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Universities and Knowledge Production in Central Europe

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Introduction

In the knowledge economy, knowledge has become the crucial source of added value (Stehr 2002: 17).[1] Definitions of the knowledge economy abound: as Foray puts it:

> by knowledge-based economies I mean, essentially, economies in which the proportion of knowledge-intensive jobs is high, the economic weight of information sectors is a determining factor, and the share of intangible capital is greater than that of tangible capital in the overall stock of real capital (Foray 2006: ix; see also Leydesdorff 2006 and Stehr 1994).

There seem to be no fundamental differences between understandings of the concept of the knowledge economy in social sciences and in international organizations. As the World Bank defined it recently,

> A knowledge economy is one in which knowledge assets are deliberately accorded more importance than capital and labor assets, and where the quantity and sophistication of the knowledge pervading economic and societal activities reaches very high levels (World Bank 2007: 14; see also OECD 1996).

This chapter explores the question of knowledge production in the four Central European economies, all OECD members (Poland, Hungary, the Czech Republic and the Slovak Republic) in the context of the knowledge economy, economic competitiveness and research intensity.[2] I argue that, today, they are not "knowledge economies" to the same extent as their

[1] The paper will be published in Paul Temple (ed.), *Universities in the Knowledge Economy. Higher education organisation and global change*, New York: Routledge, 2011.

[2] The paper focuses on "Central Europe" rather than on (more traditional in social sciences and economics) "Central and Eastern Europe": although, for almost two decades, Central and Eastern Europe (CEE) was the major political, economic, social and geographic point of reference in research into postcommunist transition countries, the countries in question have become too diversified today to analyze them under a single label.

more affluent and technologically advanced Western European counterparts. Therefore one of the major themes of the chapter is an ongoing East/West divide in knowledge production resulting from a high path dependency for the economy, society, as well as higher education and research and development systems in the region. I also argue that the communist legacy in Central European countries matters substantially: it matters for their economies, in transition to market economies; it matters for their societies, in transition to what are sometimes termed "postcommunist welfare states"; and it matters for both educational and research and innovation systems crucial for knowledge production. The three areas (economies, societies, and higher education and research systems) are closely interlinked and an assessment of knowledge production requires an analysis of their interrelations.

How deep is the divide between knowledge production in Central Europe and in major Western European economies? To what extent is the divide today is driven by hard (difficult to change in the medium-run) factors, and to what extent by soft factors (more easily changeable)? The former factors include levels of public funding in higher education and research systems, the social and age structure of the workforce by levels of education and by types of professions, the structure of employment by major economic sectors, and the overall national level of economic competitiveness. The latter, soft, factors include funding and governance modes in higher education and research systems, access policies in higher education and the matching of education systems and the labor market, as well the majority of factors related to business, legal and institutional environments (as, for instance, reported annually by the World Bank via the "ease of doing business" indicators, World Bank 2010).

Both hard and soft factors link the patterns of ongoing knowledge production in the region to the communist and postcommunist legacies. Social and economic change takes time and, from a current perspective, the two decades of transformation (1990-2010) are not enough to bridge the gap between the East and the West in knowledge production. Universities in Central Europe are changing, sometimes rapidly but most often gradually, but Western European universities have been changing even more rapidly in the last twenty years, as comparative studies indicate (see Shattock 2008, Bonaccorsi and Daraio 2007, Maassen and Olsen 2007). As commentators note about public services in general in the region (and which can be applied to higher education), "social transformation, including the adoption of a new value system and social behavioral pattern, is not a process of one or two decades. It takes generations. Based on the economic and political transformation, gradual social adjustment

may follow. History, however, remains part of the present for a long time" (Berend 2007: 279).

Universities in Central Europe are desperately struggling to remain in the outer layers of the dramatically changing global academic centre. Without thoughtful higher education and research policies, combined with radically increased research funding and new funding modes, they might move from the outer layers of the centre to the global academic periphery. The processes in question can be most clearly observed through the analysis of trends over time in various global competitiveness indexes and in various European and global university rankings. What is especially revealing is the trends over time in those pillars of economic competitiveness (to refer to the annually reported *Global Competitiveness Index*) which refer directly to higher education, research and innovation systems and the trends in the four Central European economies under discussion. In particular, Central European academics and policymakers in charge of higher education should no longer believe in three interrelated myths, still popular in the region: first, the myth that postcommunist universities, due to their history, are exceptional in Europe and their exceptionality should be preserved (exceptional in being systematically inward-looking and academically-driven institutions, isolated from concerns of both society and the economy); second, the myth that postcommunist universities as public sector institutions are radically different from all other public sector institutions, and immune from the impact of global and European public sector reforms; and, third, the myth that knowledge production can be more visible in reformed (in both funding and governance modes) higher education systems even with current low public expenditures on research and development. The three myths have been powerful inhibitors to knowledge production in the region and have been shared throughout the two decades of the transition and accession period by academics and policymakers.

Knowledge production and historical legacies

Knowledge production in Central European economies is strongly linked to their legacies of operating for fifty years in command-driven communist economies, and to wider postcommunist transition processes in the last twenty years. The historical legacies relevant for the knowledge production in the region include the following parameters: economy and society (rather than merely politics), public services (social policies, leading to the "emerging" welfare states, as opposed to "established" welfare states, Castles et al. 2010),

higher education policies (including especially governance and funding reforms), and research and innovation policies (especially those related to academic entrepreneurialism and university-enterprise partnerships).

The fiscal context: communist and transition periods

The fiscal context in which knowledge is produced in universities and in which universities operate in Central Europe is of critical importance for the present discussion. In postcommunist Central Europe, there has been a continuing conflict between the need for high-quality higher education and powerful fiscal constraints, especially in the 1990s when higher education systems were under the first-wave of reform pressures (see for details, Cunning et al. 2007: 29). Central European countries in general have similar funding modes for financing public higher education: financial aid to students is combined with the avoidance of charging them tuition fees. A dual-track system is prevalent in the region: fee-free higher education is available for regular students (disproportionately coming from socially and economically privileged families; only Poland being an "equity success story", with decreasing inequality in access to higher education, Kwiek 2008c) admitted via competitive entrance exams, and a special fee-paying track available for those who fail to gain admission – which tends to "penalize students from disadvantaged families" (Cunning et al. 2007: 29) and raises serious equity concerns. Funding modes for both higher education and for research performed in higher education, most often in separate streams, have had powerful and long-term impacts on knowledge production in universities: generally, the focus of universities in Central Europe, especially in the 1990s, has been on the teaching mission. The research mission (as well as the third mission), in general, has been systematically denigrated throughout the region for almost two decades, despite differences between the four countries, related to various attempts at reforming governance and funding patterns, especially in the 2000s – the Polish reforms of 2008-2011 being an interesting example of introducing "new rules of the game", see Kwiek and Maassen 2011. Drastic public underfunding of universities in the 1990s led both academic institutions and individual academics to apply various "survival strategies", related mostly to introducing fee-based university programmes for part-time students in public universities and teaching in private higher education institutions by academics from public institutions (see on the two types of privatization in Kwiek 2010 and on the emergent public-private dynamics in higher education in Kwiek 2011). The survival

strategies have led to research underperformance: both institutions and academics alike were focusing on teaching.

But does almost half a century of operating under the communist regime and two decades under transition conditions explain sufficiently the current differences in overall research performance levels of higher education systems in Central Europe and in EU-15 economies? What is the long-term impact of a different academic culture(s) in Central European countries under communism, including different governance and funding regimes and the lack of academic freedom and institutional autonomy? What is the impact of what Elster et al (with reference to economies) called "the long arm of the past" (1998: 158) in the area of knowledge production? As stressed by analysts of social policy generally, much more attention is currently paid by academics to the legacies of the past and the ways in which these legacies "influence meaningful change" today (Inglot 2005: 5).

There were three major effects of the post-1989 transition, all relevant for trajectories of transformations of higher education systems: the distribution of income and earnings widened; output fell and tax revenues fell even more sharply; and job security ended (Barr 2001: 242-243). In the 1990s, a relatively stable social and economic environment in which knowledge was produced in communist-period universities was disintegrating, leading to new institutional and individual "survival strategies" in the higher education sector. New institutional norms and behaviors emerged together with institutional autonomy and academic freedom, regained immediately following the collapse of communism. But autonomy was accompanied by severe financial constraints: long-term, systemic financial austerity was the trademark of university knowledge production in the region throughout the 1990s, and its impact on higher education systems, institutions and individual academics has been substantial (Kwiek 2011).

The social context: communist and transition periods

Communist-era higher education and research systems and their knowledge production in Central Europe differed substantially from their Western European counterparts, in these ways: a heavily centralized higher education system, with attempts at balancing the number of graduates with the number of jobs, displaced job competition, and with educational credentials more important in job allocation than actual knowledge or skills; curriculum

guidelines, research goals, and requirements for filling teaching positions defined and closely monitored by the communist party; a unitary system of traditional university education, with no bachelor's programmes; the number of students admitted and enrollment procedures based on quotas set for controlling the proportions of students of various social backgrounds; and the financing of universities entirely dependent on the government (Mateju, Rehakova and Simonova 2007: 374-375). All these points are no longer valid but the removal of their legacy is what was happening, at various speeds, during the past twenty years, with different reform programs. The current shape of universities and knowledge production in Central Europe is determined by specific factors defining both the communist and postcommunist transition periods (as is the case with social policies, see Tomka 2005). Again, the "arm of the past" is "long" for both social policies and university knowledge production.

It would be unfair to deny the large extent to which Central European universities have been transformed in the last two decades. But knowledge production in the region cannot escape its recent history: after being viewed as strategic, bureaucratic elements of communist regimes, universities in the first decade of the transition period were largely left on their own, autonomous but severely underfunded, and engaged much more in (mostly fee-based) teaching than in traditional knowledge production. Their recent history matters, especially in three areas: slow (and generally conservative) governance and funding reforms, academic institutional culture accepting the denigration of the research missions, and underfunding of research in higher education.

Competing social narratives about universities in the region

From a historical perspective, universities in Central Europe, Poland included, are not able to produce convincing social and institutional narratives in defense of their traditional roles in society – as their historical rootedness is either too far-reaching into the past (that is, too explicitly Humboldtian), or too idiosyncratic and "tainted" by the period of communism. In both cases, their historical rootedness, and resulting narratives linking their past to their future, are viewed by Central European policy makers and the media as interesting but largely irrelevant for current and future challenges.

In the absence of convincing narratives about universities produced by universities themselves, new narratives are increasingly produced by the state, especially governments

involved in reform programs. Not surprisingly, in these new narratives (for instance, the 2005-2008 and, especially 2008-2010 narratives about the need of reforms in Poland), universities are viewed as "instruments for national political agendas" rather than as "institutions" (to use Olsen's distinction, see Maassen and Olsen 2007). Universities seem unable to protect both their institutional identities and their institutional integrity, unable to produce and promote a common, socially-convincing narrative about the social, cultural and economic future of academic institutions. Institutions without powerful founding ideas at their disposal are much more easily subject to radical reform programmes – which is the Polish case of 2008-2011 and beyond.

What seems to matter more for the strength of the instrumental view of the university prevalent in the region is the relatively weak rootedness of traditional organizational and funding patterns: both the communist period and the two decades of postcommunist transformations have not been strong enough, or legitimate enough, reference points for the production of convincing narratives based on the vision of the university as a community of scholars. Consequently, universities in the region – if, as in Poland, exposed to the pressures of comprehensive instrumental reform – seem much weaker partners in a stakeholders' dialogue about their future than universities in Western Europe.

And the consequences for university knowledge production are manifold: first, in the absence of powerful, socially accepted narratives linking universities' past, present and future, governance and funding reforms in the last two decades were much less substantial than they should be, and often merely cosmetic. Public interest in universities focused on their increasing teaching capacities, and increasing enrollment rates, combined with the policy fascination (although often not without disgust) with increasing enrollments in the newly created and socially illegitimate private sector in the region. The identity crisis of the academic profession, caused, inter alia, by severe institutional underfunding and low academic salaries, led to a decade of weak, cosmetic reforms, lost the interest of the public in universities as knowledge-generating institutions, and, consequently, lost the interest of policymakers in the university research mission.

Reforming higher education in the region

In the early years of the transition period, both domestic and, especially, international policy actors were paying little attention to social policy in general (setting up unemployment systems was the only area of priority concern at that time): neoliberal policymakers focused on stabilization, liberalization, and privatization policies (Orenstein and Haas 2005: 145ff). The neoliberal "Washington Consensus" "had little to say on the social-sector restructuring that was to become such a large part of postcommunist transformation" (Orenstein 2008: 85). The process of reforming social policies in Central Europe during the postcommunist era turned out to be "much longer and much more difficult than most experts anticipated" (Inglot 2005: 3). Nevertheless, a "surprisingly long distance from the Soviet Bloc to the European Union" was covered in a "historically extremely short period of time" (Berend 2007: 269). The general lack of reformers' focus on higher education, and the general fascination of both the public and policymakers with the single indicator of student numbers had far-reaching consequences for the knowledge production: the teaching mission became the core mission.

Most prominent political figures and their advisors involved in Polish economic reforms of the early and mid-1990s (notably Leszek Balcerowicz and Jeffrey Sachs) hardly mentioned the need for reform of teaching and research. Poland was not an exception: the lack of higher education reforms was prevalent in Central Europe, perhaps partly owing to Western views that communist educational systems did not need substantial transformations, in contrast to economic and political systems. It needs to be added, by way of justification, though, that the 1990s in the region meant creating "the very fundamentals of capitalism"; not surprisingly, "in Eastern Europe, both markets and private enterprises were virtually non-existent for about 40 years" (Elster, Offe and Preuss 1998: 157). It is perhaps only from a safe distance of almost two decades of "transition" and "accession" that we can criticize the missing dimension (higher education reforms) in Central Europe in the 1990s and stress its role in ongoing East/West divide in knowledge production.

The East/West divide continues

The different roles of universities in knowledge production in more affluent OECD countries and in Central Europe can be viewed in terms of these four characteristics:

(1) The structure and levels of research funding. The share of university (and government) R&D funding in Central Europe is much higher than the share of enterprise R&D funding in the national picture, compared with the OECD average. And the levels of R&D funding, both public and private, are considerably lower (gross domestic expenditure on R&D activity, or GERD, for Poland was 0.59 percent of GDP in 2009). At the same time, the structure and levels of higher education funding (usually as a separate funding stream from research funding) is broadly similar. Knowledge production is located mostly in the public sector: while, in the OECD area, on average, about 70 percent of R&D funding is concentrated in the business sector, for Poland (and Central European members of OECD) it is only 30.4 percent (2009). Different structures and substantially lower levels of research funding have powerful negative impact on knowledge production (as a recent EC report put it explicitly, research systems in new EU member states may not deserve to be designated as "research systems" at all, EC 2009: 40).

(2) Institutional focus on teaching-related revenues rather than research-related revenues in public universities in the region, as a consequence of very low public funding for research. Teaching-related revenues mean most of all fees from part-time students, a specific feature of Central European higher education systems: full-time students studying without fees, part-time students paying fees. Almost full dependence on fees in the private higher education sector and, consequently, the research mission of marginal importance in the private sector. The role of private higher education in the four countries, and in postcommunist countries generally, is exceptional on a European scale (the only exception in Western Europe being Portugal). In Western Europe, the role of research-generated revenues is growing considerably (their share in total university income grew by 50 percent in the last ten years, see CHEPS 2010). The denigration of the research mission of the university, and continuing focus on its teaching mission and teaching-related revenues, have powerful negative impact on knowledge production, as testified by the two next features.

(3) Low levels of engagement in academic entrepreneurialism and weak university-enterprises partnerships. Academic entrepreneurialism is mostly generated by research (and third-mission) activities, although some teaching activities may be viewed as entrepreneurial (Shattock and Temple 2006). In Central Europe, though, there are only islands of entrepreneurialism located in public universities. The level of university-enterprise

partnerships is generally low for structural reasons common throughout the region and related to university governance modes and levels and modes of university research funding.

(4) The continuing absence of Central European universities in global (and especially European) university rankings. In 2010, only five universities from the region were present in the Academic Ranking of World Universities: one in the third hundred (Charles University in Prague, the Czech Republic, rank 201-300) and four in the fourth hundred (Warsaw University and Jagiellonian University in Poland, Eotvos Lorand University and University of Szeged in Hungary, ranks 301-400). No university from the Slovak Republic (as well as from Romania and Bulgaria) was ranked in top 500 world universities. No university in Central Europe is located in top 100 world universities either in subjects (like chemistry) or fields (like social sciences). The ranking is dominated by American universities: in the top 10, there are only two European universities (Cambridge ranked 5th and Oxford ranked 10th), and in top 20 there is only one more non-American university, University of Tokyo (ranked 20th). In top 200 world universities published by *The Times Higher Education* in 2010, there are no institutions from Central Europe. And among the top 100 European universities, there are none from the region.

Knowledge production in Central Europe and economic competitiveness

Is there a Central European variant of the knowledge production model, related to a possible Central European variant of the knowledge economy? Probably both can be discerned, both being historically related (path dependent) to communism and its central planning, in both economic and education and skills sectors. Thus postcommunist universities, regional knowledge production, the emergent socio-economic model ("postcommunist welfare state"), and a regional variant of the knowledge economy seem to be strongly interrelated concepts.

Generally, in a world in which the economic dimension is viewed by policymakers as increasingly important in assessing countries in general and their higher education systems in particular (compared with the traditional social dimension), rankings of economic competitiveness based *inter alia* on assessments of higher education and research and innovation systems can hardly be ignored. Especially, they should not be ignored in postcommunist countries still aggressively seeking foreign direct investments. Both national economies and universities themselves are increasingly ranked and assessed according to

standardized global measures. Universities are increasingly constructed as organizations (rather than merely institutions, what Ramirez called their "rationalization", Ramirez 2006, see Brunsson and Sahlin-Andersson 2000). As Meyer at al. stress, the modern university in a globalized and rationalized world is a "purposive actor":

> In this world of imagined homogeneity, standardized dimensions of ranking, certification, and accreditation make sense. Universities around the world can be compared and rated on standard scales. And if they are effectively and purposively managed organizations, perhaps they can improve their rankings vis-à-vis all the other universities in the world (Meyer et al. 2007: 206).

The discussion of Central European knowledge production in this section refers only to two global indexes: the Global Competitiveness Index (*The Global Competitiveness Report 2010-2011*) and *Doing Business 2010.*[3] The major point is that economic competitiveness is not determined by higher education and innovation pillars in Central European countries to the same extent as it is in affluent OECD economies. Michael Porter's higher education and training and innovation "pillars of competitiveness", compared with the other ten pillars of competitiveness, seem to be substantially less important. Central European economies, compared with major European economies, still severely lag behind in most of the other ten pillars; lagging-behind is structural and extremely difficult to overcome; requires both time and funding, counted in years, if not decades, and (mostly public) investments counted in dozens, if not hundreds, of billions of euros. At the same time, expectations of both governments and the general public in the region from higher education and public R&D and innovation systems regarding economic competitiveness are very high; we view them here as largely exaggerated, due to numerous other factors exogenous to the two systems, and related to the other ten pillars of competitiveness.[4]

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[3] It could also be accompanied by references to other indexes, such as especially IMD *World Competitiveness Scoreboard 2010*, BCI *Business Competitiveness Index 2009-2010*, *The Lisbon Review 2010. Towards a More Competitive Europe*, as well as World Bank: *Knowledge Economy Score Board 2009* for Central European countries – but the overall results regarding knowledge production would not be much different, though.

[4] The other ten pillars of competitiveness include institutions, infrastructure, macroeconomy, goods market efficiency, labor market efficiency, financial market sophistication, technological readiness, market size, business sophistication and, last not least, of interest to us here as well, innovation. They are often interdependent and try to reinforce each other (Porter, Sala-i-Martin, and Schwab 2008: 3-6).

An almost automatic passage from (high) levels of individuals' earnings premium in higher education to (high) levels of economic growth of countries based on the strength of their (higher) education systems is often taken for granted. Central European economies have still the highest wage premium on higher education in the OECD area (they have been for a decade in the top five countries), while their knowledge production is relatively low, and their economic competitiveness is modest. We argue here that for Central Europe, the other ten "pillars of competitiveness" are of critical importance, and without progress in the other pillars, the higher education and innovation pillars lose the fundamental role which they have in Western European "knowledge economies". We argue that it is difficult for higher education and innovation systems to go beyond their national social and economic contexts: they belong to national legal and infrastructural settings and are regulated by national arrangements, are funded from national taxes, and produce graduates with skills necessary for national economies. The national settings are for higher education and innovation systems both burdens and challenges (see Arbo and Benneworth 2007).

Higher education systems in Central European countries today face generally the same challenges as those in other OECD countries but in a doubly-unfriendly context of the need to change the structure (and focus) of their former educational systems, while operating in tough fiscal and economic environments (Barr 2005). The four Central European countries discussed here have the most expanding higher education systems in the OECD area: they are among the top six OECD countries with the highest increase in the number of students in higher education between 1995 and 2004, with the first three ranks belonging to Poland, Hungary, and the Czech Republic (OECD 2008a: 30). But the massification of higher education in Central Europe took place in a specific context. As Nicholas Barr stressed, in EU accession countries, the governments were caught between conflicting imperatives:

> the constraints of the Stability and Growth Pact, and the demands of other parts of the public sector – unemployment benefits, active labor market policies, poverty relief, and policies to address social exclusion, pensions, healthcare, and school education. The resources to finance mass, high-quality higher education from taxation were simply not there (Barr 2005: 243).

One of the implications is that the numerical expansion of higher education occurred mostly in cheap-to-run programmes, with a strong fee-based (rather than tax-based) private sector wherever relevant, with a strong negative correlation with the quality of education – and this is the Polish case. Polish universities shifted their institutional attention away from joint research and teaching missions, to teaching missions, as fees guaranteed an additional income stream – and now, re-focusing attention back to research and teaching missions, after almost 20 years of neglect, is difficult to achieve. Internationally visible knowledge production requires transformations of institutional cultures towards substantially more entrepreneurial, innovative, and competitive ones; new institutional cultures need to be supported by competitive research funding schemes, transparent employment and promotion policies linked to research and third mission achievements, the internationalization of research activities and, perhaps most of all, changes in funding and governance structures.

Two pillars of competitiveness: higher education and innovation

Let me follow here the notion of economic competitiveness developed by Michael Porter (and used in annual *Global Competitiveness Reports*, Porter, Sala-i-Martin, and Schwab 2008, Schwab 2010). Macroeconomic, political, legal and social circumstances underpin a successful economy – but are not in themselves sufficient: "wealth is actually created in an economy at the microeconomic level – in the ability of firms to create valuable goods and services using efficient methods. Only firms can create wealth, not government or other societal institutions" (Porter, Sala-i-Martin, and Schwab 2008: 53). So, on this view, economic competitiveness and productivity ultimately depend on the microeconomic capability of the economy.

Knowledge production in Central Europe is viewed in this section in the context of different types of economic competitiveness. As nations develop, their competitive advantages move from the factor-driven stage (low-cost labor, natural resources), to the investment-driven stage (foreign technology, imitation), to the highest one – the innovation-driven stage (innovative products and services at the global technology frontier). Only one Central European member of the OECD studied in this paper – the Czech Republic – is driven by the same type of competitiveness as the most affluent OECD countries. But Poland, the Slovak Republic and Hungary (as well as Latvia, Lithuania, Estonia, and Romania) are in a transition stage. And Bulgaria is still in the lower stage of development. The role of (higher) education is different

in each of the three stages and economic growth is faced with different competitiveness challenges in each of them.

Discussions on knowledge production in the postcommunist Europe cannot ignore a fundamental distinction between efficiency-driven growth in such European countries as Albania or Bulgaria, almost innovation-driven growth (in transition between the second and the third stage of economic development in this classification) in Hungary, the Slovak Republic, Poland and Romania, and finally innovation-driven growth in the Czech Republic.

Of the twelve pillars of competitiveness (Schwab 2010), two are of special interest: "higher education and training" and "innovation". While most major OECD economies are ranked in the first two deciles of the index, the four Central European countries are in the fourth, fifth and sixth deciles of it (Czech Republic is ranked 36th, Poland ranked 39th, the Slovak Republic ranked 60th, and Hungary ranked 52nd; additionally, Romania is ranked 67th and Bulgaria 71st).

Not surprisingly, in the context of Central Europe, what seems to matter much less for the economic competitiveness from a larger perspective is enrollments in education (certainly with the massification model already achieved, though), both secondary (Switzerland ranked 38th, Singapore 30th and Sweden ranked 13th) and tertiary (Switzerland ranked 38th, Singapore 30th and Sweden 16th). The four Central European countries discussed in this paper are relatively well ranked in terms of tertiary enrollments (Hungary ranked 23rd, Poland 21st, Czech Republic 32nd and Slovak Republic 40th) and relatively weakly ranked in terms of both the university-industry collaboration in R&D (the Czech Republic ranked 29th, Hungary 32nd, Poland 64th and Slovak Republic 87th) and extent of staff training (the Czech Republic ranked 40th, Poland ranked 52nd, Slovak Republic ranked 75th and Hungary ranked 88th).

Let me focus on Poland, the Slovak Republic and Hungary (and two other newer EU member states, non-OECD members, Romania and Bulgaria), considerably less competitive economies than the Czech Republic. Where are the weak and the strong points in their tertiary education and training pillar and in their innovation pillar?

Table 1. Ranks by indicators of the "higher education and training" section

Indicators	Poland	Hungary	Czech Republic	Slovak Republic	Bulgaria	Romania
Secondary education enrollment rate	25	33	42	50	66	54
Tertiary education enrollment rate	21	23	32	40	46	22
Quality of the educational system	62	75	34	111	85	84
Quality of math and science education	40	30	25	65	69	43
Quality of management schools	62	71	56	114	94	98
Internet access in schools	48	31	24	35	45	55
Local availability of specialized research and training services	22	47	17	41	80	95
Extent of staff training	52	88	40	75	135	72

Source: Schwab 2010: 111-299.

Overall, Hungary is ranked high in higher education and innovation pillars (34th and 41st, respectively), while Poland is ranked high in the higher education pillar and low in the innovation pillar (26th and 54th, respectively). The Slovak Republic is ranked low in both pillars (53rd and 85th, respectively). The strong points for both Poland and Hungary in the higher education and training pillar are certainly tertiary enrollments; strong points for Hungary and Poland are the quality of mathematics and science education; internet access in schools is strong in Hungary; the quality of the educational system is ranked low for Poland and dramatically low for both Hungary and Slovak Republic; the quality of management schools is again low for Poland and dramatically low for both Hungary and Slovak Republic; local availability of specialized and training services is relatively good only for Poland; and finally the extent of staff training is very low for all three countries. In the sub-indices for innovation, the three Central European economies rank low (about 40th-50th) or dramatically low (about 70th-80th) in all: they rank low in "capacity for innovation", dramatically low in "quality of scientific research institutions" (except for Hungary), "company spending on R&D", and "university-industry collaboration in R&D" (except for Hungary); they also rank low in "availability of scientists and engineers" and in "utility patents" (again except for Hungary).

Table 2. Ranks by indicators of the "innovation" section

Indicators	Poland	Hungary	Czech Republic	Slovak Republic	Bulgaria	Romania
Capacity for innovation	50	46	24	69	79	72
Quality of scientific research institutions	47	18	21	90	73	83
Company spending on R&D	61	75	25	68	96	103
University-industry collaboration in R&D	64	32	29	87	110	103
Gov't procurement of advanced tech products	61	106	31	127	87	105
Availability of scientists and engineers	60	48	50	71	77	55
Utility patents per million population	54	32	34	44	31	62

Source: Schwab 2010: 111-299.

Consequently, in the areas most important for knowledge production in global competitiveness index, the three Central European economies are ranked generally low, and in some specific cases, dramatically low. But even if they were ranked high in these areas, their overall economic competitiveness would be still very low due to low (or, in some cases, dramatically low) rankings in other standardized and measurable pillars, not related to higher education and innovation systems. And this is the point I want to stress: Central European economies are not globally competitive not only because they lag behind in higher education and innovation pillars of economic competitiveness; they lag behind in the other pillars as well. Consequently, even much more modernized higher education and innovation systems would not be decisive about their economies' competitiveness. There is a wide, although slowly bridged, East/West gap related to a multitude of factors, from tax systems to legal systems to transportation infrastructure. Knowledge production in the region cannot and should not be assessed in isolation from its economic environments.

Knowledge production and its regulatory environment

Knowledge production in universities and in business occurs in regulatory environments which cannot be easily avoided by either universities or companies. In universities, it is funding and governance regimes, in the business sector it is often "ease of doing business" that matters most. To show the differences between major OECD economies and the four Central European countries let me refer briefly to the "ease of doing business" ranking (at the

microeconomic level of companies), annually measured by the World Bank in the last five years, most recently in *Doing Business 2011. Making a Difference for Entrepreneurs* (World Bank 2010).

There are ten categories in which comparative advantages of countries are sought: starting a business, dealing with construction permits, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts and closing a business. Central European countries are scattered along the ranks, with Slovak Republic and Hungary in the forties (ranks 41st and 46th), followed by Poland and the Czech Republic almost in the middle of the ranks (70th and 63rd) (World Bank 2010: 4). Top OECD economies are in the top thirty ranks, with Singapore, Hong Kong (China), New Zealand, the UK and the USA in the first five ranks. These are the regulatory realities in which Central European economies are operating, which go far beyond (higher) education and innovation systems but, at the same time, directly influence both national economic competitiveness and processes of knowledge production in the business sector. These realities also directly or indirectly influence two other areas where knowledge production occurs in between universities and companies: the area of academic entrepreneurialism and the area of university-enterprise partnerships, as recent research tends to show (Shattock 2008, Mora et al. 2010).

What are the advantages of the Slovak Republic and Hungary over Poland and the Czech Republic? Poland's weaknesses are clear: it is ranked higher than 100 (out of 183 countries) in such categories as starting a business (rank 113), dealing with construction permits (rank 164) and paying taxes (rank 121). The Czech Republic is ranked over 100 in two categories: starting a business (rank 130) and paying taxes (rank 128). And not surprisingly, all four Central European countries are ranked around 120 (ranks 121-128, with the lowest rank for Hungary – 109) in a single category – paying taxes, with between 257 and 557 hours spent on taxes per year (World Bank 2010: 159-193).

Table 3. Ranks of countries in World Bank's ranking of favoring business regulations in 183 economies by the *Doing Business* indicators

Indicators	Poland	Hungary	Czech Republic	Slovak Republic	Bulgaria	Romania
Ease of doing business	**70**	**46**	**63**	**41**	**51**	**56**
Starting a business	113	35	130	68	43	44
Dealing with construction permits	164	86	76	56	119	84
Registering property	86	41	47	9	62	92
Getting credit	15	32	46	15	6	15
Protecting investors	44	120	93	109	44	44
Paying taxes	121	109	128	122	85	151
Trading across borders	49	73	62	102	108	47
Enforcing contracts	77	22	78	71	87	54
Closing a business	81	62	32	33	83	102

Source: World Bank 2010: 159-193.

What is important in our context of Central European knowledge production is that higher education and innovation systems in Western European countries – as opposed to Central European countries – function in very competitive economies and companies, including companies involved in research, development, and innovation, operate in relatively friendly legal and regulatory environments. Which brings us back to two ideas: first, expectations from higher education (and innovation) systems should not be exaggerated in globally less competitive economies (such as Central European economies), as opposed to more competitive economies in which all other components of competitiveness are in place. And, second, the role of higher education (and innovation) systems in Central Europe and in Western Europe differs strongly due to a multitude of factors exogenous to higher education systems. The necessary (and measurable) need of "catching up with the West" in such areas as infrastructure, technology or business sophistication may be viewed as more important, and consequently public funding may be directed more easily towards these areas than towards higher education or R&D in public higher education. And, assessing the level of public funding for university research in almost all new EU member states, this is exactly what has been the case in the last two decades. Which comes close to recent Aghion and Howitt's claim from *Economics of Growth* that, generally, the closer a country to the productivity frontier, the more it becomes urgent to invest in higher education to foster innovation (and therefore in the US, growth will be enhanced by investing more in research education instead of two-year colleges, Aghion and Howitt 2009: 312). Central European countries are not at the productivity frontier, as shown in the research sector by both low publications intensity and low patents intensity.

Knowledge production and fiscal constraints

The fiscal constraints in which higher education in Central Europe operates are high and there are high levels of inter-sectoral competition for (scarce) public funding. To give a dramatic illustration of the point: Poland in the global competitiveness index consistently ranks dramatically low in the last few years in one of the publicly most expensive categories – the pillar of infrastructure: quality of overall infrastructure is ranked 108th out of 139 economies, quality of roads ranked 131st, quality of port infrastructure is ranked 114th and quality of air transport infrastructure ranked 108th, Schwab 2010: 278; the three other countries are also generally ranked very low in all above sub-indices of infrastructure, with the exception of railroad infrastructure in the Czech and Slovak Republics.

Table 4. Ranks by selected indicators of the "infrastructure" section

	Poland	Hungary	Czech Republic	Slovak Republic	Bulgaria	Romania
Quality of overall infrastructure	108	49	37	65	120	136
Quality of roads	131	63	80	67	135	134
Quality of railroad infrastructure	62	43	22	21	54	70
Quality of air transport infrastructure	108	66	17	120	90	102

Source: Schwab 2010: 111-299.

Thus Central European knowledge production is performed not only in economies with different levels of competitiveness, and operating in different regulatory frameworks than most economically advanced Western European countries, as discussed above. Knowledge production is also performed in different, although convergent in the last two decades, labor markets and corresponding employment patterns, leading towards the service economy. There is a tendency of employment structures in Poland and other Central European countries to become similar to those in major OECD economies. In Poland, between 1994 and 2004, the share of those employed in agriculture and forestry decreased (from 24% to 18%), those employed in manufacturing also decreased (from 32% to 29%), and those employed in services increased substantially, from 44% to 53%. This is still far below the OECD average in terms of employment patterns but in terms of GDP by sector, the share of services is 66%, close to the OECD average of about 70%. The substantial difference, though, is that the

service sector is composed of various activities, only some of which are knowledge-intensive. Central European countries lag behind in the share of knowledge-intensive service activities (which reaches 25-30% in the USA, France, or the UK; Anita Wölfl 2005: 9). In the business sector in Poland, for instance, there are only four companies with considerable (but still marginal by OECD standards) R&D investments – BRE Bank, Telekomunikacja Polska, Netia, and Orlen, with R&D funding between 5 and 23 million EUR (in 2007). The above factors have strong impact on the realities of knowledge production in higher education institutions, including their ability to do research in partnerships with the enterprise sector.

The geography of knowledge production in Europe: regions

Apart from countries as units of analysis in knowledge-production assessment, in recent years also regions in European countries (referred to as NUTS 2 level) are increasingly becoming the focus of attention of both researchers and policy makers (see EC 2009, Hanell and Neubauer 2006, Arbo and Benneworth 2007, Goddard 2000, OECD 2007). A report on *Europe's Regional Research Systems: Current Trends and Structures* published by the European Commission presents a new typology of regions which is very relevant for the assessment of knowledge production in Central Europe.

There are six leading R&D performers in Europe (three regions in Germany and one in the Netherlands, Finland and Sweden each). All other regions in the EU are classified into four types: Type 1 regions are R&D-driven regions (a high publishing and a very high patenting intensity, business sector contributes an above average share to regional GERD), Type 2 regions are public-sector-centered, R&D supported regions (with a very high publishing intensity in contrast to an only slightly above average patenting intensity; gross expenditures for R&D per GDP are slightly above average, mostly accounted for by either universities or public research institutions; the contribution of the business sector is below average). Type 3 regions are broadly-based, R&D supported regions (with an average publishing and patenting intensity; unlike Type 1 or Type 2 regions, they are not home to outstanding centers of excellence in either public sector or business research). And, finally, Type 4 regions comprise the remaining regions in which R&D plays a small role (with a far below average publishing intensity, a very low patenting intensity and an amount of investment in R&D "that can only be described as complementary to the region's main drivers of growth", EC 2009: 40).

With an exception of merely two regions (the Praha region in the Czech Republic and the *Bratislavsky kraj* region in the Slovak Republic), all regions in Central Europe (as well as, presumably, in Romania and Bulgaria, for which data are not available in a comparable format) are classified as either Type 3 or Type 4 regions, the vast majority of them being classified as Type 4 regions. Central European regions are weakest in research intensity and the least research-driven in the European Union.

A number of countries – including the four in Central Europe studied here – consist of Type 3 and Type 4 regions only (with the two above exceptions). The EC report concludes: "it is likely that within their national context they lack sources of knowledge to which an enlarged ERA network could provide access" (EC 2009: 44). A report on *Geographies of Knowledge Production in Europe* published by NORDREGIO stresses in its conclusions "a clear core-periphery pattern" in the structure of knowledge intensity in Europe. "The East-West divide in Europe" – the theme of the present paper – is "still clearly discernable" (Hanell and Neubauer 2006: 28). Consequently, knowledge production in Central Europe, at a regional level, is performed in regions which are not R&D-driven: in the vast majority of regions R&D plays a supportive role or R&D is merely complementary to the local economy.

Conclusions

A fair assessment of knowledge production in the region needs to refer back to historical legacies of the communist system and to two decades of its postcommunist transformations. Universities in Central Europe for half a century were operating under special circumstances, with far-reaching consequences for the postcommunist transition period and beyond. The early 1990s brought about rapid political and economic transformations, while in the next ten years the reform packages included also welfare policies and higher education policies. Despite a powerful role of European agendas in transforming higher education systems in the region in the 2000s, both prior to and following the EU accession in 2004, Central European higher education still struggles with communist and postcommunist legacies. Consequently, social narratives, or founding ideas, about the role of universities in society and economy produced by universities themselves are relatively weak, as opposed to strong narratives increasingly produced by policy makers involved in comprehensive reform programs, as the Polish example clearly indicates.

The East/West divide in knowledge production continues, as testified by assessments of both higher education and innovation systems. On economic grounds, both pillars of economic competitiveness related to higher education (higher education and training, and innovation) are weak, as are both research and patenting outputs in the region. The role of factors other than higher education and innovation systems is substantially more important for competitiveness and growth in Central Europe than in affluent Western economies. The international visibility of universities as knowledge production centers is extremely low, with just a few of them present in either global or European university rankings. The analysis of the geography of knowledge production at the level of regions may indicate that Central Europe is in danger of being effectively cut off from the emergent European Research Area. The very idea of knowledge economies may be far more difficult to apply in the region than is generally accepted in OECD and EC discourse.

The East/West differences in higher education systems and in university knowledge production may be bigger than expected, and the role of historical legacies may be more long-term than generally assumed in both social sciences and public policy studies on the region. Transformations of universities may take much longer and the gradual convergence of both higher education and research systems in two parts of Europe cannot be taken for granted without thoughtful changes in both university funding (including both its modes and its levels) and governance. Central European universities desperately struggle to remain in the global academic center but their gradual decline to academic peripheries cannot be excluded if proper measures are not taken. Which brings to the top of the agenda the issues of European integration in higher education and research on the one hand, and of revised national policies in the two areas in the region on the other hand.

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