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**Graduate employment in the knowledge society  
Norwegian mastergrade-level graduates**

by

**Terje Næss**

*Nordic Institute for Studies in Innovation, Research and Education*

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AlmaLaurea Inter-University Consortium | viale Masini 36 | 40126 Bologna (Italy)  
Website: [www.almalaurea.it](http://www.almalaurea.it) | E-mail: [pubblicazioni@almalaurea.it](mailto:pubblicazioni@almalaurea.it)

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## **Graduate employment in the knowledge society**

*Norwegian mastergrade-level graduates*

by

Terje Næss\*

### **Abstract**

In Norway, as in most other countries, even most educational researchers and politicians agree that knowledge worker jobs will be plentiful in the new knowledge economy and that new graduates from higher education will not have large problems in finding relevant employment in spite of their increasing numbers, there is still some disagreement about this. In Norway, the development on the graduate labour market is monitored by NIFU using graduate-surveys. According to the surveys, most graduates still find “relevant employment” after graduation. In this article we have explored the content of “relevant employment” by looking at various indicators for the skill level for those graduates who are in “relevant employment”; economic activity, sector, wages, and information-related work. This has been analysed for four fields of study; humanities, law, economics and science&technology, and by comparing the 1989/91-cohorts with the 2005/07-cohorts. All the indicators seem to indicate that “relevant employment” for the large part still is high-skill employment, and that there is not substantial deskilling or overqualification. Firstly, the large part of growth in graduate numbers has been absorbed by typical high-skill economic activities. This was however not mainly traditional academic work areas, but different types of “knowledge-intensive service production”. Especially important was “professional and technical services” and information&communication. 43 per cent of the growth in recruitment occurred within these two economic activities. Wages in these two economic activities were also higher than in the traditional academic sector, indicating that the shift in recruitment to these two economic activities not should be interpreted as deskilling. For two other relatively important “new” work areas, for these groups of graduates, “cultural and other personal services” and “health care and social services”, however, and especially the first group, average wages was lower than in other economic activities, especially for the first group, which may indicate that the skill level is lower than in the traditional academic areas.

Another important signal of large demand for graduates is that the business sector, which generally is thought of as more attractive than the public sector, accounted for three quarters of the increase in the number of employed graduates. This was not only because it was economic activities within the business sector domain that increased recruitment the most; there was also a general trend towards increased recruitment in business sector organization irrespective of economic activity. Lastly, nearly a third of the growth in recruitment was information-related work, also usually thought of as typical skilled work.

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\* NIFU Nordic Institute for Studies in Innovation, Research and Education  
e-mail: Terje.nass@nifu.no

## 1. Introduction & background

The basic economic premise for the “academization” of the labour force is that educated people can use their skills to increase the skill level and the productivity in a wide variety of jobs, compared to workers with lower education. However, opponents to this policies believes that the number of potential “knowledge worker jobs” where such a skill-increase is possible is limited and far lesser than the number of graduates, thus causing overeducation among graduates and even that many graduates end up in unskilled employment.

Even though most educational researchers, bureaucrats and politicians agree that the large majority of graduates benefit from their education, both in terms of career possibilities and in terms of personal and social development, such concerns should be taken seriously by researchers, because it must be admitted that the empirical evidence on how the students later fares in the labour market is far from complete.

In Norway, the development on the mastergrade graduate labour market is monitored by NIFU using annual graduate surveys, covering unemployment, assessment of the relevance of education, wages etc (Arnesen 2010 Aamodt & Støren 2009, 2010). According to the results, most graduates still find relevant employment. The other main empirical “leg” of studies on the labour market for educated manpower is studies of the wage-premium for workers with higher education (HE). Various studies have been undertaken, which shows that the wage-premium for HE has remained unaltered in spite of the huge increase in the number of workers with higher education (see Bjørnstad, Gjelsvik, Godøy, Holm & Stølen 2010).

However, beyond the rather vague term “relevant employment”, relatively little is known about how the increased supply of graduates has affected the skill level in the graduate’s jobs, and how their education is being put to use. In this article, we will use data from the graduate survey to attack this question by looking at some other possible indicators for the skill level; economic activity, sector, wages and information-related work. Since we want to explore the content of the term “relevant employment” we only look at graduates that thought that they had some use of their education. Or, to put it another way, we want to learn more about the new academic professional role “knowledge worker” in the Norwegian graduate labour market, and to give some substance to the content of this term.

Economic activity is of course an important indicator for skill-level, as there are large and well-known variations in the skill-requirements between different economic activities, and working in a high-skill economic activity of course increases the probability that the graduate also is doing high-skill work. If a graduate for example work in a high-skill economic activity such as knowledge-intensive service-production, it seems likely that the graduate is doing skilled work. If the graduate on the other hand works in low-skill economic activities such as transportation or trade, there is a larger possibility that the opposite is the case. However, of course the opposite is also possible; it is possible that the graduate working in the high-skill activity only holds an unskilled position, while it also is possible that the graduate working in the low-skill activity holds a managerial or other high-skill position.

In addition, we will therefore also look at the average wages in the different economic activities, which we will interpret as a measure for the skill level. Especially it is interesting to see how new areas of graduate employment measure up compared to the more traditional academic work areas.

The proportion of the graduates being employed in the business sector is also an important indicator for the employment possibilities for the graduates, as the business sector generally, but now necessarily always, is viewed as more attractive than public sector, and in many OECD-countries competition from the business sector is causing problems for recruitment to traditional academic areas (OECD 2008). By sector we here mean a broader 3-group categorization based on ownership and financing&market-behaviour; business, semi-public and public. While there is a close relationship between this variable and economic activity (industrial sector), there is also for most economic activities a mix of organizations from all these three sectors. Thus, according to this

definition, sector is not overlapping with economic activity. It is also interesting in itself to see if the sector the organization belongs to seems to affect the use of workers with mastergrade education.

The knowledge society is also often called the information society, and information-work is thought of as a type of work which higher education is especially suited for. We therefore also look at how much of the increased recruitment that are connected to information work, either through working in the information-sector, or through working in information-positions within other types of organizations, using occupational codes.

We look at four fields of study: humanities, law, economy and science&technology (S&T).

Most of the results in the paper have earlier been published in Næss (2008, 2010). In section 2 we present the data we use. In section 3 we first look at the recruitment into different economic activities. In section 4 we look at the recruitment pattern categorized by sector, and in section 5 we discuss the importance of information services, and in section 6 we give a summary of the results.

## 2. Data & methodology & definitions

The data source is the NIFU STEPs graduate survey (Arnesen 2010), which surveys the labour market situation six months after graduation, for spring-term graduates. The approach we have taken is to compare two groups of graduates, one group consisting of graduates from the spring term in 1989 and 1991, and one group consisting of new graduates in the spring term in 2005 and 2007. 1989 is chosen as the starting year, because in 1989 the questionnaire was revised, so using this period we get a relatively coherent definition of sectors.

We have looked at two graduate cohorts in each group, to increase the number of graduates, since Norway is a small country with relatively few graduates, and also to diminish the effect of temporary fluctuations in labour market conditions, which can have quite large impact on the recruitment possibilities for new graduates.

Table 1 shows the number of graduates in the sample, consisting of graduates with degrees at the mastergrade-level. In the group consisting of graduates in 1989 and 1991, all graduates were included in the survey. In the other group, samples were drawn for some fields of study, and for this group we use weighted numbers. Field of study is coded using the Norwegian Standard Classification of Education (Statistics Norway 2000).

**Table 1.** The number of graduates with a master-degree (or equivalent degree) in the spring term that was in employment six months after graduation, where HE had some relevance, by field of study. 1989/91 and 2005/07.

	1989/91	2005/07	
		Actual	Weighted
Humanities	179	656	807
Law	292	249	368
Economy <sup>1</sup>	473	378	508
S&T	730	1 043	1 310
Total	1 674	2 326	2 993

1) Only public institutions is included

We have only weighted to correct for sampling, not for lack of response. Since the response rate was somewhat higher in 1989 and 1991, 82 and 78 per cent respectively, than in 2005 and 2007, 61 and 66 per cent respectively, the growth in the numbers of graduates is somewhat underestimated in the numbers that we present.

Since we in the article want to shed some light on the content of jobs that usually is thought of as relevant jobs, which is the case for large majority of the jobs the graduates have, we have *excluded*

graduates who worked in jobs where the graduates thought had no use of their education.<sup>1</sup> The proportion of excluded employed graduates was 3 per cent in 1989/91 and 12 per cent in 2005/07.

### 3. Economic activity

In this section we first look at how the growth in the supply of graduates has been distributed on different economic activities. We first say something about what to expect from earlier studies. Many studies find empirical evidence that imply that the demand for workers with high skills have increased the most for branches which already have had a high skill level (Kim 2002, Haskel & Slaughter 2002). Secondly, a Norwegian study (Rambøll 2008) found that the possibility of continued learning and academic development and to work with skilled academic colleagues was the two most important job aspects that graduates emphasized when choosing job, which also indicate that they will prefer to work in well-established academic work places. Barth & Røed & Schøne & Torp (2004) also found that the increased supply of academic was concentrated even more in traditional high skill branches, and concluded that academics also in the future mainly would work in the same branches they already are established. Thus, the labour market may not have been as radically changed as one often gets the impression of, or is assumed.

However, not all high-skill branches have experienced rapid growth in the workers skill level. In Norway for example, skill demand has increased relatively little for health services (Barth et al 2004, Børing & Næss 2007), while demand has increased much also for some branches with a low skill level (see Bjørnstad & Skjerpen 2003).

This implies that the change of skill demand and consequently the graduate labour market is complex and multi-dimensional, skill-level being just one of several factors influencing changes in demand for skills and graduates. Kim (2002), a metastudy, for example points to the manufacturing vs service production as one such possible dimension, and refers to several studies that have found that skill demand has increased more for manufacturing, than for the service sector.

In this study, the economic activities are categorized into 19 different economic activities.<sup>2</sup> In figure 1, we have shown the recruitment pattern for the whole sample. The figure shows that it has been an increase in recruitment for all economic activities, except for R&D (mainly the research institute sector) and transport (the actual development in recruitment may have been somewhat higher than the numbers in the paper indicate, as mentioned in the previous section).

Still, we see that there are two economic activities which distinguish themselves with especially high growth; "professional and technical services"<sup>3</sup> and information&communication. 43 per cent of the growth in recruitment occurred within these two branches. The two activities increased their share of total recruitment from 17 to 28 per cent.

Also for "cultural and other personal services", "health care and social services", "primary school", "public administration", HE and "mining and quarrying" it was (in rank order) a high growth in recruitment, in absolute numbers. These economic activities accounted for nearly 40 per cent of the growth in recruitment.

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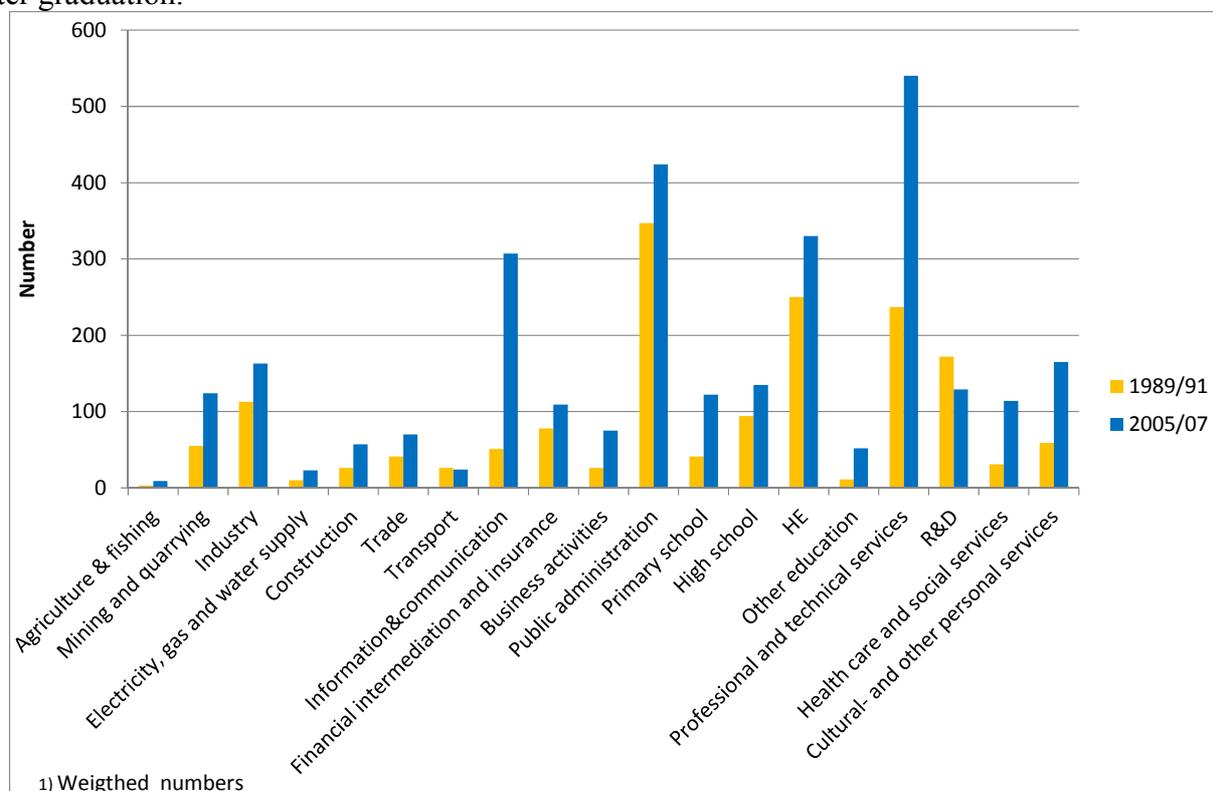
<sup>1</sup> This is a slightly more narrow definition of "relevant employment" than is normally used in the graduate survey (see Arnesen 2009).

<sup>2</sup> Even though the standard for classification of economic activity have changed much from 1989 to 2007, this has in most cases not caused problems for the definition of the 19 activities we look at here. However, something that might be a bit problematic is the separation of the three groups information&communication, "professional and technical services" and "business activities". In 1989/91, it was just one 5-digit branch-code for information&communication-services, while it was a host of different codes for this in 2005 and 2007. Therefore, it might be the case that some firms that was classified as information&communication in 2005 and 2007, was classified as "professional and technical services", or possibly "business activities", in 1989 and 1991.

<sup>3</sup> This activity corresponds to the economic activity "professional, scientific and technical services" in the new branch standard from Statistics Norway (2007), except that R&D not is included. This economic activity is in this branch standard defined as "professional, scientific and technical services. Services in this activity demands higher education and supplies specialized knowledge and skills to the users."

With the exception of “mining and quarrying”, all these economic activities produce services. Also, for the secondary sector in total, the relative growth in recruitment was somewhat lower than for the tertiary sector, in total.

**Figure 1.** Number of employed graduates by economic activity. 1989/91 and 2005/07. Six months after graduation.



Changes in the graduates recruitment pattern to a large degree of course reflects structural changes in the labour market, with a shift in employment from manufacturing to service production, and especially so called knowledge intensive services. The reduction in recruitment for R&D reflects that this sector almost has stagnated, partly because it is a political goal that more of the type of research being done by research institutions should be done by business enterprises.

All the economic activities with high growth in recruitment are also typical high skill economic activities, even “mining and quarrying” which in Norway includes oil-extraction, where many engineers work. Even though the growth in recruitment to economic activities with few academics in relative terms was somewhat higher, these economic activities still remain of little importance. Thus, high-skill activities has been able to absorb most of the increased supply of graduates.

These results thus seem to support the findings from the studies mentioned earlier that find empirical evidence that imply that the demand for workers with high skills have increased the most for branches which already have had a high skill level

Still, in relative terms not all high skill economic activities had large increase in recruitment. Both for “public administration” and HE the growth in recruitment was relatively low, and for R&D it was even a reduction of 25 percent. Information&communication and “professional and technical services”, on the other hand, had very high growth in relative terms. The recruitment to information&communication was more than five-times doubled, while recruitment to ”professional and technical services” increased with 129 per cent.

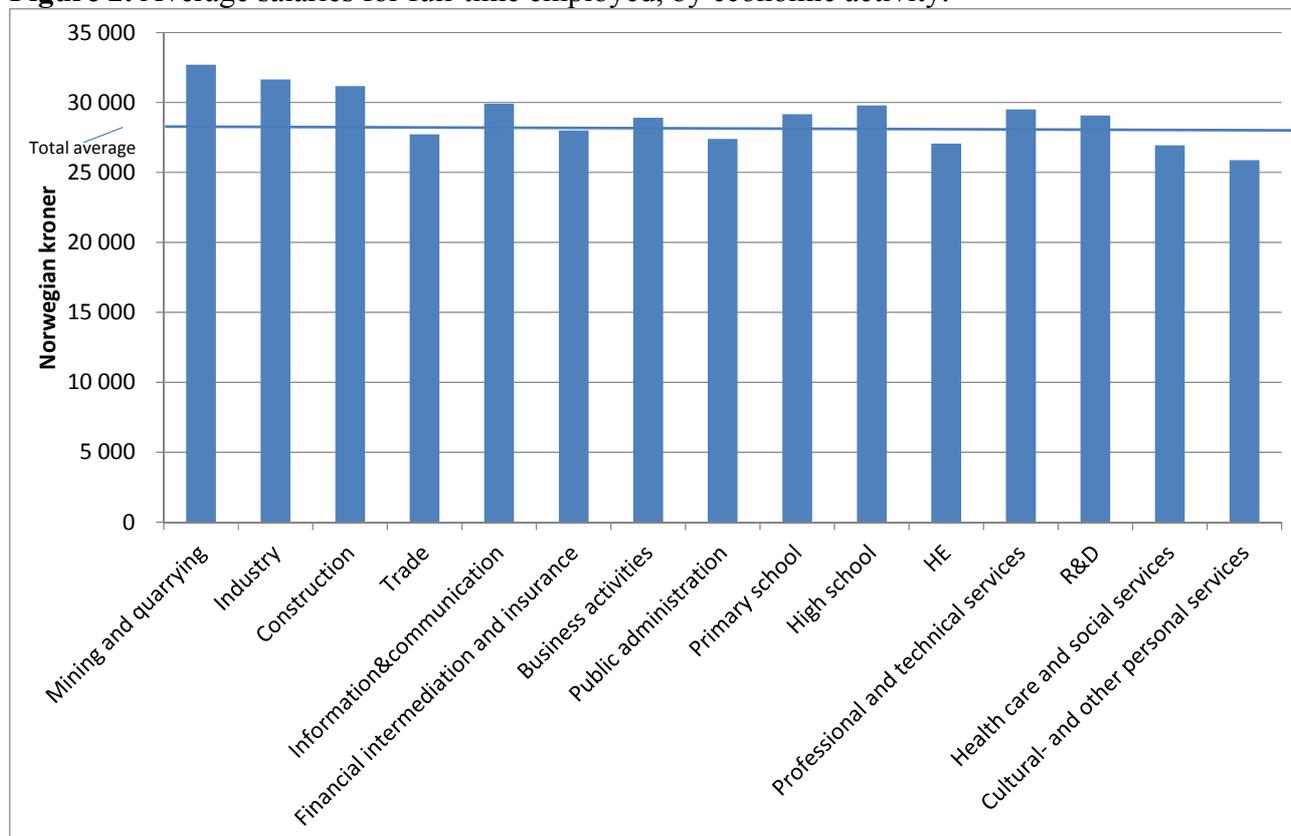
Even though most of the graduates are being recruited to high-skill economic activities, it is still a question of whether the skill level and professional standards in the “new” graduate work areas that has ensured employment possibilities for the growing number of graduates can match the

competence level and the professional standards of the traditional academic sector. As an indication on the skill-level in the different economic activities we have therefore in figure 2 also looked at the average wage level (we have excluded graduates with less than 20 graduates). There we see that in the two most expansive economic activities, in terms of recruitment, "professional and technical services" and information&communication, average wages were above total average, and also above the wage level in the traditional academic areas public administration, HE and R&D. Thus, at least if we accept wages as a measurement for the skill level, there doesn't seem to be any grounds for claiming that the shift in recruitment towards these economic activities implies a lowering of professional standards or skill utilization, compared the academic sector.

Two of the other relatively important "new" work areas, for the graduate group in the study, "cultural and other personal services" especially, but also "health care and social services", however, was the two economic activities with lowest average wages, and especially for the first group wages was considerably lower than in the other economic activities. But this also has to be seen in connection with field of study; a high proportion of the graduates that work in these two economic activities are graduates in humanities (see table 2), which in general have a lower wage level than the other graduates (see Næss 2008).

Thus, these analyses certainly seem to confirm that the large majority of the graduates still do get a good career outcome of their education, and not only according to their own assessment; they also work in typical high-skill economic activities with an initial high proportion of academic workers, and their wages are also mostly as least as good as in the traditional academic work areas. Thus, the "new" graduate work areas outside the traditional academic sector do indeed seem to have been able to offer relevant employment possibilities to a large part of the increased supply of graduates. It is only for a minor part of the graduates that it seems relevant to question if there might have been some downgrading of skill utilization.

**Figure 2.** Average salaries for full-time employed, by economic activity.



Still, the graduate labour market has been significantly altered. In figure 3 we have tried to illustrate the major changes that have taken place, by using broader categories of employment that capture the differences between the traditional academic sectors “public administration” and education&research and the new work areas associated with the knowledge society;

“knowledge-intensive services” and “other knowledge work”. “Public administration” is of course “public administration”, education&research is education on all levels plus R&D. “Knowledge-intensive services” is information&communication, “financial intermediation and insurance”, “business activities” and “professional and technical services”. “Other knowledge work” is then all other economic activities, including both manufacturing and cultural and personal services.

While in 1989/91 it was education&research that was the most important outlet of the new graduates, in 2005/07 “knowledge intensive services“ had overtaken this position, and more than a third of the graduates started their career in this segment of the labour market. Also “other knowledge work” had become almost as important as education&research, and more important than “public administration”.

Many other OECD-contries experience a similar reduction in recruitment to the academic sector (OECD 2008). Low wages, difficulties in moving institutionally and internationally and unfavourable working conditions are put forward as possible explanations for this development (OECD 2010).

**Figure 3.** Number of employed graduates by main group of economic activities. 1989/91 and 2005/07. Six months after graduation.

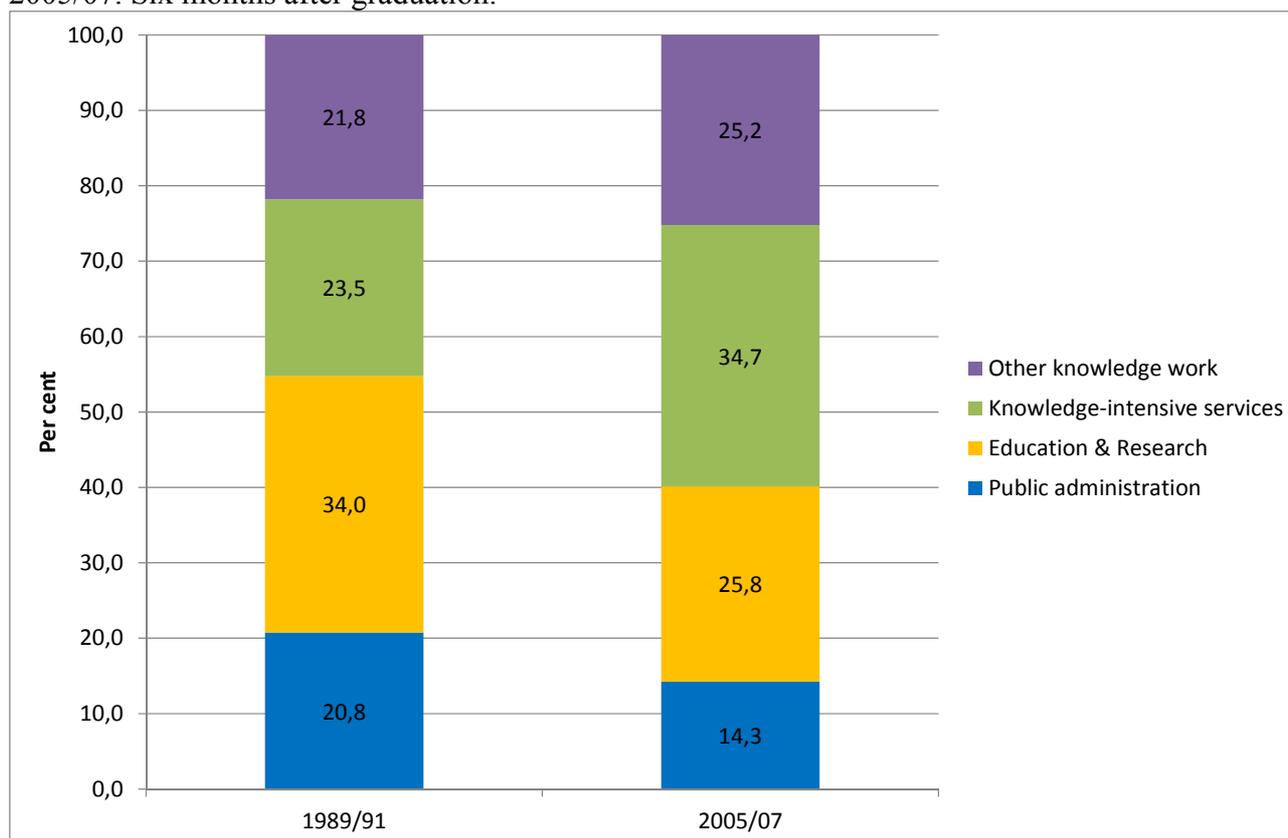


Table 2 shows the number of recruited graduates by economic activity and field of study. In general, we find much the same pattern for all the fields of study, with large growth in recruitment for “professional and technical services” and information&communication. For S&T, also the industry recruited many more graduates in 2005/2007 than in 1989/91. For economy the same was

the case for “business activities”, while it was a quite substantial reduction in recruitment to “public administration”.

For law, almost all of the growth in recruitment occurred in “professional and technical services”, while information&communication was of relatively little importance. Also for law it was a noticeable reduction in recruitment to “public administration”.

For humanities however, we found another pattern; recruitment increased the most for “cultural and other personal services”, while this economic activity not was important for any of the other fields of study. Also typical public sector activities; “public administration”, education and “health care and social services” offered employment to many more graduates in 2005/07, than in 1989/91. For humanities, the recruitment to information&communication and “professional and technical services” increased less, even though it was a substantial increase in recruitment also to these economic activities. In addition, it was a substantial increase in recruitment of graduates in humanities in new and untraditional economic activities, such as industry, trade and “business activities”. This broadening of the employment possibilities for graduates in humanities in new typical business sector activities corresponds well with the findings in the Danish study of graduates in humanities in Denmark (Humanistundersøgelsen 2007).

**Table 2.** Employed graduates, by field of study and economic activity. 1989/91 and 2005/07. Six months after graduation. Absolute numbers.<sup>1</sup>

	1989/91				2005/07 <sup>2</sup>			
	Hum.	Law	Econ.	S&T	Hum.	Law	Econ.	S&T
Agriculture&fishing	0	0	1	2	0	0	2	7
Mining&quarrying	1	0	14	40	0	2	28	95
Industry	1	0	45	67	10	6	28	119
Electricity, gas and water Supply	1	2	2	5	0	1	8	14
Construction	0	2	7	17	1	0	12	44
Trade	1	1	29	10	18	5	22	25
Transport	0	2	19	5	3	4	7	9
Information&communication	2	1	13	35	47	7	43	209
Financial intermediation and Insurance	0	12	55	11	2	13	71	23
Business activities	1	5	13	7	20	6	31	20
Public administration	13	199	85	50	105	177	53	88
Primary school	31	2	2	6	96	0	11	16
High school	50	0	15	29	116	0	4	14
HE	41	15	27	167	101	18	14	197
Other education	2	2	7	0	49	0	0	3
Professional and technical Services	1	32	106	98	37	107	153	244
R&D	2	1	14	155	11	0	7	112
Health care and social Services	2	8	4	17	40	12	11	52
Cultural- and other personal Services	30	8	12	9	143	5	4	14
Other/unknown		0	3	0		2	3	5
<b>Total</b>	<b>179</b>	<b>292</b>	<b>473</b>	<b>730</b>	<b>807</b>	<b>365</b>	<b>510</b>	<b>1310</b>

1) : = number of graduates is less than 20, () = number of graduates is between 20 and 50

2) Weighted numbers.

#### 4. Sector

In the graduate survey, the respondents are also asked to respond to a question about which *sector* they work in, with categories that can be grouped as public, semi-public or business. In many cases it may be difficult for the graduates to decide which sector the organization they work in belong to, but we think that the following definitions largely is in accordance with how the graduates have responded to this question<sup>4</sup>:

*Public*: Publicly owned organizations which are financed by public funding, and public monopoly-enterprises

*Semi-public*: self-owned non-profit organizations which completely or in part is financed by public funding

*Business*: market-financed enterprises operating on free markets

In table 3, we have shown the distribution of the graduates on these three sectors. The table show that the distribution on sectors have changed quite substantially; while in 1989/91 only a third of the graduates was recruited to the business sector, this was the case for more than half of the graduates in 2005/07. Also internationally it is recognized that recruitment of academics to the private sector is challenging the recruitment to other sectors (see OECD-report 2008). Both in Denmark (Humanistundersøkelsen 2007, Arbejdsmarkedsstyrelsen 2003) and France (Louvel 2007) we find documentation on a shift in recruitment towards the business (private) sector.

For all the fields of study there was a marked shift in recruitment towards the business sector. For economy and S&T, both the public/semi-public and the business sector have traditionally been important, but now we see that this has tipped in favor of the business sector; the business sector has clearly emerged as the dominant sector, especially for economy. And also for humanities and law which traditionally mainly has been aimed at the public sector, we see a large increase in the recruitment to the business sector, especially for law.

**Table 3.** Employed graduates distributed on sector, by field of study. 1989/91 and 2005/07. Per cent. Six months after graduation.

	1989/91			2005/07 <sup>1</sup>		
	Public	Semi-public	Business	Public	Semi-public	Business
Humanities	82,7	11,7	5,6	65,2	11,8	23,0
Law	82,9	5,5	11,6	56,8	1,9	41,3
Economy	33,2	9,3	57,5	19,5	0,8	79,7
S&T	47,1	12,9	40,0	32,1	3,9	64,0
Total	53,2	10,5	36,3	41,9	5,2	52,9

1) Weighted numbers.

Table 4 shows the development in recruitment in absolute numbers. Even if there has been a reduction in the share of the graduates that work in the public sector, it has still been a substantial increase, in absolute numbers. But this has mainly been the case for humanities. Also for S&T it has been some increase, but for law and economy it has been a substantial reduction also in absolute numbers. The numbers in the table shows that the business sector accounts for three quarters of the increase in the number of employed graduates in relevant positions.

In the semi-public sector it has been a reduction in total recruitment, also in absolute numbers. For humanities it has been a large increase, but for the other fields of study it has been a reduction. This

<sup>4</sup> In the surveys in 2005 and 2007 it was not distinguished between semi-public and business sector organizations. For these years, therefore, we have on the basis of the company's name found its appropriate sector from a firm-database for Norwegian firms.

is especially so for economy, it was almost no economists that were recruited to the semi-public sector in 2005/07. However, as mentioned in footnote 3 on the previous page, the sector-question was different in 2005/07 from in 1989/91, which may have led to fewer being counted in the semi-public sector in 2005/07, than in 1989/91.

**Table 4.** Employed graduates by field of study and sector. 1989/91 and 2005/07. Absolute numbers. Six months after graduation.

	1989/91			2005/07 <sup>1</sup>		
	Public	Semi-public	Business	Public	Semi-public	Business
Humanities	148	21	10	526	95	186
Law	242	16	34	209	7	152
Economy	157	44	272	99	4	405
S&T	344	94	292	421	51	838
Total	891	175	608	1 255	157	1 581

1) Weighed numbers.

Next we would like to see if the shift in recruitment towards the business sector only reflects that it is especially economic activities that belongs to the business sector domain that has increased recruitment, or if we also find shifts in recruitment towards the business sector within the different economic activities. In most economic activities, there is a mix of public, semi-public and business sector organizations, responsible for different tasks at a more specialized level of economic activity, or complementing each other producing the same products/services. A shift towards the business sector could come from a variety of reasons. One important such reason is of course New Public Management (NPM). It is also conceivable that market position and financing structure of the organization affects the use of educated manpower, and that increased competence are more important for business sector organizations which are more exposed to competition, than public organizations. Paul (2007), for example, has found that graduates with HE that work in private organizations are more involved in innovation than graduates working in public sector organizations, which may support such a hypothesis. Thirdly, in Norway, the different sectors operate under different and separated wage bargaining systems, which have implications for their possibility to compete for the highly skilled manpower.

In table 5 we have therefore shown the distribution on sectors within the different economic activities. Mining&quarrying and industry are per definition not public, while “public administration” of course only can be public. For all the other economic activities, there is a mix of public, semi-public and business sector organizations. Public sector organizations in the different activities mainly associated with business sector activities are largely different public organizations with special national responsibilities.

Of the 12 economic activities which can be both public, semi-public and business sector, the percentage working in the business sector have increased in 11 cases. For several economic activities it has been a large increase. That pertains in particular (in rank order) for “business activities”, “financial intermediation and insurance” and R&D.

Also for construction, information&communication, “cultural- and other personal services”, “health care and social services”, and “professional and technical services” it has been a substantial increase in the business sector. When it comes to information&communication, and perhaps to some degree maybe also for “professional and technical services” and “business activities”, it might however, as described earlier, be a bit problematic to compare the economic activity-classification that was used in 1989/91, with the economic classification that was used in 2005/07.

**Table 5.** Employed graduates distributed on sectors, by economic activity. 1989/91 and 2005/07. Six months after graduation. Per cent.<sup>1</sup>

	1989/91			2005/07 <sup>2</sup>		
	Public	Semi-public	Business	Public	Semi-public	Business
Agriculture&fishing	:	:	:	:	:	:
Mining&quarrying	0,0	1,8	98,2	0,0	0,0	100,0
Industry	0,0	0,0	100,0	0,0	0,0	100,0
Electricity, gas and water supply	:	:	:	:	:	:
Construction	(23,1)	0	(76,9)	(3,5)	(0,0)	(96,5)
Trade	(0,0)	(4,9)	(95,1)	1,4	1,4	97,1
Transport	(26,9)	3,8	(69,2)	:	:	:
Information&communication	13,7	5,9	80,4	2,9	1,0	96,1
Financial intermediation and insurance	20,5	14,1	65,4	3,7	0,0	96,3
Business activities	(34,6)	(19,2)	(46,2)	(6,7)	(2,7)	(90,7)
Public administration	100,0	0,0	0,0	100,0	0,0	0,0
Primary school	(97,6)	(2,4)	(0)	90,2	4,9	4,9
High school	90,4	3,2	6,4	89,6	6,7	3,7
HE	96,8	2,4	0,8	95,2	3,3	1,5
Other education	:	:	:	(80,4)	(7,8)	(11,8)
Professional and technical services	3,4	5,5	91,1	2,2	0,9	96,9
R&D	37,8	50,0	12,2	35,7	26,4	38,0
Health care and social services	(87,1)	(9,7)	(3,2)	77,4	10,4	12,2
Cultural- and other personal services	33,9	61,0	5,1	41,6	40,4	18,1
Other/unknown	:	:	:	:	:	:
<b>Total</b>	<b>53,2</b>	<b>10,5</b>	<b>36,3</b>	<b>41,9</b>	<b>5,2</b>	<b>52,9</b>

1) := number of graduates is less than 20, () = number of graduates is between 20 and 50.

2) Weighted numbers.

For several of these economic activities these changes are clearly connected to the removal of public monopolies. That goes for “business activities”, which includes labour market services which was opened up for private firms after 2000, and information&communication which includes telecommunication which was opened up for business enterprises in the 90s, and probably also other of these economic activities has been affected by such changes.

In most areas of economic activity, the recruitment-proportion was reduced both for the public and the semi-public sector.

We have also conducted a multinomic logistic regression analysis, to see if there is a general significant increased probability of working in the business sector, when controlling for economic activity. In this analysis we have excluded those who have worked in economic activities which have been affected by deregulation of public monopolies, to try to reduce the effect of changes in the organization of public services. We have also excluded activities which according to our definitions only can be public sector, or only semi-public/business-sector.

The probability that graduate  $i$  goes to sector  $j$ ,  $P_{i,j}$ , is assumed to have a multinomic logistic distribution:

$$(1) P_{i,j} = \frac{e^{\sum_k \beta_{j,k} x_{i,k}}}{1 + e^{\sum_k \beta_{2,k} x_{i,k}} + e^{\sum_k \beta_{3,k} x_{i,k}}} \quad j = 2,3$$

where  $x_{i,k}$  is the value for explanatory variable  $k$ , for graduate  $i$ . The reference alternative is the business sector. The explanatory variables are dummy-variables for each economic activity, and where “cultural- and other services” is the reference-group, dummy-variables for each educational group where S&T is the reference-group, and the variable cohort which also is a dummy variable with the value 1 for those who graduated in 2005/07, and the value 0 for those who graduated in 1989/91.

The results from the analysis are shown in table 6. The estimated coefficients show the effect of the explanatory variables on the log-odds, that is the logarithm of the ratio of the probability of working in the public and the semi-public sector respectively, and the probability of working in the business sector.

As we see the cohort-variable is significantly negative for the public sector, which means that the probability of working in the public sector relative to the probability of working in the business sector has been significantly reduced, also when we control for economic activity (and educational group). For the semi-public sector we found an even greater negative cohort-effect. A simulation using the estimated model indicated that the increased probability of working in the business sector could explain more than half of the overall shift in recruitment towards the business sector.

**Table 6.** Multinomic logistic regression of the probability of working in the different sectors. Employed graduates six months after graduation.

	Public sector	Semi-public sector
Constant	1,797***	1,797***
Construction	-3,033***	-24,527
Trade	-5,466***	-4,806***
Transport	-2,143***	-5,031***
Information&communication	-3,737***	-4,945***
Financial intermediation and insurance	-2,829***	-3,964***
Business activities	-2,233***	-3,119***
Primary school	2,411***	-0,860
High school	1,708***	-1,397***
HE	3,350***	-0,229
Other education	0,821*	-0,964*
Professional and technical services	-4,681***	-4,947***
R&D	-0,460	-0,332
Health care and social services	1,288***	-0,776
Cohort (2005/07=1)	-1,365***	-1,741***
Humanities	0,362	0,789***
Law	0,493	1,115***
Economy	-0,719**	0,182

\*=significance level 10 %, \*\*=significance level 5 %, \*\*\* = significance level 1 %

## 5. The information society

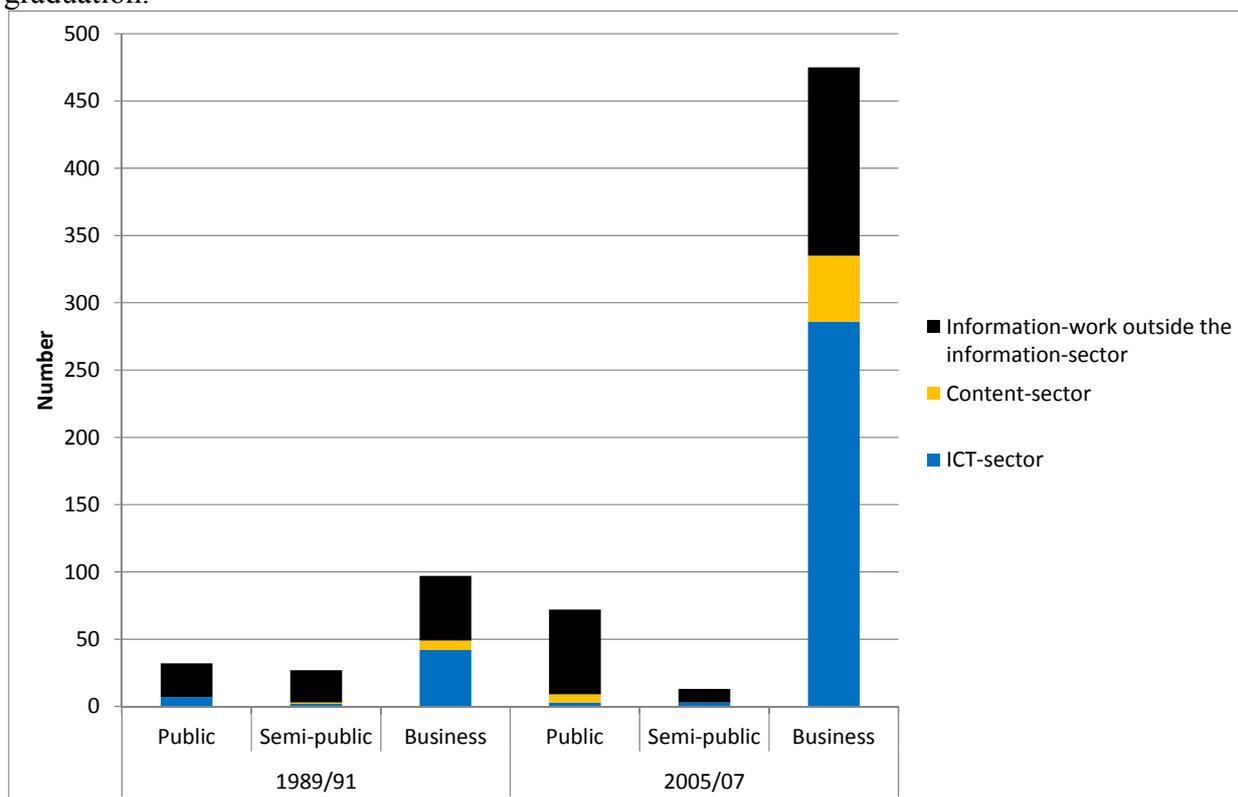
As we have seen, the economic activity information&communication accounted for a large part of the growth in recruitment. However, the role and importance of information and communication for the graduate labour market may expand beyond this particular economic activity, of several reasons. Production and distribution of ICT (information&communication technology)-equipment is for example not reckoned to this economic activity. To be able to give a measure of the total effect from information on the growth in recruitment of graduates, we have used a standard-definition of the information sector (see Gjedtjernet et al 2007), which entails both the ICT-sector and the

“content-sector”. The ICT-sector is branches that produce goods and services for the information society, this means ICT-industry, ICT-trade, telecommunication and ICT-consulting.

The content sector is defined as economic activities that produce content such as text, sound and images for the information society, which means publishing, information services, radio- and television, film and video. The importance of information in today’s society and work life is however even greater than the activity within the information sector give the impression of, because it is obvious that information activities also is a part of the activity in most branches. To try to capture also something of this, we have on the basis of the occupational codes, which are coded according to the prevailing Standard Classification of Occupations (Statistics Norway 1998), tried to make a similar definition of ICT-occupations and content-occupations, which then includes occupations which are occupational counterparts of ICT-firms and content-firms. Examples on such occupations are ICT-occupations, journalists and information-workers.

Using this definition, we found that nearly a third of the growth in recruitment was related to information-work. In figure 4 we have tried to show how much of the increased recruitment in the different sectors that can be attributed to the different categories of information-related work, which we have constructed. The figure shows that information has had much greater impact for the recruitment in the business sector, than in the public sector. Nearly 40 per cent of the growth in recruitment in the business sector could be related to information. It is then especially the ICT-sector which has increased the recruitment. But also for the content-sector it has been a high growth in recruitment. In the business sector it has also been a substantial growth in recruitment to information-related occupations in other types of firms. But as already mentioned, we did not have as good information about these types of branches and occupations in 1989/91 as in 2005/07, so that the numbers probably give a somewhat exaggerated picture of the growth. In the public sector, the importance of information-related work for recruitment was much smaller, and only 10 per cent of the growth in recruitment could be related to information. In the public sector, the growth was mainly about information-related occupations outside the information-sector.

**Figure 4.** Number of employed graduates in information-activities, by sector. Six months after graduation.



## 6. Summary & concluding comments

The picture that emerges from this analysis does not seem to give reason to worry about the employment possibilities for the Norwegian master grade graduates. On the contrary, from the data we have presented it may seem more relevant to question if there is sufficient recruitment in many important academic work areas.

The large bulk of growth in employment occurred in typical high-skill economic activities. There were especially two high-skill economic activities with very high growth in recruitment; "professional and technical services" and information&communication. 43 per cent of the growth in recruitment occurred within these two branches.

Also for "cultural and other personal services", "health care and social services", "primary school", "public administration", HE and "mining and quarrying" it was (in rank order) a high growth in recruitment, in absolute numbers. These economic activities accounted for nearly 40 per cent of the growth in recruitment.

Also, for the two most important "new" economic activities, "professional and technical services" and information&communication, wages were higher than the average for the traditional academic areas education, research and public administration, which also indicates that working in these economic activities not should be thought of as a downgrading of use of competence or overqualification, compared to the traditional academic work areas.

For two other relatively important "new" work areas, for these groups of graduates, "cultural and other personal services" and "health care and social services", however, average wages was lower than in other economic activities, especially for the first group, which may indicate that the skill level is lower than in the traditional academic areas. However, this may also be because a high proportion of the graduates that work in these two economic activities are graduates in humanities, which in general have a lower wage level than the other graduates.

Also, from various sources (St. Meld.Nr. 30 (2008-2009), Christensen, Egeberg, Larsen, Læg Reid, Roness) there are coming reports about problems of recruiting these groups of workers in high-skill activities such as R&D and public administration, areas where we have found low growth in recruitment. If high-skill jobs are available in these areas, it seems unlikely that the graduates would choose to work in low-skill employment in other areas.

Still, the analysis has shown that the transition from mass education to universal education and to the knowledge society has been accompanied by relatively large alterations of the master grade graduate labour market. "Knowledge intensive services" has become a significantly more important work area for the new graduates, than education&research. Information&communication and "professional and technical services" were the main two types of knowledge intensive services with a high growth in recruitment.

Also "other knowledge work" (mainly manufacturing and personal and cultural services) has become almost as important as education&research, as a starting point for the graduates career, and also more important than "public administration". Thus, as in most OECD-countries (OECD 2008), we also in Norway find a substantial down-grading of the importance of an academic career for the mastergrade graduates, most notably for the research institute sector.

The analysis also revealed that it is the business sector that it is responsible for most of the growth in recruitment. During the period we have looked at, 1989/91 – 2005/07, the business sector accounted for three quarters of the increase in the number of employed graduates in relevant positions. For all the fields of education, the proportion working in the business sector increased.

The shift in recruitment towards the business sector is not only because it is typical business sector economic activities that has expanded the most in the new knowledge society. The shift in recruitment towards the business sector also reflects a general shift in recruitment towards the business sector. In most areas of economic activity it is a mix of public, semi-public and business sector organizations, and when we took a multinomic logistic regression of the probability of

working in the different sectors, we found a significantly higher probability of working in the business sector for graduates who graduated in 2005/07, than graduates who graduated in 1989/91, which confirmed such a hypothesis. We found that this general shift towards the business sector could explain more than half of the total increase in the proportion working in the business sector.

For most types of economic activities there was a general shift in recruitment towards business sector organizations. Areas of economic activity with particularly large increase in the share working in the business sector was “business activities”, “financial intermediation and insurance” and R&D. On at least some of these areas this was partly a consequence of deregulation of public monopolies. Also for information&communication, construction, “cultural- and other personal services”, “health care and social services”, and “professional and technical services” it has been a substantial increase in the share working in the business sector.

Even though the proportion of the graduates that works in the public sector has declined, it has still been a significant increase, in absolute numbers. This increase has however largely consisted in increased recruitment of graduates in humanities. For law and economy it has been a quite substantial reduction also in absolute numbers, especially for economy.

The shift towards the business sector probably have several explanation. One important explanation is of undoubtedly New Public Management (NPM) which in general has the favored business sector. It is also possible that increased competence is more important for business sector organizations which are more exposed to competition, than public organizations. Thirdly, in Norway, the different sectors operate under different and separated wage bargaining systems, which may also give business sector organizations an edge in the competition for skilled labour.

Lastly, nearly a third of the growth in recruitment was related to information-work, in the business sector almost 40 per cent. Also this is an important signal that the graduates are doing skilled worked, because information-work is thought of as a type of work which higher education is especially suited for.

Thus, in Norway at least, there doesn't seem to be too much reason to worry about the employment possibilities for the graduates. However, the results from the international REFLEX-study presented in Aamodt & Støren (2010) shows that this may not be the case for all other countries. In fact, the results shows that graduates are far more satisfied with the relevance of their education for their work and future career in Norway than in all the other countries in the study. It is also quite large differences between the countries regarding this.

Even though there can be many explanations to these national differences, which not necessarily only reflects through differences in skill-levels, an interesting question is whether the seemingly high degree of success in the Norwegian graduate labour market can be attributed to the “Nordic model”, with an egalitarian wage system and a high skill level as two of it most important characteristics? One consequence of this is that wages for skilled labour are lower in Norway than in other countries (Barth et al 2004), which gives Norway a competitive edge in skill-intensive production, which may favor the use of skilled labour more than in other countries.

However, one last concluding comment should be that the graduate survey only cover a minority of all those who enrol into higher education. One consequence of the huge increase in enrolment to HE has been a substantial reduction in the response-rate in the graduate survey, from about 80 per cent in the eighties, to about 60 – 65 per cent at present. It is not unlikely that it is those who have fared the best in the labour market that also have the highest response rate, and when as much as 40 per cent of the graduates not participate in the survey, there is of course substantial uncertainty about the results. Moreover, there is also many who drop out from the studies, and very little is known about how these fare in the labour market.

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