RAPPORT 18/2009

Lifelong learning and work-related training in Norway – an international perspective

Final report from the project "Framework conditions for investments in training"

Terje Næss, Liv Anne Støren and Aris Kaloudis

NIFU STEP

Rapport 18/2009
ISBN 978-82-7218-625-7
ISSN 1504-1824

The publications of NIFU STEP are available at www.nifustep.no

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Forord

På oppdrag fra Kunnskapsdepartementet gjennomførte NIFU STEP et større prosjekt med formål å undersøke hvilke rammebetingelser som påviker investeringer i kompetanse i Norge og internasjonalt. Resultatene fra dette prosjektet er dokumentert i tre rapporter.

Rapport nr. 1 ”Rammebetingelser for kompetanseinvesteringer i arbeidslivet – en litteraturgjennomgang” identifiserte faktorer som internasjonale studier finner sentrale når det gjelder omfang av og innretning på kompetanseinvesteringer. Noen av disse faktorene er:

- Strukturelle trekk i økonomien, for eksempel bransjesammensetning og bedriftsstørrelse
- Mobilitet blant arbeidstakere
- Arbeidstakernes utdanningsnivå
- Alderssammensetning i arbeidsstokken
- Innovasjonsaktivitet i bedriftene, inklusiv offentlig sektor
- Større grad av autonomi i arbeidslivet, sterke fagforeninger

Rapport nr.2 ” En kvantitativ studie av CVTS3, ABU 2003 og Lærevilkårsmonitoren” undersøkte betydningen av flere av de forholdene som nevnes ovenfor, og gir noen svar på hvilke faktorer som kan forklare den høye investeringsaktiviteten i kompetanse i Norge.

Den foreliggende rapporten er den tredje og siste fra dette prosjektet og bygger videre på de to foregående. Rapporten undersøker hvordan enkelte samfunnsmessige og økonomiske faktorer påvirker investeringer i kompetanse i Norge i forhold til andre land. Vi benytter to nokså ulike internasjonale datakilder, nemlig data fra European Innovation Scoreboard og individdata fra REFLEX-prosjektet (EU-prosjekt i 6. rammeprogram).

Rapporten er utarbeidet av Terje Næss, Liv Anne Støren og Aris Kaloudis, sistnevnte var også prosjektleder. Etter departementets eget ønske er rapporten skrevet på engelsk slik at en bredere internasjonal leserkrets kan få innsikt i prosjektets innhold og resultater.

Forfatterne takker spesielt Kunnskapsdepartementet for finansieringen av dette langsiktige og kompetansebyggende prosjekt. Vi har lært mye i løpet av de siste to årene. Prosjektet ga NIFU STEP muligheten til å undersøke mer systematisk sentrale forhold som synes å påvirke investeringsnivå i kompetanse, særlig sammenhengen mellom innovasjonsaktivitet og kompetanseinvesteringer.

Videre ønsker vi å takke medlemmene i prosjektets referansegruppe for alle de gode innspill og gode kommentarer vi fikk underveis. Deltakerne i denne gruppen var:

- Lars Nerdrum (KD)
- Terje Risberg (SSB)
- Tone Evje (NHD)
- Bjørn Eggen Hermansen (NHD)
- Einar Jakobsen (NHO)
- Sveinung Skule (Høgskolen i Oslo).

Vi ønsker også å takke Magnus Gulbrandsen som var medforfatter i rapport nr. 1 fra dette prosjektet og Tore Sandven som har vært sentral i hele prosjektet og medforfatter i rapport nr. 1 og rapport nr. 2.

Til slutt ønsker vi å takke Pari Patel fra SPRU og Hugo Hollanders fra MERIT for kvalitetssikringen av denne rapporten samt for deres gode råd og forslag til forbedringer. Patel og Hollanders er av de mest anerkjente forskere innenfor kvantitative studier av innovasjonsaktivitet i Europa.

Oslo, mai 2009

Direktør
Per Hetland

Programleder
Jannecke Wiers-Jenssen

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Summary

This is the third and final report from a project funded by the Norwegian Ministry of Education and Research. The main objective of this project was to investigate which framework conditions stimulate or hamper investments in work-related training. Through available data, NIFU STEP analysed how different types of structural aspects, such as the educational level of the labour force, research and development (R&D) and innovation, level of user-adoption of generic technologies and so forth, affect the level of investments in training.

One of the research questions is whether the high level of investments in training in Norway can be attributed to the so called 'Nordic Model' (see Chapter 1), or whether *other* structural labour market factors have greater influence, making it profitable for workers and firms to invest in training activities.

The results in Chapters 2 and 3 of this report are based on the analyses of two data sets:

a) The European Innovation Scoreboard 2007 data set including data on 25 variables for 32 countries (Chapter 2)
b) Data from a study of graduates with higher education from thirteen different countries collected in the REFLEX FP6-project (2004–2007) (Chapter 3).

High level of participation in lifelong learning in Norway
According to the European Innovation Scoreboard there is a high level of lifelong learning (LLL) in Norway, as well as in other Nordic countries. This is in accordance with other international findings, indicating a high level of work-related training both in Norway and other Nordic countries.

Using multivariate regression techniques, we examined the factors contributing to a high level of lifelong learning, defined as the proportion of the age-group 25–64 that participated in any form of education or course during a four-week period. Three main factors contribute to a high level of lifelong learning in a country. These are:

- the educational level of the labour force
- the R&D and innovation-intensity in the country
- the level of adoption of information and communication technology in the country.

Regarding both the educational level of the labour force and the level of adoption of information and communication technology, Norway scored, according to the indicators used, well above EU-average. These two factors were thus an important part of the explanation for the high LLL participation rates in Norway. On the other hand, Norway scored below EU-average on the majority of the parameters for 'R&D and innovation-

intensity'. Consequently, this factor does not contribute to explaining the high LLL participation rate in Norway.

This does not imply that R&D and innovation indicators are not important also in Norway regarding participation in training. In the second report from this project we found a clear and strong positive relationship between innovation activities and training activities in the business sector. The point we make here is, however, that Norway scores below the EU-average on these indicators and hence, in our model, R&D and innovation factors do not contribute in explaining why Norway scores above EU-average when it comes to lifelong learning.

In total, the estimated model could explain about three quarters of the difference between the LLL participation rate in Norway and the average for the EU-countries. Our estimations show that only a relatively small part of the difference between Norway and EU-average remains "unexplained", that is, it cannot be attributed either to a high level of adoption of information and technology (measured as broadband penetration rate) or to a high proportion of the Norwegian population with tertiary education.

This 'unexplained part' may be (partly) related to aspects of the Nordic model. In addition, the high education level of the Norwegian labour force, as such, may in itself be seen as a result of a set of policies and practices understood a the 'Nordic model'. Thus, the project results generally seem to support the hypothesis that the Nordic model is a factor stimulating participation in lifelong learning and work-related training. However, our analyses reveal some uncertainty concerning the strength of this relationship.

Low level of work-related training participation among graduates with higher education in Norway

Although a high education level of the workforce contributes to a high level of lifelong learning in Norway, and presumably also to a high level of (more specific) work-related training, this does not necessarily mean that the part of the labour force in Norway which has higher education (HE) participate more frequently in work-related training than higher-educated persons in other countries. It may only imply that more persons in Norway participate in work-related training than in other countries because a relatively greater proportion of individuals have higher education. In all countries those with higher education participate more in training than low educated persons. Previous research has shown that the differences in training rates between highly and low-educated persons are smaller in the Nordic countries than in other OECD countries. This implies that the 'low and medium educated' parts of the Norwegian labour force have a higher training rate than in most other countries.

The results from the REFLEX survey indicate that the HE labour force participates in work-related training to a *lesser* extent in Norway than in other countries. This is found among HE graduates five–six years after graduation, and the result *may* reflect that such

training is more prevalent at the start of the careers in other countries, whereas the opposite *may* be the case in Norway. The result of the REFLEX study refers to work-related training courses the past four weeks as well as the past twelve months. Even after controlling for a variety of variables affecting the training rate, it was found that Norwegian graduates participated less than the graduates in all the other twelve countries which had participated in the survey.

Policy implications

Although workers in Norway *without* higher education participate more in work-related training than workers with corresponding education level in other countries, their participation rate is low compared to those with higher education. Thus, it remains a challenge to increase and better target the participation level among the lower (and medium) qualified. This challenge seems to be even more important today as society has to meet the challenge of the world-wide financial crisis, facing increasing unemployment and, over time, an increasing need for retraining due to rapid structural changes in the economic system.

In addition, there is also a challenge as regards enhancing work-related training among higher educated workers. The Norwegian graduates in Education and teacher training, for instance, will most probably benefit from participating more frequently in work-related training courses, but this also applies to graduates in Humanities and Science, who participate in such training rather seldom. A recent report (Brandt, Thune and Ure, 2009) has also shown that the HE institutions have few incentives concerning investments in further education courses; further, that private firms invest in such training mainly to meet the firms' immediate requirements and needs. In addition, firms' knowledge about further education programmes and courses provided by the educational institutions are often lacking.

We believe that there is a clear need for more systematic quantitative and qualitative investigation into how economic and societal framework conditions affect investment in training and skills in the business sector involving a network of international and national research teams. This is not only important for the development of a better national training and skill policies (*kompetansepolitikk*), it is also important for the development of a better and more encompassing innovation policy in Norway.

1 Introduction

1.1 Background

In recent decades, it has been a concern of Norwegian policy to invest in work-related training and lifelong learning. This particularly found place on the agenda in the early 1990s. At that time unemployment rates in Norway increased to a historically high level, especially among workers with low competence. At the same time there was an increasing awareness of the fact that the workers' competence and skills were insufficient to meet future challenges resulting from new technology and increased international trade and competition. There was a need for enhancing these skills. From economic theory it is well-known that despite economic benefits for society derived from investment in training,– such benefits may not be apparent for the single worker or firm, and these may thus under-invest in training.

A committee was appointed to outline whether there was a need for improved lifelong learning and adult education in Norway (NOU 1997:25). The report of the committee concluded that there was a lack of awareness of the importance of training activities by employers concerning the future of their firm. The committee pointed in particular to the shortcomings of the educational system concerning the educational needs of adults. Further, few union and labour associations had an elaborated and systematic strategy for increasing the competence of their members.

The Norwegian parliament adopted an action plan called the "Competence Reform" with the aim of overcoming these shortcomings. The plan was implemented as part of the centralised labour market negotiations on wage tariffs in the period 1997–2000, and included a wide range of measures and the declaration of new rights for workers. Examples of such rights are the right to take leave of absence to participate in organised training for workers who have been employed at least three years; the right to be enrolled in relevant higher education programmes; exemption from taxation for training activities funded by the firm; and a special program to support the development of new training schemes with the aim of increasing the relevance and the adequacy of adult training. The plan has since been supplemented with several new measures.

The Lisbon agenda constitutes the international context of the policy developments in Norway; cf. the strong focus of the agenda on lifelong learning as one of the important policy pillars, together with education, research and innovation policies, for achieving greater degree of competitiveness and growth.

1.2 The purpose of the report

Several recent studies have shown that Norway performs well regarding investments in work-related training compared to other countries (see PRO INNO Metrics 2008). This might have lead to a perception that the national policy on lifelong learning has been very successful. In previous research, the high training rate in Norway has been explained as a result of policy arrangements pertaining to the Nordic model (Hagen and Skule 2004), which is claimed to have training as a key element in a strategy to offset the high wage levels in Norway.

However, Hagen and Skule (2004, 2008) have also shown that the effects of direct policy actions to stimulate lifelong learning and on-the-job-training have not been very significant. In the period 1996–2002 when the national competence reform was implemented, work-related training was actually reduced (Hagen and Skule, 2004) According to a new evaluation of the "competence reform" (Hagen and Skule, 2008), the goals set in the national competence plan have not been achieved.

Hence, one may question whether the high level of on-the-job-training in Norway actually is the result of the specific lifelong learning policy implementation in Norway, or if there are other more general framework conditions resulting in stronger focus on work-related training among Norwegian workers and firms in other countries.

From earlier research (Bassanini et al., 2005) we know that several general conditions are conducive to work-related training, such as the educational attainment in the labour force, the level of investments in research and innovation in the different economic sectors. Such factors can explain country differences in the amount of lifelong learning, independent of policy measures concerning lifelong learning. The data from the European Innovation Scoreboard 2007, which we use in our analysis below, contains macro data on country level on many of the parameters that previous research (also from this project, see Kaloudis et al. 2008) has shown to be important for the level of lifelong learning activities in a country. These include the educational level of the labour force, R&D and innovation intensity, and the level of adoption of new technology in a country. Using this data set we can estimate to what extent such factors simultaneously affect the level of training in a country.

One of the research questions concerns whether the high level of investment in training in Norway can be attributed to the so called 'Nordic Model'. With regard to labour market organization, this model is described as a system with a high degree of union affiliation of workers, centralized agreements and coordinated bargaining at several levels, extensive worker representation at the company and community levels, and well-developed, smooth regulation of working life through legislation and agreements (see, foe example, Dølvik, 2007). Further, the Nordic models involves a welfare state providing public services (see Dølvik, 2007; Olberg. 2007), education, active labour market policies, and income as well

as health security through a universal social welfare system together with solidaristic wage policies (as an important precondition for development of productivity and restructuring) and macro-economic policies (fiscal rectitude and cautious use of monetary policies).

'Flexicurity' (flexibility combined with security in working arrangements) is another concept often associated with the Nordic Model. However, also the EU Commission (2007a; b) has developed a set of common principles of flexicurity. According to Olberg (2007, p. 7) the models for labour market organization in the Nordic countries may be seen as variations of the Nordic model – or as variations of the flexicurity model. One of the pathways[1] of flexicurity concerns training; "... promote opportunities of low-skilled people to enter into employment and develop their skills in order to obtain a sustainable position at the labour market" (EU Commission, 2007b, p. 32).

Key aspects of the Nordic model are the focus on societal equity, resulting in policies focusing more on less advantageous groups in the society, for example workers with low educational levels, and a general level of high wage equity which may reduce the incentive for workers with higher education (HE) to invest in work-related training. Previous studies (Tuijnan and Hellström, 2001) clearly suggest this. Also a recent study based on the analysis of Adult Education Survey data set[2] shows that the Norwegian employees with low levels of education participate more often in lifelong learning activities than their counterparts in other countries.

Be that as it may, in this study we have had access to a very rich data set on higher education graduates (The REFLEX Survey) allowing us to investigate whether Norwegian HE graduates more often – or less often – participate in work-related training compared to their colleagues in other countries.

1.3 Earlier documentation on country-differences

One important data source for country comparisons in this field is the continuing vocational training survey (CVTS) which collects information on training in enterprises in European countries. Norway participated in the second survey with reference year 1999 (CVTS2), and in the third survey with reference year 2005 (CVTS3). Country-data from CVTS2 has been presented in a report from the European Commission (2002). This report shows that:

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1 "Flexicurity" may be summed up in four pathways (EU Commission, 2007a; b): 1) tackling contractual segmentation; 2) developing flexicurity within the enterprise and offering transition security; 3) tackling skills and opportunity gaps among the workforce; and 4) improving opportunities for benefit recipients and informally employed workers.

2 See http://www.ssb.no/magasinet/analyse/art-2008-11-12-01.html

- the percentage of enterprises that had conducted training of employees was much larger in Norway than the average for the EU-15 countries
- the percentage of employees participating in vocational training courses was higher than the average for the EU-15 countries, at 48 and 40 percent, respectively.

The OECD has also used data from CVTS2 in combination with data from the Adult Literacy Survey and other data to estimate training rates in different countries (OECD 2004). According to these estimates Norway has a high training rate. Only Sweden and Denmark had significantly higher training rates: 50 percent of Norwegian employees receive training during a year, three times as many as in the low-scoring countries.

Bassanini et al. (2005) investigates several factors as being possible explanatory factors of country differences regarding investment in on-the-job-training. This analysis revealed that the level of training is correlated with many different factors. About half of the variation between countries could be attributed to differences in the labour force regarding workers educational attainment, age, gender, and possibly other individual characteristics which affect training participation. Industrial structure in terms of firm size was also important. Small firms invest less in training than large firms. The study also found that the training rates were positively correlated with investment in R&D on a national level, and a negative correlation with anti-competitive product market regulation. Bassanini et al. (2005) found no correlation between training and the percentage of workers on a temporary contract. They also argued that the supply of training opportunities was an important factor.

The question of whether a “Nordic Model” of adult education exists has been analysed previously using data from the first and second International Adult Education Literacy Survey by Tuijnman et al. (2001). The results showed that there was “no doubt that a high level of participation in adult education characterizes the Nordic region and differentiates it from countries outside this region”. This could be due to a number of factors including “the role of popular movements, study circles and folk high schools, the quality of the initial educational systems for adults, the legal frameworks regulating study leave from work, and the general commitment in Nordic countries to employed intervention policies targeted towards at-risk groups”. However, Tuijnman et al. concluded that “there does not exist a one-dimensional ‘Nordic Model’ of adult education. Yet there are distinctive Nordic patterns of adult education, characterised by the following: a high participation rate, a high volume per capita, a high public share in financing, a high share of public suppliers, and a high share of personal-interest education”.

1.4 Content of the report

In Chapter 2, we analyse the European Innovation Scoreboard 2007 data using a linear regression model where lifelong learning scores by country is the dependent variable. We attempt to explain the variation on this variable by other variables included in the EIS-data.

In Chapter 3 we investigate work-related training among higher education graduates five to six years after graduation. In Chapter 4 a summary of the results from the second report of this project is presented, and in Chapter 5 we discuss the policy implications of the results from the entire project.

2 Lifelong learning in the total population

Earlier studies (Bassanini et al., 2005) have shown that factors such as R&D-innovation, the educational attainment of the labour force and the degree of competition or regulation of both product markets and labour markets may all have an impact on the level of at work-related training in a country.

However, since such factors are highly correlated, it can be difficult to assess the exact importance of each of them. In this chapter, we attempt to increase our knowledge on this issue by the use of multivariate regression analysis. The purpose is to investigate how these factors simultaneously affect the lifelong learning outcome.

We employ data from the European Innovation scoreboard (EIS) 2007 (Pro Inno Europe, 2008). The analysis includes 32 countries, the EU27 member states as well as Croatia, Turkey, Iceland, Norway, and Switzerland. The EIS 2007 data set is compiled primarily for international comparisons of national innovation systems and is consequently particularly suitable for analyses of the relationship between innovation variables and participation in lifelong learning across countries.

Further, the data set contains many relevant innovation indicators which, to our knowledge, have seldom been used in previous studies.

The indicator in EIS 2007 we are particularly interested in is the "participation in lifelong-learning" (hereafter called LLL-indicator). This indicator is defined as the percentage of the age-group 25–64 that participated in any form of education or course during the four weeks prior to the survey. This includes basic education and further education, training within the company, apprenticeship, on-the-job-training, seminars, distance learning, evening classes etc. The data source for the LLL-indicator is the quarterly EU Labour Force Survey (EU LFS)[3] which is the main source of the lifelong learning data at EUROSTAT.

Of course, this is only a crude measure for work-related training since also persons who are non-employed or still participate in basic education are included. In Norway, the average age for master graduates is well above 25 years, so that this bias can be

[3] The Labour Force Survey is a rotating random sample survey of persons in private households. It is organised in thirteen modules, covering their demographic background, labour status, employment characteristics of the main job, hours worked, employment characteristics of the second job, time-related underemployment, search for employment, education and training, previous work experience of persons not in employment, situation one year before the survey, main labour status, income, and technical items relating to the interview.

considerable. However, this also applies to several other countries, such as Germany, Switzerland and UK (Støren, 2008, p. 21).

2.1 Participation in lifelong learning – national differences

In Figure 2.1, we have ranked the countries in the LFS study according to how well they performed on lifelong learning, i.e. the percentage of the population in the age group 25–64 that participated in lifelong-learning during a four-week-period. We see that compared to EU, Norway performed well and was ranked number 7 on the list, and that the participation rate was almost twice the country average.

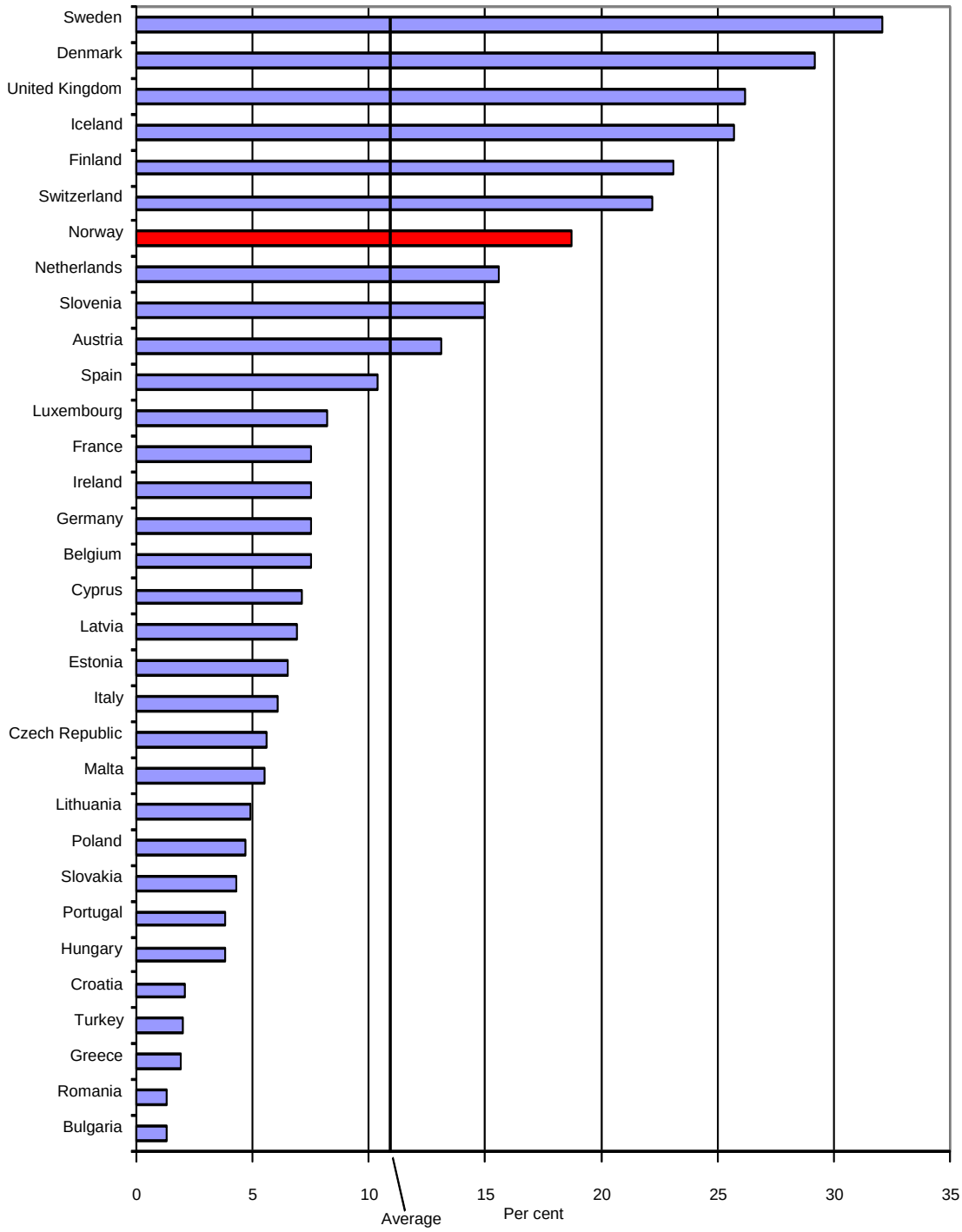
In OECD estimates including only employed persons, Norway's performance is even better (OECD 2004). The reason for this is that Norway has a very high employment rate. In these estimates only Sweden and Denmark had a significantly higher training participation rate than Norway. Further, in the OECD-estimates, the training rate in Norway was on approximately the same level as in Finland and UK. The OECD estimates are partly based on CVTS2 which also includes other types of training than courses.

Very large national differences in training participation
Figure 2.1 shows that there were huge differences in the participation rates between the countries. The participation rate in Sweden at the top of the list was 25 times as high as in Romania and Bulgaria at the bottom of the list. These differences were much smaller in the study in Bassanini et al. (2005) and in the OECD estimates (OECD 2004).

Figure 2.1 also shows that to a large degree country differences can be attributed to a strong regional south/east versus north/west dimension. Especially in the Nordic countries, the training participation rates were high. Sweden and Denmark topped the list, and all the five Nordic countries belonged to the "top-seven-countries". Compared to the other Nordic countries, Norway's performance was not so good.

But also between larger countries we observe large differences in the LLL participation rates. The training rate, for example, was three to four times as high in UK as in Germany.

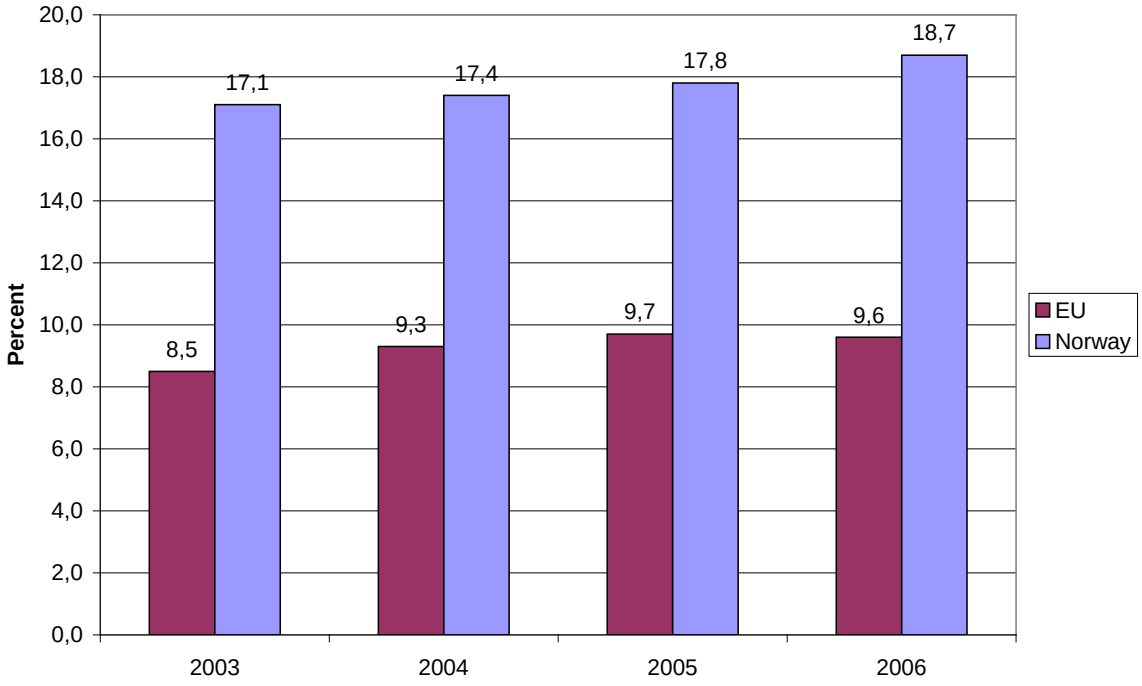
Figure 2.1 *Percentage of the age group 25–64 years that had worked and participated in lifelong learning during a four-week period, by country. 2005. Source: Quarterly EU Labour Force Survey.*



Increasing training participation

Figure 2.2 shows that the training participation rate has been increasing in recent years. This refers both to Norway and the average for the EU, but the increase in Norway was somewhat higher than the EU average. With the exception of Denmark, which has had a very rapid increase, the percentage increased more in Norway than in the other Nordic countries. The participation rate increased for about half of the EU-countries.

Figure 2.2 Percentage of the age group 25–64 years that had worked and participated in lifelong learning during a four-week period. Norway and EU-average. 2003–2006. Source: Quarterly EU Labour Force Survey.



2.2 Explanatory factors

In this section we discuss various explanations for the high performance level in lifelong learning participation in Norway. As already mentioned, the data set that we use is especially compiled for international comparisons of national innovation systems, and is therefore suitable for analyses of the relationship between innovation variables and participation in lifelong learning across countries.

Figure 2.3 shows the performance of Norway concerning 23 possible, relevant explanatory variables in the EIS data set which includes 32 countries, that is, all EU27 Member States plus Croatia, Iceland, Norway, Turkey, Switzerland, *relative to the EU27 country average, measured as the ratio between the Norwegian score and the EU27-country average, when the latter is set to 100*. They are categorised according to

three major themes: educational level of the labour force, R&D and innovation, and technological level. Precise definitions of the variables are given in Pro Inno Europe (2008).

Educational attainment
As may be seen from Figure 2.3, the proportion of the population with tertiary education (25–64 years) in Norway is much higher than the EU-average, and certainly this is an important candidate for explaining the high training rate in Norway, since, as we showed in the second report from this project (see also Chapter 4), the training rates are much higher for employees with higher education than for employees without higher education.

There are also two other indicators that can have something to add to the importance of formal education levels. "New S&E graduates" (Science and Engineering graduates) is the ratio between the numbers of new S&E graduates aged 20–29 and the total population aged 20–29. This indicator can tell us if S&E-education is particularly important regarding LLL. As can be seen, Norway scores lower than EU-average on this indicator, and in this case would have a negative effect on the training rate in Norway.

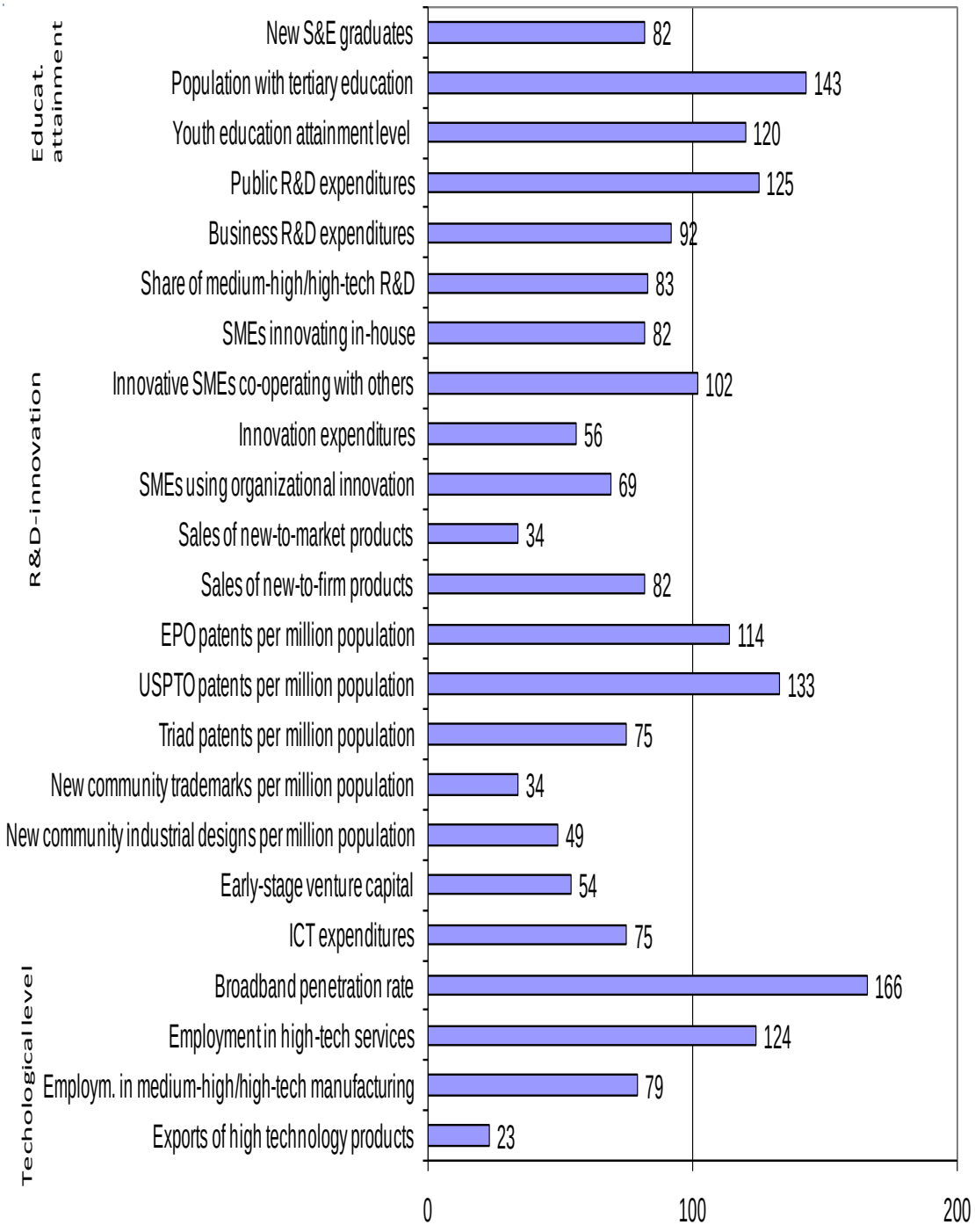
The indicator "Youth education attainment level" is the proportion of the age-group 20–24 that has attained at least upper secondary education. The rationale for including this indicator is that it can give a more complete picture of the educational level in the country than the proportion of the population with tertiary education. Also on this indicator Norway scores above the EU-average.

R&D and innovation
There are many indicators on R&D and innovation (see Figure 2.3), and on most of these indicators Norway scores below the EU-average. The highest deviation in favour of Norway we find for the indicator "USPTO patents per million population" (USPTO = US Patent and trademark office). Also regarding "EPO patents per million population" (EPO = European Patent Office) Norway scores close to the average. Regarding R&D-expenditure, Norway has a higher level of public R&D expenditures (as a proportion of gross domestic product) than the EU. The sum of public and business R&D-expenditure is also somewhat higher than the EU-average. For all the other indicators, Norway scores about at the same level as EU, *or lower*.

Technological level
On the variables that we have chosen to interpret as indicators for how technologically advanced Norway is, on the other hand, we see that Norway performs very well – at least on two of the indicators, especially "the broadband penetration rate" (= number of broadband lines per 100 population). Norway has also a high score on "employment

in high-tech-services". High-tech services include post- and telecommunications (NACE64); information technology; software development (NACE72), and R&D-services (NACE73). On the other hand, Norway scores low on "export of high technology products".

Figure 2.3 Norwegian scores on explanatory variable, relative to the 32 country average (=100). Source = European Innovation Scoreboard 2007.*



*All EU27 plus Croatia, Iceland, Norway, Turkey and Switzerland.

Correlations

In Annex B, the correlations between the LLL indicator and other EIS indicators are displayed. Many of the EIS indicators are highly correlated with lifelong-learning. There were three explanatory variables with particularly high correlations; "employment in high-tech-services" (0.81), "the broadband penetration rate" (0.80) and "business R&D expenditures" (0.79).

Other explanatory variables highly correlated with LLL indicators are "EPO patents per million population" (0.70); "USPTO patents per million population" (0.67); "public R&D expenditure" (0.66); "population with tertiary education" (0.65), and "innovative SMEs co-operating with others" (0.61).

Significant correlations were also found for "Triad patents per million population" (0.54); "new community industrial designs per million population (0.52), and "early stage venture capital" (0.48). For the remaining explanatory variables the correlations were no higher than 0.41.

Of the eight variables with highest correlations, i.e. 0.61 or higher, Norway performed above EU average on all, except "business R&D-expenditures". Thus, while in Figure 2.3 we saw that Norway's performance was below EU average on most of the explanatory variables, it turns out that Norway's performance is above EU average on most of the variables that seem to be most important with regard to life-long learning. This strengthens the hypothesis that the high lifelong participation in Norway can be largely explained by the labour –market dimensions covered in our data set.

However, these correlations are "spurious"[4] as the indicators also are highly intercorrelated (see Table B.1 in Annex B), and also correlated with the level of per capita GDP. This means the actual causal effect of the different indicators and what actually matters is uncertain.

For example, the correlation between "employment in high-tech services" and "business R&D expenditure" is 0.82. Thus, there seems to be a strong relationship between the technological level and R&D and innovation. This raises the question of whether it is R&D and innovation that matters, or the technology level, or both. Using advanced technology might require special skills and knowledge which in turn might require training, but this does not necessarily have a strong relationship with

[4] In statistics, a spurious relationship (or, sometimes, spurious correlation or spurious regression) is a mathematical relationship in which two occurrences have no causal connection, yet it may be inferred that they do, due to a certain third, unseen factor (referred to as s "confounding factor" or "lurking variable"). The spurious relationship gives an impression of a worthy link between two groups that is invalid when objectively examined." (http://en.wikipeda.org/wiki/Spurious_relationship).

innovation. Using multivariate analysis techniques we will try to analyse such questions below.

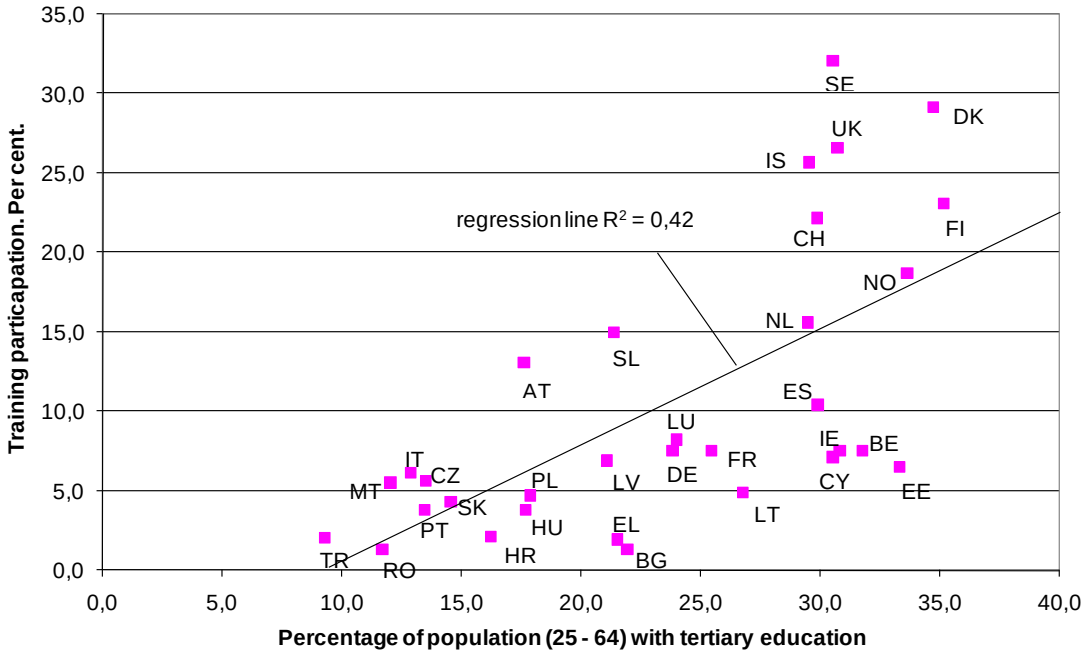
Hugo Hollanders (at UNU-MERIT) has calculated the correlations between the LLL indicator and the EIS-indicators when controlling for the level of per capita per GDP (Table B.2 in Annex B). This table provides an indication of the robustness of the correlation results. In this case, we find that only two indicators correlate with the indicator of Lifelong learning – the number of community designs per million population and the broadband penetration rate.

Educational attainment of the labour force
Of the three variables related to the educational level of the labour force, only the percentage of the population with tertiary education had a high correlation with lifelong learning. That is, "S&E graduates per 1000 population aged 20–29" was correlated with lifelong-learning (0.33), but the correlation with the proportion of the population with tertiary education was even higher, which to a large degree explains this correlation. "Youth education attainment level" (= percentage of population aged 20–24 having completed at least upper secondary education) was not correlated with lifelong learning. Bassanini et al. (2005), on the other hand, found that country differences could be related to differences in schooling measured as the percentage of the population aged 18 – 24 with at least upper secondary education.

The high proportion of the population with tertiary education is therefore undoubtedly an important cause for the high training participation rate in Norway. Figure 2.4 shows the result of linear regression in which the training rate is conditioned by the educational attainment in the country, and we see that Norwegian employees do not receive more training than the level of educational attainment would imply. In other words, when we control for the educational attainment in the labour force, the training rate in Norway is no better than in other countries.

In all the other Scandinavian countries, on the other hand (which also have high proportions of workers with tertiary education), the workers receive even more training than predicted. Thus, when controlling for educational level in the population, the difference between Norway and the other Scandinavian countries seems to be even larger.

Figure 2.4 Training participation and percentage of population (25–64) with tertiary education.



Multivariate analysis

In an attempt to single out the effect of the different explanatory variables we have also conducted a multivariate regression analysis of how the different explanatory factors simultaneously affect training. Since we have many variables which largely measure the same phenomena (the same framework condition), we commenced with a model where– from each of the three different dimensions – we first included only that variable with the highest correlation with lifelong learning. Thereafter, we added successive variables from each of the three fields until the significance level of one of the variables in that field was larger than 0.2.

As the bivariate analysis shows, there are clear signs of heteroskedasticity; that is that the *variation* in the training rate seems to increase as the *level* of training increases. We therefore conducted tests for heteroskedasticity. The tests confirmed this, and we have therefore used weighted regression, where the weights are the square of the percentage of the population with tertiary education.

Table 2.1 shows the estimates for the model we found to be best, according to the procedure described above. Regarding the educational level of the labour force, one variable, the "percentage of the population with tertiary education", turned out to be most relevant. Regarding R&D-innovation, we employed two significant variables; "business R&D-expenditures" and "EPO-patents per million population". "EPO-patents per million population" had a negative estimated effect. Regarding the

technological level, the "broadband penetration rate" was the most significant variable when controlling for other variables. These variables largely explain variations in LLL-training rates as the R^2 of the regression is quite high (0.888).

Table 2.1 Estimates from the regression analysis of EIS 2007 data

	B	S.E.	Beta
Percentage of population with tertiary education	0.236*	0,127	0.134
Business R&D expenditures	7.916***	2.658	0.712
EPO-patents per million population	-0.028*	0.017	-0.421
Broadband penetration rate	0.447**	0,179	0.420
Constant	-5.264**	2.367	-0.151
Model data:			
Adjusted R^2	0.888		
N	29[5]		

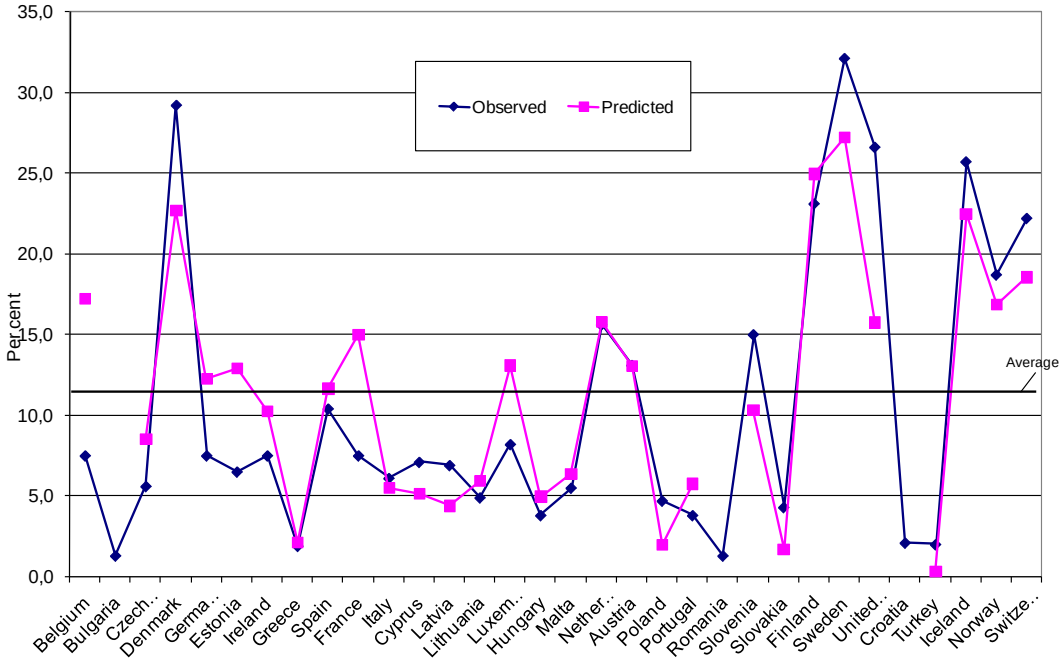
**** = significance level 0.0, ** = significance level 0.0, * = significance level 0.0*

In Figure 2.5 we show the predicted training rate from the final model compared with the actual values. The figure shows that in most cases the model is able to predict the training rates in the different countries quite accurately. Not only is the model able to predict the large deviations in the training rates for countries with very high and very low training rates quite accurately, it is also able to predict the smaller variations between countries in the mid-area with considerable precision. Considering that the predictions are based on only four explanatory variables and that we are looking at 29 different countries, we must conclude that these variables indeed are very important determinants for the level of training in a country.

But there are, of course, some substantial deviations (especially the UK) which have a much higher training rate than predicted. Further, Belgium has a much lower training rate than predicted. Also we see that it is a pattern that countries belonging to the same region deviate from the predicted values in the same direction, implying that there are some regional factors not captured by the model. This applies to the Nordic countries, which all have a higher training rate than predicted. Countries in the north-western part of Europe (with the exception of UK), that is, Germany, France, Luxembourg, Ireland, and especially Belgium, all exhibit lower training rates than predicted by the model. In other words, the regional aspect seems also to play a role, both directly and indirectly in affecting the four explanatory variables used in the prediction model.

[5] In this regression we only included 29 of the 32 countries in the data set due to missing values.

Figure 2.5 Observed and predicted LLL rates, by country.



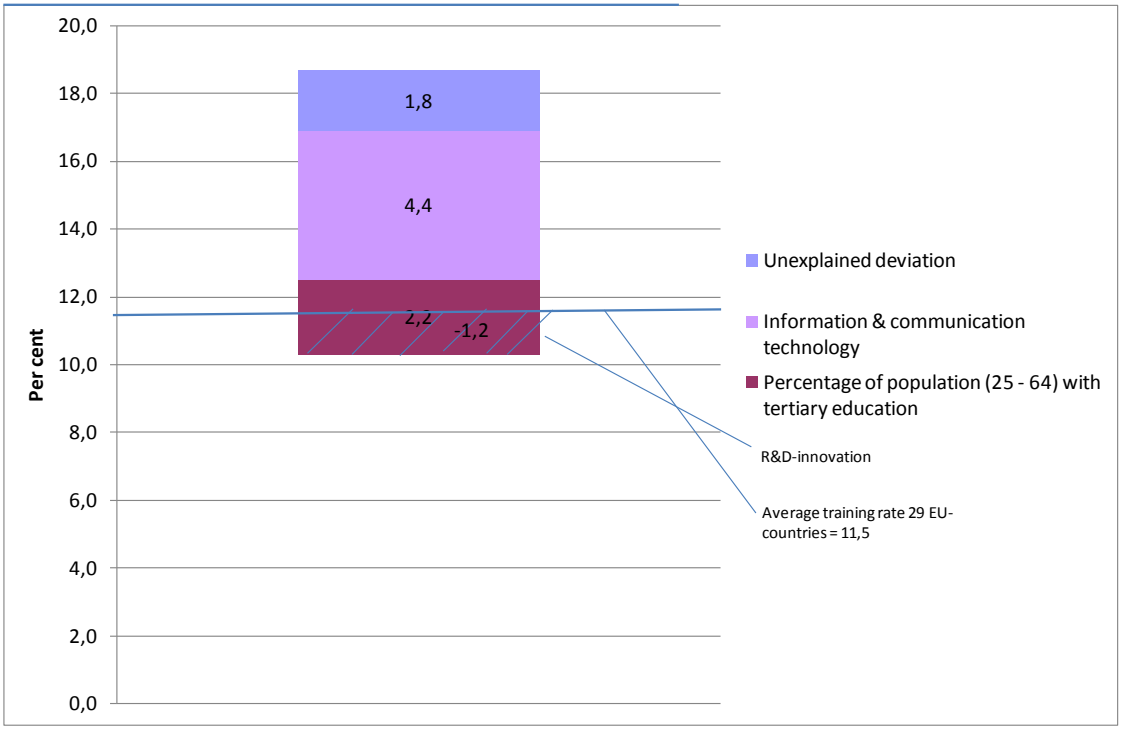
The final question we wish to answer in this chapter is which factors most likely explain the high training participation rate in Norway. Of the four explanatory variables in our final model, Norway scores above the EU average on all except for business R&D-expenses. But since the effect of "EPO patents per million population" on the LLL-indicator was negative, only a high proportion of the population with tertiary education and a high technological level (broadband penetration level) can explain the high training rate in Norway.

In Figure 2.6, we have decomposed the deviation between the EU average (for the 29 countries included in the model estimation) and the training rate in Norway into deviations due to country differences with regard to scores on the explanatory variables as well as the deviation that is unexplained by the model.[6] According to these calculations, the high technological level in Norway was the most important factor, and increased the training rate in Norway with 4.4 percentage points compared to the

[6] If we define $Y_{\cdot}$ as training rates, using ^ to denote predicted or estimated values, we can then decompose the training rate in Norway as: $Y_N = Y_{EU} + \hat{\beta}(X_N - X_{EU}) + \hat{U}_N$, where N and EU is the index for Norway and EU respectively, X is a vector with the explanatory variables, β is the coefficient and U is the residual. Also, since the model is estimated by regression, the predicted EU average is equal to the observed average.

average for the 29 EU-countries included in these estimates. The EU average is 11.5 per cent, and the predicted average for Norway is 16.9. The high proportion with tertiary education in Norway increased the training rate with an additional 2.2 percentage points. However, the level of R&D and innovation intensity reduced the training rate with 1.2 percentage points compared to average for the EU-countries.

Figure 2.6 Factors explaining high participation in lifelong learning in Norway. Predicted values.



The difference between the predicted training rate in Norway and EU that remained unexplained is then only 1.8 percentage points and which refers to about 25 per cent of the total estimated difference between LLL-indicator for Norway and for EU average. The conclusion is that Norway still performs better than expected, even when we take into account factors that our analysis identifies as important for the international level of LLL participation. This may be partly due to the Nordic model and the Norwegian welfare system. But most of the high LLL-training rate in Norway, according to our estimates, is due to the educational level of the labour force and the high levels of adoption of technology in the Norwegian society.

These two structural aspects cannot be directly linked to characteristics of the Nordic model, but both may have been shaped by characteristics of the Norwegian welfare system, in particular the generous funding/loaning schemes for higher education studies.

However, the conclusion that a large part of the high training rate in Norway is due to the high educational level of the labour force is based on the assumption that the effects of the different explanatory variables (such as the educational level of the labour force) are the same in all the countries. If this is not true, the picture may be different. For example, in the next chapter we find that Norwegian graduates with HE participate less in work-related training than their counterparts in other countries. Seen together with the results in this chapter, this implies that the effect of the educational level of the workforce in Norway might be smaller than in other countries. In that case, the high educational level of the Norwegian population might explain less of the high LLL participation rate in Norway than implied by the above calculations, opening up the possibility that also other factors not included in the model, such as those ascribed to the Nordic model, actually play a more important role.

3 Graduates with higher education

This chapter deals with work-related training among persons with *higher education (HE)*. We use a data set that enables a comparison between Norwegian employees and employees in twelve other European countries with the same level and field of education. The data are from the REFLEX graduate survey undertaken in 2005 among persons who graduated from higher education institutions in 1999/2000. Thus, the data refer to the situation five to six years after graduation. For more information about the project see the REFLEX website,[7] Allen and van der Velden (2007) and the Norwegian report from the project (Støren 2008).

As seen in subsection 2.1, Norwegians do – in general – participate in lifelong learning to a larger extent than the EU average. Do we get the same picture if we concentrate on persons with HE; do the Norwegian graduates more often than their European counterparts participate in work-related training?

We have also seen in the second report of the project (Kaloudis, Næss and Sandven 2008) that employees in *innovative* firms/organizations participate more frequently in training than other employees. Does this also apply to persons with HE, and does it also apply to Norwegian HE employees?

Another finding in the second report is that employees in the *public* sector in general participate in training somewhat more frequently than persons who work in the private sector. Do we also find a relationship between the occurrence of training and working in public versus private sector among HE graduates? Does this relationship possibly depend on the extent to which the organization is innovative? Do we find differences between the Norwegian HE graduates and the European graduates in these respects?

A third question may be raised whether *market conditions* are of significance for the amount of training. This question may be taken into consideration with the use of the REFLEX data set.

When we examine these questions we take into account the possible relationship between field and level of study and the extent to which the HE employees participate in training. This possible relationship is also investigated. In addition, field of study will serve as control when we examine the possible differences between Norwegian and European employees concerning participation in work-related training. We will also control for field of study etc. when examining the possible impact of working in innovative organizations or in public versus private sector. In addition we will control

[7] http://www.fdewb.unimaas.nl/roa/reflex/

for a number of demographic variables and the duration of work experience and so forth. The independent variables are shown in Table C.1 in Appendix C.

3.1 Some general results from the REFLEX graduate survey – in Norway and in Europe

Before looking at the results concerning training, we briefly present some of the main results concerning the Norwegian graduates' labour market situation compared to the other European graduates. The Norwegian graduates scored high on most of the parameters. Their labour market situation was good; they were frequently among the 'winners' concerning realization of different sets of work values (Støren and Arnesen, 2007); their job satisfaction was generally high. In addition, overall they were more satisfied than their European counterparts with their HE concerning the extent to which the study programme had been a good basis for starting work, for further learning on the job, for performing current work tasks, and for their future career (Støren 2008). Based on these findings, we expect that also when it comes to work-related training, the Norwegian HE graduates will score high.

3.2 Descriptives – work-related training

In the analyses below we look at results for the *employed* graduates only as we are controlling for workplace characteristics. Most of the graduates were employed (90 per cent of the total sample, 95 per cent of the Norwegian sample). The analyses will focus on the question: "*Did you follow any work-related course/training in the past 12 months?*"

In Table 3.1 we see that 63 per cent of the total sample answered "yes" to this question. Table 3.1 also displays the corresponding percentage concerning a question referring to the four weeks prior to the survey: "*In the past four weeks, were you engaged in further education or other training related to your professional development?*" It is important to be aware that both questions refer to work-related training, and *not* to further HE such as master degree programmes for those graduated as bachelors, or PhD programmes for those graduated as masters.

Table 3.1 shows that contrary to our expectations, the Norwegian graduates answered "yes" to both these questions less frequently than the other European graduates. Below we analyse this difference between the Norwegian other European graduates. We then choose to employ the answers that refer to the past 12 months because we see that the pattern concerning the country differences is very much the same, and by looking at

the last 12 months we minimize problems concerning the fact that the graduates responded to the questionnaire at different times of the year (summer, autumn etc.).[8]

Table 3.1 Participating in work-related training the past 4 weeks/the past 12 months among employed HE graduates, 5–6 years after graduation, by country. Per cent.[9]

	Training past 4 weeks	Training past 12 months
Italy	24.3	48.7
Spain	43.1	70.9
France	31.7	47.5
Austria	32.4	70.3
Germany	27.4	65.0
Netherlands	37.8	63.1
United Kingdom	40.1	68.0
Finland	33.6	71.6
Norway	**22.4**	**52.2**
Czech Republic	62.6	72.8
Switzerland	37.7	60.9
Belgium	[a]	67.9
Estonia	19.8	65.4
Total	34.5	63.4
N (total, weighted)	19 886	22 565

[a] Question not asked

Table 3.2 examines whether the Norwegian graduates participate in work-related training or not, less frequently than their European counterparts, regardless of whether they work in the public sector or private sector. We see that both in Norway and in the total sample those who work in public sector are most likely to get such training, and we also see that the Norwegian graduates participate in such training less often than the others, regardless of whether they are employed in public or private sector.

8 When looking at training the past 12 months we cannot be exactly sure that the job to which the job characteristics refer is the same job as the graduate held when participating in training, but for most of the graduates it will be the same job. 69 per cent of the graduates only had 1–2 employers during the 5–6 years period, so it is not likely that a high share of the graduates had changed work after their training course which had taken place within the last 12 months.

9 The data are weighted in all cross-tabulations. The weights correct for bias between the population and the sample in the different countries with regard to field of study and HE level, in addition to a weight to make all the country samples of the same size (2000 observations). In the regression no weights are used because all the stratifying variables (used as basis for the weights) are controlled for. Because the samples are of different sizes, a selection is used in the regression in order to secure that none of the country samples exceeds 2000 cases.

Table 3.2 Participating in work-related training the past 12 months among employed HE graduates 5–6 years after graduation, by sector. Total sample and Norway. Per cent.

	The total sample	The Norwegian sample
Private sector	59.4	48.0
Public sector	69.2	55.0

In Table 3.3 we examine the possible differences in the participation level by the extent to which their organization is at the forefront when it comes to adopting innovations, new knowledge or new methods.

Table 3.3 Participating in work-related training the past 12 months among employed HE graduates 5–6 years after graduation, by the extent to which the organization is at the innovative forefront, and by sector. The total sample. Per cent.

	1 Mainly at forefront	2 -	3 -	4 -	5 Mainly a follower
Private sector	64.8	63.8	56.5	56.8	50.2
Public sector	72.5	71.2	67.6	71.0	66.0
Total	67.2	66.5	61.1	63.5	58.8
N (total)	3379	5921	7130	3141	1784

We see that work-related training is more widespread among those whose organization is at the innovative forefront than among those characterized as mainly a follower. We see that there are small differences between those in categories 3 and 4 (in the middle), and rather small differences between those in categories 1 and 2 (at the forefront). In the analyses below, those in categories 1 or 2 are merged as 'at the forefront' and those with value 5 as 'a follower'. They are compared to those in categories 3 and 4, which will serve as the reference group in the regressions.

Another finding in Table 3.3 is that the relationship between the occurrence of training and the extent to which the organization is innovative seems to apply mainly to the private sector. However, there is also a tendency in the public sector whereby those who are in the category 'mainly a follower' often participate in training less frequently than those in the category 'at the forefront'.

The direction of causality might go in the opposite direction of what is indicated in Table 3.3. This table shows that the more innovative organization, the more frequently graduates participate in training. However, based on the results, it is plausible to suggest that the more training; the more innovative is the organization. Organizations that are concerned with training of their employees might be the most innovative. If we reverse the dependent and independent variable in Table 3.3 (i.e. "swap" the percentages and presuppose that innovation is the *dependent* variable), we find that

this is not true, see Table C.3 in the appendix. Those who participate in training are not significantly more frequently employed in an organization that is "at the forefront" than those who do not. Those who do not participate in training are not more frequently among the 'followers' than those who do not participate in training. The differences overall are very small.

Nevertheless, we cannot be exactly sure whether 'being innovative' or 'getting training' happens first. The results indicate, however, that it is reasonable to include variables measuring the extent to which the organization is innovative as *independent* variables in regressions where the *dependent* variable is training.

The REFLEX data set also makes it possible to test whether some market-specific conditions seem to influence the prevalence of work-related training as indicated in Tables 3.4 and 3.5.

Table 3.4 Participating in work-related training the past 12 months, by "How strong is the competition in the market in which your organization operates", and by sector. The total sample. Per cent.

	1 Very weak	2 -	3 -	4 -	5 Very strong	Question not applicable
Private sector, per cent with training	57.3	59.0	57.3	60.2	60.3	56.8
N	295	588	1836	4411	5330	586
Public sector, per cent with training	68.1	68.6	70.6	69.8	65.0	69.1
N	933	835	1440	1502	831	3380

The results in Table 3.4 do *not* indicate that there is a relationship between the strength of competition in the market where the graduate's organization operates, and the occurrence of work-related training. Neither was such a relationship found as mentioned in the second report of the project (Kaloudis, Næss and Sandven, 2008). This variable is consequently not included in the multivariate analyses below. However, a question concerning *stability* of the demand shows some interesting results (see Table 3.5).

Table 3.5 Participating in work-related training the past 12 months, by "How stable is demand in the market in which your organization operates", and by sector. The total sample. Per cent.

	1 Highly stable	2 -	3 -	4 -	5 Highly unstable	Question not applicable
Private sector, per cent with training	65,3	62,7	57,7	58,4	53,6	55,5
N	1450	3445	3870	2567	802	904
Public sector, per cent with training	72,9	71,5	67,2	67,0	64,6	69,0
N	1241	1089	1252	713	364	4525

Table 3.5 shows differences in the occurrence of training indicating that the more stable the demand, the higher the proportion of workers participating in work-related training. Bassanini et al. (2005) postulate that the investments in training will be largest in periods of economic expansion. Thus, our results may *to some extent* be seen as in accordance with their arguments, but with the reservation that the question in the REFLEX survey did not refer to *growing* demand. This hypothesis was also confirmed by the results in Kaloudis, Næss and Sandven (2008).

The tendency of increased training participation by an increase in demand stability is found both among persons who work in private sector and persons in public sector. It is interesting to see whether this tendency exists also after having controlled for field of study and a set of other control variables. In the analyses below we include the control for demand stability through the use of three dummy variables. Those who checked off categories 1 or 2 on the stability variable constitute one group and have value 1 on a dummy-variable for 'highly/fairly stable' (else=0). Those who are in the highly unstable category have value 1 on the dummy-variable 'highly unstable' (else 0). Those who checked off values 3, 4 or 6 are seen as 'neutral', and serve as the reference category in the regressions.

3.3 Results of multivariate analyses – work related training

As indicated in the introduction, many factors may have an impact on the occurrence of work related training. This is taken into account, in the following when we examine:

- whether there is a difference between the Norwegian sample and the country samples in participating in work-related training after controlling for a large set of independent variables (such as field of study etc.)
- whether there is a positive effect of working in public sector after controlling for field of study, country etc.

- whether there is a positive effect of working in an organization that is in the forefront when it comes to adopting innovations, after controlling for public sector, field of study etc.
- whether there is an effect of stable/unstable demand, after controlling for public sector, field of study etc.

We examine the questions above using logistic regression where the dependent variable is the probability of having participated in training the past 12 months (value 1), or not (value 0). (See Table C.1 in the Appendix).

The regression results in Table C.1 show that of the graduates in 13 European countries, Norwegian graduates are those who *most seldom* participate in work-related training, *also after controlling for a large set of independent variables*. The results of logistic regression are often not intuitively comprehensible, and the results are presented in Figures 3.1 and 3.2. Those participating most frequently in training are the Czech, Spanish, British, Finnish, Belgian, and Austrian graduates. This means that the picture is more or less the same after controlling for all the independent variables (Table C.1) as seen in the bivariate distribution depicted in Table 3.1.

From Table C.1 we also see that there is a large positive effect of working in public sector and of working in an innovative organization. We also see a significant positive effect of working in an organization with stable demand. This effect is not large, however.

Other noteworthy results include the following.
There is no gender difference. Those educated as bachelors with no further education participate less frequent than other groups ("ceteris paribus"). Graduates in the fields of Health, Service, Agriculture and Veterinary science, and Education participate in work-related training more frequently than graduates in other fields of study. There is no significant difference between Social science (the reference group), Law, Business and management, Computing, and Engineering, all of which are in the median group when it comes to participating in work-related training. Those who participate most seldom are graduates in Humanities; the second most seldom are graduates in (natural) Science. This indicates that graduates in the classical university disciplines participate most seldom in work-related training.

Graduating from an academically prestigious study programme as well as from a vocationally oriented study programme also significantly increases the probability of having participated in work-related training, although the increases are modest. The same applies to those who had a position in an organization during study; those having work experience (relevant or otherwise) during study; having a useful social network (useful for obtaining a job); and those having completed further education (but not

PhD education). In addition, the longer the work experience, the higher the probability of having participated in work-related training.

These results overall point in one direction: participating in work-related training is not incidental; it tends to occur most often among graduates in Health (for instance nurses) and in Education (teachers), who might not be seen as privileged groups, but otherwise it is most prevalent among those who are privileged in one way or another.

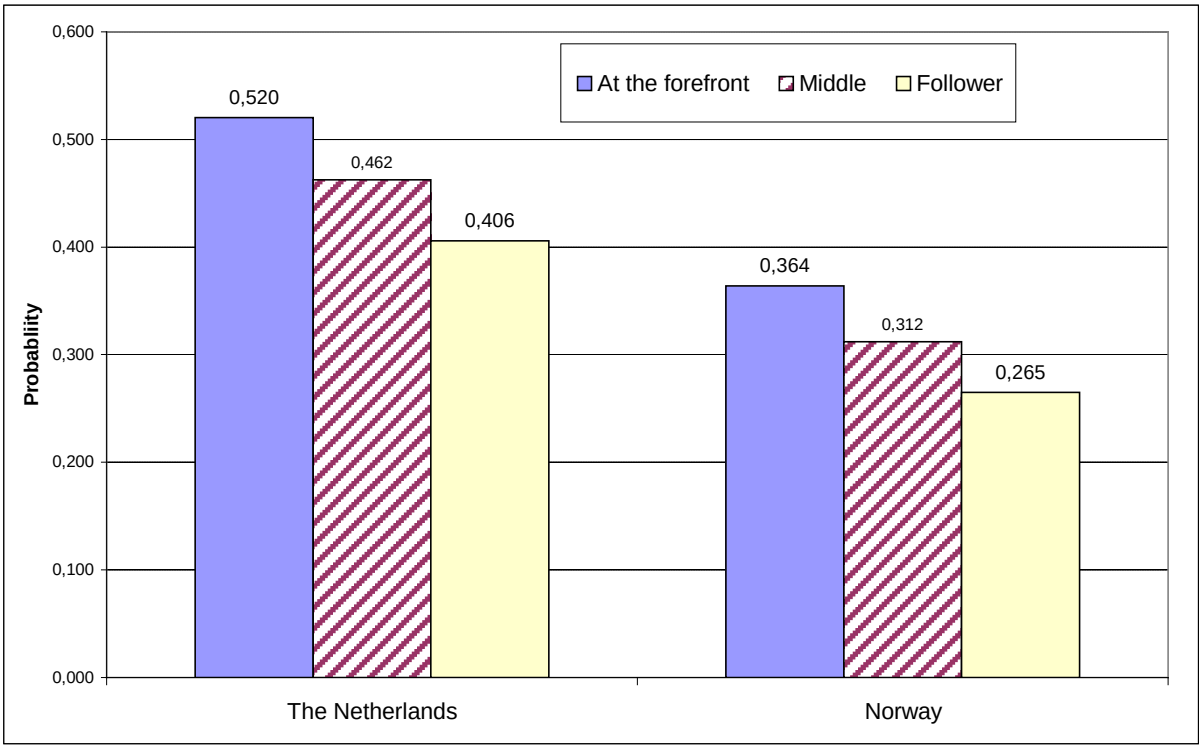
In Appendix Table C.2 we have conducted a corresponding analysis on the Norwegian sample alone. The results of this regression are:

- The relationship between the extent to which the organization is innovative and participating in training is strong also in Norway. A difference might however be seen. It is the negative effect of 'being a follower' rather than the positive effect of being at the forefront, that is of importance in Norway.
- Unlike the results for the analysis of the total sample, the effect of working in public sector is not significant in the Norwegian sample.
- In the same way as for the total sample, graduates in Health and welfare are those who participate in work-related training most frequently. Also in accordance with the results for the total sample there is a positive indication of the effect of having graduated in Service, and in Agriculture and veterinary science, although because of few observations and (as a consequence) high standard errors, this is not significant.
- In the Norwegian sample we do *not* find a positive effect of having graduated in Education.
- The tendency that graduates in the classical university disciplines (Humanities, Science) are those who participate most seldom in work-related training, is even more clearly found in the Norwegian sample than in the total sample of 13 countries.
- Those who graduated from a study programme that was academically prestigious have increased probability of having participated in work-related training. This relationship is stronger in the Norwegian sample than in the total sample.
- The tendency that those whose study programme was vocationally oriented participate more often in work-related training is not significant in the Norwegian sample.
- The positive effect of useful social network is larger in the Norwegian sample than in the total sample.
- The positive effect of the duration of work experience is the same in the Norwegian sample and the total sample.

Figure 3.1 illustrates the importance of the extent to which the organization where one works is innovative for the probability of having participated in work-related training,

having controlled for other relevant characteristics. It also shows the difference between Norway and one of the selected countries, the Netherlands, which has average score on the dependent variable (see Table 3.1). The country difference is larger than the difference by type of organization where the graduate works.

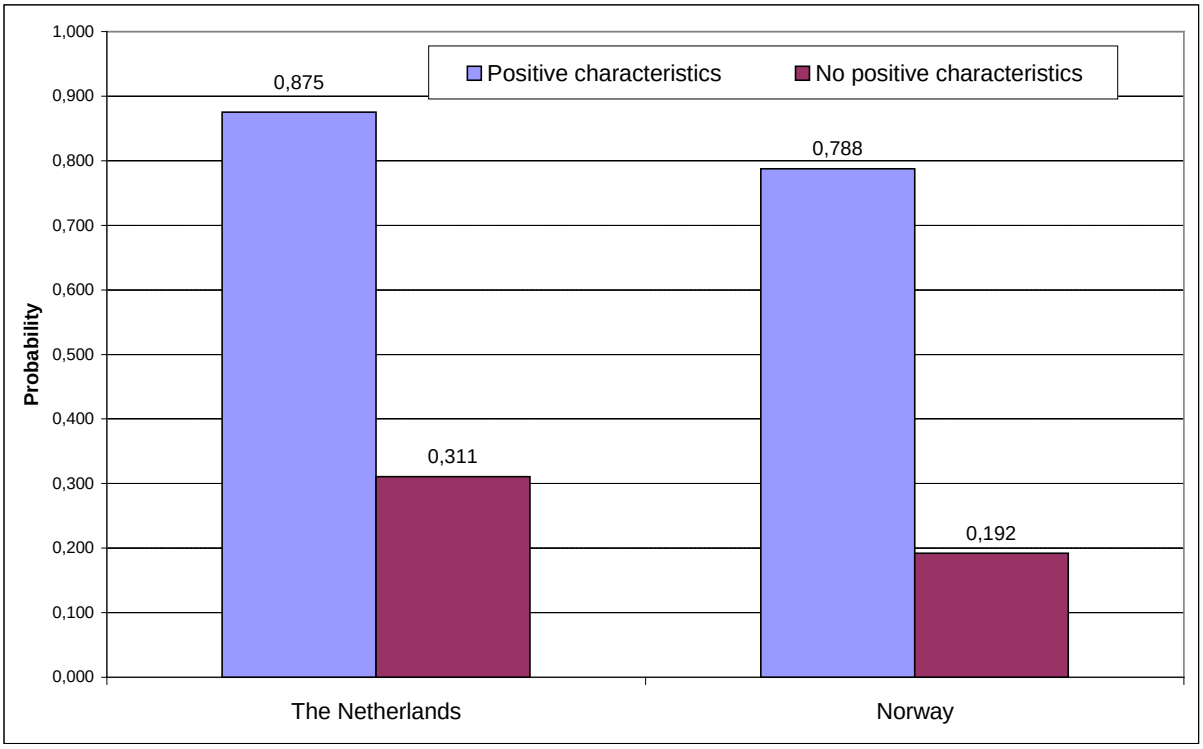
Figure 3.1 Participating in work-related training by the extent to which the organization is innovative. Estimated probabilities.[a]



[a] The reference for the estimates works in private sector, is a male graduated as a Master in social science, with average age and average amount of employment experience after graduation and has value 0 on the variables for work experience during study, academically prestigious study programme, vocationally oriented study programme, position in organization and social network. That which varies is the extent to which the organization is innovative, and country. The estimates are based on the results of Table C.1.

In Figure 3.2 below we have estimated the probability of participating in work-related training for persons who have all the characteristics which increase the probability of participating in such training, compared to those who lack these characteristics.

Figure 3.2 Participating in work-related training by positive/lack of positive characteristics, concerning the probability of participating in work-related training. Estimated probabilities.[a]



[a] The estimates are based on the results of Table C.1. Positive characteristics: at the forefront when it comes to innovations, public sector, stable demand, field of study=health, the study programme is vocationally oriented, the study programme is academically prestigious, held a position in organization, has a useful network, and both relevant and non-relevant work experience during study. Negative characteristics: mainly a follower when it comes to innovation, private sector, unstable demand, else= value 0 on the variables mentioned. In addition, the reference person for the estimates has average age and average amount of employment experience following graduation.

Figure 3.2 clearly illustrates the sum of the effects that increase the probability of participating in work-related training. When lacking all these characteristics, the probability of participating in work-related training is rather small, especially in Norway. If all these favourable characteristics are possessed by the graduate, he/she is very likely to have participated in work-related training the past 12 months, also in Norway.

In Figures 3.1 and 3.2, the estimates are based on the analysis presented in Table C.1; that is for the total sample. The effects of some of the independent variables when analysing the Norwegian sample (Table C.2) are somewhat different than the corresponding effects for the total sample. In additional estimations based on Table C.2 (the Norwegian sample alone) we find even larger differences than depicted in Figure 3.2 between those who have all the favourable characteristics and those who do not. Then the estimated probability among the Norwegians, if possessing all the positive characteristics, would be 80.6 per cent. For the “unfavourable” group, the

estimated probability of having participated in work-related training would be only 10.1 per cent. The reasons for this difference in results are (mainly) that the negative effect of having graduated in the humanities is larger in Norway than in the total sample, and that the positive effects of graduating from a study programme that was academically prestigious, and of social network, are greater for the Norwegian sample than for the total sample.

3.4 Discussion and conclusions

The analysis in this chapter has shown that some of the same factors that affect training participation in general are also important for training among the HE graduates. Innovative organisations have higher training rates than less innovative organisations; working in an organization with stable demand has a positive effect and working in public sector increases the probability of participation in training. We have also seen, among other things, that graduates in the classical university disciplines (Humanities, Science) are those who participate most seldom in work-related training, and this tendency is even more clearly found in the Norwegian sample than in the total sample of 13 countries.

However, this chapter and Chapter 2 have shown, at least apparently, *diverging results*, which may be questioned. Chapter 2, as well as previous international studies (see Chapter 1) have shown that Norway has a high training rate compared to most OECD countries, whereas in this chapter we have found that workers with HE in Norway participate in work-related training five to six years after graduation to a *lesser* extent than their European counterparts. This is also evident after controlling for factors that significantly increase or decrease the training rate.

Further, we found that the high education level of the Norwegian labour force is one of the factors contributing to a high participation rate in lifelong learning in Norway (Chapter 2). How can the results of the current chapter (Chapter 3), which apparently are contradictory to other results, be explained?

One explanation is probably that to some extent we have measured different things. Although work-related training constitutes an important part of lifelong learning, this covers many more education-related activities than work-related training/courses. Another explanation is that although the overall participation rate in lifelong learning in Norway is high, and although this partly is an effect of a relative high educational level of the Norwegian labour force, the difference in the participation rate between workers with high education and workers with low education is lower in Norway than in many other countries. The Nordic countries all score high on the lifelong learning participation rate (see Figure 2.1). Tuijnan and Hellström (2001) (ref. Hagen and

Skule, 2008) have shown that the difference in participation rates between the high and low educated is smaller in the Nordic countries than in other industrialized countries. Thus, although workers *without* higher education also in Norway participate less than the higher educated, they participate more than workers in non-Nordic countries with the same education level. Therefore, it is not unlikely that the Norwegian HE graduates participate less than graduates in other countries at the same time as Norwegian workers without HE participate much more than workers without HE in other countries.

Another factor is the effect of age. In the second report from this project (Kaloudis et al. 2008, p. 48), it was found that the participation rate in Norway increases with increasing age up to 50 years of age. The REFLEX study is undertaken five to six years after graduation, and most of the graduates were in their (very) early thirties at the time of the survey, and they are thus supposed to participate less than those between 35 and 50 years. This applies to Norway. The effect of age may be different in other countries. The participation rate is possibly highest in the *early* career in many other European countries.

The latter is relevant concerning the question whether the participation rate is possibly is underestimated in the Norwegian REFLEX sample. However, the estimates of the HE graduates in the REFLEX survey correspond well to the estimates for the HE labour force displayed in the second report from this project (Kaloudis et al. 2008; p. 36). The percentage of the total labour force with HE participating in courses the past four weeks (which was about 26–27 per cent) is only a few percentage points higher than what we have shown for the Norwegian REFLEX graduates in Table 3.1. If we take into account that the REFLEX graduates are younger than the average labour force (and thus have lower participation rate), and that the definition of 'course' is somewhat narrower in the REFLEX survey than in the estimates for the total labour force, the estimates really fit fairly well.

We do not observe any indication in the Norwegian REFLEX data that the answers to the questions on work-related training are not valid and reliable. When comparing with answers to other questions in the REFLEX survey we find no reason to doubt the validity of the answers concerning work-related training.

Finally, our conclusion is that we find no reason to doubt the finding that the Norwegian HE graduates participate in work-related training to a lesser extent than graduates in other European countries. The question is therefore: *Why is it so?* We do not have the answer, only suggestions for further discussion, and we recommend that this should be an issue for further research.

Initially, we expected that the Norwegian HE graduates would score high on work-related training because the Norwegian HE graduates were more satisfied than their European counterparts concerning the extent to which "the study programme had been a good basis for starting work, for future learning on the job, for performing current work tasks, and for future career" (see Section 3.1). One could possibly argue for an opposite expectation; that the Norwegian graduates *need less* work-related training than graduates in other countries, since the Norwegian educational system *apparently* has been more successful in preparing the students for their future work. This would, however, be too simple an explanation. One argument is that research has shown that education and further training are complementary, not substitutes. Another argument is that even if the Norwegian graduates' subjective assessments of the usefulness of their study programmes are more positive than the assessments of graduates in other countries, this does not imply that the quality of Norwegian HE is so good or so much better than in the rest of Europe that there is little need for work-related training in Norway. One example concerns graduates in "Education and teacher training". It is commonly stated that the Norwegian teachers should have more further education and training**,** among other things based on the poor Norwegian PISA results, and in a recent white paper (Ministry of Education and Research, 2008) the need for further education of teachers is stressed. The results in this chapter (and in Støren, 2008) have shown that the Norwegian graduates in Education and teacher training have participated in work-related training far less frequently than graduates with the same educational background in the other REFLEX countries.

One possible explanation for the low participation rate among Norwegian graduates is that workers with HE in Norway have less economic incentive to increase their competence than in other countries because the wage-structure is more suppressed. However, a suppressed wage-structure does not necessarily have a negative effect on training. It might increase firm-sponsored training because it makes it possible for the firms to extract a larger share of the returns to training than with a more market-determined wage-structure. Schøne (2001, p. 12) states "the often-found result that European workers seem to receive more firm-financed training than their counterparts in the USA, may partly be explained by differences in the wage structure, with European countries (like Norway, Sweden, and Germany) having a much more compressed wage structure compared to the USA".

Another possible explanation is that graduates in other countries are employed as trainees to a higher extent than is the case of Norwegian graduates, implying more participation in training courses. If this is the case, the employers invest more in training HE graduates than Norwegian employers. In any case, the results *indicate* that employers in other European countries invest more in training their HE employees than Norwegian employers, at least in the early career.. At the same time they invest

more in training opportunities for workers without HE than employers in other countries.

It is also possible that the Norwegian HE graduates – for reasons we do not know – are less interested in participation in work-related training. If this is the case, one possible reason might be that their jobs are safer than what is the situation for their European counterparts. The REFLEX survey showed (Støren, 2008) that the Norwegian graduates held permanent jobs more frequently than graduates in most of the other countries. In addition they work full time more often. However, suggestions like this (less interest because of greater job-security) are speculations, and probably the variation among employers concerning the willingness to invest in training is a more relevant explanation.

4 Summarising results from previous phases of this project

The objective of this chapter is to summarise the main findings from the earlier stages of this project as documented in Kaloudis, Næss and Sandven (2008). This report provides an insight into those factors and conditions which are significant for investment in training, both at individual and macro levels in Norway. The rationale of this chapter is to provide relevant information supplementing the analysis and the findings in the previous chapters of this report.

The analyses in the report of Kaloudis, Næss and Sandven (2008) were based on two firm-level databases, the ABU 2003 and the CVTS3. ABU 2003 is a data set based on a survey conducted by Statistics Norway on behalf of a national project managed by the Institute of Social Research (ISF).[10] The advantage of this data set is that it contains information on investments in training in organisations in both the private and public sectors. Unfortunately, no other country replicated the methodology adopted in the ABU 2003 data set.

Conversely, CVTS is now a well-established business survey carried out in all EU Member States and a number of associated countries, such as Norway. The disadvantage of CVTS3 data set is that it only covers the private sector. We have only used the Norwegian data set in the analysis.

In addition to CVTS3 and ABU 2003 we also used micro-level Labour Force Survey 2006 data from Norway, in particular those questions dedicated to lifelong learning issues – the so called *Lærevilkårsmonitoren* 2006. It is now possible to analyse the *Lærevilkårsmonitoren* 2008 data set (Dæhlen and Nyen 2009).

In the following we summarise main findings from the analysis of these three databases. For a more thorough documentation of methodologies applied and for detailed documentation of results, the reader should consult the NIFU STEP 31/2008 report. [11]

4.1 High Level of training activities in Norway

In NIFU STEP Report 31/2008 we attempted to provide a broad and comprehensive summary of the extent of training in Norwegian working life. We examined not only

[10] For more information contact Dr. Pål Schøne at ISF.

[11] The report is only available in Norwegian.

course and similar activities, but also other types of organised training: structured guidance for colleagues, job-rotation, practice exchange, study circles and self-study. We paid particular attention to training activities for new employees. The results clearly showed that *courses and similar activities comprise only a small part of the total training which occurs in working life.*

Almost 90 per cent of firms and companies had provided training within the course of a year. Based on the results, we estimate that at least half of the employees received training during the course of a year in Norway, corresponding well with findings in previous studies.

According to our calculations, employees devote an average of at least 20 hours per year in attending courses and similar training activities. An important part of this is related to training new employees where we estimate that almost 50 hours per employee are assigned to this. Other organised training comes in addition and is at least as frequent as courses and similar.

On the basis of the above, a qualified guess is that a minimum of 80 to 90 hours per employee is devoted to work-related training during the course of a year, corresponding to 4–5 per cent of working time.

4.2 Those with highest education receive most training

As in other countries, we found that those with the highest level of formal education underwent most training at the workplace. Employees in this category received almost three times as much training in form of courses, seminars, and so forth as those who only had basic schooling. In both the private and public sectors, those with higher education received much more training compared to those with basic schooling.

One third of private firms who had supplied in-service training had offered courses particularly designed for those who, for various reasons, were considered to have a special need for training. This concerned unskilled employees as well as those with basic education, part-time employees and temporary staff.

Generally, male and female employees spent an equal amount of time on training courses. The association between level of education and training activity was, however, stronger among women than among men. This applied both when we considered the likelihood for participation and when we looked at the actual hours devoted to training.

The analysis of *Lærevilkårsmonitoren* 2006 showed that there are clear and systematic differences among younger and older employees: the younger tend to participate significantly more often in on-the-job-training activities than their senior colleagues. Age differences persist even when we control for many other variables, including gender, sector of economic activity, educational levels, etc.

4.3 High level of training activity also in small firms

Training in the form of courses and similar varied widely between industrial branches. The level of activity was highest in the public sector, but was equally as high in many branches in the private sector. There was a broad variation, however, between branches in the private sector. Training of new employees was also somewhat more important (intensive) in private firms than in the public sector.

The size of firm as a factor determining the level of investments in training did not appear to be as important in Norway compared to many other EU countries (Bassanini 2005). Analysis of CVTS3 data shows, for example, that most small firms with 10–19 employees – about 80 per cent of all firms – provided training for their employees. However, this should not be interpreted as meaning that policy-oriented measures directed towards small firms should be moderated. On the contrary, Norway is one of the few nations which has a high level of training activity in both small and large firms. It can be thought that this is the consequence of a deliberate policy choice and priority afforded to skill-training policy.

The report has clearly shown that in private firms, training is largely planned and organised by the firm itself. Two-thirds of private firms undertook a survey in one form or another of the need for training while the majority of firms undertook evaluations of the advantages of training.

4.4 Innovation

One notable finding was a *clear positive association between innovation activity and the extent of training within the firm*. This also applied when controlling for size of firm and branch of activity. This is a relatively important finding since it indicates that measures directed towards investment in skills in SME (small- and medium-sized establishments) can also strengthen innovation activity in these firms.

The interesting question is whether the opposite is also true, that is whether public support of innovation activities strengthens skills and competencies in the firms. Currently, the Norwegian Innovation Agency, (Innovasjon Norge), is carrying out a broad analysis of its innovation measure portfolio for examining how innovation

measures affect the creation and strengthening of skills and abilities needed for the economic growth of the firms receiving public support.

Another interesting finding is that "democratic" models of organisation of work within the firms have a positive impact on businesses investments in training. Autonomy – to the extent that the employees could determine their work, opportunities for promotion as well as the fact that the employees were organised in work-groups – were factors which had a positive effect on training within private firms. This did not, however, apply to the public sector.

We also found a positive correlation between growth in demand for firm products and services and the level of training in the firm. The degree of exposure to competition on the other hand, was not significant for explaining the proportion of employees who underwent training. Hence, even though this issue needs to be examined in greater depth using qualitative analytical methods, we may conclude that the long-term focus on development of employees' skills through diverse measures, including courses, is an important factor related to the firm's growth potential in Norway. It may be considered that this is a competitive advantage for Norwegian enterprises, also those in the public sector.

4.5 The Nordic model

Neither within private firms nor the public sector did trade union activity as such appear to have any direct significance for training in the form of courses or similar activity. Nevertheless, we found that such organisations were of significance for private firms whereby plans were prepared for the development of employees' skills and training through job rotation. In total, it appears that a strong focus on training and other measures for promoting skills at the local level was of greater significance than the status of trade unions in the firm as such.

In our opinion, the Nordic model – understood here broadly as a model seeking inclusion, safety, security and equity of opportunities in the labour market and which among other characteristics stimulates the development of employees through at work training at the micro-level, has significant positive effects on firms' investment in skills.

Consequently, the organisation of work in the direction of increased autonomy, possibilities for career development, work councils and job rotation, are all aspects of a philosophy attributed to the Nordic model.

3 Policy implications and concluding remarks

Together with other Nordic countries the Norwegian population – participates more in lifelong learning compared to most other OECD countries. This report suggests that the positive results for Norway can be attributed to basic labour market characteristics which increase the probability for organisations and workers to invest in training, namely a high educational level of the labour force and advanced user-adoption of technology. Our estimates indicate that such factors can explain about three quarters of the difference in lifelong learning between Norway and EU-average.

Highly-educated persons participate more in lifelong learning in general and work-related training in particular both in Norway and in other countries. The difference between those with higher education and those with lower education is, however, smaller in the Nordic countries than in other industrialized countries. Although a high proportion of persons with higher education in the Norwegian labour force is a major factor behind a relatively high participation rate in lifelong learning and work-related training in Norway, this does not imply that the participation rate *within* the group of higher educated is higher in Norway than in other countries. The latter is illustrated by the result from the international REFLEX survey of HE graduates five to six years after graduation. These results showed that Norwegian graduates participated less frequently in work-related training than graduates with the same educational background in other European countries. It is not clear whether this partly is due to national differences concerning the effect of age. It is *possible* that in other European countries more in training in the start of the career, whereas the opposite (at least up until the age of 50) might be the case in Norway.

Concerning training for that part of the labour force with lower education level, all results point in the direction of higher participation level in Norway (and other Nordic countries) than in most other OECD countries.[12]

Earlier research (Hagen and Skule, 2004) emphasized the Nordic model and the Nordic welfare systems as a central feature explaining the high training rate in Norway. Our estimations show that only a relatively small part of the differences between Norway and other countries remains “unexplained” after we take into account the high educational level of the labour force and the advanced user-adoption of technology in the country (measured as broadband penetration rate). This “unexplained part” may (partly) be attributed to the so-called Nordic model. In addition, the high education level of the labour force may in itself, to some extent be seen as a result of the Nordic model. Thus, the results of our analysis provide some support for claiming

[12] See for example http://www.ssb.no/magasinet/analyse/art-2008-11-12-01.html.

that the Nordic model has a positive impact on the participation rate in lifelong learning and work-related training, but our analyses leave some uncertainty concerning the extent to which the Nordic model is an important framework condition for investment in training. Of course, it is indicative that all Nordic countries invest heavily in training and lifelong learning. On the other hand, countries such as the UK also have a system favouring investments in training and lifelong learning.

Previous research and extensive evaluation exercises suggest that the public policy efforts to increase the participation in training have had relatively small effects (Hagen and Skule, 2004). In the period 1996–2002, when the *competence reform* was under implementation, participation in firm-sponsored training and education was actually reduced. Hagen and Skule (2004) assume that this mainly is due to a lack of demand in the course-market, but in addition a lack of relevant courses and insufficient dissemination of information on such courses may also represent a problem.

In a follow-up evaluation of the "competence reform" (Hagen and Skule, 2008) it is concluded that the goals of the reform still not have been reached. Hagen and Skule particularly emphasize that the goals of increasing the competence and skills for those with low education has not been reached. Few adults have used the statutory right to attend primary and upper secondary education. This result is valid, even if the general level of lifelong learning in Norway is higher than in most other countries, especially among persons having no higher education. Hagen and Skule also criticize the fact that the reform mainly is aimed at increasing participation in formal education, and that it does not pay sufficient attention to the need for "everyday learning" at the workplace, which both employees and employers very often assume as the most important source for enhancing their competence level.

Although Norwegian workers *without* higher education participate more in work-related training than workers with corresponding education level in other countries, their participation rate is low compared to those with higher education. It remains a challenge to identify adequate scale and scope of training activities for those having lower (and medium) educational levels. This challenge seems to be even more important at a time when society has to meet the challenge of the world-wide financial crisis, increasing unemployment and, over time, an increasing need for retraining.

In addition, the results of the REFLEX survey indicate that there is also a challenge regarding enhancing work-related training among the higher educated workers. These results may possibly bring about a question whether this is a sign of an unfortunate and unanticipated side effect of the established skills and competencies policies in Norway, and a consequence of the ideology behind the Nordic model. This is, however, hardly reasonable. Even if the Norwegian HE graduates take part in work-related training five to six years after graduation to a lesser extent than HE graduates in other European

countries, HE workers participate on average much more than workers without HE, also in Norway. But this does not imply that the Norwegian graduates, say in Education and teacher training or graduates in Humanities and Science, will benefit from participating more frequently in work-related training courses.

In relation to this issue, a question could also be raised concerning the market for further education courses for HE workers. A recent report from NIFU STEP and Fafo (Brandt, Thune and Ure, 2009) sheds light on this, particularly on the supply and demand for further education delivered by post-secondary educational institutions (universities, colleges and post-secondary non-tertiary institutions, for instance technical vocational schools). One of the conclusions of this report is that these institutions see few incentives for prioritizing further education. Factors that hamper such efforts on the supply side are, for instance, that the institutions generally experience low growth and little long-term planning in the market for further education. The educational institutions also point to a weakened focus on further education in the education policy, the finance system and guidelines, as well as in the national priorities.

On the demand side (the demand of training courses services by firms/organizations), many factors are influential. There is a gap between the public and private sectors with clearly higher demand in the public sector. Further, Norwegian firms are not primarily engaged in formalised further education, but prioritize learning at the workplace. Of high importance is also the fact that training is mainly implemented to meet the firms' *immediate* requirements and needs. Another factor concerns information. Private firms, and particularly small firms, often have little knowledge about the further education programmes and courses that educational institutions provide.

The findings of Brandt et al. (2009), like those described above, may contribute to an explanation why Norwegian HE graduates participate in work-related training to a less extent than graduates in other European countries, and may give an indication concerning where extra efforts could – or should – be directed the coming years. Age differences in work-related training should be more carefully examined. Within certain fields and domains of activities one should expect that elderly employees probably need more, not less, training than middle-aged or younger persons.

Another central finding of the project concerns the interactions between LLL and innovation policies. There is a clear and strong positive relationship between innovation and training activities, both in Norway and in EU. Training may enhance innovation activities, but innovation activities may also promote training. Thus, policies to promote training and innovation could go "hand in hand".

Norway does not score high on innovation and R&D indicators. Thus, Norway's high score on LLL participation exists *in spite* of low scores on innovation and R&D indicators. Therefore, most probably, higher scores at R&D and innovation EIS indicators in Norway imply that Norway could achieve an even higher level of lifelong learning and work-related training.

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Annex A. Country-abbreviations

AT Austria
BE Belgium
BG Bulgaria
DK Denmark
EE Estonia
FI Finland
FR France
EL Greece
IE Ireland
IS Iceland
IT Italy
HR Croatia
CY Cyprus
LV Latvia
LT Lithuania
LU Luxembourg
MT Malta
NL Netherlands
NO Norway
PL Poland
PT Portugal
RO Romania
SK Slovakia
SL Slovenia
ES Spain
UK United Kingdom
CH Switzerland
SE Sweden
CZ Czech Republic
TR Turkey
DE Germany
HU Hungary

Annex B. Correlations

A Participation in lifelong learning

EDUCATIONAL LEVEL
F1 S&E graduates per 1 000 population aged 20-29
F2 Population with tertiary education
F3 Youth education attainment level

R&D INNOVATION
F4 Public R&D expenditures
F5 Business R&D expenditures
F6 Share of medium-high/high-tech R&D
F7 SMEs innovation in-house
F8 Innovative SMEs co-operating with others
F9 Innovation expenditure
F10 SMEs using organisational innovation
F11 Sales of new-to-market products
F12 Sales of new-to-firm products
F13 EPO-patents per million population
F14 USPTO-patents per million population
F15 Triad patents per million population
F16 New Community trademarks per million population
F17 New Community industrial designs per million population
F18 Early stage venture-capital

TECHNOLOGICAL LEVEL
F19 Broadband penetration rate
F20 Employment in high-tech services
F21 Exports of high technology products
F22 Employment in medium-high/high-tech manufacturing
F23 ICT-expenditure

Table B. 1 Correlation matrix

	A	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
A	1											
F1	0.33	1										
F2	0.65	0.46	1									
F3	0.03	0.24	0.23	1								
F4	0.66	0.37	0.49	-0.01	1							
F5	0.79	0.31	0.50	0.05	0.71	1						
F6	0.36	0.29	0.23	0.21	0.51	0.50	1					
F7	0.36	0.16	0.43	-0.15	0.25	0.56	0.33	1				
F8	0.61	0.34	0.75	0.23	0.47	0.57	0.35	0.51	1			
F9	0.27	0.13	0.16	0.25	0.31	0.42	0.40	0.37	0.48	1		
F10	0.41	0.09	0.34	-0.22	0.27	0.67	0.35	0.90	0.59	0.57	1	
F11	-0.07	-0.04	-0.43	-0.04	-0.19	0.11	-0.03	-0.12	-0.21	0.00	-0.27	1
F12	-0.02	-0.12	-0.08	-0.39	-0.08	0.13	-0.36	0.19	-0.05	0.02	0.22	0.29
F13	0.70	0.24	0.53	0.02	0.64	0.91	0.50	0.55	0.46	0.28	0.60	-0.02
F14	0.67	0.24	0.52	0.00	0.61	0.90	0.48	0.57	0.45	0.26	0.60	0.02
F15	0.54	0.14	0.41	-0.02	0.46	0.79	0.50	0.55	0.35	0.19	0.57	-0.03
F16	0.25	-0.19	0.23	-0.21	-0.03	0.40	0.32	0.51	0.30	0.04	0.61	-0.04
F17	0.52	0.20	0.32	0.02	0.42	0.69	0.45	0.52	0.28	0.30	0.62	-0.08
F18	0.48	0.41	0.32	-0.12	0.15	0.20	0.33	0.30	0.23	0.22	0.27	0.03
F19	0.80	0.21	0.65	-0.08	0.70	0.74	0.13	0.36	0.50	-0.09	0.31	-0.14
F20	0.81	0.35	0.65	-0.03	0.74	0.82	0.53	0.40	0.61	0.19	0.35	0.00
F21	0.14	-0.08	0.09	-0.23	-0.16	0.23	0.06	0.46	0.17	-0.06	0.37	0.31
F22	0.03	0.10	-0.28	0.27	0.09	0.30	0.42	-0.05	-0.15	0.10	-0.12	0.52
F23	0.06	-0.04	0.11	0.14	-0.13	-0.03	0.11	-0.13	-0.07	-0.27	-0.39	0.15

	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23
F12	1											
F13	0.08	1										
F14	0.11	0.98	1									
F15	0.12	0.95	0.94	1								
F16	0.28	0.49	0.53	0.60	1							
F17	0.09	0.80	0.73	0.77	0.42	1						
F18	0.16	0.13	0.15	0.09	0.21	0.03	1					
F19	0.15	0.77	0.74	0.66	0.33	0.57	0.23	1				
F20	-0.02	0.73	0.74	0.59	0.27	0.46	0.33	0.80	1			
F21	0.15	0.25	0.30	0.34	0.60	0.15	0.47	0.16	0.22	1		
F22	0.22	0.23	0.20	0.18	-0.24	0.34	-0.08	-0.04	0.20	-0.02	1	
F23	-0.23	-0.03	-0.03	0.02	-0.03	-0.16	0.25	0.20	-0.12	0.17	-0.24	1

Table B. 2 Partial correlation results controlling for per capita GDP.

		Lifelong learning
S&E graduates	Correlation	-.119
	Significance (2-tailed)	.712
Tertiary education	Correlation	.451
	Significance (2-tailed)	.142
Broadband	**Correlation**	**.741**
	Significance (2-tailed)	**.006**
Youth education	Correlation	-.158
	Significance (2-tailed)	.624
Public R&D	Correlation	.449
	Significance (2-tailed)	.143
Business R&D	Correlation	.377
	Significance (2-tailed)	.227
Med/hi-tech R&D	Correlation	.000
	Significance (2-tailed)	1.000
SMEs in-house	Correlation	-.179
	Significance (2-tailed)	.577
SMEs coop	Correlation	.480
	Significance (2-tailed)	.114
Innovation expenditures	Correlation	-.064
	Significance (2-tailed)	.843
Early-stage VC	Correlation	.114
	Significance (2-tailed)	.724
ICT expenditures	Correlation	.429
	Significance (2-tailed)	.164
SMEs organisational	Correlation	.171
	Significance (2-tailed)	.594
High tech services	Correlation	.401
	Significance (2-tailed)	.197
High tech exports	Correlation	-.098
	Significance (2-tailed)	.763
New-market sales	Correlation	-.073
	Significance (2-tailed)	.823
New-firm sales	Correlation	-.063
	Significance (2-tailed)	.846
Med/hi-tech manufacturing	Correlation	-.083
	Significance (2-tailed)	.797
EPO patents	Correlation	.364
	Significance (2-tailed)	.245
USPTO patents	Correlation	.125
	Significance (2-tailed)	.698
Triad patents	Correlation	.177
	Significance (2-tailed)	.583
Trademarks	Correlation	.383
	Significance (2-tailed)	.220
Designs	**Correlation**	**.528**
	Significance (2-tailed)	**.078**

Annex C. Logistic regressions in Chapter 3

Table C.1 Logistic regression predicting participation the past 12 months. The total sample of 13 countries.

	B	S.E.
Organization characteristics		
At the forefront (innovative)	0.232***	0.034
Follower (innovative)	-0.231***	0.059
Public sector (private=ref.)	0.413***	0.036
Highly/fairly stable demand in the market	0.124***	0.036
Highly unstable demand in the market	-0.061	0.071
Country (the Netherlands=ref.)		
Italy	-0.267***	0.082
Spain	0.630***	0.082
France	-0.360***	0.081
Austria	0.370***	0.085
Germany	0.240***	0.081
UK	0.549***	0.086
Finland	0.438***	0.080
Czech republic	0.728***	0.086
Norway	-0.639***	0.075
Switzerland	0.006	0.077
Belgium	0.409***	0.088
Estonia	0.185*	0.097
Educational level (master=ref.)		
Bachelor level (original)	-0.153***	0.042
Further education, master level	0.130*	0.076
Further educ., PhD/specialist level	-0.125	0.086
Other further education	0.137***	0.040
Field of study (social science=ref.)		
Education	0.132*	0.075
Humanities	-0.361***	0.065
Computing	-0.087	0.118
Science (rest)	-0.140*	0.072
Engineering	-0.079	0.065
Agriculture and veterinary	0.221*	0.116
Health	0.624***	0.071
Service	0.258**	0.115
Law	0.016	0.079
Business and Management	-0.002	0.064
Biographical (etc.) characteristics		
Age (in 2000)	-0.035	0.022
Age^2	0.001*	0.000
Female (male=ref.)	0.015	0.035
Vocational oriented study programme	0.081***	0.036
Prestigious education programme	0.088***	0.035
Position in organization during study	0.178***	0.039
Social network very useful	0.080**	0.036
Relevant work experience prior to graduation	0.157***	0.035
Non-relevant work exp. during HE	0.113***	0.033
Months employed since graduation [a]	0.009***	0.001
Answered no work exp. but may have some work exp. (dummy)	0.159	0.114
Did not answer work experience (dummy)	-0.039	0.074
Constant	-0.066	0.356
Pseudo R-Square, Nagelkerke	0.091	
N	18872	

[a] Missing values assigned average values per country. In addition dummy variables for missing values are included as control dummy-variables.

*** P< 0.01, ** P < 0.05, * P<0.1.

Table C.2 Logistic regression predicting participation in work-related training/course the past 12 months. The Norwegian sample.

	B	S.E.
Organization characteristics		
At the forefront (innovative)	0.146	0.109
Follower (innovative)	-0.394**	0.191
Public sector (private=ref.)	0.172	0.122
Highly/fairly stable demand in the market	0.164	0.105
Highly unstable demand in the market	-0.562*	0.297
Educational level (master=ref.)		
Bachelor level (original)	-0.190	0.163
Further education, master level	0.388	0.280
Further educ., PhD/specialist level	0.174	0.379
Other further education	0.334***	0.125
Field of study (social science=ref.)		
Education	0.050	0.230
Humanities	-0.476*	0.267
Computing	0.202	0.319
Science (rest)	-0.535*	0.294
Engineering	0.113	0.231
Agriculture and veterinary	0.302	0.390
Health	0.677**	0.225
Service	0.335	0.322
Law	0.019	0.281
Business and Management	0.075	0.295
Biographical (etc.) characteristics		
Age (in 2000)	0.068	0.073
Age^2	-0.001	0.001
Female (male=ref.)	-0.184	0.117
Vocational oriented study programme	0.097	0.115
Prestigious education programme	0.412***	0.135
Position in organization during study	0.169	0.111
Social network very useful	0.245**	0.110
Relevant work experience prior to graduation	0.165	0.111
Non-relevant work exp. during HE	-0.069	0.108
Months employed since graduation [a]	0.009*	0.005
Answered no work exp. but may have some work exp. (dummy)	-0.513	0.577
Did not answer work experience (dummy)	-0.128	0.236
Constant	-2.309*	1.309
Pseudo R-Square, Nagelkerke	0.089	
N	1 737	

[a] Missing values are assigned average. In addition dummy variables for missing values are included as control dummy-variables.

*** P< 0.01, ** P < 0.05, * P<0.1.

Table C.3 The extent of innovation in the organization, by work-related training the past 12 months. The total sample. Per cent.

	1 Mainly at forefront	2 -	3 -	4 -	5 Mainly a follower	N (=100 %)
Training: No	14.3	25.6	35.8	14.8	9.5	7 747
Training: Yes	16.7	28.9	32.0	14.7	7.7	13 608
Total	15.8	27.7	33.4	14.7	8.4	21 355