is generally considered to be exogenous. How the new firm got there in the firm place is generally considered to be beyond the scope of such studies.

Yet a clearly bothersome aspect is that the initial population of new entrants is not likely to be homogeneous across industries in terms of their ‘genetic codes’,
and it is plausible to suppose a possible link between these codes and subsequent post-entry performance. The purpose of this paper is to provide at least some insight into the link between the decision to start a new firm and the post-entry performance. In particular, we relate those factors which are decisive in leading an economic agent to the decision to start a new firm to the performance of that enterprise subsequent to its start-up. This enables us to distinguish among the types of motivations underlying the start-up of a new enterprise and the manner in which they shape the post-entry performance.

Section 8.2 provides a short literature review that tries to relate the decision to start a new enterprise with its post-entry performance. The data set based on a sample of 100 new Italian firms and their subsequent performance is described in Section 8.3. In Section 8.4 the hypothesis is tested that factors inducing new-firm startups have a disparate effect on post-entry performance. Finally, in the last section the main findings of this study are briefly summarized.

### 8.2 The link between entry and post-entry performance

Why is entry relevant to economic theory and how does the literature deal with this topic? One answer is provided by the traditional economic literature focusing on industrial organization. An excess level of profitability induces entry into the industry. In this framework, if excess profits occur – caused by the opening of a market niche or by a cost-saving innovation or by a product differentiation – additional agents are attracted into the market. In this view, a queue of well-informed potential entrepreneurs is supposed to be waiting outside the market and the expected level of profit is the ‘trigger’ factor determining entry (see Geroski, 1991; Geroski and Schwalbach, 1991).

In most of the models the maximization of expected profits takes into account barriers to entry which can hinder the free movement of firms into a particular industry. Since the seminal works of Bain (1956) and Sylos Labini (1956), consideration of entry barriers has made theoretical analyses more realistic. In these models, entry is still driven by expected profits, but it is also hindered by factors such as initial capital requirements, minimum efficient size, and industry-specific features such as innovation and advertisement expenditures (see Mansfield, 1962; Orr, 1974; Baldwin and Gorecki, 1987). However, all these models are only concerned with market factors affecting the decision to entry.

Perhaps one of the main limitations of this traditional approach in industrial organization is that by treating the industry market as the essential unit of observation, it is virtually impossible to explain why an individual economic agent would choose to start a new firm rather than be employed by an incumbent organization. That is, the unit of observation at the level of the market obscures the decision-making process at the level of individual (see Winter, 1991). As a complement of the simplified view of entry discussed so far, a different tradition can be singled out in the history of economic thought: Schumpeter (1911) and Knight (1921) have turned the attention to the subjective characteristics of the actual founder of a new firm. Their well-known definitions of entrepreneurship
open the way to a more general framework where market conditions (‘pull factors’) are studied together with some ‘push factors’ concerning the environment and the particular situation of the potential founder.

For instance, according to the results of the surveys carried out in Storey (1982) and Johnson (1986), the founder of a new firm is heavily influenced by his own background, with particular reference to his previous job experience. In more detail, his entrepreneurial project is dependent on technical and managerial competences that have been acquired in the previous job experience. Thus, spin-off can be affected by the previous hierarchical position as a dependent employee (for instance, innovative entrepreneurs are more likely to be managers previously involved in supervisory functions).

Likewise, family background is singled out as a key factor by econometric estimates devoted to explaining new firm formation as an act of self-employment (see De Wit and Van Winden, 1989; Evans and Leighton, 1989).

Finally, entry decision can be based on the so-called ‘income choice’ (see Creedy and Johnson, 1983; Storey and Jones, 1987; Blanchflower and Oswald, 1990; Evans and Leighton, 1990; Blanchflower and Meyer, 1994). According to this theory, a potential founder has to compare his present income and perspectives as employee with the expected income from the independent activity; if this difference is more than a given threshold – whose level depends on the individual’s risk aversion and on particular psychological aptitudes such as a strong desire to be independent – the new firm will be founded. While this approach encompasses the traditional view where entry is pulled by expected profits, it also explains some situations where the new firm foundation is induced by unemployment or by a strong psychological motivation to be independent (for an application of this model to the Italian case, see Audretsch and Vivarelli, 1995, 1996).

While there is a long tradition of studies devoted to the entry process – briefly summarized earlier – a new stream of literature devoted to the post-entry performance of firms has emerged only in the last few years (see, for instance, Boeri and Cramer, 1992; Dunne and Hughes, 1994; Audretsch and Mahmood, 1995; Baldwin and Rafiquzzaman, 1995; Mata et al., 1995). This literature focuses on aspects of industry dynamics such as the post-entry patterns of survival, growth or else exit of cohorts of new firms within different industrial sectors.

For instance, Dixit (1989) and Hopenhayn (1992) both argue that post-entry performance may be affected by the level of sunk costs in the industry: higher sunk costs should reduce the likelihood of early exit since precommitment can be seen as a signal of superior entrepreneurial capabilities.

Other studies (see Audretsch, 1995) focus on the degree of scale economies in a given industry, arguing that new, small firms not able to grow and to approach an industry’s minimum efficient scale will presumably be characterized either by bad post-entry performance or even by early exit.

While these studies are extremely useful in explaining the role of entry in determining evolutionary patterns at the industry level (industry differentiation and innovation, Gibrat’s law, patterns of early exit and population renewal, and so on), they say little about the post-entry performance of single newborn firms.
Hence this paper focuses, instead, on the micro-performance of newborn firms and how their performances can be linked to their initial characteristics.

While Jovanovic (1982, 1994) assumes that the income decision resulting in a new entrepreneurial firm and subsequent post-entry performance are shaped under a ‘veil of ignorance’, the literature discussed earlier reveals different aspects specific to both the individual decision-making economic agent as well as to the external economic environment, suggesting that not all factors triggering the start-up of a new enterprise may have the same impact on the post-entry performance.

For example – taking into account both traditional models and the self-employment theory – if the underling motivation to start a new firm is explicitly linked to profit expectations and to the intention to exploit a market niche, then a superior post-entry performance may be expected than if a new firm is started for some deeply rooted psychological motivation, such as the strong desire to be independent (the reason being that strong personal motivation can hinder a rational and objective consideration of the real business chances for the new firm). Similarly, as the studies on barriers to entry and post-entry have shown, a greater start-up size can be coupled with a more expensive initial investment and presumably a higher degree of sunk costs. This would tend to imply better post-entry performance.

Turning to other personal motivations, anticipation of innovative activity clearly biases the likelihood that a new enterprise will be innovative in a positive direction and therefore is more likely to be associated with a positive post-entry performance. On the other hand, purely ‘defensive’ motivations – such as the fear of becoming unemployed influencing the ‘income choice’ – are presumably associated with poorer post-entry performances.

Finally, personal background factors – which the literature considers so important in shaping the start-up decision – such as a higher position in the previous job, skills and family tradition may indicate superior post-entry performance.

8.3 Data and measurement issues

To link the entry decision to the post-entry performance, a database consisting of 100 new firms in the Italian region of Emilia was constructed on the basis of returned questionnaires which were collected in 1993. In order to avoid possible biases, inconsistencies and exaggeration effects which typically affect postal surveys, questionnaires have been administered by direct interviews, which have been done by interviewers previously trained by the authors. The most important sections of the questionnaire are discussed in the Appendix.

The database includes only entirely new firms; any enterprise that is a new branch or subsidiary establishment belonging to an incumbent enterprise was eliminated from the database. The firms included in the database were randomly selected according to the local industrial structure, with the assistance of lists from the local Chambers of Commerce. All of the firms are young, with a mean age of 3 years. In more detail, all firms are <9 years old, with the majority of them (87% of the sample) concentrated in the foundation period 1988–1992.
Most of the interviewed firms are very small firms: the mean start-up size was three employees, while at the time of the interview the average sample size was four employees. Most of the young firms have revealed a satisfactory economic performance (64%), but only 10% of them have declared to sell >50% of their products on foreign markets.

The database consists solely of firms that had survived, at least up to the point of the interview; this creates a particular bias in that only surviving enterprises are analysed. Obviously, locating and obtaining information from failed new enterprises is important, but posed insurmountable challenges to the implementation of the survey instrument. At any rate, the survivor bias is not particularly worrying for the purposes of this study since the variance of business performance within survived firms turns out to be sufficiently large. While we will not be able to address the issues concerning early failures versus survival, we will focus on performance differentials among surviving young firms.

The database is used to construct three alternative measures of the post-entry performance. The first is the subjective evaluation by the respondent of the recent performance of the new enterprise assuming a value of 1 in the case of a satisfactory performance and 0 in the case of a negative performance. While subjective in nature, this question was posed by trained interviewers who tried to take into account both possible exaggeration effects and sectoral peculiarities (in other words, the ‘recent performance’ has been assessed relative to the average performance within a market). Thus, although this indicator cannot be considered purely objective, it has been controlled for firm and sector specificities (however, in order completely to avoid fixed sectoral effects, estimates have been computed including sectoral dummies, see later).

The second measure is the annual post-entry growth, defined as:

$$G_i = \frac{(\text{Size}_{i(1)} - \text{Size}_{i(0)})}{\text{Age}_i}$$

where $G_i$ represents the annual employment growth of firm $i$, $\text{Size}_{i(0)}$ represents the initial size – in terms of employees – of the new enterprise, $\text{Size}_{i(1)}$ represents the size of the enterprise at the time of the interview and $\text{Age}_i$ represents the age of the enterprise.

Annual employment growth has been chosen as a first objective measure of the performance of new firms since these firms generally start very small and decide to hire new employees only in the case of very positive expectations on current and future incomes. The gross employment growth has been weighted by firm’s age since younger firms have had less opportunity to increase their size in comparison with their older counterparts. While all firms within this sample have entered the market with a sub-optimal size, and so all of them ‘need to grow’, one can argue that in different sectors specific levels of the minimum efficient scale call for different pace of growth for new entries which want to survive. These considerations support the choice to control for sectoral fixed effects when growth performance is analyzed. Indeed, regressions of $G_i$ on different determinants will
be characterized by the inclusion of sectoral dummies, some of them turning out to be statistically significant (see later, Table 8.3).

Finally, the third measure of business performance is the openness to foreign markets, which has been chosen as an index of entrepreneurial ability and good expectations about a firm’s performance. Taking into account that different sectors are characterized by different propensities to export, this performance indicator has been applied only to those firms which belong to ‘open sectors’ (endogenously defined as those sectors in the sample that present at least one exporting firm). In addition, sectoral fixed effects have also been included in this third regression specification.

Hence, three measures of post-entry performance have been used; these turn out, not surprisingly, to be positively correlated, but the linear correlations are sufficiently low to suggest that these indicators are three different and alternative measures of post-entry performance.

The explanatory variables are drawn from a combination of industrial organization literature focusing on industry-specific characteristics and other approaches focusing on personal and background characteristics (see Section 8.2). In particular, three measures are included in the first category: (1) the profit perspective (Profit); (2) the perception of the existence of an unexploited market niche (Niche); and (3) the opportunity to introduce an innovation (Innovation). In the second category an additional four variables are included: (4) either the state of actual unemployment or an impending state of unemployment (Unemployment); (5) the opportunity to better exploit technical or managerial capabilities (Skill); (6) a tradition of entrepreneurship in the family (Family); and (7) the desire to be independent (Independence). These variables are all measured subjectively, on the basis of a ranking assigned by the entrepreneurs included in the database. Each entrepreneur ranked each factor from a scale of 1 (indicating that the factor had only a minimal influence on the start-up decision) to 5 (indicating that the factor had the maximum influence on the start-up decision). The mean ranking of those factors influencing the decision to start a new firm together with standard deviations and number of answers giving the maximum score (5) are shown in Table 8.1.

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Mean score</th>
<th>SD</th>
<th>Maximum score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independence</td>
<td>4.26</td>
<td>1.25</td>
<td>65</td>
</tr>
<tr>
<td>Skill</td>
<td>4.06</td>
<td>1.33</td>
<td>55</td>
</tr>
<tr>
<td>Profit</td>
<td>3.93</td>
<td>1.31</td>
<td>50</td>
</tr>
<tr>
<td>Niche</td>
<td>3.37</td>
<td>1.56</td>
<td>35</td>
</tr>
<tr>
<td>Unemployment</td>
<td>2.19</td>
<td>1.55</td>
<td>15</td>
</tr>
<tr>
<td>Innovation</td>
<td>2.09</td>
<td>1.54</td>
<td>17</td>
</tr>
<tr>
<td>Family</td>
<td>1.77</td>
<td>1.42</td>
<td>11</td>
</tr>
</tbody>
</table>

Note
a Indicates the number of interviewed entrepreneurs awarding the maximum score (5).
While it is not explicitly the purpose of this study, it can be seen that the ranking of factors shaping the entrepreneurial decision is consistent with the findings in the literature discussed in the previous section. As Vivarelli (1991) found, the desire for independence turns out to be the most decisive factor underlying the decision to start a new firm. Similarly, the attempt to create a situation where an economic agent’s human capital is more fully deployed also plays an important role in the entrepreneurial decision. While the perceived potential for profits is somewhat less important, it still plays a more important role than does the potential for innovative activity. In other words, profit expectations are more related to demand factors (the openness of a market niche) than to supply factors (the belief of introducing an innovation). Unemployment – or the fear of becoming unemployed – turns out to be a minor motivation, but is still very important for 15% of the interviewed entrepreneurs. Finally, in the subjective perceptions of these founders, family tradition does not seem to play an important role in shaping the start-up decision. These findings are again consistent with Vivarelli (1991) and Audretsch and Vivarelli (1995, 1996).

According to the theories surveyed in Section 8.2 and to the considerations proposed at the end of that section, all the earlier seven motivations – apart from independence and unemployment – should be positively linked with the post-entry performance of newborn firms.

In addition to the earlier subjective perceptions, four additional objective measures which may influence the post-entry performance are also included. The first two are economic in nature and are (8) the start-up size, measured in terms of number of employees at the time of entry (\( \text{Size} \)) and (9) the importance of initial investment for the firm’s start-up (\( \text{Investment} \)): to the extent that the initial size and the degree of investment reflect sunk costs, a greater level of either start-up size or investment should involve a lower likelihood of exit from the industry and a better business performance. The other two are: (10) the age of the firm at the time of the interview in order to control for possible effects connected with either the problems in the early stage of firm’s lifecycle or the impact of the economic cycle (most firms started their activities at the beginning of a recessionary period) (\( \text{Age} \)); (11) the status of the previous job position of the entrepreneur, measured on a scale of 1–6 (\( \text{Position} \)): a higher position in the previous job is supposed to be positively correlated with post-entry performance (see Section 8.2).

### 8.4 Empirical evidence

Table 8.2 presents the linear correlation coefficients between the 11 independent variables defined earlier and the three measures of post-entry performance. The first column indicates the sign of the expected relationship based on the hypotheses discussed earlier. Coefficients listed in Table 8.2 generally are unambiguous and are consistent with the hypotheses. However, there are three exceptions: correlations between the measures of post-entry performance and size, skill and independence. In these latter cases, it will be the regression analysis which will single out the prevailing, if any, causal relationship. Finally, as far as the effect of age on
performance is concerned, the impact of the recession seems to be more harmful than the difficulties connected with the early stages of a firm's development. Thus, younger firms, which have suffered less from the recession that started in 1989, seem to show a better post-entry performance.

At any rate, simple correlations have to be coupled with multiple regressions where relevant relationships are jointly evaluated. Based on ordinary least-squares estimation for the post-entry performance measure of employment growth, and logit estimations for the subjective evaluation and for the internationalization, preliminary regressions have been run. These multiple regressions included all the dependent variables; in addition, sectoral dummies have been introduced in order to control for the fixed effects due to either structural or cyclical peculiarities of different manufacturing and business sectors.\(^5\)

Preliminary estimates led to the following outcome: the coefficients generally showed the expected signs, but most of them were not statistically significant even at the 90% level of confidence (one-tailed \(t\)-test). This evidence called for a more selective specification.

Thus, as a second step of the regression analysis, a selection procedure has been developed. Starting from the results of the preliminary regressions, less significant variables – including sectoral dummies – have been progressively dropped out, one by one. The final specifications – whose estimates are shown in Table 8.3 – are the outcome of this selection where a coefficient has been kept only when significant at least at the 90% level of confidence. Final specifications have been controlled for possible collinearity problems, according to the correlation matrix reported in the Appendix (Table 8A.1). In more detail, variables with a linear correlation >0.3 have been alternatively included in the tested specifications, and when both variables have resulted in a certain degree of significance, both the specifications have been reported in Table 8.3.\(^6\)

---

**Table 8.2 Linear correlation coefficients**

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Expected sign</th>
<th>Performance</th>
<th>Growth</th>
<th>Internationalization(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit</td>
<td>+</td>
<td>0.18</td>
<td>0.20</td>
<td>0.21</td>
</tr>
<tr>
<td>Niche</td>
<td>+</td>
<td>0.18</td>
<td>0.05</td>
<td>0.32</td>
</tr>
<tr>
<td>Innovation</td>
<td>+</td>
<td>0.19</td>
<td>0.25</td>
<td>0.51</td>
</tr>
<tr>
<td>Size</td>
<td>+</td>
<td>0.04</td>
<td>-0.04</td>
<td>0.06</td>
</tr>
<tr>
<td>Investment</td>
<td>+</td>
<td>0.05</td>
<td>0.05</td>
<td>0.16</td>
</tr>
<tr>
<td>Unemployment</td>
<td>-</td>
<td>-0.17</td>
<td>-0.19</td>
<td>-0.25</td>
</tr>
<tr>
<td>Position</td>
<td>+</td>
<td>0.11</td>
<td>0.32</td>
<td>0.28</td>
</tr>
<tr>
<td>Skill</td>
<td>+</td>
<td>0.11</td>
<td>-0.10</td>
<td>0.17</td>
</tr>
<tr>
<td>Family</td>
<td>+</td>
<td>0.29</td>
<td>0.07</td>
<td>0.16</td>
</tr>
<tr>
<td>Independence</td>
<td>-</td>
<td>-0.04</td>
<td>-0.10</td>
<td>0.25</td>
</tr>
<tr>
<td>Age</td>
<td>?</td>
<td>-0.19</td>
<td>-0.26</td>
<td>-0.16</td>
</tr>
</tbody>
</table>

Note

\(a\) While the coefficients in the first two columns are computed on the whole sample of 100 firms, correlations between firms' features and internationalization are based on a subsample of 80 firms (only firms belonging to internationalized sectors).
Table 8.3  Regression results (t-statistics in parentheses)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.11</td>
<td>-0.03</td>
<td>0.10</td>
<td>-4.43***</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(-0.24)</td>
<td>(0.86)</td>
<td>(-2.92)</td>
</tr>
<tr>
<td>Profit</td>
<td>0.03*</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.44)</td>
<td>(1.10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Niche</td>
<td></td>
<td>0.81***</td>
<td>0.91***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.41)</td>
<td>(2.90)</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>0.27*</td>
<td>0.03*</td>
<td>0.67***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.61)</td>
<td>(1.49)</td>
<td>(3.12)</td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td></td>
<td>-0.82**</td>
<td>-0.64**</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-2.03)</td>
<td>(-1.70)</td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>0.57***</td>
<td>0.06***</td>
<td></td>
<td>0.54**</td>
</tr>
<tr>
<td></td>
<td>(2.45)</td>
<td>(2.46)</td>
<td></td>
<td>(1.91)</td>
</tr>
<tr>
<td>Position</td>
<td></td>
<td>0.06***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.46)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.25**</td>
<td>-0.03**</td>
<td>-0.04**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.70)</td>
<td>(-2.46)</td>
<td>(-2.20)</td>
<td></td>
</tr>
<tr>
<td>Printing</td>
<td>-1.89**</td>
<td>-0.21**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.88)</td>
<td>(-1.84)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery</td>
<td>0.16*</td>
<td>0.17*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.53)</td>
<td>(1.64)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office machinery</td>
<td>0.46**</td>
<td>0.37**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.36)</td>
<td>(1.81)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber</td>
<td>-0.18*</td>
<td>1.06***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.62)</td>
<td>(6.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business services</td>
<td></td>
<td>-1.33*</td>
<td>-1.94***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.61)</td>
<td>(-2.41)</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.46</td>
<td>0.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.42</td>
<td>0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-56.75</td>
<td>100</td>
<td>100</td>
<td>-23.68</td>
</tr>
<tr>
<td>Sample size</td>
<td>100</td>
<td>100</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

Notes
Statistically significant at the *90%, **95% and ***99% levels of confidence.
a While the first three regressions are computed on the entire sample of 100 firms, the fourth and fifth regressions are based on a subsample of 80 firms (only firms belonging to internationalized sectors). Internat. = Internationalization.

The clearest result in Table 8.3 concerns the positive role of the innovative motivation in promoting a better post-entry performance of newborn firms. As can be seen, innovation enters all three equations with some degree of significance and turns out to determine internationalization with a 99% level of confidence.

Performance in terms of subjective evaluation seems to be positively affected – besides innovation – by family tradition, which turns out to be highly significant. Thus, the presence of entrepreneurial tradition within the founder’s family seems to have a positive impact on post-entry performance, as the significant coefficient of the first regression suggests; yet the second and third results suggest one should be very cautious in interpreting this empirical evidence. Indeed, entrepreneurs belonging to ‘entrepreneurial families’ might be affected by a tendency to rate themselves and their relatives as more competent than others and so give themselves higher performance ratings which are not reflected by other more objective measures (see Brown, 1986).”
Performance in terms of employment growth is significantly improved by a higher position of the founder in his/her former dependent job. There is also some evidence that economic agents who start a new firm based on the rational assessment of expected profits tend to experience a superior post-entry performance. With regard to the regressor Age, the relative advantage of younger firms turns out to be confirmed both in determining a better performance and a faster employment growth.

Finally, performance in terms of internationalization is positively linked to motivations related to innovative activity and to the emergence of a market niche: the prospects of a potential demand and innovative activity tend to lead to a superior export performance. Moreover, internationalization is also facilitated by a higher position in the previous job and hindered by a defensive motivation such as a previous status of unemployment.

8.5 Conclusions

The main conclusion is that the post-entry performance of newborn firms is not neutral with respect to the particular motivations that led to the decision to start a new firm. Rather, a Schumpeterian innovative motivation tends to be linked to a superior post-entry performance. To a lesser extent, this is also true with regard to other more traditional economic motivations such as the rational consideration of profit expectations and potential demand evolution. Conversely, a defensive motivation like the avoidance of possible or actual unemployment seems to be a predictor of inferior post-entry performance. Finally, there is some evidence that background factors – such as a higher position in the previous job – tend to be positively correlated with post-entry performance.

Appendix

The questionnaire

The questionnaire was proposed through direct interviews done by trained interviewers. The latter were informed about possible biases and exaggeration effects connected with the degree of self-esteem of the interviewed founder, with the sectoral and environmental backgrounds and with the particular entrepreneur’s profile. Thus, the questionnaires have been filled up by the interviewer after careful discussion with the entrepreneur, and taking into account possible idiosyncrasies. The main questions about the determinants of the start-up are the following (translated from the Italian).

Please give a score from 1 to 5 according to the importance attributed to the following economic and personal factors in determining your choice to establish a new firm:

1 Profit perspectives (Profit).
2 The perception of the existence of an unexploited market niche (Niche).
3 The possibility of introducing a technological innovation (Innovation).
4 Family tradition (Family).
5 Actual unemployment or the fear of becoming unemployed (Unemployment).
6 The desire to be independent (Independence).
7 The exploitation of your own technical and/or managerial and/or marketing skills (Skill).

Among the other four independent variables Age has been computed on the basis of the declared foundation year while the initial Size in terms of employees was directly asked to the interviewed. The variable Investment – given the lack of any accounting data within this particular survey – is qualitative and consists in a score from 1 to 5 attributed to the importance of the initial investment as an expensive precommitment in the start-up stage. Finally, the founder was asked about his/her previous Position and a variable has been constructed as follows: 1 = the founder was previously either unemployed or looking for his/her first job opportunity; 2 = workman; 3 = clerk; 4 = manager; 5 = entrepreneur; 6 = professional.

Turning to the dependent variables, Performance is the subjective evaluation of ‘the recent business performance of the firm’ and takes the value 1 for ‘satisfactory’ and 0 for ‘unsatisfactory’; Growth is a weighted measure of employment growth, according to Equation (8.1); Internationalization is another binary variable taking the value 1 when the firm has a percentage of its sales sold on foreign markets and 0 otherwise.

Table 8A.1 Linear correlation coefficients among independent variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Variable</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit/niche</td>
<td>-0.07</td>
<td>Size/investment</td>
<td>0.17</td>
</tr>
<tr>
<td>Profit/innovation</td>
<td>0.23</td>
<td>Size/unemployment</td>
<td>0.18</td>
</tr>
<tr>
<td>Profit/size</td>
<td>-0.33</td>
<td>Size/position</td>
<td>0.10</td>
</tr>
<tr>
<td>Profit/investment</td>
<td>0.15</td>
<td>Size/skill</td>
<td>0.08</td>
</tr>
<tr>
<td>Profit/unemployment</td>
<td>-0.19</td>
<td>Size/family</td>
<td>-0.00</td>
</tr>
<tr>
<td>Profit/position</td>
<td>0.07</td>
<td>Size/independence</td>
<td>0.18</td>
</tr>
<tr>
<td>Profit/skill</td>
<td>0.02</td>
<td>Size/age</td>
<td>0.01</td>
</tr>
<tr>
<td>Profit/family</td>
<td>0.26</td>
<td>Investment/unemployment</td>
<td>0.04</td>
</tr>
<tr>
<td>Profit/independence</td>
<td>0.07</td>
<td>Investment/position</td>
<td>0.01</td>
</tr>
<tr>
<td>Profit/age</td>
<td>-0.19</td>
<td>Investment/skill</td>
<td>-0.13</td>
</tr>
<tr>
<td>Niche/innovation</td>
<td>0.32</td>
<td>Investment/family</td>
<td>0.09</td>
</tr>
<tr>
<td>Niche/size</td>
<td>0.22</td>
<td>Investment/independence</td>
<td>-0.10</td>
</tr>
<tr>
<td>Niche/investment</td>
<td>-0.08</td>
<td>Investment/age</td>
<td>0.07</td>
</tr>
<tr>
<td>Niche/unemployment</td>
<td>-0.04</td>
<td>Unemployment/position</td>
<td>-0.24</td>
</tr>
<tr>
<td>Niche/position</td>
<td>0.13</td>
<td>Unemployment/skill</td>
<td>-0.26</td>
</tr>
<tr>
<td>Niche/skill</td>
<td>0.17</td>
<td>Unemployment/family</td>
<td>-0.07</td>
</tr>
<tr>
<td>Niche/family</td>
<td>0.02</td>
<td>Unemployment/independence</td>
<td>-0.10</td>
</tr>
<tr>
<td>Niche/independence</td>
<td>0.19</td>
<td>Unemployment/age</td>
<td>0.15</td>
</tr>
<tr>
<td>Niche/age</td>
<td>-0.19</td>
<td>Position/skill</td>
<td>0.15</td>
</tr>
<tr>
<td>Innovation/size</td>
<td>0.05</td>
<td>Position/family</td>
<td>0.07</td>
</tr>
<tr>
<td>Innovation/investment</td>
<td>0.08</td>
<td>Position/independence</td>
<td>0.16</td>
</tr>
<tr>
<td>Innovation/unemployment</td>
<td>-0.09</td>
<td>Position/age</td>
<td>-0.27</td>
</tr>
<tr>
<td>Innovation/position</td>
<td>0.32</td>
<td>Skill/family</td>
<td>-0.13</td>
</tr>
<tr>
<td>Innovation/skill</td>
<td>0.11</td>
<td>Skill/independence</td>
<td>0.37</td>
</tr>
<tr>
<td>Innovation/family</td>
<td>0.09</td>
<td>Skill/age</td>
<td>-0.23</td>
</tr>
<tr>
<td>Innovation/independence</td>
<td>0.18</td>
<td>Family/independence</td>
<td>-0.15</td>
</tr>
<tr>
<td>Innovation/age</td>
<td>-0.19</td>
<td>Family/age</td>
<td>-0.19</td>
</tr>
</tbody>
</table>

Independence/age -0.10
Acknowledgements

Comments by three anonymous referees were extremely useful for revision; the usual caveats apply. The authors would like to thank the Italian CNR for financial support. The research centre ‘GENESIS-Bologna’ is gratefully acknowledged for data collection.

Notes

1 The sample composition is representative of the population composition at the two-digit level; about two-thirds of the firms (69%) are in manufacturing, while the remaining one-third (31%) are in business services.

2 Once this selection procedure has been applied to the sample, 16 firms out of 80 have shown a certain degree of internationalization. The following sectors have turned out not to be internationalized: chemicals, food, office machinery and computers, paper and printing, stone–clay–glass, transportation. All of these are sectors where the local competitive specialization does not exhibit any comparative advantage.

3 Linear correlation between performance and growth turns out to be 0.20; between performance and internationalization 0.22; between internationalization and growth 0.35.

4 These four additional variables – not included in Table 8.1 – exhibit the following means and SDs: investment = 4.25 (0.96); size = 3.03 (2.50); age = 3.36 (1.66); position = 2.36 (1.18). See the Appendix for further details concerning the measurement of these variables.

5 According to the composition of our sample – which is in turn balanced on the basis of the real population – the following sectoral dummies have been introduced: chemicals (1 firm), electrical (4), food (6), footwear and clothing (5), machinery (8), medical instruments (3) metalworking (11), office machinery and computers (2), paper and printing (7), rubber and plastics (3), stone–clay–glass (2), textile (1), transportation (2), wood and furniture (1), business services (31). The constant has been kept and so the dummies have to be interpreted as a deviation from the excluded sector ‘other manufacturing and not classifiable’ (13 firms).

6 This is the case of the alternative inclusion of innovation and position as regressor in the second and third equations.

7 In this article, the author points out that self-evaluation evolves through a comparative process in which the self is contrasted with others and, in particular, that ‘members of a particular social group evaluate ingroup members more favorably than outgroup members’ (Brown, 1986, p. 361).

References


9 The role of innovation in the postentry performance of new small firms
Evidence from Italy

With Alessandro Arrighetti

9.1 Introduction
The aim of this paper is to relate the start-up decision to the postentry performance of new small firms. Hence, this paper is part of economic research in industrial organization, more specifically of the study of industrial dynamics.

In the literature focusing on industry dynamics, there are at least two different strands relevant to the object of this study. On the one hand, there is the literature devoted to entry and to the start-up decision; this line of the economic thought has typically examined the characteristics external to the firm, such as profit expectations in a given sector, entry barriers and financial constraints. In this field, the basic research questions concern the ‘pull factors’ that can stimulate the entry flow into a given industry. On the other hand, other studies have tried to link the decision to start a new enterprise to characteristics specific to the individual founder and his/her personal background, personal motivation, and sociological environment. In this field, the basic research issues regard the ‘push factors’ that can stimulate entry into a given industry. A common thread running through both strands is that the decision-making horizon is essentially bounded by the point of entry. In other words, the object of the story is simply the entry into a given market.

More recently, a growing literature focusing on the postentry performance of firms has developed. Within this third strand of literature, research topics include the measurement and determinants of survival rates, early exit and the firm’s growth. Although the literature on entry does not pay attention to issues like early exit and chances of survival, papers on postentry performance generally take entry as an exogenous occurrence, in some way preliminary to the analysis. How and why the new firm entered the market is generally considered to be beyond the scope of such studies.

Nevertheless, one can suppose that the initial population of new entrants (entrepreneurs) is not likely to be homogeneous in terms of personal characteristics, motivation, and previous experiences, and it is plausible to suppose a possible link between these preentry features and the firm’s subsequent postentry performance.

In other words, this paper will address questions such as: does an innovative entrepreneur have the same chances of postentry profitability as a conservative one? Does a former blue collar worker have the same chances as a former manager? Does a defensive motivation for the start-up of a new firm – such as the avoidance of unemployment – tend to be related to an inferior postentry performance? Thus, the purpose of this paper is to provide some insight into the relationship between the decision to start a new firm and the subsequent postentry performance. In particular, we relate those factors that are decisive in leading an economic agent to leave a mother company to start a new firm to the postentry performance of the new-born enterprise. This enables us to distinguish between the types of motivation leading to the better or poorer postentry performance. Although policy conclusions will not be explicitly drawn in this particular study, the results presented in the following sections may be of some help in designing national and local industrial policies.

In the second section of this paper a survey of previous studies on entry and postentry performance will be presented. The dataset, which consists of a sample of 147 Italian spin-offs, is described in the third section. In the fourth section the hypothesis that different factors inducing new-firm start-ups have a disparate effect on the postentry performance is tested. Finally, the main findings of this study are briefly summarized.

9.2 Start-up of small firms and their subsequent early performance: a review of the literature

Entry has an important role in the model of perfect competition since an excess level of profitability induces entry into the industry; that is, if excess profits occur – caused by the opening of a market niche, a cost-saving innovation, or product differentiation – additional agents are attracted into the market. In this view, a queue of well-informed potential entrepreneurs is supposed to be waiting outside the market, and the expected level of profit is the ‘pull factor’ determining entry (Khemani and Shapiro, 1986; Acs and Audretsch, 1989a; Geroski, 1991; Geroski and Schwalbach, 1991).

In most of the conventional entry models, the maximization of expected profits is discounted by taking into account barriers to entry. In these models, entry is still driven by expected profits, but it is also hindered by factors such as initial sunk costs, minimum efficient size, industry-specific features such as innovation and advertising expenditure (Mansfield, 1962; Orr, 1974; Baldwin and Gorecki, 1987). More recently, ‘strategic barriers to entry’ have attracted the attention of many scholars: in these models entry barriers play a preemptive role in a game between incumbents and potential entrants (Tirole, 1989, Ch. 8). The main shortcoming of this traditional approach to industrial organization is that by treating the industry market as the essential unit of observation, it is virtually impossible to take into account individual characteristics of the potential founder (push factors). In fact, while the diversification of an existing firm into a new market can be fully explained through the consideration of expected profits and (strategic) entry barriers,
the study of the foundation of a new small firm by a single entrepreneur requires a wider perspective. Indeed, if the unit of observation is the level of the market, this obscures the decision-making process at the level of the individual (Winter, 1991) and underestimates the factors shaping the entrepreneur’s motivation in starting a new business (McClelland, 1961).

As a complement to the simplified view of entry discussed so far, a different tradition can be singled out in the history of economic thought: Schumpeter (1911), Knight (1921) and Oxenfeldt (1943) drew attention to the subjective characteristics of the actual founder of a new firm. Their well-known definitions of entrepreneurship opened the way to a more general framework where pull factors are studied together with some push factors concerning the environment and the particular situation of the potential founder (for a discussion of push factors contrasted with pull factors, see Kilby, 1971).

This literature is mainly empirical in nature and gives interesting insights into the actual process of entry. For instance, according to the results of the surveys carried out by Storey (1982) and Johnson (1986), the founder of a new firm is heavily influenced by his/her own background, with particular reference to his/her previous job experience (it has to be taken into account that the vast majority of new firms originate through spin-off from a mother company: 60% in Storey (1982) and 68% in Vivarelli (1991)). In other words, his/her entrepreneurial project is dependent on technical and managerial competence acquired in the previous job: technical savoir faire, organizational skills, knowledge of the market, and so on (Bates, 1990). Thus, spin-off results can be affected by the previous hierarchical job position of an ex-employee (for instance, successful entrepreneurs are more likely to have been managers involved in supervisory functions). As regards the personal characteristics of the founder, family background is also singled out as a key factor by econometric estimates explaining new firm formation as an act of self-employment (De Wit and Van Winden, 1989; Evans and Leighton, 1989). However, other empirical studies tend to play down the relative importance of this factor in shaping the start-up decision (Vivarelli, 1991).

An interesting way to model entry decision to encompass both pull and push factors is the so-called ‘income choice’ approach (Creedy and Johnson, 1983; Storey and Jones, 1987; Blanchflower and Oswald, 1990; Evans and Leighton, 1990; Blanchflower and Meyer, 1994). In this theory, a potential founder compares his present income and prospects as an employee with the expected income from the independent activity; if this difference is more than a given threshold, whose level depends on the individual’s risk aversion and on particular psychological aptitudes such as a strong desire to be independent, the new firm will be founded. While this approach encompasses the traditional view whereby entry is pulled by expected profits, it also explains some situations where the founding of the new firm is induced either by uncertainty about future career perspectives or by a strong psychological motivation to be independent (for an application of this model to the Italian case, see Foti and Vivarelli, 1994; for a general view of entry and survival processes in Italy, see Contini and Revelli, 1992; Santarelli and Sterlacchini, 1994). Obviously, this model is of particular interest in modelling
the spin-off of previously dependent workers who opt for self-employment (for theoretical models based on the income choice, see Lucas, 1978; Kihlstrom and Laffont, 1979; Blau, 1987; Holmes and Schmitz, 1990).

In addition, the income choice approach can be adapted to some situations where the decision to start a new firm is induced either by unemployment or by fear of becoming unemployed; that is, by a very low expected income from the present employment. Indeed, this kind of start-up has been called ‘escape from unemployment’ (Oxenfeldt, 1943, Ch. 10). Storey and Jones (1987) discovered a percentage of previously unemployed founders varying between 25% and 50%, whereas Highfield and Smiley (1987) found evidence for a counter-cyclical feature of new firm formation (for critical reviews of the escape from unemployment hypothesis, see Hamilton, 1989; Storey, 1991).

The literature on the entry process has roots in the history of economic thought, but a new strand of literature on the postentry performance of firms has emerged in the last few years (see, for instance, Reid, 1991; Boeri and Cramer, 1992; Dunne and Hughes, 1994; Audretsch and Mahmood, 1995; Baldwin and Rafiquzzaman, 1995; Mata, Portugal and Guimaraes, 1995). These studies have drawn attention to issues of industry dynamics such as postentry patterns of survival, growth and early exit. In these analyses, cohorts of new firms are tracked over time and their postentry performance is theoretically modelled and empirically observed. Here it will be sufficient to focus attention on those studies that have attempted to relate postentry performance to some newly founded firms’ initial characteristics. For instance, Dixit (1989) and Hopenhayn (1992) both argue that postentry performance may be affected by the level of sunk costs in the industry: higher sunk costs should reduce the likelihood of early exit since precommitment can be seen as a signal of superior entrepreneurial capabilities. Other studies are more concerned with industrial rather than firm characteristics; for example, Audretsch (1995) focuses on the degree of scale economies in a given industry, arguing that new small firms not able to grow and to approach the industry’s minimum efficient scale will presumably be characterized either by bad postentry performance or by early exit (see also, Acs and Audretsch, 1989b).

On the whole, although these studies are very useful in representing the role of entry in determining evolutionary patterns at industry level (industry differentiation and innovation, Gibrat’s law, patterns of early exit and population renewal, and so on), they say little about the postentry performance of the single new-born firms. In this paper, however, the focus of the analysis will be the microperformances of newly founded firms and how their performances can be linked to their initial characteristics.

Jovanovic’s studies (1982, 1994) are based on the hypothesis that the income decision resulting in a new entrepreneurial firm and subsequent postentry performance are formed under a ‘veil of ignorance’. In this paper the hypothesis is that the determinants of the starting of a new firm do not have a neutral influence on the postentry performance. In Jovanovic’s framework it is the postentry learning that matters. In our analysis, postentry performance is partially predetermined on the basis of the founder’s preentry features. For example (and taking into account
both conventional entry models and the income choice model), if the underlying motivation to start a new firm is explicitly linked to innovative projects, then a better postentry performance may be expected than if a new firm is started on the basis of a purely defensive motivation, such as the fear of becoming unemployed (for the role of innovation in making a new small firm successful, see Acs and Audretsch, 1990; Audretsch, 1991). Similarly, some deeply rooted psychological motivation, such as the strong desire to be independent, can hinder a rational and objective consideration of actual profit expectations for the new firm and jeopardize future chances of business success. Moreover, a spin-off originated by a managerial position may have better chances than a spin-off originated by a low-skilled worker.

More generally (and taking into account that our sample is made up of new-born firms originated through spin-off), it is important to see that an individual economic agent’s choice to start a new firm rather than remaining employed in an incumbent organization can be influenced by many different factors related to the founder’s previous job experience and learning within the mother company (Porter, 1980; Storper and Salais, 1997, p. 164 and ff.).

9.3 Data and measurement issues

A database of 147 new manufacturing firms originating through spin-offs in the Italian province of Milano was constructed on the basis of returned questionnaires collected in 1996. In order to avoid possible bias, inconsistencies, and exaggeration which typically affect mail surveys, questionnaires were filled in during direct phone interviews conducted by interviewers previously trained by the authors.

The database includes only entirely new firms set up in 1989 and 1990 and surviving up to the time of the interview (1996). Thus, it consists solely of surviving firms; this creates a particular bias in that early failures are excluded from the analysis. However, a variance in business performance within surviving firms was sufficiently large to ensure that the survivor bias would not be particularly worrying for the purposes of this study. We will not be able to address the issues concerning early exit versus survival, but we will focus on performance differentials among surviving spin-offs.

The firms included in the database were randomly selected according to the local industrial structure with the assistance of lists from the local Chamber of Commerce. From an initial sample of 439 new-born firms, any start-up that was either a new branch of an incumbent enterprise or simply a nominal legal transformation of an existing firm was eliminated from the database. Next, the interviewers selected only the new founders who were previously employed in existing firms (spin-off). The resulting subsample consisted of 226 cases, out of which 147 entrepreneurs allowed interviews.

As previously mentioned, the entire sample was found in the Milano province, which is the most industrialized and advanced local economic system in Italy. The province industrial structure is deeply diversified and does not exhibit idiosyncratic
features such as a specific sectoral specialization (in contrast with most industrial
districts located in northwest and central Italy), the presence of a dominant large
firm (as in Torino with the presence of FIAT), or the prevailing weight of the
public sector (as in the south of Italy). In addition, national and local industrial
policy, although not completely absent, does not appear to have significantly
affected the structure and the performance of the local economy. Hence, the
degree of generalizability of this particular empirical study appears to be suffi-
ciently high, though limited to industrialized, advanced local economic systems.

The questionnaire has a qualitative/quantitative nature: together with personal
qualitative characteristics and background, the founder interviewed was asked to
give a score (from 0 to 10) to motivations and factors that had been relevant to
shaping his/her start-up decision. Most of the interviewed entrepreneurs had set
up very small firms after leaving larger but still small mother firms; 90.4% of
those interviewed had fewer than five employees at start-up, while 52.9% of the
mother companies had fewer than 10 employees (although 34.8% had more than
20 employees). All those interviewed had at least one employee, so pure self-
employment has been excluded from the analysis and the results focused on the
spin-off of a new (although small) firm from an incumbent firm. In addition,
mean start-up investment costs proved very low (about US$60,000) and only
partially sunk (on average, two-thirds of the initial investment was considered
irreversible). On the basis of these results, one can say that barriers to entry do
not play an important role in deterring spin-offs in Italian manufacturing.

The database was used to construct, through a factor analysis, a joint measure
of postentry performance. This measure takes into account both annual postentry
employment growth and the relative profitability of the new-born firm (in com-
parison with the sectoral average). Although the second measure is the standard
way of appraising a firm’s performance, annual employment growth has been
chosen as a second objective measure of new-born firms’ performance, since
these firms generally start very small and they decide to hire new employees only
in the case of very positive expectations regarding current and future incomes.
Although virtually all firms within this sample entered the market at suboptimal
size, and so all of them ‘needed to grow’, one can argue that in different sectors
the specific levels of the minimum efficient scale call for different paces of
employment growth for new entries that want to survive. These considerations
support the decision to check for sectoral fixed effects when a newly founded
firm’s performance is analysed. Thus, the regressions explaining firm performance
with different determinants will be characterized by the inclusion of sectoral
dummies (see later).

The empirical tests carried out in the following section will follow a three step
procedure.

1 Answers to the questionnaire will be processed and resulting rankings will
be commented on, trying to underline the main determinants of new firm
formation with regard to both personal background and motivation and to
learning and competence accumulated in the mother firm.
All factors will be grouped by factor and cluster analyses, with the purpose of singling out some dominant profiles that may help to construct a taxonomy of different categories of spin-offs.

Factors and clusters derived by steps 1 and 2 will be used, together with other isolated characteristics and checking by means of sectoral dummies, as regressors of an econometric analysis for the explanation of postentry performance across the sample of 147 spin-offs.

### 9.4 Empirical results

Each entrepreneur ranked each factor from a scale of 0 (indicating a minimal influence on the start-up decision) to 10 (indicating a maximal influence on the start-up decision). The median ranking of those factors influencing the decision to start a new firm is reported in Table 9.1 together with means, standard deviations and variation coefficients for each answer (the ranking according to the average scores would prove very similar to that shown in Table 9.1).

Although it is not explicitly the purpose of this study, it can be seen that the ranking of factors shaping the entrepreneurial decision is consistent with the findings in the literature discussed in Section 9.2. As Storey (1982), Johnson (1986)

| Table 9.1 Ranking of factors influencing new firm (spin-off) formation (range 0–10) |
|-------------------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Factor                                         | Median | Mean     | Standard deviation | Variation coefficient |
| Desire to manage working time                   | 9      | 7.701    | 2.996             | 0.389            |
| Refusal to carry out tasks for others           | 8      | 6.286    | 3.640             | 0.579            |
| Openness of a market niche                      | 7      | 6.299    | 2.980             | 0.473            |
| Perceived potential for income increase         | 6      | 5.503    | 3.062             | 0.556            |
| Disagreement about the general managing criteria of the mother firm | 5      | 4.122    | 3.721             | 0.903            |
| Belief in introducing a marketing innovation    | 5      | 4.122    | 3.501             | 0.849            |
| Underestimation of skills by the mother firm    | 4      | 3.939    | 3.642             | 0.925            |
| Belief in introducing a process innovation      | 4      | 3.809    | 3.706             | 0.973            |
| Concern about future career developments        | 3      | 3.776    | 3.848             | 1.019            |
| Underestimation of technological opportunities by the mother firm | 3      | 3.374    | 3.309             | 0.981            |
| Belief in introducing a product innovation      | 2      | 3.388    | 3.582             | 1.057            |
| Scepticism about prospects of the mother firm   | 1      | 3.395    | 3.711             | 1.093            |
| Waste of market opportunities by the mother firm| 1      | 2.003    | 3.361             | 1.123            |
| Fear of becoming unemployed                     | 1      | 2.905    | 3.602             | 1.240            |
| Support from the mother firm                    | 0      | 1.714    | 2.017             | 1.702            |
and Vivarelli (1991) found, the desire to be independent turns out to be the most
decisive factor underlying the decision to start a new firm. Indeed, at the top of
the ranking we find the desire to manage one’s working time and the refusal to
carry out tasks for others.

Although the perceived potential for income increase is somewhat less important
(median = 6), it still plays an important role; interestingly enough, profit expecta-
tions are more related to demand factors (the openness of a market niche) than
to supply factors (belief in introducing an innovation).

In fact, innovative motivation ranks in the middle of the list (marketing
innovation = 5; process innovation = 4; product innovation = 2). This result is
consistent with previous research on the start-up of Italian small firms (Vivarelli,
1991, p. 220). However, although innovative determinants are not dominant
within the population of new founders, they might be relevant to the superior pos-
tentry performance of the subsample of better entrepreneurs (see later).

Turning attention to personal motivation connected with previous job experience,
the attempt to create a situation where an economic agent’s human capital is more
fully deployed seems to play an important role in the entrepreneurial decision.
Disagreement about the general managing criteria of the mother firm is the fifth
factor in the ranking (median = 5), and undervaluation of skills is the seventh
(median = 4). Other more specific forms of disagreement with the management
of the mother firm follow: the undervaluation of technological opportunities
(median = 3) and the waste of market opportunities (median = 1).

Fear of unemployment and scepticism about the future prospects of the mother
firm turn out to be minor motivations (median = 1), although concern about future
career developments scores higher (median = 3). On the whole, defensive moti-
vations are not very common, although they may be relevant to a minority of new
potential entrepreneurs. Finally, these spinoffs were not supported by the mother
firms (median score = 0).

As can be deduced from the reported standard deviation values, the population
of new founders shows a quite large variability in the motivation leading to
start-up. In other words, although motivation can be ranked, new founders seem
to be quite heterogeneous. It could therefore be useful to construct a typology of
entrepreneurs.

This exercise has been conducted with the help of a factor analysis, with results
being reported in Table 9.2. The results of the statistical inference are both satis-
factory (the explained variance is more than 60%) and interesting.

The first factor (F1) is undoubtedly connected with innovative motivation,
expressed in all its different forms (four questions in the questionnaire). Moreover,
innovative factors are related to actual market opportunities (two questions). F2 is
made up of a group of motivations related to the previous frustration within the
mother company and to the desire to better exploit different opportunities that were
inadequately valued in the mother firm. F3 is a defensive factor both in terms of
fear of losing one’s job and of scepticism about future career opportunities. Finally,
factor F4 is a residual factor mainly connected with the desire to be independent
coupled with profit expectations.
Table 9.3 is similar to Table 9.1, but it concerns the learning process that occurred in the mother firm and that may have played a role in shaping the start-up decision and in determining postentry performance.

As can be clearly seen, acquired technical capabilities are ranked as the most important preconditions for start-up. On the other hand, and consistent with the results shown in Table 9.1, innovative learning is not so common among the founders interviewed (the four innovative forms of learning are all among the last five items in the ranking list). In the mid-ranking, there are both managerial learned competences (organization, accounting, finance) and entrepreneurial abilities (information, personal contacts, knowledge of the market and the cost–benefit approach).

All these determinants linked to previous job experience are grouped into three factors, according to the results of a second factor analysis shown in Table 9.4.

The outcome of the factor analysis explains almost 55% of the entire variance and singles out three factors. FF1 groups together all technical capabilities and entrepreneurial skills, FF2 is clearly defined and picks up the four forms of learning connected with innovation, and FF3 consists of managerial skills.

In general, the two factor analyses (Tables 9.2, 9.4) are sufficiently clear-cut and the seven factors can be used in an attempt to explain postentry performance.
Table 9.3 Ranking of level of competence accrued within the mother firm (range 0–10)

<table>
<thead>
<tr>
<th>Skill Description</th>
<th>Median</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Variation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific technical skills</td>
<td>8</td>
<td>7.255</td>
<td>3.157</td>
<td>0.435</td>
</tr>
<tr>
<td>Production process management</td>
<td>8</td>
<td>6.241</td>
<td>3.682</td>
<td>0.590</td>
</tr>
<tr>
<td>Technical knowledge</td>
<td>7</td>
<td>6.683</td>
<td>3.097</td>
<td>0.463</td>
</tr>
<tr>
<td>Opportunity of testing the new entrepreneurial project</td>
<td>6</td>
<td>5.731</td>
<td>3.185</td>
<td>0.556</td>
</tr>
<tr>
<td>Knowledge of the final market</td>
<td>6</td>
<td>5.421</td>
<td>3.791</td>
<td>0.699</td>
</tr>
<tr>
<td>General management competence</td>
<td>6</td>
<td>5.400</td>
<td>3.340</td>
<td>0.619</td>
</tr>
<tr>
<td>Cost–benefit analysis of new entrepreneurial projects</td>
<td>6</td>
<td>5.345</td>
<td>3.305</td>
<td>0.618</td>
</tr>
<tr>
<td>Knowledge of the market of raw materials and intermediate goods</td>
<td>6</td>
<td>5.221</td>
<td>3.572</td>
<td>0.684</td>
</tr>
<tr>
<td>Personal contacts</td>
<td>5</td>
<td>4.993</td>
<td>3.643</td>
<td>0.730</td>
</tr>
<tr>
<td>Knowledge of unexploited opportunities</td>
<td>5</td>
<td>4.117</td>
<td>3.378</td>
<td>0.821</td>
</tr>
<tr>
<td>Raising of financial resources</td>
<td>5</td>
<td>4.055</td>
<td>3.278</td>
<td>0.808</td>
</tr>
<tr>
<td>Knowledge of competing firms</td>
<td>4</td>
<td>3.979</td>
<td>3.531</td>
<td>0.887</td>
</tr>
<tr>
<td>Experience in developing new products</td>
<td>2</td>
<td>3.359</td>
<td>3.549</td>
<td>1.057</td>
</tr>
<tr>
<td>Administrative skills</td>
<td>2</td>
<td>3.007</td>
<td>3.370</td>
<td>1.121</td>
</tr>
<tr>
<td>Opportunity to test product/process innovation</td>
<td>1</td>
<td>2.917</td>
<td>3.177</td>
<td>1.089</td>
</tr>
<tr>
<td>Marketing skills</td>
<td>1</td>
<td>2.855</td>
<td>3.223</td>
<td>1.129</td>
</tr>
<tr>
<td>Experience in new equipment engineering</td>
<td>0</td>
<td>2.524</td>
<td>3.361</td>
<td>1.332</td>
</tr>
<tr>
<td>Involvement in advanced technological projects</td>
<td>0</td>
<td>1.938</td>
<td>2.977</td>
<td>1.536</td>
</tr>
</tbody>
</table>

The regression analysis is threefold: the first regression relates postentry performance (as defined in the previous section) to the four factors (F) derived from personal motivation; the second regression relates postentry performance to the three factors (FF) derived from learning in the mother firm; the third regression relates postentry performance to three dummy variables, which have been built on the basis of a cluster analysis run on the seven factors F and FF. The resulting clusters are the innovative firms (19 firms, where F1 and FF2 are the dominant factors), the experience firms (47 firms, where F2 and FF3 are dominant), and the defensive plus residual firms (81 firms, where F3, F4, and FF1 are dominant).

All regressions have been controlled for both sectoral effects (dummy variables included in all the regressions reported in Table 9.5, except e) and objective characteristics of the newborn firm: initial size, size of the mother firm, number of business partners, years of previous founder’s job experience, founder’s level of education, founder’s previous hierarchical job position. Among all these variables, only the last was positively and significantly connected with postentry performance and has been retained in the final regression analysis. The status of the previous job position of the entrepreneur (position) has been measured on
<table>
<thead>
<tr>
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<td>V25S</td>
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Notes
Total variance explained: 54.9%; % of variance: FF1 = 34.2; FF2 = 11.8; FF3 = 8.8.

Key

Regressions a and b refer to the four factors derived from the revealed motivation leading to the start-up. A clear-cut result is that innovative motivation (F1) is positively and significantly (99%) connected with superior postentry performance. Although the other three factors were not significant, it is of some interest to notice that defensive motivation (F3) is characterized by the lowest coefficients and degrees of significance. The inclusion of the previous job position does not affect the results and confirms the positive role of previous managerial experience in supporting better postentry performance (although the coefficient is just barely significant).

Regressions c and d are instead based on factors that have been derived from the revealed importance of different job experience within the mother firm. Again,
learning connected with innovative activities (FF2) is strongly linked with better postentry performance and shows a high degree of statistical significance. On the other hand, the other forms of learning, although characterized by positive coefficients, do not exhibit a sufficient degree of significance. The inclusion of the additional regressor ‘position’ does not change the results and consistently shows the positive influence of previous job experience in a higher hierarchical position.

Interestingly enough, both regressions $a$ and $c$ throw some light on what is commonly known as managerial efficiency. Indeed, factor analyses presented in Tables 9.2 and 9.4 are built on the different features that may cause different degrees of managerial efficiency within the spin-off firm. Instead of treating managerial effects as dummy variables, regressions $a$ and $c$ directly relate factors to the firm’s performance. However, one can argue that these regressions might be affected by the omission of an additional direct measure of managerial effort. In order to check for this possible bias, regressions $a$ and $c$ have been rerun including an additional
regressor measuring the weight of managerial and coordination expenditure as a percentage of the firm's total expenditure. Both regressions are robust regarding this additional control: results reported in Table 9.5 remain virtually unchanged, both in terms of coefficient values and in terms of their statistical significance, while the additional regressor turns out to be of the expected sign (positive), but not significant ($t = 1.39$ in the modified regression $a$ and $t = 1.11$ in the modified regression $c$).

Regression $e$ is based on the cluster analysis described earlier and shows, once again, the positive and significant effect of an innovative background (innovative motivation plus innovative experience). This result is not surprising and is consistent with the positive effect of F1 and FF2, the ‘constituent factors’ of the innovative cluster. In addition, the defensive cluster shows a negative, though barely significant, influence on postentry performance. This result gives some support to the hypothesis that when avoidance of unemployment or career concern is the motivating force behind the entrepreneurial decision, the subsequent postentry performance tends to be worse.

On the whole, the most unambiguous result in Table 9.5 concerns the positive roles of innovative motivation and experience in promoting a better postentry performance of newly founded firms.

9.5 Conclusions

The start-up of new small firms is not a homogeneous phenomenon: different motivation and different previous job experience lead to different forms of spin-offs, which can be characterized by very different postentry business performances.

One of the main conclusions of this study is that the postentry performance of new firms originated by spin-off does not seem neutral regarding the motivation and job experience that led the economic agent to the decision to start a new firm. In other words, the questions posed in the introduction of this study turn out to be relevant; that is, innovative motivation and job experience in innovative activities tend to be linked to a superior postentry performance.

In contrast, there is some evidence that defensive motivation such as the avoidance of possible or actual unemployment seems to be a predictor of a poorer postentry performance. Finally, a high position in the previous job tends to be positively correlated with postentry performance.

Since the sample used in this study does not appear to be significantly biased by idiosyncratic local and institutional factors (see Section 9.3), these conclusions could be applied to other advanced and industrialized local economic systems. However, this work opens the way to further research on a subject that seems to be of some importance in explaining industry dynamics.

References


10 Are all the potential entrepreneurs so good?

10.1 Introduction

Entry can be interpreted as a dynamic process starting from the business idea, passing through the foundation of a new firm and developing into a given post-entry economic performance of the newborn firm.

While the economic literature has studied these three stages separately, few attempts have been done to connect the motivations of the potential founders, the actual foundation of the new firm and the level of the subsequent post-entry performance. This paper will try to correlate the ex ante characteristics and motivations of the potential founder with the actual foundation of a new enterprise (or the giving-up of the business idea) and then with the post-entry performance of the newborn firm. The paper is organized as follows.

In the next section the literature on entry and post-entry is critically discussed and different approaches are compared. In Section 10.3 the database is presented and the econometric methodology is clarified. In Section 10.4 results are commented on, while the conclusive Section 10.5 tries to summarize the message of the paper and to derive some policy implications.

10.2 The literature

Entry is an important topic in the studies of industrial organization. In particular, three strands of literature can be singled out.

1 The first one looks at entry as a process triggered by expectations of extraprofits and hindered by barriers to entry. In this view, a queue of well-informed potential entrepreneurs is supposed to be waiting outside the market and the expected level of profit is the ‘trigger’ factor determining entry (see Khemani and Shapiro, 1986; Acs and Audretsch, 1989a; Geroski, 1991; Geroski and Schwalbach, 1991). However, the maximization of expected profits is discounted
by taking into account both exogenous barriers to entry such as scale economies and cost of investment (see Mansfield, 1962; Orr, 1974; Baldwin and Gorecki, 1987; Geroski and Schwalbach, 1991), and industry specific sunk costs such as innovation and advertising expenditures (‘endogenous barriers to entry’, see Sutton, 1991).

2 The second strand of literature focuses its attention not only on the classic ‘pull factors’ – such as profits and barriers to entry – but also on those ‘push factors’ which can be related to the individual and environmental characteristics of the potential founders.

In fact, while a diversification of an existing firm into a new market can be fully explained through the consideration of expected profits and (strategic) entry barriers, the study of the foundation of an entirely new small firm by a single entrepreneur requires a wider perspective. On the contrary, in the textbook approach the focus on the market obscures the decision making process at the level of individual (see Winter, 1991) and undervalues the factors shaping the entrepreneur’s motivation in starting a new business.

As a complement to the simplified view of entry discussed so far, a different tradition can be singled out in the history of economic thought: namely, Schumpeter (1911), Knight (1921) and Oxenfeldt (1943) drew attention to the subjective features of the actual founder of a new firm. These features include both the founder’s personal characteristics – such as age and education – and his/her individual motivations towards entrepreneurship.

This literature is mainly empirical in nature and gives interesting insights into analysing the actual process of entry. For instance, according to the results of the surveys carried out by Storey (1982) and Johnson (1986), the founder of a new firm is heavily influenced by his/her own background, with particular reference to his/her previous job experience (see also Bates, 1990; Reynolds et al., 2001, p. 54).

Among personal characteristics of the founder, family backgrounds are also singled out as key factors by econometric estimates which explain new firm formation as an act of self-employment (see De Wit and Van Winden, 1989; Evans and Leighton, 1989, 1990; for a contrasting empirical evidence, see Vivarelli, 1991). Family background or just the knowledge of another entrepreneur (see Reynolds et al., 2001, p. 54) are both signals of an above-average information set about the different aspects of a start-up experience.

Other studies show that non-economic factors may play an important role in triggering the startup decision and that sometimes they turn out to be more important than market variables such as profit expectations and entry barriers. According to a large number of studies, the potential entrepreneur is strongly influenced by particular psychological attitudes such as a strong desire to be independent, the search for autonomy in the workplace, the aspiration to a full exploitation of previous experiences and acquired abilities, the desire to be socially useful and to acquire a better social status (see Creedy and Johnson, 1983; Blanchflower and Oswald, 1990; Evans and Leighton, 1990; Blanchflower and Meyer, 1994). With regard to social status, entrepreneurship as a signal of self-sufficiency and individualism has been traditionally highly valued in the
US (see Zacharakis et al., 2000, p. 14), but it is increasingly appreciated in European countries as well (see, as far as Italy is concerned, Minniti and Venturelli, 2000, p. 19).

Finally, a personal motivation to start a new business can be related to a defensive attitude such as the uncertainty about future career perspectives or even the fear to becoming unemployed. This kind of start-up has been called ‘escape from unemployment’ (see Oxenfeldt, 1943, ch. 10; Storey, 1991; for empirical evidence suggesting an important role of job losses in stimulating entry see Storey and Jones, 1987; Foti and Vivarelli, 1994; Audretsch and Vivarelli, 1995 and 1996). Recent results from a multi-country panel study – the Global Entrepreneurship Monitor based on surveys of adult populations in 29 countries (see Reynolds et al., 2001) – reveal that ‘opportunity entrepreneurs’ (pulled by market opportunities) are the majority, but that ‘necessity entrepreneurs’ (pushed by defensive attitudes) represent in any case a considerable portion of potential and actual founders (for instance, in the UK, five people out of 100 start a firm because of a market opportunity whilst 1.4% do so just because they have no better choices for work, see Small Business Service, 2001, p. 6).

3 A common thread running throughout both the previous fields of study is that the decision-making horizon essentially is bounded by the point of entry. In other words, the object of the story is simply the entry into a given market.

More recently, a third stream of literature focusing on the post-entry performance of firms has been developed (see, for instance, Reid, 1991; Boeri and Cramer, 1992; Dunne and Hughes, 1994; Audretsch and Mahmood, 1995; Baldwin and Rafiquzzaman, 1995; Mata et al., 1995). These studies have drawn the attention to industry dynamics issues such as post-entry patterns of survival, growth and early exit.

Within this field, it is possible to analyse the relationship between ex ante features of entry and the post-entry performance of new firms, measured in terms of employment growth, profitability or market penetration. For instance, Dixit (1989) and Hopenhayn (1992) both argue that post-entry performance may be affected by the level of sunk costs in the industry: higher sunk costs should reduce the likelihood of early exit since precommitment can be seen as a signal of superior entrepreneurial capabilities. Other studies are more concerned with industrial rather than firm’s characteristics: for example, Audretsch (1995) focuses on the degree of scale economies in a given industry, arguing that new small firms not able to grow and to approach the industry’s minimum efficient scale (MES) will presumably be characterized either by bad post-entry performance or even by early exit (see also Acs and Audretsch, 1989b).

However, while these studies are very useful in representing the role of entry in determining evolutionary patterns at the level of industries, they say little about the relationship between the post-entry performance of newborn firms and the initial microeconomic characteristics of the firm and the founder.

With regard to this, other studies discovered a positive relationship between start-up size and survival (see Audretsch and Mahmood, 1995; Mata et al., 1995; for less
obvious results, see Audretsch et al., 1999); and a negative relationship between start-up size and post-entry growth (see Hall, 1987; Dunne and Hughes, 1994).

In this paper we will try to go a step further, trying to relate the entire set of initial characteristics (including motivations) both to the actual decision to start a new business and to the post-entry performances of starters.

For example, if the underlying motivation to start a new firm is explicitly linked to innovative projects, then a better post-entry performance may be expected than if a new firm is started on the basis of a purely ‘defensive’ motivation, such as the fear of becoming unemployed (for the role of innovation in making a new small firm successful, see Acs and Audretsch, 1990 and Audretsch, 1991; for an empirical evidence showing a positive relationship between innovative motivation and postentry performance see Vivarelli and Audretsch, 1998; Arrighetti and Vivarelli, 1999).

Similarly, some deeply rooted psychological motivation, such as the strong desire to be independent, can hinder a rational and objective consideration of actual profit expectations for the new firm and jeopardize future chances of business success.

More generally, it is important to see that both the economic agent’s choice to start a new firm and his/her subsequent post-entry economic performance can be influenced by many different factors related to the founder’s personal characteristics, his/her previous job experience and informational background and his/her personal ranking of motivations.

Exploiting the opportunity of using data concerning potential entrepreneurs, this study will try to relate ex ante economic, individual and environmental features to both the decision to start a new firm and – in the case of actual foundation – to the post-entry performance exhibited by the newborn firm.

10.3 Data and methodology

The unique database used in this study includes 365 Italian potential entrepreneurs who were interviewed in the first quarter of 1999. These individuals can be considered ‘potential entrepreneurs’ because they attended – during the 1990s – special training courses for people intending to found a new firm (supplied by FORMAPER, a training agency of the Chamber of Commerce of Milano).

Although being a large sample, FORMAPER database cannot be considered representative of the entire population of potential entrepreneurs. Due to the lack of a comprehensive survey of ‘nascent entrepreneurs’ in Italy, one cannot compare FORMAPER sample’s characteristics with population’s ones (nevertheless, the resulting sample composition shown in Table 10.1 is consistent with general findings about potential entrepreneurs in terms of gender, age and educational attainment, see Reynolds et al., 2001, pp. 25ff.).

However, it is important to remind the reader of the purpose of this paper, that is, not to draw the dominant profile of the ‘nascent entrepreneurs’ (as in – for example – Storey, 1994 and Reynolds, 1997), but to try to relate ex ante entrepreneur’s characteristics and motivations to the actual decision to start a new
<table>
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<tr>
<th>Definition</th>
<th>Variable</th>
<th>Measure</th>
<th>Mean</th>
<th>SD</th>
<th>OBS</th>
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(Table 10.1 continued)
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<td>2.06</td>
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<td>SPINOFF</td>
<td>score from 1 to 10</td>
<td>1.39</td>
<td>1.53</td>
<td>364</td>
</tr>
</tbody>
</table>

Note

a In the case of a dummy variable, the average is the percentage of observations equal to 1.
firm and – if such is the case – to the post-entry performance exhibited by the newborn firm.

Among the 365 ex-participants, at the moment of the interview 215 had actually started a new economic activity (starters), while 150 had definitively given up (renouncers). The questionnaire included several questions concerning start-up/renounce determinants, individual motivation and post-entry performance. The subjects interviewed had to give a quantitative score to each question. In Table 10.1 all the relevant variables, their measures and their descriptive statistics are reported.

As it can be seen, the list of the independent variables includes most of the pull and push determinants discussed in the previous section. With regard to the text-book approach, profit expectations and the penetration into a market niche are ranked within the motivation list while the role of self-financing, the possible use of a public subsidy, initial firm size and the three sectoral dummies jointly take into account the important roles of barriers to entry, scale economies and the MES threshold.

With regard to the pushing factors, personal characteristics include gender, age, level of education, years of previous working experience and family tradition of the potential founder.

The escape from unemployment hypothesis is represented by the motivations induced by the uncertainty about future career and the unemployment status (or risk of unemployment). In addition to that, the indicator CHOICE measures the degree of determination of the potential founders dividing them between those induced by defensive determinants such as the escape from unemployment and those pushed by more progressive motivations.

Psychological motivations include the desire to be independent, the search for autonomy, the satisfaction in working, the desire to fully exploit previous job experience, the desire to be socially useful and to get a better social status.

The roles of an innovative motivation and of coming from a mother firm are represented by the two variables INNO and SPINOFF.

In addition to the variables derived from the theories discussed in the previous section, it has been decided to emphasize the role of the information set available to the potential founder (INFORM) since the sample population was characterized by a high degree of heterogeneity (as in the real world where founders go from the top manager to the low-skilled blue collar and the unemployed).

Finally, two variables regarding the training courses have been included: the shown ability to prepare an acceptable business plan and the difference between free and fee-paying courses (where the latter signals a higher degree of self-commitment).

Consistently with the purpose of this paper, empirical estimates were used to evaluate the impact of characteristics and motivations upon the start-up decision (START) and – in case of actual start-up – on the firm’s post-entry performance measured in three alternative ways: ECON (a subjective entrepreneur’s perception of a good economic performance); INCOME (earning capacity in terms of income comparison) and PROF (profitability in comparison with competitors).
The possible additional dependent variable ‘employment growth’ was discarded since the variable had resulted zero inflated.

The empirical test was developed through a two-stage regression analysis.

First, the single and joint impacts of the independent variables on START, ECON, INCOME and PROF were assessed by means of a stepwise algorithm. All the specifications were controlled for sectoral fixed effects (MANIF, COMM and BUSSERV) and heteroskedasticity (consistent covariance matrix), while the performance equations were controlled for firm’s age (FIRMAGE: older firms are more likely to exhibit a more stable performance). In Table 10.1, the variables which were significant in at least one of the four estimates have been underlined.

Then, final results were obtained using the selected variables in a sample selection model: since firms’ performance can be assessed only across a subset of the examined population (the starters), while the decision to start concerns all the population (starters and renouncers), the appropriate econometric method to deal with this censoring problem is the two-step procedure suggested by Heckman (1979) (see also Amemiya, 1984). This specification introduces an additional explanatory variable (the inverse Mill’s ratio) obtained by the corresponding probit model (START as a selection equation) into the maximum likelihood estimation of the post-entry performance equation.

Hence the estimated models have the following common structure:

\[
\text{PERF} = \alpha + \beta X + \varepsilon \quad \text{main equation} \quad (10.1)
\]

\[
\text{Prob} (\text{START} = 1) = F (\delta + \gamma X + \mu) \quad \text{selection probit equation} \quad (10.2)
\]

where

\[
\text{PERF} = \text{performance indicator (ECON, INCOME, PROF)}
\]

\[
X = \text{vector of the independent variables}
\]

\[
\text{START} = \text{start-up (1) or not (0)}
\]

### 10.4 Results

Some preliminary descriptive considerations can be derived by the motivational ranking reported in Table 10.1. As it can be seen – and accordingly to the most recent theories and evidences – textbook explanations of entry (RETURN and MARKET) turn out to be less important than psychological pushing factors such as SELF, INDEP, SATISF and EXPER. Moreover, the innovative motivation is in the middle of the ranking, while the defensive determinants, other psychological motivations and family tradition seem to play a minor role. However – as it will be shown – most of the motivational variables do not have a significant impact on the actual decision to start-up and on the subsequent post-entry economic performance.

Table 10.2 reports the estimated values and the degree of significance of relevant coefficients, Breusch-Pagan’s test for heteroskedasticity (correction has been
necessary in the third model), the degree of correlation between the selection and performance equations (\( \rho \)) and the number of observations.

For each of the three models, the first column reports the results for the post-entry performance (main equation) and the second one the results for the entry decision (selection equation). Starting from the six independent variables selected from the stepwise procedure described earlier, in each model only significant or barely significant regressors (in one or both the model’s equations) were included.

Finally, all the equations have been controlled for the three sectoral dummies (not reported) and two models (ECON and INCOME) registered the expected positive impact of firm’s age upon post-entry performance.

The overall picture which emerges from Table 10.2 can be summarized by the following considerations:

1. The probability of starting a new firm is partially influenced by the degree of determination exhibited by the potential founder and significantly facilitated by the availability of a rich information set. In addition, potential founders who are not able to write a business plan are less likely to start a new business. In one model, fee-paying precommitment makes start-up more likely. Thus, although profit expectations do not seem to play a dominant role in the motivational

| Table 10.2 Determinants of post-entry performance (3 sample selection models) |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
|                                  | **ECON**                        | **START**                        | **INCOME**                       | **START**                        | **PROF**                         | **START**                        |
| Constant                          | 3.03***                         | −1.93***                         | 1.40***                          | −1.43***                         | 1.69***                          | −1.93***                         |
|                                  | (3.08)                          | (−5.39)                          | (3.85)                           | (−3.82)                          | (5.48)                           | (−5.39)                          |
| CHOICE                            | 0.81***                         | 0.18*                            | 0.15                              | 0.14                              | 0.20**                           | 0.18*                            |
|                                  | (2.97)                          | (1.74)                           | (1.49)                           | (1.29)                           | (2.00)                           | (1.74)                           |
| INFORM                            | 0.24**                          | 0.48***                          | 0.14***                          | 0.44***                          | 0.12***                          | 0.48***                          |
|                                  | (2.21)                          | (7.88)                           | (3.27)                           | (6.99)                           | (2.65)                           | (7.88)                           |
| FREE                              | −0.24*                          | −0.73***                         | (−1.85)                          | (−4.24)                          |                                  |                                  |
| PLAN                              | 0.44***                         | 0.68***                          | 0.44***                          |                                  |                                  |                                  |
|                                  | (2.90)                          | (4.10)                           | (2.90)                           |                                  |                                  |                                  |
| ZEAL                              | −0.11**                         | 0.01                             | −0.42**                          | 0.01                             |                                  |                                  |
|                                  | (−2.35)                         | (0.48)                           | (−2.34)                          | (0.48)                           |                                  |                                  |
| FIRMAGE                           | 0.23**                          | 0.18***                          |                                  |                                  |                                  |                                  |
|                                  | (2.14)                          | (4.99)                           |                                  |                                  |                                  |                                  |
| Breusch and                       |                                  |                                  |                                  |                                  |                                  |                                  |
| Pagan’s test for                 |                                  |                                  |                                  |                                  |                                  |                                  |
| heteroskedasticity               |                                  |                                  |                                  |                                  |                                  |                                  |
| Log likelihood                    | −438.72                         | −190.30                          | −241.05                          | −181.18                          | −232.61                          | −190.30                          |
| \( \rho \)                       | 0.97                            | 0.99                             | 0.99                             | 0.74                             |                                  |                                  |
| Sample size                       | 213                             | 359                              | 212                              | 359                              | 208                              | 359                              |

Notes:
- All the regressions have been controlled for sectoral dummies (not reported).
- t-statistics in parentheses.
- * Significant at 10%.
- ** Significant at 5%.
- *** Significant at 1%.

In the third model a heteroskedasticity-consistent covariance matrix has been used.
ranking (see Table 10.1), the textbook view of entry appears to be supported by these results. Within the population of potential entrants the better informed, the most rational (able to write down a consistent business plan) and the better determined and self-committed are those most likely to actually start a new enterprise.

2 Once the potential founder becomes an actual entrepreneur, her/his economic performance is above average when the start-up has been based on a convinced choice, that is, on a positive entrepreneurial calculation and not on a defensive reason such as the escape from unemployment or the absence of alternatives. The good econometric performance of the CHOICE indicator compensates for the not significant impact of the single motivations in the Table 10.1 ranking. In other words, it is shown that founders pushed by rational economic expectations are more likely to succeed than new entrepreneurs pushed by defensive reasons such as the escape from unemployment.

A larger information set not only makes the actual start-up more likely (see previous point), but also induces a better post-entry performance. Differently from the textbook assumptions, in the real world potential founders are not part of a homogeneous queue of well-informed individuals but are characterized by very different information sets; inside the entrepreneurial pool, those who gain access to better and more reliable information are more likely to become successful entrepreneurs.

While the conclusion that the better informed and determined potential entrepreneurs are more likely to start a new firm and to show above-average economic performances appears not surprising, it is important to underline that these characteristics show not particularly high means and large standard deviations within the examined population (see Table 10.1 with regard to the variables CHOICE, INFORM and PLAN). This means that potential entrepreneurs are highly heterogeneous and cannot be treated as a uniform pool. On the contrary, selective policies become necessary (see Section 10.5).

As expected, non-economic motivations – such as the desire to be socially useful – exert an adverse effect on post-entry performance; they probably interfere with the rational assessment of the actual market chances and tend to exaggerate – in the potential founder’s mind – the actual potentialities of his/her business idea.

Finally, in one model, fee-paying can be interpreted as self-commitment, promising an above-average post-entry performance.

10.5 Conclusions and policy implications

The evidence presented in this study show that the potential founder’s characteristics and motivations do not have a neutral influence both on the decision to actually start a new business and on the subsequent post-entry performance.

For instance, a business idea based on a large and reliable information set and induced by a positive attitude and not by defensive motivations is more likely to actually generate a new firm. Consistently, founders pushed by positive and rational economic expectations are more likely to register an above-average
post-entry performance than those pushed by defensive reasons such as the escape from unemployment.

In terms of policy implications, these results support the view that *ex ante* heterogeneity matters and that subsidizing entry through incentives *erga omnes* might be very risky in terms of deadweight and substitution effects. On the contrary, the public authority should be able to single out potential entrepreneurs pushed by progressive motivations. While previous studies have suggested the innovative motivation as a way to efficiently discriminate potential entrepreneurs more likely to succeed (see Vivarelli and Audretsch, 1998; Arrighetti and Vivarelli, 1999), this result is not significantly confirmed by the present analysis. However, the econometric results suggest that the availability of a large information set, the ability to write a consistent business plan, the willingness to some kind of precommitment are all signals of an above-average entrepreneurial talent.

On the contrary, defensive motivations such as concern about a possible job loss and non-economic motivations such as the desire to be socially useful appear to be negative marks preluding disappointing post-entry economic performances.

While these conclusions seem to be very close to common sense, they actually contrast with the dominant policy guidelines adopted by many local communities, national laws and international authorities (such as the European Union). Unfortunately – among policy makers – the conventional wisdom is that start-ups are good *per se* and that all the potential entrepreneurs have to be helped. The results of this study suggest to be more cautious and selective in managing public subsidies.

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**References**


Index

Note: Page numbers in italics refer to tables.

Acs, Z. J. 1, 2, 3, 6, 22, 23, 31, 73, 90, 117, 119, 131, 133, 134
advertisement expenditures 19, 22, 103, 132
Agarval, R. 8
Aghion, R. 1
Almus, M. 8, 71, 74
Amemiya, T. 63, 92
Amirkhalkaly, S. 47
Arauzo-Carod, J. M. 3
Armington, C. 6
Arrighetti, A. xi, 3, 9, 116, 134, 141
Audretsch, D. B. xi, 1, 2, 3, 5, 6, 8, 9, 22, 23, 30, 31, 44, 45, 47, 49, 50, 54, 56, 57, 58 n.1, 62, 66, 73, 76, 77, 89, 90, 92, 102, 104, 108, 117, 119, 120, 131, 133, 134, 141
Bagnasco, A. 39
Bain, J. R. 18, 103
Baldwin, J. R. 2, 8, 45, 47, 56, 57, 90, 103, 104, 117, 119, 132, 133
barriers: to entry 4, 24, 51, 103, 131, 132; to survival 52
Bartelsman, E. 1, 2
Bassett, G. 76
Bates, T. 4, 8, 40 n.2, 118, 132
Baumol, W. J. 2
Bayesian models: learning processes 93, 97; noisy selection 7
Becattini, G. 33
Becchetti, L. 8, 71, 75
Becker, G. S. 8
Beesley, M. E. 2, 89
Blanchflower 4, 31, 40 n.2, 104, 118, 132
Blau, D. M. 21, 31, 119
Boeri, T. 8, 45, 92, 104, 119, 133
Bögenhold, D. 75
Bonini, C. P. 53, 58 n.10, 68, 69
Breschi, S. 6
Breusch, T. S. 37, 41 n.18, 138, 139
Brown, J. D. 110, 113 n.7
Brüderl, J. 8, 9
Brusco, S. 20, 45, 57, 69, 70
Buchinsky, M. 76
business performance, measures of 106–107; see also start-ups
Bygrave, W. D. 4
Cabral, L. 4, 5, 6, 54, 73, 86 n.1, 97, 99 n.4
Camerer, C. 5
Canada 47, 56; data, studies based on 19; industry dynamics 45
capital: initial requirements 103; intensity 47; markets 4; see also human capital
Carlton, D. W. 30, 40 n.1
Carpenter, R. E. 8
Carree, M. 1
Cathecart, D. G. 6, 20
Caves, R. E. 2, 73
Chesher, A. 54, 63, 72, 74, 76, 91, 92; see also Mansfield-Chesher specification
Colombo, M. G. 2, 8
competitive model, traditional 18
Contini, B. 62, 70, 72, 73, 118
Cooper, A. C. 3, 9
cost of investment 132
Cramer, U. 8, 45, 92, 104, 119, 133
credit rationing 8
Creedy, J. 3, 4, 21, 104, 118, 132
Cressy, R. 8
Delmastro, M. 2
‘Deterministic’ approach: to theory of size distribution of firms 45, 47; see also ‘Stochastic’ approach
De Wit, G. 4, 20, 104, 118, 132
Dixit, A. 8, 46, 104, 119, 133
Index

Doms, M. 47, 50
Dosi, G. 2, 5
Duetsch, L. L. 19
Dunkelberg, W. C. 3
Dunne, P. 5, 8, 45, 47, 56, 62, 63, 64, 70, 73, 77, 92, 104, 119, 133, 134
Dunne, T. 45, 47, 50, 54, 62, 70, 73, 90

economy/economic: determinants for entry 23; growth 6; policy providing ‘guidelines’ 10
education/educational: and family backgrounds 20, 25; higher 20, 27; and human capital 8
Efron, B. 77
Egidi, M. 5
employment: generation 1, 2; growth 66 n.1, 74, 86 n.3, 111, 121, 133; see also self-employment
entrepreneur/s: characteristics and motivations 134, 140; opportunity 133; potential, psychological attitudes 131, 132; sequential 9
entrepreneurship 1–10, 103; definitions of 19; social status and 4, 9, 132, 136, 137
entry: barriers 4, 24, 51, 103, 131, 132; competition models 17; decision and post-entry performance, questionnaire 111–112; determinants of 9; driven by expected profits 18; mistakes 9; post-entry behaviour of new small firms, ‘try and see’ interpretation of 89; and post-entry performance, link 103–112; process, literature on 119; rates 2; subsidizing 10, 89, 98; threat in oligopolistic and ‘price limit’ models 17
environmental factors/forces, external to firm 31
erga omnes policies 10, 141
Ericson, R. 7, 83, 97; and Pakes’ model 7
European industrial policy, subsidies to support new firm creation 90
Evans, D. S. 4, 20, 21, 31, 32, 62, 63, 70, 72, 73, 89, 104, 118, 132
Evans, L. B. 3, 8
evolutionary patterns at industry level 119
excess profits 17, 18, 103, 117
exit: early 119; rates 2
expected profits 3, 18, 103, 104; entry 111, 117, 118, 132; maximization of 117, 131
Fachinger, U. 75
family background, of founder 4, 110, 118, 132
Fieldman, M. P. 6
firm/s: formation 6; growth patterns, joint influence of size and age on 73; interdependence and independence effects 83; size and growth 44–57, 62–66; see also start-ups
Florida 1
Foti, A. 3, 40, 118, 133
Fotopoulos, G. 71, 74
founder/s of new firm 118; family background 4, 110, 118, 132; ‘genetic’ features of 10; heterogeneity, at level of individual 6; personal characteristics of 132
Frank, M. Z. 89
Garofoli, G. 3, 14, 20
geographical environments 3, 6, 20
Germany 47, 51, 56; firms 74; industry dynamics 45; manufacturing 74; survival rates 49
Geroski, P. A. 2, 3, 5, 41 n.8, 44, 45, 54, 57, 58 n.12, 86 n.1, 89, 103, 117, 131, 132
Gibrat, R. 8, 68
Gibrat’s Law of Proportionate Effect 8, 45, 53, 58 nn.9, 11, 62, 63, 68, 69, 75–83, 89, 92, 95, 97, 104; empirical studies on 70–71; empirical test of 53–57, 69; Italian studies 69; pattern of growth 97; study within cohort of new entrants 62–66; among young, small firms 75–83
Gimeno, J. 8
Gimeno-Gascón, F. J. 9
Giovannetti, A. 69, 70
Giunta, A. 45
Global Entrepreneurship Monitor 133
Gorecki, P. K. 2, 19, 103, 117, 132
Greene, W. H. 51
Grilli, L. 2, 8
Grossman, G. 1
Gudgin, G. 20
Guimaraes, P. 5, 119
Hall, B. 8, 50, 53, 62, 63, 70, 72, 73, 89, 134
Hamilton, R. T. 2, 3, 89, 119
Harhoff, D. 63, 71
Hart, P. E. 1, 53, 54, 62, 69, 71, 74, 89
Heckman, J. J. 63, 75, 92
Heiner, R. A. 5
Helfat, C. E. 3
Helpman, E. 1
Heshmati, A. 71, 74
Highfield, R. 3, 21, 119
Holmes, T. J. 30, 119
Holtz-Eakin, D. 4
Hopenhayn, H. 7, 8, 46, 58 n.4, 104, 119, 133
Howitt, P. 1
Hsiao, C. 36
Hughes, A. 8, 45, 47, 56, 62, 63, 64, 70, 73, 77, 89, 92, 104, 119, 133, 134  
human capital 6, 108, 120, 123; as determinant of entry 9, 10; and income choice 40 n.2; role, in survival of new firms 1, 8  
Hymer, S. 53, 69  
ICT services 2  
incentives 10, 93, 141; European subsidies as 90  
income choice approach 40 n.2, 118, 119; general model of 30; literature 31  
income expectations 23, 104, 117, 118  
incubator factors 20, 23  
independence: effects 48, 83; founders’ desire for 27, 107, 108, 112; see also interdependence  
individualism 4, 6, 10, 22, 102, 116, 120, 132  
industry/industrial: dynamics, aggregate outcomes of 1; organization, modern studies in 19; policy 10  
inovation 27, 103, 110, 132; definition 26; as exogenous process 7; role, in post-entry performance of new small firms in Italy 116–128; technical 23  
interdependence: effects 83; strategic 48, 83; see also independence  
Italy 44, 69; determinants of new-firm start-ups in 17, 30; electric and electronic engineering sector 90–97; entry decision and post-entry performance, study on 105–111; firm formation in 34; Gibrat’s Law among young, small firms, study on 75–83; industry, data and simple characteristics 21–23; industry study, principal findings and conclusions 26–27; Italian National Institute for Social Security (INPS) 33, 48, 62, 75, 90; manufacturing, survival of new firms in 48–53; Network of Italian Chambers of Commerce (CERVED) 33; newborn firms 62; new manufacturing firms originating through spin-offs, study 120–128; survival rates 49  
Johnson, P. S. 3, 4, 6, 19, 20, 21, 104, 118, 132  
Johnson, S. 6, 20  
Jones, A. M. 3, 21, 104, 118, 119, 133  
Joulfaian, D. 4  
Jovanovic, B. 4, 30, 31, 46, 57, 83, 89, 92, 97, 99 n.4, 105, 119; model of passive learning 7, 119  
Judge, G. G. 36  
Keilbach, M. C. 1  
Khemani, R. S. 3, 19, 117, 131  
Kihlstrom, R. E. 30, 31, 119  
Kilby, P. 19, 118  
Klepper, S. 3  
Knight, F. H. 3, 19, 30, 103, 118, 132  
knowledge: non-tradable 6; spillovers 6  
Koenker, R. 76  
Krugman, P. 6, 32  
Kumar, M. S. 53, 64, 70, 72, 73, 77, 92  
labour: Italian, data 41 n.10; local 4, 74; market 3, 30, 31, 32, 74  
Laffont, J.-J. 30, 31, 119  
Law of Proportionate Effect see Gibrat’s Law of Proportionate Effect  
learning 46, 89, 98; Bayesian Gibrat’s Law 124; Jovanovic’s model 7, 119; passive or active 7–8, 10; in process of entry 57, 119  
Lee, D. 9  
Lee, S. Y. 1  
Lehmann, E. E. 1  
Leicht, R. 75  
Leighton, L. S. 3, 4, 20, 21, 31, 32, 104, 118, 132  
Lieberman, M. B. 3  
Lindt, T. 4  
Lotti, F. xi, 8, 62, 68, 71, 75  
Louri, H. 71, 74  
Lovallo, D. 5  
Lucas, R. E., Jr 1, 7, 30, 31, 53, 119  
McClelland, D. 118  
McCoughlan, P. 58 n.11, 86 n.1  
MacDonald, J. M. 22  
Machin, S. 58 n.12  
Mahmond, T. 5, 8, 45, 47, 49, 50, 90, 92, 104, 119, 133  
Malagoli, W. 69, 70  
Malerba, F. 6  
Mandke, R. B. 46  
Mandelbrot, B. 53  
Manjón-Antolín, M. C. 5  
Mansfield, E. 3, 18, 41 n.8, 53, 58 n.9, 62, 68, 69, 70, 72, 89, 103, 117, 132  
Mansfield-Chesher specification 73, 74  
manufacturing sector 2, 7, 22, 33, 34; German 74; Greek 74; Italian 44–57, 98, 121; Portuguese 73; start-up 41 nn.11, 13, 14, 16; technologies, advanced 47; US firms 70  
markets: churning and turbulence 2, 5, 9, 44; independence across submarkets 48; labour 3, 30, 31, 32, 74; niches 22, 23, 27, 52; penetration 44; selection 93, 97
Index 147

Marris, R. 45
Marshall, A. 32, 40 n.6
Marsili, O. 6
Mata, J. 4, 5, 8, 45, 47, 49, 50, 54, 56, 62, 63, 71, 73, 74, 90, 92, 104, 119
Mazzucato, M. 5
Meyer, B. 4, 31, 40 n.2, 104, 118, 132
Milgrom, P. 38
minimum efficient scale (MES) 7, 46, 49, 57, 68, 90, 133, 137
Minniti, M. 4, 133
Mueller, D. C. 44, 45
Mukhopadhyay, A. K. 47

Nerlinger, E. A. 8, 71, 74
new enterprises: as agent of change 45; background factors 19–20; birth of 17; creation of 21, 25, 26, 90
new firm formation 1; impact on an industry 45; macroeconomic outcomes, to microfoundations of 37; probability of starting 139; rates of 44
new-firm start-ups: in Italy 30; measurement issues of 33–35; in model of income choice 30–33; see also start-ups
‘new technology-based firms’ (NTBFs) 2
noisy selection, model of 46

OECD 1
Ohlsson, D. N. 4
opportunity entrepreneurs 18
Orr, D. 3, 19, 41 n.8, 103, 117, 132
Orsenigo, L. 6
Oswald, A. 4, 31, 104, 118, 132
Oulton, N. 1, 8, 54, 62, 71, 89, 90
Oxenfeldt, A. R. 3, 19, 21, 118, 119, 132

Pagan, A. R. 37
Pakes, A. 7, 83, 97; Ericson and Pakes’ model 7
Parker, S. C. 8
Pashigian, P. 53, 69
Pavitt, K. 6
personal motivations, to start new business 26, 133
Petersen, B. C. 8
Piergiorgini, R. 58 n.1
Piole, M. J. 20, 38
policy and foundations, of firms 2, 9–10, 140–141; subsidy 97–98, 141
population renewal 119
Porter, M. E. 120
Portugal, P. 5, 8, 45, 47, 51, 56, 92, 119
Portugal 51; manufacturing 73; survival rates 49
post-entry performance, of new firms 45–48, 75, 104, 111, 119, 134; heterogeneous entrants 7–9; literature, focusing on 116, 133; measures of 106–107, 121; see also sunk costs
Pras, S. J. 53, 69
Preisendörfer, P. 8, 9
pre-market selection 10
‘price limit’ models 18
profit: entry based on entry 111, 117, 118, 132; excess 18; expectations 3, 4, 18, 103, 104, 132; maximization of 117, 131
Proportionate Effect, Law of see Gibrat’s Law of Proportionate Effect
pull factor 17, 18, 19, 21, 104, 116, 117, 132, 133, 137; determinants and motivations 23–26; see also income expectations
push factors 3, 5, 18, 19, 21, 27, 104, 116, 117, 118, 132; determinants and motivations 23–26
Rafiquzzaman 8, 57, 104, 119, 133
Reid, G. C. 5, 8, 119, 133
research and development (R&D) 1, 19, 35; expenditure as drawback 22; spillover effect, on new firm formation 38, 40
restructuring, of companies 3, 6
Revelli, R. 20, 62, 70, 72, 73, 118
‘revolving door’ firms 2, 5, 10
Reynolds, P. D. 3, 4, 132, 133, 134
Roberts, M. J. 5, 38, 70, 73
Romer, P. M. 1
Rosen, H. 4
Sabel, C. F. 20, 38
Salais, R. 120
Salop, S. C. 18
Samuelson, L. 5, 70, 73
Santarelli, E. xi, 5, 6, 8, 44, 45, 51, 58 n.1, 62, 68, 71, 75, 76, 77, 89, 118
scale economies 46, 47, 104, 132, 133
Scalera, D. 45
Scarpetta, S. 1, 2
Schalk, J. 1
Schivardi, F. 1, 2
Schmitz, J. A., Jr 30, 119
Schumpeter, J. A. 2, 3, 19, 31, 40 n.3, 103, 118, 132; displacement–replacement effect 5; innovative motivation 111
Schwalbach, J. 3, 41 n.8, 44, 89, 103, 117, 131, 132
sectoral inertia 27
sectoral variety 6, 106, 111, 121; influence on birth rates 20, 27
Segarra-Blasco, A. 3
self-employment 118, 132; choice 3, 21;
model 3, 25; solo 75; theory 3, 105
self-sufficiency 4, 132
Shane, S. 3, 6, 9
Shapiro, D. M. 3, 19, 117, 131
Shepherd, D. A. 4
Simon, H. A. 5, 53, 58 n.10, 68, 69
Singh, A. 53
size of firm and growth 44–57, 62–66
Smiley, R. 3, 21, 119
social status and entrepreneurship 4, 9, 132,
136, 137
Solinas, G. 45, 57
specialization 20, 121; flexible 20;
industrial 6; opportunities 25
spin-off 104, 118, 119, 120, 128, 136;
formation, factors influencing new firm
122; managerial efficiency 127
Stahl, K. 71, 74
start-ups 97, 117, 141; Gibrat’s Law 56, 80;
size and industrial dynamics 44; size and survival, relationship between 8, 94; small firms and early performance, review of literature 117–120; West German manufacturing data 74
Sterlacchini, A. 58 n.1, 118
‘Stochastic’ approach: in theory of size
distribution of firms 45, 46, 53;
see also ‘Deterministic’ approach
Storey, D. J. 3, 4, 6, 19, 20, 21, 31, 104, 118,
119, 132, 133, 134
Storper, M. 120
strategic interdependence 48
strategic models 18
submarkets see markets
subsidy 93, 97; as deadweight effect 10, 93,
94, 98, 141; of entry as optimal policy
89–99; European 90; as incentives 10,
93, 141; substitution effect 93, 141
sunk costs 8, 46, 105, 132; as barrier to
entry 49, 117; as barriers to exit 94, 104,
108, 133; and ‘revolving door’ firms 6
survival, of newborn firms: analysis 92–94;
entrepreneurial foundations 1–10; and post-entry performance 90; rates in
United States 49
Sutton, J. 6, 8, 47, 48, 62, 63, 69, 83,
86 n.1, 90, 132
Sylos Labini, P. 18, 103
Taylor, M. 4
Tenga, S. 20
Thurik, R. 1
Tirole, J. 18, 117
Trovato, G. 8, 71, 75
Tsang, E. 9
turbulence 2, 5, 6, 9, 40, 44, 89, 93;
see also market
unemployment 3, 119; escape from 133;
rates 6
United Kingdom (UK) 47, 51, 56, 133;
companies 73, 74; incidence of people starting firm 4; industry dynamics 45
United States (US) 47, 51, 56; industry dynamics 45; self-employment rate and changes in environmental factors 31; Small Business Data Base 72; studies 73; survival rates 49
Van Stel, A. 1
Van Winden, F. A. A. M. 1, 4, 20,
104, 118, 132
Varga, A. 1
Varian, H. R. 18
Venturelli, P. 4, 133
Vivarelli, M. 3, 4, 5, 6, 8, 9, 32, 41 n.10,
58 n.1, 71, 75, 76, 77, 108, 118, 132,
133, 134, 141
Wagner, J. 5, 45, 47, 49, 54, 56, 70, 73, 90
White, H. 64, 72
Winter, S. G. 3, 103, 118, 132
Wittington, G. 53
Woo, C. Y. 3, 9
Woywode, M. 71, 74
Xu, B. 8
You, J.-I. 53
Zacharakis, A. L. 4, 133
Ziegler, R. 8