

This article was downloaded by: [T&F Internal Users], [Tom Cuthbertson]
On: 08 November 2012, At: 05:48
Publisher: Routledge
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Entrepreneurship & Regional Development: An International Journal

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tepn20>

New firm mortality, survival and structural change in an industrialized area: the case of Milan province

A. Fumagalli ^a & L. Marcora ^b

^a Center for Studies on Entrepreneurship F. Cicogna, Bocconi University, Via Gobbi 5, 20136 Milano

^b Department of Economics and Mathematical Methods, University of Pavia, Via S. Felice 6, Pavia

Version of record first published: 29 Jul 2006.

To cite this article: A. Fumagalli & L. Marcora (1993): New firm mortality, survival and structural change in an industrialized area: the case of Milan province, *Entrepreneurship & Regional Development: An International Journal*, 5:2, 155-178

To link to this article: <http://dx.doi.org/10.1080/08985629300000011>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or

howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

New firm mortality, survival and structural change in an industrialized area: the case of Milan province

A. FUMAGALLI† and L. MARCORA*

*Center for Studies on Entrepreneurship F. Cicogna, Bocconi University, Via Gobbi 5, 20136 Milano; and †Department of Economics and Mathematical Methods, University of Pavia, Via S. Felice 6, Pavia

1. Introduction

The purpose of this study is both to analyse the survival rate of new firms as an indicator of the entrepreneurial capacity of an industrialized area, such as that of the province of Milan, and to highlight eventual positive correlations between birth and death rates and particular variables regarding economic trends, with reference to the dynamics of the labour market and that of industrial production.

While the first requirement simply concerns descriptive statistics, the second is more important if one is to interpret the phenomenon of new entrepreneurship in the province of Milan, and in particular to understand why certain variables of the labour market, such as the unemployment rate (with a distinction between employees and self-employed), the number of people registered at the local job office, etc., are more important than others. The purpose of this second requirement aims at ascertaining how reliable the 'self-employment' hypothesis is in the province of Milan.¹

Since the experts in entrepreneurial phenomena generally explain the dynamics of new firms as a result of the dynamics and the changes taking place in the labour market, it is extremely important to ascertain the presence of the relationship of cause and effect between employment dynamics and entrepreneurial dynamics. This is also very useful in order to make forecasts that take into consideration the new social behaviour that tends towards greater independence.

In order to achieve our goal, the period of time analysed covers the whole decade of the 1980s. This report, which is the continuation of a previous one,² is divided into four parts. After a first section analysing the dynamics of the birth, death and survival rates of new firms on an aggregate level (see section 2), and, concerning the death and survival rates, on a sectoral level also (see section 3), there follow two sections which deal with the analysis of the relations between birth, mortality and survival dynamics (section 4) and between entrepreneurial demography and economic trend dynamics (see section 5). Some conclusions will be presented in section 6.

2. Entrepreneurial dynamics in the decade 1980-90

The tables show the birth, death, and development rates for the manufacturing sector (branches 2, 3 and 4 of the ISTAT classification) and for production services (class 83 of

This paper was first presented at the RENT V: Workshop on Entrepreneurial Bridging. Luca Marcora has contributed sections 2, 4 and 6; Andrea Fumagalli sections 1, 3 and 5. The authors would like to thank Flavio Addolorato for his computer assistance and Diana Guarnieri for improving our English. This research is a part of a wider research project on entrepreneurial activity in Milan Province financed by FORMAPER.

the classification) in the whole province of Milan. These rates are the result of the ratio between, respectively, registrations, cancellations and the settlement between these two values and the stock of firms present at the beginning of that period of time. This indicator has sometimes been considered not sufficiently well grounded because it depends on the number of existing firms. In fact, in scarcely industrialized areas, a sharper increase in the number of new firms is enough to cause an overestimate of new entrepreneurship. But this is not the case for the province of Milan, for which such overestimates are not found in the trends of the rates examined.

Table 1 shows the general data concerning birth, mortality, and development rates in the decade considered. They are divided according to the manufacturing sector and production services (class 83). The main observations concerning this table are:

- 1 Birth rates in the manufacturing sector and in production services to production clearly decrease throughout the whole period, and only a few exceptions are present.
- 2 Conversely, the trend for mortality rates diverges: in the manufacturing sector, the trend is more or less constant in the first period 1980-1985, around 8-9% (with one relative peak, 11.24% in 1985, due to the procedures in data collecting), while it is quite inferior in the second period (1986-90), around 6%. However, as far as the services to production are concerned, the mortality rate decreases in the period from 1980-84; thereafter, there are two years with a relatively higher mortality rate: 7.9% in 1985 and 8.45% in 1986. The second half of the decade is characterized by a tendentially constant trend, around 5%.
- 3 It follows that the demographic growth rates of manufacturing firms tends to be negative, with the exceptions of 1980 and 1987-88, due to the lower number of dead firms. Production services, however, show very high growth rates, especially in the first half of the decade, while in the second half the trend tends to decrease.

Table 1. New firm birth rate, mortality rate, growth rate in the manufacturing sectors and in production services in Milan province, 1980-89.

Year	BR		MR		GR	
	Man.	PS	Man.	PS	Man.	PS
1980	11.19	13.73	9.71	8.65	+ 1.48	+ 5.08
1981	9.86	14.70	9.96	7.28	- 0.10	+ 7.42
1982	8.72	13.68	9.03	5.41	- 0.31	+ 8.27
1983	8.33	10.73	8.83	5.59	- 0.50	+ 5.14
1984	8.83	8.62	9.25	5.84	- 0.42	+ 2.78
1985	8.58	5.12	11.64	7.90	- 3.06	- 2.78
1986	7.43	9.25	8.94	8.54	- 1.51	+ 0.71
1986	6.12	7.02	6.41	5.74	- 0.29	+ 1.28
1987	6.32	7.37	5.85	4.31	+ 0.47	+ 3.07
1988	5.69	6.47	8.37	5.50	- 2.68	+ 1.97
1989	5.11	6.00	5.83	4.27	- 0.72	+ 1.73

Notes:

- BR = birth rate;
- MR = mortality rate;
- GR = growth rate;
- Man. = manufacturing sectors;
- PS = production services.

Source: Databank Infocenter - Chamber of Commerce of Milan.

It can therefore be inferred that the entrepreneurial dynamic in the province of Milan clearly tends to decrease during the decade. As a first approximation, this negative trend is sharper in the manufacturing sector, which had its turning point in the last two years of the 1970s. From the beginning of the second half of the decade, a decrease in new registrations is also evident in the sector of production services, even if there still are positive values in the growth rate. Whether this trend indicates that the expansion of tertiary industry has already reached its apex and is now stabilizing, it is too early to say. However, we believe it is possible to state that, in the second half of the 1980s, the increased share of the advanced tertiary in the productive structure of Milan is due more to the sharpest decrease in entrepreneurial birth of manufacturing firms than to the increase in registrations in the tertiary sector itself.

Finally, an analysis of these data allows us to recognize a closer correlation between the mortality rate and the growth rate in manufacturing industries beginning in 1984. This is in contrast with the data collected in previous years, which showed that the dynamics of the firm birth rate largely determined that of the growth rate. The positive correlation between birth and growth rates, conversely, is confirmed as regards the sector of production services.³

Therefore, while the firm birth trend appears to be evident, this is not the case for the mortality and growth rates. Consequently, in the following section attention will be focused exclusively on the sectoral analysis of mortality and survival rates.

3. Sectoral analysis: mortality and survival

In order to gain a better understanding of the dynamics present in the manufacturing sectors in the period 1981-90, a disaggregated analysis was made of the main market sectors in respect of mortality, and survival rates were analysed in the three areas considered for the following sectors:

- chemical/pharmaceutical (classes 25, 26 ISTAT);
- mechanical (31, 32);
- high-tech (33, 34, 37);
- vehicles (35, 36);
- food (41, 42);
- traditional sectors (43, 44, 45, 46);
- paper and rubber (47, 48).

This distribution is produced, on one hand, by the need to determine the dynamics of the emerging sectors and, on the other, by the need to keep under consideration the productive composition of the province of Milan.

3.1 The trend of sectoral mortality in the province of Milan: some possible causes

As regards firm birth rates, both from a statistical and an analytical point of view, no particular changes were present, once the birth rate peak was reached during the first years of the 1980s (compared with a decrease in the last five years). However, the dynamics of mortality rates appear more complex and substantially different.

First, a statistical and methodological premise is needed, since although no statistic problem was found concerning birth rates, many problems emerged concerning

Table 2. Sectoral mortality rates: 1975–90.

Year	Chemical Ind.			Mechanical Ind.			Vehicles			High-tech			Food			Traditional			Rubber/paper		
	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP
1975	7.4	3.1	2.9	6.3	4.1	3.9	7.7	6.7	3.4	6.3	5.3	3.3	7.3	4.7	3.0	5.7	4.2	4.1	7.1	4.8	4.1
1976	9.6	4.3	8.1	8.3	6.7	6.1	11.1	7.2	6.3	8.3	7.1	5.7	8.6	5.1	5.9	9.0	6.5	7.7	8.7	6.5	8.4
1977	9.8	7.6	9.2	9.7	7.5	6.7	9.9	7.7	5.6	9.7	7.9	6.4	10.2	6.7	7.8	9.9	6.5	7.7	10.2	7.9	9.6
1978	10.8	4.6	10.1	9.0	7.0	6.7	10.5	5.9	6.1	8.8	7.6	6.5	10.3	5.6	4.3	9.5	6.6	7.7	9.8	6.1	7.0
1979	12.0	7.4	8.6	10.2	8.3	6.9	9.9	9.2	8.8	9.8	9.5	7.5	11.5	7.8	6.6	11.4	8.0	9.7	10.6	8.6	9.9
1980	21.1	6.7	7.1	10.6	7.9	7.6	10.4	8.8	31.2	10	9.5	7.0	14.2	6.2	6.6	11.3	8.7	10.9	11.4	8.8	10.1
1981	14.7	6.7	7.4	12.2	6.8	6.6	11.1	10.5	4.8	11.2	8.4	8.8	13.0	7.3	6.4	14.4	7.4	10.9	13.0	7.9	8.1
1982	5.6	5.5	11.7	9.1	8.8	10.0	7.4	9.7	7.8	8.3	9.6	9.4	7.7	7.6	7.7	9.5	9.2	11.2	7.4	9.5	10.4
1983	6.0	6.6	10.2	9.1	8.1	8.2	9.0	10.3	3.7	9.0	9.5	10.8	7.5	7.1	7.9	9.9	9.2	11.2	7.1	8.0	10.4
1984	6.1	6.4	14.7	8.9	9.4	8.3	8.8	7.6	7.1	8.6	9.9	9.4	9.3	7.1	8.0	9.5	9.8	11.2	7.4	8.8	10.5
1985	7.2	10.2	11.7	10.6	11.9	12.1	9.7	12.9	12.5	10.6	12.3	14.6	10.2	11.4	9.0	11.1	11.0	12.8	10.1	11.8	11.9
1986	6.2	6.0	9.6	8.5	8.4	9.7	8.2	8.8	7.8	8.5	9.2	12.4	7.2	6.9	7.6	9.4	9.6	9.9	7.1	8.8	9.5
1986*	5.2	5.1	7.6	6.9	6.5	7.8	6.0	7.3	7.5	7.1	7.6	10.2	5.5	5.3	6.5	7.5	7.4	7.8	5.6	6.8	7.1
1987*	5.2	5.7	2.9	5.6	6.2	5.6	4.0	6.3	1.9	6.0	6.6	7.8	4.8	4.8	6.9	7.5	6.4	7.4	4.9	5.2	7.7
1988*	5.7	4.2	5.6	6.0	6.1	5.1	5.4	4.6	1.9	6.0	6.0	6.3	4.5	4.1	4.2	7.3	6.1	6.5	4.7	5.1	6.3
1989*	5.8	4.9	8.2	6.2	6.2	5.5	4.7	3.8	5.4	6.0	6.4	7.8	7.5	4.2	7.8	7.3	6.8	6.6	5.4	5.2	8.1
1990*	6.1	5.8	7.2	5.5	5.5	5.2	4.4	4.9	7.5	6.0	6.0	8.7	5.9	4.1	4.8	7.7	6.0	6.9	4.8	5.0	7.5

Note:

MI = Milan;

IC = hinterland;

RP = rest of the province.

* from 1986 to 1990, new series of data, due to the process of control of dead firms.

Source: Databank Infocenter - Milan's Chamber of Commerce.

mortality and, consequently, concerning survival. There are two different series, occasioned because of the different calculating methods of CCIA (Chamber of Commerce of Milan), one from 1975–86, and the other from 1986–90 (highlighted by * in the tables). The data from the series 1975–86 are overestimated, therefore presenting higher absolute values than those of the following series (1985–90).

The data available concerning sectoral disaggregation (see Tables 2, 3 and 4) show different trends depending on the sector considered. In the high-tech sector, mortality tends to increase in the 1970s and to remain stable or even to decrease slightly during the last five years. In the food and chemical sectors, the trend is similar, but with an earlier turning point; this means that after an increasing mortality rate in the first half of the 1970s there is a sharp decrease in the same rate during the first few years of the 1980s, after which the value remains constant. As far as the city of Milan is concerned, the decrease in the mortality rate that took place in the first few years of the 1980s seems to be an event common to many sectors. However, it is important to point out that in the seventies 'urban' mortality tends to be higher than in suburban areas. Hence, the 'incubator' hypothesis is not confirmed, since the firms located in the city have a stronger tendency to close down than those on the outskirts. If that was the case in the 1970s, it is also true that the situation changes in the eighties as one moves towards suburban areas. In the first belt and in the rest of the province, mortality increases in almost all the sectors until the first half of the 1980s. Such a difference is caused both by the fact that productive units were moved from the centre towards the outskirts, and by the fact that new entrepreneurial activities were created just outside the centre. This is why, year after year, the 'turbulence axis' moves towards the outskirts, therefore increasing mortality in the hinterland and decreasing in the centre. This process reaches its peak in the first few years of the 1980s.

Therefore, the highest peak in mortality rates tends to move during the years, depending on the area examined. However, the mortality rates reach the maximum values between 1981 (as regards Milan) and 1985 (as regards the rest of the province).

Table 3. Birth, mortality and survival rates: manufacturing sectors, 1975–90.

Year	Birth			Mortality			Survival		
	MI	IC	RP	MI	IC	RP	MI	IC	RP
1975	10.9	16.4	14.2	6.7	4.4	3.8	42.8	44.0	39.3
1976	7.3	10.4	10.4	8.7	6.5	6.8	44.7	44.0	42.9
1977	8.6	11.3	10.4	9.7	7.7	7.7	48.7	44.8	47.0
1978	6.6	9.4	8.8	9.4	6.8	6.7	48.4	49.3	47.8
1979	8.2	12.8	13.7	10.7	8.3	8.2	52.5	48.2	43.8
1980	8.5	13.2	14.2	10.9	8.5	8.9	57.1	52.3	47.2
1981	8.7	10.8	10.5	12.8	7.4	8.4	60.0	53.9	54.6
1982	7.7	9.3	9.4	8.5	9.1	10.3	64.3	59.2	54.6
1983	7.6	8.6	9.6	8.7	8.6	9.8	70.7	62.3	59.9
1984	8.1	9.2	9.6	8.7	9.4	9.8	74.9	66.0	67.0
1985	6.5	9.5	10.0	10.5	11.7	12.5	84.2	78.5	74.4
1986	6.2	8.0	10.0	8.3	8.9	8.5	89.1	86.5	80.9
1986*	7.7	6.5	7.9	6.7	7.0	7.9	74.4	71.0	65.1
1987*	6.8	7.8	8.7	6.0	6.2	6.8	79.1	76.5	74.6
1988*	5.9	6.8	7.7	6.0	5.9	5.8	85.0	80.4	78.0
1989*	5.3	6.0	6.6	6.3	6.2	6.7	92.0	78.0	85.3
1990*	4.1	4.4	5.5	6.0	5.7	6.7	=	=	=

Note: Abbreviations as for Table 2.

Source: Databank Infocenter – Milan's Chamber of Commerce.

Table 4. Birth, mortality and survival rates in the production services, 1975-90.

Year	Birth			Mortality			Survival		
	MI	IC	RP	MI	IC	RP	MI	IC	RP
1975	6.0	9.8	7.7	5.1	4.1	4.8	58.7	51.4	54.2
1976	6.2	10.1	11.5	6.6	5.6	5.0	57.3	55.4	60.8
1977	6.2	10.1	11.5	6.9	5.7	7.1	59.9	63.0	70.4
1978	7.2	12.6	15.8	7.1	5.9	5.9	59.2	63.8	68.9
1979	9.0	15.4	12.8	7.7	6.2	6.4	62.6	64.0	74.5
1980	12.0	19.4	20.5	9.2	6.4	6.4	71.0	71.6	83.3
1981	13.3	18.8	19.3	7.8	5.3	5.2	74.7	73.5	77.8
1982	12.1	17.9	18.8	5.4	5.3	5.5	77.3	79.8	76.7
1983	9.3	14.5	14.1	5.4	5.8	6.4	80.6	79.7	78.1
1984	7.7	11.2	9.9	5.7	6.2	5.7	84.4	77.3	83.3
1985	4.4	7.0	7.1	7.9	7.8	7.5	87.3	80.7	82.7
1986	8.4	11.3	10.9	7.9	7.2	6.4	92.7	90.1	94.9
1986*	8.0	10.9	10.4	6.6	5.8	4.7	81.1	77.4	86.3
1987*	8.6	11.0	12.3	4.4	4.7	3.7	84.6	81.2	82.7
1988*	6.9	10.2	11.7	4.5	5.1	4.7	88.3	88.8	86.5
1989*	6.5	8.8	10.0	5.2	5.2	6.1	94.7	94.7	93.2
1990*	6.9	8.9	10.4	5.2	5.1	5.1	=	=	=

Note: Abbreviations as for Table 2.

Source: Databank Infocenter - Milan's Chamber of Commerce.

The existing literature on the causes of firms' mortality is quite scarce. Only recently has mortality been the object of more systematic and deeper analyses, in parallel with the experts' increased interest in entrepreneurial dynamics. Studies on entrepreneurial demography carried out during the 1980s⁴ show that certain factors underlie the causes of firm mortality, especially in the case of recently established firms. Here we will briefly address these aspects, though only as far as they are present in the sectors we analysed:

- 1 *Insufficient financial resources*: this relation is very evident in the high capital-intensive sectors. This factor is even more evident for those productive sectors which have been characterized by a tendency towards concentration and in which the birth rate initially increased (while the mortality rate was low); thereafter the two rates were negatively correlated. High-tech industries are a good example. In the 1970s, technological and marketing opportunities caused them to be good incubators of new entrepreneurial initiatives, and there was a high turnover of new firms. Once competition became keener and market shares decreased, the oligopolistic structure of the market brought about an increase in entry barriers (caused by both static and dynamic economies of scale). A decrease in firm births and an increase in failures followed. The chemical and pharmaceutical firms in particular show reduced demographic dynamics while having one of the highest average sizes. A lower birth rate corresponds to a lower mortality rate.
- 2 *Decrease in demand*: this comprises all of the causes which brought about the closing down of activities due to contractions of demand or to forecast errors caused by sudden changes in the economy cycles. While insufficient financial resources explain the intersectoral differences between the absolute values of mortality levels of the differing sectors, the decrease in demand is able to explain the dynamics and the trend of mortality rates as well as eventual differences between the sectors analysed. The unfavourable economic cycles help in explaining the increase in the

mortality rate of that period. In 1981, the peak in the urban area was caused by territorial reasons, while as far as the other areas are concerned, the peak of 1984–85 was brought about by unfavourable economic trends present in the previous years. It is not surprising that the greatest failures occur during the negative phase of the economic cycle, just before the phase of economic recovery: these phases are caused by the previous crisis dragging on.

- 3 *Market viscosity*: in addition to the high-tech sector, some other examples are given by the sector of traditional commodities and, in part, by the food sector.
- 4 *Unbalanced growth*: this is the least common mortality factor characterizing rapidly growing sectors which are particularly vulnerable to sudden changes in demand or changes in market structures caused by mergers and acquisitions. From this point of view, its effects are similar to those caused by a reduction in demand.

By comparing the sectoral trends of mortality with the average value of the whole manufacturing industry, it is possible to highlight four specific and different dynamics:

- 1 an *expansive trend*, defined by decreasing and lower values of mortality rates than the manufacturing average;
- 2 an *increasing trend*, defined by decreasing mortality rates but higher than the manufacturing average;
- 3 a *decreasing trend*, defined by increasing mortality rates but lower than the manufacturing average (stable trend, if equal);
- 4 a *recessive trend*, defined by increasing and higher mortality rates than the manufacturing average.

The resulting classification of the manufacturing sectors is presented in Table 5. As far as the first period (1976–83) is concerned, it is interesting to note that the prevailing sectors of the province of Milan (besides production services, food, paper and rubber and traditional mechanics) show the lowest mortality rates. However, the traditional manufacturing industries highlight mortality rates higher than the average, similar to the birth dynamics. In the chemicals sector, the recessive trend of mortality is the opposite to that of birth rates.

Generally, the increasing dynamics of mortality seems to be a consequence of two different factors: the role played by economic scales, which operate more as an incentive to exit than as a barrier to entry (see the chemical and vehicle sectors), on one side, and negative effects, due to the unfavourable economic conjuncture, on the other. With the exception only of the high-tech sector, there does not appear to be a high analogy with birth rate dynamics.

The exit dynamics in the second period (1984–90) is completely different. All the industrial sectors show decreasing mortality rates, except production services. More specifically, the industries with more or less good performances in the first period improve their relative position. This is the result of a generalized drop in mortality as a consequence of lower birth rates. As will be shown in section 4, the existence of a positive correlation between the two rates is proved only in the eighties.

Conversely, the increasing mortality rates of production services confirm what has already been hypothesized as regards the birth rate dynamics: the structural changes in manufacturing industry of Milan province are based on a process of sectoral and productive concentration, which is led by big corporations, and, therefore, the internalization of production services is now more marked than before. Contemporaneously, the increasing economic difficulties of small and medium-sized firms constitute a new obstacle to the role of incubator for new entrepreneurial activities; this is also true on the production services side.

Table 5. Sectoral dynamics of mortality rate in Milan province, 1976–83, 1984–90.

<i>1976–83</i>	
Sectors with increasing mortality rate:	
Lower than the manufacturing average: DECREASING TREND	
<ul style="list-style-type: none"> • production services • food 	<ul style="list-style-type: none"> • traditional mechanical • rubber/paper
In manufacturing average: STABLE TREND	Higher than manufacturing average: RECESSIVE TREND
<ul style="list-style-type: none"> • high-tech • vehicles 	<ul style="list-style-type: none"> • traditional • chemical industries
<i>1984–90</i>	
Sectors with decreasing mortality rate:	
Lower than manufacturing average: EXPANSIVE TREND	Higher than manufacturing average: INCREASING TREND
<ul style="list-style-type: none"> • traditional mechanical • food • rubber/paper 	<ul style="list-style-type: none"> • chemical industries • traditional industries • vehicles • high-tech industries
Sectors with increasing mortality rate:	
Lower than manufacturing average: DECREASING TREND	Higher than manufacturing average: RECESSIVE TREND
<ul style="list-style-type: none"> • production services 	

Source: Infocenter - CCIA dataset.

3.2 *The dynamics of survival in the province of Milan*

The strong turbulence shown in the statistical data is linked to the aspect of survival during the first few years of activity of the firm. In recent years, this aspect has been the object of extensive studies, especially as it concerns the Italian situation.⁵ Although there were slight differences, almost all of these studies agree in saying that the critical period for the survival of recently established firms is between the second and third years of activity. In the province of Milan, this result is also confirmed for the period 1986–90 (see Tables 6 and 7). The following points must be reasserted:

- 1 About 80% of the firms born in 1986 and which stopped or changed their entrepreneurial activity before 1990 (28.5% of the total) went bankrupt during the first three years of activity, that is, before 1988. This share represents 18.8% of the new firms. This percentage remains approximately the same during the following years, even if a slight decrease can be perceived. However, it is too early to assume that there is an increase in the survival rate during the first few years of activity and that there is a decrease in 'infant mortality'.
- 2 A disaggregated analysis, based on average survival rates in the period 1986–89 (which is the average ratio of existing firms at the end of the period divided by the number of firms that were founded in each of the previous years analysed) clearly shows that firms dealing with production services (class 83) are fittest for survival.

Table 6. Sectoral survival rates: 1975-89.

Year	Chemical Ind.			Mechanical Ind.			Vehicles			High-tech			Food		Traditional			Rubber/paper			
	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP
1975	49.1	45.3	50.0	42.7	41.7	39.6	51.7	46.7	50.0	41.5	43.3	46.1	32.1	44.1	47.1	42.8	47.3	35.5	45.6	40.1	35.3
1976	52.1	43.7	37.5	43.0	44.6	46.2	62.6	50.0	60.0	42.7	39.5	35.8	52.0	54.0	52.2	41.5	44.6	40.4	54.0	45.1	43.4
1977	62.5	45.1	50.0	50.8	45.7	51.0	52.5	57.7	=	50.6	41.2	39.8	54.0	43.5	62.5	43.5	45.7	43.3	50.7	48.0	47.5
1978	63.1	56.7	50.0	47.8	48.8	50.0	59.4	46.1	=	47.8	49.4	44.4	65.4	56.7	58.3	41.9	49.9	44.1	52.3	48.0	47.5
1979	65.1	63.3	27.3	49.5	49.9	51.0	73.0	45.9	28.5	51.0	45.3	42.1	57.4	67.2	84.6	46.3	46.1	39.1	58.4	52.4	44.1
1980	62.6	71.0	56.2	56.9	52.5	53.4	64.1	53.1	44.4	51.8	50.9	49.3	54.4	64.9	72.7	53.8	51.9	37.6	67.7	52.3	48.8
1981	70.0	59.7	60.0	55.6	53.3	52.9	76.2	55.0	81.8	56.8	50.9	52.8	69.1	79.7	63.0	56.8	52.4	44.9	69.3	59.2	50.0
1982	72.6	66.7	52.9	62.0	59.6	59.5	75.0	55.2	85.7	61.0	58.2	52.0	70.1	66.2	76.8	61.7	59.7	49.8	70.5	59.5	45.6
1983	73.9	69.2	50.0	71.3	62.7	64.3	80.0	47.8	75.0	69.5	63.0	58.5	67.8	76.8	76.4	69.7	58.0	57.3	72.1	70.7	52.1
1984	75.8	71.4	72.2	74.6	64.9	69.3	86.2	66.7	100.0	77.9	65.5	54.1	83.8	68.4	91.3	68.3	66.3	68.1	79.7	67.1	73.0
1985	88.9	88.5	88.3	79.9	79.4	78.0	84.6	73.7	50.0	86.4	75.4	67.4	91.1	92.5	82.1	81.5	74.7	73.5	89.6	81.7	71.4
1986	92.6	90.9	85.7	89.8	85.8	80.5	100.0	92.0	100.0	90.0	88.4	86.4	94.0	90.0	80.9	83.6	84.3	77.8	92.9	91.7	81.8
1986*	90.0	78.2	57.1	72.5	69.2	69.0	82.3	81.5	100.0	75.0	71.5	70.7	72.3	83.0	66.6	66.7	69.2	63.5	82.7	76.9	59.2
1987*	77.9	87.5	63.6	81.3	73.8	78.3	100.0	83.3	100.0	79.6	78.7	82.4	93.7	85.1	69.6	73.4	73.0	70.7	73.1	84.7	68.3
1988*	87.8	74.3	72.7	84.1	77.3	79.8	73.3	84.6	100.0	86.5	82.7	80.6	90.9	91.3	79.2	78.7	79.8	76.6	90.7	83.4	74.5
1989*	96.2	96.8	80.0	90.9	89.4	89.1	100.0	66.7	=	93.0	89.5	79.2	95.8	92.2	100.0	89.1	88.5	88.2	92.8	89.5	78.6

Note: Abbreviations as for Table 2.

Source: Databank Infocenter - Milan's Chamber of Commerce.

Table 7. Survival index in manufacturing sectors and in production services: sectoral data, 1986-90.

<i>Sectors</i>	<i>live</i>	<i>1st year</i>	<i>2nd year</i>	<i>3rd year</i>	<i>3 years</i>
Chemical ind.	85.9	1.0	5.4	5.4	11.8
Mechanical ind.	81.3	4.4	7.2	4.1	15.7
High-tech.	83.4	3.3	5.9	3.8	13.0
Vehicles	86.6	1.3	7.0	1.9	10.2
Food	89.0	1.8	4.5	2.6	8.9
Traditionals	80.0	4.8	7.5	4.8	17.1
Tyres/Publishing	85.9	2.9	5.0	3.3	11.2
Production serv.	89.0	1.7	4.0	2.9	8.6
1986	71.5	5.5	7.4	6.0	18.9
1987	77.3	4.1	7.4	7.3	18.8
1988	81.7	4.5	9.1	4.6	18.2
1989	89.9	3.7	6.4	=	10.1

Note: Survival index: number of living firms at 31 December, 1989 on number of new firms born at year t ; average values.

Source: Databank Inforcenter - Milan's Chamber of Commerce.

This confirms what had already been observed in previous studies⁶ and it is not in contrast to the hypothesis stating that survival is easier where the demand and the offer are highly differentiated and, at the same time, start-up costs and fixed costs are scarce.

- 3 As regards the manufacturing sector, the data concerning the single sectors for the period 1986-90 confirm those of the previous period (1975-86). The food sector, together with rubber, paper and vehicles show, on average, higher survival rates. In the food sector, the high survival rate is present more in suburban areas, where the sector is massively represented, and therefore external economies greatly influence the firms' permanence in the market. In the rubber and paper sector, the survival rate tends to decrease as one moves from the centre to the suburban areas. In the city of Milan, the high survival rate of recently constituted firms depends therefore on the fact that the centre is a good incubator not only regarding birth rates, but also in respect of the firms' presence in the sector. The case is different for means of transport, where the high entry barriers highlight selection mechanisms in the birth rate process: the firms that are able to spring up are those which can better develop themselves and therefore able to survive longer.
- 4 From a territorial point of view, the data shown in Table 6 indicate the incubating role held by the city of Milan in the survival process of almost all the manufacturing sectors, except the food sector. In particular, the role held by the city of Milan favoured not only the rubber and paper sectors but also the high-tech sectors in the 1980s.
- 5 Finally, after analysing the time series, the existence of years which are critical for the survival of new firms is clear:
 - For almost all sectors, and until 1986, the firms born around 1979-80 have lower survival rates than those born in previous years. This means that a higher number of firms created in that period ceased to exist before 1986.
 - For some sectors, the critical period also tends to widen as regards the previous year (in the food and traditional goods sectors) and, conversely, for the following years (in the chemical and pharmaceutical sector).
 - The performance of high-tech firms born in 1985 is particularly spectacular: in 1985 survival rates increased, on average, by 10%.

A global view of these data leads us to advance a hypothesis: the existence of a positive correlation between economic cycles and survival rates. In fact, the firms born in 'difficult' years which developed during periods in which recession was greater (the first few years of the 1980s), have average final survival rates lower than those of the firms born in more favourable years (1985, for instance).

On the basis of these observations, the joint sectoral analysis of mortality and birth rates in the province of Milan, together with the analysis of survival, can be a good indicator of the economic trend in which the main sectors of the manufacturing industry operate.

4. Birth rate, mortality and survival: a few observations on their interrelations

This section analyses the possible relations of cause and effect between birth rate and mortality and their respective influence on the quantitative increase in the number of firms (growth rate). At the same time, the interrelations between birth rate and early death (within the first three years of life) are studied in order to detect the phenomena of selection and turbulence which characterize a high entrepreneurial turnover.

Table 8 shows the correlation indexes between the historical series of birth, mortality development and survival rates for each class in which the firms are located. Table 9 gives confirmation of what had already been observed elsewhere.⁷ Contrary to what has been asserted by many sources, the data collected for the province of Milan do not show a strong relation of cause and effect between birth rate and mortality. The fact there is no evidence of a possible dragging effect exerted by the dynamics of birth rates on mortality, such that an increase in entrepreneurial birth rates should correspond to an increase in sectoral turbulence and therefore a higher mortality rate and vice versa. However, there are a few important exceptions which seem to outnumber and to have higher correlation indexes than those resulting from the previous study which also showed some exceptions to the generalized scarce correlation between birth and mortality rates.

For some the most advanced industrial sectors (chemical, class 25, computer, class 33, rubber and plastics, class 48) and for the services to production (class 83), on one side, but especially for some mature sectors and for those in a state of crisis (mechanical, class 32, food, class 41, textile, class 43, shoe industry and clothing trade, class 45), on the other side, there are correlation indexes which, even if they are not particularly meaningful (0.2-0.3), show a certain (feeble) relation between birth and mortality rates. For the first group, which includes the most advanced manufacturing sectors and services to production, it is possible to suppose that after the expansion phase at the beginning of the 1980s - in which technological opportunities and the creation of new products paved the way for a high increase in the number of firms - in the second half of the 1980s the steady high birth rate - helped, once again, by structural and technological opportunities - will be characterized by the phenomena of selection and sectoral turbulence, and, as a consequence, by high mortality rates, because of the progressive shrinking of market shares. On the contrary, as for the most mature industrial sectors, the reason why birth and mortality rates seem to be parallel lies in the crisis experienced by small and medium-sized firms in the second half of the 1980s, a crisis which worsened and had long-lasting effects. This situation caused a dramatic reduction in entrepreneurial birth rates which led to the settling of the entrepreneurial components of such sectors and therefore to a slight decrease in demographic turbulence and to the subsequent reduction of mortality rates.

Table 8. Correlation index between birth, mortality, growth and infantile mortality rates by industries, areas and years: Milan province, 1975-90.

<i>Sector</i>	<i>BR→GR</i>	<i>MR→GR</i>	<i>BR→MR</i>	<i>BR→IMR</i>
21	0.79	0.31	0.01	0.01
22	0.65	0.19	0.03	0.01
23	0.46	0.60	0.00	0.01
24	0.25	0.31	0.19	0.15
25	0.50	0.05	0.27	0.31
26	0.52	0.40	0.01	0.23
31	0.41	0.17	0.19	0.44
32	0.61	0.03	0.21	0.40
33	0.88	0.06	0.33	0.06
34	0.74	0.02	0.14	0.34
35	0.62	0.06	0.15	0.02
36	0.81	0.00	0.16	0.19
37	0.92	0.04	0.01	0.00
41	0.17	0.15	0.46	0.10
42	0.22	0.57	0.04	0.00
43	0.58	0.01	0.33	0.45
44	0.41	0.18	0.18	0.16
45	0.24	0.15	0.37	0.57
46	0.22	0.37	0.17	0.14
47	0.58	0.05	0.21	0.56
48	0.44	0.08	0.27	0.36
49	0.69	0.02	0.19	0.45
83	0.85	0.01	0.23	0.12
<i>Area</i>				
MI	0.27	0.26	0.22	0.07
IC	0.78	0.06	0.06	0.17
RP	0.73	0.05	0.10	0.04
<i>Year</i>				
1975	0.96	0.06	0.00	0.13
1976	0.74	0.35	0.01	0.30
1977	0.72	0.00	0.29	0.01
1978	0.78	0.23	0.00	0.17
1979	0.85	0.01	0.23	0.34
1980	0.70	0.23	0.01	0.12
1981	0.92	0.29	0.08	0.00
1982	0.62	0.04	0.20	0.02
1983	0.58	0.33	0.01	0.00
1984	0.79	0.14	0.01	0.13
1985	0.62	0.02	0.26	0.11
1986	0.77	0.18	0.00	0.16
1987	0.97	0.11	0.03	0.03
1988	0.47	0.36	0.03	0.03
1989	0.57	0.02	0.29	0.00
1990	0.33	0.84	0.04	=
Total	0.714	0.075	0.079	0.079

Notes:

- BR = birth rate;
 MR = mortality rate;
 GR = growth rate;
 IMR = infantile mortality rate.

Area abbreviations as for Table 2.

Source: Infocenter - Cicogna Databank.

The correlation indexes, which are too low to allow us to talk about the presence of a definite relationship between cause and effect, and the fact that the general trend denies the existence of a correlation between birth rates and mortality leads us to confirm the result of the previous study, which is that the two phenomena were basically due to different causes. The creation of a firm, (birth) seems to be more related to structural and environmental factors, to technological opportunities and also to non-economic factors. Conversely, mortality seems to be an endemic component of entrepreneurial development – due to lack of experience, lack of preparation of the new entrepreneurs, to their mistakes in evaluating the market, to the viscosity of the markets themselves, to the inefficiency of the capital market – or it seems to be due to the worsening of particular economic trends, rather than to the flow of new enterprises.

The other side of the coin regarding these observations, which is further confirmation of the results of the research described⁷ is the fact that, once again, the entrepreneurial birth rate in the area of Milan depends more on the dynamics of birth rates than on that of mortality rates. It emerges from Table 8 that the correlation between birth and growth rates takes on greater importance as far as almost all of the industrial sectors and especially services to production are concerned. However, the opposite takes place when we are dealing with the mortality rate which, except in a few instances, shows very low correlation indexes. The exceptions for which there is some sort of correlation between mortality and growth rates can be divided into two groups. On one side there are in industrial sectors having a very low birth rate, caused by the strong barriers to entry, for which mortality has a greater impact on entrepreneurial demography. These sectors include the mining industry (classes 21 and 23), industries for processing minerals (class 24), the industry for the production of synthetic fibres (class 26), and the sugar and beverages industries (class 42). On the other side there are the mature sectors, also with low birth rates, which went through a crisis in the second half of the 1980s; for some of them a correlation between birth rate and mortality has already been observed. These sectors include the food industry (class 41), the mechanical industry (class 31), the leather and skin industry (class 44), the shoe and clothing industries (class 45) and the editing industry (class 46). As we have previously observed, the settling of entrepreneurial firm births in low birth and mortality rates must be considered the consequence of the long-lasting crisis experienced by these sectors and, on the other hand, it also explains why the growth rate is influenced more by mortality rates.

Apart from these exceptions, which, once more, show pretty modest correlation indexes, the birth rate always determines the dynamics of entrepreneurial demographic development: the analysis of variance permits affirmation that the growth rate can be globally explained for 80% by the dynamics of the birth rate and only for the remaining 20% by mortality rate trends.

5. Entrepreneurial demography and economic trends in the province of Milan

On the basis of the previous observations (see section 3), it is possible to sense the existence of correlated trends between entrepreneurial dynamics and the evolution of the economic situation. These intuitions will be closely examined by analysing the data available on the state of both the labour market and that of production.

The study of the eventual relation between these variables and the birth of new firms is one of the subjects most widely analysed during the last few years both in Italy and elsewhere.⁸

Two main aspects are analysed: first, the effects of employment dynamics as the factor causing the creation of new firms, and, second, in particular, the effects of entrepreneurial dynamics as the factor increasing the number of both employees and the self-employed. The self-employment framework applies to the first aspect. According to this theory, the creation of new firms can be due partially to the loss of the previous (subordinate) job during a negative phase of the economic cycle. From the alternative angle, employment dynamics resulting from the creation of small firms (like firm networks, scientific and technological parks and industrial districts) must be studied.

Since the purpose of this study is an analysis of the causes underlying entrepreneurial dynamics, the evolution of labour and production markets are considered to be the main explanatory variables. In other words, greater emphasis will be given to the first aspect, while policy and sociological analysis will not be treated.

5.1 *The labour market*

In this section, the dynamics of the labour market in the province of Milan and in Lombardy will be analysed in order to ascertain the eventual presence of relations of cause and effect between employment and (especially) unemployment evolution (quantified by the number of people registered with the local job office and the demographic dynamics of new entrepreneurship in Milan).

The following information can be identified from the data in Tables 9 to 11:

- 1 In the province of Milan, during the decade of the 1980s, the employment rate went from 43.4 in 1980 to 44.6 in 1989. This was due both to a fairly constant decrease in population (equal to -0.15% per year) and to a slight increase in the labour force during the decade ($+0.4\%$ per year).
- 2 The increase in the employment rate implies an increase in the number of unemployed greater than that of the employed ($+2\%$ per years vs. $+0.02\%$ per year). However, this global trend can be divided into two distinct periods. During the first five years (1980-84) the total number of unemployed sharply increased ($+60.5\%$ in that period, which means $+47,600$ units). After having reached the statistic mode in 1984, the tendency changes in 1985: the number of unemployed decreased by 35,000 units (particularly from 1988-89) while the employment rate increased by an average of about 1% .

Table 9. Unemployed people (registered at local job office) in Milan, 1980-89.

Year	Registered at the job office		Real unemployed		Looking for first job	
	Value	Index	Value	Index	Value	Index
1980	76,561	100.0	17,600	100.0	43,000	100.0
1981	77,107	100.7	13,800	78.4	48,400	112.5
1982	81,542	106.5	15,600	88.6	67,800	157.7
1983	98,648	128.8	21,600	122.7	78,400	182.3
1984	110,375	144.2	30,300	172.1	67,700	157.4
1985	113,425	148.1	27,900	158.5	66,800	155.3
1986	113,594	148.4	25,000	142.0	68,200	158.6
1987	113,695	148.4	24,100	136.9	69,000	160.5
1988	111,100	145.1	21,000	119.3	55,000	127.9
1989	=		17,000	96.6	48,000	111.6

Note: First column: data in thousands; second column: index based on 1980 = 100.

Source: Economic conjuncture of Lombardy, various years.

Table 10. Resident population, manpower, employed and unemployed in Milan province, 1980-90 (data in thousands): for the whole economy.

Year	Population		Manpower		Employed		Unemployed	
1980	3995.9	100.0	1731.3	100.0	1645.5	100.0	85.8	100.0
1981	3983.7	99.7	1752.1	101.2	1653.4	100.5	98.7	115.0
1982	3975.9	99.5	1738.0	100.4	1621.9	98.6	116.1	135.3
1983	3973.8	99.4	1725.8	99.7	1595.6	97.0	130.2	151.7
1984	3973.6	99.4	1726.8	99.7	1589.1	96.6	137.7	160.5
1985	3960.7	99.1	1737.7	100.4	1604.2	97.5	133.5	155.6
1986	3953.3	98.9	1758.6	101.6	1622.3	98.6	136.3	158.9
1987	3948.7	98.8	1795.6	103.7	1685.5	100.8	137.1	159.8
1988	3940.0	98.6	1802.0	104.1	1683.0	102.6	114.0	132.9
1989	3933.0	98.4	1756.0	101.4	1654.0	100.5	102.0	118.9

Note: Second column: index based on 1980 = 100.

Source: Economic conjuncture of Lombardy, Research Center of Lombardy, various years.

3 On the basis of this general trend, the data on employed and unemployed dynamics can be disaggregated. So far as employed dynamics is concerned, employment decreases only in the manufacturing sector (- 30%). This decrease is only partially counterbalanced by the dynamics of self-employed (entrepreneurs and independent working). While the number of manufacturing entrepreneurs rapidly increases in the first half of the 1980s (+ 26.2% during the first three years) the dynamics of those working on their own is more constant. However, both these categories recede during the second half of the 1980s, showing, therefore, a negative correlation with the dynamics of the unemployed.

4 As for the unemployed, the two main elements (strictly unemployed and people looking for their first job) show a somewhat similar trend, with an increase at the beginning of the decade and a decrease beginning in 1985-86. It is interesting to observe that the number of unemployed decreases from 1980-82, before reaching the maximum level in 1984 (which was twice the minimum value of 1982). This decrease was parallel to a sharp increase in the number of entrepreneurs. The trend presents an opposite dynamic with respect to that of independent workers, and the existence of a negative correlation between the trend of the employed and that of the independent workers is confirmed.

Table 11. Total employment, employees, self-employed in manufacturing sectors: Milan province, 1980-90 (data in thousands).

Year	Employed		Employees		Self-employed				Total
					1	2			
1980	850.8	100.0	774.4	100.0	6.5	100.0	60.8	100.0	100.0
1981	815.3	95.8	740.1	95.6	6.9	106.1	60.3	99.2	98.6
1982	777.6	91.4	696.3	89.9	8.2	126.2	62.7	103.1	106.5
1983	753.3	88.5	673.5	87.0	7.0	107.7	62.8	103.3	104.6
1984	705.3	82.9	626.7	80.9	6.6	101.5	62.4	102.6	103.0
1985	690.7	81.2	615.1	79.4	7.5	115.4	58.7	96.5	99.0
1986	676.1	79.5	604.7	78.1	7.2	110.8	54.8	90.1	93.0
1987	681.5	80.1	614.5	79.3	6.3	96.9	52.4	86.2	87.7
1988	660.0	77.6	583.0	75.3	=	=	=	=	100.9
1989	643.0	75.6	556.0	71.8	=	=	=	=	100.9

Note: 1: entrepreneurs. 2: independent workers.

Second column: index based on 1980 = 100.

Source: Economic conjuncture of Lombardy, various years.

In conclusion, the analysis of market dynamics in the province of Milan allows us to detect two distinct periods within the decade considered. The first period ends in the biennium 1984–85, a period in which the unemployment rate increased and the number of employed decreased, while the second period, in the second half of the 1980s, shows an improvement in the labour market due to an increase in the employment rate and to a decrease in the unemployment rate. As far as the labour force is concerned, the dynamics of independent workers perfectly follows this temporal disaggregation: an increase in the first phase follows a decreasing trend in the second, while the employment rate increases. However, it is necessary to observe that the number of employees constantly decreases in the manufacturing sector.

5.2 *The evolution and dynamics of industrial trends*

The employment trend can be used, indirectly, as a proxy indicator of the industrial trend because the data available are not sufficiently disaggregated on a sectoral level. Therefore, it is necessary to take into consideration the dynamics of the balance between positive and negative variations in the production of the current year/quarter compared to that of the previous year/quarter. In any case, these data are difficult to use; it is thus better and more precise to refer to the existing aggregate data.

As regards the total of the industrial sector, on an aggregate level, two non-homogeneous series, that of the annual value added (1980–86) and that of the quarter index for industrial production (see Table 12) are available, keeping the disaggregated analysis only from a qualitative point of view.

Table 12. Index of industrial added value (1980–86) and of industrial production (1986–90) in Milan province.

<i>Index of added value</i>		<i>Index of industrial production</i>		<i>Yearly average</i>
1980	100.0	1986-1	99.3	
1981	98.2	1986-2	101.9	
1982	95.7	1986-3	96.0	100.0
1983	91.6	1986-4	102.8	
1984	94.1			
1985	96.7	1987-1	105.4	
1986	98.5	1987-2	111.1	107.1
		1987-3	103.7	
		1987-4	107.7	
		1988-1	108.0	
		1988-2	111.2	108.7
		1988-3	103.7	
		1988-4	111.9	
		1989-1	114.0	
		1989-2	115.4	112.0
		1989-3	105.6	
		1989-4	113.2	
		1990-1	115.0	
		1990-2	116.3	

Note: 1980 = 100.

Source: Index of added value: Unioncamere databank; index of industrial production: Economic conjuncture of Lombardy, various years.

An overall view of global manufacturing sectors shows a cyclic trend which, for the province of Milan, has the following turning points:

1980–83: a recessive phase in which the annual index of added value decreases;

1984–89: a feeble but steady recovery phase.

The industrial production index for the province of Milan returned only in 1986 to the values it had before the recession. It is important to stress that this recovery reached its highest levels in 1987 and 1989.

5.3. *To what extent is there an interrelationship with entrepreneurial demography?*

The information set out in the previous sections allow us to make some observations about the existence of eventual relations between demographic variables in the entrepreneurship of Milan and economic and employment trends. In order to reach a better understanding of this situation, these relations will be analysed separately, considering birth rate, mortality and survival one at a time.

5.3.1. *Birth rates:* The main conclusions as regards birth rates are as follows:

- 1 On an aggregated level, after comparing Tables 1 and 13 with the tables showing employment and industrial trends in the province of Milan, (Tables 11 and 12), it is not possible to detect a distinct relation between entrepreneurial birth rate and the variables in the economic trend, at least as far as the period of greatest recession is concerned (1980–84). In fact, during a negative economic cycle, a decrease in the employment rate and an increase in the number of jobless do not coincide with a particularly significant entrepreneurial birth rate trend. In the manufacturing sector, this trend tends to remain steady in the period from 1982–84, while it decreased slightly in the periods immediately before and after this three-year period. The same is true for production services. Even after an analysis of mortality rates during the first half of the 1980s, no particular relations with the variables of the economic trends were found.
- 2 For the province of Milan, the period from 1986–90 appears to be very interesting on an aggregated level. During these years, while entrepreneurial birth rates decreased sharply both in the manufacturing sector and in the sector of production services, the economic cycle was quite favourable, with an increase in production and a decrease in the number of jobless. Therefore, on an aggregate level, though it is not possible to detect a negative correlation between birth rates on one side and production and employment variables on the other during the period of recession, it is possible to detect such a correlation in the expansive conjuncture phase of the second half of the 1980s.
- 3 The situation is different if the data are analysed on a disaggregated level (see Table 13) and if the entrepreneurial demography trends are analysed for the single sectors. At this analysis level, a negative correlation between birth and employment dynamics actually takes place, especially in the periods of greater crisis (1978–83). In fact, in the chemical and pharmaceutical sector, the birth rate is higher during the years of greatest crisis, especially in the period from 1980–84 (this is not accidental, since this sector has a longer period of crisis due to lower technological and productive flexibility) in the paper and rubber industry (1978–82), in the traditional sectors (1979–84), in the food sector (in which there

Table 13. Sectoral birth rates: 1975–90.

Year	Chemical Ind.			Mechanical Ind.			Vehicles			High-tech			Food			Traditional			Rubber/paper		
	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP	MI	IC	RP
1975	6.1	10.4	11.8	10.5	17.5	15.4	9.4	11.3	13.8	17.5	32.7	25.4	9.4	11.3	4.6	9.9	13.3	11.6	9.1	16.6	18.6
1976	3.9	7.3	10.8	7.9	11.9	10.2	8.7	13.7	=	9.9	16.4	14.4	4.3	9.1	6.2	6.5	7.8	9.9	7.2	10.8	12.6
1977	5.6	7.5	13.2	9.1	11.7	10.1	13.2	16.8	2.9	10.1	17.9	16.8	4.5	7.4	6.4	7.9	9.0	8.4	8.1	13.1	16.9
1978	4.6	4.4	12.7	6.8	11.0	8.5	10.2	15.4	9.1	8.2	13.4	10.6	5.8	6.2	3.3	5.8	7.0	7.7	5.9	10.9	13.0
1979	5.4	8.9	13.6	8.0	13.1	11.5	11.8	20.0	20.6	9.3	19.0	17.1	8.6	8.6	7.1	7.2	10.7	15.1	8.6	13.6	15.5
1980	8.0	13.6	18.8	8.8	14.4	13.9	12.2	15.6	23.7	9.8	17.4	18.8	8.2	8.7	6.0	7.0	10.4	13.3	8.9	14.8	15.6
1981	7.3	9.1	15.8	8.7	12.0	10.4	6.5	9.1	26.2	9.9	13.7	14.2	10.7	7.3	7.5	7.7	8.3	9.1	8.7	11.8	11.9
1982	7.5	7.6	16.5	8.0	9.8	9.5	7.7	13.4	13.7	7.7	11.1	10.7	7.7	8.8	6.6	6.9	7.2	9.1	8.2	10.6	13.7
1983	7.4	8.5	11.1	7.2	8.5	9.5	8.0	10.3	7.4	8.6	11.2	12.7	9.6	7.8	4.7	6.9	7.0	8.9	7.3	9.3	8.1
1984	9.4	10.8	16.5	8.0	9.1	8.2	9.4	14.7	7.1	9.4	12.5	12.9	11.8	10.7	6.6	7.4	7.3	9.1	6.8	9.0	10.9
1985	4.0	9.6	15.3	6.7	9.7	9.6	4.2	7.9	3.6	8.4	13.6	13.2	7.3	11.5	8.2	6.2	7.2	8.7	6.2	10.6	13.2
1986	4.1	5.4	12.2	6.7	8.1	8.4	2.4	11.0	2.0	7.5	10.9	10.7	5.6	7.6	6.2	5.5	6.6	6.4	6.8	9.5	13.1
1986*	5.4	5.5	10.6	6.7	7.6	7.1	5.7	11.0	5.7	7.5	10.9	9.7	5.6	6.6	6.3	5.9	6.2	6.2	6.9	9.4	13.0
1987*	5.2	4.7	8.1	7.2	7.7	8.4	3.7	9.4	5.8	7.4	9.5	9.0	3.8	6.7	6.9	6.8	6.7	8.6	7.4	9.4	9.1
1988*	3.1	4.2	7.7	6.3	6.6	7.3	5.0	4.9	3.6	6.1	9.0	9.6	5.3	6.8	7.2	5.9	5.9	7.1	6.2	7.3	8.2
1989*	4.2	3.7	3.4	4.9	5.8	5.7	3.7	3.4	=	5.6	6.7	10.0	5.7	7.4	5.2	5.1	5.8	6.1	6.0	6.7	8.2
1990*	2.5	2.1	6.5	3.7	4.2	5.6	3.7	3.0	3.8	4.4	5.4	6.8	6.0	5.8	5.4	4.3	4.0	5.0	4.3	4.8	4.8

Note: Abbreviations as for Table 2.

Source: Databank Infocenter – Milan's Chamber of Commerce.

are birth rate peaks in the period from 1979–81, particularly in Milan) and, finally, in the vehicles sector, which, in the period from 1977–80, showed birth rates above 10%, even if it presents a high level of scale economies and more barriers to entry. The reason why birth rates are high is due to partly to both the structure of the subcontractors and that of the supplier firms of the big enterprises, which are good incubators of new entrepreneurial initiatives and, in a parallel way, these high birth rates are due to the strategy of the large enterprises wanting to externalize part of productive and immediate functions. A smaller correlation can be seen in the high-tech sector, which showed very high expansion rates even during the years of greatest recession. Finally, the situation of the traditional mechanical sectors, which in the years from 1979–81 showed a slight increase in birth rates, is quite uncertain. However, the composite make-up of this sector does not allow further investigation.

- 4 The negative correlation between birth rates after 1986 and the parallel increase in production is much more evident. When, in the second half of the 1980s, production increased, this growth was largely due to the large-scale dimension of the enterprises. An explanation for this is given by the fact that the large corporations regained profitability and productivity after exploiting dynamic economies of scale and after regaining efficiency on the basis of a restructuring process made in the first half of the 1980s; this caused a relative decrease in importance of the smaller firms, especially in terms of their capacity to incubate new entrepreneurship.⁹ The favourable conditions that allowed the development of the entrepreneurial culture which characterized Italy's industrial areas from the 1970s to the 1980s fell into decay, and the increase in concentration degree (at all levels: sectoral, technological, territorial and informative) complicates the process of creation of new entrepreneurship and its chances of survival.

5.3.2 Mortality rates: As for mortality rates, the aggregate analysis does not differ from what has already been observed regarding birth rates in the first two points of the previous section. However, as far as only the city of Milan is concerned, it is necessary to observe that in the manufacturing sector mortality trends are higher in the three-year period from 1979–81, that is, in the period of greatest recession. It follows that high mortality goes with a fall in production, with an increase in unemployment, and with an increase in entrepreneurial birth rate, confirming therefore the self-employment hypothesis. From the point of view of mortality, such as correlation, with all its conjunctural variables, appears more distinct than that concerning birth rates. However, as soon as one moves from the centre to the perimeter, this correlation tends to be less evident.

On a sectoral level, in fact, some industries show an increase in mortality rates in the rest of the province in the mid-1980s, that is, in the period of economic expansion. An example of this is given by the traditional sectors, by the rubber and paper sectors and by the sectors which are more technologically advanced. Survival rate trends confirm this observation. The increased mortality of these sectors in the recovery phase or in the phase in which, from the view of employment, the previous recession drags on, can be explained by the strong turbulence, by expansive dynamics and by the dynamics aiming at restructuring which characterize both the rest of the province and the first belt, and the other sectors considered. The productive structure deriving from the recession of the first few years of the 1980s in the province of Milan looks substantially different. The traditional sectors are those that do not take much advantage of the introduction of

information technology and the acceleration of technical progress. Sectors which are technologically advanced show the highest turnover rate among entry and exit firms. The rubber/paper industry, as we have already stated, is one of the strong points of the economy of Milan. This sector is influenced on one side by the restructuring process and, on the other, by changes in the subcontractors' market which keeps the turbulence at a high level, and therefore keeps birth rates and mortality high inside the sector itself.

It follows that the elements underlying mortality do not derive from the labour market trend only, but also, and especially, from structural changes in the productive system.

5.3.3 Survival rates: Conversely, as regards survival rates, it has already been observed that the critical years are those at the end of the last decade and the beginning of the new one, in particular, the year 1980. The worsening industrial trend, which began in 1979, seems therefore to have more or less immediate effects on the resistance of new firms, which are those firms more influenced (negatively, in this particular case) by exogenous elements, not totally foreseeable by the entrepreneur. The correlations with the variables in the economic trends are therefore confirmed. It is interesting to observe that the effect of economic cycles on survival rates come before that on mortality. It can hence be supposed that there is an unambiguous connection that stretches from survival to mortality.

6. Conclusions

In conclusion, we will now report the main results of this data analysis.

The dynamics of entrepreneurial demography slowed down considerably and progressively during the 1980s even if, depending on whether we are considering manufacturing activities or the services to production, there are differences in intensity and in the periods in which they occurred.

The birth rate shows decreasing values throughout the whole period but whereas for the manufacturing sector the trend is very clear and constant (ranging from 11.1 in 1980 to 4.4 in 1990), for the services to production the decrease is smaller, becoming relevant only towards the end of the 1980s, so that for this section, until 1987, it is still possible to talk of a clear expansive trend.

The mortality rate in manufacturing industry shows a constant trend in the two sub-periods 1980–85 and 1986–90, with decidedly higher values in the first half of the decade (also due to problems in the data of the Register of Companies). On the other hand, the services to production show that until 1986 the mortality rate fluctuates more until becoming stable with values of approximately 5%.

During the last decade entrepreneurial birth and mortality rate trends are a substantially negative growth rate for the industries and a positive growth rate – which tends to decrease – for the services to production.

Throughout the 1980s, therefore, there is an important decrease in the number of industrial firms, which is in contrast with the great proliferation of manufacturing entrepreneurship which took place during the second half of the 1970s. During the whole decade the number of production services continuously increased – even if the intensity was decreasing – and this is a symptom of a progressive saturation of market shares and of increasing selection.

The disaggregated sectoral analysis permits a better understanding of the dynamics of the manufacturing sector. These are the main results concerning birth rates:

- 1 The sectors showing higher birth rates in the second half of the 1970s and during the first few years of the 1980s are, in decreasing order: advanced mechanical, vehicles, traditional mechanical, paper and rubber/publishing. These are the most important sectors in the area of Milan, and they confirm the fact that the high entrepreneurial growth rate of the 1970s was not so much a consequence of a change in the sectoral make up of the manufacturing industry, but an effect due to deverticalization and productive decentralization processes.
- 2 In the second half of the 1980s, the food and traditional sectors (textile, leather, furniture, etc., together with the advanced mechanical sector) show a smaller decrease in birth rates. This means that – in terms of absolute values – if there is a general decrease in birth rates, the sectors that at the beginning of the period have low initial indexes show a smaller decrease.
- 3 During the last few years the birth rate of the chemical and pharmaceutical sector, a sector not allowing a high birth rate because of barriers to entry, has been particularly low and sharply decreasing. During the last few years there has also been a strong decrease in birth rate in the vehicles sector, confirming the state of deep crisis that such sectors and their subcontractors are experiencing.
- 4 The rubber industry, together with the paper and publishing sectors, shows a very high entrepreneurial birth rate trend, thus confirming the important role these sectors play in the Milanese industrial structure.
- 5 There seems to be no confirmation of the incubator hypothesis. The birth rate is higher in the hinterland and in the rest of the province than in the city of Milan. This is due to the fact that the most specifically productive businesses have moved from the city to the suburbs, because Milan is increasingly becoming a centre of activities and services.

As regards mortality rates, the disaggregated analysis is synthesized in the following three conclusions:

- 1 During the 1970s the advanced mechanical sector shows increasing mortality rates which stabilized at a value of 9.5% in the first half of the 1980s, and then decreased (with constant values of approximately 6%) during the last few years. A similar trend is shown by the food and chemical sectors, where the turning point – which shows the decrease in mortality – takes place earlier: during the first few years of the 1980s.
- 2 The traditional manufacturing sectors show mortality rates above average, confirming therefore the trend that sees these sectors losing their importance in the province of Milan – a trend previously outlined by birth rate trends.
- 3 Until the first few years of the 1980s mortality rates – in all sectors – tend to be higher in Milan than in the hinterland. This evidence too questions the validity of the incubator hypothesis. However, during the following years mortality is higher in the hinterland than in the centre (or is at least equal to it) because of the many localization and re-localization processes of the companies in the external areas.

The analysis of survival rates in the five-year period confirms the results of the research published in Vol. I, 'New entrepreneurs in Milan during the 80s': the most critical year in terms of entrepreneurial survival seems to be the second and almost one-fifth of new businesses cease their activities before their third year of life, showing how important

infant mortality is. Other evidence is the fact that tertiary businesses have a higher survival rate than industrial ones. Among the latter, the sectors of food, paper and rubber, vehicles and the chemical and pharmaceutical sector show mean rates above those of the traditional and advanced mechanical sector and of the traditional ones.

In terms of territory, the firms born in Milan are the ones showing, in the second half of the 1980s, the highest survival rates in the manufacturing sector, and this is in agreement with what we have outlined about mortality rates, which during this period were higher in the hinterland than in the centre.

Finally, in terms of time, the historical series outlines the presence of a positive correlation between economic cycle and survival rates, meaning that the firms that were born and that developed in a period of crisis show mean final survival rates below those shown by the firms that were started in more favourable years.

The analysis of correlation indexes between entrepreneurial birth rates permits confirmation of the conclusions reached in the previous research. Contrary to what is often asserted, correlation indexes do not show the presence of a strong relation of cause and effect between birth rate and mortality, a relation for which an increase in new firms should correspond to an increase in sectoral turbulence – and therefore higher mortality rates – and vice versa.

We can therefore suppose that these two phenomena are caused by distinct determining factors: the creation of a firm, i.e., its birth, seems to be related more to environmental factors, but, most of all, firm birth seems to depend on the structural changes of the productive system, on technological opportunities and also on factors of a non-economic nature. Mortality, on the other hand, seems to be an endemic component of entrepreneurial dynamics – due to lack of preparation and to the lack of experience of the entrepreneurs, to market viscosity, to the inefficiency of the capital market, or to a consequence of the worsening of the economic cycle.

The other side of the coin regarding these observations is the fact that the entrepreneurial growth rate depends more on the dynamics of birth rates than on the dynamics of mortality rates: the analysis of variance allows us to state that the development rate is explained for approximately 80% by the dynamics of the birth rate and for only the remaining 20% by the mortality rate trend.

Asserting that there is a low correlation between entrepreneurial birth rate and mortality does not mean denying the fact that the sectors having high birth rates can also show high mortality rates, but rather that there is low correlation between birth rate and mortality dynamics, and that the evolution of mortality does not depend on that of birth rate.

As regards the existence of possible relations between entrepreneurial birth rates and economic and employment variables in the province of Milan, it is possible to draw the following conclusions:

- 1 On an aggregate level, it is not possible to detect a definite relation between entrepreneurial birth rates and economic variables, at least during the period of worst recession (1981–83). In fact, a decrease in employment and an increase in the number of jobless and in the presence of a negative productive cycle, does not correspond to a particularly significant entrepreneurial birth rate trend, which, on the contrary, tends to remain constant in the manufacturing sector in the three-year period 1982–84 and to decrease slightly in the years immediately before and after this triennium. The same observations can be made for the class of services to production.

- 2 Still on aggregate level, it is possible to observe that in the period 1986-90 - characterized by a sharp decrease in entrepreneurial birth rate both in the manufacturing sector and in that of services to production - the economic cycle is quite favourable, with an increase in production and a decrease in the number of jobless. Therefore, if - on an aggregate level - it is not possible to detect a negative correlation between birth rate and productive and employment variables during the phase of recession, it is, however, possible to determine a correlation during the positive economic cycle in the second half of the 1980s which could lead us to confirm the self-employment hypothesis. However, this correspondence during the positive economic cycle can be better explained by an analysis of the structural changes that took place during that period, rather than just limiting ourselves to pure economic data. When production increased, in the second half of the 1980s, this increase was largely influenced by large sizes. A possible explanation lies in the fact that the profitability and productivity recoveries following the exploitation of dynamic economies of scale and improvements in efficiency, thanks to refurbishments made in the first half of the 1980s, caused a relative decrease in the importance of small-sized firms and, most of all, a decrease in the importance of the incubator role of new entrepreneurship. The conditions favourable to the development of an entrepreneurial culture, which characterized Italian industrial areas from the 1970s to the 1980s, have faded and the increase in the degree of concentration at all levels (sectorial, technological, territorial, informative) hampers the creation of new entrepreneurship and decreases its chances of survival.
- 3 As far as the manufacturing sector is concerned, mortality was higher in the very early years of the 1980s, that is, in the period of greatest recession, whereas it was more limited during the positive economic trend. The correlation with the economic trend seems to be more relevant than in the case of birth rate, meaning that a higher mortality rate occurs when there is a parallel sharp decrease in production and an increase in unemployment.
- 4 Concerning survival rates, the critical years are those between the end of the 1970s and the beginning of the 1980s, and in particular 1980. The worsening of the industrial trend, which began in 1980, seems to have had more or less immediate effects on the 'resistance' of the newly born firms, i.e., those more influenced (negatively, in this case) by exogenous factors which are not completely foreseeable by the new entrepreneur. The correlation with the economic variables is therefore confirmed.

Notes

1. For an estimation of the self-employment hypothesis in Italy, see Foti and Vivarelli (1991).
2. See FORMAPER (1990).
3. See FORMAPER (1990).
4. See, among others, Evans (1987), Phillips and Kirchoff (1989), Mussati (1990), Arrighetti (1991), Contini and Revelli (1986).
5. See Contini and Revelli (1986), Arrighetti (1991), Fumagalli (1990), Fumagalli and Marcora (1990), Marcora (1990).
6. See Fumagalli (1990), Fumagalli and Marcora (1990), Marcora (1990).
7. See FORMAPER (1990).
8. In Italy, see note 5, in Europe and the USA, see, among others, Phillips and Kirchoff (1989), O'Neill and Duker (1986).
9. See, among the papers from this conference, Mussati and Fumagalli (1991).

References

- Arrighetti, A. (1991) *La mortalità delle imprese e l'ipotesi di selezione naturale* (Milan: IRES).
- Contini, B. and Revelli, R. (1986) Natalità e mortalità delle imprese italiane: risultati preliminari e nuove prospettive di ricerca, *L'industria*, No. 2, pp. 114-136.
- FORMAPER (ed.) (1990) *Nuovi imprenditori a Milano negli anni '80* (Milan: Ricerche FORMAPER).
- Foti, A. and Vivarelli, M. (1991) The birth of new firms: an empirical investigation of the self-employment choice, paper presented to RENT V: Workshop on Entrepreneurial Bridging', Vaxjo, 28-29 November 1991.
- Fumagalli, A. (1990) L'analisi dei tassi di sopravvivenza nella provincia di Milano. In Centro Cicogna (ed.) *Nuovi imprenditori a Milano negli anni '80* (Milan: Ricerche FORMAPER).
- Fumagalli, A. and Marcora, L. (1990) Nuove imprese in Provincia di Milano. In Mussati, G. (ed.) *Alle origini dell'imprenditorialità* (Milan: Etas Libri).
- Marcora, L. (1990) L'analisi della natalità e della mortalità imprenditoriale. In Centro Cicogna (ed.) (Milan: Ricerche FORMAPER).
- Mussati, G. (ed.) (1990) *Alle origini dell'imprenditorialità* (Milan: Etas Libri).
- Mussati, G. and Fumagalli, A. (1990) Survival, entrepreneurship, growth: which relationship? The Milanese area's case, forthcoming in *Proceedings of IV Workshop in Entrepreneurship*, Cologne, 29-30 November 1990.
- Mussati, G. and Fumagalli, A. (1991) Italian industrial dynamics from the seventies to the eighties: some reflections on entrepreneurial activity, paper presented at RENT V: Workshop on Entrepreneurial Bridging, Vaxjo, 29-30 November 1991.
- O'Neill H. M. and Duker, J. (1986) Survival and failure in small business, *Journal of Small Business Management*, Vol. 1, pp. 14-28.
- Phillips, B. D. and Kirchoff, B. A. (1989) Formation, growth and survival: small firms dynamics in the US economy, *Small Business Economics*, Vol. 2, pp. 77-90.