INGENIO WORKING PAPER SERIES

Ingenio CSIC-UPV
INSTITUTO DE GESTIÓN DE LA INNOVACIÓN Y DEL CONOCIMIENTO

An analysis of the Graduate Labour Market in Finland: the impact of Spatial Agglomeration and Skill-Job Match

Davide Consoli, Francesco Vona, Toni Saarivirta

Working Paper Nº 2010/02

INGENIO [CSIC-UPV] Universidad Politécnica de Valencia | Camino de Vera s/n | 46022 Valencia
tel. +34 963 877 048 | fax +34 963 877 991 | innco@ingenio.upv.es

An Analysis Of The Graduate Labour Market In Finland: The Impact Of Spatial Agglomeration And Skill-Job Match

Davide Consoli[a,b]; Francesco Vona[c,d], Toni Saarivirta[e]

[a] Manchester Institute of Innovation Research (MIoIR), Manchester Business School (UK) - davide.consoli@mbs.ac.uk

[b] INGENIO (CSIC-UPV), Valencia (Spain)

[c] OFCE (Observatoire Français des Conjonctures Économiques), 250 Rue A. Einstein 06560 Valbonne (France)

[d] SKEMA Business School, 60 Rue Dostoïeski 06902, Sophia Antipolis Cedex (France)

[d] Research Unit for Urban and Regional Development Studies (Sente), University of Tampere, FIN-33014, (Finland)

JEL: R11; J24; J31; O33

Keywords: Regional Development; Earning Distribution; Education and Skills; Spatial Inequalities

NOTE: This is a pre-publication version. Please quote as:

Consoli, D., Vona, F. and Saarivirta, T. (2012) "An analysis of the Graduate Labour Market in Finland: Spatial Agglomeration and Skill-Job Match". *Regional Studies (forthcoming)*

Abstract

During the 1990s Finland's economy went from deep recession to becoming among the most innovative and competitive within merely a decade. Economic recovery driven by the surge of ICT-related industries with the active support of the higher education system gave way also to growing inequalities among regions, especially within graduate workers. The paper elaborates an empirical analysis of the returns to education of a cohort entering the labour force between 1995 and 2005; our objective is to capture the extent of spatial and occupational determinants on income distribution as Finland slid from its most troubled to most prosperous times.

1 Introduction

The role of universities in the process of local and regional economic development has attracted considerable interest among scholars and policy makers (Varga, 2000; Boucher et al, 2003). This strand of analysis initially centred on income-expenditure-employment effects (see e.g. Brownrigg, 1973; Bleaney et al, 1992) has embraced new directions as universities' capacity of incubators for new basic research and loci for learning gradually gained due recognition (Malecki, 1985; Varga, 1998). Empirical evidence also indicates that the presence of a skilled labour force fosters local development, either through productivity effects due to local knowledge spillovers and human capital externalities (Howells, 1986; Glaeser et al, 1992; Westhead and Storey, 1995), by attracting private sector R&D and investments in high-tech activities (Malecki, 1991; Saxenian, 1994; Almeida and Kogut, 1997) or by further encouraging immigration or retention of highly skilled workers (Herzog et al., 1986; Beeson and Montgomery, 1993; Faggian and McCann, 2009). The organization of local labour markets, in turn, brings to bear upon each of the foretold dimensions by either stimulating or hampering the mobility of and the access to pools of skilled workers (Andersson et al, 1990; Malecki and Bradbury, 1992).

The transformations unleashed by widespread diffusion of Information and Communication Technologies (ICTs) during the 1990s added an important dimension to the class of phenomena just outlined. ICT-driven technical change has been observed to trigger major inequalities across geographical areas as well as educational groups, especially among more educated workers (see Eckstein and Nagypal, 2004 on the US and Martins and Pereira, 2004 for a cross-country analysis). The most credited argument ascribes the latter to the intrinsic skill-biased nature of ICTs (Acemoglu 1998; Machin and van Reenen, 1998; Piva et al, 2005) combined with the renowned tendency of hi-tech activities to concentrate in selected geographical areas (Acemoglu and Angrist, 1999; Moretti, 2004a). It is remarkable however that inequality has an autocatalytic nature whereby imperfect geographical mobility prevents the equalization of graduate premia across regions while, at the same time, non-convex returns to education favour retention of skilled workers by more innovative regions. As a result the latter remain close to the technological frontier while the others drift away (Aghion and Howitt, 1998). Add to this that while wage premia could be reasonably expected to diminish in regions with abundance of skilled workers, the existence of human capital spillovers (due to clustering of high-tech activities) tends to counteract the conventional demand-supply dynamic and to accrue extra returns to highly educated workers (Moretti, 2004a).

As these transformations undermine the explanatory power of traditional variables like observable worker characteristics – educational attainment, age, experience, etc – (see Juhn et al. 1993; Goldin and Katz, 2008; Vona and Consoli, 2009) empirical research has probed several new options in the attempt to enrich the wage equation with variables such as innate abilities (Card, 1994); differences in university quality (Brewer et al, 1999; Dale and Krueger, 2002); job-skill mismatches (Green and McIntosh, 2007); firm-specific effects (Dunne et al, 2004; Faggio et al, 2007); and geographical location (Moretti 2004a; Glaeser and Maré, 1994).

The present paper elaborates a cross-regional analysis of earning differentials in Finland with a view to contribute this debate, specifically by connecting two areas of scholarly research: on the one hand it looks at the relationship between universities and regional economic development through the lenses of labour market dynamics while at the same time it adds a ‘regional’ perspective to the labour economics literature on earning inequality. The remarkable rebound that followed the recession of the mid 1990s and the related emergence of novel phenomena like spatial and income inequalities make the recent history of Finland especially interesting for our purposes (Asplund, 2001; Kautto, 2003). The proposed analysis uses an original dataset containing detailed individual information on a cohort of labour market entrants and seeks to tackle the following questions: (1) What is the wage premium associated to a perfect job-degree match? (2) How do agglomeration effects impact earning distribution? And (3) to what extent do spatial distributions of workers' characteristics affect cross-regional differences in the returns to qualifications and occupations? By addressing these, the paper will add novel empirical evidence to a growing area of empirical research that so far has focused exclusively on Anglo-Saxon countries (Böckerman and Maliranta, 2007).

2 Framework for analysis

The recent history of Finland offers a compelling illustration of the turbulences that follow major regime transitions such as the emergence of new Information and Communication Technologies (ICTs). This section reviews concisely key milestones of the country's long-term economic development and connects them with the outlined conceptual framework.

2.1 The 1990s in Finland: bust to boom

The process of industrialization in Finland follows a typical pattern with the creation of manufacturing and processing activities in the mid-1950s and the progressive reconversion towards services in the late 1970s. The combined pressures of the oil crisis and of growing foreign competition in the 1980s stimulated the emergence of novel high-tech activities to reduce dependence on transportation and energy supplies (Ollikainen, 1997). In the early 1990s Finland entered the most severe recession of its recent history, a storm which over its 5-year course brought the country to a halt with record unemployment of 18% in 1993(Rouvinen and Ylä-Anttila, 2003). At the root of this was the uncontrolled financial deregulation of the late 1980s implemented as a response to the difficulties caused by the collapse of trade with the Soviet Union. The legislation however favoured the accumulation of unsustainable private debt thus leading to a cascade of bankruptcies (Kiander, 2004a; Kiander, 2004b).

Less than a decade later Finland was set on a different course, enjoying renewed prosperity and falling unemployment. In the following years the country became a global leader in the ICT sectors with over 6000 specialised firms (Paija and Rouvinen, 2003) and a wealth of resources for research accounting for more than 50% of national industrial R&D (Castells and Himanen, 2002; Ylä-Anttila, 2005).[1] Let us offer a synthetic account of the changes that Finland went through the decade 1995-2005 with the aid of Table 1 and Map 1. Consistent with various accounts of the recent history of Finland, the Table paints a picture in which Southern regions like Uusimaa (home to Helsinki), Eastern Uusimaa and Pirkanmaa (home to Tampere and Nokia headquarters) capture more migrants and enjoy overall higher levels of Gross Value Added (GVA) per capita and of employment recovery. North Ostrobothnia – whose main city is Oulu, a hub with cutting-edge hi-tech firms (Nokia, Nokia Siemens, Stora Enso, UPM), a vibrant University and specialist centres for research and technology development – stands out as an exception among northern regions, especially if compared to Lapland Kainuu, North Savonia and North Karelia.

TABLE ONE AND MAP ONE ABOUT HERE

2.2 Higher Education and Labour Markets

Beneath the remarkable transformations that bolstered recovery stand two pillars – both central to the remit of this paper: higher education and the labour markets (OECD, 2004). Consistent with egalitarian principles after which the higher education system has been modelled, in Finland no fees are levied on full-time students, the ratio of university per inhabitant is rather high (21 universities and 31 polytechnics with total population around 5 million) and subsistence grants are widely available (Usher and Cervenan, 2005). Two significant pieces of legislation are worth mentioning: the creation of new Universities between the 1960s and 1970s which facilitated access to higher education for residents of remote areas, and the upgrading of Polytechnics degree in the late 1990s to meet the growing demand for higher vocational skills (Schienstock, 2004). The statistics available seem to confirm the efficacy of these reforms considering that between 2000 and 2007 entry rates into Finnish tertiary education were about 70%, and that in the same period graduation rates for first degree programs and postgraduate qualification were respectively 47% and 2.1% - both significantly above the OECD average (OECD, 2008). Also data on average graduation times and PISA tests scores speak to the high quality of the educational system (Välijärvi, et al, 2002; OECD, 2005).

Finland's labour market is organized around the canons of a traditional Nordic welfare system with high labour taxes, extensive social benefits, elevated trade union membership (currently 70%, of the labour force down from more than 80% in the 1990s) which all together underpin a traditionally compressed wage structure (Nickell and Layard, 1999). Wage bargaining involves centralized framework agreements between unions and employers on a fixed-term basis followed by union-level bargains.[2] Despite high women participation the pay gap is higher in Finland compared to the OECD average, mostly due to self-selection into low-wage careers like teaching (Vartiainen, 2002; Böckerman, 2006). Consistent with the broader international trend, the expansion of ICT-related activities has altered substantially the wage structure in Finland by spurring fragmentation of local labour markets and the emergence of earning inequalities within high-skilled workers. In relation to this Böckerman and Maliranta (2007) observe that in spite of the extent of these transformations, only a few empirical studies have thus far accounted properly for the effects of these new characteristics in Finland's labour market.

2.3 Economic growth and rising regional inequalities

The rebound of the late 1990s contributes to the widely-held perception of Finland as successful knowledge-intensive society, and fuels debates about the 'Finnish model' or 'Finnish miracle' (Castells and Himanen 2002; Schienstock 2004). To be sure Finland reaped the opportunities of the nascent ICT industry more effectively and rapidly than other European countries thanks to a mix of forward-looking industrial policies and public investments in higher-education and R&D which stimulated and supported ICT-complementary clusters in manufacturing and service sectors (OECD, 2004; Honkapohja and Koskela, 1999; Honkapohja et al, 2008). Empirical evidence confirms also that the industrial revitalization of the 1990s was the backdrop to a story that has arguably attracted less attention: the emergence of significant inequalities across regions.

Like the canonical examples commonly offered in the literature (see e.g. Krugman, 1991; Feldman and Audretsch, 1999), the growth of specialised innovation activities in Finland was strongly localized in some areas. A large number of empirical studies contribute to portray the following picture: as the Southern regions joined the nascent high-tech trajectory the bulk of industries located in the Central and Northern areas remained anchored to declining activities like paper, pulp and metal processing. Hanell et al (2002) present evidence of massive migration towards Helsinki and the South at the peak of the crisis; Kautto (2003) reports significant and growing divergences in capital income shares and average household incomes after 1994; Kangasharju and Pekkala (2004) show remarkable differences in sectoral expansion between fast- and low-growing regions, especially in the business service sectors (with a gap of 4,5% over the period 1995-2000); Loikkanen et al (2005) identify divergent patterns of capital deepening, with the Helsinki region ahead of the Southern regions (+20% in the period 1996-2000) and even more of the Central and Northern areas (+40%); Loikkanen and Lönnqvist (2007) confirm post-recovery imbalances in the patterns of investments and migration in favour, again, of the Southern regions and Helsinki.

Common to all these studies is the acknowledgement of growing inequalities in both unemployment and earnings distribution (OECD, 2001; Asplund, 2001; Böckerman, 2002; Tervo, 2005; Neubauer et al., 2007). Böckerman and Maliranta (2007), for example, show the contrast between job destruction in Eastern and Northern Finland and hi-tech driven job creation rates in Helsinki and the Southern regions, the net effect of which is signified by widening spreads of wage differentials. Other empirical studies by Uusitalo (1999), Kyyrä (2000) and Asplund and Leijola (2005) indicate that, in spite of centralised wage bargaining and tight labour market regulation, unexplained wage dispersion among graduates increased substantially after the mid-1990s. These phenomena are ascribed to the concurrence of various factors. Empirical evidence suggests statistical association between earning inequalities and the concentration of highly educated workers in the nascent ICT clusters of the South (Kyyra, 2000; Asplund and Leijola, 2005). Some authors argue that regulation impeded the adaptations demanded by the changing industrial structure thus amplifying the impact of job-skill mismatches and agglomeration effects which triggered within-group inequality among highly educated workers (Asplund and Liljia, 2000; Kyyra, 2000). Uusitalo (2002) on the other hand stresses that in the mid-1990s, when income inequality increased, industry-level bargaining partially replaced central agreement. Yet other works emphasise the impact of the dual income tax system introduced by the fiscal reform of 1993 which, according to Riihela et al (2008), created strong incentives to shift labour income to capital income for individuals in the highest marginal tax brackets. The common denominator across all these studies is that the aftermath of the crisis in

Finland was the backdrop to the fastest growth in income inequality among the OECD countries (OECD 2008).

3 Data and descriptive analysis

This section proposes an analysis of the relation between individual characteristics and their earnings. As discussed in the introductory section, this paper has three empirical goals. First, to assess the wage premium associated to a perfect job-degree match; secondly, to evaluate the impact of agglomeration effects on earnings' distribution; and, lastly, to capture the extent to which differential distributions of workers' characteristics across regions affect returns to qualifications and occupations. Let us provide a brief illustration of the database and of the criteria that guided the construction of specific variables.

3.1 The dataset and construction of main variables

The data source is the Longitudinal Census of Statistics Finland containing information on 8787 individuals[3] [4292 men (49%); 4495 women (51%)] collected by means of a two-step survey: in 1995, year of enrolment at a Finnish University, and in 2005. Individual information includes (for 1995) gender; high-school mark; university of enrolment; field of study; degree aiming at; (for 2005) degree accomplished (if any); region of residence; occupational status; and income.[4] It is worth reiterating the cohort under analysis entered the labour force as the crisis levelled off and Finland's economy started to enjoy a new phase of expansion. Focussing on this particular group reduces the turmoil typically associated to a phase of profound recession.

A key feature of the proposed analysis is the construction of ad-hoc variables to capture occupational and spatial determinants (see Blundell et al., 1997; Robinson, 1997; Dearden et al., 2002). For what concerns the former we matched the occupational categories listed by Statistics Finland with the International Standard Classification of Occupations (ISCO).[5] Furthermore we create a job-degree dummy variable by comparing occupation-specific requirements listed in ISCO with the content of each degree (second digit of degree codes), and assigning 1 in case of perfect match and 0 otherwise.[6] To assess the influence of spatial agglomeration we use region-specific human capital calculated as the weighted average of educational attainment of the residing population[7] and the share of post-graduates within the population. Since the analysis focuses on a cohort of labour market entrants we also include variables for degree of experience in the local labour market, namely: relocation after completing studies (Relocate), change of degree or drop-out (Shift) and duration of formal schooling weighted by expected length of study in the field chosen (Years of Education).

3.2 Descriptive Analysis

Table 2 presents descriptive statistics for our main variables of interest. More than 90% of individuals in the sample are employed in 2005 with high average educational attainment – about 70% holding a Master's Degree. Among the most preferred areas of study are Business and Social Sciences (23%), first among women, followed by Engineering (18%), first among men. For what concerns occupations, lower half of the Table, the largest share of individuals are employed in Medium-Skill Jobs (20%)[8] followed by Teachers (18%) – the first choice among women. Finally, the population divides almost equally between those who took residence in Helsinki and those who live elsewhere in Finland – a slight majority of the latter being women.

TABLE TWO ABOUT HERE

The descriptive statistics of Table 3 illustrate the spatial distribution of our sample broken down in two groups depending on area of residence in 2005. Here we note immediately that the capital city features overall higher levels of human capital (Upper part of the Table). Further, 37.4% of the observations relocate to Helsinki after graduation while 54.4% to other regions. When combined with information on the field of study we observe that Helsinki residents are mostly graduates in Business Studies (note the difference with other regions), Engineering and to a smaller extent Humanities while other regions feature comparatively more graduates in Medicine, Information Sciences and Humanities. The breakdown by occupations shows that medium-skill jobs have the highest share in Helsinki – recall the data concern labour market entrants – followed Teachers, Public Service Professionals, Legal and Business Professionals and Scientists; consistent with the previous distributions the workforce of other regions has its peak with Teachers (more than twice as in Helsinki) and relatively more Medical doctors.

The lower-intermediate part of Table 3 shows that postgraduates residing in Helsinki earn more compared to other areas while the opposite holds for Graduates. The breakdown by occupation indicates that Helsinki residents enjoy a higher wage premium when employed as Managers (+8%), Scientists (+11%), Legal and Business professionals (+20%), Medium-skill (+13%) and low-skill workers (+15%). Looking at other regions, Teachers (+7%), Engineers (+1%) and Medical Doctors (+2%) earn more compared to their peers in the capital city. The bottom of the table shows that the distribution of individuals with perfect job-skill match does not displaying substantial asymmetry, with a slightly lower percentage in the Helsinki area owing to the larger fraction of highly educated workers in the area.

TABLE THREE ABOUT HERE

Let us now turn to the empirical analysis of earnings distribution.

4 Econometric analysis of earnings

This section presents an empirical analysis of the determinants of earnings (Log Monthly Wage) among a cohort of individuals who enrolled at any of the Finnish Universities in 1995. The basic wage model, a Mincer-type of regression, is progressively enriched by the addition of controls and variables that capture job-skill match and agglomeration effects. Variables are listed in the Appendix.

4.1 OLS Estimates

The basic model includes standard controls for individual characteristics[9] and specific occupation dummies. The first OLS regression (column 1, Table 4) yields positive and significant returns to high qualifications with respect to university dropouts, ranging from 46% for Master’s degree to 68% for PhDs’.[10] The estimated coefficients also indicate that Medical doctors, Engineers, Legal professionals and Scientists enjoy relatively higher returns compared to other occupations.[11] When dummy variables for Helsinki residence and job-skill match are included (column 2) the estimates show that the former yields an extra premium of 6%, and that being employed in a job that matches perfectly the educational background carries a 4% higher monthly wage. Note that the Helsinki dummy is a first, albeit crude, indication of the effect of location on wages that will be progressively refined.

The indications provided by the baseline model remain robust when 'Field of Study' is controlled for (column 3). As might be expected, having a degree increases the wage compared to individuals with no degree especially for Engineering, Business Studies and Medicine degrees. The finding that returns to formal education are lower compared to the previous model resonates with studies showing that the type of specialisation acquired with a degree explains a large part of the educational premia (Asplund, 1993; Asplund and Leijola, 2005). In particular the higher coefficients for Engineering and Business Services studies compared to ICT-related degrees – such as Information Sciences – resonate with studies indicating that the wage premium of generic-to-specific computer skills had decreased during the late 1990s (Asplund, 1997). In fact, regional employment shares in private services are highly correlated with our human capital index and hence with wages.[12] In the enriched model coefficients for the job-skill match and the Helsinki dummies remain statistically significant.

TABLE THREE ABOUT HERE

As anticipated earlier the Helsinki dummy captures in rather crude fashion the influence of spatial factors on earnings. As a matter of fact different issues are at stake when it comes to assess the impact of local characteristics on earnings. In general it is plausible that skilled workers sort themselves into metropolitan areas with high level of human capital (Glaeser and Maré, 2001); in such cases an observed positive correlation between wage levels and graduate share is ascribed to unobservable individual factors, like innate ability positively correlated with the skill of the workforce, rather than productivity differentials. On the other hand the positive association between earning levels and the share of graduates living in large cities may depend on unobservable characteristics of the location, such as the industrial mix: in this case the wage levels cause the increase of the skilled workers, not the other way round (Moretti, 2004a).

While our data do not allow a proper test of these concurrent hypotheses, agglomeration effects can be captured by taking the weighted average of educational attainment among residents as index of regional Human Capital (column 4). An increase of one standard deviation in the human capital in the region yields a remarkable 75% extra premium.[13] Further, we focus on the effect of regional human capital and check whether the latter benefits more – e.g. those with Master or more – or less skilled workers – e.g. Degree or less. Under the traditional framework an increase of aggregate human capital bears two effects on local labor markets. If there is imperfect substitution between educated and uneducated workers, an increase in the number of educated workers will lower the wage of the educated and raise the wage of uneducated workers. On the other hand, human capital spillovers can increase productivity and the wage levels of both groups. In the estimates of columns (5) and (6) the Human Capital coefficient is large and significant for both but twice as large for low-skilled individuals. This suggests that human capital spillovers benefit relatively more those with lower qualifications (less than post-graduate).

To further investigate location effects we consider interactions between being postgraduate and region of residence in 2005. This interaction effect is included to check whether substantial differences emerge in the returns to postgraduate qualifications across regions. Different from previous studies employing a similar methodology (e.g. Moretti 2004b) the fine-grained information contained in our dataset allows focussing on regional differences in returns to postgraduate degrees. Note that in our sample of highly qualified workers a postgraduate qualification is the characteristic that explains the greatest fraction of earning premium. The coefficients for individual regions in column (1) (upper part of Table 5), for groups of regions by GDP-per capita (column 2, intermediate part of Table) and by Levels of Human Capital (column 3, lower part of Table) all confirm that residing in Helsinki accrues a higher wage premium to postgraduates.[14]

TABLE FIVE ABOUT HERE

Overall these findings resonate with various accounts of the post-recession gap between fast-growing regions located in the South of Finland and the remaining regions. At the onset of the high-tech boom the uneven distribution of ICT-specific knowledge accrued early users an extra wage premium. However as the technology entered a mature phase and the range of GPT-related applications expanded, the demand for skills shifted towards those that match emergent activities like Business Services, especially in Helsinki. This is also confirmed by evidence on the higher wage premium commanded by postgraduates specialised in Engineering and Business Science compared to those possessing narrow computing skills (see Asplund, 1997). It is important to emphasise that such a process entails significant capacity in knowledge systematization and adaptation of training to changing job content (Autor et al, 2003; Goldin and Katz, 2008; Vona and Consoli, 2009; Consoli and Elche-Hortelano, 2010). In the case under observation the regions that had joined early the party of hi-tech development managed stay close to the frontier owing to the autocatalytic effects of high concentration of human capital discussed earlier in the paper.

Let us now take a final step and check whether Finnish macro-regions, grouped by intensity of human capital, respond to different models generating wage differentials across skill and occupational groups. This exercise is particularly important in view of the wage policies adopted in Finland to the effect of ensuring availability of certain professionals in remote Northern areas. Moreover compositional effects such as differences in the regional endowments of other individual controls can be relevant not only for human capital as well as for managers or high skilled professionals. To this end we use that Oaxaca-Blinder (Blinder, 1973; Oaxaca, 1973) decomposition to check the extent to which regional differences explain differences in returns to individual characteristics or differences in the endowments of these characteristics (Table 6).[15] This technique, which was originally employed to decompose the male-female wage differentials, is applied here to capture the regional wage gap in terms of (i) a compositional effect due to cross-regional differences in individual characteristics that have a positive effect on earnings; (ii) a price-component associated to different returns to characteristics in each region; and (iii) an interaction term. This exercise allows disentangling the sources of regional wage gap.

TABLE SIX ABOUT HERE

Taking Helsinki as the reference region for pair-wise comparison, predicted wages are always higher in Helsinki with respect to the other three macro-areas. With respect to other macro-areas, an important fraction of this gap is explained by a larger endowment of highly paid occupations, such as scientists and business professionals. However, the total endowment effect yields a penalty for residing in Helsinki –especially compared to middle- and low-human capital regions. This can be ascribed to the relatively smaller fraction of teachers and civil servants working in the capital area. To a lesser extent a negative endowment effect for engineers signals scarcity of these qualifications in the capital region.

Returns to characteristics that positively affect earnings are generally higher in Helsinki and explain more than 2/3 of the wage difference with the high-human capital macro-region. Looking at this effect in detail, postgraduate workers receive significantly higher premia when employed there. By contrast, teachers, civil servants and, to a minor extent, doctors and engineers command lower wages. These patterns emerge with greater intensity among fast growing regions, e.g. Oulu, where also returns to being employed in medium-skill job are significantly larger compared to the capital area (comparison 2).

The large and positive interaction effect here is mostly due to Medical doctors and especially Teachers since both groups are less represented and less paid in Helsinki compared to other regions. These results resonate with the policy actions aimed at discouraging out-migration from Northern regions, especially among public sector professionals (see Kouvonen and Katainen, 2004).[16] Similar rewards are also available to engineers and probably associated to the presence of Nokia and other high-tech firms in North Ostrobothnia (home to Oulu and hi-tech research facilities) and Pirkanmaa (home to Nokia headquarters).

5 Conclusions

Finland's recent history has a lot to contribute to the scholarly debate on both regional economic development and income inequality. Within merely a decade the country weathered a deep recession to become a central actor in the global knowledge economy thanks to the impressive expansion of ICT-related activities. In turn, the associated structural changes elicited far-reaching effects on the economic and social structure of the country. The empirical evidence unanimously indicates that the Southern regions of Finland played an active role in the development of high-tech sectors early on while other areas of the country remained behind. This process, combined with other events, gave way to persistent cross-regional differences in terms of migration flows, productivity, unemployment and income distribution.

Using a novel dataset containing individual information over the period 1995-2005 we show the impact of educational attainment, agglomeration and skill-job match on the wage premium. In so doing the paper contributes various areas of scholarly research. Direct observation of the impact of job-skill mismatches and agglomeration effects, both emblematic symptoms of radical technological change, enriches the existing debate on earning inequality. The finer disaggregation of educational levels adds to previous literature by showing the additional returns accrued by postgraduate degrees and are substantially higher in developed regions, closer to the technological frontier. Our empirical results also confirm the impact of local human capital on earnings, especially for less skilled workers. Finally, the paper captures novel important insights on the importance of job-skill mismatch in explaining an important fraction of the educational premium.

At this point it is important to emphasize some limitations of the current study. First, the data that are available to us contain information on one cohort only, which obviously precludes an appreciation of the inter-temporal aspects of the dynamics analysed here. We are seeking to acquire additional data to disentangle the long-term characteristics of spatial agglomeration and to investigate the extent to which the expansion of higher education has affected intergenerational mobility in Finland. Yet another limitation concerns the lack of information on the sectoral dimension of regions in the data. Before concluding it is worth stressing that the present paper invites reflections on what empirical studies on continental Europe might bring to the debate on the relation between technological change, education and income distribution, a debate so far limited to Anglo-Saxon countries. The inherent diversity of regions within the European Union is perhaps an excellent opportunity to extend the debate further, and we hope that this paper is but the first step in that promising direction.

Acknowledgements.

A preliminary version of this paper was presented at the DIME Workshop on Technology, Skills and Geography held at SPRU, University of Sussex on September 11-12, 2009. On that occasion we benefited from remarks by Ron Boschma, Stefano Breschi and Francesco Quatraro. We are also indebted to Richard Nelson, Cristiano Antonelli, Rita Asplund and Petri Böckerman for useful insights. Finally, we are grateful to the managing editor and three referees for comments and suggestions. Saarivirta acknowledges the financial support of the Jenny and Antti Wihuri Foundation (Saarivirta) and Consoli of the European Commission (FP7-PEOPLE-IEF-2008-235278). The collaboration of Statistics Finland for making data available is also gratefully acknowledged. All remaining errors and omissions are our own.

Appendix

List of Variables

	MALE	1=Male; 0=Female
	EMPL	1=Employed; 0=Otherwise
	Relocate	1=Moved to other city after studying; 0=Otherwise
Education	Vocational Degree	1=Upper Secondary. Vocational. Tertiary; 0=Otherwise
Ref: No Degree	Master's Degree	1=Master's Degree; 0=Otherwise
	PhD	1=PhD; 0=Otherwise
	Graduate	1 = Bachelor's Degree or higher; 0=Otherwise
	Postgarduate	1=Master´s Degree or higher; 0=Otherwise
	Shift Study	1=Completes studies (no change. no dropout); 0=Otherwise
	Years of Education	Average Number of Schooling Years weighted by expected graduation time per university and per field of study
Age	Age_19	
Ref: >25 years	Age_20	
	Age_23	
High-school Mark	HS_mark_low	
Ref: Blanks	HS_mark_ aver	
	HS_mark_high	
Profession	Manager	1=Manager; 0=Otherwise
Ref: Low-Skill Job	Scientist	1=Scientist; 0=Otherwise
	Medical Doctor	1=Medical Doctor; 0=Otherwise
	Engineer	1=Engineer; 0=Otherwise
	Teacher	1=Teacher; 0=Otherwise
	Legal /Business	1=Legal/Business Professionals; 0=Otherwise
	Public Service Professionals	1=Social Scientists. Administrators; 0=Otherwise
	Other Professionals	1=Artists. Clergy. Public Serv; 0=Otherwise
	Medium-Skill Jobs	1=Medium-Skilled Job; 0=Otherwise
Mismatch	Match	1=Perfect occupation-qualification match; 0 otherwise
Helsinki	Helsinki	1=Lives in Helsinki in 2005; 0=Otherwise
Field of study	Education	1=Works in Education; 0=Otherwise
Ref: Agriculture	Humanities	1=Studies Humanities and Arts; 0=Otherwise
	Business/Social Sciences	1=Studied Business. Social Sciences; 0=Otherwise
	Information Science	1= Information Sciences/Hard Sciences; 0=Otherwise
	Engineering	1=Technical Studies. Engineering. Architecture; 0=Otherwise
	Medicine	1=Studied Medicine. Health-Care; 0=Otherwise
	Service	1=Studied Services; 0=Otherwise

Data Treatment

The original sample consists of 9713 observations. Observations with missing earnings were dropped after having checked that missing earnings were not correlated with individual characteristics (i.e. gender. education attainment). Observations with missing earnings also missed working months: when we had data on earnings we imputed the average number of working months of the income class to which the individual belongs. We excluded from the final sample 146 individuals with missing working months and zero earnings. For observations with 'zero' value for working months we assigned a fictitious 0.1 whereas we dropped those with positive income since working is not their main source of earning and they can distort our model specification. Moreover we created a specific category for those with missing job code. Finally we dropped observations where information on degrees was missing. The remaining sample was further reduced to 8787 after excluding earners above the 99% percentile.

Bibliographic references

ACEMOGLU D. and ANGRIST J. (1999) How Large are the Social Returns to Education? Evidence from Compulsory Schooling Laws. NBER Working Papers 7444, National Bureau of Economic Research, Inc.

ACEMOGLU D. (1998) Why Do New Technologies Complement Skills? Directed Technical Change and Wage Inequality. The Quarterly Journal of Economics 113(4): 1055-1089.

AGHION P. and HOWITT P. (1998) Endogenous Growth Theory. Cambridge MA, MIT Press.

ALMEIDA P. and KOGUT B. (1997) The Exploration of Technological Diversity and Geographic Localization in Innovation: Start-Up Firms in the Semiconductor Industry. Small Business Economics 9: 21-31.

ANDERSSON E., ANDERSTIG C. and HARSMAN B. (1990) Knowledge and communications infrastructure and regional economic growth, Regional Science and Urban Economics, 20: 359-376.

ASPLUND R. (1993) Essays on Human Capital and Earnings in Finland. ETLA, The Research Institute of the Finnish Economy, Series A 18, Helsinki, (Ph.D-thesis).

ASPLUND R. (1997) The Disappearing Wage Premium of Computer Skills. The Research Institute of the Finnish Economy, Discussion Papers 619.

ASPLUND R. (2001) Mobility and Earnings. An analysis of Finnish manufacturing and services. ETLA Discussion papers No. 753.

ASPLUND R. and LEIJOLA L. (2005) Education and Wage Inequality in Finland: A Review of the Empirical Evidence. In: ASPLUND R. and BARTH E. (eds.) Education and Wage Inequality in Europe: A Literature Review, ETLA, Helsinki.

ASPLUND R. and LIJLIA R. (2000) Employment and Unemployment in Finnish Manufacturing 1985-95: is Technological Progress the Cause or the Cure? ETLA Discussion Paper 717.

AUTOR, D., LEVY F. and MURNANE R. (2003) The Skill Content of Recent Technological Change: An Empirical Exploration. Quarterly Journal of Economics 118: 1279-1333.

BEESON P. and MONTGOMERY E. (1993) The effects of colleges and universities on local labor markets. *The Review of Economics and Statistics*75, 753-761.

BLEANEY M.F., BINKS M.R., GREENAWAY D., REED G.V. and WHYNES D.K. (1992) What does a university add to its local economy? Applied Economics 24, 305–311.

BLINDER A.S. (1973), "Wage Discrimination: Reduced Form and Structural Estimates", Journal of Human Resources, vol. 8, pp. 436-455.

BLUNDELL R., DEARDEN L., GOODMAN A. and REED H. (1997) Higher Education, Employment and Earnings in Britain. Institute for Fiscal Studies, London.

BÖCKERMAN P. (2002) Understanding Regional Productivity in a Nordic Welfare State: Does ICT Matter? Discussion Papers 798, The Research Institute of the Finnish Economy.

BÖCKERMAN P. (2006) Empirical Studies on Working Hours and Labour Market Flows, Helsinki School of Economics, HSE Print.

BÖCKERMAN P. and MALIRANTA M. (2007) The micro-level dynamics of regional productivity growth: the source of divergence in Finland. Regional Science and Urban Economics 37(2): 165-182.

BOUCHER G., CONWAY C. and VAN DER MEER E. (2003) Tiers of engagement by universities in their region's development. Regional Studies 37 pp. 887–897

BREWER D., EIDE E. and EHRENBERG R. (1999) Does it Pay to Attend an Elite Private College? Cross-Cohort Evidence on the Effects of College Type on Earnings. Journal of Human Resources 34: 104-123.

BROWNRIGG M. (1973) The economic impact of a new university, Scottish Journal of Political Economy 20, 123–139.

CARD D. (1994) Earnings, Schooling and Ability Revisited. NBER Working Papers No. 4832.

CASTELLS M. and HIMANEN P. (2002) The Information Society and the Welfare State. The Finnish Model. Oxford University Press.

CONSOLI D. and ELCHE-HORTELANO D. (2010) Variety in the knowledge base of Knowledge Intensive Business Services. Research Policy 39(10): 1303 – 1310.

DALE S. and KRUEGER A. (2002) Estimating the Payoff to Attending a More Selective College: an Application of Selection on Observables and Unobservables. Quarterly Journal of Economics 117: 491-1527.

DAVERI F. and SILVA O. (2004) Not only Nokia: what Finland tells us about new-economy growth. Economic Policy 38: 117-163.

DEARDEN L. (1999) Qualifications and Earnings in Britain: How Reliable are Conventional OLS Estimates of the Returns to Education? Working Paper No. W99/7. Institute for Fiscal Studies, London.

DUNNE T., FOSTER L., HALTIWANGER J. and TROSKE K. (2004) Wage and Productivity Dispersion In US Manufacturing: The Role of Computer Investments. Journal of Labor Economics 22: 397-429.

ECKSTEIN Z. and NAGYPAL E. (2004) The Evolution of U.S. Earnings Inequality: 1961-2002. Federal Reserve Bank of Minneapolis Quarterly Review, 28 (2): 10-29.

FAGGIAN A. and MCCANN P. (2009) Human capital, graduate migration and innovation in British regions. Cambridge Journal of Economics 33, 317–333.

FAGGIO G., SALVANES K. and VAN REENEN J. (2007) The Evolution of Inequality in Productivity and Wages: Panel Data Evidence. National Bureau of Economic Research Working Paper No. 13351.

FELDMAN, M.P. and AUDRETSCH D.B. (1999) Innovation in Cities: Science-based Diversity, Specialization, and Localized Competition. European Economic Review, 43: 409-429.

FINNISH MINISTRY OF ECONOMIC AFFAIRS (2008) Lappi-työryhmän loppuraportti elinkeinoministerille. Report. In Finnish. Available online at http://www2.eduskunta.fi/fakta/edustaja/483/Lappityoryhman%20loppuraportti031008.pdf

GLAESER E.L., KALLAL H., SCHEINKMAN J. and SHLEIFER A. (1992) Growth in cities. Journal of Political Economy, 100, 1126-1152.

GLAESER E.L. and MARE D.C. (2001) Cities and Skills. Journal of Labor Economics 19(2): 316-342.

GOLDIN C. and KATZ L.F. (2008) The Race Between Education and Technology. Cambridge, MA: The Belknap Press of Harvard University Press.

GREEN F. and MCINTOSH S. (2007) Is there a genuine under-utilization of skills amongst the over-qualified? Applied Economics 39: 427-439.

GUJRATI D.N. (1988). Basic Econometrics. New York: MacGraw-Hill, Inc.

HANELL T., AALBU H., NEUBAUER J. (2002) Regional Development in the Nordic Countries. Nordregio Report.

HÄYRINEN-ALESTALO M., PELKONEN A. TERÄVÄINEN T. and VILLANEN S. (2005) Changing Governance for Innovation Policy Integration in Finland. In: SVEND-OTTO R. (ed.): Governance of Innovation Systems: Volume 2. Case Studies in Innovation Policy. OECD Publishing, Paris: 111-138.

HERZOG H., SCHLOTTMANN A. and JOHNSON D. (1986) High-technology jobs and worker mobility. *Journal of Regional Science* 26, 445-459.

HONKAPOHJA S. and KOSKELA E. (1999) The Economic Crisis of the 1990s in Finland. Economic Policy 29: 401–436.

HONKAPOHJA S., KOSKELA E., LEIBFRITZ W., and UUSITALO R. (2008) Economic prosperity recaptured: the Finnish path from crisis to fast growth. MIT Press.

HOWELLS J. (1986) Industry–academic links in research and innovation: a national and regional development perspective, Regional Studies 20, 472–476.

JUHN C., MURPHY K. and PIERCE B. (1993) Wage inequality and the rise in returns to skill. Journal of Political Economy 101: 410-442.

KANGASHARJU A. and PEKKALA S. (2004) Increasing regional disparities in the 1990s: the Finnish experience. Regional Studies 38: 255–267.

KATZ L.F. and MURPHY K.M. (1992) Changes in Relative Wages, 1963-1987: Supply and Demand Factors. Quarterly Journal of Economics 107(1): 35-78.

KAUTTO M. (2003) Welfare in Finland in the 1990s. Scandinavian Journal of Public Health 31: 1-4.

KIANDER J. (2004a) The Evolution of the Finnish Model in the 1990s: from depression to high-tech boom, VATT Discussion Papers 344, Government Institute for Economic Research, Helsinki.

KIANDER J. (2004b) Growth and Employment in Nordic Welfare States in the 1990s: a tale of crisis and revival, VATT Discussion Papers 336, Government Institute for Economic Research, Helsinki.

KOUVONEN S. and KATAINEN A. (2004) Monien ammattien palkkauksessa on merkittäviä alueellisia eroja. Statistics Finland study (In Finnish). Available online at: http://www.stat.fi/tup/tietoaika/tilaajat/ta_06_04_aluepalkat.html

KRUGMAN P. (1991) Increasing returns and economic geography. Journal of Political Economy 99: 483–499.

KYYRÄ T. (2000) Welfare Differentials and Inequality in the Finnish Labour Market over the 1990s. Recession VATT Research Reports 68.

LOIKKANEN H.A. and LÖNNQVIST H. (2007) Metropolitan Housing Markets: the Case of Helsinki. In: ANDERSSON Å.E., PETTERSON L. and STRÖMQUIST U. (eds.) European Metropolitan Housing Markets. Springer. Berlin.

LOIKKANEN H.A., RIIHELÄ M. and SULLSTRÖM R. (2005) Regional Income Convergence and Inequality in Boom and Bust: Results from Micro Data in Finland 1971–2000. In: D. FELSENSTEIN and B.A. PORTNOV (Eds) Regional Disparities in Small Countries, Springer Berlin Heidelberg: 109-127.

MACHIN S. and VAN REENEN J. (1998) Technology and changes in the skill structure: evidence from seven OECD countries. Quarterly Journal of Economics 113, 1215–1244.

MALECKI E. (1985) Industrial location and corporate organization in high-technology industries. *Economic Geography* 61, 345-367.

MALECKI E. (1991) Technology and Economic Development. Longman Scientific and Technical, Essex.

MALECKI E. and BRADBURY S. L. (1992) R&D facilities and professional labour: labour force dynamics in high technology. Regional Studies, 26, 123-136.

MARTINS P. and PEREIRA P. (2004) Does education reduce wage inequality? Quantile regression evidence from 16 countries. Labour Economics 11: 355– 371.

MORETTI E. (2004a) Human capital externalities in cities. In: J.V. Henderson and J.F. Thisse (ed.) Handbook of Regional and Urban Economics 4: 2243-2291.

MORETTI E. (2004b) Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data. Journal of Econometrics, 121(1-2): 175-212.

NEUBAUER J., DUBOIS T., HANELL K. , LÄHTEENMÄKI-SMITH K. , PETTERSSON J., ROTO J. and MOXNES STEINEKE J. (2007) Regional Development in the Nordic Countries 2007. Stockholm: Nordregio.

NICKELL S. and LAYARD R. (1999) Labor market institutions and economic performance. In: ASHENFELTER O. and CARD D. (eds.), Handbook of Labor Economics, Vol. 3: 3029-3084.

OAXACA R. (1973) Male-Female Wage Differentials in Urban Labor Markets. International Economic Review, vol. 14, pp. 693-709.

OECD (2001) Economic Surveys: Finland.

OECD (2004) Territorial Reviews Helsinki, Finland: Regional Competitiveness with a Special Focus on the ICT Sector. OECD Urban, Rural and Regional Development 4.

OECD (2005) OECD thematic review of tertiary education. Country Background report for Finland.

OECD (2008) Education at a Glance 2008. OECD Indicators.

OLLIKAINEN M. (1997) Luonnonvara- ja ympäristötalous, in LOIKKANEN H., PEKKARINEN J., SIIMES S.A. and VARTIA P. (Ed) Kansantaloutemme – rakenteet ja muutos, Taloustieto Oy, Tammer-Paino Oy, Tampere.

PAIJA L. and ROUVINEN P. (2003) The ICT Cluster in Finland – Can we explain it? In: SCHIENSTOCK G. (ed.), Catching up and forging ahead: The Finnish Success Story. Aldershot: Edward Elgar.

PELKONEN A. (2008) The Finnish Competition State and Entrepreneurial Policies in the Helsinki Region. Research Reports No. 254. University of Helsinki: Department of Sociology.

PIVA M., SANTARELLI E. and VIVARELLI M. (2005) The skill bias effect of technological and organisational change: Evidence and policy implications, Research Policy, 34, 141-157.

RIIHELA M., SULLSTROM R. and TUOMALA M. (2008) Economic Poverty in Finland 1971–2004. Finnish Economic Papers, 21 (1).

ROBINSON P. (1997) The Myth of Parity of Esteem: Earnings and Qualifications. Discussion Paper No. 354. Centre for Economic Performance, London.

ROUVINEN P. and YLÄ-ANTTILA P. (2003) Little Finland's Transformation to a Wireless Giant. In: DUTTA S., LANVIN B. and PAUA F. Global Information Technology Report: Toward an Equitable Information Society. New York and Oxford: Oxford University Press with World Economic Forum.

RUSKOAHO J. (2008) Terveyskeskuslääkäreiden palkkaeroja vuosina 1998-2004 selittävät tekijät Suomessa. ("Income differentials between medical doctors in health centres in 1998-2004"). In Finnish. VATT discussion papers 457, Helsinki.

SAXENIAN A. (1994) Regional Advantage. Culture and Competition in Silicon Valley and Route 128, Harvard University Press, Cambridge, MA/London.

SCHIENSTOCK G. (2004) The Finnish model of the knowledge economy. In: SCHIENSTOCK G. (ed) Embracing the knowledge economy. The dynamic transformation of the Finnish innovation system. Cheltenham: Edward Elgar.

TERVO H. (2005) Regional policy lessons from Finland. In: D. FELSENSTEIN, B.A. PORTNOV (eds.) Regional disparities in small countries. Springer-Verlag, Berlin: 267-282.

USHER A. and CERVENAN A. (2005) Global Higher Education Rankings 2005. Toronto, ON: Educational Policy Institute. http://www.educationalpolicy.org/pdf/Global2005.pdf

UUSITALO R. (1999) Essays in Economics of Education. Research report n. 79, Department of Economics, University of Helsinki. http://www.oecd.org/dataoecd/4/38/37576324.pdf

UUSITALO R. (2002) Changes in the Finnish Wage Structure: Will Demand and Supply Do? Scandinavian Journal of Economics 104(1): 69-85.

VÄLIJÄRVI J. et al. (2002). The Finnish Success in PISA and some reasons behind it. Institute for Educational Research, University of Jyväskylä, Finland.

VARGA A. (1998) *University Research and Regional Innovation: A Spatial Econometric Analysis of Academic Technology Transfers.* Kluwer Academic Publishers, Boston.

VARGA A. (2000) Regional economic effects of university research: a survey. Working Paper, Department for Economic Geography and Geoinformatics, University of Economics and Business Administration, Vienna.

VARTIAINEN J. (2002) Gender Wage Differentials in the Finnish Labour Market, Labour Institute for Economic Research, Discussion Papers 179.

VONA F. and CONSOLI D. (2009) Innovation, Human Capital and Earning Distribution Towards a dynamic life-cycle approach. SENTE *Working Paper Series 27.* Tampere University.

WESTHEAD P. and STOREY D.J. (1995) Links between higher-education institutions and high-technology firms, Omega International Journal of Management Science 23, 345–360.

YLÄ-ANTTILA P. (2005) Finland: an ICT-driven economy. ICT Cluster Finland Review – TIEKE Finnish Information Society Development Centre. http://www.tieke.fi/review2005.pdf

			Popul %			GVA/capita (Eur)			R&D exp (Mln Eur)			Unempl (%)		
Map Code	Region	Capital city	1995	2000	2005	1995	2000	2005	1995	2000	2005	1995	2000	2005
1	Lapland	Rovaniemi	3.94	3.7	3.54	15289	18816	20816	30.40	40.60	52.90	12.71	9.66	7.92
2	North Ostrobothnia	Oulu	7.04	7.11	7.19	14403	19055	23502	183.50	511.00	717.10	9.49	6.5	6.13
3	Kainuu	Kajaani	1.86	1.73	1.62	13379	14465	17379	10.30	14.40	24.00	11.83	9.97	8.76
4	North Karelia	Joensuu	3.46	3.31	3.2	12073	16235	19042	31.60	54.40	65.70	10.98	8.59	7.59
5	Northern Savonia	Kuopio	5.08	4.9	4.76	13552	16855	20434	50.00	85.50	134.00	9.97	7.67	6.09
6	Southern Savonia	Mikkeli	3.37	3.2	3.05	12004	15410	19058	11.10	16.60	28.60	10.36	7.97	6.29
7	South Ostrobothnia	Selinajoki	3.93	3.78	3.69	11553	15674	18921	9.40	25.40	29.70	8.84	5.39	4.53
8	Ostrobothnia	Vaasa	3.4	3.34	3.3	16298	21248	24361	58.70	96.10	85.00	7.15	4.53	3.65
9	Pirkanmaa	Tampere	8.52	8.67	8.89	15384	20550	25325	211.10	633.90	878.50	9.44	6.55	5.71
10	Satakunta	Pori	4.7	4.51	4.38	14689	19927	23239	42.20	60.80	56.30	10.02	7.65	6.38
11	Centr. Ostrobothnia	Kokkola	1.36	1.31	1.35	13090	17541	20399	3.70	9.40	12.50	9.02	6.52	4.89
12	Central Finland	Jyvaskyla	5.14	5.13	5.13	14392	18638	21226	75.90	181.40	223.90	10.26	7.53	6.65
13	Southwest Finland	Salo	8.5	8.63	8.67	16554	21326	25013	219.80	466.10	566.70	8.16	5.3	4.38
14	South Karelia	Imatra	2.73	2.65	2.58	17656	22306	23784	36.30	49.40	81.20	10.21	7.35	6.65
15	Päijänne Tavastia	Lahti	3.88	3.81	3.79	13993	17752	20998	22.00	48.70	51.30	10.78	7.35	6.66
16	Tavastia Proper	Hameenlinna	3.22	3.19	3.2	14471	17178	20944	45.40	48.10	81.70	9.35	6.04	4.97
17	Uusimaa	Helsinki	23.93	25.18	25.8	21383	31480	35406	1102.10	1990.10	2306.90	8.28	4.04	4.15
18	Eastern Uusimaa	Porvoo	1.69	1.73	1.77	16933	18823	25939	---	54.70	43.60	7.55	4.14	3.74
19	Kymenlaakso	Kotka	3.76	3.62	3.52	16759	22951	25786	28.30	34.40	32.80	9.52	7.56	6.13
20	Åland Islands	Mariehamn	0.49	0.5	0.51	20808	27786	33262	0.70	1.70	1.40	3.48	1.04	1.24
	Mean					15230	19747	23369	132.07	230.64	285.31			
	Standard Deviation					2703	4259	4651	268.42	465.39	552.09			
	Mean Standard Error					620	977	1067	67.11	106.77	126.66			

Source: Statistics Finland, Altika Database (R&D Expenditure for Eastern Uusimaa missing from data)

Table 1. Overview of Finland's regions

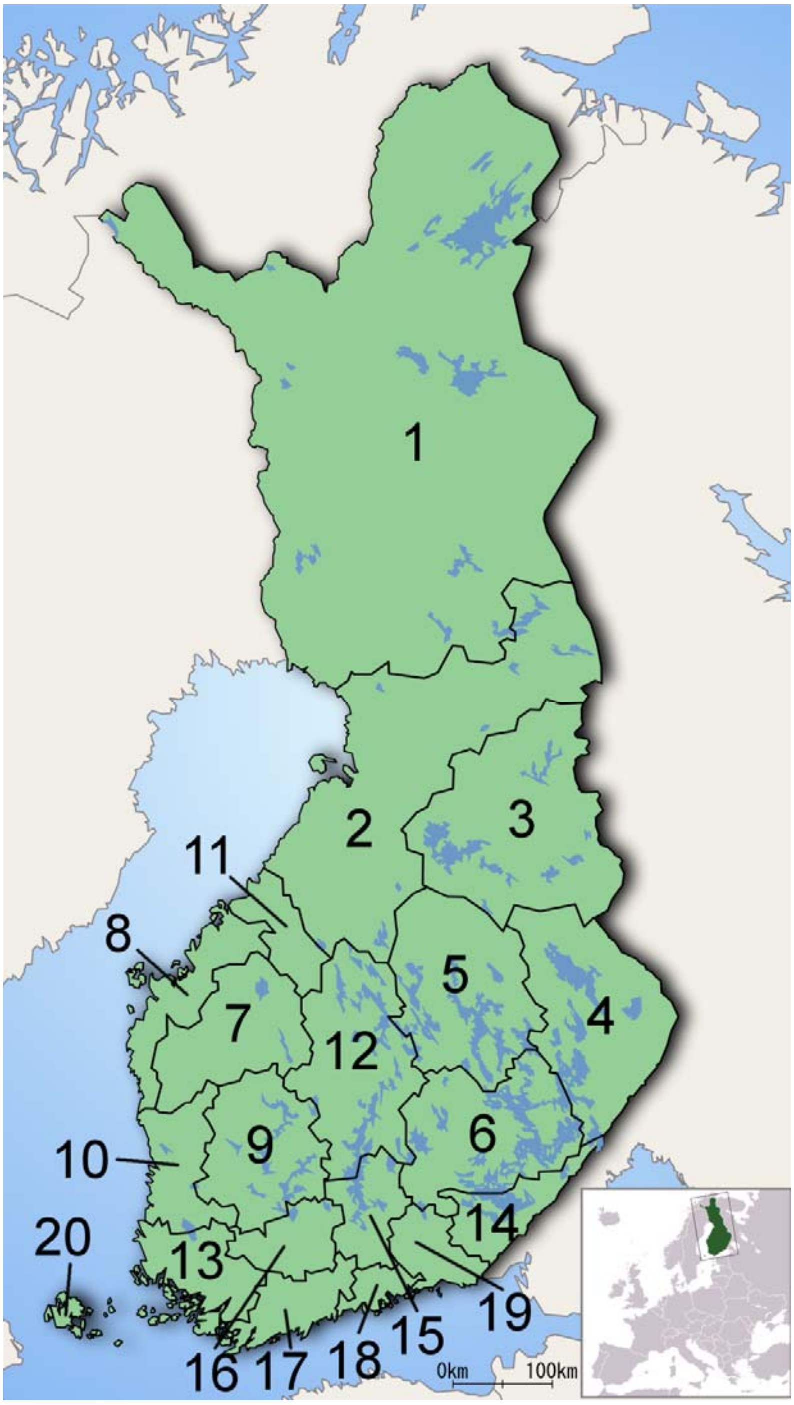

Figure 1. Map of Finland

	Frequencies		
	Tot	Male	Female
N	8787	4292	4495
Employed	8141	4057	4084
Education (%) (Tot=8787)			
No degree	16.17	22.83	9.81
Upper Secondary/Vocational	1.83	2.00	1.67
Lowest tertiary	2.98	2.17	3.76
Upper tertiary	6.67	7.15	6.21
Master's degrees	69.10	62.28	75.62
Doctorate	3.24	3.56	2.94
Field of Degree (%) (Tot=8787)			
No degree	16.17	22.83	9.81
Education	9.50	3.70	15.04
Humanities and Arts	13.12	6.99	18.98
Business and Social Sciences	22.94	20.08	25.67
IT and science	8.96	10.11	7.85
Engineering and Architecture	17.84	29.57	6.65
Agriculture and Forest	2.03	1.84	2.20
Health and Welfare	7.90	3.45	12.15
Services	1.54	1.42	1.65
Occupation (%) (Tot=8141)			
Manager	5.47	7.60	3.33
Scientist	7.6	11.95	3.43
Medical Doctor	4.45	3.39	5.51
Engineer	7.11	11.04	3.17
Teaching	19.46	9.72	29.22
Legal/Business	7.17	8.12	6.21
Public Service	10.47	9.04	11.89
Other Prof	2.83	2.62	2.97
Medium-Skill	15.59	21.32	9.86
Low-skill	3.77	2.59	4.94
Unskilled	16.07	17.53	14.61
Residence (%) (Tot=8787)			
Helsinki	47.75	50.54	45.09
Elsewhere	52.25	49.46	54.91

Table 2. The database

	Helsinki	Elsewhere	Finland
Tot. Residents	4196	4591	8787
Human Capital Indexes			
Postgraduates per Population	0.1	0.05	0.08
Average Educational level	0.46	0.38	0.41
Mobility (%)			
Relocates after degree	37.46	54.43	
Does not relocate after degree	62.54	45.57	
Resident by Field of Study (%)			
Education	5.77	14.31	
Humanities	12.77	13.05	
Business & Social Sciences	27.84	17.90	
Information Sciences	7.58	10.45	
Engineering	17.99	16.90	
Agriculture	2.12	1.86	
Medicine	6.17	10.27	
Services	1.31	1.84	
No Degree	18.45	13.41	
Resident by Occupation (%)			
Manager	6.17	4.77	
Scientist	9.56	5.62	
Medical Doctor	3.93	5.44	
Engineer	6.94	7.24	
Teaching	12.73	27.15	
Legal/Business	10.2	4.02	
Public Service Professional	10.72	10.37	
Other Professionals	3.69	1.84	
Medium-Skill	16.75	14.22	
Clerk	4	3.31	
Unskilled	15.3	16.00	
Average wages (Euros)			
All	3176	2989	3083
Non-Graduates	2699	2428	2563
Graduates	2781	2864	2823
Post-Graduates	3355	3132	3243
Manager	4235	3913	4074
Scientist	3503	3151	3327
Medical Doctor	4196	4300	4248
Engineer	3588	3625	3606
Teaching	2702	2900	2801
Legal/Business	3920	3284	3602
Public Service	2590	2513	2552
Other Professional	2858	2743	2801
Medium-Skill	3326	2955	3140
Clerk	2377	2063	2220
Unskilled	2522	2584	2553
Perfect job-skill Match (%)	43.52	56.48	

Table 3: Descriptive statistics

	Log_Monthly_Wage	(1)	(2)	(3)	(4)	(5)	(6)
	MALE	0.15***	0.148***	0.133***	0.133***	0.128***	0.128***
		(0.009)	(0.009)	(0.010)	(0.010)	(0.025)	(0.01)
Age	Age_19	-0.058***	-0.062***	-0.057**	-0.058***	-0.03	-0.05**
Ref: >25 years		(0.022)	(0.022)	(0.022)	(0.022)	(0.051)	(0.023)
	Age_20	-0.046**	-0.050**	-0.040*	-0.0402*	-0.06	-0.02
		(0.022)	(0.022)	(0.022)	(0.022)	(0.052)	(0.022)
	Age_23	-0.0552***	-0.060***	-0.049**	-0.049**	-0.03	-0.04**
		(0.020)	(0.020)	(0.020)	(0.020)	(0.046)	(0.021)
High-school mark	HS_mark_low	-0.053**	-0.055**	-0.044**	-0.044**	-0.14***	0.002
Ref: Blanks/missing		(0.021)	(0.021)	(0.021)	(0.021)	(0.049)	(0.022)
	HS_mark_aver	-0.042**	-0.047**	-0.043**	-0.043**	-0.1**	-0.01
		(0.020)	(0.020)	(0.020)	(0.020)	(0.046)	(0.021)
	HS_mark_high	-0.04*	-0.049**	-0.044**	-0.044**	-0.12**	0
		(0.021)	(0.021)	(0.021)	(0.021)	(0.049)	(0.022)
	Shift Study	-0.019	-0.022*	-0.039***	-0.038***	-0.07**	0
		(0.013)	(0.013)	(0.012)	(0.012)	(0.034)	(0.013)
	Relocate	0.013	0.021**	0.024***	0.027***	0.029	0.021**
		(0.009)	(0.009)	(0.009)	(0.009)	(0.023)	(0.009)
	Years of Education	-0.025***	-0.028***	-0.007	-0.005	0.01	-0.02***
		(0.006)	(0.006)	(0.008)	(0.008)	(0.018)	(0.008)
Education	Vocational Degree	0.133***	0.129***	0.022	0.0179	-0.09	
Ref: No Degree		(0.033)	(0.033)	(0.052)	(0.052)	(0.121)	
	Master´s Degree	0.376***	0.365***	0.203***	0.194***		
		(0.044)	(0.045)	(0.066)	(0.066)		
	PhD	0.516***	0.527***	0.298***	0.283***		0.131***
		(0.064)	(0.065)	(0.087)	(0.087)		(0.03)
Profession	Manager	0.524***	0.527***	0.497***	0.499***	0.575***	0.387***
Ref: Unskilled jobs		(0.025)	(0.025)	(0.025)	(0.025)	(0.046)	(0.033)
	Scientist	0.351***	0.357***	0.347***	0.348***	0.457***	0.206***
		(0.025)	(0.025)	(0.025)	(0.025)	(0.037)	(0.035)
	Medical Doctor	0.584***	0.592***	0.523***	0.523***	0.575***	0.358***
		(0.029)	(0.029)	(0.036)	(0.036)	(0.087)	(0.046)
	Engineer	0.385***	0.394***	0.338***	0.339***	0.452***	0.221***
		(0.026)	(0.026)	(0.028)	(0.0282)	(0.061)	(0.034)
	Legal/Business	0.422***	0.423***	0.380***	0.382***	0.483***	0.277***
		(0.027)	(0.027)	(0.027)	(0.027)	(0.061)	(0.034)
	Teacher	0.169***	0.187***	0.222***	0.222***	0.131***	0.152***
		(0.023)	(0.023)	(0.024)	(0.024)	(0.049)	(0.031)
	Public Service	0.069***	0.082***	0.068***	0.068***	0.214***	-0.03
		(0.024)	(0.024)	(0.024)	(0.024)	(0.055)	(0.032)
	Other Profess.	0.211***	0.216***	0.249***	0.250***	0.377***	0.12***
		(0.032)	(0.032)	(0.032)	(0.032)	(0.056)	(0.039)
	Medium-skill Jobs	0.286***	0.297***	0.267***	0.266***	0.314***	0.173***
		(0.024)	(0.024)	(0.024)	(0.024)	(0.037)	(0.032)
	Low-skill Jobs	-0.081**	-0.069*	-0.069*	-0.069*	-0.03	-0.13***
		(0.037)	(0.037)	(0.037)	(0.037)	(0.053)	(0.05)
Field of study	Education			-0.008	-0.008	0.223*	-0.07*
Ref: Agriculture				(0.040)	(0.040)	(0.119)	(0.044)
	Humanities			-0.078**	-0.081**	-0.06	-0.09**
				(0.037)	(0.037)	(0.111)	(0.04)
	Business/ Soc.Sci.			0.094***	0.094**	0.145	0.068*
				(0.036)	(0.036)	(0.103)	(0.039)

Information Science			-0.037	-0.040	0.088	-0.06
			(0.037)	(0.037)	(0.121)	(0.039)
Engineering			0.106***	0.102***	0.188*	0.087**
			(0.036)	(0.036)	(0.108)	(0.038)
Medicine			0.114***	0.112***	0.063	0.156***
			(0.041)	(0.041)	(0.106)	(0.046)
Service			0.054	0.053	0.136	0.035
			(0.057)	(0.057)	(0.118)	(0.05)
Match		0.039***	0.024**	0.024**	0.042	0.019
		(0.011)	(0.011)	(0.011)	(0.036)	(0.012)
Helsinki		0.062***	0.056***			
		(0.009)	(0.009)			
HC Region				0.562***	1.005***	0.466***
				(0.110)	(0.278)	(0.111)
Constant	7.846***	7.849***	7.607***	7.375***	7.008***	8.028***
	(0.082)	(0.083)	(0.100)	(0.104)	(0.232)	(0.174)
Observations	8137	8137	8137	8137	2146	5991
F	112.71***	107.61***	92.38***	91.86***	23.65***	74.17***
R-squared	0.2420	0.2473	0.2622	0.2611	0.216	0.249
Root SME	.39781	.39647	.39271	0.39301	0.49521	0.345

Table 4. (Robust Standard Errors in parenthesis)

Legenda: (1) Basic model (Explanatory variables=Age; High-School Mark; Education; Profession);
(2) Basic model + 'Job-skill Match' + 'Helsinki' dummies;
(3) Model (2) plus control variables 'Field of Study';
(4) Basic model (1) + control variables 'Field of Study' + 'Regional Human Capital'
(5) Basic model (1) for low skilled (e.g. Vocational Degree only) + control variables 'Field of Study' + 'Regional Human Capital'
(6) Basic model (1) for high-skilled (e.g. Master and PhDs only) + control variables 'Field of Study' + 'Regional Human Capital'

Log_Monthly_Wage	(1)	(2)	(3)
Baseline PG premium	0.177*** (0.037)	0.174*** (0.037)	0.172*** (0.037)
PG*Suomi	-0.083*** (0.020)	Rich	High H
PG*Satakunta	0.006 (0.025)	Rich	Low H
PG*Tavastia Proper	-0.069 (0.047)	Poor	Low H
PG*Pirkanmaa	-0.0432*** (0.015)	Rich	High H
PG* P. Tavastia	0.022 (0.032)	Poor	Low H
PG*Kymenlaakso	-0.043 (0.035)	Rich	Low H
PG*South Karelia	-0.041 (0.034)	Rich	Low H
PG*South Savonia	-0.057* (0.036)	Poor	Low H
PG*North Ostrobothnia	-0.046* (0.024)	Poor	Low H
PG*North Karelia	-0.025 (0.030)	Poor	Low H
PG*Ostrobothnia	-0.109*** (0.037)	Rich	Med H
PG*Centr. Finland	-0.063*** (0.021)	Poor	Med H
PG*South Ostrobothnia	0.019 (0.033)	Poor	Low H
PG*North Ostrobothnia	-0.004 (0.015)	Rich	Med H
PG*Centr Ostrobothnia	0.030 (0.043)	Poor	Low H
PG*Kainuu	-0.030 (0.049)	Poor	Low H
PG*Lapland	0.032 (0.036)	Poor	Low H
PG*East. Uusimaa	-0.085** (0.034)	Rich	Med H
PG*Aland Islands	0.153* (0.090)	*Ref*	Low H
PG*Helsinki	*Ref*	*Ref*	*Ref*
PG*Below-Average GDP procapite		-0.049*** (0.010)	
PG*Above- Average GDP procapite		-0.030** (0.012)	
PG*High Hum. Cap.			-0.061*** (0.013)
PG*Med. Hum. Cap.			-0.034*** (0.012)
PG*Low Hum. Cap.			-0.024* (0.013)

(Continued below)

POSTGRAD	0.1743***
	(0.0379)
POSTGRAD*Below-Average	-0.0496***
	(0.0105)
POSTGRAD*Above-Average	-0.0304**
	(0.0129)
Ref.Helsinki & Ahvenmaa	
POSTGRAD	0.1743***
	(0.0379)
POSTGRAD*Below-Average	-0.0496***
	(0.0105)
POSTGRAD*Above-Average	-0.0304**
	(0.0129)
Ref.Helsinki & Ahvenmaa	
POSTGRAD	0.1721***
	(0.0379)
POSTGRAD*High	-0.0615***
	(0.0132)
POSTGRAD*Medium	-0.0342***
	(0.0122)
POSTGRAD*Low	-0.0242*
	(0.0133)
Ref: Helsinki	

Table 5. Regional Dispersion in Returns to Post-graduate - different regional groupings

Differential	(1)		(2)		(3)		(4)	
Prediction_1	7.987337	***	7.987337	***	7.987337	***	7.955729	***
	(0.0073786)		(0.0073786)		(0.0073786)		(0.0120399)	
Prediction_2	7.89764	***	7.955729	***	7.929331	***	7.89764	***
	(0.0121632)		(0.0120399)		(0.0116973)		(0.0121632)	
Difference	0.089697	***	0.031608	**	0.058006	***	0.058089	***
	(0.0142263)		(0.014121)		(0.01383)		(0.0171144)	
Endowments								
MALE	0.000825		0.007888	**	0.008114	***	-0.00742	**
	(0.0027537)		(0.0030744)		(0.0026212)		(0.0036683)	
Age_19	-8.6E-05		-0.00469		-0.00164		-0.00036	
	(0.0009925)		(0.0035473)		(0.0057923)		(0.004106)	
Age_20	-0.00081		0.000999		-0.00011		-0.00113	
	(0.0018848)		(0.0013366)		(0.0010106)		(0.0026399)	
Age_23	-9.4E-05		-0.00186		-0.00116		5.95E-05	
	(0.0010629)		(0.0019358)		(0.0013476)		(0.0006802)	
HS_mark_low	0.002784		0.00259		0.001999		-0.00156	
	(0.0017532)		(0.0024375)		(0.0027567)		(0.0016802)	
HS_mark_aver	-0.00103		0.000517		-0.00141		-0.00317	
	(0.0016427)		(0.0011359)		(0.0015256)		(0.0024989)	
HS_mark_high	-0.00625	*	-0.00602		-0.01978	*	0.009103	*
	(0.0034056)		(0.0085391)		(0.0101577)		(0.0048071)	
Shift Study	-0.00141		-3.6E-05		6.24E-05		-0.00168	
	(0.0013615)		(0.000207)		(0.0002603)		(0.0016392)	
Relocate	-5.7E-05		0.002031		-0.03251	**	-0.00019	
	(0.0009139)		(0.0018678)		(0.0134532)		(0.0030538)	
Graduate	-0.00132		-0.00547		-0.00676	*	0.007452	**
	(0.0016012)		(0.0036777)		(0.0039062)		(0.0034337)	
Postgraduate	0.000108		-0.00313	*	-0.00251		0.004117	*
	(0.0012989)		(0.0018596)		(0.0017176)		(0.0024629)	
Manager	0.011533	***	0.007356		0.002597		0.006095	
	(0.0036009)		(0.0055317)		(0.0038979)		(0.0044536)	
Scientist	0.01006	***	0.012882	***	0.018988	***	0.000162	
	(0.0033137)		(0.0047957)		(0.0052873)		(0.0037419)	
Medical Doctor	-0.00487		-0.02485	***	-0.00127		0.01274	**
	(0.003831)		(0.0072497)		(0.0042996)		(0.0057157)	
Engineer	-0.00891	**	-0.00231		0.002759		-0.0073	
	(0.0039789)		(0.0056987)		(0.0028537)		(0.0049147)	
Legal/Business	0.019271	***	0.04181	***	0.017795	***	-0.00609	*
	(0.0046251)		(0.0072638)		(0.0051557)		(0.0031848)	
Teacher	-0.01372	***	-0.0679	***	-0.05925	***	0.022869	***
	(0.0037992)		(0.0135046)		(0.0144543)		(0.0059981)	
Public Service	-0.0007		0.002057		0.001099		-0.00145	
	(0.0010856)		(0.0030964)		(0.0014691)		(0.0014588)	

Other Profess.	0.003157	**	0.009836	***	0.00353	**	-0.00233	*
	(0.001521)		(0.0027714)		(0.0017714)		(0.0013945)	
Medium-skill Jobs	-0.0009		0.007992		0.009837	**	-0.00535	
	(0.0032298)		(0.0063376)		(0.004092)		(0.0041642)	
Low-skill Jobs	0.000597		0.000876		-1.7E-05		0.003736	*
	(0.0012889)		(0.0016626)		(0.0001604)		(0.0022142)	
Match	-0.00158		-0.0024		-0.00308	*	0.001406	
	(0.0013156)		(0.0018223)		(0.0016094)		(0.0012832)	
Total	0.006613		-0.02184	**	-0.06272	***	0.02971	***
	(0.0087906)		(0.0105045)		(0.0165437)		(0.0104939)	
Coefficients								
MALE	-0.01692		-0.01182		0.029018	**	-0.00411	
	(0.0138576)		(0.0121903)		(0.0117307)		(0.01607)	
Age_19	-0.03585		-0.00311		-0.01873		-0.03194	
	(0.0226792)		(0.0188997)		(0.014726)		(0.0292582)	
Age_20	-0.00705		0.004198		-0.01167		-0.01048	
	(0.01304)		(0.016009)		(0.0132687)		(0.0165122)	
Age_23	-0.01998		-0.00548		-0.00839		-0.01423	
	(0.0163223)		(0.0156166)		(0.0147551)		(0.0205378)	
HS_mark_low	0.00808		0.00182		-0.00215		0.006423	
	(0.0089739)		(0.0105347)		(0.0107669)		(0.011481)	
HS_mark_aver	0.027096		0.001371		0.021283		0.025842	
	(0.0172999)		(0.0203622)		(0.0162836)		(0.0226312)	
HS_mark_high	0.030276		0.003953		0.017153		0.025211	
	(0.0225527)		(0.0197481)		(0.0140445)		(0.0304591)	
Shift Study	0.00163		-0.00462		-0.00447		0.004971	
	(0.0047592)		(0.0056008)		(0.0051157)		(0.0052171)	
Relocate	0.012371		0.026844	**	-0.03043		-0.00692	
	(0.0090352)		(0.0112674)		(0.0270303)		(0.0102717)	
Graduate	-0.1087	**	-0.07346		-0.09176		-0.04003	
	(0.0512272)		(0.0559688)		(0.0587534)		(0.060194)	
Postgraduate	0.074918	*	0.095687	***	0.068101	*	-0.01549	
	(0.0386523)		(0.0366758)		(0.0371659)		(0.0413777)	
Manager	-0.0016		-0.01221	**	-0.00242		0.008034	*
	(0.0028288)		(0.0048798)		(0.0048218)		(0.0041734)	
Scientist	-0.00399		-0.01232	*	-0.00037		0.008265	
	(0.0045277)		(0.0063552)		(0.0037921)		(0.006764)	
Medical Doctor	-0.00521		-0.02491	***	-0.00873	**	0.012237	**
	(0.0039258)		(0.0070184)		(0.0036933)		(0.0052927)	
Engineer	-0.01493	**	-0.02741	***	-0.00486		0.018243	**
	(0.0066108)		(0.0071662)		(0.0052784)		(0.0091393)	
Legal/Business	0.002499		-0.00751	**	0.005677		0.013218	**
	(0.0043806)		(0.0036523)		(0.0040147)		(0.0061608)	
Teacher	-0.03486	***	-0.11004	***	-0.08091	***	0.037346	**
	(0.0113729)		(0.0248036)		(0.0258349)		(0.0171549)	

Public Service	-0.0131 *	-0.0317 ***	-0.01539 *	0.02257 **
	(0.0070979)	(0.0092669)	(0.0084297)	(0.0107624)
Other Profess.	-0.00182	-0.00358 **	-0.003	0.004377
	(0.0021584)	(0.0016165)	(0.0025212)	(0.0028515)
Medium-skill Jobs	-0.00227	-0.03834 ***	0.007448	0.040576 **
	(0.0101699)	(0.0132295)	(0.0105665)	(0.0157543)
Low-skill Jobs	0.006564	-0.00317	-0.00202	0.011875 *
	(0.0048281)	(0.0032465)	(0.0042108)	(0.0065182)
Match	-0.00909	-0.00482	-0.0201	-0.00454
	(0.0198863)	(0.017626)	(0.0181872)	(0.022235)
Constant	0.173613 ***	0.261065 ***	0.186249 **	-0.08745
	(0.0666567)	(0.0891793)	(0.0943385)	(0.0984937)
Total	0.061701 ***	0.020426	0.029517 **	0.023996
	(0.0127542)	(0.0124654)	(0.0143609)	(0.016235)
Interaction				
MALE	-0.00015	-0.00111	0.006652 **	0.000319
	(0.0005024)	(0.0012128)	(0.0028743)	(0.0012585)
Age_19	0.001772	-0.00061	-0.00837	0.006544
	(0.0018112)	(0.0036994)	(0.0066514)	(0.0061981)
Age_20	-0.00112	-0.00022	-0.00101	-0.00235
	(0.002125)	(0.0008754)	(0.0013357)	(0.0037914)
Age_23	-0.00146	-0.00069	-0.00078	0.000664
	(0.0015452)	(0.0019894)	(0.001437)	(0.0013062)
HS_mark_low	-0.00142	-0.00045	0.00062	0.000632
	(0.0016682)	(0.0026267)	(0.0031149)	(0.0012803)
HS_mark_aver	0.000818	-7.9E-05	0.001065	0.002403
	(0.0013582)	(0.0011718)	(0.0013068)	(0.0026194)
HS_mark_high	0.004557	0.001873	0.013985	-0.00553
	(0.0035893)	(0.0093591)	(0.0114737)	(0.0067883)
Shift Study	0.000523	0.000205	-0.00027	0.001901
	(0.0015329)	(0.0004227)	(0.0004508)	(0.0020687)
Relocate	0.001449	-0.00529 **	0.016589	-0.00271
	(0.0011791)	(0.0024075)	(0.0147421)	(0.0040388)
Graduate	0.001343	0.005649	0.006934	-0.0028
	(0.0016699)	(0.0044109)	(0.0045799)	(0.0042624)
Postgraduate	0.000114	-0.00514 *	-0.00208	-0.0009
	(0.001381)	(0.0026503)	(0.001664)	(0.0024435)
Manager	-0.00081	-0.0023	-0.0002	0.002149
	(0.0014483)	(0.0019224)	(0.00049)	(0.0018967)
Scientist	-0.00146	-0.00442	-0.0005	4.88E-05
	(0.0017137)	(0.0026877)	(0.0051766)	(0.0011287)
Medical Doctor	0.000852	0.01032 ***	0.000367	0.005237 *
	(0.0009189)	(0.0039214)	(0.0012525)	(0.0031621)
Engineer	0.003162	0.00127	-0.00056	-0.00317
	(0.0019297)	(0.0031456)	(0.0008278)	(0.0026129)

Legal/Business	0.002362		-0.01334	**	0.007408		-0.00395	
	(0.004148)		(0.0063548)		(0.0052427)		(0.0026295)	
Teacher	0.01096	***	0.060536	***	0.049675	***	0.019569	**
	(0.0040701)		(0.0143821)		(0.0160726)		(0.0094783)	
Public Service	0.000701		-0.00206		-0.00111		-0.00251	
	(0.0011172)		(0.0031153)		(0.0015013)		(0.0025774)	
Other Profess.	-0.00104		-0.00616	**	-0.00155		-0.00185	
	(0.0012761)		(0.0026182)		(0.0014101)		(0.0014878)	
Medium-skill Jobs	4.01E-05		-0.00374		0.002633		-0.00426	
	(0.0002304)		(0.0031825)		(0.0037797)		(0.0036385)	
Low-skill Jobs	-0.00042		-0.0018		-8.2E-05		-0.00478	
	(0.0009427)		(0.0019292)		(0.0003454)		(0.0031625)	
Match	0.000614		0.000581		0.001782		-0.00027	
	(0.0013623)		(0.0021278)		(0.0016856)		(0.001346)	
Total	0.021383	***	0.033024	***	0.091206	***	0.004382	
	(0.0060075)		(0.0084301)		(0.017366)		(0.0079222)	
N	5498		5115		5404		2733	

Legenda

Model (1) Helsinki vs high Human Capital regions
Model (2) Helsinki vs high-medium Human Capital regions
Model (3) Helsinki vs medium Human Capital regions
Model (4) High Human Capital vs med-high Human Capital regions

Table 6. Oaxaca Blinder Decomposition

---

1 See also Daveri and Silva (2004) for a critical view of the impact of ICTs on economic expansion in Finland, as well as the critique towards the social model that emerged in association with ICT-related growth by Pelkonen (2005) and Häyrinen-Alestalo et al. (2005).

2 Böckerman and Maliranta (2007) attribute high union participation to the fact that membership fees are tax deductible and to the involvement of the unions in the administration of unemployment insurance benefits.

3 See data treatment in Appendix.

4 This representative sample accounts for 52% of all university entrants in 1995. See the appendix for details on data cleaning and treatment of missing data.

5 http://www.ilo.org/public/english/bureau/stat/isco/index.htm

6 This method is appropriate in a context like Finland where educational programs have a manifest occupation-specific content (Asplund, 1993). Note that this measure of job-skill mismatch includes both over-educated workers as well as cases of perfect match. In a companion paper we analyse over-educated and perfect match separately and observe that results remain robust. For those observations listed as 'not employed' it is not possible to check for a mismatch we assign 1 if the educational attainment is higher than the minimum level and 0 otherwise. In future research we seek to disentangle the effect of over-(under-)education from that of qualitative match.

7 The index is obtained by assigning to the human capital of those with secondary education ½ of the human capital of the graduate, whereas we weight 1.5 the human capital of the postgraduates and 0 the human capital of those with less than secondary education. Similar arbitrary scores are

widely used in the literature (e.g. Katz and Murphy, 1992) as they stress more than, for example, the average of the years of education required to attend a degree the difference associated to the attainment of a high qualification. Our results remain robust to different human capital indexes such as the weighted years of education.

8 Medium-High Skill Occupations include specialised professionals, like Matrons and ward sisters, Archivists, Librarians, as well as generic ones like Science associate professionals and technicians, Computer associate professionals, Instructors, Entertainment and sports professionals. Low-skill occupations include trades workers, painters, cleaners, metal workers, machinery mechanics and fitters, plant operators, machine operators, assemblers, drivers, caretakers, labourers and handlers.

[9] Gender, age, High-School mark, proxy for tenure.

[10] The percentage values are calculated from the antilog of parameter estimates $(e^b-1)*100$, where b is the estimated coefficient in the log earnings equation. For further details see Gujrati (1988).

[11] This result is sensitive to how occupations are grouped, indeed in an alternative specification with broader occupational classes (e.g. Managers, all Professionals, Medium-Skill Jobs, etc) the wage gap between professionals and medium skill jobs disappears. The finer specification employed here captures important details, namely the lower wage premium of some professional occupations compared to that of medium-skilled jobs. These alternative estimates are available by the authors. Note that the category 'medium skilled jobs' consists essentially of associate professionals.

[12] We tried to control for the industry composition of regions to check the effect on wages independent from that captured by the skill composition of the labour force, i.e. our human capital index. Using Statistics Finland data we regressed a variation of the baseline model (Table 4,

column 1) that includes employment shares for public sector, private services and high-medium tech manufacturing. This, however, did not affect our results. On one hand, the share of employees in private services is highly correlated with the human capital index; on the other hand, the data available to us do not capture high-tech manufacturing and the ICT sector in each region in detail (like e.g. Böckerman, 2002). These additional regressions are available upon request. As for the share of private services, it is very likely that also the sectoral employment in high tech manufacturing is highly correlated with variables included in the regressions, such as the human capital index, the share of top occupations and that of postgraduates. We suspect that even if more refined information were available, our dataset would not be appropriate to disentangle the sectoral-composition effect from the agglomeration effect. A correct identification would require time-varying information on the evolution of these effects. We thank an anonymous referee for pointing out this issue.

[13] The regression with an alternative measure of Human Capital (share of Postgraduates in a region) produces broadly similar results. Estimates are available by the authors.

[14] The Åland Islands is an autonomous, Swedish-speaking archipelago in the Baltic Sea. It is the smallest region of Finland, with a population share of just 0.50%.

[15] This methodology is not as robust as it would be for comparing groups that are purely exogenous, like male and female, but can nevertheless elucidate broader differences in local labour markets.

16 Looking at medical doctors, Kouvonen and Katainen (2004) and Ruskoaho (2008) find that the wage premium for residents in areas where there is no faculty of medicine is higher, due to the local paucity of physicians. A recent report for the Finnish Ministry of Economic Affairs (2008) resonates with these results and emphasises the resistance of medical doctors and teachers to relocate in North Finland due to the geography and the climate of the areas.