

Dynamic analysis of disability in Spain using the European Community Household Panel

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ABSTRACT

In this work we analyse the disability phenomenon from a dynamic perspective to identify the different trajectories that working-age individuals follow over a 7-year period (1995-2001). The results obtained from the microdata of the European Community Household Panel for Spain show that a high percentage of disabled people are disabled in the short-term, especially in the case of women. However, when the same analysis is done for any specific year, disabled people are firmly located on long-term trajectories. We also identify significant differences in the probability of having a certain trajectory according to the socioeconomic characteristics of the individuals. When we analyse how long the disability lasts we find that although the number of disabled people who remain disabled decreases significantly in the first few years the percentage stays relatively stable in the remaining years.

Keywords: Panel data, disability, Spain.

Análisis dinámico de la discapacidad en España con el Panel de Hogares de la Unión Europea

RESUMEN

En este trabajo se analiza la discapacidad desde una perspectiva dinámica con el objetivo de identificar las diferentes trayectorias que siguen los individuos en edad de trabajar a lo largo de un periodo temporal de siete años (1995-2001). A partir de los microdatos del Panel de Hogares de la Unión Europea para España, los resultados obtenidos muestran el elevado porcentaje de individuos que son discapacitados de corta duración, especialmente en el caso de las mujeres. Sin embargo, cuando se realiza este mismo análisis para un determinado año, las discapacidades se concentran en las trayectorias más largas. También, se detectan diferencias significativas en la probabilidad de encontrarse en alguna de las trayectorias de discapacidad según las características socioeconómicas de los individuos. Al analizar la duración de la discapacidad se observa que aunque el número de individuos que permanecen discapacitados decrece significativamente en los primeros años el porcentaje se mantiene estable en el resto de años.

Palabras clave: Panel de datos, discapacidad, España.

JEL classification: I10, J20.

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1. INTRODUCTION

In recent years, disability has become a phenomenon of special relevance within the European Union giving rise to social and economic concern. The establishment of rules and regulations to support equal opportunities and the integration of disabled people into the workplace, as well as prioritising the implementation of public policies in this regard, have helped to increase awareness and concern among State Members, governments, organizations and society as a whole in relation to the problems and needs of people with disabilities. The struggle against any type of discrimination toward disabled people by the effective application of equal opportunities principles at work has become one of the major challenges identified by the European Union for the near future¹.

The levels of employment among people with disabilities are still much lower than among non-disabled people, while their inactivity rates are very high (OECD, 2003). This low activity rate in the labour market means that a reduced percentage of disabled working-age people are receiving unemployment benefits. Although public policies based on social benefits and subsidies play a crucial role in guaranteeing a minimum level of income for these people, in recent years Member States have strongly implemented active employment policies to people with disabilities which have been integrated within national employment plans. For these active public policies to be effective and assessable, it is necessary to obtain a more comprehensive picture of the situation than the one provided by administrative records or the cross-sectional studies carried out in a given year (Burkhauser and Daly, 1998). As Burchardt points out (2000), using data from a single year or pooled data has the drawback of including, for example, people with temporary disabilities (e.g. an injury suffered during that year), as well as people disabled from childhood or with a longer-term disability. The possibility of differentiating between the different disability trajectories a person might follow as well as their main socioeconomic characteristics is an essential requirement for the design, implementation and later evaluation of the effectiveness of public policies aimed at people with disabilities.

The objective of this work is to analyse disability from a dynamic standpoint and identify the different trajectories individuals with disabilities follow as well as their main characteristics over time. Based on a panel of working-age individuals from the European Community Household Panel (ECHP) for Spain during the period 1995-2001, and using the work of Burchardt (2000) as a framework, we estimated

¹ See, for example, the European Community Action Programme to combat discrimination. Available at: http://europa.eu.int/comm/employment_social/fundamental_rights/index_en.htm.

the percentage of individuals suffering a short- or long-term disability and whether this occurs in a continuous or intermittent way. We also identified the profile of people within each disability trajectory by estimating a multinomial logit model. Furthermore, the data available allow us to estimate the duration of the disability that began within the panel period by calculating the survival functions using the method proposed by Kaplan-Meier. Although at an international level there are some works that have analysed disability from a dynamic perspective (Burkhauser and Daly, 1996 and 1998; Bardasi, Jenkins, and Rigg, 2000; Burchardt, 2000 and 2003; Jenkins and Riggs, 2004), this kind of research has not been done for Spain and thus our work should serve to fill a gap in the existing literature.

The results obtained underline the relevance of analysing disability from a dynamic perspective due to the important differences observed when comparing these results with those obtained in a cross-sectional study. In a dynamic analysis a high percentage of individuals are regarded as short-term disabled people, especially in the case of women, whereas the same analysis carried out for a given year yields a higher percentage of individuals in longer-term disability trajectories. In addition, when the analysis is performed both at a descriptive and econometric level, significant differences have been detected regarding types of disability trajectories depending on the individual's characteristics. The results obtained from estimating disability survival functions show a strong reduction in the percentage of people who continue to be disabled in the first few years after the beginning of the disability, whereas after this period the percentage decreases at a lower rate. Furthermore, the estimations of survival functions are statistically different depending on the age and educational level of the person with disability.

This paper is organized as follows: the next section contains a brief review of the existing literature on disability studies from a dynamic standpoint; Section 3 defines the concept of disability as well the data and methodology used in the analysis done later; Section 4 includes the results obtained after estimating the different disability trajectories as well as an individual's profile within each trajectory and the duration of disabilities which began during the panel years. In the last section we present the main conclusions and offer some recommendations regarding economic policy.

2. LITERATURE REVIEW

Research into disability is relatively new and has been mainly driven by three factors (Salkever and Sorkin, 2003): 1) the availability of new databases dealing with disability and health problems from this specific standpoint; 2) new antidiscrimination legislation aiming at implementing equal opportunities in all areas of life, especially in the labour market; and 3) increases in the costs associated with disabilities arising from public expenditure.

In recent years, a large number of international studies have been published analysing different aspects of disability. For example, there are several studies on the effect of disabilities on labour participation (Parsons, 1980 and 1982) and on wage levels as perceived by individuals (Baldwin and Johnson, 1994 and 1995; Kidd *et al.*, 2000), the (dis)incentives to work associated with different social benefits programs (Bound and Burkhauser, 1999), or the use of disability pensions as an instrument for leaving the labour market definitively (Kreider and Riphahn, 2000). However, there are few longitudinal studies. Although there is an increasing number of disability studies in Spain — for example, The Spanish Institute for Elderly People and Social Affairs, IMSERSO (1998), the Spanish Economic and Social Council (1995 and 2003) and authors like Malo (2001, 2003 and 2004), Pagán and Marchante (2004), Dávila (2006), and Malo and Pagán (2005) — none of them introduce the dynamic component into analysing disability.

One of the first disability studies undertaken from a dynamic perspective was published by Burkhauser and Daly (1996) who, using data from the United States for 1970-1980, concluded that the reductions in employment and income levels suffered by people with disabilities were less than initially expected because their situation in terms of employment and income was already poor before becoming disabled. In a later work (1998), these authors compared the situation of males with a disability in the United States and Germany. The results again showed the deterioration of employment and income levels in people who become disabled in both countries. However, the situation was better for German people than for Americans. Very similar conclusions were later obtained for Germany in a work carried out by Riphahn (1999) where it became explicit that the negative effects of disability were greater among people suffering the most severe disabilities and among those groups with lower income levels.

The framework for our study in Spain is the work of Burchardt (2000), who uses data from the British Household Panel for the United Kingdom, in which she analyses the trajectories followed by disabled people and the duration of their disability using a 7-year panel. The results obtained by Burchardt show the relevance of the shorter-term disability trajectories and how, even bearing in mind possible measurement errors, people who have been disabled for a single year are less disadvantaged than people with a longer disability trajectory, especially if their disability is repeated or non-continuous. The author justifies the importance of carrying out dynamic analyses of disability rather than cross-sectional studies based on a single year, for the design, implementation, and evaluation of public policies aimed at people with disabilities.

Bardasi, Jenkins, and Rigg (2000) also carried out a longitudinal analysis with data from the British Household Panel for 1991-1998 and estimated the economic impact of becoming disabled on working-age males. An important result obtained by these authors was that the income levels of working-age males becoming disa-

bled was significantly lower than the income levels of males with no disability and much closer to the incomes of males who already were disabled. Although becoming disabled causes a reduction in employment levels, the fall in income is palliated by disability benefits or by tax reductions. These results are very similar to those obtained previously by Burkhauser and Daly (1996), and Riphahn (1999).

Recently, Jenkins and Rigg (2004) have analysed the economic disadvantages implicit in being disabled by identifying three possible sources. A first source is related to what they call the “*selection effect*” and is based on the substantial number of people currently disabled who were in a very precarious economic situation before becoming disabled. A second source would be the effect of the onset of disability on employment and income levels. Finally, a third source is related to the impact on income and employment levels of remaining disabled after the onset of the disability. The results show that the mean household income of people who become disabled was already limited before the onset of the disability which means that the fall in income at the onset is not very significant. With regard to employment levels, they fall from 73% in the year before the onset of disability to 55% the year the disability starts and to 52% a year later. Furthermore, the onset of the disability is related to a fall in the probability of finding paid employment and a fall in mean income.

Finally, we should mention the work carried out by Gannon and Nolan (2004) on disabilities and the labour market participation of disabled people in Ireland. In addition to a review of the statistical sources available and possible definitions of disability, this work makes a dynamic analysis of disability, transitions between employment and disability, and disability duration as an explanatory variable of the labour market participation of disabled people. The results of this dynamic analysis are similar to those of Burchardt (2000), Burkhauser and Daly (1996) and our work, thus highlighting the need to carry out studies that include an analysis of the different disability trajectories followed by individuals. One of the results obtained by these authors is that those people who are identified as disabled on the 6-year panel, are employed for only 1.5 years during this period, whereas the people who have never suffered any disability throughout the panel period average 3.5 working years.

3. DEFINITION OF DISABILITY, DATA, AND METHODOLOGY

The identification of a person with a disability is not simple due to the lack of consensus regarding the definition of disability and the different agents and institutions involved in the disability phenomenon. The World Health Organization (WHO) defines disability as “*restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being*”. In our case, the questions used to identify a person with disability in the ECHP were the following:

PH002: Do you have any chronic, physical or mental health problem, illness or disability? If the answer is “Yes”, then

PH003: Are you hampered in your daily activities by this chronic or mental health problem, illness or disability? *Yes, severely/Yes, to some extent/No.*

Those people who answered question PH003 with a “Yes” (“severely” or “to some extent”) were considered to be disabled. This is obviously a self-classification in the sense that respondents assess their own current state of health. This self-classification can lead to overestimation (when the individuals try to justify situations of inactivity or limited work activity) or underestimation (when the disability is regarded as a stigma) of the prevalence of disability rates due to the so-called self-justification bias (Chirikos and Nestel, 1984; Kreider 1999). According to García-Serrano and Malo (2002), the self-justification bias is unlikely to appear on the ECHP due to the anonymous nature of this survey²; question PH003 does not refer to working disability and so the relationship with the labour market is not implicit in the definition itself³; also, the questions regarding labour market and disability are too far down the questionnaire for the respondent to make a connection, which would be a necessary condition for the self-justification bias to appear.

Another important factor to bear in mind when the ECHP is used in a disability analysis is the need to compare the results with other surveys such as the Spanish Survey on Deficiencies, Disabilities and State of Health (*Encuesta sobre Deficiencias, Discapacidad y Estado de Salud*, EDDS) carried out in 1999. The difference detected between the two sources is due to the actual definition of disability. Although people who reply “*Yes, severely*” to question PH003 could be considered people with disabilities according to the WHO definition, the answer “*Yes, to some extent*” could include situations that individuals consider close to disability and presumably they are strongly linked to the labour market (Malo, 2003). Thus, the differences between the ECHP and other statistical and administrative data sources are not due to the ECHP data lacking quality or to this survey capturing labour behaviour in a worse

² According to Benítez-Silva *et al.* (2004), the people interviewed feel more comfortable when anonymity is guaranteed. In this way they provide private information on certain situations which could otherwise lead to penalization or even put at risk their disability social benefits should the administration break the confidentiality regarding statistical data. In this way, the existence of people who claim to be disabled when they are not seems to be unlikely in these kinds of anonymous surveys (e.g. ECHP). Recently, Gannon (2005) has proposed a different way to classify the disabled population with the ECHP, which allows us to distinguish three different groups of individuals: work-limited disabled, non-work limited disabled and non-disabled.

³ Some surveys, like the “*Health and Retirement Survey*” in USA, include a definition that relates disability with working disability which is more likely to lead to self-justification bias.

way than others, but rather to the way disability is defined as a concept. Furthermore, the ECHP has been used in other international (Kidd *et al.*, 2000; Burchardt, 2000; Jenkins and Rigg, 2004) and Spanish works (García-Serrano and Malo, 2002; Pagán and Marchante, 2004; Malo and Pagán, 2005) to analyse the situation of disabled people in Europe.

The microdata used in this work are taken from the ECHP for Spain for the period 1995 - 2001⁴. The sample consists of working-age individuals, with ages ranging from 16 to 64. A data panel was built based on data from all those individuals who, in the seven waves, answered the questions aimed at identifying people with disabilities (PH002 and PH003). This included 5,552 individuals involving a total of 38,864 observations. Of the 5,552 individuals analysed, 1328 (583 men and 745 women) had suffered some kind of disability in at least one of the years comprising the sample, and the rest, 4224 (2341 men and 1883 women), had never suffered any disability. It is important to point out that, for the longitudinal analysis of disability described in the next section, the sample obtained was weighted to reflect population characteristics and to correct the possible lack of representativity of the sample⁵.

In this work we basically applied Burchardt's methodology (2000) to identify the different trajectories disabled people followed during the period 1995-2001. Thus, according to the definition of disability in the ECHP, people who were considered disabled in any year were assigned 1 and those who were not disabled 0. In this way we can represent the different trajectories followed by the people included in the seven waves (Table 1). Based on the distributions obtained, we defined seven possible trajectories ranging from no year with disability (*Never*) to seven years with disability (*Always*). Within these two end-trajectories, we defined other trajectories: one-off disability ("*one-off*"), short-term disability ("*short*"), which could be repeated or continuous, and long-term disability ("*long*") that can also be repeated or continuous. Our work contributes to Burchardt's work (2000), in the sense that we also analyse the socioeconomic profiles of individuals within each disability trajectory by estimating a multinomial logit model which should help to design and carry out public policies for disabled people in Spain.

⁴ Although also available for 1994, we decided not to use it because question PH002, which serves as a filter, was used for the first time in the second wave (1995), and thus the definition of disability is slightly different for this year (Malo, 2001).

⁵ As stated in the ECHP methodology, longitudinal analyses must refer to people included in all the waves (years) for which a basic weight different from zero and feasible for this type of study has been defined. In this study we used the reference weights for the most recent year in the ECHP, i.e., 2001.

Table 1
Disability trajectories for a 7-year period (1995-2001)

Type of trajectory	Definition	Trajectory example
<i>Never</i>	Not disabled in any year	0000000
One-off	Disabled in just one year	0100000
Short repeated	Disabled in two or three years but intermittently (not consecutively)	0001000 0100100 1100010 0011000
Short continuous	Disabled in two or three consecutive years in total	0000111 1101100
Long repeated	Disabled in four, five or six years but intermittently (not consecutively)	1111001 0111110
Long continuous	Disabled in four, five or six consecutive years	1111110 1111111
Always	Disabled in 7 consecutive years	1111111

Source: European Community Household Panel. Years 1995-2001.

Note: 0 = Not disabled, 1 = Disabled

One of the problems encountered when analysing disability trajectories is that some spells might be “*censored*.” As pointed out by Burchardt (2000), apart from possible measurement errors (for example, errors in the coding of the individuals as disabled people or not), and given that we only observe and follow the individuals during a given period (1995-2001), it is impossible to know what happened before (*left-censored*) or after (*right-censored*) such a spell, which can lead to a change in the type of disability trajectory followed by the individual. For example, if a person is disabled only during the first and the second year of the panel, he/she will be classified as a person with a short continuous disability trajectory. However, this person might have been disabled for three years before the beginning of the panel and accordingly, he /she should have been included in the long continuous trajectory.

Despite these limitations, the strength of a dynamic disability analysis is that it provides information on the different trajectories followed by people throughout the panel and on the importance of each one within all possible identified trajectories (Burchardt, 2000). As previously pointed out, the analysis of the different types of trajectories and the characteristics of individuals have been complemented by studying the duration of the disability for those people who *enter* (*inflow*) into the disability during the panel period by estimating survival functions with the Kaplan-Meier method (Greene, 1997).

5. RESULTS

Table 2 shows the distribution of each disability trajectory for the whole sample and distinguishes between men and women. The results show that 76.09% of the individuals in the panel never had any kind of disability during 1995-2001. Of the individuals who suffered some disability during this period, 36.88% had a one-off disability and 7.15% had a disability over the whole panel period. Although short disability trajectories have a greater weight than long ones, the difference is not really significant (29.8% versus 26.17%). Nevertheless, most disability trajectories considered as long-term were non-continuous (i.e. repeated) (20.65%) and their weight was similar to repeated short trajectories (19.21%). These results are similar to those obtained by Burchardt (2000) for the United Kingdom and Gannon and Nolan (2004) for Ireland.

Table 2
Distribution of disability trajectory types by gender. Period (1995-2001)

Type of trajectory	Total	Males	Females
Never	76.09%	80.06%	71.65%
One-off	36.88%	38.43%	35.58%
Short repeated	19.21%	15.75%	22.12%
Short continuous	10.59%	9.16%	11.79%
Long repeated	20.65%	23.28%	18.45%
Long continuous	5.52%	4.99%	5.97%
Always	7.15%	8.39%	6.10%
SUBTOTAL	100.00%	100.00%	100.00%
TOTAL	23.91%	19.94%	28.35%
	100.00%	100.00%	100.00%

Source: European Community Household Panel. Years 1995-2001.

Note: The distributions were calculated with weighted data.

Some differences can be observed when disability trajectories are analysed by gender. First, the percentage of women who never suffered a spell of disability is smaller (8.41 percentage points) than in men, a finding also reported by Burchardt (2000). Second, in the “one-off” trajectory, both men and women show the greatest weight among the individuals who have suffered at least one disability within the panel period (38.43 and 35.58%, respectively). In addition, the weight of the long repeated trajectory (23.28%) is the most outstanding for men, while the short repeated trajectory reaches the greatest weight for women (22.12%). Furthermore, the trajectory with smaller weight for both sexes is the continuous long disability. Third, we can see a greater number of women than men in the short trajectories (repeated and continuous) and in the long continuous trajectory.

Analysing the distribution of disability trajectories by age range reveals a clear relationship between age and the type of trajectory (Table 3). The presence of older people in long trajectories is associated with their state of health, which tends to

deteriorate with age (Malo, 2003). Thus, for example, 37.23% of individuals who were always disabled throughout the panel, had ages ranging from 55-64, whereas only 1.12% of the latter are found in the lower range (16-24 years old). Nevertheless, we should point out that for all the disability trajectories, except for “Never”, the greatest percentages are found in age ranges higher than 45.

Table 3
Distribution of types of disability trajectories by age groups. Period (1995-2001)

Type of trajectory	16-24	25-34	35-44	45-54	55-64	TOTAL
Never	13.65%	28.45%	25.93%	20.96%	11.00%	100.00%
One-off	7.45%	23.32%	21.03%	28.32%	19.88%	100.00%
Short repeated	3.29%	13.98%	17.63%	28.18%	36.93%	100.00%
Short continuous	4.18%	15.67%	22.39%	29.62%	28.13%	100.00%
Long repeated	4.60%	14.35%	14.63%	26.99%	39.43%	100.00%
Long continuous	0.93%	10.56%	17.27%	34.65%	36.58%	100.00%
Always	1.12%	7.24%	15.92%	38.49%	37.23%	100.00%
TOTAL	13.65%	28.45%	25.93%	20.96%	11.00%	100.00%

Source: European Community Household Panel. Years 1995-2001

Note: The distributions were calculated with weighted data.

The distribution of disability trajectories has also been calculated according to the educational level of the individual. Table 4 shows a close relationship between each trajectory and the average educational level of individuals. When the trajectory is short, the percentage of individuals with higher education is greater, although it is still far from the percentages reached by people who have never suffered disabilities (23.19%). Another striking result is that repeated disability trajectories, whether short or long, have greater percentages of individuals with primary education only than continuous trajectories. In other words, the repetition of the disability has a very important and negative effect on the educational level of disabled people. In many cases it can be considered that temporary drop-outs in education due to illness or a disability can induce a higher rate of school failure, a lack of motivation among students as well as a lack of integration and adaptation after the disability, giving rise to lower educational levels in disabled people.

Although in the current literature on disability a low educational level has already been mentioned as one of the most significant features of disabled people in comparison with non-disabled (especially among women), our results show the importance of carrying out a dynamic analysis of disability to identify those groups with the greatest risk of lagging behind in education in order to define and implement measures and actions at the level of public policies that will increase the educational level of such

groups. Furthermore, authors like Kruse (1998), Zwinkels (2001) and Malo (2004) conclude that the lack of adaptation of the educational system to the specific needs of disabled people is one of the main factors that most influences people's educational level, and not, as often thought, their lack of learning skills, motivation or adaptation. Similarly, educational investment has little attraction for disabled people because their wages are lower and it is also harder for them to enter the labour market compared to people without disabilities, which seems to be another factor behind their low educational levels (Stern, 1989; Bound, *et al.*).

Table 4
Distribution of disability trajectories by educational level. Period (1995-2001)

Type of trajectory	Primary school	Secondary School	Higher education	TOTAL
Never	55.35%	21.46%	23.19%	100.00%
One-off	71.31%	15.81%	12.88%	100.00%
Short repeated	86.71%	9.20%	4.09%	100.00%
Short continuous	81.79%	12.13%	6.08%	100.00%
Long repeated	90.40%	7.41%	2.19%	100.00%
Long continuous	78.64%	15.22%	6.14%	100.00%
Always	91.19%	6.73%	2.09%	100.00%
TOTAL	58.26%	20.34%	21.40%	100.00%

Source: European Community Household Panel. Years 1995-2001.

Note: The distributions were calculated with weighted data.

As in Burchardt's work (2000), it is interesting to compare the results obtained with longitudinal and cross-sectional approaches to investigate the differences. In order to do this, we chose 1998 (wave 5 from the ECHP) and identified disabled and non-disabled people for this year. The results show a disability prevalence rate of 9.78% among working-age people. However, this percentage includes disabled people within different types of trajectories. According to Table 5, which shows the distribution of the total number of people with and without disability throughout the different types of trajectories, almost two-thirds of disabled people in 1998 have a trajectory of "long" disability (continuous or repeated) or "always", with the greatest percentages found in the repeated long trajectory (34.50%). If we compare this with the figures in Table 2, we can see a significant difference because whereas in a given year, 1998 in our case, the percentage of disabled people with long disability trajectories is almost 66%, in the seven consecutive year panel (1995-2001) this percentage of long disability barely reaches 33%, i.e. it is reduced by half.

Table 5
Distribution of people with and without disability in 1998 according to the type of disability trajectory

Type of trajectory	DISABLED (9.78%)	NOT DISABLED (90.22%)
Never	0.00%	84.67%
One-off	11.83%	8.37%
Short repeated	16.39%	3.41%
Short continuous	6.70%	2.04%
Long repeated	34.50%	1.51%
Long continuous	13.33%	0.00%
Always	17.25%	0.00%
TOTAL	100.00%	100.00%

Source: European Community Household Panel. Year 1998

Note: The distributions were calculated with weighted data.

Furthermore, in the cross-sectional analysis, a person might be considered not disabled whereas the longitudinal analysis would include him/her in some of the disability trajectories. Although 84.67% of the people who were never disabled in 1998 had never been disabled throughout the panel, 8.37% of those not disabled in 1998 were disabled within the panel period. In addition, there are short trajectories (repeated and continuous) and long repeated disabilities among the individuals who were not disabled in 1998, although the percentage is relatively lower than for the “one-off” trajectory. This result again shows the importance of studying disability from a dynamic perspective since this helps us to understand the situation better and provides a more precise and complete analysis compared to the one obtained in a cross-sectional study⁶.

In order to complete our analysis we identified the socioeconomic profile of people in each disability trajectory, which could facilitate the design of specific public policies depending on the trajectory type. We estimated a multinomial logit model where the dependent variable is a categorical variable with values ranging from 1 to 7 corresponding to each type of trajectory identified throughout the panel (Table 6). Thus, if the individual had never been disabled it takes value 1, if he/she was disabled one-off it takes value 2, and so on till reaching value 7 if the individual

⁶ Our result is similar to that obtained when we analysed the duration of unemployment, wherein the stock is a length-biased sample of the flow thus implying a longer mean duration of unemployment.

was disabled every year of the panel. It is necessary to bear in mind that rather than attempting to identify the factors accounting for why an individual is found in a given disability trajectory and not in another, our intention is to go beyond the descriptive analysis shown in Tables 2-4 and identify the profiles of the individuals with a greater probability of being in each trajectory and analyse the usefulness of the results from the standpoint of designing public policies. Thus, the analysis carried out below is framed within a descriptive context rather than an explanatory one. The independent variables included in the estimation of the multinomial logit model are related to the characteristics of the individual (gender, marital status, age and educational status) as well as to the characteristics of the household (size, existence of children and total net income). We also included some dummy variables to take into account the place of residence and the year the interview was carried out. The reference category used in the estimation is the disability trajectory “*Never*”. The reference person is a male, not married nor living with a partner, no children, living in a 4-member household and with an average net income of 2,696,000 pesetas, aged between 16 and 24 years, having completed primary school, living in the northwest of Spain and interviewed in 1995.

One of the advantages of using this type of model is the possibility of calculating relative probabilities based on estimated coefficients. These relative probabilities are obtained by calculating the exponential of the estimated coefficients ($\text{Exp}(B)$) and show the effect of increasing the continuous independent variable by one unit or the dummy variables from zero to one on the probability of belonging to group j with regard to the reference group (Cabrer, Sancho and Serrano, 2001). According to Table 6, women have a greater probability than males of being in a continuous repeated disability trajectory or in a continuous long disability with respect to the reference category (*Never*). On the other hand, women have a smaller probability than men of being in the “repeated long” and “*always*” trajectories. Being married or living together significantly reduces the probability of having a disability trajectory in the longer term, especially in the “*always*” trajectory. In relation to the variables included in the estimation of certain household characteristics, the existence of children in the home increases the probability of having a long trajectory (continuous or repeated) or a “*one-off*” trajectory with respect to the reference category (although the latter is more common), whereas it reduces the probability of having a continuous short disability trajectory. The probability of being in the “*one-off*” and the “*long repeated*” disability trajectories only increases when the average size of the household increases by one unit. Although an increase in average household income reduces the probability of being in most disability trajectories, except in “*always*”, the reduction is greater in most short trajectories. This result is obtained as a consequence of the positive relationship between the individual’s health and household income. The likelihood of having greater financial resources makes it possible to improve the individual’s health as well as their potential to access private medical services via health insurance.

The probability of being in some of the disability trajectories compared to the reference category of never having had a disability increases with the age of the individual. However, the effect of each age range in relation to the reference age (16-24 years) on relative probabilities is much greater as the disability becomes more lasting and persistent. For example, the probability of being disabled throughout all the years of the panel (*always*) with respect to the reference category (*never*) is 80.9 times greater for those people with an age range of 55-64 years compared to the reference group (16-24 years old). This result is compatible with the data in Table 3, showing a greater number of older people in the long-term disability trajectories as a consequence of the deterioration of health with age. Furthermore, the relative probabilities obtained for the variables reflecting the age of the individuals are much higher than those for the rest of independent variables in almost all the disability trajectories.

The effect of educational level on the probability of being in a given disability trajectory is consistent with the data shown in Table 4. Individuals with a higher educational level have a lower probability of suffering any type of disability whether long, short or permanent throughout all the years of the panel. Furthermore, the reduction in the relative probability of being in any of these disability trajectories is greater as the disability becomes longer and permanent. Although a similar result is obtained for individuals with secondary school education, the reduction in relative probability is in many cases much lower than for individuals with higher education studies (for example, for the trajectories "*always*" or "*long repeated*"), or even nil with respect to the reference category reference (for "*one-off*" and "*long continuous*").

Finally, regional and temporary differences are also found with regard to the probability of being in each of the disability trajectories. For example, the greatest relative probabilities of suffering from a short continuous or long repeated disability are found in the Canary Islands (2.92 and 2.52 times more than in individuals from the northwest, respectively). Timewise, it is interesting to highlight the important and gradual growth of the relative probability of being in the trajectories of short- and long continuous disability in almost every year compared with 1995, something that is not observed for other trajectories. In fact, the relative probability for "*always*" decreases from 0.91 in 1996 to 0.68 in 2001.

Table 6
Estimations of a multinomial logit model of the disability trajectories (Reference category: Never)

	One-off		Repeated short		Short continuous		Long repeated		Long continuous		Always	
	Exp(B)	z	Exp(B)	z	Exp(B)	z	Exp(B)	z	Exp(B)	z	Exp(B)	z
Female	0.9914	-0.10	1.3967	4.15	1.2064	1.75	0.8162	-3.76	1.2318	2.02	0.7131	-4.48
Married	1.2148	1.58	0.8696	-1.30	0.9558	-0.31	0.3373	-16.59	0.7824	-1.82	0.2880	-13.92
Household without children	1.2053	1.93	0.8698	-1.56	0.7849	-1.91	1.6001	8.17	1.7108	4.90	0.9379	-0.76
Size of the household	1.1386	4.90	1.0199	0.74	1.0091	0.23	1.1756	11.01	0.9688	-0.95	0.9815	-0.71
Household income/100000	0.9867	-5.98	0.9897	-4.79	0.9924	-2.72	0.9918	-6.64	0.9940	-2.41	0.9986	-0.72
Age												
25-34 years old	1.3809	1.65	2.0205	2.87	1.5949	1.55	2.6422	6.81	5.0465	2.98	4.9953	4.32
35-44 years old	1.2127	0.90	2.5040	3.65	2.0473	2.31	3.8551	8.98	9.0858	4.07	16.0225	7.60
45-54 years old	1.9262	3.12	4.4666	6.08	3.1116	3.69	7.3509	13.78	21.8276	5.75	43.8853	10.52
55-64 years old	2.5572	4.20	11.1421	9.66	5.4375	5.35	20.0843	20.46	37.1072	6.69	82.4163	12.12
Education												
Higher education	0.6859	-2.61	0.2135	-7.64	0.2691	-5.65	0.0903	-13.39	0.3967	-4.15	0.0946	-9.06
Secondary School	0.8807	-1.01	0.5080	-4.84	0.5985	-3.02	0.3467	-10.23	1.0971	0.62	0.3547	-6.88
Spanish Region												
Northeast	0.9177	-0.46	0.3929	-4.75	1.2057	0.71	1.3679	2.82	0.1772	-5.45	1.1288	0.67
Madrid	0.9022	-0.56	0.6104	-2.99	1.1325	0.47	1.3005	2.35	0.3676	-4.47	0.0881	-5.34
Central Spain	0.9520	-0.30	0.5182	-4.30	1.1164	0.45	1.3054	2.73	0.8305	-1.11	1.1525	0.85
East	0.9036	-0.65	0.7519	-2.19	1.5804	2.07	1.0437	0.44	0.7484	-1.89	2.1056	5.18
South	1.0351	0.23	0.7939	-1.80	1.6465	2.29	1.0174	0.18	0.4493	-4.50	1.9964	4.76
Canary Islands	1.3132	1.15	0.6964	-1.54	2.9284	3.87	2.5212	7.30	0.1394	-3.29	1.1688	0.62
Year												
1996	0.5571	-3.27	0.7429	-1.95	2.4151	2.84	0.8205	-2.01	5.8334	4.45	0.9130	-0.65
1997	0.6185	-2.77	0.4713	-4.38	2.6347	3.17	0.8011	-2.27	7.9115	5.33	0.8412	-1.23
1998	0.8861	-0.76	0.9296	-0.51	2.7682	3.33	0.8112	-2.11	9.5606	5.87	0.8215	-1.39
1999	1.2145	1.29	0.9672	-0.23	5.0319	5.60	0.7102	-3.34	8.8794	5.66	0.7667	-1.87
2000	0.8947	-0.67	0.9080	-0.66	5.7711	6.12	0.7386	-2.98	7.1379	5.05	0.7082	-2.41
2001	1.5866	3.13	1.1395	0.93	4.2234	4.88	0.8516	-1.61	5.1351	4.12	0.6839	-2.62
Chi ²	5.109.35											
Pseudo R ²	0.1196											
N° observations	38.864											

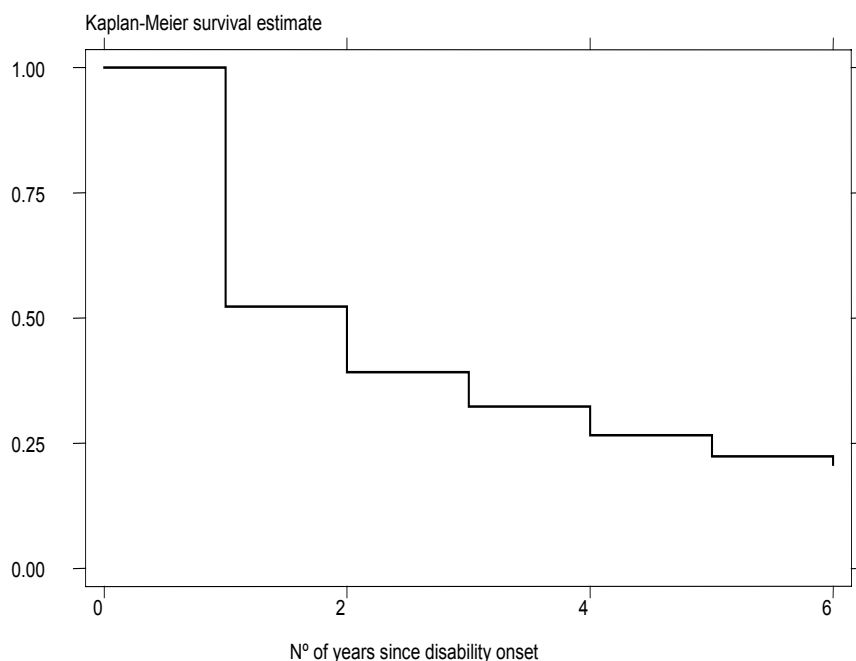
Source: European Community Household Panel. Years 1995-2001.

Note: Estimations have been calculated by using the weight available in the panel. Exp(B) shows relative probabilities.

As pointed out in the previous section, we analysed disability spells for those individuals whose disability started within the panel years. Once again we took Burchardt's work (2000) as our reference, and survival functions were estimated with the Kaplan-Meier method. The results are shown graphically below. Some considerations should be borne in mind before discussing the results. When the disability starts and finishes within the panel, the duration of the disability spell can be calculated. However, when the disability begins in the panel but does not finish within this period it is not possible to calculate its duration, although it can be assumed that the disability lasts at least until the end of the panel period. Another factor to point out is that individuals are observed annually, which means that possible outflows and inflows into the disability within a single year cannot be observed. In any case, and despite these limitations, the study of the duration of the disability can provide an initial approach to the subject.

Figure 1 shows the results obtained when estimating the survival function by the Kaplan-Meier method for disabled people. The horizontal axis shows the number of years (waves) since the beginning of the disability and the vertical axis the percentage of individuals disabled every year. The initial number of people who became disabled is 488.

Figure 1
Percentage of people who remained disabled throughout the period 1995-2001.

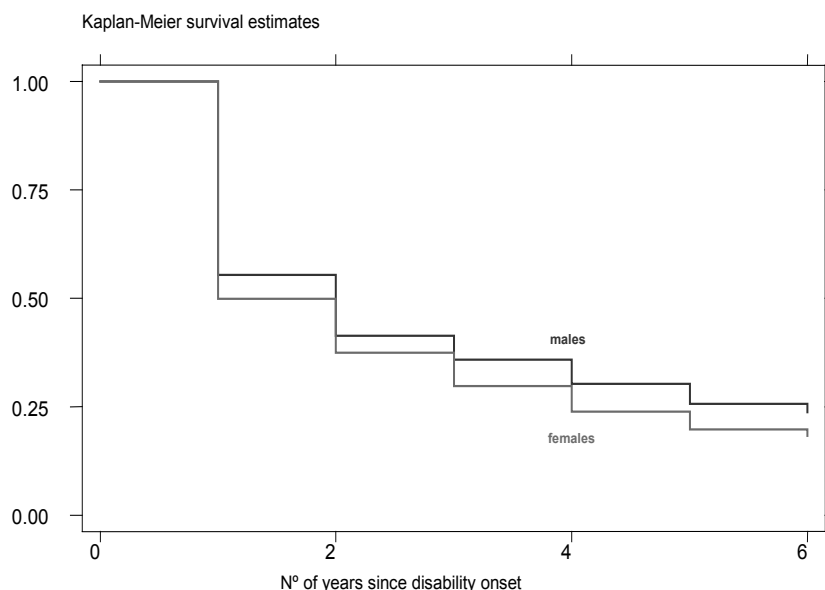


Source: European Community Household Panel. Years 1995-2001.

As shown in Figure 1, the percentage of people who remained disabled in the second year decreases significantly (almost 48%). Although the reduction is also important in the third year (25%), from this year onwards the number of people still disabled decreases more slowly to 22.34% in the sixth year. Despite not being able to know what happens beyond the 7-wave panel, we can assume that the survival functions should be similar to those obtained within the panel for the latter waves and so the form of the curve for remaining in disability should not be very different from the one shown in Figure 1 (Burchardt, 2000).

Figure 2 shows the survival functions using the Kaplan-Meier method broken down by gender. Although men have a slightly greater probability of continuing to be disabled than women, both distributions show very similar values. In order to verify whether this slight difference in men's and women's distributions is statistically significant, the *log-rank test* for equality was calculated. The results show that the differences are not statistically significant at the 5% significance level⁷.

Figure 2
Percentage of people who remain disabled throughout the period 1995-2001
by gender.

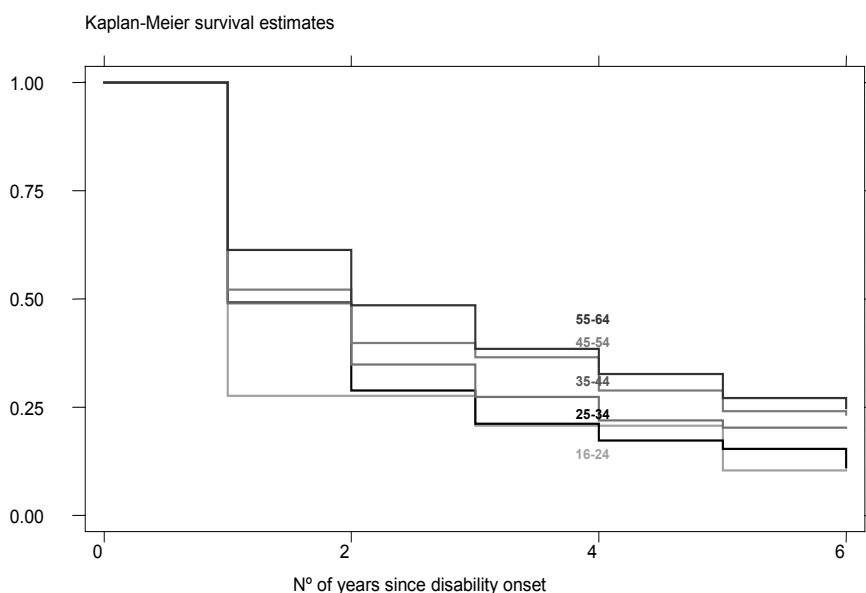


Source: European Community Household Panel. Years 1995-2001.

⁷ The value of the *chi-squared* statistic is 2.39 and the probability of being above this value for *chi*² is 0.1219.

The survival functions of the disability have also been estimated for different age ranges (Figure 3). As expected, the older people with a disability have a greater probability of remaining disabled throughout the panel. For example, for the year after the onset of the disability, the percentage of people aged between 55 and 64 who remained disabled was 61.31%, whereas this same percentage falls to 27.59% for people in the 16- to 24-year-old group. At the end of the panel the differences in the survival functions calculated for each age range decrease and become 24.13% for the older group (55-64 years) and 10.34% for the younger group (16-24 years). We have also applied the log-rank test for equality of the survival functions represented in Figure 3. The value for the *chi-squared* test (11.17) makes it possible to reject the equality of age distributions at the 5% significance level.

Figure 3
Percentage of people who remain disabled throughout the period 1995-2001
by age groups.

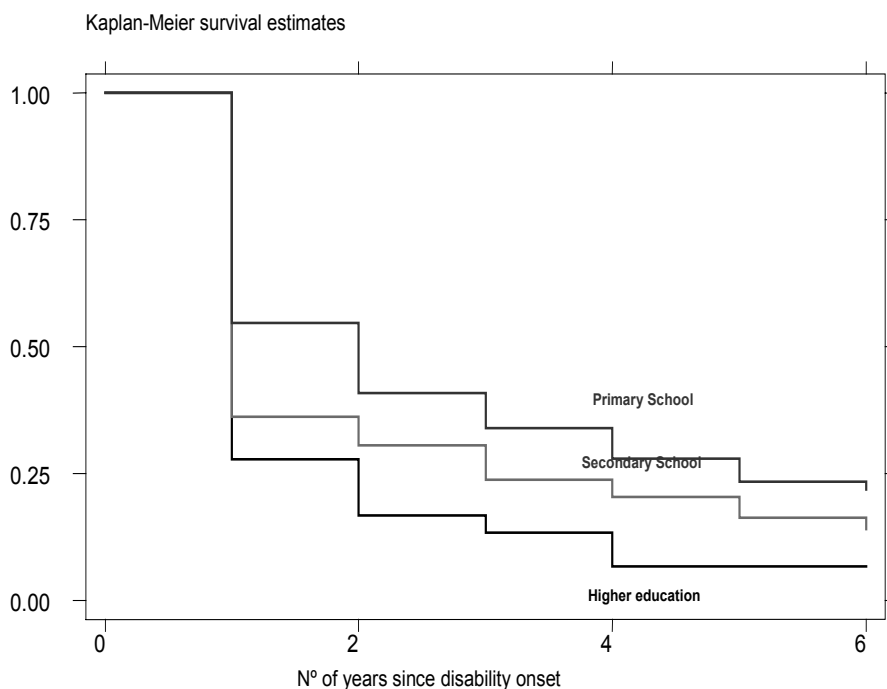


Source: European Community Household Panel. Years 1995-2001.

Finally, we calculated the survival functions according to the educational level of the individuals. According to Figure 4, those individuals with a lower educational level have a greater probability of continuing to be disabled throughout the panel waves. The differences between the three educational levels under consideration are very marked. For example, only 27.78% of the people who were disabled the first year and who had completed higher education remained disabled during the second year,

compared to 36.11% and 54.61% for those with secondary and primary school education, respectively. Throughout the panel, the disability permanence rates continued to decrease, although to a lesser extent, reaching 21.18% for people with primary school education and 6.67% for people with higher education. These important differences in the estimated educational distributions are corroborated by the log-rank test that yields a *chi-squared* statistic of 6.61, making it possible to reject the null hypothesis of equality of distribution at a 5% significance level. Furthermore, the results obtained when estimating the survival functions by educational level are closely linked to those shown in Table 4 and have already been described. That is, the people with the lowest educational level are mainly found on the trajectories with longer-term disability, and therefore higher permanence rates in disability are expected as shown in Figure 4.

Figure 4
Percentage of people who remain disabled throughout the period 1995-2001
by educational.



Source: European Community Household Panel. Years 1995-2001.

Although the results previously obtained are in line with the work of Burchardt (2000) for the United Kingdom, a limitation within our analysis is the lack of information available on the type of disability suffered by the individuals in the ECHP. One of the main characteristics of disabled people is the heterogeneity within the

group due to the differences existing for each type of disability. A possible way to control for this heterogeneity within the ECPH is to differentiate between those people with a “severe” disability (question PH003, people replying “Yes, severely”) and “moderate” disability (question PH003, people replying “Yes, to some extent”)⁸. The problem arising from this differentiation is that the sample size available becomes very small and makes the results less robust. Ideally we should have had information on the type of disability the individual suffers from available as in Kidd *et al.* (2000), who analysed the effect of disability on wage levels of the people with and without a disability. Having this information available would allow a more comprehensive analysis since it make it possible to identify the different trajectories existing within each type of disability and compare the results obtained.

6. CONCLUSIONS

Unlike the majority of studies carried out to date which have analysed disability from a static perspective, this work analyses disability from a dynamic standpoint. We have used the ECHP for Spain during the period 1995-2001 to build a panel of working-age individuals (16-64 years old) to identify the different disability trajectories followed throughout the panel by individuals and analyse their main socioeconomic characteristics. Using the work of Burchardt (2000) as a reference, our results show marked differences when a longitudinal analysis is used compared to a cross-sectional study for a given year. From a dynamic standpoint there are fewer people in the long-term disability trajectories, whereas the importance of this type of trajectory is significant when the analysis is done for a single year.

A descriptive and econometric analysis identified differences in the trajectories of disability followed by men and women, with a smaller presence of the latter in the disability trajectory defined as “Never.” The direct relationship between age and disability was revealed by the greater weight of older-people groups in long-term trajectories as a consequence of the deterioration of the individual’s health over time. One of the most interesting results was to verify the distribution of the individuals in each disability trajectory according to their educational level. Although a shorter disability is associated with higher education, the results reflect that the repeated disability trajectories, whether short or long, produce a more negative effect on the educational level than continuous trajectories. Interrupted education due to disability in many cases leads to dropout, lack of motivation, and a lack of adaptation on the part of the student following the disability, together with the serious problem of the educational system’s

⁸ This differentiation has been used in other work, for example, by the OECD (2003) and Pagán and Marchante (2004).

failure to adapt to the specific needs of disabled people. Significant differences have also been detected in the probability of being in a given disability trajectory according to the characteristics of the household, marital status, residential region and the year of the interview. According to the analysis of duration of the disability within the 7-year panel, and taking into account the considerations stated, the percentage of individuals who continue to be disabled in the first few years drops significantly, whereas after these initial years the decrease rate is much smaller. Although men have a greater probability of remaining disabled for more time than women throughout the panel, the difference between the distributions was not significant at the 5% level. On the other hand, distributions were statistically different when they were estimated according to the age and educational level of the individual, with the greatest probabilities of remaining disabled in the older age group and at lower education levels.

These results are in line with other international studies on disability and have implications for social and economic policies. The impact of public policies and actions in favour of disabled people would be better understood by making statistical data available allowing us to monitor individuals over time. Currently, the only available survey with these characteristics in Spain is the ECHP for 1995-2001. However, the ECHP is not specifically designed to measure disabilities in a detailed and comprehensive way such as knowing the type of disability (whether physical or mental), its time of onset, whether the individual is officially certified as disabled or not, etc. This type of information is available in other surveys in Spain, such as the Spanish Survey on Deficiencies, Disabilities and State of Health (*Encuesta sobre Deficiencias, Discapacidad y Estado de Salud*, EDDS) for 1999, but it is not possible to do a longitudinal analysis of disability with this survey. It should also be pointed out that although the European Commission has made the use of indicators compulsory to evaluate the effectiveness of its programs, plans, and actions (those for disabled people being among them and which have become more active in recent years), the information available is still insufficient to analyse the validity and efficacy of the implemented measures and whether the aims have been achieved.

One of the main objectives pursued at a public level within employment policies is to integrate disabled people into the job market. To achieve this aim it is necessary to design policies that identify and take into account the different trajectories of disability since, depending on the trajectory disabled people are in and their socioeconomic characteristics, this might make it easier for them to participate and remain in the job market. For example, those people in repeated short- and long-disability trajectories, which have an important weight within the trajectories analysed, but which are behind “one-off”, can encounter difficulties in the transition between employment and inactivity due to the lack of flexible and effective mechanisms (assistants, specialists in employment, adapting the workplace to the disabled, etc.) that permit an easy, smooth and non-traumatic transition between the two labour states for the person with a disability. In this regard, and after many years of demand from disabled people’s

representatives and organizations, if people with a disability are dismissed from a job they are now able to again receive the pension they had before finding that job. In this way disabled people can avoid the pitfalls of subsidies that keep them isolated and outside the labour market, especially for those in discontinuous trajectories. We have to bear in mind that in many cases the discontinuous nature of the disability trajectory is associated with the nature of the disability itself, for example, in the case of people with mental and emotional disorders. However, to obtain positive results in terms of insertion and employment, individuals' trajectories of disability must be identified and the measures and policies to implement adapted to the characteristics and needs of the people located in every trajectory, as well as carrying out preventive measures aimed at those people with a greater risk of being excluded from the labour market.

Finally, for efforts at the public level to produce the desired results, the cooperation and commitment of the employers is necessary, since this is the ultimate source of employment. At the level of firms, and as many economic agents have pointed out, it is necessary to break away from the discriminatory practices many companies have regarding disabled people, in favour of equal opportunities, fighting prejudice, mistrust, and fear and especially overcoming the lack of information and education in the business community regarding such people. As pointed out in current legislation on disability, moving forward toward equal opportunities and fighting against any type of discrimination should be translated into better and greater integration of disabled people in all areas of life, but especially in the labour market.

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