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Economics Letters 72 (2001) 107–115

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**economics  
letters**

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# Testing the Acemoglu–Pischke model in Spain

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Received 24 January 2000; received in revised form 19 December 2000; accepted 10 January 2001

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## Abstract

The Acemoglu–Pischke approach to training in imperfect labor markets predicts that wage compressions should shift incentives to invest in training from workers to firms. This will increase firm-sponsored general training when workers are unable to invest in training by themselves. Spain is on the top of the ranking of regulated labor markets. However, the training figures for Spain indicate a poor effect of highly compressed wage structure on firm-sponsored training. © 2001 Elsevier Science B.V. All rights reserved.

*Keywords:* Firm-sponsored training; Wage compression

*JEL classification:* J24; J31

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## 1. Introduction

In the standard theory of human capital with competitive labor markets, firms never invest in the general skills of their employees and all costs of general training are borne by workers. However, a variety of evidence from European countries with highly frictional and regulated labor markets contradicts this prediction (e.g., Acemoglu and Pischke, 1998, 1999a). When labor markets are imperfect and labor market frictions and institutions compress and distort the structure of wages, firms may want to invest in the general skills of their employees. Acemoglu and Pischke (1999a), in one of their recent works, relax the assumption of perfectly competitive labor markets that underlies the human capital theory, and they show that firm-sponsored training arises as an equilibrium phenomenon. Apart from this prediction contrasting with the standard training theory, they show that the distortion in the wage structure turns technologically general skills into specific skills (Acemoglu and Pischke, 1998). The key of their non-competitive training model is the labor market imperfections,

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“which imply that trained workers do not get paid their full marginal product when they change jobs, making technologically general skills de facto specific” (Acemoglu and Pischke, 1999b, p. 540). The kind of institutions and the form of labor market frictions play a major role in this result. Thus, more frictional and regulated labor markets may encourage more firm-sponsored training. Indeed, the Acemoglu–Pischke approach predicts that wage compressions should shift incentives to invest in training from workers to firms. This will increase firm-sponsored general training when workers are unable to invest in training by themselves.

There are important differences between labor markets institutions of continental European countries and Anglo-Saxon countries, but certainly the Spanish economy is on the top of the ranking of regulated labor markets. For example, Nickell (1997, Tables 4 and 5) presents direct measures of labor market rigidities and summarizes labor statistics drawn up by the OECD during 1989–1994 in different countries. Overall, Spain appears to have serious labor market rigidities and presents a very centralized wage determination system. Moreover, in Spain, there are the highest firing costs in the European Union, and the trade unions play a very important role in wage determination, regulate hiring, and firing practices. In addition, the job security provisions and other social benefits increase so much the labor cost for the employers.

## 2. The distribution of firm-sponsored training

In this paper I use the Spanish micro-data of the 1994 European Community Household Panel (ECHP) survey. The National Institute of Statistics of Spain collected the data of the Spanish sample (INE, 1996). The 1994 ECHP Survey represents a unique source of information of who is receiving formal employer sponsored training in the work force. However, data limitation forced us to make use of the responses of employees as direct measures of formal training variables.<sup>1</sup>

The determinants of who is receiving formal training are linked to the cost and returns of that human capital investment. The screening process to take part in training courses offered by employers is linked to ensure that employees receiving training will have higher increases on productivity for longer duration. Therefore, the workers, workplace, and job characteristics are overall linked to the likelihood of an employer receiving firm-sponsored training.<sup>2</sup> Table 1 reports the 11.6 percent of employees receiving any type of firm-sponsored training. Tables 1 and 2 show that the distribution of training in the work force for Spain is uneven and concentrated among highly qualified workers in the upper deciles of the wage distribution. In addition, as I argued in the paper, Spain has a very regulated labor market, and despite this, has relatively low training.

In order to interpret this relatively low training rate in Spain, I present some detailed comparable evidence from other countries. Using the German Socioeconomic Panel (GSOEP) in 1986, Pischke

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<sup>1</sup>Some recent findings of articles that attempt to match employer and employee responses to identical training questions show that there is a great deal of measurement error in on-the-job training variables. Barron et al. (1997) find that establishments report 25% more hours of training on average than do workers, although establishments and workers report similar incidence rates.

<sup>2</sup>The main training questions asked to employees in the ECHP Survey was, “[Q082] Have you been in any education or training, including any part-time or short courses, at any time in 1993”; “[Q085] Was the course paid for or organized by your employer?”; “[Q086] Full-time or part-time”; and “[Q087] What is/was the overall duration of the course or training”.

Table 1  
Workers in Spain receiving firm sponsored training (%) by groups<sup>a</sup>

|                                  | Any type | Type of training |           |
|----------------------------------|----------|------------------|-----------|
|                                  |          | Full-time        | Part-time |
| All Workers                      | 11.61    | 27.4             | 72.6      |
| Gender:                          |          |                  |           |
| Male                             | 12.18    | 29.2             | 70.8      |
| Female                           | 9.90     | 20.8             | 79.2      |
| Age:                             |          |                  |           |
| 18–24                            | 4.83     | 14.3             | 85.7      |
| 25–34                            | 11.75    | 29.2             | 70.8      |
| 35–44                            | 15.06    | 27.2             | 72.8      |
| 45–54                            | 11.38    | 21.6             | 78.4      |
| 55–64                            | 5.82     | 54.5             | 45.5      |
| Education Attainment:            |          |                  |           |
| Illiteracy and less than Primary | 3.31     | 13.0             | 87.0      |
| Primary                          | 7.10     | 33.3             | 66.7      |
| Secondary (Academic)             | 21.24    | 26.2             | 73.8      |
| Vocational (Secondary)           | 18.91    | 29.0             | 71.0      |
| Higher (short cycle)             | 29.70    | 36.7             | 63.3      |
| Higher (long cycle)              | 32.98    | 22.6             | 77.4      |
| Economic Activity:               |          |                  |           |
| Manufacturing                    | 8.52     | 16.2             | 83.8      |
| Wholesale and Retail Trade       | 6.93     | 36.7             | 63.3      |
| Finance, Insur. and Real St.     | 23.25    | 28.8             | 71.2      |
| Transport, Comun. and Elect.     | 17.13    | 34.7             | 65.3      |
| Hotels and Restaurants           | 5.22     | 33.3             | 66.7      |
| Occupational Category:           |          |                  |           |
| Managers                         | 27.69    | 22.2             | 77.8      |
| Professionals                    | 24.78    | 32.9             | 67.1      |
| Clerical Workers                 | 17.45    | 25.0             | 75.0      |
| Production Workers               | 7.06     | 18.5             | 81.5      |
| Service Workers                  | 4.41     | 46.2             | 53.9      |
| Unskilled Workers                | 2.22     | 9.1              | 90.9      |
| Establishment Size:              |          |                  |           |
| Less than 100 Employees          | 4.19     | 31.9             | 68.1      |
| 100–499 Employees                | 15.17    | 14.3             | 85.7      |
| More than 500 Employees          | 26.00    | 30.8             | 69.2      |

<sup>a</sup> The numbers of the column “Any Type” are the percent in each group receiving the firm-sponsored training. The numbers in each other cells are percentual distribution (row percent). *Source*: Author’s calculations from the 1994 ECHP Survey.

(2000) reports that unconditional incidence of employer sponsored further training in Germany was 23 percent (excluding apprenticeships). Similar evidence presented in Olson (1996) from the National Household Education Survey (NHES) for the US, shows that about 25 percent of the employed US work force participated in firm-sponsored training during a 12-month period in the early 1990s.

Table 2

Distribution of workers (%) receiving firm sponsored training by deciles of the wage distribution<sup>a</sup>

| Decile of the wage distribution | Any type    | Type of training |             |
|---------------------------------|-------------|------------------|-------------|
|                                 |             | Full-time        | Part-time   |
| 1st                             | 2.7 [3.1]   | 4.8 [1.6]        | 1.8 [1.6]   |
| 2nd                             | 1.3 [1.5]   | 0.0 [0.0]        | 1.8 [1.5]   |
| 3rd                             | 3.1 [3.7]   | 4.8 [1.6]        | 2.4 [2.1]   |
| 4th                             | 3.5 [4.0]   | 3.2 [1.0]        | 3.7 [3.0]   |
| 5th                             | 5.8 [7.1]   | 8.1 [2.7]        | 4.9 [4.4]   |
| 6th                             | 6.7 [7.4]   | 4.8 [1.5]        | 7.3 [5.9]   |
| 7th                             | 9.7 [11.3]  | 8.1 [2.6]        | 10.4 [8.7]  |
| 8th                             | 17.3 [20.1] | 22.3 [7.2]       | 15.2 [12.9] |
| 9th                             | 19.5 [22.6] | 17.7 [5.6]       | 20.1 [16.9] |
| 10th                            | 30.5 [35.4] | 25.8 [8.2]       | 32.3 [27.2] |

<sup>a</sup> The number in each cell in brackets is the percent of all workers in each decile receiving firm sponsored training. *Source*: Author's calculations from the 1994 ECHP Survey.

However, this figure is considerably higher than the 17 percent reported in the 1991 Current Population Survey (CPS) for the US. Another recent study (Harris, 1999) using 1995 UK Labour Force Survey (LFS), obtains a 24.8 percent of employees who had received training provided directly by the employer on site. Information relating to firm sponsored training obtained from the above surveys is comparable with Spanish data, because the “percentage of workers receiving formal company training” is the concept most closely resembling the ECHP Survey question. The four Surveys show that the incidence of training is lower among the less educated and blue collar workers. However, the median duration of the full-time training is less than a week in Germany and US, but around 7 days in Spain. Table 2 shows that the bottom 20 percent of workers in the wage distribution represent 4.0 percent of all workers that received training, and only 2.3 percent of workers in the lowest 20 percent received firm-sponsored training. Comparable figures for the US are 9.1 percent and 10.9 percent, respectively<sup>3</sup> (see Olson, 1996).

Age rows of Table 1 capture an inverted “U” relationship between age and the probability of receiving any type of firm-sponsored training. There is a very strong positive relationship between education and the probability of receiving firm-sponsored training. The occupation rows show that highly qualified workers have the greatest chance of receiving any type of training. More than 30 percent of workers with a college degree received some firm-sponsored training, which is four times greater than the probability of those with primary school. Highly qualified workers were five times more likely to receive training than were less qualified workers. Employees in economic activities with higher skill requirements are more likely to receive firm-sponsored training. The establishment size rows in Table 1 suggest that the employees in the smallest establishments are much less likely to receive firm-sponsored training than employees from larger establishments. These data suggest that firms match employees with higher education attainments (high abilities) to positions that require formal training. The full-time course and part-time course columns provides us with a measure of the

<sup>3</sup>It must be noted that the comparisons of training incidence differ across countries, and Spain has a different industry mix as compared with that of the US.

intensity of firm-sponsored training. Some studies assume a negative relationship between intensity and duration (Altonji and Spletzer, 1991), but others have assumed an independent relationship for these variables. The mean days of full-time training duration is 17.8 and 58.1 for part-time training duration (the median are 7.5 and 17.8, respectively). The correlation between the intensity of firm-sponsored training, as measured by part-time course or full-time course (1 and 2, respectively) and the duration of training, as measured by number of days, is  $-0.225$  and is statistically significant.

### 3. Wages and training in an imperfect labor market

Following Acemoglu and Pischke (1999a), the link between labor market distortions and human capital accumulation is useful in evaluating international patterns in training provision, because institutions (e.g., unions) compress the structure of wages and, therefore compress returns to skills. Thus, the difference between the 90th and the 10th percentiles of the log net monthly wages of distribution in 1994 was 0.49 for Spain, considerably below figures of continental European economies. According to their theory, the above compressed wage structure may induce firms to provide and pay for general training, because labor market distortions turn general skills into de facto specific skills. Therefore, we would expect that Spain has a high rate of workers receiving firm-sponsored training. However, Table 2 shows a different scenario: the distribution of these employees receiving firm-sponsored training was very uneven and was concentrated among the more skilled workers in the upper percentiles of the wage distribution. Focusing on the “any type” column of Table 2, the top 20 percent of workers in the wage distribution represent 50.0 percent of all workers that received firm-sponsored training, and 29.0 percent of those in the top 20 percent received training.

Acemoglu and Pischke (1999a) suggest that there are complementarities between training systems and regulation regimes in labor markets. They discussed the interaction between training systems and patterns of wage inequality, and showed that wage inequality did not increase in Germany while rising in the United States. Table 3 gives the unemployment and returns to schooling figures for Spain over the period 1975–1993.<sup>4</sup> The return to schooling figures given in Table 3 show that vocational education has the lowest rate of return, and that during the 1980s the return for a lower secondary education dropped sharply. In contrast, in 1991 there was a pattern of increasing returns for additional years of schooling with long cycle higher education, short cycle higher education and upper secondary education. These figures suggest that new technologies complement skills. The increase in the supply of skills induces a skill-biased technical change that increases the skill premium during the 1980s (Acemoglu, 1998). However, working with the earnings variable on the 1994 ECHP survey (net monthly wage), the difference between the 90th and the 10th percentiles of the log net monthly wages of distribution was 0.49 in Spain, notably below figures of Germany and the United States (Acemoglu and Pischke, 1999a, Table 2).

The central explanation offered by Acemoglu and Pischke (1999a) for the different patterns of wage inequality is that the labor market institutions which compress wages do not allow new technologies to widen the gap between skilled and unskilled workers wages in these economies with highly regulated labor markets. Consequently, if labor market institutions push unskilled wages, firms would

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<sup>4</sup>See Acemoglu and Pischke (1999a), Tables 2 and 3 in comparison with our Table 3.

Table 3  
Unemployment and returns to education in Spain<sup>a</sup>

| Male unemployment rates by education (%)                         |           |           |           |
|--|-----------|-----------|-----------|
|  | 1975–1982 | 1983–1990 | 1991–1993 |
| (a) Less qualified   | 10.6      | 19.6      | 20.0      |
| (b) Highly qualified   | 6.2       | 9.9       | 9.0       |
| Ratio (a)/(b)  | 1.7       | 2.0       | 2.2       |
| All workers  | 8.9       | 16.9      | 15.1      |
| Difference 90th–10th percentile of the log monthly wage          |           |           | 1993      |
| All workers in 1994 ECHP survey                                  |           |           | 0.49      |
| Marginal rates of returns to education by educational levels (%) |           |           |           |
|  | 1981      | 1991      |           |
| Lower secondary/Primary  | 8.9       | 4.2       |           |
| Upper secondary/Lower secondary                                  | 4.3       | 6.0       |           |
| Vocational/Lower secondary                                       | 3.3       | 4.8       |           |
| Higher (short cycle)/Upper secondary                             | 3.9       | 7.3       |           |
| Higher (long cycle)/Higher (short cycle)                         | 10.1      | 9.3       |           |

<sup>a</sup> The bottom panel shows private rates of return by level of schooling from regressions of log yearly wages carried out using dummies for educational level, experience, and experience squared (the simplest Mincerian framework). The coefficients of two consecutive levels of education are divided by the years of schooling involved, to obtain rates of return by year of schooling (see Vila and Mora, 1998). Thus, the numbers refer to the return on investment by level of schooling relative to the preceding level. *Sources:* Author's calculations from the 1994 ECHP Survey; Nickell and Bell (1996); and Vila and Mora (1998).

substitute skilled workers for the unskilled and unskilled unemployment increase relative to skilled unemployment. The unemployment data for Spain shown in Table 3 indicate that the unemployment rate of the less qualified workers is substantially higher than that of the highly qualified group. Furthermore, unemployment rates in both groups have tended to rise over the period 1975–1990, with insignificant increases over the period 1991–1993. These increments are similar in the European Community countries, including also the significant rises in highly educated unemployment. The explanation offered by Acemoglu and Pischke (1999a) for the “unresolved puzzle why wage inequality did not increase” in economies with non-competitive labor markets is that firms in these economies (i.e., Germany) have a greater incentive to train unskilled and less educated workers. However, Table 1 and Table 2 show that the likelihood of receiving firm-sponsored training for a low education employee is dramatically reduced. The same pattern fits for employees in the bottom deciles of the wage distribution. In contrast, the firm-sponsored training is concentrated among better-educated employees in the upper deciles of the wage distribution. This result is similar to the obtained in the US, where highly educated workers also receive more training (see Olson, 1996).

Fig. 1 shows how the log average monthly wage varies with education level for the employees receiving firm-sponsored training and for employees non-participant in training programs. In our compressed wage structure, the log wage gap is wide among the employees without higher education (about 0.13). However, the differential is 0.05 when comparing the more skilled workers. Fig. 1 shows that firms do not make greater profits from low-skilled workers receiving firm-sponsored training, and therefore the firm will not find it more profitable to invest in their training than does investing in these

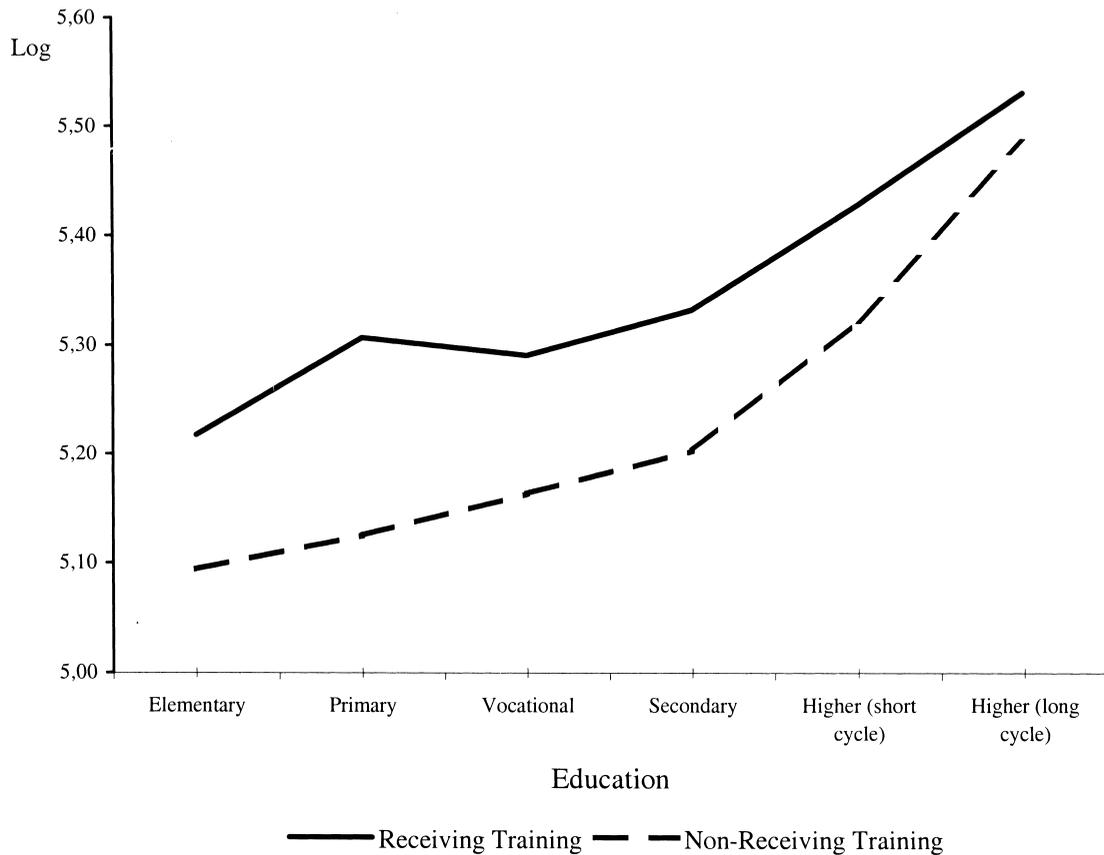


Fig. 1. Low wages by education levels.

low-skilled employees in the lower portion of the wage distribution. Fig. 1 above may be compared with the corresponding Fig. 1 in Acemoglu and Pischke (1999b). These figures show the profiles of the curves for both wages of no firm-sponsored training workers and firm-sponsored training workers. A possible explanation to the divergence between our finding and theirs is that the costs of training workers is likely to depend on their educational attainment.

Next, I would like to consider the different patterns of investment in training by education levels between two types of labor markets, high regulated or low regulated. This is an interesting issue, because the incentives to invest in training are always vested with workers, so that education incentives are a natural control for different incentives to invest in training. In the context of the analysis presented in this section, Table 4 below shows the incidence of firm-sponsored training by education levels in Spain and the US. These figures show that training rates for the lowest educated workers are similar between the two countries, but high school workers receive some more training in Spain. In contrast, the likelihood of training for a college worker is lower in Spain than in the US. However, as pointed out in footnote 3, Spain has a different industry mix than the US, and the above cross-country differences in training incidence might reflect differences in industry composition, because the comparisons presented in Table 4 are not controlled for industry composition. Overall, and with the necessary qualifications, the Spanish training patterns reflect that wage compression

Table 4  
Training incidence in Spain and in the US<sup>a</sup>

|  | Spain                       | US                     | US                    |
|--|-----------------------------|------------------------|-----------------------|
|  | 1993                        | 1990                   | 1990                  |
| Workers receiving formal firm training (%) |                             |                        |                       |
|  | Paid-organized <sup>b</sup> | Firm paid <sup>c</sup> | Any type <sup>d</sup> |
| Less than high school                      | 5.1                         | 4.4                    | 5.2                   |
| High school                                | 21.2                        | 15.5                   | 17.7                  |
| Some college                               | 29.7                        | 31.8                   | 36.3                  |
| College                                    | 33.0                        | 40.1                   | 46.6                  |
| All workers                                | 11.6                        | 23.9                   | 28.1                  |

<sup>a</sup> The US sample (National Household Education Survey) include individuals 16 years or older. The sample for Spain (European Community Household Panel) includes men and women aged 18–64. Workers with some college have short cycle (three academic courses) of higher education in Spain. Workers with college degree have completed higher education (five academic courses) in Spain. *Sources*: Author's calculations from the 1994 ECHP Survey; and Olson (1996).

<sup>b</sup> “Paid-Organized”: The training was paid for or organized by employer.

<sup>c</sup> “Firm Paid”: The employer paid all or a portion of the cost of the training.

<sup>d</sup> “Any Type”: The worker was given timeoff or it was paid for by the employer or provided by the employer or held at the workplace.

would not lead to more substantial training in this regulated labor market by giving firms more incentives to provide training for both types of workers, less educated and highly educated.

The non-competitive training model is consistent with a number of economies with compressed wage structures. For example, this occurs in Germany, where apprenticeship programs provide industry specific skills and firms have a greater incentive to train unskilled and low educated workers. However, in Spain and in the US, unskilled and less educated workers have similar training rates. Therefore, the highly compressed wage structure in Spain does not induce firms to pay for training on the two types of workers. When the Spanish firms are paying for training, they are offering sponsored training among the privileged, because highly educated workers are more productive. Nevertheless, several organizational factors have been ignored, and the analysis is not exhaustive. Thus, the training incidence differences may not only reflect differences in industry composition, but also differences in occupational characteristics of high and low education employees among Spain and the US. The evidence for Spain indicates that high wage compression has a poor effect on the incentives of firms to invest in firm-sponsored training.

## Acknowledgements

I Thank V. Calabuig, R. Moner and an anonymous referee for valuable suggestions and comments.

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