Managing Intellectual Capital and Innovation for Sustainable and Inclusive Society
27–29 May 2015
Bari • Italy

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TIIM

Management, Knowledge and Learning
Joint International Conference 2015
Technology, Innovation and Industrial Management

THE CHALLENGE OF MARKETING INTERVENTIONS IN GLOBAL MARKETS

Bistra Vassileva
University of Economics-Varna, Bulgaria
bistravas@ue-varna.bg

Abstract:
We live in a world where disruptive technologies, rapid structural changes and economic turbulence are impacting the global economy by accelerating the rise of complexity. Complexity turns out to be a major power business must consider when develop and execute marketing strategies. Globalisation has been the quintessence of the last decade of the 20th century. The effect of globalisation on marketing strategies has been outstanding. This paper presents an investigation of the dynamics of top 500 companies in Central and Eastern Europe (CEE) by applying the Zipf-Pareto law and the index of Sheppard. It was assumed that there are variations in the factors which affect the distribution of the sizes of top 500 CEE companies and top 300 Bulgarian companies as well as that these variations can be modelled by stochastic processes. The main research goal of the study was twofold: (1) if the state of equilibrium of the ranked companies (based on their sizes) fits to the power law, and (2) if the deviations from the power law are characterised by the index of Sheppard. Based on the achieved results several implications for different types of marketing interventions have been suggested and discussed.

Keywords: marketing interventions, global markets, complexity, power laws, index of Sheppard

1. INTRODUCTION

We live in a world of shrinking boundaries and shifting economic fortunes (Ryder, 2005: 206). Disruptive technologies, rapid structural changes and economic turbulence are impacting the global economy by accelerating the rise of complexity. Complexity turns out to be a major power business must consider when develop and execute marketing strategies. It affects businesses both by delivering challenges and opening new opportunities which means that complexity changes radically the way business is managed. Globalisation has changed the strategic context for the business. Globalisation which is viewed not only as a geographical expansion but rather as a new operating theory of the world based on connectedness among pre-existing political, social, economic, thematic, and geographic boundaries (Singer, 2006: 51). Both this connectedness and its complexity became a source of instability and risk, as well as a driver for accelerating reorganisation of the global economic landscape. More or less, complexity becomes the new norm for the business which requires new perspective[1].

Following the rise of complexity theory and nonlinearity, the complexity economics (Arthur, 2013; Axelrod, 1999) became a hot-spot issue in contemporary scientific business literature. The recent debate within the field of economics over the concept of complexity (Israel, 2005; Markose, 2005; McCauley, 2005; Velupillai, 2005; Rosser, 2007) gives an emphasis on more dynamically based definitions of complexity that have tended to be used more widely and frequently in economics over recent decades than the computational explanation of complexity (Rosser, 2008: 2).

Some researchers believe that the application of the ideas of complexity and nonlinear dynamics allows them to understand the spontaneous, self-organising dynamics of the world with the potential for immense impact on the conduct of economics, business, and even politics (Waldrop, 1992: 12). In contrast, John Horgan (1995, 1997, cited in: Rosser, 1999: 170) teases what he labels “chaoplexology,” arguing that complexity is the latest in a series of failed fads, the “four C’s” of cybernetics, catastrophe, chaos, and complexity. These sharply contrasting viewpoints reflect the controversy surrounding the multidisciplinary study of complexity, as well as its predecessors in a line of development within the broader science of nonlinear dynamics.

2. NONLINEAR DYNAMICS, MARKETING INTERVENTIONS AND GLOBAL MARKETS

2.1. The notion of nonlinear dynamics

Although dynamics is an interdisciplinary subject today, it was originally a branch of physics. The subject began in the mid-1600s, when Newton invented differential equations, discovered his laws of motion and universal gravitation, and combined them to explain Kepler's laws of planetary motion (Strogatz, 1994: 2). The breakthrough came with the work of Poincaré in the late 1800s when he introduced a new point of view that emphasised qualitative rather than quantitative questions and further developing a geometric approach to analysing such issues. According to the framework developed by Strogatz (1994: 9-10), the application of complexity theory and nonlinear dynamics in economics is a part of the spatio-temporal complexity and belongs to the frontier studies. These studies deal with many variables ($n \gg 1$) and they are characterised by their nonlinearity. During the last decade a constant flow of multiple applications of nonlinear dynamics and deterministic chaos in economics has been developed (Chatrath, Adrangi, and Dhanda, 2002; Goodwin, 1990; Majumdar, Mitra & Nishimura, 2000; Pesaran and Potter, 1993; Rosser, 1999; Vitanov, Dimitrova, and Kantz, 2006). One focus of the chaos studies in economics is on the structural changes in economic systems (Sakai et al., 2007). Small shifts of policy may result in structural changes and thus it is very difficult for the government to keep the system at equilibrium when the system is at a critical state (Zhang, 1990).

In the last two decades various methods of nonlinear dynamics and chaos theory have been frequently used to analyse various branches of economics (Markose, 2002). He divided these methods into three groups. The first group includes formalist/deductive methods and related dynamical systems, e.g. classical methods of optimisation, classical probability and econometric models. These methods have an implication for economic models studying perfect competition, market completeness,

[1] According to the results of KPMG research of 1400 senior corporate decision makers from 22 countries, representing seven primary business sectors.

command economy. The second group is the so called 'New logic' or mathematics of incompleteness. These methods have been applied by renown economists like Hayek (1967, 1982) in his studies on the limits of constructivist reason and later (Hayek, 1952,1982) on cognitive incompleterness and Lewis (1985,1987) with his work on algorithmic unsolvability of general equilibrium prices. Inductive methods and self-organising dynamics comprises the third group. Some of the most important implications of these methods in the field of economics emphasise on market incompleteness, irregular innovation based structure changing dynamics in capitalist growth, stock market crashes and non-Guassian asset returns with fat tails.

2.2. Global markets and marketing interventions

The world is changing with a speed which has never been seen before. Years of research done by the McKinsey Global Institute (MGI) and McKinsey's Strategy Practice reveal three major economic forces the global economy has ever seen: the collision of technological disruption, rapid emerging-markets growth, and widespread aging. Much bigger shifts in each of these areas are expectet which will tremendously affect economy, social life and personal behaviour worldwide.

First, technology and connectivity have disrupted industries and transformed the lives of billions of people in their different roles as workers, consumers and citizens. The KPMG report on complexity (2011) shows that technology is changing business models, improving processes, and opening new markets, but also creating volumes of new data that must be managed, supported, and secured. More transactions are taking place across more borders. Changing global regulatory environment is forcing businesses to react to ensure compliance while managing new risks. We are witnessing an extraordinary growth in computing capacity, power, and speed of ITC penetration[2]. This acceleration in the scope, scale, and economic impact of technology will be supplemented with a new age of artificial intelligence, consumer products and services, instant communication, and unlimited information which in turn will distress the business in unthinkable way. With instant information and communication, virtually everything is available to anyone, anywhere. Markets are now global and many corporations are often richer and more powerful than many countries.

Second, the world's economic center of gravity has continued shifting from West to East, with China being at the centre of the trend. This shifting locus of economic activity and dynamism to emerging markets and to cities within those markets, will give rise to a new class of global competitors both companies and brands. The global urban population is growing by 65 million a year, and nearly half of global GDP growth between 2010 and 2025 will come from 440 cities in emerging markets, 95% of them being almost unknown small and medium-sized cities in emerging markets. This shifting balance of power has been indicated as a transition from Globalisation 2.0 (Western-dominated) to Globalisation 3.0 (China-dominated) (Walker, 2007)[3]. Globalisation 3.0 is characterised by the fact that the West no longer dominates the world's savings, and as a result no longer dominates global investment and finance. The erosion of Western power is accompanied by the erosion of the authority of the grand institutions of Globalisation 2.0, which sustained power by enforcing the implicit rules of Western economic orthodoxy. This situation is confirmed by the 2014 FDI Confidence Index ranking and scores[4]. The first and second place are occupied by United States and China with maintained ranking from 2013 (respectively 2.16 and 1.95 out of maximum 3.0)[5].

[2] According to the Moore's Law, the overall processing power for computers doubles every two years.
[3] The exact moment of the shift is considered to be the accession to WTO membership of China on December 11, 2001.
[4] The Foreign Direct Investment Confidence Index®, established in 1998 by A.T.Kearney, ranks countries based on how changes in their political, economic, and regulatory systems are likely to affect foreign direct investment inflows in the coming years.
[5] There are scholars (Dreher, 2006) who question the statistical significance of FDI Confidence Index since it covers only 67 countries, there is no clear explanation about the weights and cultural factors are excluded. They propose KOF Index of Globalisation which measures the three main dimensions of globalisation: economic, social and political, and includes sub-indices referring to: actual economic flows, economic restrictions, data on information flows, data on personal contact and data on cultural proximity. An alternative perspective to measuring globalisation from the perspective of nation-states can be found in UNCTAD's "Transnationality Index" (TNI). Although ostensibly a measure of how internationalised MNCs are, the TNI can also be construed as reflecting organisational responses to globalisation.

Third, the rapid aging of the world's populaton will create a massive set of economic pressure. The baby boomers have begun retiring. Aging has been evident in developed economies for few years, with Japan and Russia seeing their populations decline and the trend is spreading slowly to China. It is expected that during the next few years it will "reach" Latin America. The researchers suggest that during the collision of these three forces, the resulting change will be so significant that much of the management and marketing expertise, know-how and intuition that have surved in the past will become irrelevant. Companies will face with more discontinuity and volatility, with long-term charts no longer looking like smooth upward curves, with outdated long-held assumptions, and useless formerly powerful business models (Dobbs et al., 2014).

The above picture presents a perfect description of a situation when low-probability, high-consequence events can dominate the impacts and societal concerns which is called by Nordhaus (2011:1) "the problem of fat tails" or "tail events". Such situations often force governments and companies to develop and to implement intervention strategies especially when their efforts are focused on global expansion. As a response to the key global market trends firms adopt different strategies within the continuum from revenue-based to cost-based strategies. These strategies are additionally affected by global markets fragmentation and consolidation. Market fragmentation arises when market entry costs are low and exit costs are high, where there are few positive experience curve effects, where cost structures are atypical and governments *interfere* in the market (Bradley, 2005: 16). Consolidation of markets is achieved when low-cost, standardised products are provided, marketing expenditures are high, M&As are in rise and there is a constant flow of large capital investments. In order to succeed in global markets companies should learn to operate in a more complex, uncertain environment where the global competitive reality differs considerably from everything which is previously known. Thus globalised markets affect both company performance and industry structure. In turn, the impact on marketing strategies and the pressure on the whole process of marketing management is tremendous. Marketing managers face shortened product life cycles, intense price pressures, accelerated technology outdating which lead to sales and profitability declines. However, global markets offer new growth opportunities, new sources of know-how and expertise, new partnerships and new sources of competitive advantage.

The following question arises based on the discussion provided above: if the ranked distribution of firms by size (by revenues or EBITDA) satisfies the Zipf-Pareto law then firms' size growth can be treated as a random process and growth rates will be independent of the size of the firm (Axtell, 2001). The predominant assumption in the studies of power laws and the particular case of a rank-size rule of Zipf is the existence of the steady-state distribution. To guarantee its existence, some deviations from a pure random growth process (i.e., some friction) need to be added in order to get a power law distribution (Gibrat, 1931, cited in: Gabaix, 2009: 261). A concluding statement could be derived that a friction is needed to prevent cities, firms or brands from becoming too small. Such frictions could be initiated by the government or other regulating bodies as a part of their *intervention policies*. When frictions are large, small units grow faster than large units.

3. METHODOLOGY AND RESULTS

The main research goal of the study was twofold: (1) if the state of equilibrium of the ranked companies in CEE and Bulgarian companies (based on their revenues or EBITDA) fits to the power law, and (2) if the deviations from the power law are characterised by the index of Sheppard. Three research hypotheses were defined based on the main research goal:

RH1: The distribution of top 500 firms (by revenues) in CEE satisfies the Zipf-Pareto law.

RH2: The distribution of top 300 Bulgarian firms (by EBITDA) satisfies the Zipf-Pareto law.

RH3: Both systems of top 500 companies in CEE and top 300 Bulgarian companies satisfy the primacy index of Sheppard.

The empirical analysis was based on data drawn from COFACE (top 500 companies in CEE) and ICAP (top 300 Bulgarian companies) data sets. The performance of rank-size rule and power law was checked against these data for the period from 2010 to 2012. The empirical analysis is employed to show that the rank-size rule could be implemented to the distribution of firms' sizes. The analysis is based on considerations of complex systems, i.e. finding whether power or other simple law fits are appropriate to describe some internal dynamics. It is observed that the ranking is specifically organized: a major class comprising a few firms emerges every year. Other classes, which apparently

have regular sizes, occur subsequently. Thus, the notion of the Sheppard primacy index (Sheppard, 1982) is envisaged to describe the findings.

The analysis started with a representation of empirical distributions and their corresponding rank-size relationships for the period from 2010 to 2012. Next, the distribution of rescaled values and a power law fit for the same period were described with the corresponding visual representation of these relationships. During the second research stage the primacy index of Sheppard was used to explore the hierarchy within the system of top 500 companies in CEE and top 300 Bulgarian companies. The problem of primacy comprises an essential issue in the analysis of distributions of firms'sizes being a part of the assessment of their dynamics. The primacy index of Sheppard which is used to determine the level of dominance in the system of top 500 companies in CEE and top 300 Bulgarian companies in current research is presented in Eq. 1.

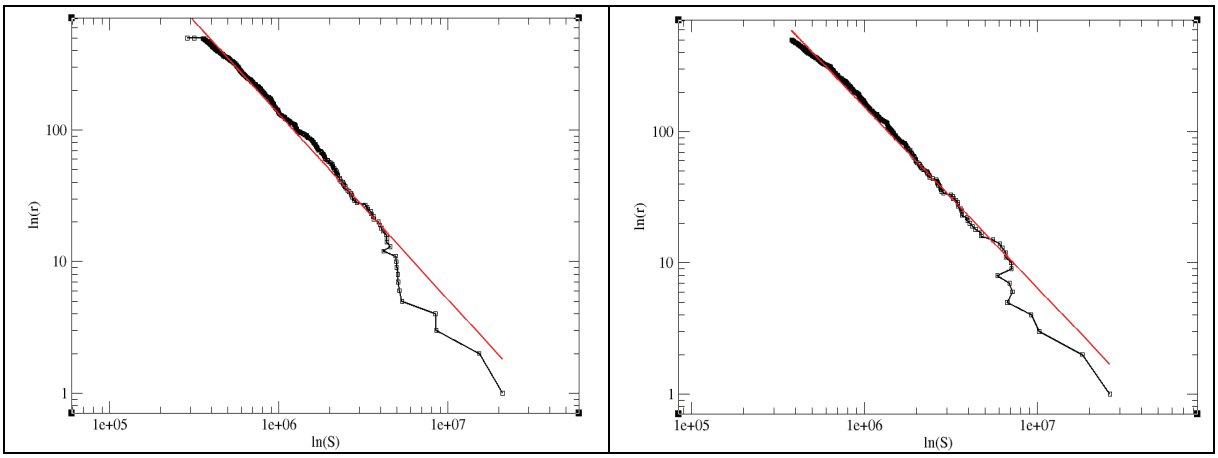
$$P_{rN} = \frac{1}{N-2} \sum_{r=1}^{N-2} \left[\frac{\ln(N_r) - \ln(N_{r+1})}{\ln(N_{r+1}) - \ln(N_{r+2})} \right] \times \left[\frac{\ln(r+2) - \ln(r+1)}{\ln(r+1) - \ln(r)} \right] \quad (1)$$

where N = number of observations,
Nr = r-th observation,
Nr+1 = observation with a rank (r + 1).

3.1. Results and Discussion

During the first stage of present research top 500 companies in Central and Eastern Europe (CEE) and top 300 Bulgarian companies were compared with respect to the emergence of power laws in the size distribution. The analysis of the data set of top 500 companies in CEE (measured by revenues) started with representation of empirical distributions and their corresponding rank-size relationships for the period from 2010 to 2012. Next, a rescaling procedure to log-log distributions was performed. The distribution of rescaled values and a power law fit for the same period are given in Figure 1.

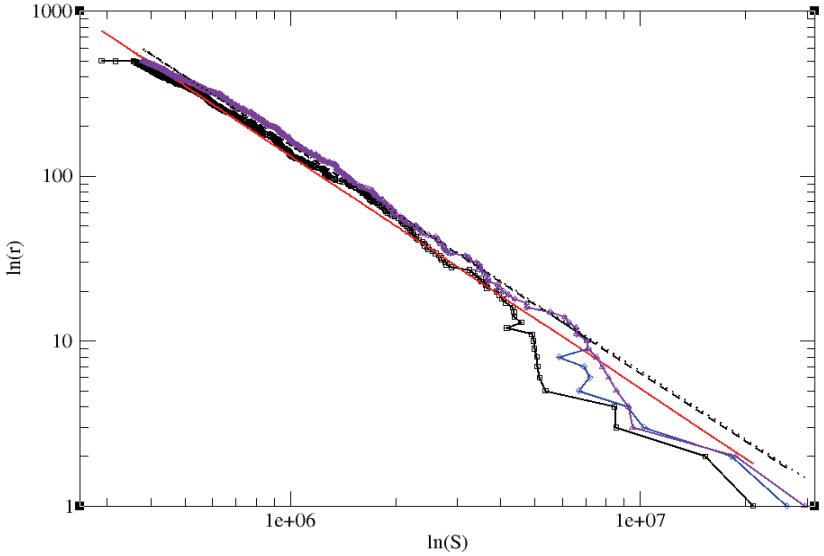
Figure 1: Rank-size relationship for the rescaled values S of top 500 companies in CEE, 2010 and 2011



Based on curve estimation results (Figure 1) the author suggested that top 15 companies should be excluded from the data row and should be analysed separately since their distribution differs substantially from the distribution of the rest (Figure 2). It is obvious that despite the variations in companies' size (measured as revenues) for the researched period, only small changes occur in the rank-size relationship. The rank-size relationship seems to be almost folding on a unique relationship and describes a state near equilibrium. The system fluctuates around such a status of equilibrium, hence the parameters of the power law will change slowly with the time.

The same calculations were performed with the data for top 300 Bulgarian companies (measured as EBITDA). The empirical distributions and their corresponding rank-size relationships have been constructed. The previous conclusion was confirmed that the distribution of the top 15 companies differs from the distribution of the rest. After the rescaling process with a power law fit it was found out that there is still deviation of the values of the top few companies (Figure 3).

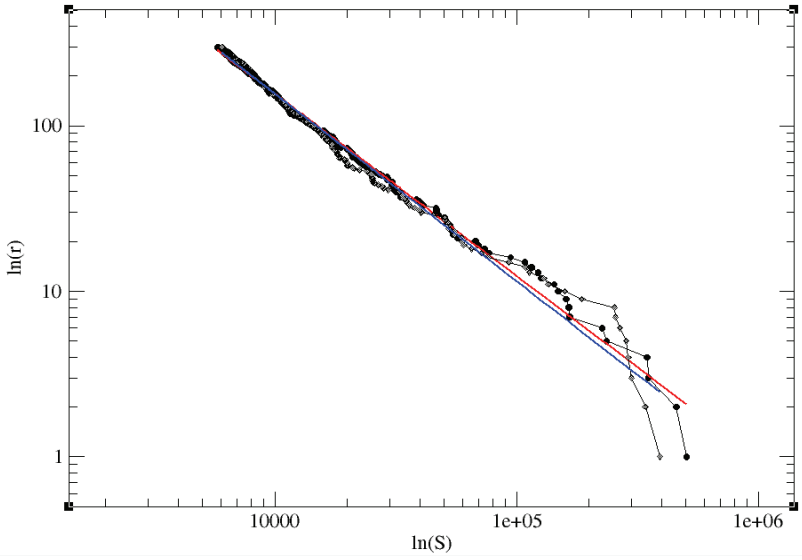
Figure 2: Rank-size relationship for the rescaled values S of top 500 companies in CEE (without top 15, N=485), 2010-2012



Year 2010 – square for rescaled values and red line for RSSR; Year 2011 – diamond for rescaled values and blue line for RSSR; Year 2012 – triangle up for rescaled values and black dashed line for RSSR

Hence, the author extracted the top 10 and the top 15 observations from the data row and completed the analysis again.

Figure 3: Rank-size relationship for the rescaled values S of top 300 companies in Bulgaria (N=300), 2011-2012



Year 2011 – square for rescaled values and red line for RSSR; Year 2012 – diamond for rescaled values and blue line for RSSR

The calculated power law fit characteristics for both data sets are presented in Table1.

Table 1: Summary of power law fit characteristics: correlation coefficient and regression coefficient (slope), N = 500 (top CEE companies) and N = 300 (top 300 Bulgarian companies)

Year	Top 500 companies in CEE			Top 300 Bulgarian companies		
	Power law	Corr. coef.	Regr. coef.	Power law	Corr.coef.	Regr. coef.
2010	$y = 3.825e+10\ x^{-1.41}$	-0.992	-1.410	n.a.	n.a.	n.a.
2011	$y = 3.03e+10\ x^{-1.382}$	-0.994	-1.382	$y = 3.988e+06\ x^{-1.102}$	-0.997	-1.101
2012	$y = 2.684e+10\ x^{-1.373}$	-0.994	-1.373	$y = 5.259e+06\ x^{-1.132}$	-0.992	-1.132

The evolution of the power law exponent indicates the position of the state of equilibrium, which can change during the years. The power law exponent is decreasing for the top 500 companies in CEE. The power law exponent for the top 300 Bulgarian companies fluctuates around a value of -1.12.

The first hypothesis of present research states that the distribution of top 500 firms (by revenues) in CEE satisfies the Zipf-Pareto law. Based on aforementioned results author concludes that the distribution of top 500 companies in CEE is non-Gaussian and it satisfies the Zipf-Pareto law. It means that the moments depend considerably on the size of the sample and the probability of extreme events becomes larger. The same conclusion is done for the second research hypothesis which states that the distribution of top 300 Bulgarian firms (by EBITDA) satisfies the Zipf-Pareto law. Next, the index of Sheppard was calculated for the system of top 500 companies in CEE and for top 300 Bulgarian companies (Table 2) to study their primacy (or "hierarchy").

Table 2: Index of Sheppard calculations for top 500 companies in CEE and top 300 Bulgarian companies

Year	Top 500 companies in CEE	Top 300 Bulgarian companies
2010	0.366	0.867
2011	0.474	0.951
2012	0.603	0.970

The third research hypothesis that both systems of top 500 companies in CEE and top 300 Bulgarian companies satisfy the primacy index of Sheppard has been confirmed. The index of Sheppard is quite below one for top 500 companies in CEE which suggests convexity. Convex distributions correspond to presence of a number of very big companies (with high revenue levels) which supports author' former proposition. For top 300 Bulgarian companies local "oscillations" were determined as in the simple Zipf case since P_{TN} (see Eq. 2) was approximately equal to one (with small deviations).

3.2. Conclusions, limitations and implications for future research

Economic systems are constantly evolving. Disruptive technologies, rapid structural changes and economic turbulence are impacting the global economy by accelerating the rise of complexity. Companies are facing a growing number of both market challenges and business opportunities. Firms' size is an important economic indicator which is used for economic analysis and for economic policy development. It could be applied both as marker (lagging indicator) and as a driver (leading indicator). That is why, it is important to investigate if the distribution of ranked firms satisfies the Zipf-Pareto law. In the literature review it has been pointed out that regardless of the particular forces driving the growth of firms, as soon as firms satisfy Gibrat's law with very small frictions, their value distribution converges to Zipf's law.

It was confirmed that both distributions satisfy the Zipf-Pareto law. Both systems (top 500 companies in CEE and top 300 Bulgarian companies) fluctuate around a status of equilibrium, hence the parameters of the power law will change slowly with the time. The results show that the power law exponent is close to one which suggest a state near equilibrium for both systems (top 500 companies in CEE and top 300 Bulgarian companies). Naturally defined classes of companies within the investigated systems were not explored in this paper which is its main limitation and a subject for future research. Few more implications for future research could be defined as well.

First, it is interesting to be explored further if tail events matter for the regulating bodies when they develop protectionist policies or strategies to stimulate SMEs.

Second, in order to support EU policies in the field of economic development it would be noteworthy to test if power law applies for the top ranked companies within the EU.

Third, regarding the industry sectors where top companies operate the following two research hypotheses could be defined for future study: (1) the distribution of top firms satisfies Zipf-Pareto law and power law within the industry sectors, and (2) deviations of firms' sizes from power law by industry sectors can be described by the primacy index of Sheppard.

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