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Social change, institutional pressures and knowledge creation: A bibliometric analysis

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ABSTRACT

Contemporary academic environment can be characterized by an overwhelming trend toward enhancing research productivity and knowledge creation. The purpose of this study is to examine the impact of radical social change and subsequent institutional pressures on internationally relevant knowledge creation. The setting examined is business and economics science in Eastern Europe. Using a case study of Slovenian business schools and deploying a bibliometric analysis we find that research productivity is increasing significantly. We note however dilemmas pertaining to the content and quality of knowledge created. Further, we find that international research cooperation has positive quality effects. From a theoretical perspective, we argue that radical social change was not mirrored by such change in normative institutions, whereas recent changes in regulatory institutions seem to have a substantial positive effect on research performance.

1. Introduction

Contemporary academic environment can be characterized by an overwhelming trend toward enhancing research productivity and knowledge creation (Colyvas, Crow, & Gelijns, 2002; Silver, 2009) best represented by the "publish or perish" adage (Gendron, 2008; Long, Crawford, White, & Davis, 2009). In the EU and USA, more than 90% of scientific discovery is disseminated to wider audience in the form of scientific publications (Abramo, D'Angelo, & Pugini, 2008; Cohen, Nelson, & Walsh, 2002; Munoz-Leivaa, Sanchez-Fernandez, Liebana-Cabanillasa, & López-Herrerab, 2012). There are three main reasons for such trend. First, due to increasing social pressures for accountability of academia, research productivity represents a method of legitimization of the academic profession (Greenwood, Oliver, Suddaby, & Sahlin, 2008; Modell, 2003; Suchman, 1995). Second, research productivity is a mean of reducing information asymmetry between supply (universities) and demand (students) in the knowledge market by serving as a proxy for organization's overall quality (Bonner, Hesford, & Van der Stede, 2006; Chan, Chen, & Cheng, 2007a; Velasco, 2012). Third, research productivity is also a vehicle for reducing information asymmetry in the funding market by providing a yardstick for allocation of (public) research funds (Abramo & D'Angelo, 2009; Bonaccorsi, Daraio, & Simar, 2006; Geuna & Martin 2003; Reidpath & Allotey, 2010).

While the "publish or perish" convention has a long tradition in Anglo-Saxon countries (Geuna & Martin, 2003; Van Raan, 2005), it is becoming increasingly embraced in other countries (Knowledge, networks and nations, 2011). Nevertheless, despite this surge, researchers from other countries still find it very difficult to secure publications in top tier journals traditionally dominated by Anglo-Saxon researchers (Chan et al., 2007a; Raffournier & Schatt, 2010). This suggests either low quality of non-Anglo-Saxon research (Bonner et al., 2006), editorial bias (Moizer, 2009) or different motivational forces of those authors (Trkman & Desouza, 2012).

Changes in research practices are particularly profound in Eastern Europe. After the radical social change incorporating economic and political upheaval in the 1990s once isolated researchers are now augmenting their presence in international journals (Knowledge, networks, and nations, 2011).

The purpose of this study is to examine the transition of research practices in business and economics science following radical social change associated with the transition of Eastern European countries into capitalism and democracy. The context of business and economics science in Eastern Europe is particularly interesting for two reasons. First, genuine academic freedom in this discipline was only instituted with the introduction of democracy. Second, research transition in this discipline was radical also in terms of research topics (Garrod & Turk, 1994). From a theoretical perspective, the paper draws on institutional theory and attempts to provide linkage between organizational contexts, organizational actions, and human behavior (Bruton, Ahlstrom, & Puky, 2009; Oliver, 1991). The method used is a longitudinal bibliometric anal-

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ysis of business and economics research output in Slovenia. Slovenia was chosen because Slovenian researchers in business science are at the forefront of Eastern European researchers in terms of adopting internationally acknowledged research practices as illustrated in the recent analyses of accounting research (Cadez, Slapnicar, & Valentincic, 2011; Chan et al., 2007a).

The paper is organized as follows. In the next section, contemporary trends in research are described on a global and Eastern European level. Next, the institutional framework and research questions are presented. In section four, research method is outlined, followed by data analysis. The paper ends with a discussion of the findings and conclusion.

2. Contemporary research changes in academia

2.1. Global upsurge of bibliometric paradigm

The global expansion of publish or perish convention (Abramo, D'Angelo, & Pugini, 2008) coincides with the global upsurge of the bibliometric paradigm. The increasing importance of school quality rankings and external funding (Parker, 2012) provides an increasing challenge for tangible evaluation of research achievements of organizations and individuals. Many argue that bibliometric methods are an objective and universal means of research evaluation since the number of publications and citations are measurable and internationally comparable categories (Abramo & D'Angelo, 2009; Deng & Lin, 2012).

Despite their embedded shortcomings (for a review see Abramo & D'Angelo, 2009; Bonaccorsi et al., 2006; Juznic et al., 2010; Van Raan, 2005) bibliometric methods are being increasingly deployed in international initiatives to rank the best universities, schools, and researchers (Brown, 1996; Chan, Chen, & Lung, 2007b; Chan et al., 2007a; Conroy, Dusansky, Drukker, & Kildegaard, 1995; Trieschmann, Dennis, Northcraft, & Niemi, 2000; Van Raan, 2005; Williams, Jenkins, & Ingraham, 2006). One of the most influential rankings is the so-called Shanghai Ranking of the world's 500 best universities prepared annually by the Shanghai Jiao Tong University. Their criteria for evaluation is exclusively bibliometric, namely: Nobel Prizes and Fields Medals for researchers and alumni (30% weight), number of university's highly cited researchers (20%), papers published in Nature and Science journals, (20%), papers published in SCI and SSCI indexed journals (20%), and institution's per capita academic performance with regard to all indicators listed above (10%). A number of ranking initiatives exist also for business schools. Jiao Tong University is preparing a special ranking of the best business schools that is also based exclusively on bibliometric indicators. Probably even more influential business school rankings are provided by established business newspapers (e.g. Financial Times) and magazines (e.g. Business Week, Forbes) (Bonner et al., 2006).

Further, bibliometric methods are being also increasingly deployed for the purposes of research funds allocation (Abramo & D'Angelo, 2009; Juznic et al., 2010). In some countries, a significant part of funds is allocated to universities on the basis of research performance as opposed to a traditional way of allocating funds based on student numbers (Geuna & Martin, 2003; Obadic & Aristovnik, 2011; Parker, 2012).

2.2. Research change in Eastern Europe

In the times of socialism, business research in Eastern Europe could have been characterized as isolated and unconventional by international research standards. The main property of research output was low appearance in international scientific journals. The reasons for absence were many and mutually reinforcing: little faculty exchange between the East and the West, deficient fluency in English language, academic inbreeding, unorthodox promotion criteria in the academia, etc. Perhaps the most important reason was pertinent particularly to the business and economics science. A prerequisite for quality and internationally relevant research is critical interpretation of observed phenomenon. In socialism however the limit between critical interpretation of the socialist economic system and political dissent was very thin thus deterring researchers from such interpretations. In such circumstances, the main focus of "research" was publishing textbooks for students in national languages and papers in national professional magazines or at best in regional business journals with limited or no international recognition (Cadez et al., 2011; Capkun & Pervan, 2010).

An important cataclysm concerns the abandonment of socialism and its replacement with market economy system. Central planning was replaced by market mechanism, social and government ownership was replaced by private ownership, and production motive was replaced by profit motive (Garrod & Turk, 1994). Another important turmoil was political. This includes the introduction of democracy, institution of basic human rights (such as free travel to the West), and the disintegration of former federal entities (i.e. Czechoslovakia, Soviet Union, Yugoslavia) into a large number of new independent states (Aristovnik, 2012).

The radical social change in Eastern Europe was reflected also in the academia. The main contemporary policy in academia is increasing adoption of Western research standards by putting progressively more weight on research and its international relevance. This trend is manifest through increasing number of Eastern European scholars attending major international academic conferences and growing number of papers published in international journals (Knowledge, nations, and nations, 2011). Yet, despite the same general trend, different countries are at a divergent stage of this development. Croatia and Slovenia, two republics of the former state Yugoslavia, provide a palpable example. While Croatian business researchers still publish predominantly in national business journals and are only starting to secure publications in international outlets (Capkun & Pervan, 2010), Slovenian researchers already secure publications even in the most prestigious international journals in the field (Cadez et al., 2011).

Very divergent levels of progress are also evident at the level of business schools. The most unwavering business schools in Eastern Europe are the Faculty of Economics at the University of Ljubljana in Slovenia (despite the name this is de facto a business school) and the Kozminski University in Poland. As a part of their commitment to join world's top business schools these are the only institutions in Eastern Europe that have acquired two most prestigious business education accreditations in the world, i.e. EQUIS and AACSB (FELU's annual report, 2012). Other business schools may have similar aspirations however are not yet at this stage of development.

2.3. The Slovenian context

Slovenian business schools started implementing international research standards soon after gaining independence from Yugoslavia in 1991. In the first stage, universities started promoting and funding established research practices from the West, such as paper presentations at international conferences, short and long term international exchanges of academics, and foremost, publications in reputable international outlets (Cadez et al., 2011). Gradually, carrot was replaced by a stick. At present promotion criteria at all universities explicitly require publications in international scientific journals and long term visits of foreign research institutions in order to secure promotions (FELU's Annual Report, 2012).

Alongside growing focus on research Slovenian universities also developed highly quantified models of research evaluation. The

university model is bibliometric and used for promotion purposes. For every researcher, his or her entire research output (journal publications, monographs, other publications, conference presentations, etc.) and teaching output (textbooks, student supervisions, etc.) portfolio is being translated into points. A sufficient amount of points however is just necessary, not sufficient condition for promotion. Another more stringent condition is that a researcher has published a required number of works that are internationally relevant. While international relevance may seem a vague term, it is usually operationalized in the university model as a publication in a journal included in Thomson Reuters Web of Knowledge database.

2.4. Institutional forces affecting research

The study employs an institutional theory framework for analysis. Institutional theory argues that institutions and culture highly influence the actions of organizations and individuals (DiMaggio & Powell, 1991). The term "institution" broadly refers to the formal set of rules, ex-ante agreements, norms, values, less formal shared interaction sequences, and taken for granted assumptions which organizations and individuals are expected to follow (Bruton et al., 2009; Greenwood et al., 2008). Institutions initiate expectations that determine appropriate actions thus rendering other actions as improper or beyond consideration (DiMaggio & Powell, 1991). As a result, institutions affect the profile, goals, and beliefs of organizations, groups, and individuals (Meyer & Rowan, 1991; North, 1990; Scott, 2007). Prior literature provides ample evidence that institutions have profound implications also for organizational (Oliver, 1991; Reidpath & Allotey, 2010; Trieschmann et al., 2000) and individual research strategies (Czarniawska, 2011; Gendron, 2008; Hopwood, 2011).

For analytical purposes, a classification of institutional forces is desired. Though there is some disagreement on hove to organize institutions, Scott (2007) presented the relevant institutional forces under the terms regulatory, normative, and cognitive. His classification is analogous to DiMaggio & Powell, 1983 coercive, normative, and mimetic institutional forces signifying the validity of this taxonomy (Bruton et al., 2009).

Regulatory (coercive) institutions are characterized by the highest level of formality and reflect their influence through laws and other regulations generated by the government or other organizations. In the academic environment, promotion criteria with formal requirements in terms of number of publications would be such example. In contrast, the normative and cognitive institutional pillars are not legally enforced but socially or cognitively constructed over time (Scott, 1995). Both normative and cognitive institutional forces are informal in nature, typically composed of values (what is considered proper) and norms (how things are to be performed in coherence with those values) to which people conform (Scott, 2007). Recent reports from Eastern Europe suggest that publishing is increasingly starting to become also a value and a norm (Cadez et al., 2011; Capkun & Pervan, 2010).

3. Research propositions

We examine the interaction of wider social and organizational pressures (institutions) on researchers' behavior by conducting a longitudinal study concerned with research productivity, knowledge creation, and research internationalization (see Fig. 1).

The setting examined is business and economics science in Slovenia. The period examined is from year 2000 to 2011. Research questions concern three facets of research: (1) the trend of research productivity, (2) characteristics or knowledge created (in terms of subject field and quality), and (3) the trend and impact of international research cooperation.

3.1. The trend of research productivity

Concerning research productivity, we predict an upward trend, for several reasons. First, enhancing research productivity is a global trend and hence a normative institution (Long et al., 2009; Silver, 2009). Second, increasingly tough promotion criteria with formal requirements about internationally relevant publications provide a regulatory incentive for increased research productivity. And third, the number of international journals is increasing in time thus extending the number of potential publication outlets.

P1: Research productivity is increasing from year 2000 to year 2011.

3.2. Characteristics of knowledge created

The discipline of business and economics sciences is comprehensive including many subject fields, ranging from accounting to tourism and hospitality management (Harvey, Kelly, Morris, & Rowlinson, 2010). A general convention (i.e. normative institution) holds that scientific discovery in a particular field is published in journals from a respective subject field, although the designation of "respective subject field" may be problematic in case of interdisciplinary studies (Biehl, Kim, & Wade, 2006; Knowledge, networks, and nations, 2011). Further, it is a common occurrence that a particular country or organization excels in some subject fields but is lagging behind in others (Knowledge, networks and nations, 2011; Trieschmann et al., 2000). This effect is examined by comparing the content of publications and teaching and research interests of researchers.

P2a: The content of knowledge created mirrors the departmental affiliation of researchers.

A general convention in research asserts that the best scholarly achievements are published in the most prestigious scientific journals (Bonner et al., 2006; Harvey et al., 2010; Lowe & Locke, 2005) while lower quality achievements are published in less reputable journals. In view of rising adoption of international research standards we predict that this is reflected also in the increasing quality of research output.

P2b: The quality of knowledge created is increasing from year 2000 to 2011.

3.3. International research cooperation and its effects

Science is conducted in a growing number of places and is becoming increasingly interlinked. The number of internationally co-authored papers has more than doubled since 1990 and at present, over one third of research papers are the result of international collaboration (Knowledge, networks and nations, 2011). Taking into account increasing faculty mobility and rapid progress of IT technology we predict an upward trend of international cooperation.

P3a: The extent of international cooperation is increasing from year 2000 to 2011.

Empirical evidence shows that international research cooperation is beneficial for the quality of research output. Yet more, evidence shows that the impact of the paper increases with each additional international co-author up to a certain tipping point (Knowledge, networks and nations, 2011). Further, empirical evidence also shows that English speaking scholars are at a competitive advantage in the race for publication in recognized periodicals published mainly in English language (Raffournier & Schatt, 2010). We posit that international cooperation increases both the international relevance and quality of knowledge created.

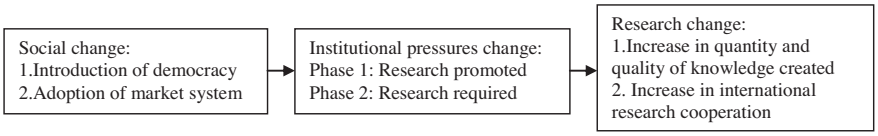

Fig. 1. Conceptual research change model.

P3b: International cooperation has a positive effect on international relevance and quality of research.

4. Research method

Similar to prior studies (e.g. Abramo, D'Angelo, & Pugini, 2008; Bonaccorsi et al., 2006; Chan et al., 2007b) we operationalize research productivity and internationally relevant knowledge creation in terms of journal publications in international scholarly journals, included in the Thomson Reuters Web of Knowledge database (TR WoK). TR WoK database was selected for several reasons: (1) it offers the most comprehensive and reliable overview of scientific literature at the level of journals, papers and citations (Norris & Oppenheim, 2007), (2) it enables the evaluation of research content by subject field and quality, and (3) includes primarily journals published in English language which we consider a proxy for international relevance of knowledge created.

4.1. Sample

Slovenia is home to four research universities, of which three comprise business schools that offer business and economics education. These are:

(1) Faculty of Economics at the University of Ljubljana (FE UL).
(2) Faculty of Management at the University of Primorska (FM UP).
(3) Faculty of Economics and Business at the University of Maribor (FEB UM).

Although Slovenia features also some smaller private business schools, they are not research oriented and do not provide postgraduate education. We presume that business schools identified above are representative of business and economics science research in Slovenia as they employ more than 90% of research staff in the field and enrol a similar proportion of students (FELU's annual report, 2012).

4.2. Variable measurement

Research productivity is measured in terms of number of papers published in journals covered by TR WoK database.

The content of knowledge created in terms of subject field is measured indirectly via the subject category of a journal where a particular paper has appeared. The SSCI database, covering social sciences in TR WoK database, comprises 55 categories, of which 4 can be considered as core categories for business and economics research. The core categories are (in alphabetical order): (1) "business" (comprising about 110 journals), (2) "business, finance" (about 100 journals), (3) "economics" (about 320 journals), and (4) "management" (about 170 journals). In addition to the 4 core categories, there are some other none-core categories that overlap with business science both in SSCI database (e.g. "hospitality, leisure, sport & tourism", "information science and library science", etc.) and SCI database (e.g. "operations research & management science") thus they may also be relevant for business and economics research.

Quality of knowledge created is also assessed indirectly via the quality of the journal where a particular paper has appeared. The quality indicator is journal's relative ranking within its respective subject category in terms of its impact factor. Similar to Harvey et al. (2010) we divide journals in four groups (quartiles) with respect to their relative ranking: Q1 (top 25% journals in terms of impact factor in a respective subject category), Q2, Q3, and Q4 (bottom 25% journals in terms of impact factor in a respective category).

International cooperation is measured using two indicators. The first indicator signals at least one international co-author on the paper. The second indicator highlights that at least one international co-author comes from an English speaking country.

4.3. Data collection

A two-step procedure was used to collect the data. In the first step we identified all researchers from three appraised business schools. This identification was conducted in summer 2012 from the webpages of appraised business schools. The data about researchers and their departmental affiliation is provided in Table 1.

In step two, each identified researcher was looked up in the SICRIS database (Slovenian research information system) which synopsizes data directly from TR WoK database but in a more integrated manner. For each identified researcher we recorded all his or her papers published in the period from year 2000 to 2011. Each paper record comprises the following variables: (1) paper authors, (2) country of authors' institutional affiliation (3) year of publication, (4) paper title, (5) journal title, (6) journal's subject category in TR WoK database, (7) journal's relative ranking within respective subject category in TR WoK (see example below). In the period examined, 280 appraised researchers published 628 papers in 246 different journals covered by TR WoK, or 2.24 papers per researcher.

Paper record example:

(1) Cardon Melissa S., Wincent Joakim, Singh Jagdip, Drnovsek Mateja; (2) USA, Sweden, USA, Slovenia; (3) 2009; (4) The nature and experience of entrepreneurial passion; (5) Academy of Management Review; (6) Business, Management; (7) Q1, Q1)#.

#Academy of Management Journal is included in two subject categories, i.e. »Business« and »Management«. In both categories in was ranked in the first quartile in 2009 (Q1).

A procedural problem also emerged with classifying papers to subject categories. Namely, in TR WoK database a particular journal can be assigned to more than one subject category (i.e. Academy of Management Review is included in "business" and "management" categories). To resolve this problem the following hierarchical approach was used. First, if a particular journal belongs to two (or more) of the four core business and economics categories, a new joint category was created (e.g. Academy of Management Review was assigned to a new "business and management" joint category). Second, if a particular journal is in one of the four core categories and a non-core category, it was automatically assigned to a respective core category. Third, if a particular journal is in two (or more) non-core categories, it was assigned to a non-core category where it had a higher relative ranking.

Table 1
Identified researchers and their departmental affiliation.

Business school	Number of researchers	Departmental affiliation[a]					
		Economics	Business	Business, finance	Management	Information science	Other[b]
FE UL	141 (50.3%)	26	32	25	27	15	16
FM UP	65 (23.2%)	10	13	7	12	9	14
FEB UM	74 (26.4%)	8	21	12	4	12	17
Total	280 (100%)	44 (15.7%)	66 (23.6%)	44 (15.7%)	43 (15.3%)	36 (12.9%)	47 (16.8%)

Source: Business School webpages.
[a] Due to different organizational structures in appraised business schools departmental affiliation follows a TR WoK classification of subject categories.
[b] Group Other comprises researchers mainly from mathematics, statistics and law sciences.

Similar procedural problem relates to classifying papers to quality categories. If a journal features in more than one subject category we assigned it to a quality category where it was ranked highest.

5. Findings

5.1. The trend of research productivity

Fig. 2 presents the trend of paper publications. As expected, the trend is upward. In year 2000, Slovenian researchers have published 20 papers and until year 2011 this number has grown to 97 per annum. Although the visual inspection suggests and almost linear upward trend of research output, the number of publications was relatively stable in the first half of the period examined, ranging between 20 and 28, whereas steady growth is evident from year 2005 on.

5.2. The content of knowledge created

The identified 628 papers were published in 246 different journals, included in TR WoK database. Ten most popular outlets are outlined in Table 2. The top 10 listing suggests a considerable regional orientation of Slovenian business and economics research, as most of these journals have an explicit Eastern European orientation, evident from the journal name. Collectively, one third of total research output was published in these 10 journals.

Of the total 628 papers 361 (57.5%) papers were published in 112 journals included in core business and economics categories. Detailed distribution of papers with respect to subject categories is provided in Table 3. As evident, most papers feature in the subject field "economics" (26.8%) while least papers feature in the subject field "business,finance" (1.8%). Noteworthy, 14.7% of total papers are published in journals that belong to more than one core subject category.

The remaining 267 (42.5%) papers were published in 134 journals encompassed in non-core business and economics categories. Detailed distribution of papers with respect to non-core subject categories is provided in Table 4. The most widely represented categories are mathematics, engineering and computer science, which collectively account for 25% of total research output.

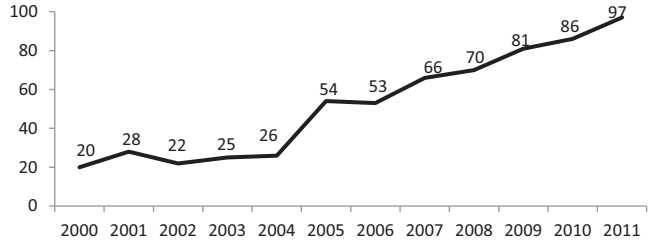

Fig. 2. Number of papers published in the period 2000–2011 by year.

Table 5 provides a comparison of researcher's departmental affiliation and the subject category of their publication outlets. This comparison required an allocation of 92 (14.7%) papers from journals contained in more than 2 core categories (see Table 3). For this purpose, we split the number of papers equally between respective categories. For example, of 53 papers, published in journals that feature both in business and economics category, 26.5 papers were assigned to business category and 26.5 papers to economics category. Despite the somewhat subjective allocation the data reveals significant differences between departmental affiliation and publication outlets. For example, while non-core business and economics researchers represent "merely" 16.8% of total researchers, over one third of total papers are published in non-business and non-economics journals. On the other hand, while finance researchers represent 15.7% of total researchers, only 2.2% of total research output features in finance journals.

5.3. Quality of knowledge created

Papers were published in journals of distinct quality. Table 6 summarizes the number of papers in journals belonging to different quality quartiles for the overall period. As evident, over a half of total papers were published in journals from the bottom quartile while 12.7% of papers were published in journals from the top quartile.

Fig. 3 signals quality changes during the period examined. Visual inspection does not suggest an unequivocal trend towards either increasing or decreasing quality of knowledge created. It does seem though that the proportion of papers in bottom/upper quartile seems to be lower/higher in the second half of the period examined relative to the first half of the period.

5.4. International cooperation in research

Overall, international co-authors contributed to 22.9% of total papers. The relative proportion fluctuates between 10% and 30% annually with Fig. 3 suggesting an upward trend. Overall, 7.8% of total papers were co-authored by researchers that are affiliated with a research organization from an English speaking country. Contrary to the first indicator, Fig. 4 suggests a downward trend of cooperation with researchers from English speaking countries.

5.5. The effect of international cooperation on international relevance and quality of research

The effect of international cooperation on quality of research output is tested using the following regression model

$$\text{QUALQ} = a + b^{*}\text{INT AUTHOR} + c^{*}\text{ENG AUTHOR}$$

where:

- QUALQ – quality quartile of the journal where a paper was published
- INT AUTHOR – dummy variable denoting at least one international author on the paper

Table 2
Most popular publication outlets.

	Journal title	Number of papers	% of papers ($N = 628$) (%)	TR WoK Journal's IF 2011	TR WoK journal's subject category and relative ranking in year 2011
1	Eastern European economics	34	5.4	0.33	Economics (251/319), Q4
2	Zbornik radova Ekonomskog fakulteta u Rijeci	28	4.5	0.40	Business (96/112); economics (236/319), Q3
3	Post-communist economies	25	4.0	0.46	Economics (222/319), Q3
4	Kybernetes	22	3.5	0.24	Computer science, cybernetics (19/20), Q4
5	Ekonomska istraživanja	18	2.9	0.19	Economics (288/319), Q4
6	Journal for East European management studies	18	2.9	0.58	Management (128/166), Q4
7	Transformations in business & economics	17	2.7	0.99	Business (65/112); economics (128/319), Q2
8	Ekonomicky casopis	15	2.4	0.27	Economics (268/319), Q4
9	Industrial management & data systems	14	2.2	1.47	Computer science, interdisciplinary applications (43/99); Engineering, industrial (11/42), Q1
10	Prague economic papers	13	2.1	0.26	Economics (276/319), Q4
	Total	204	32.5		

Table 3
Subject category of papers published in core business and economics journals.

Core business and economics subject categories	Number of papers	Relative proportion ($N = 628$) (%)
Business	27	4.3
Business, finance	11	1.8
Economics	168	26.8
Management	63	10.0
Business & economics joint category	53	8.4
Business & economics & management joint category	3	0.5
Business & management joint category	28	4.5
Business, finance & economics joint category	6	1.0
Economics & management joint category	2	0.3
Total	361	57.5

- ENG AUTHOR – dummy variable denoting that at least one international author comes from an organization in an English speaking country.

The results of regression analysis are presented in Table 7. As evident from the model, international cooperation significantly improves the quality of the paper's outlet, whereas the effect is not significantly reinforced if at least one of the authors comes from an English speaking country.

6. Discussion

The study analyses the effects of radical social change and institutional pressures change on research behavior in an emerging country context. To document these changes, we examine research productivity, knowledge creation and research internationalization in a longitudinal setting of business and economics science in Eastern Europe.

The first research trend, consistent with expectations, is significant increase in research productivity. During the period appraised, research productivity increased about fivefold, however from a low starting point. With respect to research productivity, two issues are worthy of consideration. The first theme is low starting point in year 2000. Low productivity in the early period following social change seems to reflect the confluence of regulatory and normative institutions. In this period international publications were not required to secure academic promotions although universities attempted to impose new normative and cognitive institutions by

Table 4
Subject category of papers published in non-core business and economics journals.

Non-core subject categories	Number of papers	Relative proportion ($N = 628$) (%)
Mathematics	61	9.7
Engineering	55	8.8
Computer science	40	6.4
Materials science	12	1.9
Sociology	12	1.9
Information science & library science	10	1.6
Medicine	9	1.4
Hospitality, leisure, sport & tourism	6	1.0
Agriculture	5	0.8
Operations research & management science	5	0.8
Communication	4	0.6
Area studies	4	0.6
Criminology & penology	4	0.6
Education & educational research; Polymer science; Public administration; Social sciences; Social issues; Public environmental occupational health	3 in each category	2.9
Health policy & services; Law; Political science Statistics & probability; Transportation science & technology	2 in each category	1.6
Anthropology; Environmental studies; Food science & technology; Forestry; Gastroenterology & hepatology; Geography; International relations; Metallurgy & metallurgical engineering; Physics; Psychiatry; Telecommunications; Urban studies	1 in each category	1.9
Total	267	42.5

Table 5
A comparison of researchers' departmental affiliation and subject category of their publication outlets.

Departmental affiliation/subject category	Relative proportion of researchers (%)	Relative proportion of papers (%)	Variance (%)
Economics	15.7	31.8	16.1
Business	23.6	10.9	−12.7
Business,finance	15.7	2.2	−13.5
Management	15.4	12.6	−2.8
Information sciences	12.9	8.0[a]	−4.9
Other	16.8	34.6	17.8
Total	100.0	100.0	0.0

[a] Includes subject categories "information science & library science" and "computer science".

Table 6
Quality rating of papers published.

Quality category TR WoK	Number of papers	Relative proportion (%)
Q1 (Top 25%)	80	12.7
Q2	97	15.4
Q3	118	18.8
Q4 (Bottom 25%)	333	53.0
Total	628	100.0

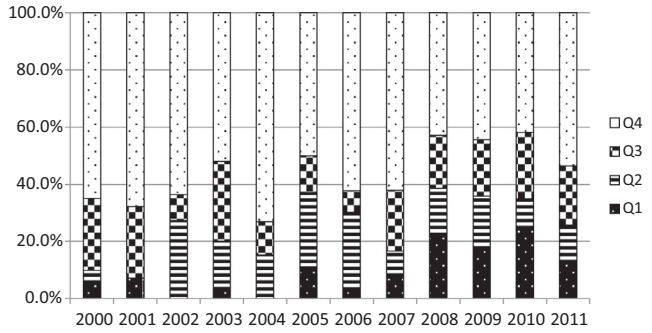

Fig. 3. Relative proportion of papers in quality quartiles by year.

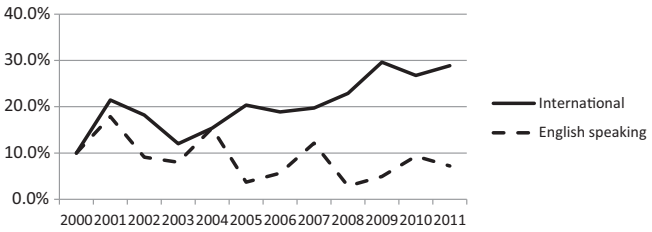

Fig. 4. Relative proportion of papers with international co-authors by year.

promoting and funding internationally accepted research practices. The ineffectiveness of this combination of institutions suggests the perseverance of old values and norms (that research is unnecessary) which is consistent with assertions that normative institutions have a self-sustaining ability (DiMaggio & Powell, 1991). Alternatively, researchers may have had aspiration and motivation to research, however lack of research know how resulted in low publication success despite growing social obligations to conform (March & Olsen, 1989). The second issue is a significant and steady increase of research productivity after year 2005. This increase coincides with the changes in university promotion criteria explicitly requiring publications in TR WoK included journals and recent reports from Eastern Europe that publishing is increasingly considered as "appropriate" in the research community (Cadez et al., 2011; Capkun & Pervan, 2010) hence suggesting a positive interaction of regulatory and normative institutions.

Table 7
International cooperation – quality of research regression analysis parameters.

Parameters	Parameter values
Observations	628
Intercept	3.23**
INT AUTHOR	−0.44**
ENG AUTHOR	−0.08
F value	10.47
R^2	0.04

** The coefficient is significant at $p < 0.01$ level.

The analysis of knowledge created shows a more perplexing picture than productivity. In terms of subject field, a disproportionally large amount of knowledge is created in economics and other (non-business and non-economics) fields. Although this is not an uncommon occurrence per se, as research institutions often excel in some subject fields but are lagging behind in others (Trieschmann et al., 2000; Williams et al., 2006), it warrants some discussion. In the Eastern European context the terms business and economics are often regarded as synonyms (e.g. Faculty of Economics is de facto a business school) thus it is common that regional economics journals also publish business content. Given a large proportion of papers published in regional journals it is possible that journal's subject category does not fully reflect the content of papers published. This rationale however does not explain a relatively high proportion of papers published in non-business and non-economics journals. This means either that non-business and non-economics researchers are disproportionally productive or that business researchers are very interdisciplinary oriented. Noteworthy characteristics of knowledge creation are relatively strong regional orientation (all most popular publication outlets exhibit an explicit regional focus) and relatively low quality. This latter issue clearly is worthy of further research.

The second observed trend, consistent with expectations, is increased international cooperation. Similar to the global average (Knowledge, networks, and nations, 2011; Wagner & Leydesdorff, 2005), at present almost one third of papers are co-authored by international authors. More important and also consistent with prior evidence, increasing international cooperation improves the quality of knowledge created (Knowledge, networks, and nations, 2011).

From the theoretical perspective, institutional theory proved to provide a useful framework to explain change in researchers' behavior. Albeit research in business and economics science was not prohibited, the socialist system provided neither regulatory nor normative institutions to support internationally relevant research. The radical change in economic and political system changed the nature of institutions. In the first stage, an organizational attempt was made to change normative institutions by promoting internationally accepted research practices. This attempt yielded only limited change in research behavior due to long-sustaining ability of old normative institutions (DiMaggio & Powell, 1991; March & Olsen, 1989). To secure a more profound change, in the second stage new regulatory institutions were imposed in terms of university promotion criteria. These in effect not only significantly affected research productivity but also normative institutions that publishing is appropriate (Cadez et al., 2011; Capkun & Pervan, 2010). Values and norms are now changing progressively in particular with new entrants into the system.

From a holistic perspective, the study provides support for homogenization of academic research practices (Leicht & Fennel, 2008). More precisely, Eastern Europe is in a one-way process of adopting research standards from the West. Although Heywood (1992) warned that this is not necessarily the best choice and advocated a two-way exchange, the actual occurrence in Eastern Europe more or less replicates a one-way adoption of Western economic and political systems. There is however one major difference. While the economic and political upheavals were radical and instantaneous, changes in research practices and performance are taking place at a much slower pace.

The results of the study must be interpreted in the light of its limitations. While archival data enabled us to appraise the changes in regulatory and normative institutions, it is insufficient to appraise changes in cognitive institutions. Cognitive institutions are subjectively based and operate at the individual level in terms of culture and language (Scott, 2007) hence collection of primary data would be required to appraise changes in cognitive institutions.

General limitations of bibliometric methods have been discussed at length in other studies (Abramo, D'Angelo, & Pugini, 2008; Horrobin, 1990; Moxham & Anderson, 1992; Van Raan, 2005) and will, therefore, not be repeated here. A specific limitation of this study concerns a two-step data collection procedure. Because we used a cut-off date we have not captured researchers that may have had publications in the past but are no longer employed at appraised institutions. On the other hand, we have captured researchers who may have been employed at another institution in the past. We believe that this limitation does not compromise the study's main findings, for several reasons: (1) academic staff in Slovenia is extremely immobile, most researchers start and finish their career at the same institution, (2) most exists from the population are due to retirements of older professors who in general do not have many publications, (3) most entries into the system are due to recruitments of teaching assistants who in general do not have publications yet (Cadez et al., 2011), and (4) similar approach is used also in the UK (Reidpath & Allotey, 2010).

7. Conclusion

The main contributions of the paper are threefold. First, we highlight changes in knowledge creation in a transitional country by examining research output over a long time period. While research productivity is increasing significantly, we note dilemmas pertaining to the content and quality of knowledge created. Second, from a theoretical perspective, the employment of an institutional framework advances our understanding of the interaction between the wider social and organizational pressures on individual behavior. We find that radical social change was not mirrored by such change in researchers' values, beliefs and behavior thus changes in regulatory institutions were required to initiate "appropriate" behavior as assumed by international research standards. Third, from a methodological perspective, research productivity studies typically start with a particular sample of journals representing a particular scientific area. This approach however is biased due to interdisciplinary nature of sciences, as researchers may also publish in journals not in the sample (Chan et al., 2007b). To circumvent this bias, in our study the unit of analysis was researcher, rather than a journal.

The study provides useful pointers for future research. Continuing from limitations section, the next step would involve collection of primary data in order to appraise changes in cognitive institutions and their impact on research productivity and knowledge creation. Another potential venue of research concerns an examination of contingencies regarding research productivity, international relevance and quality of knowledge created both at the individual and organizational level. The purpose of such studies would be to provide insight in high quality knowledge creation which is often regarded as a prerequisite for prosperity in the contemporary knowledge based society (Aristovnik, 2012; Colyvas et al., 2002; Marrano, Haskel, & Wallis, 2009).

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