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To what extent does disability discourage from work? An empirical analysis of labour force participation of disabled people in Italy

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Abstract

This paper is an empirical study on the work opportunities of people with disability using Italian data collected through a survey carried out by ISTAT in 2004. Our analysis is guided by the conceptual framework of the capability approach and investigates the role of conversion factors in the ability to be employed and the type of employment. We first use a simple probit for labour force participation and then a sequential logit for the outcomes of participation as well as employment status. In all variants we find that chronic illness is a stronger deterrent for labour force participation than disability. Women are more discouraged by disability compared to men. Among the various types of disabilities, 'intellectual' disability is the strongest barrier as can be expected and hearing the least influential. In a sequential decision-making process, we find that disability affects both labour force participation decision and the ability to be employed but not so much the choice between part-time and full-time.

Keywords: disability, labour market, working opportunities, personal characteristics and environmental factors.

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All errors and omissions are those of the authors.

1 Introduction

The living conditions of people with disabilities have become a topical issue in recent years, for policy-makers and scholars alike. In the past, people with disability were confined to hospitals and excluded from the society. In modern societies, the value of every person is increasingly recognized and protected independently of his or her health condition. In this paper, we study the working opportunities and patterns of labour market participation of disabled people in Italy placing our analysis within the conceptual framework of the capability approach.

The capability approach, developed by Amartya K. Sen in the 1980s, is particularly suited to the study of disability given its focus on the multidimensional nature of well-being. In this approach, a *capability set* is the set of lifestyle choices faced by each individual and achieved *functionings* are outcomes resulting from particular choices. As suggested by Mitra (2006), the disability status can then be defined as a deprivation in terms of capabilities or functionings, caused by the interaction of different 'conversion factors' such as personal characteristics (e.g. age, sex and health conditions), available economic resources (e.g. income and assets) and the environment (physical, cultural, political, economic and social circumstances).

As a complement to this definition, the International Classification of Functioning, Disability and Health (WHO, 2001) characterizes disability as an ordinary condition, unhooked from the negative meaning of disease or disorder, and interpreted as a universal experience that can affect everyone during life. Therefore, everyone can experience a peculiar health condition, which could become a disability if circumstances are unfavourable.

Starting from these frameworks, we analyse Italian microdata on people with disability, with a specific focus on work conditions and labour market participation. This study contributes to the scarce literature about working conditions of disabled people, especially in the Italian context, and contributes to the knowledge of labour market dynamics for this population across countries. The data confirm the key role played by personal factors and the environment in determining the possibility of being in the labour force as well as the nature of the job for those who are employed. The results are in line with the dynamics suggested by the capability approach, showing that different factors influence the composition of individuals' capability set and contribute to the conversion of capabilities into achieved functionings.

In section 2, we refer to the theoretical approaches that have been proposed in the literature to define disability, with special reference to the one that we apply, namely the capability approach of Amartya Sen. In section 3, the literature on disability and work is summarized, as well as the legal framework, focussing on the key issues that our applied research develops in the following sections. Italy is shown to be a particularly interesting case due to the high employment quota and non-compliance sanctions on firms. In sections 4 and 5, we introduce the data analysed and describe the characteristics of the population. In section 6, we present the main empirical findings of the paper. Different probit models are used to identify which personal characteristics and environmental factors influence the probability of being in the labour force. As a further investigation, we employ two sequential logit and multinomial logit models to understand which factors affect significantly the transitions among different working situations. Finally, section 7 wraps up the analysis with some concluding remarks.

2 Conceptual framework

There is no clear consensus on what constitutes disability. Different disciplines have tried to define this condition, using various perspectives and frameworks. Among those, the most known are the Medical Model, the Nagi Model, the Social Model and the different Classifications elaborated by the World Heath Organization (WHO). In addition, different authors have recently used the capability approach (Sen (1985) and Sen (1999)) to understand disability. In what follows we will briefly describe the different models ending with the approach that we use in our study in order to place our research in the larger perspective.

2.1 Models on disability

The Age of Enlightenment in the 18th century brought about a scientific understanding of the causes of impairment and the confidence in medical science to cure (or at least rehabilitate) disabled people. The notion of 'normality' was built during these years, and impairments are seen as a deficit, underlining what a person cannot do, instead of what one can do. This line of thinking is at the core issue of the so-called 'medical model' (Pfeiffer (2001) and Mitra (2006)). This model sees disability as an individual problem caused by a disease, a trauma or an injury. People are defined by their medical condition and, consequently, need medical care in form of treatment and rehabilitation, in order to be adapted to fit the world as it is.
As a reaction to the dominant medical model, the 'people with disability movements' introduced, in the 1960s, a different perspective on the issue that gave rise to the social model. The movements perceive the difficulties faced by disabled people as the result of social and physical barriers which obstruct them in different dimensions: at school, at home and at work (Pfeiffer (2001) and Mitra (2006)).
The sociologist Saad Nagi (Nagi (1965) and Nagi (1991)) introduced an additional dimension in the 'social' conceptualisation of disability (the so-called 'Nagi Model'). In this model, disability is strictly correlated with the individual's roles as expected by the society. The example in Mitra (2006) explains the mechanism at work. A young girl with mental retardation who does not go to school is considered disabled only if the society expects all the girls to attend school during the same age period. Therefore the Nagi model 'promotes a social and cultural relativistic view of disability' (Mitra, 2006, p. 238) and cannot be considered complete and exhaustive.
The most recent disablement model is the ICF (International Classification of Functioning, Disability and Health) by the World Health Organization (WHO) which started in 1980 and has undergone several revisions since then. It has been defined as the biopsychosocial model of disability introduced with the goal of creating a common language for disability.
The ICF 'attempts to achieve a synthesis, in order to provide a coherent view of different perspectives of health from a biological, individual and social perspective' (WHO, 2001, p. 20). The goal of the latest ICF revision is to remove the negative connotations associated with

disability by using more positive terms to describe its characteristics, in line with all modern disablement models. Unlike previous versions, the ICF codes all the components of health and provides a uniform perspective based on biological, individual and social factors.
The ICF is the most global classification in health-related analysis. Its aim is the measurement of the functionings of an individual within the society, without taking into account the reasons for the impairment thus shifting the focus from cause to impact.
Finally, different authors have recently used the capability approach (Sen (1985) and Sen (1999)) to understand disability. The main pillars of the conceptual framework are the definitions of functionings and capabilities. Capabilities are defined as 'various combinations of functionings (beings and doings) that a person can achieve. Capability is, thus, vectors of potential functionings, reflecting the person's 'freedom to lead one type of life or another' (Sen, 1992, p. 40). From this point of view, disability is viewed as a deprivation of functionings or capabilities, shifting the attention from the disability status per se to its impact on the individual's opportunities and choices (Mitra (2006)).
In a way, one can say that the capability approach combines all the above approaches by widening their scope and reasoning by taking the perspective of individuals' opportunities to do the things they value in life.
This paper combines the ICF and the capability approach as on the one hand the survey we use is in line with the ICF given the extended concept attributed to disability and the inclusion of questions concerning participation in social life and the influence of the contextual factors, and on the other hand the empirical model that is formulated analyses how the capability to work and the achieved functionings are affected by various types of disability as well as circumstances.

3 Literature review and the Italian legislative context

Literature on the relationship between disability and labour market outcomes has been developed in the last decade (Gannon and Nolan (2003), Jones et al. (2003), Jones et al. (2006), Kidd et al. (2000)). Most of the studies have included chronic illness as well as physical/mental disability in their definition of disability and investigated its impact on employment or labour force participation.

Much of the analysis has concerned developed country data and in particular the U.K. and Ireland. Gannon and Nolan (2003) use data from the Living in Ireland Survey 2000 and the Quarterly National Household Survey 2002 and employ a probit model to estimate the probability of participating in the labour force. Jones et al. (2003) use UK data from the 2002 Labour Force Survey in a first study and the 1997-2003 British Labour Force Survey in a subsequent paper, applying a Heckman two-stage procedure to investigate the size of a discriminatory wage differential between disabled and non-disabled employees. Kidd et al. (2000) perform a similar exercise also using U.K. data (i.e. the British Labour Force Survey 1996). One study that looks at a developing country setting is that of Mitra and Sambamoorthi (2006) who use the 2002 National Sample Survey which is representative of all

non-institutionalized persons to estimate the likelihood of employment (binary choice model).

As can be expected, all studies find a significant difference in participation between disabled and non-disabled persons. The probability of being employed is strongly reduced by a chronic hampering health condition or disability. Within the sub-sample of disabled people, Jones et al. (2003) find a higher labour market disadvantage for people with mental health forms of disability, which include both mental and intellectual problems. This is reconfirmed in their later study which splits the sample into those who are affected by work-limiting disabilities (self-reported long-term illness which lasts for at least twelve months and limits the type or the amount of work), non-work-limited disabled people and non-disabled ones, and reports a lower employment probability for people with mental health forms of disability compared to other types of disability if they are not work-limited. Kidd et al. (2000) which only uses data on males reports that disabled men are more likely to work part-time and to be absent from work for sickness, and psychological or learning difficulties are the most disadvantageous conditions for the probability of being in employment among disabled men.

A uniform finding across all studies is that education is a strong and significant factor in explaining the probability of being employed, with a larger effect for for disabled persons than for non-disabled ones. Gender comparisons show that married men are more likely to be employed than married women (disabled or not). Presence of young children (under 12 years old) is a powerful deterrent for women.

Finally, some studies look at the relationship between disability and household income. Among those, Parodi and Sciulli (2012) examine the Italian situation using the IT-SILC dataset (i.e. the Italian component of EU-SILC, European Union Statistics on Income and Living conditions) for the period 2004-2007. They find that the probability of staying in a low-income status is higher for households with disabled members. Further, some structural variables, such as living in the South of Italy or having a small size household, increase the probability of being in low income for households with disabled members. Cullinan et al. (2011), using Irish Data, and Zaidi and Burchardt (2005), with UK data, consider the presence of people with disability within the households as an additional source of expenditure that might impact the standards of living of all family members and advocate an 'equivalence scale' approach based on disability.

This paper analyses to what extent disability affects a person's *ability to work* unlike previous studies which mainly look at the probability of being in employment. An additional feature is the distinction made between the effect of chronic illness and that of disability which is rarely done in the literature so far. In other words, our primary aim is to find out the impact of disability on the 'willingness to go on the job market' irrespective of whether the disabled end up being employed or not. That is why we have said 'discourage from work' in the title rather than 'having a job'. Finally we compare different methodological approaches and choose the most appropriate one for our context.

The data we use is also unique in the sense that it is constructed from a national survey that was undertaken in Italy specifically to identify disabled people and collect data on their labour market outcomes. The Italian case is of particular interest, since the country has among the highest employment quota and non-compliance sanctions on firms, which make the Italian legislation a flagship case in the European setting.

In light of the above, before ending this section, we briefly describe the Italian context, in particular the legislation on labour market access for disabled persons in Italy. Lalive et al. (2013) shows that Italy is one of the countries with the highest employment quota and with the highest non-compliance sanctions[1].

The measure concerning employment protection in favour of people with disability started gaining importance in Italy at the end of the 1960s, through Law 482 of 1968 - 'General rules on compulsory enrolment of handicapped persons in the public administration and private enterprises'[2] and, subsequently, through Law 104 of 1992 - 'Framework Law on support, social integration and the rights of handicapped people'[3], which extended compulsory employment to disabled people with psychological impairments.

Notwithstanding, the real innovative change for integrating disabled persons in the labour market was introduced by Law 68 of March 1999, 'Regulation on the right to work of disabled persons'[4], which introduced the principles of targeted employment. It is based on the concept of matching the needs of the enterprises with the disabled person' s characteristics, aiming at putting the right person in the right place (Article 2).

Law 68/1999 concerns public and private employers with more than 15 employees, who are obliged to employ disabled workers according to the following proportions[5]:

- 15-35 employees: 1 disabled worker (nominative call)[6];
- 36-50 employees: 2 disabled workers (1 nominative call and 1 numerical call);
- More than 50 employees: 7% of employees (60% nominative calls and 40% numerical calls).

Furthermore, this law also comprises a benefits framework for partial relief from social security contributions and financial measures to support any adaptation of work environment. It also introduces sanctions for employers that do not meet the disability employment target, through a compensation fee to a specific fund managed at regional level. Finally, it assigns a high responsibility for its application to regional authorities, which have to coordinate employment offices, schools, provinces, associations, cooperatives, unions, etc. for implementing the law. Even though, Law 68 of 1999 aims at introducing measures for promoting an individual-based plan addressing the integration and placement of disabled persons in the labour market, the lack of cohesion and coordination among actors involved, the significant differences across

[1] A detailed analysis on employment quota schemes in different countries is also available in OECD (2003).

[2] Published in the Official Journal, n. 109, April 30, 1968.

[3] Supplement to the Official Journal, n. 39, February 17, 1992.

[4] Supplement to the Official Journal, n. 57, March 23, 1999.

[5] There are some exceptions from the obligation for political parties, unions and organizations of social solidarity, nevertheless they are obliged in case of new hirings.

[6] People with disabilities must be registered in a specific unemployment list to benefit from this law and employers can hire by nominative calls (introduced by Law 68/1999) or numerical calls (through a specific ranking). Furthermore, Article 11 introduces the possibility of hiring through special Agreements stipulated with authorized offices, which concern the possibility of apprenticeships and vocational training, longer trial period, reduced working time and part-time contracts, temporary work in social cooperatives, etc.

regions and the propensity of private and public bodies to not comply with their obligations (preferring the risk to be sanctioned and counting on delays in public controls and verifications) do not facilitate its implementation[7].
Finally we would like to clarify that this study cannot evaluate the impact of the strict legislation on the employment of disabled people as we do not have observations relating to either the period before the introduction of the laws or another context. Thus this description is only to give an idea of the special setting relating to our study.

4 Data and empirical strategy

The data used in this paper are from the Italian Survey on People with Disability, carried out in 2004 by ISTAT (Italian National Institute of Statistics), (ISTAT, 2004a).
The survey is directed towards Italian disabled persons who live in households, and the people interviewed are those who stated severe difficulties in functions (physical, sensory or in daily activities) and severe impairments or reductions in autonomy during a previous survey held in 1999-2000 ('Health conditions and use of health services survey'). The potential sample from the first survey is 4,011 persons. However, given the elapsed time between the two surveys, some people were not available for the second interview or could not be reached. Therefore, the 2004 survey only counts 1,632 individuals. Our results have to be interpreted keeping this in mind and therefore under the assumption that attrition is random. Furthermore, given the particular sampling design, the questionnaire is not aimed at disabled people with a disability that arose after the period 1999-2000.
All people in the survey are disabled, but we can distinguish between those who are disabled 'stricto sensu' (i.e. who specifically reported a mobility, sensory or psychiatric disability)[8] and those who are disabled in a more general sense (they have chronic diseases, limitations in daily activities and reduction in autonomy). Thus we do not aim to identify disabled people using the capability approach, but rather to analyse how one of the key capabilities in life, namely capability to work, is affected by disability.
Given the distinction between capability and (achieved) functioning in the capability approach, we should not only consider people who work (and, indeed, have the capability to work) but also those who do not work but may still have this capability. Thus our empirical strategy is geared towards an understanding of the factors that influence the state of being employed or being able to be employed implying a state of feeling fit to work or wanting to work, of disabled people, given their personal characteristics, the environment in which they live and the resources available.
The sample allows us to disaggregate the data by area which is particularly relevant in a country like Italy characterized by deep differences in the labour market across areas. A

[7] For further information on the implementation of Law 68/1999, see Ministero del Lavoro (2006, 2008, 2011). Every two years the Italian Ministry of Labour presents to the Parliament a report about the implementation of Law 68/1999.

[8] The interviewees could state different types of disability. Physical disability, sensory disability, intellectual disability and emotional disability. Intellectual disability is characterized by impaired cognitive functioning and a lack of the skills necessary for daily living, while emotional disability influences person's ability to recognize and express fundamental emotions, but it is not caused by organic abnormalities of the brain.

further differentiation is done with respect to gender to capture the difference in attitudes and perspectives towards working.
The literature on disability and employment clearly shows different likelihoods of employment by type of disability and we take account of this strong heterogeneity in our analysis. Since the ability and willingness to work is also influenced by general health conditions, we distinguish between the impact of 'disability' from that of 'illness' which is not always the case in the literature.

5 Descriptive analysis

5.1 General characteristics

As underlined in the previous section, the sample is composed of 1,632 individuals from 4 to 67 years old, with an equal proportion of men and women (817 and 815 respectively). The most frequent age group is 55-64, followed by the 45-54 one and 65+. The majority (60.6%) of people interviewed (with no difference by gender) are married and live with the partner, while 30.1% are single or have never been married, this share being higher among men (35.2%). As for the geographical location, 44.6% live in the South of Italy or in Sicily and Sardinia, 37.3% in the North and 18.1% in the Center.
In the sample, 52.6% have only one disability (with a majority of men, 55.6%), 31.7% are without disability 'stricto sensu' (especially among women, 36.8%), and 12% have two types of disability, with a prevalence among men, 13.9%. However, within the group of people without any disability 'stricto sensu', interviewees present limitations in daily activity and/or chronic diseases.
Those who have just one disability are affected by mobility impairments in 53% of cases, with a prevalence of women. The second type of disability stated is correlated with hearing impairments and men are more represented in this group than women, with a gender gap of 10.1%. Other disabilities present lower percentages and the language one is never present alone[9].
Descriptive evidence on the education levels (with 1,220 observations, given by people from 25 to 64 years old[10]) shows that men have on average higher qualifications than women. In particular, in most cases (34.4%) males have a leaving certificate awarded by a secondary school, while females have a primary school qualification (36%). Only 3,7% of the population have a master or bachelor degree, while 7.4% do not have any qualification.
Comparing these results with those of the whole Italian population, obtained from IT-SILC 2004 (the Italian component of EU-SILC, European Union Statistics on Income and Living conditions, ISTAT (2004b)), we notice that a university degree is achieved by 10.7% of IT-SILC interviewees aged 25-64, with really close percentages between men and women.

[9] If the interaction between two disabilities is considered, the most common situation is mental health and intellectual disability at the same time or cognitive and mobility disabilities together.
[10] The age restriction is applied throughout the analysis, in order to find more reliable results, especially when the education level is involved.

The majority obtains a high school diploma (31.7%, similarly between men and women) or a secondary school certificate (33.1%, with a prevalence among men, 35.6%). Thus differences are notable between the general population and the disabled group and tend to be more pronounced in the case of women.
As could be expected, intellectual disability is correlated with a wide disadvantage in education. The overall majority (69.1%) of interviewees with this condition obtained, at most, a primary school qualification, none of them received a university degree and only 9.8% have a high school qualification, which is the lowest percentage among types of disability for this level of education. The group affected by emotional problems presents the highest number of graduates (13.7%), even though it presents high heterogeneity, and physical or sensory disabilities are the most represented health conditions in secondary and high school diploma holders. Finally, if we consider the cause of disability, we find that the association of genetic cause with education is stronger for women, while men do not seem to have been influenced. The greatest percentage of people without any qualification is in the South of Italy (11.9% of females and 9.9% of males), while the highest percentage of graduates is in the North, without any difference by gender (5.1%).

5.2 Employment and disability

Considering the population between 25 and 64 years old, 41.9% of men are employed, a fraction that decreases sharply (24%) for women. For the whole Italian population in IT-SILC statistics, 58.7% are employed, with a prevalence among men (72%). As the number of disabilities increases, the percentage of employed people decreases and nobody with more than three types of disability has a job (people with four or five disabilities are all *unable* to work). A good proportion of women are housewives (34.6%), while men work at home only in 0.2% of cases. In IT-SILC 2004, instead, we find that 16.4% of the population fulfil domestic tasks and have care responsibility, in particular among women (30.7%).
In our sample, among those who are employed, 83.3% has a permanent contract and 80.8% has a full-time job, especially among men (86.5%). In the IT-SILC population, instead, 89.3% are employed full-time, especially for men (96%). Part-time works are consequently mainly covered by women in both samples. People with a part-time job in ISTAT 2004 justify their working hours in different ways on the basis of gender. For the majority of women, having a part-time job is dictated by family reasons in 30.4% of cases, especially in the group with 45-54 years old women. This could happen because they have to look after elder members of the family or children. For men, instead, family reasons are the cause of half-time work only in 1% of cases. Health reasons seem to be the major cause (for 52.7%) for part-time work for men, with higher percentages in the age ranges of 35-44 and 45-54. Among those persons with a part-time job, 22.5% would like to have a full-time one. This happens for 27.5% of women, especially between 55 and 64 years old, and among young men (15-24 years old).
To sum up, women seem to provide care work within the household in most cases and this task influences their working hour decisions (but only among those who are more than 25 years old), while for men it is the health condition that determines the number of hours

worked.
Furthermore, physical disability allows to achieve higher job positions, while the intellectual one creates the biggest disadvantage (all people affected by intellectual disability are blue-collar workers). Among white-collar workers, women are more represented than men (35.4% and 27.2% respectively), while the opposite happens for managerial positions, which are nevertheless seldom held by disabled people.
Having a genetic impairment does not seem to be a disadvantage in obtaining higher job positions than those obtained by people with other sources of disability. Quite surprisingly, 10.8% of men with this characteristic are executives or managers (especially in industry) and the majority is white-collar (63.7%). This finding might be correlated with the fact that men with genetic disability also tend to achieve higher education levels, as also showed previously. Genetic limitations are a disadvantage especially for women, as they lead them to be more represented among the blue-collar group, while men state a lower level in their job position when the limits are a consequence of accidents.

6 Estimation results

In this section, we go beyond simple descriptive evidence to draw model-based inference from the data. First, a probit model is specified to identify the personal characteristics and environmental factors that influence the probability of being in the labour force, with a focus on the differences between men and women. To deepen our analysis, we formulate a sequential logit model to understand the factors affecting the transitions among different working situations. Finally, the sequential logit model is compared with a different version as well as a multinomial logit model.

6.1 The probit regression model for the disabled labour force

Our first model is a probit regression model with a binary outcome variable which is equal to 1 if the person is in the labour force, and 0 otherwise. In our case, disabled persons are included in the labour force group if they say they are employed, seeking their first job, actively seeking a job or seeking a *new* one (independently from the fact that they sought actively or not in the last 4 weeks). So our set includes all people who are either working or wanting to work irrespective of whether they are housewives, students, retired and people in other conditions[11]. Given that there is no direct capability question in our date, this 'large' definition provides an indicator of whether the person feels (s)he is *able* to work or not, and

[11]The real definition of labour force includes employed people and those seeking work. The ILO defines the labour force as the number of working-age people engaged actively in the labour market, either by working or looking for work. As such, the labour force is obtained summing the number of employed and unemployed. In our setting, however, some people state to be housewives, students, retired or in other conditions and, at the same time, they admit they are looking for a job (this group is very small) and thus are included in the labour force. Others state to be in the category of those who are looking for the first or a new job, even if in practice they did not do any active action to find a job in the previous 4 weeks. For this last category, the broader definition of unemployment is applied, relaxing the criterion of being an active job seeker, as suggested by ILO.

it is within this definition that we want to analyse the effect of disability.
Potential determinants of labour force participation include the classical ones given by human capital characteristics, as well as health and disability characteristics (e.g. chronic diseases, disability status/type of disability) and some controls. Even if our sample is only concerned with disabled persons, a substantial proportion of the respondents do not state any specific disability 'stricto sensu' as seen in the descriptive section. Thus it is possible include a disability variable among the explanatory factors even for our sample. However, the magnitude of the disability coefficient can be lower than for the general population since the sample is not representative of the whole population.

Table 1 provides a complete list of the explanatory variables used in our empirical models.

[Table 1 here]

We report the average marginal effects in Table 2.

[Table 2 here]

We first estimate the model for the full sample, pooling men and women together. While Column (1) of Table 2 reports a negative and significant average marginal effect of age, the probit coefficients show a significant inverted-U shape relationship between the likelihood of participating in the labour force and age. Therefore, being older decreases the chances of entering the labour force and this effect occurs relatively early in the life of disabled people. Interestingly, the civil status does not have a significant effect on the likelihood of participation in the labour force, while being a woman decreases significantly the possibility of being in the labour force by 14.2%. This result could be explained by the double discrimination faced in the labour market (but not only in this sphere) by disabled women: being female and being disabled (Abu Habib (1995) and Sen (2005)). On average, people affected by chronic diseases have a 9.5% lower probability to enter the labour force, while being disabled 'stricto sensu' does not have a statistically significant impact. Furthermore, the coefficient of the interaction term between the dummy variable for the disability status and the dummy variable for the chronic disease (not reported) remains insignificant. Thus chronic disease seems to be a stronger cause for not being in the labour force than disability all other characteristics being equal.
Education levels higher than the primary school certificate, which is the reference group, increase the possibility of entering the labour force by 12%, 27.6% and 26.5% if the education level corresponds to secondary school certificate, high school diploma or university degree, respectively. Conversely, not having attended any school significantly lowers the likelihood of entering the labour force by 13.8%. Furthermore, if we compare the marginal effects associated with different education levels, it is found that having a high school diploma or a university degree does not make a big difference, while jumping from no qualification to primary school, from secondary to high school or from primary to secondary school leads to a significant increase in the probability of entering the labour force. The importance of

obtaining qualifications for disabled people also emerges in the analysis of Jones et al. (2003) and Jones et al. (2006) for UK.
Finally, people living in the South/Islands (i.e. the area with the slacker labour market and with more difficulties in implementing laws addressed to people with disability) are less likely to participate in the labour force than those living elsewhere in Italy, with a marginal effect of 7.2%. This may be an outcome of a worse labour market situation, a lower degree of implementation of laws in favour of the job placement of people with disability and of poorer active labour market policies.

As a further analysis, we split the sample into men and women. Columns (2) and (3) of Table 2 report the average marginal effects estimated from the Probit model for labour market participation. Like in the pooled sample, the likelihood of participating in the labour force is increasing with age, but the effect fades out and turns negative for old people. Being married and living with the partner is a significant predictor of the participation in the labour force, with a positive effect for men and a negative one for women, confirming the existing evidence (Gannon and Nolan (2003), Jones et al. (2003) and Mitra and Sambamoorthi (2006)).
Women affected by chronic diseases are less likely to participate in the labour force than those without such type of diseases, on average by 11.1%, while disabled women are 8% less likely to participate in the labour force than non-disabled ones. This reinforces our earlier finding of chronic illness having a bigger impact than disability, here for women.
Moreover, in our probit analysis the coefficient of the interaction term between being disabled and having a chronic disease (not reported) is significant and negative for men and not significant for women. Furthermore, the descriptive analysis in section 5.2 suggests that health conditions are the main reason for having a part-time job, particularly true for men. The econometric evidence in Table 2, columns (2) and (3), shows in fact that health conditions are also a significant factor in determining the decision to participate in the labour force both in general and especially for women.
Any education level higher than the primary school certificate (the reference group) has a positive and significant impact on the probability of entering the labour force for men. Women, instead, are more likely to participate in the labour market only if they have achieved the two highest levels of education (university degree or high school diploma). As for the different impact across education levels, there is a positive and significant difference between labour force participation for men with a secondary school certificate and for those with primary school. Also, the effect of having a high school diploma is significantly higher than the one of having a secondary school certificate. For women, instead, there is a significant jump in the probability of entering the labour force only when going from secondary school to high school.
Finally, the probability of being in the labour force is 11.2% lower for men living in the South than for those living elsewhere in Italy. Conversely, women in the South do not have a statistically different probability of participating in the labour force from that of women living elsewhere in Italy and this is probably due to the fact that they are probably disadvantaged also in the North/Center of Italy.

Until now the econometric analysis was focused on the whole sample of disabled and 'non-disabled' people. We now exclude those who did not report a disability 'stricto sensu'. The probit regression model has the same dependent variable (equal to 1 if the person is in the labour force, and 0 otherwise) and explanatory variables, except that we distinguish disabilities by type, and these types substitute the dummy variables indicating the presence of chronic diseases and disability.

The average marginal effects estimated from the modified probit model are reported in Column (4) in Table 2. Again, we estimate an inverted-U shaped effect of age on labour force participation, with the marginal effect being negative on average. Being female has a negative and significant impact of 14.3% on the probability of participating in the labour force, while the civil status does not affect it. The marginal effects of the education indicators are measured with respect to those people having a primary school education. In general, obtaining a high education level (high school diploma or university degree) has a positive and significant effect on the likelihood of participating in the labour force, with average marginal effects of 31.5% and 29.9% respectively, even if the difference between obtaining a university degree and a high school diploma is not statistically significant[12].

People living in the South or in the Islands are, on average, 7.3% less likely to participate in the labour force than people living elsewhere, confirming the territorial duality of the Italian economy. Finally, the marginal effects of the type of disability indicators are estimated taking the physical disability as reference group. Having a hearing disability rather than a physical one increases the probability of being in the labour force by 14.9%, while people with intellectual disability are 24.7% less likely to enter the labour force. This result is in line with the descriptive evidence in Section 5.2, the empirical findings in Jones et al. (2006) and in Jones et al. (2003) on the probability of being employed in the British labour market and with the Indian study of Mitra and Sambamoorthi (2006).

We then proceed by estimating the same probit model for men and women separately. Columns (5) and (6) of Table 2 report the marginal effects. Like in the pooled sample, being one year older decreases the likelihood of participating in the labour force by about 1.6% for men and 1.7% for women. Married women and men do not display different patterns of labour force participation with respect to their unmarried counterparts.

Compared to physically disabled people (the reference group), women with a hearing disability are 21.3% more likely to participate in the labour force, while the effect of a hearing disability for men is much smaller (13%). Furthermore, women with an intellectual or emotional disability are less likely to enter the labour force than those with a physical disability (with marginal effects of 19.5% and 13.4%, respectively), while these types of disability do not make significant difference on labour force participation of disabled men compared to physical disability. Jones et al. (2003), instead, find that having mental health forms of disability influences significantly and negatively the probability of being in employment for both men and women in UK.

[12] Only jumping from secondary school to high school is statistically significant.

Obtaining a higher education level than primary school has a positive and significant effect on the likelihood of participation in the labour force for men. More specifically, having a secondary school certificate has a statistically different effect from a primary school one, while there is no difference between a university degree and a high school diploma. For women, instead, only a high school diploma has a significant effect of 20.8% on average and, if we compare the effects of achieving different education levels, we obtain a statistically significant difference only between high school and secondary school. Finally, disabled women in the South/Islands do not have a statistically different probability of participating in the labour force from those living elsewhere in Italy, while for men there is a negative and significant effect of 8.4% on average.

Overall, the type of disability seems to be an important factor in determining the labour force participation of women, with emotional and intellectual disabilities having a negative effect. Conversely, the level of education plays an important role mainly for men. Furthermore, health conditions seem to affect men within the labour market as we saw in the decision of not working full-time (section 5.2), while for women the health status plays a role in the probability of participation in the labour force, that is, 'before' the employment choice is taken.

6.2 A sequential logit model for the working conditions

To dig further into the mechanisms behind our findings, we use a sequential logit model that allows us to focus on the 'transitions' between different working situations[13]. This model can be interpreted as corresponding to a tree decision structure of the form depicted in Figure 1. More specifically, the model first identifies which factors influence the entry in the labour force. Once an individual is in the labour force, then (s)he can be unemployed or employed. If (s)he is employed, then (s)he could be a part-time worker or a full-time one. Each of these 'transitions' can be influenced by different personal and external factors, such as age, marital status, gender, education level, place of residence and health status[14], and the sequential logit model models the probabilities of passing these transitions[15].

[Figure 1 here]

[13] For more information about the model, see Buis (2007).

[14] The choices specified in the sequential logit tree don't have to be necessarily binary (i.e. pass or fail).

[15] The probability of observing someone who is not in the labour force equals the probability of failing the first transition. The probability of observing someone unemployed equals the probability of passing the first transition and failing the second one. The probability of observing someone employed part-time is equal to the probability of passing the fist and the second transition, but failing the third one. Finally, the probability of observing someone employed full-time is equal to the probability of passing all the transitions (Buis (2011)).

The effects in each scenario are estimated using Maximum Likelihood and the likelihood function for an individual i can be written as:

$$L_i = \begin{cases} 1 - p_{1i} & \text{if } y_i = \text{ not in labour force} \\ p_{1i} \times (1 - p_{2i}) & \text{if } y_i = \text{ unemployed} \\ p_{1i} \times p_{2i} \times (1 - p_{3i}) & \text{if } y_i = \text{ employed part-time} \\ p_{1i} \times p_{2i} \times p_{3i} & \text{if } y_i = \text{ employed full-time} \end{cases}$$

where

$$\begin{cases} p_{1i} = \text{probability of being in labour force} = \Lambda(x'_{1i}\beta_1) \\ p_{2i} = \text{probability of being employed given in labour force} = \Lambda(x'_{2i}\beta_2) \\ p_{3i} = \text{probability of being full-time employed given employed} = \Lambda(x'_{3i}\beta_3) \end{cases}$$

and $\Lambda(x'_{ji}\beta_j) = \frac{exp(x'_{ji}\beta_j)}{1+exp(x'_{ji}\beta_j)}$.

We see at least two reasons for using a sequential logit model rather than a nested model for modelling the different working situations. First, disability being a potentially strong discouraging factor for any activity and hence the willingness to work for disabled people is above all the result of a conscious decision-making process that goes beyond economic considerations to the development of an appropriate mind-set that overcomes the challenge of disability. Thus the decision to go on the job market is taken in a first step before actively seeking a job. Secondly, a nested model assumes that there is no correlation between alternatives in *different* nests or groups (i.e. the property of IIA, Independence of Irrelevant Alternatives)[16], but only correlation among alternatives *within* each nest (or group). However we do not want to exclude possible correlations between different choices in all nests due to the role played by (unobservable) attitudes at all levels of decision-making. In addition, the sequential model framework allows us to test interesting hypotheses across transitions from one state to another. We also compare our results with alternative specifications without any sequencing (e.g. multinomial logit) and find that the sequential model results provides better interpretations.

Starting from the above specification of the (transition) probabilities, we introduce some unobserved individual heterogeneity following the approach by Buis (2011). In this approach, an additional unobserved standardized variable z is introduced[17] with a coefficient γ in each transition probability and different values are assumed for γ leading to different variances of the variable z. This is done in order to perform a sensitivity analysis of the impact of unobserved heterogeneity on the estimation of the coefficients of observed variables.

[16]The Independence of Irrelevant Alternatives means that an individual's choice between two alternatives is unaffected by other choices available. If A is preferred to B out of the choice set A,B, introducing a third alternative X, which expands the choice set to A,B,X, do not change the preference for A or B. In other words, X is irrelevant to the choice between A and B (Weiler (1986)).

[17]For practical purpose, we do not consider a single unobserved variable, but a weighted sum of all the unobserved variables and our model assumes that the unobserved component is normally distributed and its value and effect remain constant over the transitions (Buis (2011)).

Formally, we write:

$$p_{ji} = \Lambda(x'_{ji}p_j + z\gamma), i = 1, 2, 3 \tag{1}$$

with $z \sim N(0, 1)$ and different possible values for γ.

The explanatory variables of our models are given in Table 1.

[Table 1 here]

Table 3 shows our results, considering different amounts of unobserved heterogeneity, starting from the case of no omitted unobserved variables i.e. fixing the values of γ from 0 to 2. We assume γ to be constant over transitions.

[Table 3 here]

Results show that being older is beneficial at the first and third transitions, but the effect fades out and turns negative for old people. For a one year more of education, the log odds of being in the labour force, in employment and a full-time worker increases, with stronger effects when the amount of unobserved heterogeneity increases, and this is coherent with expectations and what has been found in section 6.1. Having a disability and living in the South/Islands do not help passing the first two transitions, i.e. to enter the labour force and to be employed, and the size of the effects increases as the amount of unobserved heterogeneity increases.
Furthermore, having a chronic disease contributes negatively to labour force participation and full-time employment, and this is in line with the results found in section 5.2 where health conditions are recognized as one of the major causes of part-time employment. Moreover, being a married man is an advantage for passing all the transitions, but being a married women turns the effect negatively. These results have been in part anticipated by our findings in section 6.1, where being married turned out to have a negative impact on the probability of being in the labour force only for women, and in section 5.2, where family responsibilities are found to be the main reason for working part-time for women.

Given that the choices specified in the tree structure of the sequential logit procedure could also take place in two stages rather than three i.e a first decision of whether to participate in the labour force or not and a second stage with three possible outcomes - unemployed, part-time, full-time. Thus, the new tree structure has only two transitions: the first one for entering or not in the labour force, and the second one for the three options, as shown in Figure 2. Note that we still maintain the sequential nature of the decision-making process in line with our above-mentioned arguments.

[Figure 2 here]

Table 4 shows the results of our estimations which are similar to the earlier ones. Again, having a disability does not help the access to the labour market and also affects significantly and negatively the probability of being employed (full-time or part-time). Furthermore, having a chronic disease contributes negatively to labour force participation, and people living in the South/Islands of Italy are more likely not to enter the labour force or to be unemployed. Being married man contributes positively to enter the labour force and to be a full-time worker, while being married woman has a negative effect. Finally, a good education level is always profitable in terms of labour force participation and employment.

[Table 4 here]

On the whole, people affected by health problems, as well as married women and people living in areas of Italy characterized by a worse situation as far as the labour market and the implementation of disability laws and active policies are concerned, encounter higher obstacles in entering the labour market, especially when these characteristics occur together. Furthermore, chronic illness is found to be a stronger deterrent for labour force participation than disability, confirming that though disability discourages from work, it does not do as much as chronic diseases. Once in the labour force, all these categories of people usually remain unemployed or, at best, work part-time.

6.3 Comparison between multinomial and sequential logit models

In this section, we see how the results change if we specify a non-sequenced multiple outcome setting namely a multinomial logit model, using the same variables included in the sequential logit depicted in Figure 1 in section 6.2. The multinomial setting avoids sequencing but has the limitation due to the IIA property, in the same way as a nested model.
The dependent variable (y) takes value j if the jth alternative is taken, with $j = 1, 2, ..., m$ (Cameron and Trivedi (2005)):

$$y_{ij} = \begin{cases} 1 & \text{if } y_i = j \\ 0 & \text{if } y_i \neq j \end{cases}$$

The multinomial logit model specifies the probability that an alternative j is chosen in a set of m alternatives as follows.

$$p(y_{ij} = 1) = \frac{exp(x_i'\beta_j)}{\sum_{k=1}^{m} exp(x_i'\beta_j)}$$

with $\beta_1 = 0$ for identification.

As shown in Figure 3, we estimate the model for the non labour force status, part-time employment and full-time employment, all in relation to unemployment, calculating log-odds for all other categories relative to the baseline.

[Figure 3 here]

As can be seen from Table 5, our two key variables - disability and chronic illness - do no have any significant impact and this is a major difference with respect to the sequential logit model. The other variables turn out to be significant. For a one unit increase in education level, the log-odds of being outside the labour force instead of being unemployed are expected to decrease by 0.6 unit, while holding all other variables in the model constant. People living in the South/Islands are found to be statistically less likely to work (part-time or full-time) than people living elsewhere in Italy. Married men are significantly more likely to work full-time than their non-married counterpart, while married women are less likely to work full-time and more likely to be unemployed relative to their non-married counterpart.

[Table 5 here]

As a 'robustness' check of the above results, we use the same variables of the benchmark model in a different multinomial tree. More specifically, as shown in Figure 4, we first branch out the 'out of labour force' and 'in labour force' separately, and nest the unemployment, part-time and full-time within the 'in labour force' branch.

[Figure 4 here]

The results, as shown in Table 6, are very similar to the previous multinomial variant with disability and chronic illness remaining largely insignificant. For a one unit increase in education level, the log-odds of working full-time (compared to the unemployment status) are expected to increase by 0.7 unit, holding all other variables in the model constant. The estimates show also that married men are significantly more likely to work full-time than their non-married counterpart. Conversely, the log-odds of working full-time is lower for married women relative to their non-married counterpart. Results suggest that disabled people and people living in the South/Islands are significantly less likely to work (part-time or full-time) than people without any disability and people living elsewhere in Italy respectively.

[Table 6 here]

Given that the variables indicating health status (i.e. presence of disability and chronic diseases) are insignificant in the multinomial variants, whereas they both have a significant and meaningful economic interpretation along with the other variables in the sequential logit model, we are inclined to favour the latter for our data. Moreover, the sequential estimation results on the relationship between disability and work capability (or functioning) are in line with the expectations based on the descriptive evidence.

7 Conclusions and avenues for future research

This paper analyses the ability to participate in the labour force of disabled persons in Italy. It considers an extended definition of labour force participation in line with the

capability approach. It makes use of a unique dataset constructed from a national survey carried out specifically targeting disabled people and their labour market status.

The descriptive evidence already shows some interesting trends. First, an important gender gap seems to exist. Disabled men have, on average, higher qualifications than disabled women and physical and sensory disability lead to a longer tenure in school, compared to intellectual disability. Furthermore, as expected, with the increase in the number of disabilities there is a reduction in the level of education obtained. Looking at the work situation of disabled people, among those who are employed, physically disabled people achieve higher job positions, while those with an intellectual disability face the biggest disadvantage, even more than the 'emotionally challenged'.

We apply several probit and logit models to analyse the impact of classical human capital variables as well as health and disability factors on the capability to work using the extended definition of labour force participation. The usual evidence of a positive effect of education on work is repeated in our case too. Chronic illness has a significant negative effect whereas disability does not seem to be significant when men and women are pooled together. Separating men and women leads to significant effects of disability and chronic illness for women, but not for men. Focussing on disabled people, we find intellectual and hearing disabilities to be the most affecting types, and emotional disability to a lower extent for women. In all variants, living in the South/Islands of Italy has a negative influence. Finally, high education levels seem to be necessary to access the labour market and to obtain a good job position for both men and women.

Going further to look at the type of labour status using a sequential logit model, we find that having a disability and/or a chronic disease fails to pass the labour force transition and the employment transition, with chronic diseases having a greater impact than disability. Being married acts against labour force participation and employment for women. These results are robust across different sequential and multinomial specifications. A direct multinomial logit model seems to be the least satisfactory specification as it fails to offer adequate explanations for the working capability as well as the employment status.

From a policy perspective, our results suggest that satisfactory outcomes in terms of placement of disabled people can be attained through coherent and tailored programmes that involve educational institutions and health authorities as education and sickness consistently have the most significant influence in all settings. Our estimations, in fact, show that any education level higher than the primary school certificate has a positive and significant impact on the probability of entering the labour force for men, while this is true for women only if a university degree or a high school diploma is obtained. In addition, it is important that interventions distinguish between specific types of disability and provide the necessary support to disabled people to be able to acquire an appropriate education level and skills suited to their characteristics.

A useful future research is to analyse the impact of disability on other capabilities in life, in particular the capability to be educated and be socially active. Finally, our analysis could be applied to other countries and definitions of disability.

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8 Appendix

Table 1: Explanatory variables

Variable	Definition
Age	Person's age
Age Sq	Interaction term: Age × Age
Female	Dummy variable = 1 if female and = 0 if male
Married	Dummy variable = 1 if married and live with the partner and = 0 otherwise
Wife	Interaction term: Female × Married
Disability	Dummy variable = 1 if disabled person and = 0 if non-disabled person
Chronic	Dummy variable = 1 if the person has chronic diseases and = 0 otherwise
Education	= 1 No Qualif., 2 = Primary Sch. (base), 3 = Secondary Sch., 4 = High School, 5 = University
South/Islands	Dummy variable = 1 if the person lives in the South/Islands and = 0 otherwise
Disabilities	= 1 Vision, = 2 Language, =3 Hearing, = 4 Intellectual, =5 Emotional, = 6 Physical

Table 2: Probit models (25-64 years old) - Marginal Effects

	(1) Whole S.	(2) Men	(3) Women	(4) Disabled	(5) Dis.Men	(6) Dis.Women
Age	-0.0151***	-0.0177***	-0.0125***	-0.0166***	-0.0162***	-0.0172***
	(-10.17)	(-7.88)	(-6.67)	(-7.89)	(-4.85)	(-6.09)
Female	-0.142***			-0.143***		
	(-4.80)			(-3.80)		
Married	0.0181	0.125**	-0.0811*	-0.0237	0.0388	-0.0405
	(0.49)	(2.22)	(-1.80)	(-0.48)	(0.57)	(-0.68)
Disability	-0.0548	-0.00877	-0.0805*			
	(-1.64)	(-0.18)	(-1.86)			
Chronic	-0.0954***	-0.0736	-0.111**			
	(-2.87)	(-1.64)	(-2.47)			
Education						
No Qualif.	-0.138**	-0.239***	-0.0584	-0.0534	-0.267***	0.0393
	(-2.00)	(-3.42)	(-0.63)	(-0.46)	(-3.64)	(0.33)
Sec. Sch.	0.120***	0.176***	0.0580	0.0909	0.194**	-0.0268
	(2.87)	(2.83)	(1.07)	(1.60)	(2.38)	(-0.35)
High School	0.276***	0.308***	0.241***	0.315***	0.435***	0.208**
	(5.90)	(4.52)	(3.88)	(4.96)	(5.06)	(2.16)
University	0.265***	0.266**	0.255**	0.299***	0.403***	0.190
	(2.94)	(1.97)	(2.15)	(2.98)	(3.16)	(1.46)
Disabilities						
Vision				0.0498	0.108	-0.00575
				(0.95)	(1.60)	(-0.08)
Hearing				0.149**	0.130*	0.213***
				(2.51)	(1.83)	(2.63)
Intellectual				-0.247***	-0.190	-0.195**
				(-3.30)	(-1.51)	(-2.21)
Emotional				-0.116	-0.0377	-0.134*
				(-1.63)	(-0.32)	(-1.91)
South/Islands	-0.0716**	-0.112***	-0.0420	-0.0733*	-0.0841*	-0.0703
	(-2.36)	(-2.67)	(-1.03)	(-1.89)	(-1.67)	(-1.37)
N	1219	624	595	645	345	300
pseudo R^2	0.2695	0.2702	0.2698	0.3403	0.3438	0.3417
Education						
Dif High-Sec	0.156	0.131	0.183	0.224	0.241	0.235
DifSE High-Sec	(0.0429)	(0.0589)	(0.0598)	(0.0559)	(0.0741)	(0.0733)
Dif Un-High	-0.0107	-0.0419	0.0142	-0.0151	-0.0318	-0.0181
DifSE Un-High	(0.0902)	(0.134)	(0.119)	(0.0998)	(0.128)	(0.123)

t statistics in parentheses in the upper part of the table. Standard errors in parentheses in the lower part.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Sequential logit model (25-64 years old)

Transitions	($\gamma = 0$)	($\gamma = 0.5$)	($\gamma = 1$)	($\gamma = 1.5$)	($\gamma = 2$)
LF v NoLF					
Age	0.399***	0.416***	0.462***	0.528***	0.606***
	(6.39)	(6.37)	(6.32)	(6.27)	(6.23)
Age Sq	-0.00516***	-0.00538***	-0.00598***	-0.00684***	-0.00786***
	(-7.58)	(-7.57)	(-7.54)	(-7.51)	(-7.47)
Female	0.126	0.135	0.157	0.183	0.204
	(0.55)	(0.56)	(0.58)	(0.59)	(0.57)
Education	0.739***	0.774***	0.866***	0.996***	1.150***
	(9.38)	(9.42)	(9.48)	(9.53)	(9.55)
Disability	-0.420**	-0.436**	-0.479**	-0.539**	-0.610**
	(-2.51)	(-2.50)	(-2.46)	(-2.41)	(-2.37)
Chronic	-0.661***	-0.691***	-0.771***	-0.885***	-1.021***
	(-4.24)	(-4.24)	(-4.24)	(-4.23)	(-4.22)
South/Islands	-0.353**	-0.370**	-0.415**	-0.481**	-0.560**
	(-2.38)	(-2.39)	(-2.40)	(-2.41)	(-2.42)
Married	1.233***	1.295***	1.462***	1.697***	1.972***
	(5.39)	(5.41)	(5.46)	(5.50)	(5.53)
Wife	-1.867***	-1.957***	-2.198***	-2.532***	-2.921***
	(-6.00)	(-6.01)	(-6.04)	(-6.06)	(-6.06)
cons	-8.704***	-9.083***	-10.10***	-11.56***	-13.29***
	(-6.12)	(-6.10)	(-6.05)	(-6.00)	(-5.96)
Emp v Un					
Age	0.149	0.171	0.231	0.319*	0.423**
	(1.12)	(1.24)	(1.55)	(1.94)	(2.34)
Age Sq	-0.000611	-0.000858	-0.00154	-0.00256	-0.00379*
	(-0.39)	(-0.54)	(-0.89)	(-1.34)	(-1.82)
Female	-0.0906	-0.0869	-0.0772	-0.0616	-0.0403
	(-0.22)	(-0.20)	(-0.17)	(-0.12)	(-0.07)
Education	0.579***	0.635***	0.776***	0.965***	1.180***
	(3.06)	(3.23)	(3.64)	(4.13)	(4.63)
Disability	-0.868**	-0.902**	-0.999**	-1.141***	-1.302***
	(-2.35)	(-2.37)	(-2.45)	(-2.58)	(-2.71)
Chronic	-0.259	-0.280	-0.346	-0.452	-0.582
	(-0.85)	(-0.89)	(-1.02)	(-1.22)	(-1.43)
South/Islands	-1.205***	-1.262***	-1.405***	-1.588***	-1.782***
	(-3.92)	(-3.95)	(-4.04)	(-4.14)	(-4.23)
Married	0.721	0.811*	1.043**	1.355**	1.707***
	(1.63)	(1.77)	(2.11)	(2.49)	(2.86)
Wife	-0.917	-1.014*	-1.277*	-1.659**	-2.112***

Continued on next page

Table 3 – *Continued from previous page*

Transitions	($\gamma = 0$)	($\gamma = 0.5$)	($\gamma = 1$)	($\gamma = 1.5$)	($\gamma = 2$)
	(-1.54)	(-1.65)	(-1.91)	(-2.25)	(-2.61)
cons	-4.307	-4.961*	-6.685**	-9.091**	-11.89***
	(-1.50)	(-1.67)	(-2.07)	(-2.56)	(-3.05)
Full v Part					
Age	0.238*	0.272*	0.360**	0.478***	0.611***
	(1.77)	(1.95)	(2.37)	(2.88)	(3.39)
Age Sq	-0.00243	-0.00281*	-0.00379**	-0.00515***	-0.00670***
	(-1.62)	(-1.80)	(-2.23)	(-2.78)	(-3.34)
Female	-0.349	-0.359	-0.383	-0.410	-0.431
	(-0.83)	(-0.82)	(-0.80)	(-0.77)	(-0.74)
Education	0.264	0.325*	0.482**	0.688***	0.913***
	(1.47)	(1.74)	(2.38)	(3.12)	(3.84)
Disability	-0.314	-0.362	-0.485	-0.641	-0.805*
	(-0.92)	(-1.02)	(-1.26)	(-1.53)	(-1.77)
Chronic	-0.552*	-0.605*	-0.734**	-0.899**	-1.073**
	(-1.70)	(-1.80)	(-2.02)	(-2.27)	(-2.51)
South/Islands	0.123	0.0722	-0.0552	-0.215	-0.380
	(0.34)	(0.19)	(-0.14)	(-0.49)	(-0.81)
Married	1.761***	1.876***	2.176***	2.569***	2.993***
	(3.42)	(3.56)	(3.89)	(4.28)	(4.64)
Wife	-2.071***	-2.227***	-2.626***	-3.147***	-3.710***
	(-3.22)	(-3.36)	(-3.69)	(-4.07)	(-4.43)
cons	-4.580	-5.529*	-7.951**	-11.17***	-14.75***
	(-1.55)	(-1.80)	(-2.38)	(-3.06)	(-3.71)
N	1216	1216	1216	1216	1216

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$(\gamma = 0) : LRchi2(27) = 573.18, Prob > chi2 = 0.0000$

Table 4: Alternative sequential logit model (25-64 years old)

Transitions	($\gamma = 0$)	($\gamma = 0.5$)	($\gamma = 1$)	($\gamma = 1.5$)	($\gamma = 2$)
LF v NoLF					
Age	0.399***	0.416***	0.463***	0.530***	0.609***
	(6.39)	(6.37)	(6.33)	(6.29)	(6.25)
Age Sq	-0.00516***	-0.00538***	-0.00599***	-0.00685***	-0.00789***
	(-7.58)	(-7.57)	(-7.55)	(-7.52)	(-7.49)
Female	0.126	0.133	0.155	0.183	0.215
	(0.55)	(0.56)	(0.57)	(0.59)	(0.59)
Education	0.739***	0.773***	0.865***	0.995***	1.149***

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Table 4 – *Continued from previous page*

Transitions	($\gamma = 0$)	($\gamma = 0.5$)	($\gamma = 1$)	($\gamma = 1.5$)	($\gamma = 2$)
	(9.38)	(9.41)	(9.47)	(9.51)	(9.52)
Disability	-0.420**	-0.438**	-0.484**	-0.549**	-0.624**
	(-2.51)	(-2.51)	(-2.49)	(-2.46)	(-2.42)
Chronic	-0.661***	-0.692***	-0.775***	-0.889***	-1.023***
	(-4.24)	(-4.25)	(-4.26)	(-4.25)	(-4.23)
South/Islands	-0.353**	-0.370**	-0.414**	-0.476**	-0.549**
	(-2.38)	(-2.39)	(-2.39)	(-2.38)	(-2.38)
Married	1.233***	1.293***	1.457***	1.687***	1.961***
	(5.39)	(5.41)	(5.45)	(5.49)	(5.52)
Wife	-1.867***	-1.955***	-2.191***	-2.520***	-2.906***
	(-6.00)	(-6.01)	(-6.02)	(-6.03)	(-6.03)
cons	-8.704***	-9.086***	-10.12***	-11.59***	-13.36***
	(-6.12)	(-6.10)	(-6.05)	(-6.01)	(-5.98)
Part v Un					
Age	-0.00600	0.0151	0.0740	0.161	0.266
	(-0.04)	(0.09)	(0.41)	(0.84)	(1.29)
Age Sq	0.000962	0.000733	0.0000766	-0.000921	-0.00215
	(0.51)	(0.38)	(0.04)	(-0.42)	(-0.90)
Female	0.104	0.111	0.127	0.146	0.165
	(0.21)	(0.22)	(0.23)	(0.25)	(0.26)
Education	0.354	0.412*	0.559**	0.754***	0.973***
	(1.51)	(1.72)	(2.19)	(2.75)	(3.32)
Disability	-0.741*	-0.773*	-0.862*	-0.989*	-1.134**
	(-1.67)	(-1.70)	(-1.80)	(-1.94)	(-2.08)
Chronic	0.115	0.0858	0.00520	-0.114	-0.256
	(0.29)	(0.21)	(0.01)	(-0.25)	(-0.53)
South/Islands	-1.312***	-1.373***	-1.521***	-1.707***	-1.903***
	(-3.20)	(-3.27)	(-3.44)	(-3.62)	(-3.78)
Married	-0.903	-0.820	-0.601	-0.303	0.0340
	(-1.43)	(-1.27)	(-0.90)	(-0.43)	(0.05)
Wife	0.910	0.803	0.519	0.120	-0.344
	(1.16)	(1.00)	(0.61)	(0.13)	(-0.36)
cons	-1.745	-2.391	-4.117	-6.542	-9.367**
	(-0.50)	(-0.66)	(-1.07)	(-1.58)	(-2.10)
Full v Un					
Age	0.211	0.233	0.294*	0.383**	0.489***
	(1.52)	(1.63)	(1.89)	(2.25)	(2.62)
Age Sq	-0.00124	-0.00148	-0.00216	-0.00318	-0.00442**
	(-0.78)	(-0.90)	(-1.21)	(-1.62)	(-2.07)

Continued on next page

Table 4 – *Continued from previous page*

Transitions	($\gamma = 0$)	($\gamma = 0.5$)	($\gamma = 1$)	($\gamma = 1.5$)	($\gamma = 2$)
Female	-0.185	-0.180	-0.169	-0.156	-0.141
	(-0.43)	(-0.41)	(-0.35)	(-0.29)	(-0.24)
Education	0.653***	0.710***	0.854***	1.046***	1.263***
	(3.35)	(3.51)	(3.90)	(4.36)	(4.82)
Disability	-0.906**	-0.941**	-1.038**	-1.174***	-1.327***
	(-2.38)	(-2.41)	(-2.49)	(-2.60)	(-2.72)
Chronic	-0.378	-0.408	-0.491	-0.613	-0.758*
	(-1.21)	(-1.26)	(-1.41)	(-1.61)	(-1.82)
South/Islands	-1.176***	-1.236***	-1.385***	-1.571***	-1.768***
	(-3.71)	(-3.77)	(-3.89)	(-4.02)	(-4.13)
Married	0.903**	0.986**	1.201**	1.495***	1.827***
	(2.00)	(2.12)	(2.39)	(2.72)	(3.04)
Wife	-1.154*	-1.262**	-1.545**	-1.944***	-2.406***
	(-1.88)	(-1.98)	(-2.25)	(-2.58)	(-2.91)
cons	-6.171**	-6.828**	-8.575**	-11.02***	-13.85***
	(-2.05)	(-2.20)	(-2.54)	(-2.98)	(-3.41)
N	1216	1216	1216	1216	1216

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$(\gamma = 0) : LRchi2(27) = 572.63, Prob > chi2 = 0.0000$

Table 5: Multinomial logit model (25-64 years old)

No Labour Force	
Age	-0.266**
	(-2.28)
Age Sq	0.00430***
	(3.15)
Female	-0.0104
	(-0.03)
Education	-0.567***
	(-3.82)
Disability	-0.0423
	(-0.12)
Chronic	0.442
	(1.55)
South/Islands	-0.238
	(-0.88)
Married	-0.708
	(-1.61)

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Table 5 – *Continued from previous page*

Wife	0.947*
	(1.67)
cons	6.603***
	(2.66)
Part-time	
Age	0.0325
	(0.21)
Age Sq	0.000343
	(0.19)
Female	0.260
	(0.54)
Education	0.0455
	(0.23)
Disability	-0.517
	(-1.20)
Chronic	0.134
	(0.35)
South/Islands	-0.969**
	(-2.56)
Married	-1.071*
	(-1.70)
Wife	0.825
	(1.06)
cons	-1.489
	(-0.45)
Full-time	
Age	0.275**
	(2.17)
Age Sq	-0.00221
	(-1.51)
Female	0.0762
	(0.19)
Education	0.257
	(1.64)
Disability	-0.550
	(-1.55)
Chronic	-0.360
	(-1.24)
South/Islands	-0.676**
	(-2.39)
Married	0.803*

Continued on next page

Table 5 – *Continued from previous page*

	(1.84)
Wife	-1.327**
	(-2.25)
cons	-6.198**
	(-2.26)
N	1216

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$LRchi2(27) = 557.66, Prob > chi2 = 0.0000$

Table 6: Alternative Multinomial logit model (25-64 years old)

Part-time	
Age	-0.00600
	(-0.04)
Age Sq	0.000962
	(0.51)
Female	0.104
	(0.21)
Education	0.354
	(1.51)
Disability	-0.741*
	(-1.67)
Chronic	0.115
	(0.29)
South/Islands	-1.312***
	(-3.20)
Married	-0.903
	(-1.43)
Wife	0.910
	(1.16)
cons	-1.745
	(-0.50)
Full-time	
Age	0.211
	(1.52)
Age Sq	-0.00124
	(-0.78)
Female	-0.185
	(-0.43)

Continued on next page

Table 6 – *Continued from previous page*

Education	0.653***
	(3.35)
Disability	-0.906**
	(-2.38)
Chronic	-0.378
	(-1.21)
South/Islands	-1.176***
	(-3.71)
Married	0.903**
	(2.00)
Wife	-1.154*
	(-1.88)
cons	-6.171**
	(-2.05)
N	444

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$LRchi2(27) = 123.01, Prob > chi2 = 0.0000$

List of Figures

Figure 1: Sequential logit tree

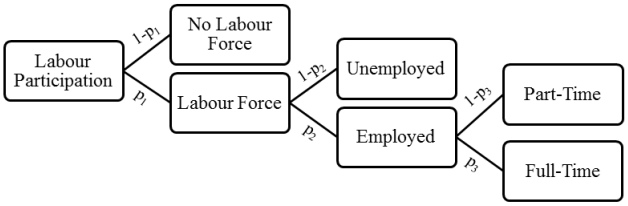

Figure 2: Alternative sequential logit tree with three branches

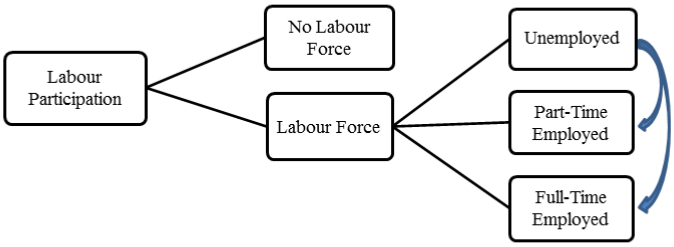

Figure 3: Multinomial logit tree

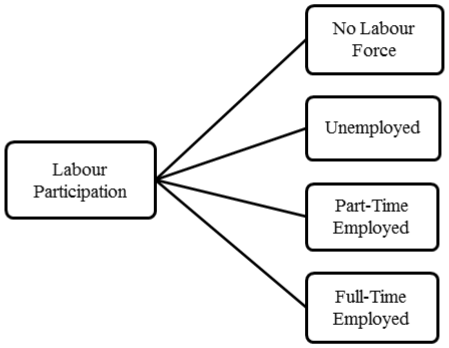

Figure 4: Alternative multinomial logit tree for only three branches