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**SKILL DISTRIBUTION OF RECRUITS
IN FINNISH INDUSTRY**

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ABSTRACT: In this paper we have analysed skill distribution of recruits in Finnish industry in the 1980's and 1990's. Our analyses are based on a sample of white-collar recruits that is based on data set gathered by the Confederation of Finnish Industry and Employers (TT). Our results show that between the years 1983-1986 about 25 per cent of recruits in Finnish industry had a university education whereas between the years 1995-1996 as many as 39 per cent of recruits had equivalent education. The share of recruits with only a basic education has more than halved over the 14-year observation period. An overall upgrading of skills has been occurring in Finnish industry but the upgrading process has varied among different industries and among small, medium-sized and large firms.

KEY WORDS: labour turnover, recruitment

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TIIVISTELMÄ: Tässä tutkimuksessa tarkastellaan uusien, rekrytoitujen toimihenkilöiden osaamistason kehittymistä 1980- ja 1990- luvulla Suomen teollisuudessa. Empiiriset analyysit perustuvat Teollisuuden ja Työnantajain Keskusliiton (TT) keräämään palkka-aineistoon. Tuloksemme osoittavat, että vuosina 1983-1986 noin 25 prosentilla rekrytoituista oli yliopistotason koulutus, kun taas vuosina 1995-1996 jo 39 prosentilla oli vastaava koulutustaso. 14-vuoden tutkimusajanjaksolla pelkän peruskoulun käyneiden osuus rekrytoituista on puolittunut. Teollisuusyrityksissä osaamistaso on noussut voimakkaasti, mutta osaamistaso on kehittynyt eri tavoin eri toimialoilla ja eri kokoisissa yrityksissä.

AVAINSANAT: työvoiman vaihtuvuus, rekrytoinnit

1 Introduction

Changes in economic environment require different types of adjustments from firms. We know, for example, that job turnover reacts markedly to changes in the business cycle. The job turnover can provide important information on the functioning of the labour market and on the nature of the matching of workers to jobs.¹ In this paper we study a phenomenon that is related to job turnover; recruitment.² In particular, we focus on the development of skill distribution of recruits over time. To do this we use information on white-collar workers in Finnish industry over the period 1983-1996, during which Finnish economy experienced accelerating growth, deep economic slump and gradual recovery.

Different types of firms may follow different personnel strategies and they may react differently to changes in economic environment. New jobs are the first to reflect required changes in the labour market. It is, therefore, interesting to look at recruits in a more detailed fashion. Previous studies have shown that recruitment policies vary substantially in different industries and in firms of different sizes.³ In this paper we study to what extent these differences are present in Finnish industry. In particular, we focus on differences in required skill-levels from recruits.

To evaluate industry and firm size differences in the skill distribution we use in subsequent analysis results from logit model estimations. This makes it possible that in calculating skill distributions in different industries and different sized firms the effects of other background variables (such as age and gender) are kept constant. By controlling for

¹ See Jovanovic (1979), Oi (1962), or Becker (1962).

² In our analyses recruits include those employees who are new hires (external recruits) and those employees who have changed jobs within the firm (internal recruits). Thus, our concept of recruitment is broader than would be specified by mere new hires. This broader concept is more suited than that of new hires when we want to focus on skill requirements of new jobs. This concept is useful also in that respect that it does not depend on changes in external and internal recruitment strategies of firms.

³ See e.g. Anderson and Meyer (1994).

the effect of other variables in this way we can, thus, get “pure” industry and firm-size effects on the skill distributions, which do not depend on age and gender differences. This guarantees that our results reflect real strategy differences which firms in different industries and of different sizes follow in their personnel policies rather than other features in the labour market.

2 Data and empirical model

To model how recruitment strategies vary in Finnish industry we focus on studying the probability that a recruit (either internal or external) comes from a certain educational level and on how this probability changes with different background factors. The data set has been gathered by the Confederation of Finnish Industry and Employers (TT) during the period 1980-1996. The sample is restricted to white-collar workers. It can be regarded to be representative in manufacturing sector. In subsequent empirical analyses we focus on four periods that roughly correspond to different phases of the business cycle in Finnish economy:

- 1) Steady growth during the years 1983-1986.
- 2) Accelerating growth during the years 1987-1990.
- 3) Deep recession during the years 1991-1994.
- 4) Gradual recovery during the years 1995-1996.

The sample of individuals to be included in empirical analyses is restricted to new hires and to those who changed jobs within their current employer. Summing up the number of external and internal recruits gives us the sample of recruits to be analysed in subsequent sections. In Table 1 the number of recruits and their relative share with respect to all jobs are reported for the four observation periods.

It appears from Table 1 that the number of recruits were highest (in relative terms) during the period of accelerating growth 1987-1990 and lowest during the recession 1991-1994. This is expected since creation of jobs is generally found to be procyclical.⁴

Table 1. Sample size

	Number of recruits	Relative share of recruits
		%
1983-1986	5996	16
1987-1990	8323	21
1991-1994	4755	15
1995-1996	3073	19

In modelling the probability that a recruit has a certain educational level multinomial logit model is used. The model is based on the assumption that choices between different educational levels are independent from one another. We allow for three basic educational choices:

- 1) Recruit has only a basic education.⁵
- 2) Recruit has secondary education.
- 3) Recruit has a university education.

The probability that a recruit j with an educational level s ($s = 2, 3$) is chosen can be written as follows:

$$(1) \quad \Pr(I_j = s) = \frac{\exp(z_j \alpha_s)}{1 + \sum_{k=2}^3 \exp(z_j \alpha_k)},$$

where z_j represents the vector of factors that influence the probability that a j th individual with an educational level s is recruited, α_s represents vector of parameters for choice s . In

⁴ See Anderson and Meyer ((1994).

⁵ If there was no information on the educational level of the recruit we have included them into this group.

order to identify the parameters transition $s=1$ is chosen as a base case i.e. it is assumed that $\alpha_1=0$. The model is estimated using maximum likelihood method.

Both demand side and supply side factors influence the above probabilities. Therefore, the estimated multinomial logit model can be regarded as a reduced form model capturing the combined effect of both types of factors. The included background variables are as follows:

Individual characteristics:

- 1) Age
- 2) Gender

Firm characteristics:

- 3) Industry
- 4) Firm size.

In estimations the chosen variables appeared to be statistically highly significant explanatory factors for the observed skill choices.⁶ The null hypotheses that the explanatory variables do not have any influence on the observed probabilities were strongly rejected in all samples. This is also reflected in the high values of t-statistics that most of the variables received in estimations. Let us next discuss these results in more detail.

3 Results

Our results suggest that a major upgrading of skills have taken place in Finnish industry over the observation period. This can be seen from Table 2, which gives an overall picture of the skill distribution of recruits during the four observation periods. Figures presented in the table are calculated from the estimation results of the logit models and

⁶ More detailed information about the results are available from the authors.

are evaluated at the mean values of explanatory variables and, thus, represent average shares in all samples.

It appears from Table 2 that between the years 1983-1986 about 25 per cent of recruits (either internal or external) had a university education whereas between the years 1995-1996 as many as 39 per cent of recruits had equivalent education. The share of recruits with only a basic education has more than halved over the 14-year observation period. The share of recruits with secondary education has remained over 50 per cent but this share have been decreasing due to the fact that employees with secondary education have to an increasing extent been replaced by those with a university education.

Table 2 gives us an overall picture of changes in the job creation patterns over time. It does not, however, reveal how and to what extent different types of firms have adjusted their personnel strategies during the observation period. In this section we focus on two firm-level characteristics in this process; industry and firm size. In subsequent analyses the probability that a recruit has a certain educational background is calculated using estimation results from logit models which are presented in Appendices 1-4.

Table 2. Skill distribution of recruits

	Basic education	Secondary education	University education
	%	%	%
1983-1986	15.8	59.6	24.6
1987-1990	16.1	58.1	25.8
1991-1994	12.9	55.4	31.6
1995-1996	7.1	53.9	39.0

In evaluating industry and firm size differences in the skill distribution we have used in our logit model calculations mean values for other background variables, thus, keeping their effect on the skill distribution constant. By controlling for the effect of other background variables in this way we can, thus, get “pure” industry and firm size skill distributions. These skill distributions can be regarded as marginal distributions, which do not include the effects that the other control-variables have on the probability that a certain skill group is recruited.

Industry effects

Has the overall strategy of recruiting more and more skilled employees into new vacancies been similar in all industries or have different industries applied different strategies over the years? Let us first see how skill distribution of recruits varied among different industries during the period 1983-1986 (Table 3).⁷

Table 3. Skill distribution of recruits by industry, 1983-1986

Industry	Basic education	Secondary education	University education
	%	%	%
Graphic	20.7	66.0	13.3
Chemical	16.6	53.7	29.7
Consultant	9.9	43.3	46.8
Metal	13.4	55.6	31.0
Forest	17.6	61.5	20.9
Construction	9.9	69.6	20.5
<i>Overall</i>	<i>15.8</i>	<i>59.6</i>	<i>24.6</i>

It appears from Table 3 that there are marked differences between the skill distributions in different industries. During 1983-1986 in the graphic industry there was almost 21 per cent probability that a recruit⁸ was unskilled (had only a basic education) whereas among consultants and in construction this probability was only half of that, 10 per cent. In graphic industry and in construction a recruit was more likely, than in other industries to have a secondary education. However, the highest skill requirements were among consultants: in this group there was a 47 per cent chance that a recruit had a university education. It appears that skill requirement levels were high also in metal and chemical industries in which there was about thirty per cent chance that a recruit had a university education.

⁷ These figures are calculated at the mean values of other variables in the respective logit model.

⁸ ...whose other characteristics were at mean values (mean age, gender, firm size)...

During the years 1987-1990, when the economy was growing fast, the general pattern in skill distribution of recruits appears to remain, to a large extent, unaltered (Table 4).⁹ Compared with the previous four-year period some skill upgrading occurred in all industries. However, the probability that the industry recruits an unskilled employee increased in graphic and metal industry and in construction, most likely due to shortages in the supply of skilled employees in the tight labour markets.

Among consultants the probability that a recruit had a university education exceeded 50 per cent. In forest industry there was only 18 per cent chance that a recruit had a university education but almost 70 per cent chance that he or she had a secondary education.

Table 4. Skill distribution of recruits by industry, 1987-1990

Industry	Basic education	Secondary education	University education
	%	%	%
Graphic	22.4	60.0	17.7
Chemical	15.9	52.9	31.2
Consultant	8.1	37.3	54.5
Metal	14.5	53.2	32.4
Forest	13.2	69.1	17.7
Construction	11.0	67.6	21.4
<i>Overall</i>	<i>16.1</i>	<i>58.1</i>	<i>25.8</i>

Between the years 1991-1994 the Finnish economy plunged into a deep recession. During that period a chance to be recruited among the unskilled dropped in all industries (Table 5). For example, there was only a five per cent chance that consultants recruited a person with only a basic education. On the other hand, among consultants almost 65 per cent of those who had a chance to be recruited had a university education. Overall the probability that recruits had a university education was as high as 32 per cent.

⁹ These figures are calculated at the mean values of other variables in the respective logit model

Table 5. Skill distribution of recruits by industry, 1991-1994

Industry	Basic education	Secondary education	University education
	%	%	%
Graphic	18.6	65.1	16.3
Chemical	7.8	55.3	36.9
Consultant	4.9	30.7	64.4
Metal	12.2	49.5	38.3
Forest	10.3	66.8	22.9
Construction	7.5	58.3	34.3
<i>Overall</i>	<i>12.9</i>	<i>55.4</i>	<i>31.6</i>

During the period 1995-1996 gradual recovery from recession started in Finland. The number of new jobs in Finnish industry began to rise. It appears that the revived economic growth required further upgrading of skills (Table 6). Only among consultants the probability that a recruit had a university education dropped, in all other industries this probability rose markedly. During recession the proportion of university graduates among recruits rose sharply among consultants. It appears that due to this it was not as necessary among consultants to increase the share of university graduates among recruits than in other industries when new jobs were created along with the growing economy.

Table 6. Skill distribution of recruits by industry, 1995-1996

Industry	Basic education	Secondary education	University education
	%	%	%
Graphic	13.6	57.4	29.0
Chemical	3.6	47.8	48.6
Consultant	2.4	44.8	52.8
Metal	7.3	46.2	46.5
Forest	6.3	60.1	33.6
Construction	3.0	61.1	35.9
<i>Overall</i>	<i>7.1</i>	<i>53.9</i>	<i>39.0</i>

Table 6 also reveals that it is less and less likely for a person with only a basic education to be recruited to a new vacancy in Finnish industry. In construction this probability is only 3 per cent which is less than third of the propensity that an average person would have had during the years 1983-1986.

Firm size effects

Let us study next whether small, medium sized or large firms have followed different personnel strategies what comes to the educational level of recruits over the observation period.¹⁰ As was the case in studying the industry effects subsequent analyses on firm size are based on the estimation results of the multinomial logit model in which the effect of other factors have been controlled for. The figures to be presented below are evaluated at the mean values of age-, gender-, and industry indicators.

In Table 7 skill distribution of recruits by firm size is presented for the period 1983-1986. It appears from the table that there was a 34 per cent chance that a large firm recruited a person with university degree. For a small firm the corresponding figure was half of that, 17 per cent. A person who was recruited by a small firm had secondary degree with 65 per cent probability. In large and medium sized firms there was only 14 per cent chance that a recruit to a new vacancy had basic education.

Table 7. Skill distribution of recruits by firm size, 1983-1986

Firm size	Basic education	Secondary education	University education
	%	%	%
Small	18.1	64.9	17.0
Medium	14.9	58.7	26.4
Large	14.1	51.7	34.2
<i>Overall</i>	<i>15.8</i>	<i>59.6</i>	<i>24.6</i>

During the period of accelerating growth in Finnish economy firms adjusted their personnel strategies. Table 8 shows that only in small firms rapid growth meant upgrading of skills. The chance that a recruit had university degree rose to 32 per cent in small firms. In large and medium sized firms there was a higher probability than before that a recruit had either a secondary education or no vocational education at all. It appears that the tight labour markets provided job opportunities in medium sized and

large firms even to those who previously had smaller chances to obtain a job due to lack of skills.

Table 8. Skill distribution of recruits by firm size, 1987-1990

Firm size	Basic education	Secondary education	University education
	%	%	%
Small	14.9	53.6	31.5
Medium	17.8	63.2	19.0
Large	15.7	57.0	27.3
<i>Overall</i>	<i>16.1</i>	<i>58.1</i>	<i>25.8</i>

The deep recession in years 1991-1994 required further adjustments from firms. The number of recruits dropped. Table 9 shows that all firms, no matter their size, upgraded their skills through recruits. In small firms there was a 40 per cent chance that a recruit had a university education. In medium sized firms and large firms corresponding figures were 28 and 31 per cent. A person with no vocational education had only a small chance (11-14 per cent) to be recruited during this observation period.

Table 9. Skill distribution of recruits by firm size, 1991-1994

Firm size	Basic education	Secondary education	University education
	%	%	%
Small	10.6	49.7	39.7
Medium	13.8	58.8	27.5
Large	13.4	55.8	30.8
<i>Overall</i>	<i>12.9</i>	<i>55.4</i>	<i>31.6</i>

The gradual recovery from recession meant further upgrading of skills. It appears from Table 10 that during the years 1995-1996 there was only a 7 per cent chance that a recruit had only a basic education and nearly a 40 per cent chance that he or she had university degree. Medium sized firms required more than the others recruits with a secondary education.

¹⁰ Small firms belong to the smallest 25 per cent; medium sized firms to the next 26-75 per cent; and large firms to the highest 25 per cent in the size distribution of firms in our sample.

Table 10. Skill distribution of recruits by firm size, 1995-1996

Firm size	Basic education	Secondary education	University education
	%	%	%
Small	6.7	52.3	41.0
Medium	7.7	58.6	33.6
Large	7.1	53.0	39.9
<i>Overall</i>	<i>7.1</i>	<i>53.9</i>	<i>39.0</i>

4 Summary

In this paper we have analysed skill distribution of recruits in Finnish industry in the 1980's and 1990's. Our analyses are based on a sample of white-collar workers that is based on a data set gathered by the Confederation of Finnish Industry and Employers (TT). We have shown that an overall upgrading of skills has been occurring in Finnish industry but that the upgrading process has varied among different industries and among small, medium-sized and large firms.

Our results show that between the years 1983-1986 about 25 per cent of recruits in Finnish industry had a university education whereas between the years 1995-1996 as many as 39 per cent of recruits had equivalent education. The share of recruits with only a basic education has more than halved over the 14-year observation period.

Among consultants the skill requirements of recruits were the highest at all times. In particular, during 1991-1994, when Finnish economy plunged into a deep recession, consultants reacted more strongly than others did. In this industry the probability that a recruit had university degree was then almost 65 per cent when it was, on average, only 32 per cent. The skill requirement levels have also been higher than average in chemical and metal industries. Secondary education is in highest demand in forest industry and in construction. A person with no vocational training had the best chances of being recruited to a new vacancy in graphic industry. Between the years 1995-1996 for an unskilled

person in graphic industry the probability of being recruited was 14 per cent whereas it was, on average, only 7 per cent.

In the early 1980's it was the large and medium-sized firms that required high skill levels from their recruits. During 1983-1986 the probability that a recruit had a university education was 34 per cent in large firms and only 17 per cent in small firms. However, in later years the situation changed when the overall upgrading of skills took place also in small firms. Between the years 1995-1996 there was already a 41 per cent chance that a recruit had university degree in small firms. In large firms the corresponding figure was nearly the same, 40 per cent. Medium-sized firms preferred more than the other firms secondary education in their internal and external recruitment.

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