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THE REGIONAL DISTRIBUTION OF PROFESSIONAL COMPETENCE IN FINLAND

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ABSTRACT: This paper examines the regional distribution of the observable and hidden professional competence of engineers and graduates of economics and business administration in Finland. The objective is to determine where the "cutting edge" of Finnish human capital is located. The estimation results show that self-assessed professional competence is significantly lower for highly educated workers whose jobs are in remote regions of Finland. On the other hand, highly educated workers employed outside the capital region regard their ability for more demanding tasks as slightly higher and have more hidden professional competence than the average of all regions. This result suggests that engineers and business graduates working outside the capital region may feel frustrated in their current jobs. When we measure professional competence and ability explained by education, working experience and other components of observable human capital, the most competent engineers and business graduates are found in southern Finland and university cities, as expected.

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TIIVISTELMÄ: Tämä tutkimus tarkastelee suomalaisten ekonomien ja insinöörien havaittavan ja kätkössä olevan ammatillisen osaamisen alueellista jakaumaa. Tavoitteena on selvittää, minne suomalaisen osaamispääoman terävin kärki on alueellisesti sijoittunut. Estimointitulokset osoittavat, että syrjäseuduilla työskentelevät korkeasti koulutetut arvioivat oman ammatillisen osaamisensa merkitsevästi keskiarvoa alhaisemmaksi. Toisaalta pääkaupunkiseudun ulkopuolella työskentelevät korkeasti koulutetut arvioivat kykynsä nykyistä vaativampiin työtehtäviin hiukan keskiarvoa korkeammaksi. Tämä tulos antaa viitteitä siitä että ekonomit ja insinöörit pääkaupunkiseudun ulkopuolella ovat ainakin osittain turhautuneita työtehtäviinsä. Silloin kun ammatillista osaamista selitetään koulutuksella, työkokemuksella ja muilla havaittavan osaamispääoman komponenteilla, osaavimmat ekonomit ja insinöörit löytyvät odotuksien mukaisesti Etelä-Suomesta ja yliopistokaupungeista.

1. Introduction

New economic growth theories emphasise the role of human capital and know-how as a prerequisite for economic growth process (e.g. Aghion and Howitt 1998, Barro and Sala-i-Martin 1995). Highly educated workforce, R&D workers as well as skilled operative personnel, can be considered as necessary labour input in the process of production and innovation. Within a country like Finland where the supply of physical capital is not limited by regional scarcity, the role of human capital and its regional distribution becomes critical when assessing how the resource base for economic growth and innovations is distributed amongst Finnish regions. Human capital of highly educated Finnish employees, the "cutting edge" of Finnish human capital, is particularly important when assessing the potential for innovations and economic growth prevailing in different regions.

Human capital can be divided into observable and unobservable skills, which are both linked to innovation capital (Edvinson and Malone 1997, p. 146, see also Appendix). On the other hand, Abowd, Kramarz et al. (1999) divide human capital into person- and firm-specific components, which quite closely corresponds division of human capital into observable and unobservable skills. Observable skills depend on education attained, labour market experience and other fixed factors such as sex. Unobservable skills or residual human capital refer to personal compensations in work that can not be explained by education, experience or sex. A lot of the attained skills and consequent professional competence is unobserved in the traditional human capital framework, since R&D investments take place in firms (correspondence to firm-specific human capital defined by Abowd and Kramarz). Piekkola (2005) for his part measures unobserved human capital by payment on human capital above the remunerations on experience, education and firm characteristics such as the length of stay in the firm, industry, type of work and performance-related pay.

For example Huovari et al. (2001), Moisio et al. (2001) and Piekkola (2005) have already examined the regional distribution of human capital in Finland. The present paper measures human capital in a novel way and will thus add an interesting and complementary viewpoint to the previous research. Our measures of human capital are professional competence of highly educated Finns based on their self-assessment and also their self-assessment of their own ability for more demanding tasks / need for further occupational education. In our estimations the

self-assessed professional competence of highly educated Finns (engineers and graduates of economics and business administration) is explained by both observable human capital characteristics of the respondents and by their unobserved residual human capital. In addition to major region level (suuraluetaso) estimation results we also present NUTS4 level (seutukuntataso) geographical distributions of professional competence explained by the observable and residual human capital components.

When examining the regional distribution of self-assessed professional competence explained by human capital, our interest is in assessing the intangible resource base for innovative activities in Finnish regions. The strength of the intangible knowledge base in a region is naturally connected with the competitiveness of the region. This aspect of our study is related to new economic geography and theories explaining why and how production concentrates regionally and consequently why certain regions thrive economically while the others don't (see eg. Krugman 1991a, 1991b, 1993; Venables 1996 and Gaspar and Glaeser 1996). According to new economic geography approach, spatial advantages are at least partly endogenous and emphasis is on the cumulative causation process in the regional development. However, we want to emphasize that the present cross-sectional empirical study is limited to examining the prevailing state of the professional competence resource base of Finnish regions and hence we don't aim to comment the possible future development paths of these regions.

Our major region level estimation results show that self-assessed professional competence is significantly lower for highly educated workers whose working place is located in periphery. However, the highly educated working in the greater Helsinki region regard their ability to manage more demanding tasks than currently as lower (though not significantly) than the average estimate of all regions. Respondents in all other major regions than greater Helsinki regard their professional ability as slightly higher than average, which gives some hint to the direction that engineers and business graduates working outside capital region in Finland may feel frustrated in their current jobs. Our NUTS4 level results reveal that there may be hidden professional competence and ability for more demanding tasks outside university cities and industrial regions in Finland. However, our measure of human capital is relative to the average value of all regions, which biases the estimate upward in periphery (highly educated in periphery may have lots of human capital relative to other workers in the region, but not necessarily when compared to highly educated in other regions). When we measure professional competence and ability explained by traditional, observed components of human capital, the

most competent engineers and business graduates are found in southern Finland and university cities, where human capital is agglomerated.

This paper is organised as follows. Section 2 explains the empirical data, variables and methods used. Section 3 provides the empirical analysis of the regional distribution of professional competence in Finland explained by both unobservable and traditional observable human capital measures. In section 3 we present both the results of our professional competence estimation model and NUTS4 level geographical distributions of professional competence explained by different human capital measures. Section 4 concludes.

2. Data and Methods

Data

The data are part of an annual wage survey of three Finnish employees' unions from 2002. These unions are The Union of Professional Engineers in Finland (IL), The Finnish Association of Graduate Engineers (TEK) and The Finnish Association of Graduates in Economics and Business Administration (SEFE). Therefore the population under study consists mainly of highly educated and the employees are members of AKAVA. The number of observations is 17,861 of which 8,551 belong to IL, 4,339 to TEK and 4,971 to SEFE. In this study we are able to use only the answers of IL and SEFE employees because these two unions used an identical questionnaire on their members' professional competence in 2002. Our study focuses on two questionnaire questions measuring the respondents' assessment of their own professional competence and ability for more demanding tasks:

- How would you assess your own professional competence in your job at the present time? Using scale of 4 to 10.
- Which of the following alternatives describes best your competence at your present job?

    1. I would need further occupational education to be able to manage my current tasks
    2. My current tasks are in line with my professional competence
    3. I could perform more demanding tasks than currently

This personal evaluation of competence is closely related to the length of experience in the current task, so in our estimations we control for the change of employer or position during the year before the questionnaire was made. In his classical human capital study, Becker (1946) discusses the division of on-the-job training to general and specific training. When we talk about need for occupational education (on-the-job training) in the present study, this division will not be in focus.

The questionnaire includes a rich set of background variables. In our estimations we utilise the following:

- Firm size measured by the number of employees (1-29, 30-499, 500-2999, 3000-)
- Industry of the firm (general industry, IT, construction and energy, technical services, trade, financial and insurance services, other services)
- Union of the respondent (The Union of Professional Engineers in Finland (IL) or The Finnish Association of Graduates in Economics and Business Administration (SEFE)
- Sex of the respondent
- Years of labour market experience since graduation
- Position of the respondent (CEO or equivalent, functional manager, upper middle manager, lower middle manager, specialist, entrepreneur, professor, lecturer or official)
- Changing employer during past 12 months
- Starting with a new position or new tasks within past 12 months

Based on the three first digits of the postcode of the workplace we are able to identify the municipality, NUTS4 region (seutukunta) and major region (suuralue) where the respondents work. Only the rough classification according to major regions (Helsinki region, city, provincial centre, industrial region, country side, periphery) turned out to be statistically significant in our professional competence estimations. However, we also report the regional distributions of professional competence according to NUTS4 classification, see chapter 3.1 for the maps of the basic distributions and chapter 3.2 for the maps utilising the controlled distributions, where professional competence is explained by the observable and unobservable residual human capital. Our data also has information on the share of highly educated population in region and we use this control variable both in our estimation model and in NUTS4 level maps.

Methods

Our two dependent variables, respondent's assessment of his own professional competence (using scale 4-10) and whether his current tasks are too demanding, in line with his professional competence or too easy, are both transformed into a professional competence human capital index with mean 100 and standard deviation 10. This is done for two reasons: we need to be able to compare our two professional competence measures and use a similar constrained regression estimation method for both dependent variables. Constrained regression technique is applied here because we want to compare the coefficients of region dummies to the average value of all regions, not to the value of the region with the smallest serial number. In our estimations the dependent variable is always converted into logarithmic form because that allows us to interpret the independent variables' coefficients as their percentual effect on the dependent variable.

3. Regional Distribution of Professional Competence

3.1 Descriptive Results

In the following figures 1 and 2 we present the regional distributions of highly educated persons' professional competence and their ability to perform more demanding tasks than currently. Here we have used the original variables from questionnaires and the official year 2002 NUTS4 level regional distribution into 80 regions (seutukunta). Later, in figures 3-6, that are based on our professional competence estimations, we have ended up with 55 regions after merging some less populated regions to neighbours of similar character. A general remark from figures 1 and 2 is that the deviation of self-assessed professional competence and ability is remarkably small between different observations, so the regional distributions in figures 1 and 2 seem artificially clear compared to the uniformity of the observations.

Figure 1 indicates that professional competence, based on the 4-10 scale assessment of highly educated people themselves, seems to be highest in some remote regions in eastern and northern Finland but also in some agrarian or smaller industrial regions in southern Finland. Here we have to remember that the mere distribution of the dependent variable does not measure professional competence in the same way as the results of our estimations do. Some of our later control variables, for example components of observable human capital, industry and

share of highly educated in the area may explain why highly educated persons whose working place is situated in remote regions regard their own professional competence so high. An example of the effects of the control variables is that the share of highly educated can be so low in working places situated in remote regions that it is obvious for the highly educated to assess their own professional competence high relative to others, since the point of comparison are the lower educated co-workers.

Figure 2 presents the regional distribution of the ability of highly educated to perform more demanding tasks than currently. In figure 2 the results are more regionally concentrated than in figure 1: highly educated workers' self-assessed ability to perform more demanding tasks seems to be the highest in the inland of western Finland (Pohjanmaa), around the capital region and also in some regions in the eastern Finland close to the border of Russia (Pohjois-Karjala and Itä-Lappi). Also here we have to state that self-assessed human capital is a relative measure and it is important to control for observed characteristics of respondents and also industrial diversification. For example, highly educated people who work in traditional "low-tech" industries or in non-technical services may regard their abilities higher than highly educated people working in IT-sector or in technical services. To find out when and where highly educated Finns really have observable and residual, "excess" human capital, we have to proceed to estimations and control the effect of several explanatory variables.

3.2 Estimation Results

In what follows we report the results of our two professional competence estimation models. In the first estimation model the original dependent variable is the respondent's estimation of his own professional competence using scale 4 to 10. The second professional competence estimation utilises respondent's own assessment whether he would need further occupational education to be able to manage his tasks, whether the tasks are in line with his competence or whether he could perform even more demanding tasks than currently. Both dependent variables are transformed into a professional competence human capital index with mean 100 and standard deviation 10. When control variables such as education (here equivalent to respondent's union SEFE / IL), years of labour market experience and position are controlled in the estimations, both dependent variables represent respondents' professional competence explained by unobserved residual human capital.

Figure 1. Regional Distribution of Professional Competence

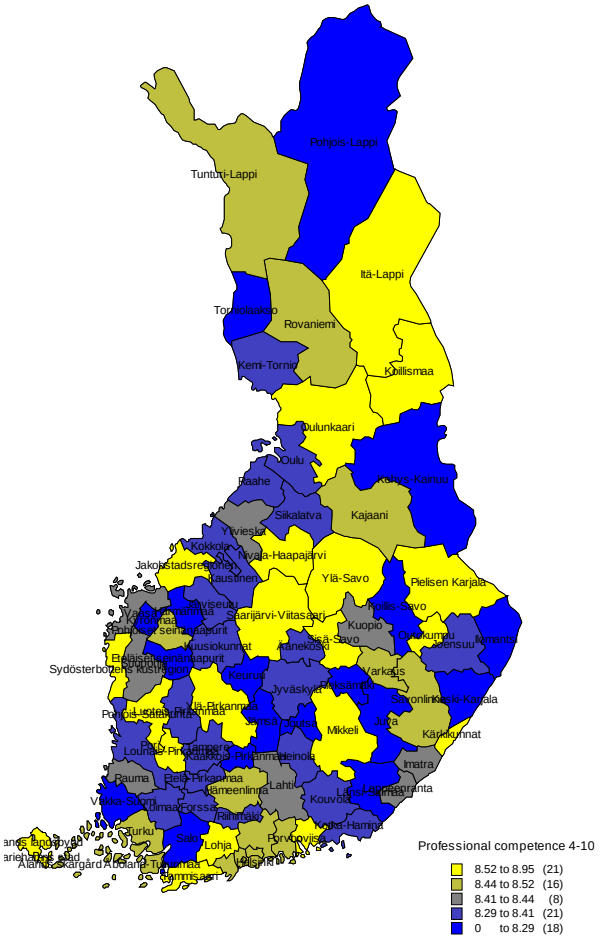
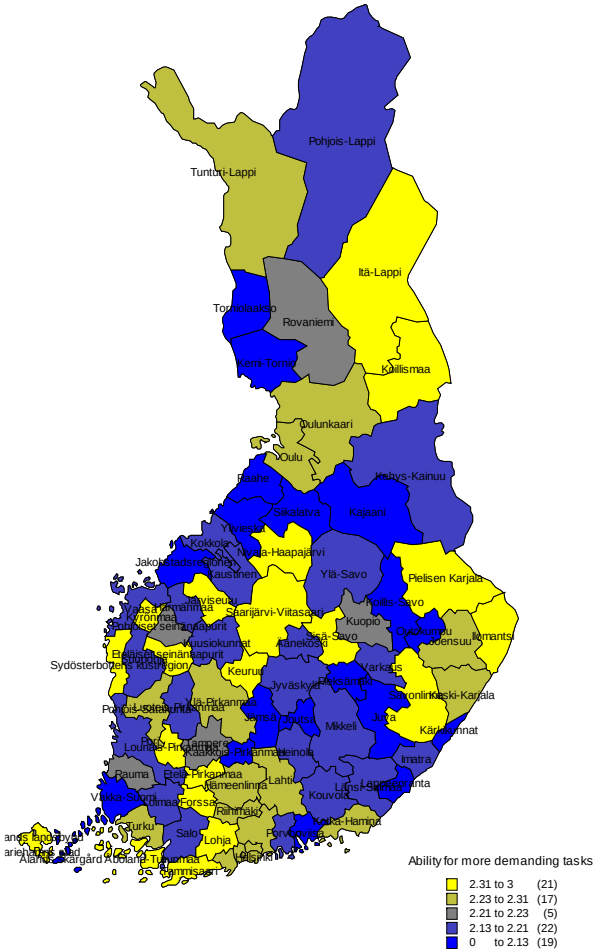


Figure 2. Regional Distribution of Ability to Perform More Demanding Tasks



Results of both professional competence estimations are presented in the following table 1. Dependent variables are transformed into logarithmic form, so we are able to interpret the percentual effects of explanatory variables based on their estimated coefficients. In the estimations reported in table 1, we have utilised 6 regional dummies based on major regions (Helsinki region, city, provincial centre, industrial region, country side, periphery). Coefficients of the NUTS4 classification based regional dummies are presented later in this section in graphical form.

Table 1. Professional Competence Estimation Results

		Professional Competence 4-10 Constrained Regression		Ability for More Demanding Tasks Constrained Regression	
Variable		**Coefficient**	**S.E.**	**Coefficient**	**S.E.**
Firm Size:	30-499	-0.0005	(0.004)	0.0007	(0.004)
	500-2999	-0.0014	(0.004)	-0.0003	(0.004)
	3000-	-0.0017	(0.004)	0.0019	(0.004)
Industry:	IT Sector	-0.0056	(0.003)*	-0.0037	(0.003)
	Construction and Energy	0.0054	(0.005)	0.0027	(0.005)
	Technical Services	-0.0071	(0.005)	-0.0133	(0.004)***
	Trade	-0.0001	(0.005)	0.0009	(0.004)
	Financial and Insurance Services	0.0027	(0.005)	0.0101	(0.005)**
	Other Services	0.0001	(0.003)	-0.0041	(0.003)
Member of the Union of Professional Engineers		-0.0242	(0.003)***	-0.0184	(0.003)***
Female		-0.0076	(0.003)***	0.0024	(0.003)
Labour Market Experience (yrs)		0.0011	(0)***	-0.0002	(0)**
Position:	Functional Manager	-0.0021	(0.006)	0.0084	(0.005)
	Upper Middle Manager	-0.0063	(0.006)	0.0122	(0.005)**
	Lower Middle Manager	-0.0156	(0.006)***	0.0088	(0.005)
	Specialist	-0.0151	(0.005)***	0.0093	(0.005)*
	Entrepreneur	-0.0466	(0.013)***	0.0159	(0.012)
	Professor	-0.0045	(0.009)	0.0081	(0.008)
	Lecturer	-0.0292	(0.006)***	0.0263	(0.006)***
	Official	-0.0195	(0.016)	0.0112	(0.015)
Change of Employer within 12 Months		-0.0388	(0.004)***	-0.0177	(0.004)***
Change of Tasks within 12 Months		-0.0173	(0.004)***	-0.0255	(0.004)***
Share of Highly Educated in Region		-0.0322	(0.103)	0.1337	(0.095)
Region:	Helsinki Region	0.0039	(0.003)	-0.0040	(0.003)
	City, not Helsinki Region	-0.0021	(0.002)	0.0013	(0.002)
	Provincial Centre	0.0010	(0.003)	0.0013	(0.003)
	Industrial Region	-0.0015	(0.005)	0.0074	(0.004)*
	Country-Side	-0.0078	(0.006)	-0.0001	(0.005)
	Periphery	-0.0377	(0.011)***	0.0106	(0.01)
Constant		4.6213	(0.009)***	4.599	(0.008)***
No. Observations		10653		10732	

Note. The dependent variables are assessment of own professional competence using scale 4-10 and assessment of own ability to perform more demanding tasks than currently. Table reports coefficients and standard errors using robust estimates. The base for firm-size dummies is firms with 1–29 employees. The base for industry dummies is general industry. The base for position dummies is CEO or equivalent position. Coefficients of region dummies indicate the comparison to the average value of all regions. * Significant at the 90% confidence level. ** Significant at the 95% confidence level. *** Significant at the 99% confidence level.

In our first professional competence estimation in the first column of table 1, firm size does not have any statistical significance. The only significant industry dummy in the first column of table 1 is IT-sector, but the size of the negative coefficient is only 0.6%, which does not allow us to conclude that working in the IT sector would remarkably decrease respondent's estimate of his own professional competence. The union dummy indicates that members of The Union of Professional Engineers in Finland (IL) consider their own professional competence 2.4% lower than members of The Finnish Association of Graduates in Economics and Business Administration (SEFE). Also the sex of the respondent is statistically significant in our first estimation but the size of the effect remains really small. Female respondents regard their professional competence as 0.8% lower than male respondents with similar characteristics. Labour market experience variable is also statistically significant in the first estimation but with only a small percentual effect: one more year of labour market experience after graduation will yield a 0.1% higher estimation of the respondent's professional competence in his current job. Coefficients for changing employer or position within the same company during past 12 moths have significant negative coefficients in the first estimation, as expected.

Position dummies have all negative coefficients in the first estimation, and this indicates that highly educated workers in lower positions than CEO regard their professional competence as lower. The negative coefficients of functional managers, upper middle managers and professors have the smallest absolute values, which shows that these groups' view of their own professional competence does not differ remarkably from that of the highest management. These coefficients are not statistically significant, either. The negative coefficients of lower middle manager, specialist, entrepreneur and lecturer dummies are statistically significant. Entrepreneur and lecturer dummies have the largest absolute values and also the highest statistical significance (at 99% confidence level). Highly educated entrepreneurs regard their professional competence as 4.7% lower than CEOs. One possible explanation for this result may be that high education does not necessarily provide the sufficient practical skills needed when running an own company. Johansson (2000) presents a result which is in line with our findings: people who have high education before they enter self-employment have shorter self-employment durations. The significance and size (2.9%) of the negative lecturer coefficient might be explained by the lecturers' possible lack of pedagogical education.

In the first column of table 1 the only significant region dummy is periphery with a negative coefficient of size 3.8%. This indicates that respondents, whose working place is situated in

the periphery with firm and personal characteristics controlled, assess their own professional competence to be at almost 4% lower level than the average professional competence estimate of all regions.[1] Also the regional human capital index of Huovari et al. (2001), which is based on traditional measures of human capital (e.g. supply of working age population, number of students, number of higher degrees), indicates the retardation of periphery. Our regional results should not be biased due to the sparse density of highly educated in periphery, as the share of highly educated in the region is controlled. The positive coefficient of Helsinki region dummy is really small and remains without statistical significance, so we can not claim that highly educated workforce working in a company situated in Helsinki region would possess a lot more professional competence than the average highly educated worker in Finland. The coefficients of all other regional dummies remain insignificant in our first professional competence estimation.

Next we turn to the results of the second professional competence (ability for more demanding tasks) estimation, presented in the second column of table 1. Similarly to the first estimation, firm size dummies do not have any statistical significance. On the other hand, industry dummies have more significance in the second estimation than in the first estimation. Technical services industry dummy has a negative, statistically significant coefficient of size 1.3%. This means that respondents working in technical services assess their own capability for more demanding tasks 1.3% lower than respondents working in the reference industry (general industry). Financial and insurance services is another industry dummy that gains statistical significance in the second estimation. Positive coefficient of size 1.3% implies that respondents working in the field of finance and insurance evaluate their own professional ability to be on average higher than the equivalent assessment of the highly educated workers in industrial firms.

Similarly to the first estimation, the union of the respondent has a negative, significant coefficient in the second estimation indicating that members of The Union of Professional Engineers in Finland (IL) consider their own professional ability for more demanding tasks lower than members of The Finnish Association of Graduates in Economics and Business Administration (SEFE). Sex of the respondent remains statistically insignificant in our second estimation and years of labour market experience variable has so small coefficient that despite its

[1] Note that constrained regression technique applied here allows us to the compare the coefficients of the regional dummies with the average competence of all regions.

significance we can not make credible conclusions based on it. Similarly to the previous estimation, coefficients for changing employer or position within the same company during past 12 moths have significant negative coefficients. Thus, it seems that job specific experience is a more significant determinant of the personal assessment of professional ability than general labour market experience.

Position variable provides us with interesting results compared to those obtained in the first professional competence estimation. Here all the position dummies have positive coefficients, which is exactly contrary to that of the first estimation. The positiveness of the coefficients here can be explained by highly educated workers' general career related ambition and the continuous pursuit of higher and more challenging positions. Compared with CEO or equivalent position, upper middle managers, specialists and lecturers assess their professional competence and ability to manage more challenging tasks than the current ones to be significantly higher. Surprisingly, the lecturer dummy is largest in size (2.6%) and highest in significance. However, this should not be straightforwardly interpreted in a way that lecturers have significantly higher ability to manage demanding tasks than CEOs. Realistically, when it comes to the position dummy, it may merely indicate the respondent's dissatisfaction with the challenges provided by the tasks of his current position.

When the share of highly educated people in region is controlled in the estimations, respondents working in the greater Helsinki region regard their ability to manage more demanding tasks than currently lower than the average estimate of all regions. This negative coefficient is not significant, however. The positive coefficient of industrial region is statistically significant at 90% confidence level but the size of the positive effect is only 0.7%. All other regions than Helsinki have small positive coefficients. Even if these regional coefficients remain mainly insignificant, they give some hint to the direction that highly educated workers working outside capital region in Finland may feel frustrated in their current jobs, when all components of observable human capital and different aspects of employment are controlled. More demanding jobs that provide challenges also for the higher educated seem to be concentrated in the capital region.

Finally, we present the geographical NUTS4 level distributions of professional competence explained by unobserved residual human capital of highly educated (figures 3 and 4) and after that, as a comparison, distribution of professional competence explained by the observed

components of human capital (figures 5 and 6). In these estimations we have used 55 regions after merging some less populated NUTS4 regions to neighbours of similar character (mostly country-side or periphery regions). In addition, Vantaa and Espoo including Kauniainen are separated from greater Helsinki region and the satellite municipals around the greater Helsinki area are considered as one separate entity. This rougher classification of regions improved our estimation results compared to those with original NUTS4 regional distribution. However, despite these measures almost all regions still remained insignificant in the estimations and that's why complete estimations are not reported here.

Figure 3 indicates the regional distribution of professional competence of highly educated explained by residual unobservable human capital. All components of observable human capital, industry and share of highly educated in the region are controlled (compare to control variables in table 1). The distribution of results on the map indicates that there is a clear concentration of unobservable cutting-edge human capital in western Finland (Keski- and Pohjois-Pohjanmaa) and also in some provincial and industrial centres such as Rovaniemi, Kajaani, Mikkeli and Varkaus. Most big cities, such as Helsinki, Tampere, Turku, Jyväskylä, Kuopio and Oulu) perform relatively badly here. Especially Tampere, Oulu and Kuopio provide surprisingly bad results as in these regions highly educated respondents for some reason report lower than average unobservable professional competence. Our results in figure 3 may be explained by three reasons. To begin with, the highly educated in regions with high values may have higher "excess" professional competence and these regions may consequently possess hidden cutting-edge human capital resources. Second, in regions with high hidden professional competence values companies may invest more in occupational education of their highly educated workers. Third, highly educated in the areas with high values may have lots of human capital relative to other workers in the region, but not necessarily when compared to highly educated in other regions.

Figure 4 shows the highly educated respondents' ability to perform more demanding tasks than currently explained by residual unobservable human capital. The distribution in figure 4 indicates that highly educated workers around Hämeenlinna region, in the eastern Finland close to the border of Russia (Pohjois-Karjala) and in some rural regions in central Finland feel that they would be able to perform even more demanding tasks than currently. It seems that jobs in these geographic areas leave the professional capacity of the highly educated workers partly unused and the jobs in these regions don't provide sufficient challenges for the

Figure 3. Regional Distribution of Professional Competence, Explained by Residual Human Capital

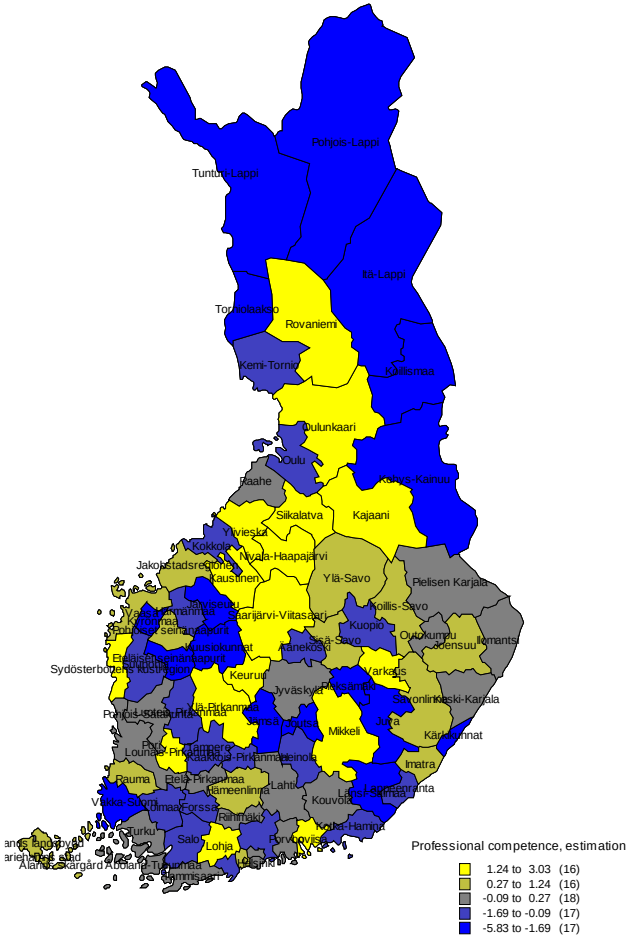
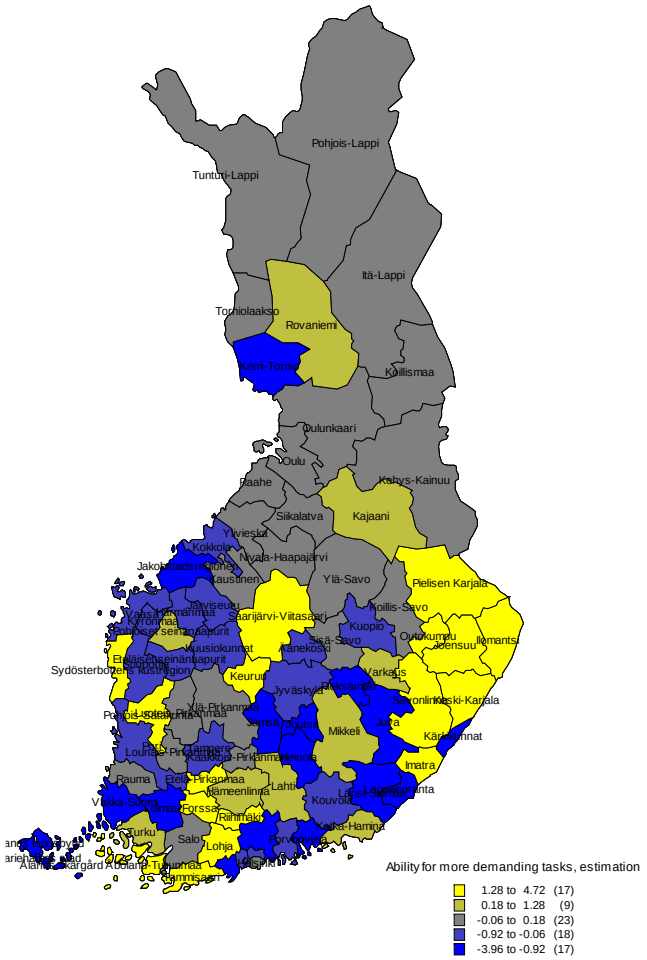


Figure 4. Regional Distribution of Ability to Perform More Demanding Tasks, Explained by Residual Human Capital



highly educated workforce. When thinking about the entirety of Finland, this finding shouldn't be taken as a deadly serious problem as it only concerns the highly educated working in a few regressive industrial and peripheral regions. Most respondents working in southern and central Finland tend to think that they would rather need occupational education to be able to manage well their current tasks. In these areas the highly educated seem to have enough challenges in their jobs or another explanation may be that matching of the requirements of jobs with the background of highly educated workers is not efficient in all these regions. An interesting remark from the capital region is that respondents working in Espoo seem to demand additional occupational education whereas respondents working in Helsinki think that they could perform more demanding tasks than currently. This result may be explained by a remarkable part of engineers in Espoo working in Nokia's R&D departments. However, respondents in the other traditional R&D centres in Salo and Oulu do not report need for additional education.

Figure 5 indicates the results of the NUTS4 level professional competence estimation, where the explanators are components of observable human capital. The coefficients here are obtained by subtracting the regional "residual human capital" coefficients shown in figure 3 from the regional "complete human capital" coefficients. Complete human capital coefficients are obtained by controlling only firm size, industry and share of highly educated in region in table 1 and leaving all the components of observable human capital uncontrolled (estimation results are not presented here). The regional distribution in figure 5 shows that observable professional competence measured by the respondents' education (here union SEFE/IL), years of working experience, position and experience in the current position are strongest in the capital region, southern coastal Finland around the capital region, in Lappeenranta, Pietarsaari, Maarianhamina and some country side regions in Satakunta. Also Turku performs well here but the below-average results of the university regions of Tampere, Jyväskylä and Kuopio are surprising. This may be due to e.g. highly educated in these regions lacking a long work history and experience. When comparing figures 3 and 5, it is easy to perceive that components of unobservable (residual) and observable components of professional competence of highly educated are distributed in a completely different way.

Regional distribution of the ability for more demanding tasks explained by observable human capital is presented in figure 6. Also here an important remark is the clear difference to figure 4 presenting the assessment of ability explained by unobservable human capital. Observable

Figure 5. Regional Distribution of Professional Competence Explained by Observable Human Capital

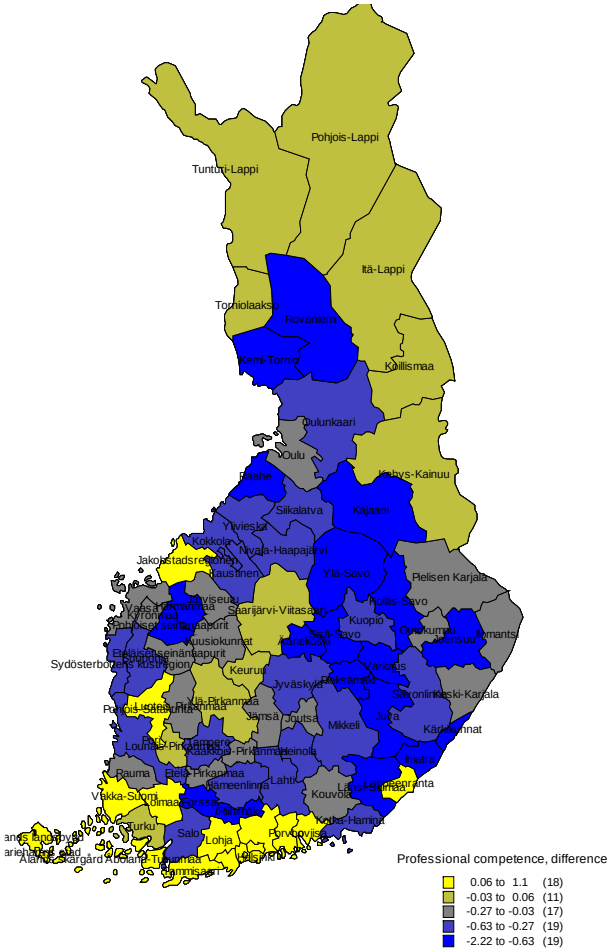
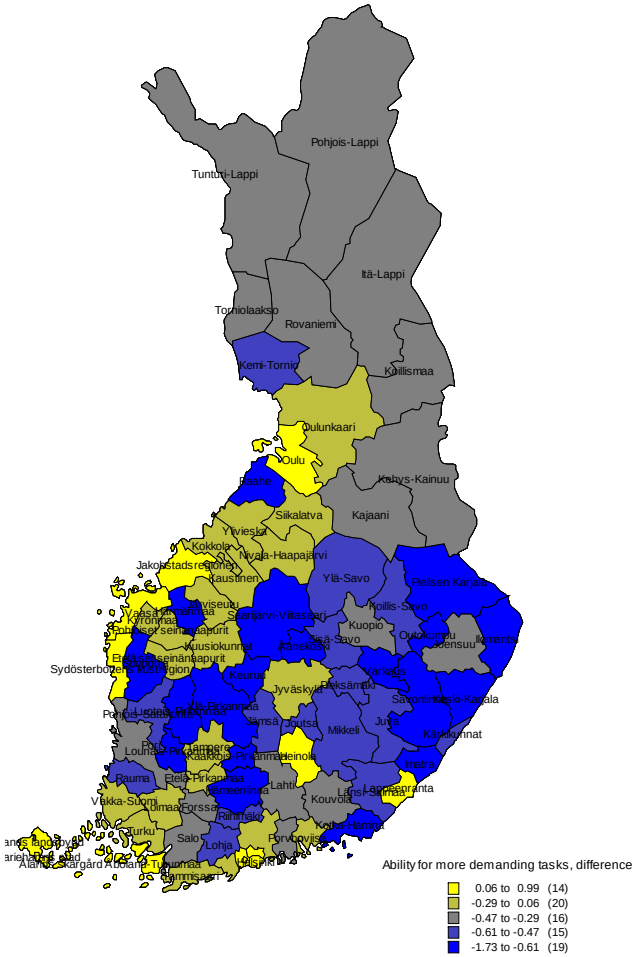


Figure 6. Regional Distribution of Observable Ability for More Demanding Tasks, Explained by Observable Human Capital



components of the professional ability of the highly educated are concentrated mostly in southern and western coast of Finland extending also to Pohjanmaa and Pohjois-Pohjanmaa. University cities such as Helsinki, Oulu, Vaasa and Lappeenranta belong to the highest category and none of the university regions falls below average category in this distribution. Also Turku, Tampere and Jyväskylä perform well here. In figure 4 we found a concentration of unobservable abilities for more demanding tasks in Pohjois-Karjala but figure 6 confirms that this finding is most probably due to lack of sufficient challenges as the observable abilities of the highly educated in this region are lower than average. The same conclusion can be done concerning the concentration of unobservable abilities around Hämeenlinna region.

4. Concluding Remarks

In this paper we examined the regional distribution of professional competence and ability for more demanding tasks among highly educated Finns. The data were part of an annual wage survey 2002 of The Union of Professional Engineers in Finland (IL) and The Finnish Association of Graduates in Economics and Business Administration (SEFE). More specifically, we examined the respondents' self-assessment of their professional competence using scale 4-10 and self-assessment of their ability to perform more demanding tasks controlling all the components of observable human capital, firm size, industry and other relevant explanatory variables. We studied the regional distribution of these two professional competence measures with a major regions estimation model and with graphical NUTS4 regional level illustrations. When figuring out possible reasons explaining the regional distribution of professional competence, we also presented graphical NUTS4 level distributions of professional competence explained by the observable components of human capital.

The most significant result of our professional competence estimation model with major regions is that self-assessed professional competence is significantly lower for highly educated workers whose working place is situated in periphery. The greater than average professional competence self-assessment of respondents in the greater Helsinki region is small in size and not significant. On the other hand, the results of the unobservable ability for more demanding tasks estimation show that respondents in greater Helsinki region assess their ability for more demanding tasks slightly lower than the average of all respondents. In areas outside the capital region there seems to be at least some excess hidden professional ability, which may well indicate the lack of sufficient challenges for highly educated engineers and business graduates

working in these regions. Unfortunately the small size and weak significance of the estimated regional coefficients doesn't allow us to make any far-reaching conclusions.

Our graphical NUTS4 level results reveal that there is hidden unobservable professional competence and ability for more demanding tasks outside university cities and industrial regions in Finland. There seems to be a clear concentration of cutting-edge professional competence explained by unobservable human capital in western Finland (Keski- and Pohjois-Pohjanmaa) and also in some provincial and industrial centres such as Rovaniemi, Kajaani, Mikkeli and Varkaus. This finding may simply indicate that in these regions companies invest more in the occupational education of their highly educated workers. Engineers and business graduates feel that they would be able to perform more demanding tasks than currently especially if they are working in Hämeenlinna region, in the eastern Finland close to the border of Russia (Pohjois-Karjala) and in some rural regions in central Finland. It may be that jobs in these geographic areas leave the hidden professional capacity of engineers and business graduates partly unused because they don't provide sufficient challenges for the highly educated workforce. When we compare these results with the distributions of professional competence and ability explained by traditional observable human capital components, the most competent and experienced engineers and business graduates were found in southern Finland and in regions surrounding university cities, as expected.

Regional distribution of human capital of the highly educated Finns, the "cutting edge" of Finnish human capital, shows where the necessary intangible resource base for innovations and growth is located. According to Lööf et al. (2001), the main challenge for Finland is to diffuse know-how, new technology and IT-investments more evenly among all companies. Our results give indication that there might be some hidden professional competence in Keski- and Pohjois-Pohjanmaa and some provincial centres outside capital region but we also notice that this self-assessed competence may simply be due to the scarcity of human capital in these areas and/or companies' heavy investments in the occupational education of their highly educated workers. Highly educated in these areas may have lots of human capital relative to other workers in the region, but not necessarily when compared to highly educated in other regions. Professional competence of engineers and economics and business administration graduates explained by their education and working experience is concentrated in southern Finland. Based on the results of our cross-sectional study it is not possible to predict the future development paths of the human capital resource base of Finnish regions but we hope that our study will provide a solid starting point for further explorations on the topic.

References

Abowd, J. M., F. Kramarz, et al. (1999). High Wage Workers and High Wage Firms. Econometrica, 67, 2, 251-333.

Aghion, P. and Howitt, P. (1998): Endogenous Growth Theory. Cambridge, Massachusetts, MIT Press.

Barro, R. J. and Sala-i-Martin, X. (1995): Economic Growth. New York, McGraw-Hill.

Becker, G. (1964): Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. 3rd edition, National Bureau of Economic Research.

Edvinson, L. and Malone, M. (1997): Intellectual capital: realizing your company's true value by finding its hidden brainpower. New York. Harper Business.

Gaspar, J. and Glaeser, E. (1996): Information Technology and the Future of Cities. NBER Working Paper No. 5562.

Huovari J., Kangasharju A. and Alanen A. (2001): Constructing an Index for Regional Competitiveness. Pellervo Economic Research Institute, Working Papers No. 176.

Johansson, E. (2000): Essays on the Determinants of Self-Employment. Publications of the Swedish School of Economics and Business Administration, No. 85.

Krugman, P. (1991a): Geography and Trade. Cambridge: The MIT Press.

Krugman, P. (1991b): Increasing Returns and Economic Geography, Journal of Political Economy, 99, 484-99.

Krugman, P. (1993): First Nature, Second Nature, and Metropolitan Location. Journal of Regional Science, 33, 129-144.

Lööf, H.; Heshmati, A.; Asplund, R. and Naas, S. O. (2001): Innovation and performance in manufacturing industries: a comparison of the Nordic countries, SSE/EFI working paper series in economics and finance No. 457, pp. 38.

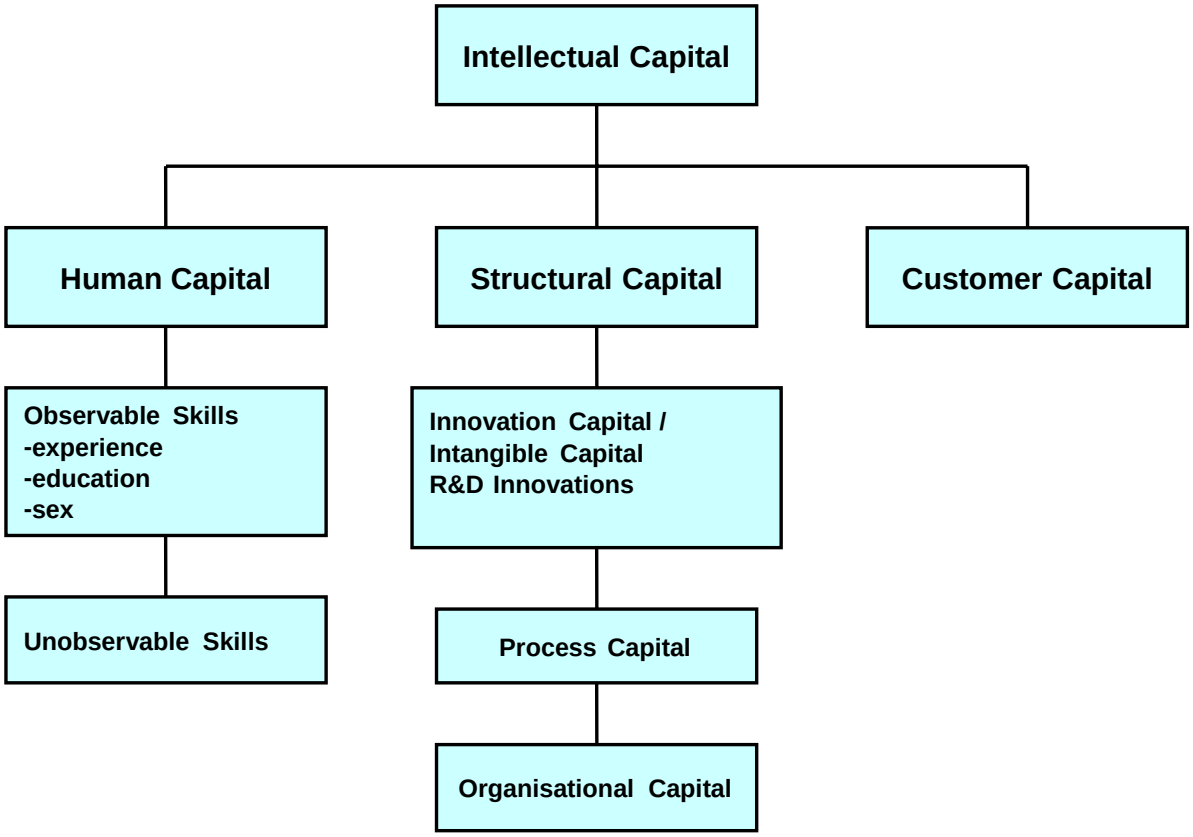
Moisio, A.; Kangasharju, A. and Ahtonen, S.-M . (2001): Menestyksen mitta? Vaihtoehtoisia mittareita aluetalouden kehitykselle. (Criterion for Success? Alternative Measures for Regional Economic Development.) Government Institute for Economic Research, Research Reports No. 84.

Piekkola. H. (2005): Knowledge Capital as the Source of Growth. Research Institute of The Finnish Economy. Forthcoming as a Discussion Paper.

Venables, A. (1996): Equilibrium Locations of Vertically Linked Industries, International Economic Review, 37, 341-59.

APPENDIX

Figure A.1. Human Capital



Source: Edvinson and Malone 1997 (adapted)

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