



UNIVERSITÀ DEGLI STUDI DI TRENTO

DIPARTIMENTO DI ECONOMIA

---

# **Demand Distribution Dynamics in Creative Industries: the Market for Books in Italy**

**Edoardo Gaffeo  
Antonello E. Scorci  
Laura Vici**

---

Discussion Paper No. 4, 2008

The Discussion Paper series provides a means for circulating preliminary research results by staff of or visitors to the Department. Its purpose is to stimulate discussion prior to the publication of papers.

Requests for copies of Discussion Papers and address changes should be sent to:

Dott. Luciano Andreozzi  
E.mail [luciano.andreozzi@economia.unitn.it](mailto:luciano.andreozzi@economia.unitn.it)  
Dipartimento di Economia  
Università degli Studi di Trento  
Via Inama 5  
38100 TRENTO ITALIA

# Demand Distribution Dynamics in Creative Industries: the Market for Books in Italy\*

Edoardo Gaffeo,<sup>a</sup> Antonello E. Scorcu,<sup>b</sup> Laura Vici,<sup>b</sup>

<sup>a</sup> *Department of Economics and CEEL, University of Trento, Italy*

<sup>b</sup> *Department of Economics, University of Bologna, Italy*

This draft: January 29<sup>th</sup>, 2008.

## Abstract

We studied the distribution dynamics of the demand for books in Italy. We found that for each of the three broad sub-markets into which the book publishing industry can be classified – Italian novels, foreign novels and non-fiction – sales over a three-year sample can be adequately fitted by a power law distribution. Our results can be plausibly interpreted in terms of a model of interactions among buyers exchanging information on the books they buy.

*Keywords:* Book publishing industry; Information transmission; Power law distribution.

*JEL classification:* L82, Z1.

Accepted for publication and forthcoming  
in *Information Economics and Policy*

---

\* Previous versions of this paper were presented at the WEHIA 2006 Conference, and at the Universities of Bologna, Padova and Trento. We are grateful to seminar participants and to two anonymous referees for their comments.

## 1. Introduction

The decision to buy a book is an activity in which social influences play a key role. The choice of title from the shelves of a bookshop is often the outcome of a decision process that combines personal attitudes with information from acquaintances' experiences through word-of-mouth on the one hand and public sources, like reviews in newspapers or magazines, on the other. Thus, social interaction and information transmission are likely powerful forces shaping the economics of the book publishing industry. Surveys conducted on a regular basis among consumers seem to support this assumption. In Italy (see e.g. AIE, 2005) for instance, 55% of buyers declare they possess all the information they need about the book they intend to purchase before entering a bookshop. For frequent readers (i.e., more than 12 books read per year), this share rises to 69%. More than 50% of Italian readers state their book selection process is the effect of word-of-mouth, while 16% and 12% are mostly influenced by booksellers and book reviews respectively.

As in all creative industries characterized by strong social influences and sequential discovery of quality (Caves, 2000) - like the film or performing arts industries - the demand for new books can never be known a priori (the famous *nobody knows* principle), but it evolves dynamically over time according to decentralized information processes. The *New York Times'* columnist Martin Arnold has admirably summarized this feature of the publishing business, by noting that “[...] *those who say there are no absolutes in the gamble that is book publishing are almost right. Actually, there is one. Ultimately the success of a novel depends on that mystical force called word of mouth*” (quoted in Beck, 2007). In turn, the supply has to adjust accordingly to meet a continuously evolving demand. The evolution of the system gives rise to a market characterized by complex dynamics, in which a new-entry bestseller selling 100,000 copies in a month cohabits with a poetry book selling a few copies a year, and all of them are sold at roughly the same final price.

In addition to the social dimension affecting consumption, a book is a typical experience good, whose value can be fully recognized only once it is consumed. Furthermore, the cost structure of a creative process leading to a published result exhibits initial high fixed costs, while the marginal cost of production, that is the cost of producing copies from the original and of distributing them, is generally very low.

Unlike other cultural goods (i.e., radio broadcasting or historic monuments), however, books are rival and excludable, so that the probability of observing market failures should be ruled out almost by definition. As a result, from an industrial

organization perspective, the book publishing industry is customarily seen as a monopolistic competitive market, which works properly, through a traditional supply chain composed of production, wholesale, distribution and retail (Allen and Curwen, 1991). Far from suggesting that problems of signal extraction on the unknown quality of a title could add to the complexity of the book business, the consensus view explicitly maintains that “[...] *author reputation, book reviews, book clubs and word-of-mouth create a fair amount of transparency. [...] The characteristics of book markets are not that different from many other markets*” (Canoy *et al.*, 2006).

Moving from these premises, in this paper we aim to shed some light on the role played by peer-to-peer influences among heterogeneous buyers on book sales, by empirically exploring some of the leading features of the demand for books in Italy. Instead of resorting to structural econometric estimates from a reduced form equation, we prefer to focus directly on the distributional characteristics of the data. The key argument of the research methodology we employ is that alternative assumptions on the decision-making process adopted by prospective buyers should lead to distinct invariant (i.e., long run) distributions of sales among all the books available on the market. Conversely, the emergence of certain regularities in the way the data are distributed should allow us to discriminate among alternative models of consumption behavior, or on the plausibility of their underlying assumptions.

Summing up our main results, we find that the Power Law (or Pareto) distribution with infinite variance represents a reasonable statistical model for fitting the right tail of book sales distribution for each of three broad categories into which the book publishing industry can be classified, i.e. Italian novels, foreign novels and non-fiction. This result, which may be naturally interpreted in terms of the invariant distributional outcome of an information contagion model, suggests that books are extremely risky products and that word-of-mouth is likely to add to this uncertainty, rather than help reduce it. Furthermore, we find that the scaling exponents characterizing sales distributions evolve in a cyclical fashion over time, denoting the possibility of interesting interactions between new releases, the transmission of peer-to-peer information and seasonal effects.

The paper is organized as follows. Section 2 provides an overview of the book publishing industry, with a special focus on Italy. Section 3 introduces some theoretical and empirical issues regarding book demand distribution, and discusses a simple choice-theoretic model aimed at capturing its main empirical characteristics. Section 4 reports our empirical results, obtained exploiting a bi-monthly data-set for books sold in Italy over the period 1994-96. Finally, Section 5 concludes.

## 2. The book publishing industry in Italy

While in the economic literature a description of the key features of the books market has been provided for several countries, see e.g. U.S. (Szenberg M. and E. Youngkoo Lee, 1994; Greco, 2000), Denmark (Hjorth-Andersen (2000) and U.K. (Allen and Curwen, 1991), far less attention has been devoted so far to Italy. Since our empirical analysis is based on Italian data, it seems worthwhile to motivate our analysis and to briefly summarize the economics of the book publishing industry by reporting some descriptive statistics for Italy. Further details on the size and characteristics of the market for books in Italy can be found e.g. in AIE (2005).

In spite of being extremely popular and its core business being well established, the book publishing industry across industrialized countries, and therefore in Italy as well, is not very large in absolute terms. In 2003, the value of total shipments (books, CD-Rom, collection editions and exports) by Italian producers was around €3.5 billion. In that same year, about 4,000 editors issued 55,000 book titles, of which around 70% were new editions. The total number of printed copies was 254 million, added to which are around 77 million copies (referring to 1659 titles) sold along with newspapers or magazines.

17.6 million people (aged 14 years and over) stated having bought at least one book during the previous year, while 23 million (over 6 year-olds) claimed to have read at least one book (other than school-books) accounting for 41.4% of the Italian population, 60% of whom were women. The number of frequent readers (at least one book per month) is much lower, however, just 2.8 million. The reading-ratio for metropolitan areas is 47%, decreasing to 40% for cities with less than 50,000 inhabitants, suggesting that people living in denser places have a greater probability of being a reader. On average, individuals spend € 44 a year on books (including school and university textbooks). However, given that a mere 13% of Italian households account for 51% of books sold, central tendencies could be misleading.

Most publishers segment their market by making books available in hardcover and paperback versions at different prices. In terms of titles, 23% of the volumes available at bookstores and other shops (like supermarkets) in 2003 were priced less than €7.75, while an additional 17% cost less than €15.50. In terms of printed copies, 67% of the total has an end-sales price lower than €15.50. The weighted average price charged for new books was €18.52.

The publishing industry is notoriously highly concentrated in terms of market shares of both publishing firms and book titles. Just 220 publishers issued more than 50 titles in 2003; four large publishing groups (Mondadori, Rizzoli, De Agostini, Messaggerie Italiane), plus 50 medium size publishers covered around 90% of the entire market, measured by total book sales. As far as the market shares of book titles is concerned, it suffices to note that in 2003 the average edition for books was 4,800 copies, slightly lower than the mean value registered in the 1990s (6,000). During the same period, however, *The DaVinci Code* by Dan Brown and *Harry Potter and Order of the Phoenix* by Joan Rowlings sold more than 500,000 copies each. Just to give an idea, assuming that the first 10 bestsellers sell 100,000 copies each at the weighted average price of €18.52, the C10 concentration index for products is equal to a staggering 65% of the total market for books. This back-of-the-envelope calculation provides figures in line with the international experience. Data reported for the U.S. market in Becker (1991) for instance, reveal that for a representative publisher the coefficient of variation in total sales from its two-year old catalogue exceeds 129% for hardcover fiction and 177% for non-fiction books, respectively.

The book publishing industry is therefore dominated by extreme events and the *nobody knows* principle, a fate shared with other industries for which social influences on individual demands matter a lot and the *ex-ante* uncertainty on the success or failure of new products is so high that it cannot be reliably estimated, like in the film or the pharmaceutical industries. New book titles are inherently risky products: what makes a book successful is in general the number of readers during the first two or three months, which in turn depends on the composite interaction of advertising and fortuitous events triggering chain reactions resulting in best-sellers or flops, generally following hump-shaped sales patterns (Beck, 2007). Bandwagon effects and/or information cascades derive from a complex stochastic process that can go anywhere, implying a time-increasing variance of the process. For consumers, the importance of prior information about the quality of a book is even more important than, say, knowing the film-goers point of view, as books are not only expensive but also and above all time consuming. Moreover, unlike films (if we exclude VHSs and DVDs) books are durable goods.

These facts form the core of several contractual arrangements aimed at minimizing risk. New authors are usually asked by a publisher to sign a contract which includes a "first refusal" clause that guarantees the latter the right to decide whether or not to edit the manuscript, by submitting it to a refereeing process. After the author has successfully published his first manuscript, he in turn is generally offered a long-term

exclusive contract, implying that he will offer the publisher right of first refusal for any subsequent manuscripts under the implicit assumption that reputation positively influences sales. As demand cannot effectively be forecast for any particular piece of work, royalties are established on the basis of a fixed end price. Fixed end pricing also allows for cross-subsidization of a large number of less successful projects by a few, but unknown *ex-ante*, more successful ones due to positive bandwagon effects. In addition, van der Ploeg (2004) suggests that fix-price agreements result in a greater variety of titles being published even in the absence of cross-subsidization, though at the cost of lower sales of each title due to monopolistic pricing. These contractual practices underline the “*winner-take-all*” nature of the book industry: many books cause losses for publishers, but a few of them reap substantial profits enabling to offset the major losses incurred on unsuccessful books.

In summary, revenues in the publishing industry are dominated, and the profits generated, by a few bestsellers in the thick upper tail of the sales distribution. This is why any publisher’s attempt to reduce the fundamental uncertainty surrounding the sector (by hiring highly reputed writers, publishing sequels, investing in advertising, and so on) is likely to fail. Information cascades drive the consumers’ selection process implying a variance much higher (potentially infinite) than what we would expect if the business were Gaussian, with almost unpredictable word-of-mouth selection processes and an expected value of sales with no attraction power.

One crucial issue is therefore empirically modelling the dynamics of demand, in order to determine whether some useful regularities may be detected that aid modelling of the forces at work in this market.

### 3. Empirical and theoretical issues

The property of non-predictability of final demand for cultural goods implies that *ex-ante* knowledge of buyers’ preferences and the intrinsic merit of artistic works may not suffice to predict the final market configuration. The complex interaction of sequential discovery of quality through word-of-mouth, reputation effects, advertising and publishers’ distribution strategies implicates that the selection among several alternative outcomes and the speed of convergence towards them are driven by the accumulation of many random historical events. Among them, spreading information on quality by early buyers is predominant. Therefore, social interactions must be taken into account if we aim to properly understand the book publishing industry.



### 3.1 Distributional analysis

The empirical detection of social interactions in markets is well-known to be affected by several identification issues emerging from the so-called *reflection problem* (Manski, 1993). In a nutshell, whenever the propensity of an agent to behave in some way varies positively with the mean behavior in a reference group, observations of market outcomes do not allow the researcher to assess whether individual behavior conforms to mean behavior, or group behavior simply reflects the aggregate behavior of isolated individuals. While several identification procedures have been successfully proposed (Brock and Durlauf, 2000; Manski, 1997), all of them rely on the availability of micro data or spatially organized observations for the same phenomenon (Glaeser and Scheinkman, 2001). Alas, given the data available none of these strategies are applicable.

In this paper we follow an alternative route in an attempt to empirically detect social interactions, i.e. by treating book sales as stochastic dynamic processes driven by information transmission, and studying the distributional features of the statistical attractors towards which these dynamic processes converge (DeVany and Walls, 1996). We start by recognizing that the existence of a few bestsellers among a large population of books selling a very limited amount of copies should imply a book sales distribution characterized by a positive support and a very long and heavy right tail. In principle, the exact profile of this tail should convey information on the stochastic process generating it, as different models lead to different testable predictions on how *large* observations relate to the bulk of the distribution.

In order to assess the legitimacy of our working hypothesis, the first step consists in performing a preliminary analysis based on a representational technique traditionally employed in *hard sciences* like physics, the so-called Zipf plot, consisting in plotting the log of the rank versus the log of the variable being analyzed (Stanley *et al.*, 1995). Briefly, suppose that we observe  $M$  realizations  $(s_1, \dots, s_M)$  of a non-negative random variable  $S$ , whose cumulative distribution function is  $F(s)$ . If we rank the data from the largest to the smallest, the index  $i$  being the rank of  $s_i$ , we obtain:

$$\ln i = \ln[1 - F(s_i)] + \ln M . \quad (1)$$

The rank-size relation is extremely useful as it accentuates the tails of the distribution. In particular, while the typical shape of many well-known fat-tail distributions, like the lognormal or Weibull distributions, is typically downward

bending if plotted in a log-log plot, the appearance of a linear rank-size relationship in double-logarithmic paper can be immediately read as the sign of a power law distribution. The power law distribution corresponds to the asymptotic limit of the Pareto distribution:

$$\Pr[S \geq s] = \left( \frac{s}{s_0} \right)^{-\alpha} \quad (2)$$

where  $s_0$  is lower threshold ( $S \geq s_0$ ) and  $\alpha > 0$ . Provided that  $[1 - F(s)] \sim s^{-\alpha}$ , where  $f(x) \sim g(x)$  denotes that the limit of their ratio goes to 1 as  $x$  grows large, the double logarithmic plot of sales versus rank appears as a straight line with slope  $-\alpha$ . It follows that in a power law distribution the tails fall to the power  $\alpha$ , which leads to much heavier tails than other models commonly used to describe how demand distributes in monopolistically competitive markets, such as Gaussian or exponential distributions. Roughly speaking, if the data on book sales are power law distributed, the average value of total revenues and profits are dominated by a few bestsellers. Furthermore, as discussed below, Paretian behaviors are generally due to stochastic processes in which all possible outcomes are equally likely ex-ante, i.e. the statistical translation of the *nobody knows* principle. As a result, the book publishing business is an extremely risky one, much riskier than predicted by publishers' conventional wisdom.

Figure 1 shows a representative sample of Zipf plots of book sales distributions in Italy, randomly selected from a data-set for bi-monthly sales in bookstores during the period 1994-96. Each point represents (the log of) a rank-size pair, where size refers to the total number of copies sold by a book title over a two month time window. More details on the data will be provided in Section 4. Note that in all cases of Figure 1 a linear relationship appears. More importantly, as we will show in more detail in Section 4, the same feature regularly emerges in our data-set, suggesting that a power law behavior seems to be pervasive in the demand for books in Italy. As shown in Section 4, all estimates yields  $\alpha < 2$  exhibiting an excellent goodness of fit to a linear relationship.

-----  
 Figure 1 about here  
 -----

The relevance of the Pareto distribution (2) can be immediately acknowledged by noting that a Paretian tail behavior with  $\alpha < 2$  is a distinguishing attribute of a family of distributions known as Lévy-stable (Lévy, 1925). In particular, the Generalized Central Limit Theorem (Gnedenko and Kolmogorov, 1954) states that the only possible limiting distribution for sums of independent and identically distributed random variables is a Lévy-stable distribution. The Gaussian distribution is just a special case of the above, obtained by imposing that each of the constituent random variables has finite variance.

### 3.2 Theory

Our theoretical benchmark is given by a simple extension of the *information contagion* model by Arthur and Lane (1993). A large (possibly infinite) number of agents  $i = 1, 2, \dots$ , are arranged along a line, the order of which is exogenously fixed and known to all. Agents enter sequentially into the books market, where they can choose one among a continuously increasing number of alternative book titles  $m = 1, 2, \dots$ , according to their internal representations – expressed in terms of probability distributions – of the characteristics or *quality* of books.

The true intrinsic cultural merit of a book,  $q_m$ , can be fully assessed only after the book itself has been read (experience good). However, purchasers can exploit all the available prior information to form an opinion about its worthiness. In particular, the quality of the generic book  $m$  may be gauged by means of public information on its performance characteristics, which takes the form of a normal prior probability distribution  $N_m \sim N(\mu_m, \sigma_m^2)$ . One can think of public information as advertising by the publisher as the book comes onto the market, or publicly available reviews published in newspapers or magazines. Furthermore, an agent can collect information by randomly sampling  $n \leq Z$  among the people who preceded him in the row, asking them about the quality of the book they read. The signal  $i$  obtains from each of the  $n_m$

people who bought the book  $m$ , with  $\sum_{m=1}^M n_m = n$  and  $M$  the total number of books already issued as the agent  $i$  enters the market, is:

$$X_m = q_m + \varepsilon \tag{4}$$

where  $\varepsilon$  is a random observational error, with  $\varepsilon \sim N(0, \sigma_{ob}^2)$ .

As the  $i^{\text{th}}$  consumer enters the market, he has probability  $p$  of choosing a brand new title ( $M+1$ ), on which no personal experience can be collected, while with probability  $(1 - p)$  he can switch to one of the old titles  $m \in (1, M)$ . In this latter case, the agent  $i$  processes all the information he has collected to obtain a posterior distribution of qualities. Such processing is performed by taking the convolution of the Gaussian integrals corresponding to the prior and to the information collected by other purchasers. The average expected posterior utility is then:

$$\mu_{post,m} = \frac{1}{n_m + \alpha_m} [n_m \mu_m^* + \alpha_m n_m]. \quad (5)$$

Thus, the posterior mean signal represents an average of different polled opinions, with a weighting factor that is inversely proportional to the variance of the distributions:

$$\alpha_m = \frac{\sigma_{ob}^2}{\sigma_m^2}. \quad (6)$$

If the new book is effectively chosen and the consumer has experienced its quality, in the following period it is treated as an old book.

Each consumer is endowed with a constant absolute risk aversion utility function defined on the internal representations associated to the quality of the  $M$  issued books:

$$u(\mu_m) = \begin{cases} -\exp(-2\lambda\mu_m) & \text{if } \lambda > 0 \\ \mu_m & \text{if } \lambda = 0 \end{cases} \quad (7)$$

so that the objective function of the  $i^{\text{th}}$  agent is to maximize a linear function of the mean and the variance of the posterior probability associated to the quality of the book  $m$ :<sup>1</sup>

$$u_m = \frac{1}{n_m + \alpha_m} (n_m \mu_m^* + \alpha_m n_m - \lambda \sigma_{ob}^2) \quad (8)$$

---

<sup>1</sup> See for example Sargent (1987, pp.154-155).

where the constant  $\lambda$  measures the degree of risk aversion: the larger  $\lambda$ , the more risk averse the agent is. Upon computing  $u_m$  for each book in  $(1, M)$ , consumers choose the book with the highest expected utility.

The long-run dynamical properties of the choice-theoretic model (8) can be characterized in terms of Markovian processes. Let us assume that the sampling procedure is with replacement, and define

$$T_j^m = \begin{cases} 1 & \text{if the } j^{\text{th}} \text{ purchase is } m \\ 0 & \text{otherwise} \end{cases} \quad \text{for } j = 1, 2, \dots$$

and

$$s_m(j) = \sum_{k=1}^j T_k^m .$$

Thus, making use of Lemma 4.1 in Arthur and Lane (1993), we introduce the conditional probability:

$$P\left[T_{n+1}^m = 1 \mid T_1^m, \dots, T_n^m\right] = f\left(\frac{s_m(n)}{n}\right) \quad (9)$$

where  $f$  is a polynomial of degree at most  $Z$ , whose coefficients depend on  $n$ ,  $\lambda$  and  $\mu_m$ ,  $\mu_m^*$  and  $\sigma_m$  for  $m = 1, \dots, M$ . In other terms, the probability of a new purchase of the book  $m$  depends only on its current proportion. This implies that the process for a consumer who has switched to buying old books with probability  $(1 - p)$  possesses an associated *urn function* (Arthur *et al.*, 1987)

$$f(x_m) = P\left[T_{n+1}^m = 1 \mid \frac{s_m(n)}{n} = x_m\right] \quad (10)$$

and that the whole choice sequence with a fixed positive probability  $p$  of choosing a brand new book each time a consumer enters the row is equivalent to an infinite Polya process, that is one in which the number of bins can grow without bound.

The urn function turns out to be a complicated polynomial, whose coefficients depend on the model parameters and the sampling mechanism. Unfortunately, analytical solutions can be obtained explicitly for special combinations of parameters only. Nevertheless, Chung *et al.* (2003) prove that the limiting occupancy-rate distribution for an infinite Polya urn belongs to just one of three broadly defined classes. In particular, as we let the probability of a new ball being placed in an existing urn (in our case, a new customer purchases an incumbent book) be proportional to  $s_m^\gamma$ , with the parameter  $\gamma \in \mathbf{R}$ , Theorems 3.1, 4.1 and 4.2 in Chung *et al.* (2003) state that:

- i) if  $\gamma > 1$ , one bin dominates;
- ii) if  $\gamma = 1$ , the limit probability distribution function associated to the random vector  $(s_1, \dots, s_M)$  satisfies:

$$P[S_m = s_m] \propto c s_m^{-(1+\alpha)} \quad (11)$$

that is a power law distribution with  $\alpha = \frac{1}{1-p}$ , and  $c$  is a constant;

- iii) if  $-\infty < \gamma < 1$ , the distribution of bin sizes decreases exponentially under rather mild conditions.

The three conditions correspond to different models of information transmission among peers. While the degenerate sales distribution of point i) emerges from a preferential attachment scheme with positive feedback, the presence of power law or exponential tails can be immediately interpreted in terms of linear interaction between buyers or of negative feedback due to congestion effects, respectively. The shape of the invariant market-share distribution, in particular along its tails, returns information useful for making inferences on the underlying interaction mechanism.

This model helps to put on firmer choice-theoretic foundations the notion of *returns to information*, which has recently gained momentum in the empirical analysis of cultural markets (Walls, 1997; Maddison, 2005; Giles, 2007). In this literature, increasing returns to information - i.e., evidence of concavity in Zipf's plots due to autocorrelation in growth rates - are generally interpreted as a signature of *informational cascades* (Bikhchandani *et al.*, 1992), that is situations where it is optimal for agents choosing sequentially to ignore their own preferences and imitate the actions of the agents ahead of them. Our model suggests that when we replace the assumption of agents imitating the actions of others with that of agents exchanging information on

the quality of the items, increasing returns to information should have far more drastic consequences than the mere appearance of concavity in Zipf's plots: they should lead instead to a degenerate asymptotic distribution, that is one superstar whose market share approaches 1. De Vany and Lee (2001) use agent-based simulations to reach exactly the same result. It turns out that the mechanism through which private information is transmitted from peer to peer – that is, whether it is passed through the observation of the action of others or through word-of-mouth – is crucial in making indirect inference on the degree of returns to information.

## 4. Data description and estimation results

The empirical analysis contained in this paper is based on proprietary data (Source: Demoskopoea) on books' sales, organized as bi-monthly samples of unitary prices and number of volumes sold in Italy between January 1994 through December 1996. For each year we only have five bi-monthly samples only, given that during the traditional summer holiday period (July-August) data are not collected.<sup>2</sup> As a result, we can examine 15 book sales distributions (sub-samples) separately, as well as track their evolution over time. The dataset includes only books which succeeded in selling more than 600 copies in each two-month window. This means that only the upper tail of the whole book sales distribution is considered ( $s_0 = 600$ ), and that the total number of titles in the tails is allowed to change period by period. Finally, individual observations refer exclusively to sales by traditional retailers. This is not likely to seriously affect the generality of our results, as non-traditional distributive channels (e.g., virtual bookshops or book clubs) were not very important during the sampled period. Incidentally, this continues to remain true for Italy even in more recent years, as Internet and book clubs sales are estimated to represent 1-1.5 and 4 percent of the whole market, respectively (Canoy *et al.*, 2006).

From an industrial organization perspective, the relevant market for differentiated goods is the one composed of products that are close demand or supply substitutes. In the case of books, close substitutability occurs among titles sharing the same artistic canons. In order to preserve a sufficient number of observations, we choose the

---

<sup>2</sup> As pointed out by a referee, the lack of data for a period in which the demand is likely to be particularly high due to more spare time available to customers could bias our analysis, especially as regards the apparent seasonality of the scaling exponent  $\alpha$ . This argument clearly reinforces the need to take our conclusions cautiously.

broadest possible definition of monopolistically competitive markets for books, classifying data into three very general genres: Italian novels, foreign novels and non-fiction. Foreign titles are systematically translated into Italian, as in Italy the demand for foreign language books is so negligible to be considered null. As the most successful books and long-sellers are sometimes published in different editions (hardcover and paperback) and issued by several publishers (under multiple-license contracts), we pool multiple entries of the same title.

The final dataset includes a total of 4510 books written by 2294 authors. In particular, 1116 authors of 1685 non fiction books (with a minimum of 1 to a maximum of 28 books per author), 354 Italian novelists producing 764 novels (from 1 to 27 books per author) and 824 foreign novelists producing 2061 books (from 1 to 46 books per authors). The sample contains one the most successful Italian novels of the last thirty years, *Va dove ti Porta il Cuore* by Susanna Tamaro. Stephen King is the foreign novelist with the highest number of books translated, Isabel Allende is the most sold writer, while Ken Follett is the foreign author with the highest revenues. Unsurprisingly, an analysis of books by authors shows that the most successful authors are also the most prolific ones.

We estimate the power law characteristic parameter  $\alpha$  in the linear regression model:

$$\text{Log}(i) = \beta - \alpha \text{Log}(s_i) + u \quad (12)$$

resorting to three alternative methods: 1) Robust (White heteroskedasticity adjusted) Ordinary Least Squares; 2) Hamilton robust regression (Hamilton 1991); 3) Quantile (median) regression.<sup>3</sup> Table 1 gives the estimated values of the coefficient  $\alpha$  for the upper tail of the book sales distribution in terms of number of copies sold for the three segments of the market, for each period considered. All three methods seem to provide results that incorporate the same information.

Point estimates suggest that the values of  $\alpha$  are always significantly different from 2 and, therefore, the estimated degree of uncertainty in the book publishing market is too high to be compatible with a Gaussian distribution. Recall that the lower the estimated  $\alpha$ , the heavier the right tail of the empirical distribution, with the mean acting less and

---

<sup>3</sup> Other possible methods are the Huber regression that refers to a bounded influence regression where observations are reweighed using criteria suggested by Huber (1964) and Mosteller and Tukey (1977); and the Trimmed least squares, which corresponds to a least squares method applied to the central deciles of the data.



less as an attractor of the expected value. Revenues, and therefore profits, are largely dependent on a few extreme events which can hardly be anticipated. Even if all segments are characterized by infinite variance, the degree of uncertainty can nevertheless be ranked in terms of the relative value registered by the characteristic exponent  $\alpha$ . From this viewpoint, the novel segment (in particular, Italian novels) turns out to be riskier than non-fiction. This result holds true irrespective of the method used in estimations.

**Table 1.** Estimates of the scaling exponent  $\alpha$  for all three markets. *a*: White's robust OLS estimates; *b*: robust regression estimates (Hamilton); *c*: median regression estimates. All parameters statistically significant at the 5% level. The goodness of fit  $R^2$  is higher than 0.94 in each case.

Sample	Italian novels			Foreign novels			Non-fiction		
	<i>a</i>	<i>b</i>	<i>c</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>a</i>	<i>b</i>	<i>c</i>
94.1	1.39	1.12	1.31	1.38	1.34	1.36	1.32	1.25	1.27
94.2	1.33	1.14	1.18	1.34	1.23	1.27	1.33	1.32	1.33
94.3	1.21	1.05	1.09	1.51	1.46	1.46	1.37	1.29	1.32
94.5	1.04	1.15	1.12	1.33	1.42	1.41	1.13	1.26	1.23
94.6	0.95	0.99	0.98	1.11	1.09	1.09	1.01	1.07	1.09
95.1	1.07	1.06	1.06	1.2	1.2	1.21	1.35	1.31	1.34
95.2	1.17	1.18	1.16	1.19	1.16	1.18	1.29	1.26	1.27
95.3	1.18	1.05	1.12	1.28	1.25	1.26	1.39	1.1	1.16
95.5	1.06	1.03	1.06	1.07	1.07	1.06	1.16	1.14	1.16
95.6	1.01	0.93	0.95	0.91	1.02	1.04	1.11	1.06	1.08
96.1	1.13	1.13	1.12	1.12	1.03	1.06	1.4	1.26	1.31
96.2	1.2	1.19	1.18	1.15	1.03	1.05	1.44	1.28	1.33
96.3	1.26	1.14	1.18	1.19	1.14	1.17	1.45	1.53	1.5
96.5	1.15	1.12	1.12	1.2	1.09	1.11	1.3	1.25	1.26
96.6	0.98	0.89	0.91	1.1	1	1.07	1.09	0.97	1.01

It is worthwhile noting that the estimated  $\alpha$ s vary significantly over time, following a seasonal pattern: during Christmas time sales increase and seem to concentrate on a few book titles in each market segment, making the business – if possible – even more risky. These seasonal effects are so strong as to threaten the existence of a mean value (see e.g. the Italian novel Nov.-Dec. samples for 1994, 1995 and 1996).

As we aggregate sales according to the total number of copies sold by each author (i.e., by pooling all his/her titles present in the list of most-sold books during a certain period), several considerations lead us to predict a higher market concentration (i.e., a lower  $\alpha$ ). First, bestseller writers are also the most prolific ones, so their books have a greater probability of being on the market at any point in time, *ceteris paribus*. Second, only titles which have proven to be a hit abroad are translated into Italian. Third, as a newly issued title by a star-writer reaches a top position in the sales rank, sales of previous books by that same author tend to increase as well due to bandwagon and reputation effects. Combining the three phenomena, we expect the author effect to be particularly strong for the novel sub-market and relatively weaker for non-fiction, as the specialization of the subjects dealt with in non-fiction makes superstar effects less likely.

The empirical evidence shown in Figure 2, where we compare the estimated  $\alpha$ s for writers and books, seems to somehow support our a-priori expectations. It appears that the time series of the estimated  $\alpha$ s for authors is systematically lower than that for books, meaning that the author effect is present in all sub-markets. Furthermore the scaling exponents calculated for novelists are in general lower than for non-fiction writers. The uncertainty in the life cycle of writers (particularly novelists) is greater than the uncertainty surrounding the life-cycle of their books; focusing a catalogue on novelists, in turn, is more risky than publishing non-fiction writers.

This effect is confirmed when we compare scaling parameter estimates for book and author revenues, as shown in Table 2. Furthermore, Table 2 also gives estimates of the scaling parameters calculated for the top 10% samples, given that theoretical arguments suggest that only for very large observations is the true tail behaviour detected, as traditional estimates based on least squares regressions are sample-size sensitive (Borak *et al.*, 2005). Results for the whole distribution are always smaller in absolute value than for the upper 10% tail, suggesting that predictions on the entire distribution (or larger tails) are systematically biased. However, even if sales on the far-right tails (i.e., bestsellers only) seems to be less concentrated, the theoretical variance is still infinite and the book market, characterized by *wild* fluctuations, proves to be extremely risky.

Similar results hold also for other creative industries. De Vany and Walls (2004), for example, report estimates of  $\alpha$  in the range 1.3 to 1.7 for motion picture box office revenues in the U.S. and many other countries, but the value of scaling parameter shrinks to 0.4 when revenues of actors in their artistic lifetime are considered. By the same token, Rock&Roll performers are characterized by a more hazardous line of

business (artists' concert revenues in the U.S. are power law distributed with  $\alpha = 0.45$ ) than their promoters ( $\alpha = 0.55$ ), who play the same role as publishers in the book industry (Connolly and Krueger, 2006). From this standpoint, the good news emerging from our paper is that the career of a typical writer seems to be less risky than that of rock stars or actors, although uncertainty regarding success is still so high as to be practically impossible to safely guess.

-----  
Figure 2 about here  
-----

**Table 2.** Full sample and top 10% estimates of total sales, revenues and sales by authors. *a*: White's robust OLS estimates; *b*: robust regression estimates (Hamilton); *c*: median regression estimates.

	Italian novels, Quantity, Titles			Foreign novels, Quantity, Titles			Non-fiction, Quantity, Titles				
	<i>a</i>	<i>b</i>	<i>c</i>		<i>a</i>	<i>b</i>	<i>c</i>		<i>a</i>	<i>b</i>	<i>c</i>
Total	0.75	0.61	0.64	Total	0.82	0.73	0.73	Total	0.96	0.73	0.84
10%	1.39	1.42	1.21	10%	1.32	1.17	1.08	10%	1.4	1.25	1.21
	Italian novels, Revenues, Titles			Foreign novels, Revenues, Titles			Non-fiction, Revenues, Titles				
	<i>a</i>	<i>b</i>	<i>c</i>		<i>a</i>	<i>b</i>	<i>c</i>		<i>a</i>	<i>b</i>	<i>c</i>
Total	0.62	0.54	0.59	Total	0.6	0.62	0.59	Total	0.68	0.67	0.67
10%	1.24	1.27	1.15	10%	1.25	1.14	0.95	10%	1.4	1.33	1.27
	Italian novels, Quantity, Authors			Foreign novels, Quantity, Authors			Non-fiction, Quantity, Authors				
	<i>a</i>	<i>b</i>	<i>c</i>		<i>a</i>	<i>b</i>	<i>c</i>		<i>a</i>	<i>b</i>	<i>c</i>
Total	0.65	0.53	0.55	Total	0.67	0.55	0.58	total	0.82	0.72	0.74
10%	1.09	0.97	0.82	10%	1.05	0.86	0.83	10%	1.36	1.36	1.26
	Italian novels, Revenues, Authors			Foreign novels, Revenues, Authors			Non-fiction, Revenues, Authors				
	<i>a</i>	<i>b</i>	<i>c</i>		<i>a</i>	<i>b</i>	<i>c</i>		<i>a</i>	<i>b</i>	<i>c</i>
Total	0.59	0.52	0.54	Total	0.58	0.5	0.52	Total	1.37	1.44	1.41
10%	1.07	0.94	0.9	10%	0.99	0.79	0.78	10%	0.71	0.69	0.81

As a final empirical exercise, in Table 3 we compare the average of the  $\alpha$ s for quantities estimated through all bimesters, to the one obtained by pooling all data for each submarket over the whole 1994-1996 period. It turns out that the pooled estimate is smaller than the average of bi-monthly observations, a result due to the correlation among successes and failures - captured by the pooled estimate, but not by the average over bi-monthly estimates - driven by the demand dynamics selection process. This is precisely what one should expect when dealing with a Lévy-stable industry. Conditional on having to sell a certain number of copies in the past, the expected sales of a book continues to increase with current sales, and this continues as more copies are sold. In other terms, a success or a failure can protract over time, making a success more successful and a failure a greater flop.

**Table 3.** Average estimates *vs.* pooled estimates

Italian novels			
	OLS	Rreg	MedR
$\alpha$	0.77	0.56	0.65
Average $\alpha$	1.142	1.078	1.1027
Foreign novels			
	OLS	Rreg	MedR
$\alpha$	0.85	0.73	0.76
Average $\alpha$	1.2053	1.1687	1.1867
Non-fiction			
	OLS	Rreg	MedR
$\alpha$	0.97	0.75	0.85
Average $\alpha$	1.276	1.2233	1.244

## 5. Conclusions

The book publishing industry lends itself well to exploring the nexus between the way private information is transmitted from peer to peer and final market outcomes. The demand for a book develops sequentially as readers discover whether they like it or not, and relate their experience to other potential readers. The dynamic disclosure of preferences can generate both hits and flops through the information bandwagon, although nobody knows *ex-ante* what makes a hit or a flop, or when it will happen. In spite of the extreme uncertainty surrounding the fate of a single book title, some regularities at the market level can however be usefully detected and exploited. In this

paper we offer a simple model of information transmission and Bayesian updating which shows how alternative invariant (i.e., steady-state) market share distributions can be derived from assumptions about the degree of returns to information in markets characterized by word-of-mouth. In particular, if agents are allowed to communicate directly about the quality of an item, increasing returns to information ( $\gamma > 1$ ) implies a long-run degenerate demand distribution, with one superstar approaching a market share of 1. If the flow of information on the quality of the book exhibits constant returns ( $\gamma = 1$ ), in turn, demand distributes itself among items according to a Pareto distribution. Finally, an exponential distribution emerges in the long-run when the transmission of information is bounded by decreasing returns ( $\gamma < 1$ ).

These results are applied to a dataset concerning sales in a representative sample of Italian bookshops from 1994 to 1996. We invariably find that the demand distribution is Pareto, with a characteristic exponent ranging between 0.9 and 1.5. Since we do not find any significant departure from the Pareto law towards a degenerate distribution or an exponential distribution, we conclude that the information transmission in the Italian market for books is likely to be characterized by constant returns. The dynamics of the book demand distribution supports the *nobody knows*, the *winner takes all* and the *success breeds success* principles, all of them features that the publishing industry shares with other creative industries (DeVany and Walls, 1996, 1999, 2004). Furthermore, the degree of uncertainty surrounding the market for books follows a seasonal patterns, Christmas being the most risky period of the year.

Two possible extensions of the analysis have been conceived but left for future research. First, alternative estimation methodologies will be employed to check for the robustness of our results. Second, we will make use of data on demand to check for the presence of economies of scale for publishers, along the lines developed in Sornette (2002).

## References

- Allen, W. and Curwen P. (1991), *Competition and Choice in the Publishing Industry*. London, Institute for Economic Affairs.
- Associazione Italiana Editori (2005), *Rapporto sullo Stato dell'Editoria in Italia - 2005*. Milan, AIE.
- Arthur, B. and D. Lane (1993), Information contagion, *Structural Change and Economic Dynamics*, **4**:81-104.
- Arthur, B., Ermoliev, Y. and Y. Kaniovski (1987), Path-dependent processes and the emergence of macro-structure, *European Journal of Operational Research*, **30**:294-303.
- Beck, J. (2007), The sales effect of word of mouth: a model for creative goods and estimates for novels, *Journal of Cultural Economics*, **31**:5-23.
- Becker, G. (1991), A note on restaurant pricing and other examples of social influences on prices, *Journal of Political Economy*, **99**:1109-1116.
- Bikhchandani, S., Hirshleifer, D. and I. Welch (1992), A theory of fads, fashion, custom, and cultural change as informational cascades, *Journal of Political Economy*, **100**:992-1026.
- Borak, S., W. Hardle, and R. Weran (2005), Stable distributions, *SFB 649, Discussion Paper 2005-008*.
- Brock, W. and S. Durlauf (2000), Interactions-based models, in Heckman, J. and E. Leamer (eds), *Handbook of Econometrics*, Vol.5. Amsterdam, North-Holland.
- Canoy, M., van Ours, J. and F. van der Ploeg (2006), The economics of books, in Ginsburgh, V. and D. Thorsby (eds), *Handbook of the Economics of Art and Culture*. Amsterdam, North-Holland.
- Caves, R. (2000), *Creative Industries*. Cambridge, Harvard University Press.
- Chung, F., Handjani, S. and D. Jungreis (2003), Generalizations of Polya's urn problem, *Annals of Combinatorics*, **7**:141-153.
- Connolly, M. and D. Krueger (2006), Rockonomics: the economics of popular music, in Ginsburgh, V. and D. Thorsby (eds), *Handbook of the Economics of Art and Culture*. Amsterdam, North-Holland.
- De Vany, A. and C. Lee (2001), Quality signals in information cascades and the dynamics of the distribution of motion picture box office revenues, *Journal of Economic Dynamics and Control*, **25**:593-614.
- De Vany, A. and D. Walls (1996), Bose-Einstein dynamics and adaptive contracting in the motion picture industry, *Economic Journal*, **106**:1493-1514.

- DeVany, A. and Walls W.D. (1999), Uncertainty in the movie industry: Does star power reduce the terror of the box office? *Journal of Cultural Economics*, **23**:285-318.
- De Vany, A. and D. Walls (2004), Motion picture profit, the stable Paretian hypothesis, and the curse of the superstar, *Journal of Economic Dynamics and Control*, **28**:1035-1057.
- Giles, D. (2007), Increasing returns to information in the US popular music industry, *Applied Economics Letters*, **14**:327-331.
- Glaeser, E. and J. Scheinkman (2001), Measuring social interactions, in Durlauf S. and P. Young (eds), *Social Dynamics*. Washington, Brookings Institution Press.
- Greco, A. (2000), Market concentration levels in the U.S. consumer book industry: 1995-1996, *Journal of Cultural Economics*, **24**:321-336.
- Gnedenko, B. and A. Kolmogorov (1954), *Limit Distributions for Sums of Independent Random Variables*. Reading, Addison-Wesley.
- Hamilton, L. (1991), How robust is robust regression?, *Stata Technical Bulletin*, **2**:21-26.
- Hjort-Andersen, C. (2000), A model of the Danish book market, *Journal of Cultural Economics*, **24**:27-43.
- Huber, P. (1964), Robust estimation of a location parameter, *The Annals of Mathematical Statistics*, **35**:73-101.
- Ijiri, Y. and H. Simon (1964), Business firm growth and size, *American Economic Review*, **54**:77-89.
- Ijiri, Y. and H. Simon (1974), Interpretations of departures from the Pareto curve firm-size distributions, *Journal of Political Economy*, **82**:315-332.
- Lévy, P. (1925), *Calcul de Probabilités*. Paris, Gauthier Villars.
- Maddison, D. (2005), Increasing returns to information and the survival of Broadway theatre productions, *Applied Economics Letters*, **11**:639-643.
- Manski, C. (1993), Identification of endogenous social effects: the reflection problem, *Review of Economic Studies*, **60**:531-542.
- Manski, C. (1997), Identification of anonymous endogenous interactions, in Arthur, A., Durlauf, S. and D. Lane (eds), *The Economy as an Evolving Complex System II*. Reading, Addison-Wesley.
- Mosteller, F. and J. Turkey (1977), *Data Analysis and Regression*. Boston, Addison-Wesley.
- Nolan, J. (2001), Maximum likelihood estimation and diagnostics for stable distributions, in Barndorff-Nielsen, O., Mikosch, T. and S. Resnick (eds), *Lévy Processes*. Boston, Birkhauser.

- van der Ploeg, F. (2004), Beyond the dogma of the fixed book price agreement, *Journal of Cultural Economics*, **28**:1-20.
- Sargent, T. (1987), *Macroeconomic Theory*. New York, Academic Press.
- Sornette, D. (2002), Economy of scales in R&D with block-busters, *Quantitative Finance*, **2**:224-227.
- Stanley, M., Buldyrev, S., Havlin, S., Mantegna, R., Salinger, M. and E. Stanley (1995), Zipf plots and the size distribution of firms, *Economics Letters*, **49**:453-457.
- Szenberg, M. and E. Youngkoo Lee (1994), The structure of the American book publishing industry, *Journal of Cultural Economics*, **18**:313-322.
- Walls, D. (1997), Increasing returns to information: evidence from the Hong Kong movie market, *Applied Economics Letters*, **4**:287-290.



**Figure 1.** Representative sample of the book sales distribution in Italy.

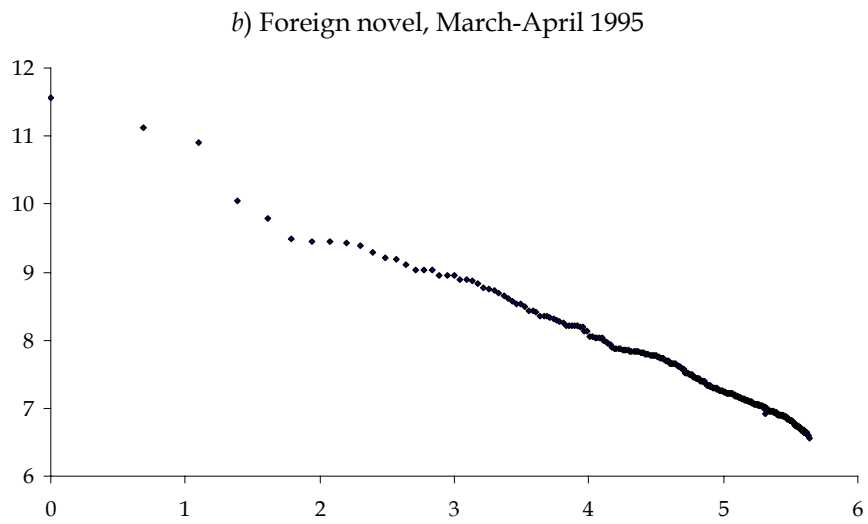
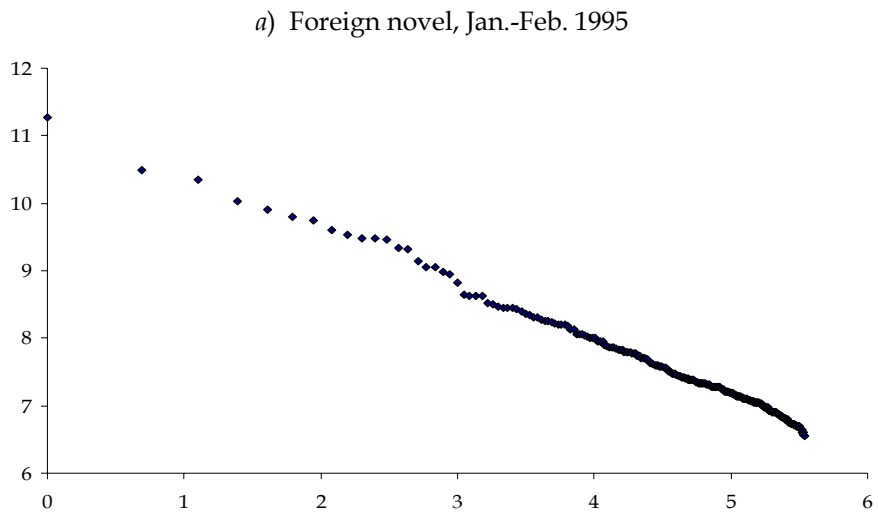
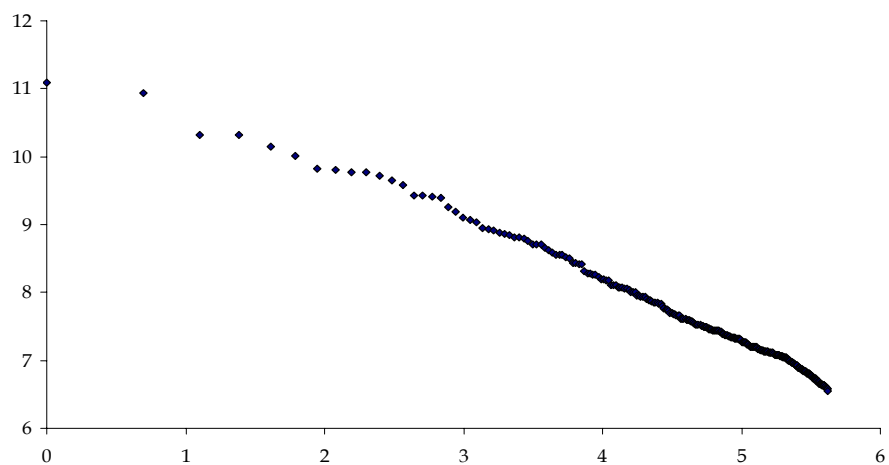
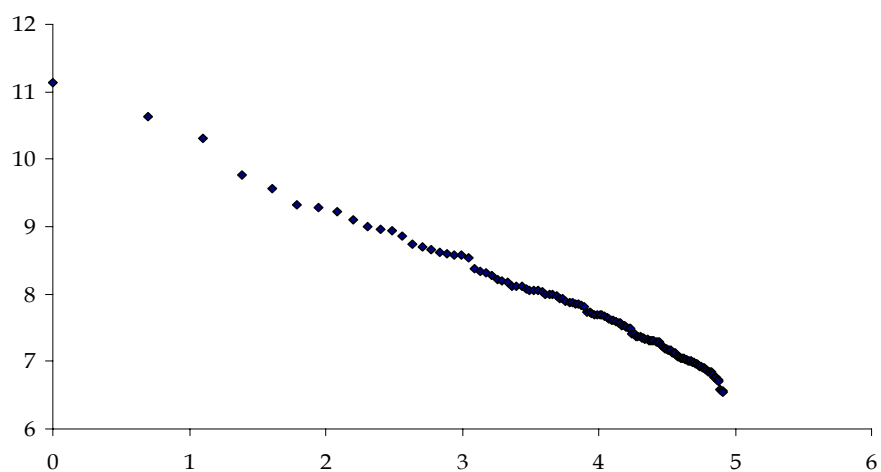


Figure 1 (Continued). Representative sample of the book sales distribution in Italy.

c) Non-fiction, Nov.-Dec. 1995

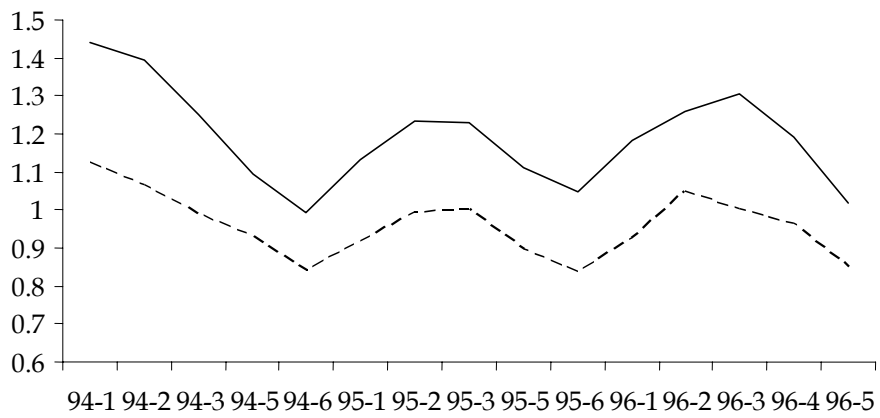


d) Italian novel, Jan.-Feb. 1996



**Figure 2.** Estimates of  $\alpha$  for writers (dashed line) and books (solid lines).

*a) Italian novel*



*b) Foreign novel*

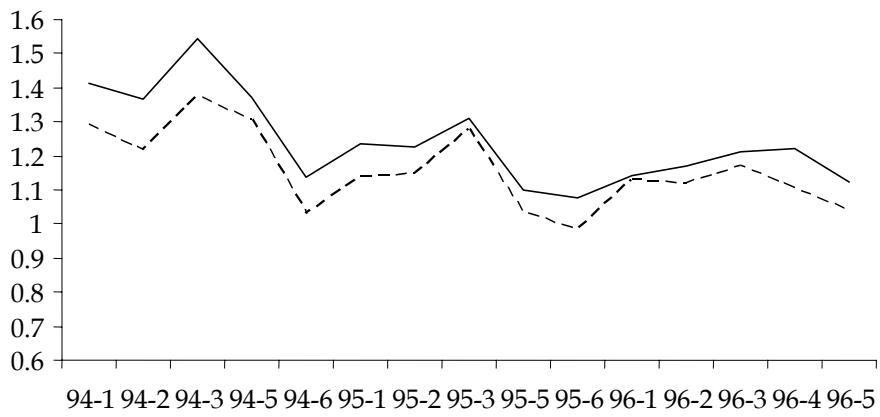
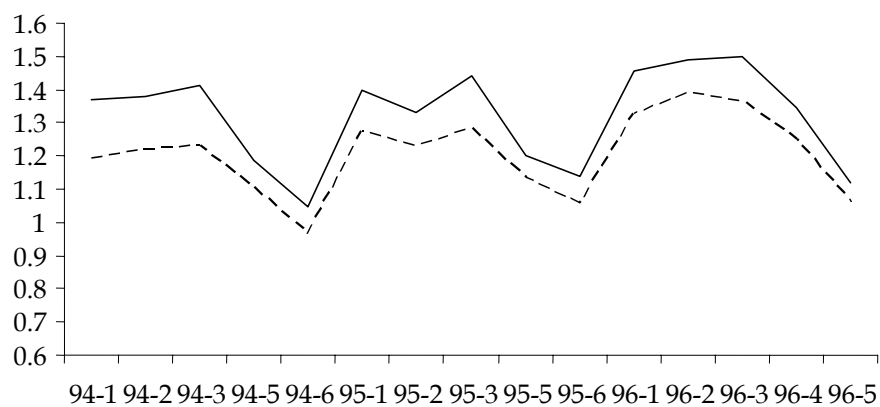


Figure 2 (Continued). Estimates of  $\alpha$  for writers (dashed line) and books (solid lines).

c) Non-fiction



Elenco dei papers del Dipartimento di Economia

- 2000.1 *A two-sector model of the effects of wage compression on unemployment and industry distribution of employment*, by Luigi Bonatti
- 2000.2 *From Kuwait to Kosovo: What have we learned? Reflections on globalization and peace*, by Roberto Tamborini
- 2000.3 *Metodo e valutazione in economia. Dall'apriorismo a Friedman*, by Matteo Motterlini
- 2000.4 *Under tertiarisation and unemployment*. by Maurizio Pugno
- 2001.1 *Growth and Monetary Rules in a Model with Competitive Labor Markets*, by Luigi Bonatti.
- 2001.2 *Profit Versus Non-Profit Firms in the Service Sector: an Analysis of the Employment and Welfare Implications*, by Luigi Bonatti, Carlo Borzaga and Luigi Mittone.
- 2001.3 *Statistical Economic Approach to Mixed Stock-Flows Dynamic Models in Macroeconomics*, by Bernardo Maggi and Giuseppe Espa.
- 2001.4 *The monetary transmission mechanism in Italy: The credit channel and a missing ring*, by Riccardo Fiorentini and Roberto Tamborini.
- 2001.5 *Vat evasion: an experimental approach*, by Luigi Mittone
- 2001.6 *Decomposability and Modularity of Economic Interactions*, by Luigi Marengo, Corrado Pasquali and Marco Valente.
- 2001.7 *Unbalanced Growth and Women's Homework*, by Maurizio Pugno
- 2002.1 *The Underground Economy and the Underdevelopment Trap*, by Maria Rosaria Carillo and Maurizio Pugno.
- 2002.2 *Interregional Income Redistribution and Convergence in a Model with Perfect Capital Mobility and Unionized Labor Markets*, by Luigi Bonatti.
- 2002.3 *Firms' bankruptcy and turnover in a macroeconomy*, by Marco Bee, Giuseppe Espa and Roberto Tamborini.
- 2002.4 *One "monetary giant" with many "fiscal dwarfs": the efficiency of macroeconomic stabilization policies in the European Monetary Union*, by Roberto Tamborini.
- 2002.5 *The Boom that never was? Latin American Loans in London 1822-1825*, by Giorgio Fodor.

2002.6 *L'economia senza banditore di Axel Leijonhufvud: le 'forze oscure del tempo e dell'ignoranza' e la complessità del coordinamento*, by Elisabetta De Antoni.

2002.7 *Why is Trade between the European Union and the Transition Economies Vertical?*, by Hubert Gabrisch and Maria Luigia Segnana.

2003.1 *The service paradox and endogenous economic growth*, by Maurizio Pugno.

2003.2 *Mappe di probabilità di sito archeologico: un passo avanti*, di Giuseppe Espa, Roberto Benedetti, Anna De Meo e Salvatore Espa.  
(*Probability maps of archaeological site location: one step beyond*, by Giuseppe Espa, Roberto Benedetti, Anna De Meo and Salvatore Espa).

2003.3 *The Long Swings in Economic Understanding*, by Axel Leijonhufvud.

2003.4 *Dinamica strutturale e occupazione nei servizi*, di Giulia Felice.

2003.5 *The Desirable Organizational Structure for Evolutionary Firms in Static Landscapes*, by Nicolás Garrido.

2003.6 *The Financial Markets and Wealth Effects on Consumption An Experimental Analysis*, by Matteo Ploner.

2003.7 *Essays on Computable Economics, Methodology and the Philosophy of Science*, by Kumaraswamy Velupillai.

2003.8 *Economics and the Complexity Vision: Chimerical Partners or Elysian Adventurers?*, by Kumaraswamy Velupillai.

2003.9 *Contratto d'area cooperativo contro il rischio sistemico di produzione in agricoltura*, di Luciano Pilati e Vasco Boatto.

2003.10 *Il contratto della docenza universitaria. Un problema multi-tasking*, di Roberto Tamborini.

2004.1 *Razionalità e motivazioni affettive: nuove idee dalla neurobiologia e psichiatria per la teoria economica?* di Maurizio Pugno.  
(*Rationality and affective motivations: new ideas from neurobiology and psychiatry for economic theory?* by Maurizio Pugno.

2004.2 *The economic consequences of Mr. G. W. Bush's foreign policy. Can th US afford it?* by Roberto Tamborini

2004.3 *Fighting Poverty as a Worldwide Goal* by Rubens Ricupero

2004.4 *Commodity Prices and Debt Sustainability* by Christopher L. Gilbert and Alexandra Tabova

- 2004.5 *A Primer on the Tools and Concepts of Computable Economics* by K. Vela Velupillai
- 2004.6 *The Unreasonable Ineffectiveness of Mathematics in Economics* by Vela K. Velupillai
- 2004.7 *Hicksian Visions and Vignettes on (Non-Linear) Trade Cycle Theories* by Vela K. Velupillai
- 2004.8 *Trade, inequality and pro-poor growth: Two perspectives, one message?* By Gabriella Berloffia and Maria Luigia Segnana
- 2004.9 *Worker involvement in entrepreneurial nonprofit organizations. Toward a new assessment of workers? Perceived satisfaction and fairness* by Carlo Borzaga and Ermanno Tortia.
- 2004.10 *A Social Contract Account for CSR as Extended Model of Corporate Governance (Part I): Rational Bargaining and Justification* by Lorenzo Sacconi
- 2004.11 *A Social Contract Account for CSR as Extended Model of Corporate Governance (Part II): Compliance, Reputation and Reciprocity* by Lorenzo Sacconi
- 2004.12 *A Fuzzy Logic and Default Reasoning Model of Social Norm and Equilibrium Selection in Games under Unforeseen Contingencies* by Lorenzo Sacconi and Stefano Moretti
- 2004.13 *The Constitution of the Not-For-Profit Organisation: Reciprocal Conformity to Morality* by Gianluca Grimalda and Lorenzo Sacconi
- 2005.1 *The happiness paradox: a formal explanation from psycho-economics* by Maurizio Pugno
- 2005.2 *Euro Bonds: in Search of Financial Spillovers* by Stefano Schiavo
- 2005.3 *On Maximum Likelihood Estimation of Operational Loss Distributions* by Marco Bee
- 2005.4 *An enclave-led model growth: the structural problem of informality persistence in Latin America* by Mario Cimoli, Annalisa Primi and Maurizio Pugno
- 2005.5 *A tree-based approach to forming strata in multipurpose business surveys*, Roberto Benedetti, Giuseppe Espa and Giovanni Lafratta.
- 2005.6 *Price Discovery in the Aluminium Market* by Isabel Figuerola-Ferretti and Christopher L. Gilbert.
- 2005.7 *How is Futures Trading Affected by the Move to a Computerized Trading System? Lessons from the LIFFE FTSE 100 Contract* by Christopher L. Gilbert and Herbert A. Rijken.

- 2005.8 *Can We Link Concessional Debt Service to Commodity Prices?* By Christopher L. Gilbert and Alexandra Tabova
- 2005.9 *On the feasibility and desirability of GDP-indexed concessional lending* by Alexandra Tabova.
- 2005.10 *Un modello finanziario di breve periodo per il settore statale italiano: l'analisi relativa al contesto pre-unione monetaria* by Bernardo Maggi e Giuseppe Espa.
- 2005.11 *Why does money matter? A structural analysis of monetary policy, credit and aggregate supply effects in Italy*, Giuliana Passamani and Roberto Tamborini.
- 2005.12 *Conformity and Reciprocity in the "Exclusion Game": an Experimental Investigation* by Lorenzo Sacconi and Marco Faillo.
- 2005.13 *The Foundations of Computable General Equilibrium Theory*, by K. Vela Velupillai.
- 2005.14 *The Impossibility of an Effective Theory of Policy in a Complex Economy*, by K. Vela Velupillai.
- 2005.15 *Morishima's Nonlinear Model of the Cycle: Simplifications and Generalizations*, by K. Vela Velupillai.
- 2005.16 *Using and Producing Ideas in Computable Endogenous Growth*, by K. Vela Velupillai.
- 2005.17 *From Planning to Mature: on the Determinants of Open Source Take Off* by Stefano Comino, Fabio M. Manenti and Maria Laura Parisi.
- 2005.18 *Capabilities, the self, and well-being: a research in psycho-economics*, by Maurizio Pugno.
- 2005.19 *Fiscal and monetary policy, unfortunate events, and the SGP arithmetics. Evidence from a growth-gap model*, by Edoardo Gaffeo, Giuliana Passamani and Roberto Tamborini
- 2005.20 *Semiparametric Evidence on the Long-Run Effects of Inflation on Growth*, by Andrea Vaona and Stefano Schiavo.
- 2006.1 *On the role of public policies supporting Free/Open Source Software. An European perspective*, by Stefano Comino, Fabio M. Manenti and Alessandro Rossi.
- 2006.2 *Back to Wicksell? In search of the foundations of practical monetary policy*, by Roberto Tamborini
- 2006.3 *The uses of the past*, by Axel Leijonhufvud



- 2006.4 *Worker Satisfaction and Perceived Fairness: Result of a Survey in Public, and Non-profit Organizations*, by Ermanno Tortia
- 2006.5 *Value Chain Analysis and Market Power in Commodity Processing with Application to the Cocoa and Coffee Sectors*, by Christopher L. Gilbert
- 2006.6 *Macroeconomic Fluctuations and the Firms' Rate of Growth Distribution: Evidence from UK and US Quoted Companies*, by Emiliano Santoro
- 2006.7 *Heterogeneity and Learning in Inflation Expectation Formation: An Empirical Assessment*, by Damjan Pfajfar and Emiliano Santoro
- 2006.8 *Good Law & Economics needs suitable microeconomic models: the case against the application of standard agency models: the case against the application of standard agency models to the professions*, by Lorenzo Sacconi
- 2006.9 *Monetary policy through the "credit-cost channel". Italy and Germany*, by Giuliana Passamani and Roberto Tamborini
- 2007.1 *The Asymptotic Loss Distribution in a Fat-Tailed Factor Model of Portfolio Credit Risk*, by Marco Bee
- 2007.2 *Sraffa's Mathematical Economics – A Constructive Interpretation*, by Kumaraswamy Velupillai
- 2007.3 *Variations on the Theme of Conning in Mathematical Economics*, by Kumaraswamy Velupillai
- 2007.4 *Norm Compliance: the Contribution of Behavioral Economics Models*, by Marco Faillo and Lorenzo Sacconi
- 2007.5 *A class of spatial econometric methods in the empirical analysis of clusters of firms in the space*, by Giuseppe Arbia, Giuseppe Espa e Danny Quah.
- 2007.6 *Rescuing the LM (and the money market) in a modern Macro course*, by Roberto Tamborini.
- 2007.7 *Family, Partnerships, and Network: Reflections on the Strategies of the Salvadori Firm of Trento*, by Cinzia Lorandini.
- 2007.8 *I Verleger serici trentino-tirolesi nei rapporti tra Nord e Sud: un approccio prosopografico*, by Cinzia Lorandini.
- 2007.9 *A Framework for Cut-off Sampling in Business Survey Design*, by Marco Bee, Roberto Benedetti e Giuseppe Espa
- 2007.10 *Spatial Models for Flood Risk Assessment*, by Marco Bee, Roberto Benedetti e Giuseppe Espa

- 2007.11 *Inequality across cohorts of households:evidence from Italy*, by Gabriella Berloff and Paola Villa
- 2007.12 *Cultural Relativism and Ideological Policy Makers in a Dynamic Model with Endogenous Preferences*, by Luigi Bonatti
- 2007.13 *Optimal Public Policy and Endogenous Preferences: an Application to an Economy with For-Profit and Non-Profit*, by Luigi Bonatti
- 2007.14 *Breaking the Stability Pact: Was it Predictable?*, by Luigi Bonatti and Annalisa Cristini.
- 2007.15 *Home Production, Labor Taxation and Trade Account*, by Luigi Bonatti.
- 2007.16 *The Interaction Between the Central Bank and a Monopoly Union Revisited: Does Greater Uncertainty about Monetary Policy Reduce Average Inflation?*, by Luigi Bonatti.
- 2007.17 *Complementary Research Strategies, First-Mover Advantage and the Inefficiency of Patents*, by Luigi Bonatti.
- 2007.18 *Dual Licensing in Open Source Markets*, by Stefano Comino and Fabio M. Manenti.
- 2007.19 *Evolution of Preferences and Cross-Country Differences in Time Devoted to Market Work*, by Luigi Bonatti.
- 2007.20 *Aggregation of Regional Economic Time Series with Different Spatial Correlation Structures*, by Giuseppe Arbia, Marco Bee and Giuseppe Espa.
- 2007.21 *The Sustainable Enterprise. The multi-fiduciary perspective to the EU Sustainability Strategy*, by Giuseppe Danese.
- 2007.22 *Taming the Incomputable, Reconstructing the Nonconstructive and Deciding the Undecidable in Mathematical Economics*, by K. Vela Velupillai.
- 2007.23 *A Computable Economist's Perspective on Computational Complexity*, by K. Vela Velupillai.
- 2007.24 *Models for Non-Exclusive Multinomial Choice, with Application to Indonesian Rural Households*, by Christopher L. Gilbert and Francesca Modena.
- 2007.25 *Have we been Mugged? Market Power in the World Coffee Industry*, by Christopher L. Gilbert.

2007.26 *A Stochastic Complexity Perspective of Induction in Economics and Inference in Dynamics*, by K. Vela Velupillai.

2007.27 *Local Credit and Territorial Development: General Aspects and the Italian Experience*, by Silvio Goglio.

2007.28 *Importance Sampling for Sums of Lognormal Distributions, with Applications to Operational Risk*, by Marco Bee.

2007.29 *Re-reading Jevons's Principles of Science. Induction Redux*, by K. Vela Velupillai.

2007.30 *Taking stock: global imbalances. Where do we stand and where are we aiming to?* by Andrea Fracasso.

2007.31 *Rediscovering Fiscal Policy Through Minskyan Eyes*, by Philip Arestis and Elisabetta De Antoni.

2008.1 *A Monte Carlo EM Algorithm for the Estimation of a Logistic Autologistic Model with Missing Data*, by Marco Bee and Giuseppe Espa.

2008.2 *Adaptive microfoundations for emergent macroeconomics*, Edoardo Gaffeo, Domenico Delli Gatti, Saul Desiderio, Mauro Gallegati.

2008.3 *A look at the relationship between industrial dynamics and aggregate fluctuations*, Domenico Delli Gatti, Edoardo Gaffeo, Mauro Gallegati.

2008.4 *Demand Distribution Dynamics in Creative Industries: the Market for Books in Italy*, Edoardo Gaffeo, Antonello E. Scorcu, Laura Vici



PUBBLICAZIONE REGISTRATA PRESSO IL TRIBUNALE DI TRENTO