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Is Training More Frequent when Wage Compression is Higher? Evidence from 11 European Countries

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SUMMARY

In this empirical paper, I use the 1996 wave of the ECHP dataset to investigate the relationship between measures of wage compression and training incidence in 11 European countries. I find that, after controlling for individual factors and country specific institutional differences, there is evidence of a positive and significant relationship between wage compression and training. This positive relationship is confirmed when I consider only general training. While the former finding is consistent with both competitive and non - competitive approaches to training, the latter result is only consistent with the non - competitive approach.

Keywords: Training, Europe

JEL: J24, J31

CONTENTS

1 Introduction

Becker's theory of training predicts that, when labor markets are competitive, a compressed wage structure discourages investment in general skills. In this theory, workers pay for their general training, and a more compressed wage structure reduces the private incentives to undertake the investment. When training is …rm - speci…c, …rms and workers share the costs and the bene…ts of the investment. In this case, wage compression increases the …rm - sponsored component and reduces the worker - …nanced component of training. Overall, total investment in skills can increase or decrease.

When labor markets are not competitive, wage compression can encourage …rms to pay for general training (see Acemoglu and Pischke [1999], hereafter AP), and may increase the overall amount of investment in skills. According to AP, wage compression occurs when the (marginal) e¤ect of …rm - sponsored training on productivity exceeds the (marginal) e¤ect on the …rm's wage. By paying for training, the …rm can increase output more than wages. In these circumstances, training can be more pro…table than no training. The positive e¤ect of wage compression on training is clear when the training cost is entirely borne by the …rm. When the cost is shared by the …rm and the worker, the total investment in skills can increase or decrease[1].

Wage compression can be generated by labor market institutions, including the minimum wage and wage bargains that involve unions. Previous empirical research in the U.S. on the relationship between labor market institutions that a¤ect wage compression and training compares training incidence in states with di¤erent institutions (see AP [1999b], Leighton and Mincer [1988] and Neumark and Wascher [2001])[2].

AP suggest that a complementary approach is to look at training incidence across countries with di¤erent wage structures. A prediction of the non - competitive theory of training is that company provided

[1] AP stress this point as follows: "..It is important to emphasize, overall, that non - competitive theories do not predict that wage compression should necessarily increase training, but that this is a possibility." (p.16)

[2] An interesting recent study by Peraita [2001] focuses on Spain.

formal training should be higher in countries with a more compressed wage structure. They notice, however, that the comparison of training levels across countries can be difficult because the data are collected using different methods, and the measured training levels are not easily comparable (AP [1999]).

This difficulty is partially removed in the European Community Household Panel (ECHP), a large household survey that covers most member countries in Europe. Rather than trying to harmonize output from national surveys, the European statistical agency (Eurostat) adopts an input oriented approach and uses the same "community" questionnaire as the base for the national versions of the survey. The data are collected by the National Collection Units and finally checked by Eurostat (European Community [1999]). A desirable feature of ECHP is that the definitions of and questions on training and earnings, the reference period and the survey methods are common across countries. This format increases comparability, but does not eliminate all problems, as the interpretation of common questions can vary across countries because of country - specific institutions and history (OECD [1991]).

In this empirical paper, I use the 1996 wave of the ECHP dataset to investigate the relationship between measures of wage compression and training incidence in 11 European countries. To preview the main results, I find that, after controlling for individual factors and country specific observed and unobserved differences, there is evidence of a positive and significant relationship between wage compression and training. This positive relationship is confirmed when I consider only general training. While the former finding is consistent with both competitive and non - competitive approaches to training, the latter result is only consistent with the non - competitive approach.

The material included in the paper is organized as follows. Section 2 illustrates the empirical strategy, Section 3 describes the data and Section 4 presents the results. Conclusions follow.

2 The empirical strategy

Comparative work on post-school training shows that the incidence of training varies considerably across developed countries (see Lynch [1994]). This variation is often explained by the presence of institutional factors. In some countries, the argument goes, there is a set of institutions, including the school system, local chambers of commerce, employer association and work councils that support a high training equilibrium (Soskice [1994]). Labor market institutions that compress the wage structure and the expected returns to training can also affect in a significant way the training decision. Examples of these institutions are the minimum wage, labor unions, and the degree of centralization of the wage bargain.

The degree of wage compression varies significantly across OECD countries (see OECD [1999]). Given this variation, it is tempting to look at the correlation between country - specific measures of wage compression and training incidence. This approach, however, has two problems. First, there are many other country - specific differences beside wage compression that can affect training; second, the heterogeneity of individuals and jobs suggests that the relevant measure of wage compression should not refer to the entire wage distribution in a country.

To illustrate the second point, consider the decision to invest in training by a 35 years old professional who is employed in the manufacturing sector. Conditional on productivity, the relevant measure of wage compression for this individual is earnings after training relative to earnings before training takes place. Assuming that individuals exploit the available information on current wages to infer future wages, a reasonably close proxy of the relevant measure of wage compression for this professional can be constructed by using the portion of the observed wage distribution that refers to employees in the same broad profession and sector and with at least 35 years of age. Since earnings vary with age, occupation and sector, the portion of the wage distribution associated to younger employees in completely different professions and sectors is unlikely to be informative.

Define C_{cjsa} as the selected measure of wage compression in country c, occupation j, sector s and age group a. It is convenient to specify the empirical relationship linking individual training and wage compression as follows

$$T_{icjsa} = \alpha + \beta X_{icjsa} + \gamma D_c + \delta D_j + \eta D_s + \lambda D_a + \sigma C_{cjsa} + \varepsilon_{icjsa} \quad (1)$$

where T is a dummy equal to 1 if the individual i has invested in training and to 0 otherwise; X is a vector of individual controls, D_c, D_j, D_s and D_a are vectors of country, occupation, sector and age group dummies and ε_{icjsa} is the error term. Since training outcomes are affected by observed and unobserved country effects, that include institutional factors, it is important to capture these effects with the country dummies D_c. Clearly, these dummies pick up all the differences in training outcomes associated to country effects, which include average wage compression. Conditional on these and other dummies, the coefficient σ in (1) is identified by the within - country variation in the selected measures of wage compression.

I measure wage compression C in two alternative ways: first, I consider the 90 - 10 wage differential (D_{91}) by country, occupation, sector and age group; second, I use the 90 - 50 (D95) and the 50 - 10 (D51) wage differentials. All measures are computed as ratios of the upper percentile to the lower percentile wage. The higher the value taken by these indicators, the lower wage compression. Wage compression could be affected by the decision to invest in skills, because individual wages depend on training. I avoid this problem by using measures of training from one wave and measures of wage compression from a previous wave of the same survey.

Since the dependent variable is a dummy variable, I estimate a probit version of (1). Moreover, I take explicitly into account the fact that training T and wage compression C are measured at different levels of aggregation and I adjust the standard errors by allowing errors to be independent among clusters (country by occupation by sector by age group) and dependent within clusters.

3 The data

The data on training incidence used in this paper are drawn from the 1996 wave of the European Community Household Panel. As pointed out in the introduction, the main advantage of these data is that the same "community" questionnaire is adopted by the national data collection units in each participating country, which increases comparability. Each wave includes a household and a personal …le, and the same households and individuals are interviewed over time. The 1996 wave covers individuals from 14 countries and the reference period is the calendar year before the survey[3].

The key question on training in the survey asks whether the interviewed individual has been in vocational education or training during the year before the survey takes place[4]. Respondents who have been in vocational education or training are asked to select the type of training received among the following options: a) third level quali…cation, such as technical college; b) speci…c vocational training at a vocational school or college; c) speci…c vocational training within a system providing both work experience and complementary instruction elsewhere; d) speci…c vocational training in a working environment, without complementary instruction elsewhere[5].

I use this classi…cation to distinguish between general and …rm speci…c training. Following AP [1999], who treat the German dual system as general training, I consider options a, b and c as general and option d as …rm speci…c training. It turns out that general training accounts for about 48% of all training episodes in the selected sample. The large majority of all training events (about 78% of the total) is paid or organized by the employer. This percentage falls to about 64% in the case of general training.

[3] The participating countries are: Austria, Germany, Denmark, Netherlands, Belgium, Finland, France, UK, Ireland, Italy, Luxembourg, Greece, Spain, Portugal. I exclude Luxembourg from this study because of its small size.

[4] The exact wording of the question in the 1996 survey was: "Have you at any time since January 1995 been in vocational education or training, including part-time or short courses?"

[5] The residual option "other" has few observations, that are dropped from the sample.

In this paper I consider only male employees aged between 16 and 55 in 1995 who are employed in manufacturing, building and private services, and I avoid endogeneity issues by computing the measures of wage compression D91, D95 and D51 from the 1994 wave, at the price of excluding individuals from Austria and Finland, who are interviewed only in 1996. Table 1 shows both training incidence in 1995, de…ned as the percentage of employees in the sample who have undertaken vocational education or training in the reference period, and the average measures of wage compression by country.

Table 1 here

Training incidence is highest in Denmark, the UK and Germany and lowest in Portugal, Greece and Italy. The evidence in the table is broadly consistent with the comparative evidence provided by the OECD and drawn from national surveys, which shows that training incidence in (West) Germany and the UK is higher than in France and Spain (OECD [1991]).

Turning to the measures of wage compression, one well known source of these measures is the OECD [1999], which computes these di¤erentials at the country level for the early 1990. There are several problems with this source for the purposes of this paper: …rst, information on Spain, Greece and Ireland is missing; second, information on Germany is limited to the previous West Germany; last but not least, the OECD indicators are developed using heterogenous national sources. I overcome these problems by using the 1994 wave of ECHP. My de…nition of earnings is net annual wages and salaries of individuals with paid employment and working full - time between 30 and 70 hours per week[6]. It turns out that wage dispersion at the country level, measured by D91, is highest in Portugal, Germany (inclusive of the previous East Germany), the UK and Ireland, and lowest in Spain, Italy and the Netherlands.

Visual inspection of the table does not show a clear relationship between country - speci…c training incidence and wage compression. The discussion in the previous section suggests that country speci…c measures

[6] With the exception of France, where earnings are gross of taxes.

of wage compression are less informative for the purpose at hand than measures that apply to portions of the wage distributions. Therefore, I construct measures of wage compression that vary by country, occupation, sector and age group. In order to avoid having too few observations in each portion of the wage distribution, I divide occupations into managers, technicians and professionals on the one hand and clerks and blue collars on the other hand; I also divide sectors into manufacturing and building and private services. Finally, I retain the entire age spectrum for individuals in the age group 16-35 and only the wage distribution of those aged more than 35 for the age group 36-55. The reason for this choice is that the portion of the wage distribution that refers to employees aged 16 to 35 is not relevant as a proxy of individual wage compression for employees aged more than 35.

Table 2 shows the average values of D91, D95 and D51 for the two occupational groups, the two sectors and the two age groups. Wage dispersion, measured by D91, is higher among managers and professionals than among clerks and blue collars and in the manufacturing and building sector than in the private services sector. Quite naturally, given that earnings profiles are concave, junior workers face higher dispersion than senior workers.

Table 2 here

4 The Empirical Evidence

The empirical analysis consists of estimating the following probit model

$$Prob[T_{icjsa} = 1]$$
$$= \Phi[\alpha + \beta X_{icjsa} + \lambda A_{icjsa} + \gamma D_c + \delta D_j + \kappa D_s + \sigma \ln C_{cjsa}] \quad (2)$$

where I use the logarithm of C as a measure of wage compression, individual age A in place of age dummies, a detailed set of 8 occupations as occupational dummies and a set of 12 sectors as sectorial dummies. The vector X includes the following variables: two education dummies, one for attained tertiary education (College) and the other for attained upper secondary education (High Sch); experience, measured as age minus age at labor market entry (Exp); marital status (Married); and long term unemployment (UI = 1: presence of at least one unemployment spell longer than one year in the …ve years before 1995, 0 otherwise).

Average age and experience in the sample are 36.62 and 18.67 years respectively. The percentages of employees with college education and a high school degree are 0.175 and 0.393; close to 62% of the employees are married and 8.9% have experienced at least one spell of long term unemployment.

Table 3 presents the main …ndings of the paper. I use two de…nitions of training. In the former de…nition, the dependent variable T is equal to one in the event of training, both general and …rm - speci…c, and to zero in the event of no training (column 1). In the second de…nition, T is equal to one in the event of general training and to zero in the event of no training (column 2). In both columns I use the log of D91 as the measure of wage compression. In the remaining two columns of the table I use the log of D95 and D51 as alternative measures. Notice …rst that country speci…c di¤erences, that include labor market and other important institutions, are captured by the inclusion of country - speci…c dummies (not shown in the table). These dummies are always jointly di¤erent from zero.

Table 3 here

I …nd that training incidence is higher among college graduates, as expected. I also …nd that training is lower among the more experienced and those who are married. Importantly, the experience of a spell of long term unemployment in the …ve years before the survey reduces the probability of training. This result con…rms that long term unemployment has a scarring e¤ect. The e¤ect, however, is small: the discrete change in the probability of training associated to the experience of a long term unemployment spell is ¡0:037 in the case of all training events and ¡0:019 in the case of general training[7].

[7] This change is computed as the probability of training when uI = 1 minus the

The key result in the table is that there is evidence of a positive and significant relationship between the selected measures of wage compression and training incidence. Based upon these estimates, I calculate that a one percent increase in wage compression increases the probability of training by 0.038 when all training events are considered and by 0.022 in the case of general training[8].

When I disaggregate the measure of wage compression in two measures, the 90 - 50 and the 50 - 10 wage differential, I find that these more disaggregated measures also have a positive effect on training incidence. The effect is quantitatively larger for D95 than for D51. On the one hand, a one percent increase in D95 raises the estimated probability of training by 0.061 and 0.071 in the case of all training events and of general training respectively. On the other hand, a one percent increase in D51 raises the probabilities of the two types of training by 0.034 and 0.014 respectively. A possible explanation of this finding is that training incidence is significantly higher among individuals with earnings in the upper part of the income distribution. On average, this incidence is 0.260 among individuals with income above the median and 0.163 among individuals with income below the median[9]. Training occurs with higher frequency among individuals in the upper part of the earnings distibution, and these individuals look at this part of the distribution to extract information on wage compression and their future wages.

One problem with the probit regressions is that they either treat firm - specific and general training as one category or ignore firm - specific training. I check the robustness of the results in Table 3 by allowing the dependent variable T to assume three separate values, 0 in the case of no training, 1 in the case of firm - specific training and 2 in the case of general training. Since these categories are not clearly ordered, I estimate a

probability of training when $ul = 0$, by keeping the other independent variables are at their sample mean values.

[8] Letting $Prob(T = 1) = \Phi(x'\beta)$, this marginal change is computed using the following formula

$$\frac{\partial \Phi}{\partial x} = \phi(x'\beta)\beta$$

[9] Peraita [2001] finds a similar distribution of training by income in Spain.

multinomial logit regression, using no training as the baseline category. Each estimated coefficient reported in Table 4 can be interpreted as the proportional change in the odds ratio when the associated independent variable changes marginally.

Table 4 here

The results in the table confirm the findings in Table 3 and show that a marginal increase in wage compression leads to a significant increase in the log odds ratio of both firm - specific and general training with respect to no training. The fact that this marginal effect is higher in the case of general training than in the case of firm - specific training is consistent with the view that, while the costs and benefits of firm - specific training are shared by the parties, the employer bears the costs of general training.

I conclude that the positive relationship between wage compression and training incidence is not limited to the broader definition of training, that includes both firm - specific and general training, but holds also in the case of general training. While the evidence concerning firm specific training is consistent with both competitive and non - competitive theories of training, the evidence about general training is only consistent with the non - competitive approach.

5 Conclusions

In this empirical paper, I have used the 1996 wave of the ECHP dataset to investigate the relationship between measures of wage compression and training incidence in 11 European countries. I have accounted for the cross - country variation in training incidence with country - specific dummies, that capture country specific observed and unobserved effects, including the wide array of institutions which affect the decision to invest in skill. Conditional on these effects, I have identified the empirical relationship between wage compression and training by exploiting the within - country variation in wage compression, that I allow to vary within each country by occupation, sector and age group.

I have found evidence of a positive and signi…cant relationship between wage compression and training, both general and …rm - speci…c. This positive relationship is con…rmed when I consider only general training. While the former …nding is consistent with both competitive and non - competitive approaches to training, the latter result is only consistent with the non - competitive approach.

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Table 1. Training incidence and measures of wage compression, by country. Male employees.

	T	D91	D95	D51
Germany	.239	5.417	1.683	3.234
Denmark	.442	3.289	1.511	2.179
Belgium	.198	3.316	1.636	2.013
France	.176	3.263	1.775	1.851
UK	.403	4.282	1.896	2.238
Ireland	.096	4.743	1.613	2.870
Italy	.067	3.242	1.649	1.980
Spain	.134	3.254	1.788	1.840
Portugal	.024	7.077	2.199	3.157
Netherlands	.135	2.464	1.476	1.671
Greece	.047	3.618	1.678	2.149

Note: T = training incidence in 1995; D91: 90 – 10 wage differential, computed as the ratio of the 90^{th} percentile wage to the 10^{th} percentile wage; D95: 90 – 50 wage differential, computed as the ratio of the 90^{th} percentile wage to the 50^{th} percentile wage; D51: 50 – 10 wage differential, computed as the ratio of the 50^{th} percentile wage to the 10^{th} percentile wage. Source: ECHP

Table 2. Measures of wage compression, by profession, sector of activity and age group. Male employees.

	D91	D95	D51
Managers/Professionals	4.203	1.790	2.312
Clerks and Blue Collars	3.288	1.542	2.113
Manufacturing and Building	4.057	1.715	2.324
Services	3.928	1.751	2.210
Age < 36	4.757	1.726	2.706
Age > 35	3.225	1.740	1.826
All	3.992	1.733	2.266

Note: D91: 90 – 10 wage differential, computed as the ratio of the 90^{th} percentile wage to the 10^{th} percentile wage; D95: 90 – 50 wage differential, computed as the ratio of the 90^{th} percentile wage to the 50^{th} percentile wage; D51: 50 – 10 wage differential, computed as the ratio of the 50^{th} percentile wage to the 10^{th} percentile wage. Source: ECHP

Table 3: Probit Regression with measures of wage compression. Dependent Variable: vocational education or training in 1995.

# obs :	14135 all training	12938 general training	14135 all training	12938 general training
college	0.438*	0.403*	0.438*	0.406*
	(0.052)	(0.076)	(0.052)	(0.075)
high sch	0.212*	0.176*	0.211*	0.173*
	(0.052)	(0.066)	(0.052)	(0.066)
age	-0.003	-0.022*	-0.003	-0.021*
	(0.006)	(0.008)	(0.006)	(0.008)
exp	-0.014*	-0.006	-0.014*	-0.005
	(0.004)	(0.006)	(0.004)	(0.006)
married	-0.023	-0.078	-0.023	-0.074
	(0.036)	(0.043)	(0.036)	(0.043)
ul	-0.227*	-0.299*	-0.228*	-0.304*
	(0.077)	(0.089)	(0.077)	(0.089)
D91	-0.205*	-0.273*		
	(0.056)	(0.073)		
D95			-0.325	-0.893*
			(0.193)	(0.271)
D51			-0.182*	-0.175
			(0.067)	(0.100)
CoDum	Yes	Yes	Yes	Yes
OccDum	Yes	Yes	Yes	Yes
SecDum	Yes	Yes	Yes	Yes
R-sq	0.186	0.236	0.186	0.237

Note: cluster adjusted robust standard errors in parentheses with $p<0.05$ = ~, $p<0.01$ = *. College: college dummy; high sch.: high school dummy; exp= actual experience; married: marital status dummy; ul: long term unemployment dummy; D91, D95 and D51: 90-10, 90-50 and 50-10 wage differentials; CoDum: country dummies; OccDum: occupation dummies; SecDum: industry dummies.

Table 4: Multinomial Logit with measures of wage compression. Dependent Variable: vocational education or training in 1995.

# obs :	14135	14135	14135	14135
	firm specific training	general training	firm specific training	general training
college	0.809*	0.753*	0.814*	0.764*
	(0.105)	(0.148)	(0.106)	(0.146)
high sch	0.469*	0.362*	0.472*	0.357*
	(0.106)	(0.138)	(0.106)	(0.136)
age	0.020	-0.042*	0.019	-0.041*
	(0.115)	(0.016)	(0.118)	(0.015)
exp	0.020	-0.013	-0.035*	-0.011
	(0.011)	(0.011)	(0.009)	(0.107)
married	0.067	-0.106	-0.068	-0.097
	(0.089)	(0.085)	(0.089)	(0.086)
ul	-0.251	-0.597*	-0.249*	-0.608*
	(0.199)	(0.196)	(0.200)	(0.197)
D91	-0.353*	-0.644*		
	(0.133)	(0.146)		
D95			-0.118	-2.277*
			(0.374)	(0.554)
D51			-0.407*	-0.426*
			(0.157)	(0.186)
CoDum	Yes	Yes	Yes	Yes
OccDum	Yes	Yes	Yes	Yes
SecDum	Yes	Yes	Yes	Yes
Pseudo R-sq	0.222	0.222	0.223	0.223

Note: cluster adjusted robust standard errors in parentheses with p<0.05 = ~, p<0.01 = *. College: college dummy; high sch.: high school dummy; exp= actual experience; married: marital status dummy; ul: long term unemployment dummy; D91, D95 and D51: 90-10, 90-50 and 50-10 wage differentials; CoDum: country dummies; OccDum: occupation dummies; SecDum: industry dummies.

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