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Business Economics in the Era of Information Society

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1. INTRODUCTION

This text is not a typical text book on the topic of Business Economics. It primarily deals with the theme of the role of information and the development of information and communication technology (ICT) in the economic environment. In the field of standard Business Economics it is possible to find many high quality textbooks (in Czech language it is recommended to look for the books by Miloslav Synek, from the University of Economics, Prague [SYNEK, 2006]).

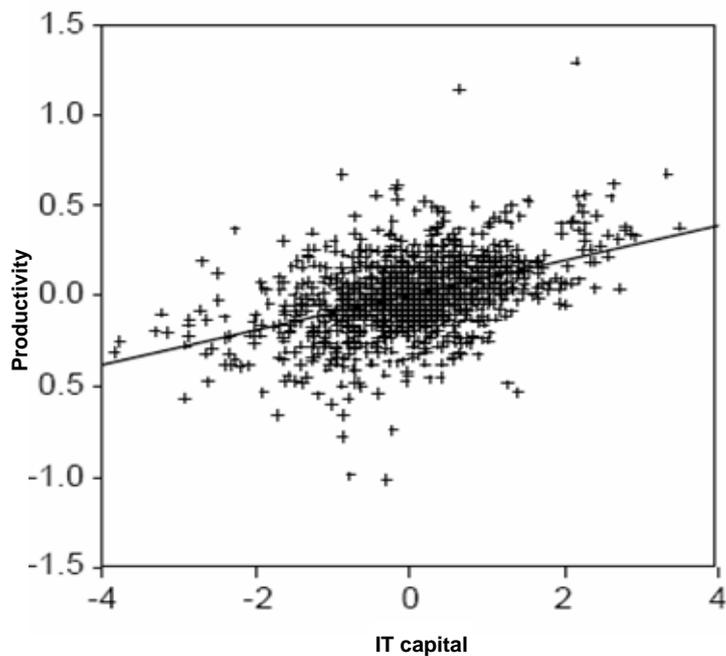
Following the research at the Institute of Information Studies and Librarianship, Charles University, Prague, this text aims to discuss some questions that the economic science has to deal with in connection with the rapid development of information and communication technologies (ICT). As opposed to the times of the second half of the 90's when we experienced a widespread euphoria on the new technologies – that very often led to unrealistic expectations regarding the impacts of these technologies – it is now possible, and appropriate, to assess (this time in realistic terms) what are the impacts of the commercial internet development on the economic environment.

First of all, it is necessary to stress that the internet does not change the fundamental economic laws and mechanisms. Application of these laws and mechanisms in the economic environment based on the ICT should be, however, subject to a much deeper examination than it is being done today. Examination of the role and value of information in the world economy and derivation of corresponding economic models should form one of the pillars of the economic science in the near future.

I believe that my academic background – in the past (faculties of Informatics and of International Relations at the University of Economics in Prague) as well as present (post-gradual studies of information science and lecturing at the Institute of Information Studies and Librarianship, Charles University, Prague) – can help me describe more closely leading trends in the examination of impacts of development of rapid ICT development on application of economic mechanisms to, at least some of, the segments of the world economy with an emphasis to their practical application.

2. ECONOMIC ENVIRONMENT IN THE INFORMATION AGE

Today's society and, indeed, also today's world economy relies increasingly on the use of ICT, and the development of the ICT infrastructure is – de facto – one of the critical factors of the successful development of the world economy. In this context it is not necessary to stress that it is not the development of the technological infrastructure itself that allows for the flourishing development of the society. If we first concentrate on the area of entrepreneurship, it is already proved that a routine implementation of the ICT to the traditional processes in the company does not usually bring striking results. Erik Brynjolfsson (2003) shows – following a large scale survey among U.S. companies – that there exists empirically provable correlation between investment of the given company to ICT and its overall productivity. However, he adds that investment to ICT itself does not guarantee automatic increase in the company's productivity – it is just 25% of the success (see graph 1). Another three quarters are hidden in a right setup of business processes, human capital or corporate culture (see also Brynjolfsson, Hitt, 2003). In the undertone of these results we can identify that utilization of the new ICT in the company requires increasingly also application of a new view information processes, on utilization of information in the company and, in consequence, on the acquisition and application of knowledge in today's economic environment.



Graph 1: Extrapolation of dependency of company's productivity on its IT capital (central values expressed as zero)
 Source: Brynjolfsson, Hitt (2003)

It already became evident that the appearance of the ICT and the commercial internet does not change the fundamental economic laws – it is, however, appropriate to pose the question if these technologies change the economic environment and, thus, also the approach to business undertaking and the conditions for success of miscellaneous business models. And the core of this text lies in an outline (in the extent provided) of some of the key impacts that the development of the ICT brings to the economic activities. This outline will be followed by a definition of the “information economy” as the economic reality of the information age.

Information economy and Economics of information

Before illustration of some of the economic models of the information economy, respectively before definition of the information economy itself, I would like to just characterize briefly the correspondence between the two terms: “information economy” and “economics of information” (see also Očko, 2005 or 2006). The first term I characterize preliminarily as an expression for today's shape of the world economy where all its segments are in some way influenced by the development of the ICT that – in various extent and in various ways – have impact on mechanisms of functioning of particular sectors, behaviour of the customers,

suppliers and other actor at the particular markets, whereas the role of information and of applied knowledge becomes a key factor for development of all the areas of the economy. Besides authors that started to examine this area of economy in the last two decades of the 20th century (some of them mentioned also in this text) we can name at least two authors that touched this area of economics in their research earlier. Especially, F. Machlup who, in the beginning of 1960's, mapped the production and distribution of knowledge in the U.S. economy, and M. Porat who, in 1970s, defined the “information sector” in the USA and tries to quantify it.¹

The second term “economics of information” characterizes an area of research within the economic science that is focused on the role of information in economic processes and on economic value of information. The research in area of the role of information in the economic mechanisms was pursued by renowned economists such as F.A. von Hayek, who described the role of price mechanism as a fundamental information system in the economy; G.J. Stigler, who is known for his work that connected the value information with its search costs; W. Vickrey, who examined informational aspects of decision making in uncertainty conditions; G. Akerlof, who described how information asymmetries lead to the adverse selection at the market; or work of M. Spence and J. Stiglitz, who demonstrated possibilities of signal or self-selection behavior in the markets with significant information asymmetries². All the above mentioned economists were awarded the Nobel Prize for Economy by the Swedish central bank.

Indeed, it is appropriate to distinguish the two areas of economic research – one focused on the role of information in the economic mechanisms and in economic decision-making, i.e. the economics of information, and the other one that is focused on economic consequences of the rapid ICT development. Necessary to add: both areas meet at some points and principles of the economics of information are highly applicable in the emerging information economy and vice versa the information economy brings new problem areas for the economics of information.

¹ See e.g.: Machlup (1962) and Porat (1977)

² See e.g.: Hayek (1993), Stigler (1961), Vickrey (1961), Akerlof (1970), Spence (1973), Stiglitz (2000)

Information Economy as a part of Information Sector

As it was already indicated the definition of the information economy as a sector of the economy as a whole was developed mainly by two economists Fritz Machlup and Marc Porat (see e.g. Vlasák, 2001). An economy becomes an information economy when information-related work begins to exceed work related to the other sectors. Based on Porat's measurements of the various sectors, this occurred in 1967, when 53% of the US workforce was engaged in "information work". Robert Verzola (2006) stresses that seeing these sections to be the core of a new emerging economy, the term "post-industrial" was often used to describe this economy. Early studies of the "post-industrial" economy mistakenly saw it as a service economy. One of the first authors to correctly recognize the main feature of the new emerging economy was Machlup (1962), who used the term "knowledge-based industry" to describe it. He found that by 1959, knowledge-producing occupations had surpassed the other occupations in terms of numbers. As late as 1973 though, authors like Daniel Bell (1973) continued to refer to the emerging economy as a "post-industrial" one. In 1977, Marc Uri Porat (1977), who was later joined by Rubin, wrote a 9-volume dissertation that measured and estimated the size of this economy, and described this emerging sector as the "information economy". His work has since then been widely quoted and cited as the first major use of the term "information economy".

As Verzola (2006) continues, the digital technology made possible the production of exact copies of text, images, audio, video and other information materials over unlimited generations, the information economy grew rapidly. With the emergence of the Internet and later the World Wide Web, the information economy gradually matured into the full-blown economy that it is today. One of the more recent efforts to estimate the size of the US information economy was done by Apte and Nath (2004), who found that the US information sector's share of the total GNP grew "from about 46 percent in 1967 to about 56 percent in 1992, and to 63 percent in 1997".

Sector	1967	1992	1997
Primary	200,025 (25.1%)	2,055,950 (33.0%)	2,940,121 (35.2%)
Secondary	168,073 (21.1%)	1,427,119 (22.9%)	2,317,419 (27.8%)
Information [Total value added]	368,098 (46.3%)	3,483,069 (55.9%)	5,257,540 (63.0%)
Non-information [Total value added]	427,290 (53.7%)	2,750,836 (44.1%)	3,088,106 (37.0%)
Total GNP	795,388 (100.0%)	6,233,905 (100.0%)	8,345,646 (100.0%)

Table 1: Value added of the sectors on GNP in the U.S., mil. USD (Apte, Nath, 2004)

Porat categorizes the information sector into the primary information sector and the secondary information sector. The “primary information sector” workers are those who are almost wholly concerned with creating or handling information, like scientists, writers, librarians, etc. The “secondary information sector” workers are those who work mainly on non-information items but whose work involve information work as a secondary aspect. They are the workers in non-information firms and industries who produce information for internal use in the production of agricultural or industrial (i.e. non-information) goods.

Porat includes in the primary information sector the following industries:

- 1) knowledge production and invention (private R&D and information services);
- 2) information distribution and communication –(education, public information services, telecommunications) ;
- 3) risk management (insurance and finance industries);

- 4) search and coordination (brokerage industries, advertising);
- 5) information processing and transmission services (computer based information processing, telecommunications infrastructure);
- 6) information goods (calculators, semiconductors, computers);
- 7) selected government activities (education and postal service);
- 8) support facilities (buildings, office furniture);
- 9) wholesale and retail trade in information goods and services.

Porat includes in the secondary information sector “all information services produced for internal consumption by government and non-information firms”, except those government activities which belong to the primary information sector such as education and printing, but including government activities such as planning, coordination, monitoring, regulatory, evaluation and decision-making activities. Also included in the secondary information sector are those portions of private non-information firms and industries engaged in information work or the production of information which are not for sale or rent in the market but only to support the production of non-information goods, including internal data processing and library services.

Delineation of the Information Economy

Even though in this text, in the extent provided, there can not be examined all the areas where the development of the commercial internet has an essential impact on the economic environment, following the issues examined in the text it is possible to delineate the framework for the research in this area – as I define it by the term „information economy“.

Indeed, I claim that the rapid development of information and communication technologies in the last decades influences deeply many areas of human activity and the economic environment is definitely one of the influenced ones. We should not speak about changing of the fundamental economic laws, however, the ways how these laws apply to the world of the information age should be newly examined. Sometimes, the application is obvious; in some

cases it's not trivial. Such a profound change of economic environment can be observed e.g. in markets for digital products, like video or audio files, or online information service from the stock market. These digital products (and many more examples could be named) are usually distinguished by high fixed costs of production but close-to-zero marginal costs. While the first unit of the given product (audio file, office software, stock market development projection) is relatively costly to produce, costs needed to produce next units of this product (i.e. its copying) are de facto close to zero. This implies further changes in economic planning and business activities – studies on specific network effects and externalities, on new dimensions of economies of scale in the online markets, on new principles of standard setting, or on impact of ICT on total factor productivity are emerging (and some of these principles were indicated in this text). Generally, we can speak about changed characteristics of the economic environment that have the same grounds: the substance of these changes lies in thorough change in the ways of transfer and of utilization of information.

This change brings many implications not only for economic but also for social, political as well as cultural attributes of the world we live in. Commonly, these developments in transfer of information, in speed of transport of people and goods etc. are summarized under the term of “globalization”. In this text we focus on socio-economic aspects of changes in the global environment that are related to the role of information and of its transfer and utilization. This is highlighted by using the term “information economy” in this text. This term is being used by many renowned institutions (see e.g. OECD, 2002), its definition is, however, usually not provided. My definition of this term is derived – following earlier work of Manuel Castells (1993) – in my older text (Očko, 2005a). Bearing in mind abovementioned facts I define the information economy as follows:

Information economy: *economy in which a key source of wealth generation lies in a competence to create new knowledge and apply it on every area of human activity by using advanced technological and organizational procedures of information processing. The information economy is at the same time, due to its informational and communicational interconnection, a network economy and successful participation in it depends largely on an ability to activate the network interconnections and to utilize network effects, which is analogically applicable on the area of social as well as political relations.*

3. EXCURSION TO THE ECONOMICS OF INFORMATION

As mentioned above, the economics of information form a part of the economic science that is focused on the role of information in economic processes and on economic value of information. The situations of asymmetric information is a one where an economic agent knows something that another agent doesn't, represent the core of information economics.

As Yadav (2010) describes, the study of Economics of Information represents how information affects an economy and economic decisions, e.g., a worker might have a better idea of his capabilities than his employer does; managers know more about investment prospects than stockholders or investors. This asymmetric information typically leads to economic inefficiencies. Many applications exist in management, finance, accounting, insurance and marketing.

The Price System as Information System of the Economy

The origins of Economics of Information can be traced back to the early works of Friedrich August von Hayek (see e.g. Jan Šindelář [2006] or Milan Sojka [2001]). The key contribution of the price system to social well-being consists, Hayek demonstrated, is the system's capacity to transmit information from one part of the market to another. As described in (Eatwell, Milgate, Newman, 1987), in the event of a natural disaster which has curtailed the availability of a specific raw material, for example, the fact of a reduced supply will be effectively communicated to potential users through the medium of a higher price—which also provides the incentive for the socially desirable economizing of the particular raw material (Hayek, 1945, p. 85-86). The need for such a communication network arises out of the fact that the information to be communicated is dispersed throughout the society. This insight into the nature of prices as signals has, during the past decade and a half, come to be fairly widely recognized and expounded in modern textbooks.

In his treatment of the use of knowledge in society, Hayek made a sharp distinction between two kinds of knowledge (see Očko, 2004 and Eatwell, Milgate, Newman, 1987):

(1) scientific, or theoretical, knowledge; and

(2) the knowledge of the particular circumstances of time and place.

The first-mentioned category is the proper concern of the economist; the second-mentioned category is the proper concern of the market participant. Failure to recognize this "division of knowledge" can lead to one of two serious errors. The assumption that economists can assimilate both kinds of knowledge leads to the conclusion that "rational planning" can outperform—or at least duplicate—the market itself. The assumption that market participants can assimilate both kinds of knowledge leads to the conclusion that "rational expectations" can nullify the systematic effects of monetary manipulation.

Hayek recognized and emphasized that if a fully adjusted system of prices—one corresponding to attained equilibrium—can be held to offer a system of coordinated and mutually reinforcing signals, such a system must depend on some prior groping process of market discovery. Hayek saw this process as consisting of market competition—which meant for him not the state of affairs consistent with the conditions for so-called perfect competition, but rather the rough-and-tumble process of market agitation kept in motion by complete freedom for competitive entrepreneurial entry. What such a competitive process can accomplish, Hayek argued, is the discovery of possibilities and preferences that no one had hitherto realized (Hayek, 1968).

These insights concerning knowledge and discovery articulated by Hayek in a number of profound papers from the late 1930s to the mid-1940s (Hayek, 1948) were partly responsible for, and partly emergent from, Hayek's participation in the celebrated interwar debate over the possibility of economic calculation under a socialist system. In deepening and widening the case originally presented by Mises in 1920, which challenged the feasibility of such calculation in the absence of market prices for factors of production, Hayek came to perceive the market process itself as crucial for the generation of that very knowledge which it would be necessary for a central planning authority to possess before it could hope to achieve a successful and efficient allocation of societal resources.

Asymmetric Information

Asymmetric information is one of the main areas of study within the Economics of Information. In 2001, the Nobel Prize in Economics was awarded to George Akerlof, Michael

Spence, and Joseph E. Stiglitz "for their analyses of markets with asymmetric information." As Investopedia (2010) states it, *asymmetric information is a situation in which one party in a transaction has more or superior information compared to another*. This often happens in transactions where the seller knows more than the buyer, although the reverse can happen as well. Potentially, this could be a harmful situation because one party can take advantage of the other party's lack of knowledge. Investopedia explains Asymmetric Information

With increased advancements in technology, asymmetric information has been on the decline as a result of more and more people being able to easily access all types of information.

Information Asymmetry can lead to two main problems:

1. Moral Hazard - immoral behavior that takes advantage of asymmetric information after a transaction. For example, if someone has fire insurance they may be more likely to commit arson to reap the benefits of the insurance.
2. Adverse selection - immoral behavior that takes advantage of asymmetric information before a transaction. For example, a person who is not be in optimal health may be more inclined to purchase life insurance than someone who feels fine.

Moral Hazard

As mentioned above "economics of information" characterizes an area of research within the economic science that is focused on the role of information in economic processes and on economic value of information. Moral hazard is an typical case of information asymmetry. As Yadav (2010) puts it, it transpires when an economic agent has more information about its actions or intentions and has a tendency or incentive to behave inappropriately from the perspective of an economic agent with less information. The Moral Hazard doctrine inculcates the principal-agent problem model that solves the difficulties emerging under conditions of incomplete and asymmetric information; when a principal hires an agent, the two may not have the same interests, while the principal is hiring the agent to trail the interests of the former.

Adverse Selection

A classic illustration of the adverse selection principle was offered by George A. Akerlof in the Nobel Prize winning article "The Market for Lemons: A Personal and Interpretive Essay" published in the Quarterly Journal of Economics in 1970.

As the essay explains; if one has 2 people willing to sell their car, the first person is an old lady, rarely driving the car and keeping it in a good condition. The second person drove the car in the teenage years; speeding, drag racing, and seldom changing the oil. The car buyers are unaware of condition of the car's to be sold and cannot distinguish between the two cars. The old lady will not accept a lesser price than what the car is worth, whereas the young man cheerfully accepts the price offered, considering the wild past of the car. The car dealer accepts lemons as the lemon sellers willingly accept the offered average price while the owners of well-maintained cars reject it.

Signaling

The concept of signaling describes that the agent, conveys meaningful information about itself to the principal. As Michael Spence's job-market signaling model defines, potential employees send a signal about their ability level to the employer by acquiring certain education credentials. The informational value of the credential originates from the fact that the employer assumes it is positively correlated to possessing greater ability.

The Applications of Information Economics

Akerlof revealed that informational asymmetries may augment to adverse selection on markets. Thus, imperfect information on the part of lenders or prospective car buyers, borrowers with weak repayment prospects or sellers of low-quality cars crowd out everyone else from the market.

Spence demonstrated that well-informed agents could improve their market outcome by signaling their private information to poorly informed agents. The management of a firm can thus incur the additional tax cost of dividends to signal high profitability.

Following the league of eminent economists of all time, the Sveriges Riksbank Prize in Economic Sciences 2001 winner, Joseph E. Stiglitz mentioned that an uninformed agent can sometimes capture the information of a better-informed agent through screening, by providing choices from a menu of contracts for a particular transaction. Insurance companies are thus able to divide their clients into risk classes by offering different policies, where lower premiums can be exchanged to avail a higher deductible.

Financial Crisis 2007-2009 and Role of Rating Agencies

One of the most visible applications of information asymmetries we could see during the great financial crisis between 2007-2009 especially in the context of the role of the credit rating agencies (CRA). The crisis marked by the fall of the Lehman Brothers investment bank (see e.g. Stuchlík, 2009) has its origins on financial markets that were trading with sophisticated financial products originally mainly based on the “sub-prime” mortgages. In the environment with such a sophisticated financial products the role of rating was essential (see e.g. Nacher, 2009).

As for example Zdeněk Husták (2009) puts it, the operation of CRAs is based on gathering the information on a subject issuing a financial instrument, situation in a given segment of the economy, or macroeconomic situation as such. Following analysis and evaluation of this information they elaborate standardized assessment (rating) that represents probability of issuer’s ability to fulfil its commitments. This assessment is an outcome of utilization of a standardized methodology that is specialized know-how of the given rating agency.

The rating is thus an aggregate information on the situation of the given subject or product. Siegfried Utzig (2010) says that the growth of the international financial markets over the last twenty years would have been unthinkable without CRAs. Only because of the availability of clear, internationally accepted indicators of the risk of default were investors willing to invest in international securities – whether corporate or government bonds – whose credit quality they would have been virtually unable to assess on their own. The CRAs worked for decades on designing a simple and readily understandable system that would allow any investor to invest in international securities with which they were not directly familiar. Where corporate

and government bonds are concerned, this system has proved reliable and enabled investors to diversify their portfolios.

In the markets for structured products, by contrast, the role of the CRAs goes far beyond eliminating information asymmetry. Markets for structured products could not have developed without the quality assurance provided by CRAs to unsophisticated investors about inherently complex financial products. CRAs have operated as trusted gatekeepers. However, the ratings for structured credit turned out to be much less robust predictors of future developments than were the ratings for traditional single name securities.

Utzig (2010) continues that over the past two years, changes in the ratings of structured credit have been far more volatile than the historical record for single name credits, and far more weighted toward downgrades. The resulting instability of ratings has not only had direct procyclical effects, but has undermined confidence in the future stability of credit ratings. Against this backdrop, calls for CRAs to be regulated in a new and more stable world financial order fell on fertile ground, all the more so given that the CRAs could be accused of making some serious errors. A number of official European reports have now described in detail how certain flaws in the rating process and the conditions governing the financial markets contributed to the crisis.

The first comprehensive analysis appeared on 7 April 2008, when the Financial Stability Forum (FSF) published its report on enhancing market and institutional resilience (Financial Stability Forum 2008). This report concluded that the CRAs' substantial underestimation of the risk inherent in structured finance products was partly due to methodological shortcomings. Singled out for criticism were the inadequate historical data, which significantly increased model risk, and the fact that CRAs had not taken sufficient account of deteriorating lending standards.

The report took a positive view of the measures already introduced by the CRAs; nevertheless, a need was seen for further steps to improve internal governance, the transparency of rating procedures, and compliance with international codes of conduct. There was criticism, too, of CRAs' failure to publish verifiable data about their rating performance. The agencies were urged to disclose this information in as standardized a form as possible.

The report also called for a distinction to be made between ratings of structured finance products and other corporate bonds in order to highlight the differences in the methodologies

used and the significantly different risk characteristics involved. The FSF felt, however, that more in-depth analysis was needed of the implications of such a step for the functioning of the market and the regulation of the industry.

In addition, the FSF report criticized CRAs for failing to adequately monitor the quality of securitized products. More rigorous scrutiny of lending practices was therefore called for. And last but not least, investors and supervisors were called on to examine whether they may have placed too much confidence in ratings.

Further reports by expert bodies and regulators were published over the course of the following twelve months. In October 2008, the President of the European Commission, José Manuel Barroso, mandated Jacques de Larosière to chair a committee to give advice on the future of European financial regulation and supervision. In February 2009, the committee published a report that cited the following shortcomings (de Larosière Group 2009):

- CRAs lowered the perception of credit risk by giving AAA ratings to the senior tranches of structured finance products like collateralized debt obligations (CDOs), the same rating they gave to government and corporate bonds yielding systematically lower returns.
- Flaws in rating methodologies were the major reason for underestimating the credit default risks of instruments collateralized by subprime mortgages. The report was especially critical of the following factors, which were all felt to have contributed to the poor rating performances of structured products:
 - the lack of sufficient historical data relating to the US subprime market,
 - the underestimation of correlations in the defaults that would occur during a downturn, and
 - an inability to take into account the severe weakening of underwriting standards by certain originators.
- October 2008 also saw the German government appoint Otmar Issing, former Chief Economist at the European Central Bank, to chair a committee to draw up recommendations first for the Group of Twenty (G-20) summit in Washington and then for the follow-up summit in London. The committee's report drew attention to the part

played by various unresolved conflicts of interests (Issing Committee 2008). It leveled the following criticisms at CRAs:

- The governance of credit rating agencies did not adequately address issues relating to conflicts of interests and analytical independence. Agencies competing for the business of rating innovative new structures may not have ensured that commercial objectives did not influence judgments on whether the instruments were capable of being rated effectively.
- Rating shopping by issuers contributed to a gradual erosion of rating standards among structured finance products. This negative effect resulted from the right of issuers to suppress ratings that they considered unwelcome, thereby exerting pressure on the agencies.

In March 2009, the United Kingdom (UK) Financial Services Authority published the Turner Review, which also highlighted the responsibility of CRAs in its analysis of the causes of the financial crisis. The review came to the following conclusions:

- The practice of making the models by which agencies rated structured credits transparent to the issuing investment banks created the danger that issuers were “structuring to rating,” i.e., designing specific features of the structure so that it would just clear a certain rating hurdle.
- The shift to an increasingly securitized form of credit intermediation and the increased complexity of securitized credit relied upon market practices that, while rational from the point of view of individual participants, increased procyclicality in the system.
- More securitization meant that a greater proportion of credit assets were held by investors seeking reassurance from credit ratings, and thus increased the potential aggregate effects of forced selling by institutions using predefined investment rules based on ratings.
- The use of market value or rating-based triggers increased in an attempt to improve investor and creditor protection.
- Arrangements that related the level of collateral posted in derivative contracts to the credit ratings of counterparties also had a significant procyclical effect.

Utzig (2010) sums it up, the following elements may be said to have had an adverse influence on the quality of CRAs' work:

- Overreliance on mathematical and statistical methodologies based on inadequate data,
- Insufficient consideration of market and macroeconomic developments as factors influencing ratings,
- Failure to take account of interdependencies,
- Disregard of conflicts of interests, and
- Inadequate disclosure practices with regard to models and model assumptions.

This outline of the ratings dilemma would be inaccurate if it were to focus only on shortcomings on the part of CRAs. It is also true that investors often accepted ratings uncritically and overestimated their significance. Not enough attention was paid to the fact that ratings are only estimates of the relative probability of default or expected loss on a debt instrument. They are not a detailed assessment of risk and say nothing about an instrument's price quality or liquidity. Ratings are no substitute for investment risk management, particularly as the information provided by CRAs is limited.

4. THE EMERGENCE OF THE INTERNET ECONOMIC ENVIRONMENT

The commercial network applications started to develop already in the 1970s' and 1980s, however, the emergence of the network economic environment was not possible before release of the internet (that worked for academic and public administration purposes since 1970s) for commercial purposes in the beginning of 1990s. Seen from the view of the information economy, the business lacked a single standard for effective realization of business solutions in the network environment – the corporate networks of that times were not mutually compatible and publicly unavailable. The more spectacular the development of the commercial sphere of the internet was in the 1990s. The boom of so called “dotcoms” (the companies realizing its business primarily on the internet) can be earmarked by the day of the breaking IPO of the Netscape company at the U.S. technological stock exchange NASDAQ that was extremely attractive for investors that was reflected by the soaring prices of the Netscape's shares.

The years of eWealth

In the following several years became founding of the internet companies very fashionable way of undertaking that often led to unrealistic expectations and to establishment of out-of-reality business models (see e.g. Image 1 for illustration). To illustrate the atmosphere of that days it is very inspirational to quote the renowned economic magazine The Economist, the issue of June 26, 1999:

Most senior managers no longer need convincing. A recent worldwide survey of 500 large companies carried out jointly by the Economist Intelligence Unit and Booz Allen and Hamilton, a consultancy, found that more than 90 % of top managers believe the Internet will transform or have a big impact on the global marketplace by 2001. That message is endorsed by Forrester Research, a fashionable high-tech consultancy. It argues that e-business in America is about to reach a threshold from which it will accelerate into "hyper-growth".

In my opinion, The Economist would not publish an article in this style a year later. The fact that even such a renowned and serious magazine did not resist to use terms as “hyper-growth” and forecasts of transformation of the market by the internet tells us something about “spirit” of that time. In 1999 was the e-Business really highly fashionable and even in the expert spheres it was not appropriate to speak about lower than double increase of the internet trade every year (that was really true at the end of 1990s). Many estimates were, however, even more optimistic and in this euphoric atmosphere the prices of dotcom shares soared in incredible pace.



Image 1: Title page of the TIME magazine (September 27, 1999 Vol. 154 No. 13)

This optimism was reflected by the financial markets where the NASDAQ index was on five times higher level in 2000 than in 1995. Many observers of this development, including renowned economists (see e.g. Baily, Lawrence, 2001), were asking if the considerable

growth of the ICT sector (and even higher growth of the technological shares value) means substantially new implications for the economic science and its mechanisms. Plethora of futuristic visions of the future of the e-world of business created an effect of “self-confirmative expectations” and even at the end of 1999 and the beginning of 2000 would almost no one believe that the ability of the world economy to generate more and more wealth in the virtual sphere of the internet does not have to be necessarily extrapolated in the long term.

Still in 2000 there was an inspiring debate in the Czech media among several Czech economists and experts in the area of electronic media on the topic of the intriguing questions if the internet changes the economic mechanism. The more unconvinced side was represented especially by Mr Václav Klaus who published an article in *Hospodářské noviny* named “Information technology does not change the economic mechanism” (Klaus, 2000) and together with his speeches at the INVEX exhibition he initiated very broad response of supporters of so called “new economy” (or even the “new economics”) that was at that time usual term for the world economy based on the internet and fast information transfer and transport of goods.

The indisputable contribution of Václav Klaus to this debate was a realistic assessment of the influence of the ICT development on the economic mechanisms (Klaus, 2000): “I insist on the fact that the old good economics is valid and will be valid as long as in the human society there will dominate scarcity, there will be necessary to allocate the limited resources in the way to let them bring the best effect and there will parallelly exist the other side of the same coin that is so called “disutility of labor”, or till people will work because of the salary not because of the work itself”. The economic laws remain the same and to speak about the “new economics” is pointless. Klaus then claims that ICT induces some structural changes and they have an impact on microeconomic area and on models of functioning of companies (reduction of transactional costs among others) that is being proved also today, however he does not agree with the term of “new economy”. As he states it further: “I consider very questionable and unconvincing deliberations about the fact that the modern information technologies caused the extraordinary growth of the American economy of the nineties, today’s strength of the US dollar against the euro and the like. There was no Reagan’s supply side revolution in Europe, Europe has no Alan Greenspan, Europe has very heavy labour legislative, decelerating the labour mobility, Europe has high rate of workers in the unions, Europe has

too spread welfare state, Europe instead of consequent liberalization of its economic and social system has chosen substitutive programme of European unification that so necessary changes shifts to the sidetrack.” Klaus considers the internet and the information technologies generally to be rather pure means of communication a de facto refuses governmental support in this area when stresses that market and the free competition are much more efficient for development of all kinds of innovations, i.e. including the ICT innovations, than the good intentions of the politicians and of the state officials (see also Klaus, 2001).

On the other hand, a thorough argumentation in favour of the “new economy” was provided for instance by Jiří Zlatuška (Zlatuška, 2000), at that time a rector of the Masaryk University in Brno, or other experts (Hlavenka, 2000). However, today we know how the situation evolved. At the beginning of the year 2000 the NASDAQ stock exchange index recorded fall that many investors analysed as “bubble burst” at the financial markets and technological shares were sold in big amounts. The NASDAQ index itself fell down back to one fifth of its value (see also Očko, 2005b). In short time other economic shocks happened (accounting scandals in Enron and other companies, terrorist attack of September 11, 2001, oil prices increase) and the fall of technological shares value was followed by deep recession of whole the world economy.



Graph 2: NASDAQ Index 1995-2001 (Source: NASDAQ)

Investors in the field of information technology lost many of their investments, many non-realistic dotcom projects had to be stopped (also because the advertisement agencies lost their trust in the internet as a reliable advertising media). The internet business had to go through a few uneasy years and term “new economy” was silently forgotten. Indeed, was Václav Klaus right in the “new economy” 2000-2001 argument?

2000: The Great Dotcom Bubble Burst

As Robert Shapiro (2002) described it, the IT bubble represented an excess of something that in itself has real value for the economy – information technologies. The bubble began in overinvestment in IT and spread to much of the stock market; but at its core, much of the IT was economically sound and efficient. Further, these dynamics also played a role in the capital spending boom of the 1990s, and much of that capital spending translated into permanently higher productivity. The result is that the American bubble should not do lasting damage to the American economy

Three factors contributed to the capital-spending boom and helped inflate the IT bubble:

- the first was continuing deregulation of telecommunications, which led to the creation of hundreds of new telecom carriers who raised billions of dollars on Wall Street to build new fiber optic networks and other systems.
- the second factor was the explosion of the Internet, which produced thousands of B2B and B2C firms that became customers for new IT and telecom equipment.
- third, Y2K fears further boosted IT and telecom purchases.

These factors are distinct and separate from the more classical bubble that occurred in Internet stocks, which had little real economic foundation and did resemble Japan's bubble, but which also did not greatly affect the rest of the economy.

The internet stock bubble was based on distorted market signals - bad information - and it was punctured by better information, when it became apparent that a number of leading web firms were misrepresenting their revenues and profits, and, more important, that the typical Internet

business model would not generate the cash to pay its bills. By contrast, the larger IT bubble wound down, first, when IT buying by manufacturing companies slowed following the energy price spike and rising interest rates of 1999, and subsequently when all that demand from new telecom and Internet companies dried up. The absence of Y2K disruptions also denied IT a possible boost in demand in 2000.

The speculation in American markets last year and the two or three years preceding essentially took the form of too much capital going to telecom and web firms in markets that ultimately did not generate the expected and necessary returns. The slowdown did not begin with IT, and much of the IT sector - especially services -- was only modestly affected by the speculative fever. But as demand for IT products fell, it became apparent that many leading IT producers had been over-investing in their productive capacities. The sector with the best information and the best ways of managing it was caught in a traditional cycle of over production and large inventories. The consequences were large, because many of the products that were over-produced have short shelf lives.

It affected the whole economy because business investment, a principal driver of the '90s boom, has been dominated by investments in IT. As business investment slowed sharply, the slowdown in manufacturing spread. GDP growth slid from the 4-to-5 percent pace of the latter 1990s, to 3 percent and then 2 percent. This was unavoidable, given the disproportionate role that the IT sector has played in recent U.S. growth. Comprising just 8 percent of GDP, the sector had been growing so fast that it accounted for nearly one-third of U.S. growth from 1995 to 2000.

As Shapiro (2002) sums it up, IT production has been falling for more than a year, and as recently as this past summer, the fall in IT production accounted for almost one-third of the decline in total output. Overall, production in the U.S. declined this summer at 4.9% annual rate, virtually across the board. However, services have continued to grow at a reasonable rate, and since services account for most the economy, the U.S. avoided recession - at least until September 11th.

Information Economy Challenges for the Microeconomics

It is necessary to say that an indisputable contribution of Václav Klaus was the fact that in the times of the most intensive “dotcom” euphoria he initiated debate on real impacts of the internet development. Briefly, we can state that the answer to the question of the impact of ICT on economics and on economy is that the ICT do not change basic economic laws, however, they have increasingly growing impact on economic environment itself. That fact then implies necessity of new approach to entrepreneurship and to definition of the business models.

The influence of ICT on economic environment is observable in many areas, especially those where network business models are in place – e.g. field of the feedback mechanism, network externalities or standard setting (exchangeable formats of software as well as hardware). There are many areas where we can identify new applications of standard economic mechanisms – the extent of this text allows just for a brief summary, not for deep analysis of these phenomenons. Some of the practical applications are, however, examined in case study of successful internet business model further in this text.

In this chapter I would like to specify the most important effects as they were analyzed in the works of Oz Shy (2001), Victor Stango (2004) and, particularly, Carl Shapiro and Hal Varian (1999). Even though was the latter study published in 1999, i.e. the year of the most intensive enthusiasm for the “new economy”, its main message is that the fundamental economic mechanism does not change. Technological progress, however, considerably modifies the characteristics of the economic environment and we ought to learn to adapt the standard economic mechanisms to these new situations (see also Očko, 2005a, 2008).

Costs of the information production

While the production of the information is usually costly, its consequent reproduction is relatively very cheap. Publication of books costs thousands of dollars but they can be then printed for a price of one or two dollars. A blockbuster movie production of which costs 100 mil. dollars can be copied to a VHS cassette or DVD for a price of several cents. Production of information shows high fixed costs but very low marginal costs. Costs of producing the first issue can be considerably high but production of all the following copies are negligible and it is remarkable especially in the digital world. That implies substantial consequences.

Setting the price of the product on the unit cost basis is not applicable: setting 20 % margin to the unit cost does not make sense when cost of unit is close to zero. Information goods must be priced on the basis of its utility for the consumer, not on the basis of production costs.

Intellectual property rights management

If producer of information goods can reproduce these goods for negligible costs, then usually almost anybody can do that. Global scale of the internet further deepened this problem as the speed, amount and generally possibilities of reproduction of informational products grew exponentially. Legal instruments of exclusive rights to the intellectual property by means of patents, copyright or trade marks do not guarantee full control over the information. The development of digital technologies and of the internet accentuated question of promoting and enforcing of these rights. On the other hand, it should be stressed that the objective of the intellectual property rights management should lie in setting such a conditions that maximize the value of the intellectual property not such a conditions that just maximize its protection.

Information as “experience goods”

Product can be classed as “experience goods” if it has to be experienced by the consumer to let him determine the value of the goods. In very general terms almost every product can be experience good and marketing managers developed sophisticated strategies how to help consumer to experience the goods: free samples, reduced market entry prices or certificates of experts. But information is experience goods every times it is consumed. We can be never sure in advance that the issue of our daily newspaper will represent for us the value of the price we paid for it before we read it through. There are some ways how to estimate the value of purchased information. Particularly, there are various ways of browsing the information: reading the headlines at the newsstand, listening to the new songs in the radio, or watching the trailers and reading the reviews of the movies. The dilemma of the producer between necessity of publishing certain information to let the consumer experience what the producer offers and between pricing these information to make the price cover the costs of the production is one of essential problems of the information economy.

However, this is just one of the possibilities how to eliminate the uncertainty of the consumer about the real value of the product before he buys it. The most effective way how to overcome

the problem of the experience goods is brand and trust building, i.e. reputation. The main reason for a consumer to buy certain title of newspapers is that he found it valuable already in the past.

Economics of attention

It was already indicated that the problem of today is not the access to the information but rather the information overload. The real value produced by the information provider is hidden in the processes of search, filtering and communication of the data that are relevant and useful for the consumer. The aim is to engage the consumer, to attract his attention. That's why we speak about the "economics of attention". This specifics of the internet has profound effects on online marketing strategies. The success of Google lies also in precise assignment of advertisement links to the context of the keywords that are searched by the user. More detailed and more precise methods of acquisition of information on the user's needs and consequent exact targeting of the advertising is a key to the successful marketing. The objective is not only to attract the attention of the user but also to give him with higher utility providing him with more relevant information.

User lock-in and the switching costs

In essence, every user of the ICT (individual as well as corporate) faces more or less frequently switching costs to another system and becomes, thus, subject to the "lock-in" in this system or technology. So called "switching costs" are the price that has to be paid by the organization (or any user) if he decides to cross form one system, technology or format of data processing and storing to another. Particularly in large corporation these costs can be critical – in some cases the switching costs can be higher in medium-term than the increase in utility stemming out of the use of the new system or technology. That's why the lock-in in certain legacy technology is a frequent problem of the information economy. The lock-in is not usually absolute – with coming of new innovated technologies after some time the utility form the switch will prevail. However, we can say that the level of the switching costs is to a large extent also a strategic decision of the system producer (typical e.g. for operational systems). Following Shapiro and Varian (1999) stipulates Shy Oz (2001: 4) main reasons for the user's lock-in: contracts on operation and maintenance, re-training of the users, temporary decrease in productivity before the system is fully incorporated, conversions of data to a new

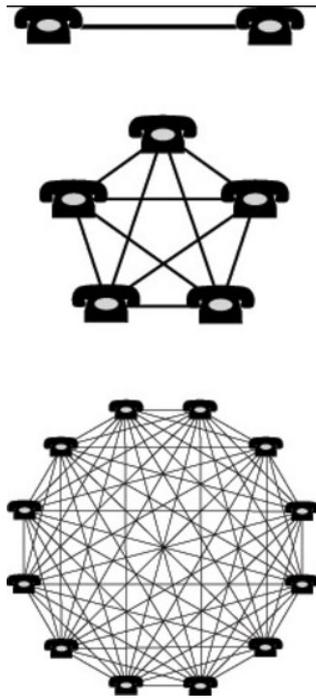
format, searching costs of the new system selection and purchasing costs including the loyalty costs (often losing some of the customer benefits).

Economies of scale

Economies of scale in the information economy are related to abovementioned characteristics of the information goods that in electronic form show certain network effects. As Oz Shy (2001 : 5) states it, costs of producing of a complex software application mean thousands hours of programming work, however, when the system is ready, its distribution over the internet is possible in de facto unlimited number of copies with the costs close to zero. It means that these segments with close-to-zero marginal costs show also very quickly falling average costs curve with increasing number of copies sold. It means that the competitive equilibrium on the relevant market is non-existent and markets of this type very often tend to model of oligopoly with one dominant company (also because of ownership of the network effects by one corporation). This company locks its users to its own system and realizes the economies of scale while the other companies are unable to overcome the barrier of the users lock-in in the dominant system and the barrier of critical mass of users of its own system to induce the network effects.

Network products and standard setting

In the previous points the importance of standards for segments with network effects was indicated. This area is being thoroughly discussed in most of the abovementioned (and other) publications – e.g. Shapiro, Varian (1999), Economides (2003), Stango (2004) or Shy (2001) – and the topic of network effects would deserve a study of its own definitely (see also Očko, 2005a). Briefly we can say that network effect occurs in sector where utility of the product for its individual user increases with increasing number of users of this product. Typically we can demonstrate it on the example of the telephone service (see scheme 1). However, it is obvious that many internet products show network effects.



Scheme 1: Growth of connections with increase of telephone users (Manley, 2008)

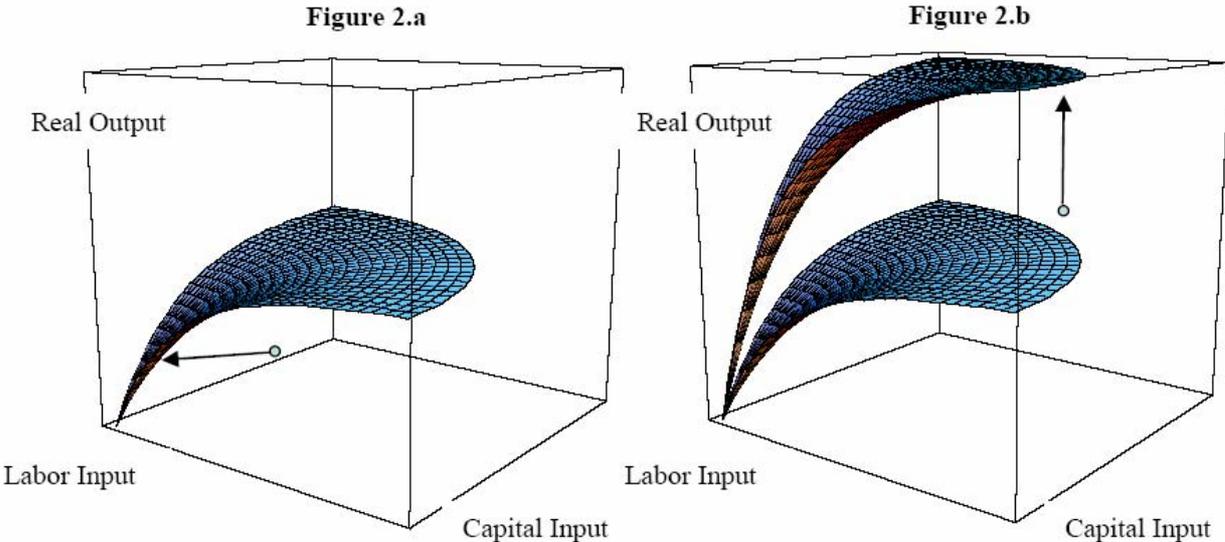
In this paper I would like to mention specifically the area of standard setting. Victor Stango (2004: 2) claims that though markets with network products tend often to standardization, it is usually very complicated process. Sometimes there are tendencies to standard setting in the way of “winner takes all” when a standard promoted by one company or alliance becomes the only utilized while the other disappear. These so called “standard wars” can be initiated in two ways.

Firstly, the new technology can be completely incompatible with the old technology. We can mention e.g. the case of digital versus analog recording of music. Specific case of such kind of standard setting is situation when two (or more) new technologies come to a market where they are about to replace the old technology (a topical example is appearance of recordable DVD media where parallely evolved two standards: DVD+R and DVD-R).

Secondly, the producers of the new technology intentionally design the new standard to be incompatible with the others. Typical example of such an approach is market with the game stations. We experience here also a principle of “path-dependence” where decision on acceptance of certain standard by latter acceptors (users) is dependant on decisions of different subjects earlier.

Information Economy and Productivity Growth

This list of application of economic mechanisms to the information economy in previous chapters is not fully comprehensive but it provides an outline of the fields where the economic science is expected to go deeper in its analysis in its future. At least I would like to stress that there are specific challenges for the socio-economic policies of the government where – particularly but not only – in the area of the competition policy new challenges are brought by the emergence of the information economy. Also the macroeconomic effects of the development of the information economy should not be omitted. Impacts of ICT on the total factor productivity are to be examined as they are non-linear to the labor and capital investment, as it illustrates graph 3 published in the study of Nathaniel Bukley and Marshall Van Alstyn (2004).



Graph 3: Productivity growth shifting the producing possibilities (2.b), not only the level of production (2.a)

As mentioned above, these are topics that constitute challenges for the economic science of today and ought to be discussed and analyse deeper. In the further text I would like to illustrate on practical examples from the online world some of the applications of the economic mechanisms to the information economy.

5. THE ROLE OF REPUTATION BUILDING IN AN ONLINE ENVIRONMENT

Main theme that will be examined further in this text is the role of reputation mechanisms in the online markets. On a practical example it will be argued that the reputation mechanisms are an important aspect of every business undertaking, however, in online markets special attention must be paid to this area and reputation building should be a cornerstone of a company's online marketing strategy. Mutual trust of the two parties of a transaction must be built on reliable information presented by both of them. However, the internet environment brings more opportunities for non-transparent business behavior and allows for risks of negative effects of the information asymmetries – situations of moral hazard or adverse selection.

The reputation building mechanism can be generally described as a repeated situations of strategic behavior of several (at least two) subjects and they can be well analyzed especially by means of the game theory. Dellacros (2003b), referring to Wilson (1985), offers definition of reputation using terms of the game theory: reputation is a concept that arises in repeated game settings when there is uncertainty about some property (the "type") of one or more players in the mind of other players. If "uninformed" players have access to the history of past stage game outcomes, reputation effects then often allow informed players to improve their long-term payoffs by gradually convincing uninformed players that they belong to the type that best suits their interests. They do this by repeatedly choosing actions that make them appear to uninformed players as if they were of the intended type, thus acquiring a "reputation" for being of that type.

It is not surprising that reputation plays an important role in every business undertaking, however, as I already mentioned, in the online business environment the efforts to build (positive) reputation must be taken much more seriously (see also Očko, 2005b). Special nature of online business is particularly due to a certain anonymity of internet, its complex and inhomogeneous legal environment, frequent non-claimability of liabilities of subjects with unclear geographical residence in the real world, or possibilities of misuse of personal and sensitive data if they are not protected enough against hacking. Indeed, in the online business, more than in other undertaking, care of company's reputation must form an integral part of the business strategy and deeper understanding of the reputation building mechanisms is needed to form a successful one.

Stimulation of “proper” consumer behaviour

As I already mentioned (based on my earlier text – see Očko, 2005b), internet marketplace shows certain specifics – some of them, as unlimited opening hours, availability of information, easy price comparison, practical independence on geographical location etc. act as rather positive impulse for both the supply and demand side of the transaction. On the other hand, the internet marketplace has also its limitations – one of the most important is the inability of the purchasing person to verify the trustworthiness of the seller (and vice versa). In the internet environment, where the seller as well as the purchaser is often anonymous, there is high risk of non-honest behaviour on one side of the transaction. We refer to this situation as to “moral hazard” that is one of the situations of so called “information asymmetries”, i.e. situation when one side of the transaction misuses the information that the other side of the same transaction does not dispose of. This misuse leads to transfer of utility from the transaction in favour of the side that acts in the moral hazard way (please see more on the moral hazard theme shown on the Google case in Očko, 2005a).

There exist some technologies that allow preventing the information misuse – particularly some security or encryption technologies that can ensure the identity of the information sender and the integrity and confidentiality of information during its transmission. We can name security certification systems (e.g. Thawte), secure payments systems (e.g. PayPal) and secure communication technologies as the SSL protocol. However, this only one aspect of the whole problem – these systems or technologies do not solve the situation when the seller delivers to the purchaser a product that does not comply with the information originally provided on the seller’s website. That is the reason why the reputation building mechanisms evolved – according to the abovementioned definition of reputation these mechanisms allow informed players to improve their long-term payoffs by gradually convincing uninformed players that they belong to the type that best suits their interests. The “type” in the context of business usually means “a honest and trustworthy seller”.

The reputation mechanisms help to create trustworthy relations in the environment prone to the moral hazard behaviour and support revelation of intentions of the persons concerned. As Chrysanthos Dellacros (2004) puts it *the objective* of reputation mechanisms in such settings is to promote cooperative and honest behaviour among self-interested economic agents. In

contrast, in settings where the primary trust issues are related to adverse selection, the role of reputation mechanisms is to help the community learn the (initially unknown) attributes of community members (such as their ability, honesty, etc.). A fundamental distinction between the two kinds of settings is that, in the former, all community members are assumed to be equally capable of behaving in “good” and “bad” ways and will act in ways that maximize their individual payoffs, whereas in the latter, community members differ in “type” (e.g. some are intrinsically more capable of providing good service than others) and behave in ways that are constrained by their type. In settings of the first kind, reputation mechanisms use the threat of future information disclosure to promote discipline – we speak about sanctioning. In contrast, in settings of the second kind reputation mechanisms publish information accumulated from past transactions to promote social learning – we speak about signalling. We will speak about the mechanism of the second type hereinafter.

The reputation mechanisms can be classed with so called feed-back mechanisms and, more generally, with the economic mechanisms that aim to creation of environment that supports self-regulating behaviour of the relevant subjects. It means such an environment where proper (honest, consistent) behaviour of subjects is not regulated by norms under a threat of sanctions but such acting is in own interest of the relevant subjects. This kind of behaviour generates certain signals that can be – through the reputation mechanisms – an important information for behaviour of other relevant actors in the given transaction. As Nir Vulkan (2003) emphasizes: “the main objective of such economic mechanisms is to reach certain behaviour of the economic actors by providing the proper incentives. These incentives are provided by the rules of the game, i.e. by specification of the communication protocol.” Vulkan considers these “rules of the game” as essential for the e-commerce applications. These applications are in effect formed by these rules and the communication protocol is the representation of this protocol to the user.

Chrysanthos Dellacros (2003a: 2) goes even further by saying that through the use of information technology, what had traditionally fallen within the realm of the social sciences is, to a large extent, being transformed to an engineering design problem. The potential to engineer social outcomes through the introduction of carefully crafted information systems is opening a new chapter on the frontiers of information systems research. Further progress in this area requires a deeper understanding of the potential role of feedback mechanisms in various types of communities, a careful scoping of the design space of online feedback

mediators, and theory-driven guidelines for selecting the most appropriate mechanism architecture for a given class of settings.

Dellacros's belief in the possibilities of the engineering design is probably somewhat too optimistic, however, definitely setting the proper self-regulating rules for stimulation of certain behaviour is a key to a successful online business model.

Reputation mechanism at eBay.com

It is necessary to say that the reputation mechanisms did not emerge as late as the commercial internet established. These mechanisms evolve together with human social communities from the ancient times. The "word-of-mouth" recommendations could certainly always have impact on the profit of two small bakeries in one village. If a rumour that the bake rolls in one of them are made from spoiled flour went around the village it could mean that the citizens of the village changed quickly their preferences and went to buy the delicious rolls in the second bakery. Reputation mechanisms in this sense exist in every human community. Referring to Chrysanthos Dellacros (2003b:1409) word-of-mouth networks constitute an ancient solution to a timeless problem of social organization: the elicitation of good conduct in communities of self-interested individuals who have short-term incentives to cheat one another. The historical appeal of these networks has been their power to induce cooperation without the need for costly enforcement institutions. Before the establishment of formal law and centralized systems of contract enforcement backed by the sovereign power of a state, most ancient and medieval communities relied on word of mouth as the primary enabler of economic and social activity (Benson 1989, Greif 1993, Milgrom et al. 1990), and many aspects of social and economic life still do so today (Klein 1997).

How can be these principles applied in the environment of anonymity and of purely virtual human communities, i.e. in the internet marketplace? As it was already emphasized, the role of reputation in the online environment is much stronger than in the "real" brick-and-mortar business world where generally product can be tested before buying and the seller and the purchaser see and know each other. In the online world, the supply and demand meets in the online environment and the seller and the purchaser very often never meet. The problem is imminent especially in the case of huge auction servers, like eBay where hundreds of thousands users every day offer products of all kinds. How to assure that the quality of the

offered product complies with the information provided and how to ensure that every bought product will be really paid?

The concrete examples of reputation building mechanisms can be for example review sections of servers like Amazon or Epinions where the users (voluntarily) spread its views on the products being sold at the website. Their role is primarily signalling: they spread (independent) information on the quality of the reviewed product. At the eBay.com, the world's biggest online auction server, the reputation mechanism is more sophisticated – the users of eBay do not evaluate the sellers according to the actual quality of their products but rather according to their ability to fulfil what their promise in the description of the product as well as in the delivery terms. The role of the eBay reputation mechanism is in the stimulation of the honest behaviour of its users, not in stimulation of high quality of the products offered as such.

It's worth noting that eBay is one of the most successful online business undertakings in the history. Its success is underlined by the fact that it started in 1995, i.e. in the “ancient times” of the commercial internet. It has never encountered losses since then and it helped almost 150 million people to buy things that they probably would not buy under the same conditions elsewhere. eBay grows every year and it even survived the dotcom bubble burst in 2000 without heavy losses as its model does not rely on advertisers' money as many other online business models of that times did.

Success of eBay is primarily based on the fact that it introduced mechanism that guarantees high level of credibility of transaction between people that (usually) do not know each other. eBay serves only as an intermediary in these transactions not as the selling or buying side. eBay does not have to maintain any stocks or to employ huge staff to deal with the thousands of every day orders. Its most remarkable added value is the reputation mechanism that allows anyone to become a trustful merchant or client. Dellacros (2003b: 1411) notes that one of the most remarkable aspects of eBay is that the transactions performed through it are not backed up by formal contractual guarantees. Instead, cooperation and trust are primarily based on the existence of a simple feedback mechanism. This mechanism allows eBay buyers and sellers to rate one another following transactions and makes the history of a trader's past ratings public to the entire community (see Image 2).

eBay ID card		pastjoys (1846) ★ power seller	
Member since: Sunday, Jun 14, 1998			
Location: Netherlands			
Summary of Most Recent Comments			
	Past 7 days	Past month	Past 6 mo.
Positive	18	101	548
Neutral	0	1	1
Negative	0	1	1
Total	18	103	550
Bid Retractions	0	0	0

View pastjoys 's [Auctions](#) | [ID History](#) | [Feedback About Others](#)

Image 2: Example of “feed-back” rating for an eBay user

These mechanisms really work as it can be demonstrated by the fact that ratings at eBay are usually close to or even above 99 % of positive references. The success of eBay is, of course, demonstrated also by huge amounts of transactions realized every day through this auction server as well as by the financial turnover and profit of the company. Necessary to say, also eBay had to build its reputation as a credible mediator of auction transactions. There are definitely examples of auction servers that did not succeed in convincing the critical mass of users that it is worth to offer its goods through the given website or critical mass of customers to look for such kind of goods in there. Also auction server as such has to start with its own marketing and stimulating the perception of itself as a place that is able to ensure credibility and trustworthiness of its users.

We should answer also the question what distinguishes the online feed-back mechanisms from the traditional word-of-mouth networks. Dellacros (2003b:1411) says that the difference is in combination of three aspects:

- 1) unprecedented scale of online feed-back mechanisms, achieved through the exploitation of the internet’s low-cost, bidirectional communication capabilities,
- 2) the ability of their designers to precisely control and monitor their operation through the introduction of automated feedback mediators,
- 3) the new challenges introduced by the unique properties of online interaction, such as the volatile nature of online identities and the almost complete absence of contextual cues that would facilitate the interpretation of what is, essentially, subjective information.

While the first two points mean a significant contribution to the development of effective online economic environment, the third point refers to complications linked to the online economic transactions. The anonymity of the internet as well as the frequent impossibility to find out more contextual information on the transaction with a subject that is physically situated on different continent of the world must be compensated by higher effectiveness of stimulation and signal mechanisms at particular commercial websites. Reputation mechanism at eBay and other, similar, show the way how to derive information from actual behaviour of the market transactions participants and, by return, to utilize this information to cultivation of the online market and to increasing of the trust among its participants and, in consequence, to increasing the effectiveness of the economy as a whole. It is a genuine example how the properly set rules can let the market work in a way of increasing the quality of transactions (and, thus, the utility gained by the relevant market players) without any involvement of the state or any enforcement institution. It is definitely an inspiring case for further research by the economic as well as information sciences.

6. CONCLUSIONS: IMPLICATIONS FOR THE ECONOMIC SCIENCE

To what extent new information and communication technologies and the rapid development of the commercial internet change the economic mechanisms? The answer was already from various view indicated in the previous text, indeed, I can summarize that when examining the impact of the ICT development on economic science and on the world economy we have always to bear in mind that the ICT do not change the fundamental economic laws. However, they proved to have considerable influence on the economic environment itself, and it often demands new approach to entrepreneurship, definitions of business models or e.g. on the necessity of actualization of particular state policies (educational, informational, business support, social or, generally, economic policy).

In the previous text, theoretical as well as practical aspects of online economic models or, more generally, the information economy were discussed, including application of some principles of the economics of information. We can say, for instance, that the feedback mechanisms examined in this paper are actually means to eliminate the information asymmetries (and particularly the moral hazard) and can be, thus, considered as mechanisms for revelation of information by subjects of the given transaction. Generally, we can speak about the mechanisms of unforced stimulation of certain economic behaviour. The role of reputation building mechanisms is a key for current online business models.

Information technologies provide tools for effective implementation of the self-regulatory or self-selection mechanisms and for revelation of information on behaviour of economic subjects in the network environment as well as on the products offered. These mechanisms were often not realizable (at least not in such an extent and with such an effectiveness) in the “offline” world. Together with the increasing role of the online trade in whole the world economy also the necessity of deeper analysis of the abovementioned mechanisms emerges. As it was demonstrated, these mechanisms are tightly connected with the ways of processing and utilization of information – it is obvious that the role of information professionals in the area of analysis and application of such mechanisms in the information economy rapidly rises. However, the thorough knowledge of the fundamental principles of the traditional economic science is always essential.

7. RELEVANT PUBLICATIONS

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ABSTRACT AND KEYWORDS

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Abstract

The global economic environment in the 21st century is significantly formed by the new forms of communication: rapid development of the information and communication technologies and of the internet respectively. The role and value of (timely and relevant) information in this environment is permanently rising, this is not, however, reflected in the development of the economic theory. Indeed, examining the new phenomena in the economic environment of the 21st century is often not only matter of the economic science but also of the information science. The view of the information science is applied also in this text.

In order to delineate the new challenges for the global economic environment, the text describes – from theoretical point of view as well as demonstrates on topical practical examples – several problem areas of so called „information economy“, i.e. economy thoroughly influenced by the development of information and communication technologies where role of timely and relevant information and applied knowledge is vital for its development. Following delineation of the subject – the information economy – applications of the principles of the economics of information are presented. Special attention is given to the role of credibility and to the mechanisms that allow for self-selection behaviour at the online economic environment. Areas discussed in the article comprise application of reputation and other “feedback” mechanisms, revelation principle, search engine algorithms and methods and these problem fields are illustrated on successful (or less successful) examples from the online economic environment as Google.com, Ebay.com or Yahoo.com.

Keywords:

Information economy, economics of information, network economy, information asymmetry, e-commerce, reputation mechanism

JEL Classification: C700, D230, D400, D800, O120, O300, O470