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Abstract

This study employs a Structural Equation Modelling (SEM) to explore the health related costs using the Standard of Livings (SoL) approach in Turkey, employing data from the cross-sectional Household Budget Survey (HBS) over the period 2002-2013. The SEM allows us to investigate all these concerns simultaneously. A health condition index is created regarding questions related to the mental and physical limitations (disability) of people. The study extends the previous research by the following ways. First, a SEM framework is introduced, which accounts for the measurement error in both SoL and health-condition indices and it allows for the simultaneous estimation of the link between health condition costs and SoL using structural equations. The underlying theory of the SoL approach is that a household's SoL is a function of needs and income and the additional costs of disability can be estimated by comparing the standard of livings of household with and without disabled members and controlling for other source of variation. The results show that disability has a significant and negative impact on SoL. Second, exploiting the health reform of 2008, a quasi-experiment approach using difference-in-difference (DID) regression within a SEM framework between the disabled and non-disabled households takes place. The disability related costs consist of the 23 per cent of the household income corresponding to 4,000 Turkish Liras (TL).

JEL Classification: I1

Keywords: Disability Costs; Health Insurance; Standard of Living; Structural Equation Modelling

ملخص

توظف هذه الدراسة الإنشائية معادلة نمذجة لاستكشاف التكاليف المتعلقة بالصحة باستخدام معيار نهج مستوى المعيشة في تركيا، وتوظيف البيانات من مسح ميزانية الأسرة خلال الفترة 2002-2013. وزارة شؤون المرأة تسمح لنا بالتحقيق في جميع هذه المخاوف في وقت واحد. يتم إنشاء مؤشر الحالة الصحية بشأن المسائل المتعلقة بالقيود النفسية والجسدية (الإعاقة) من الناس. تمتد الدراسة لأبحاث السابقة عن طريق الطرق التالية. أولا، يتم إدخال إطار معادلة النمذجة، الذي يمثل خطأ قياس في كل من ائتلاف والمؤشرات الصحية ويسمح لتقدير في وقت واحد من العلاقة بين تكاليف الحالة الصحية وائتلاف باستخدام المعادلات الهيكلية. النظرية الأساسية للنهج الائتلاف هي أن ائتلاف الأسرة هي وظيفة من الاحتياجات والدخل والتكاليف الإضافية الإعاقة يمكن تقديرها بالمقارنة بمستوى أحياء الأسرة مع وبدون الأعضاء المعوقين والسيطرة على مصدر آخر من الاختلاف. وأظهرت النتائج أن الإعاقة لديها تأثير كبير وسلبي على الائتلاف. ثانيا، استغلال إصلاح النظام الصحي لعام 2008، نهجا شبه التجربة باستخدام فارق في الفرق (DID) الانحدار في إطار معادلة نمذجة بين الأسر والمعوقين وغير المعوقين. تتكون التكاليف المرتبطة بالإعاقة من 23 في المائة من دخل الأسرة الموافق 4000 ليرة تركية.

1. Introduction

The aim of this study is to explore the effects of disability on the standard of livings of households in Turkey. The disability may affect the worker's productivity and the individual's overall well-being. The health consequences can have an important impact on the country's economic growth and the increase of the ill-health traps in poverty (World Health Organization, 1999). According to the World Health Organization (2005), the 50 per cent of the economic growth differentials between developed and developing countries is due to ill-health and low life expectancy. Households with disabled members are more likely to experience additional costs, which depend on the type and the degree of the disability.

The effects of disability are well recognized by the social security systems in the majority of the countries around the globe, since one of their aims, is the provision of disability related benefits in order to compensate for the relevant costs. However, an important issue in the policy making and the previous research is the fact that there is no common consent on the scaling of the cost that makes difficult to estimate the amount of the compensation that the social security systems target.

Thus, it is important to estimate these costs, especially when the distributional impact of tax benefit reforms is analyzed, because in the case of failing to consider that, it will result to misleading estimates in favor of the disabled people. Moreover, substantial amounts of the national budgets of the developed countries are invested in the provision of the health care, recognizing that the health status of the citizens is a major factor and driver of the economic growth and the overall well-being.

The first aim of this study is to estimate the disability related costs using the SoL approach, which is similar to the Engel curves theory. More specifically, the Engel method of estimating equivalence scales is based on the idea that the welfare of a household is reflected by the expenditure share on food, and that larger households require more money or higher levels of expenditure to reach the same standard of living.

Finally, this study explores the effects of the health reform that took place in 2008 to show the causal effects of the reform on the standard of livings. More specifically, the health reform refers to the Green Card holders who belong to the poor and low income classes and since 2008 they have the same benefits to those who have public health insurance. Moreover, in 2008 various infrastructure in rural areas have taken place, including emergency ambulance services, increases of doctors and transportation infrastructure improvement that may have led to reduced out of pocket expenditures (OOPEs) and transportation expenditures. In other words, the argument is that the disability and the poor health conditions can be associated with increased OOPEs and transportation expenditures. Previous research suggests that disability leads to significant increases of OOPEs (*Makinen et al., 2000; Musgrove et al., 2002; Boutayeb and Helmert, 2011). In addition, it has been found that the cost issues for disabled people are one of the most important barriers to mobility in terms of maintaining and accessing mobility devises, as well as, in terms of travelling by public transportation, because the disabled people often have to pay extra for companions on minibus or taxi and taking wheelchairs (*Venter et al., 2002; Mashiri et al., 2008). Therefore, the health reform of 2008 could have improved the SoL of the poor and Green Card holders, by reducing the OOPEs and the transportation related expenditures through the channels mentioned above, such as infrastructure, transportation services, especially in the rural areas where the accessibility to health centers is more difficult, relative to those who are located in urban areas. As green card holders officially did not have the same benefits as the enrollees in other public health insurance schemes (SSK, Emekli Sandığı, BAĞ-KUR) before 2008, it is more likely that they might spend more on OOPEs and transportation expenditures resulting to lower SoL levels. Moreover, the health reform of 2008 aimed to reduce the OOPEs not only for the low income groups and the green card holders, but

also for those who have public or private health insurance, by improving the health centers, the infrastructure in rural areas, providing emergency ambulance services and better transportation to the relevant health centers. For this reason a differences-in-differences (DID) regression is estimated, where the treatment group is the disabled and the control group is the non-disabled households. Moreover, those who have no health insurance are not considered, but it can be applied for future research.

To summarize, this project aims to explore the link between the health insurance schemes, disability and the related health costs of household using the standard of living approach (SoL). The results suggest the disability costs consist the 23 per cent of the household income and the monetary values are 4,000 TL per year. In addition, the individuals and households with public-compulsory social security coverage are more likely to report higher levels of SoL than those with no social security and the Green Card Holders. Then a DID within a SEM framework is applied in order to exploit the effects of the health reform of 2008 and estimate the disability costs between the disabled and non-disabled households, before and after the program. The results suggest that the health reform had significant effects on disabled households' SoL improving their SoL after the implementation of the program.

The structure of the study is the following: In section 2 the previous literature review and the value added of this study are discussed. In section 3 the data employed are described, while in section 4 the methodology followed in presented. The empirical results are reported in section 5 and in the last section the concluding remarks are discussed.

2. Literature Review

This section presents previous researches related to this study and it briefly discusses how this study contributes to the previous literature. Regarding the costs of disability previous researches have mainly employed four different approaches. The first approach is the direct survey (NRB, 1995; Martin and White, 1998; Thompson et al., 1998), where the disabled people are asked directly how much they spend on specific items. This approach tries to derive a comparison how the disabled people would spend their money in the case they did not had a disability. While this approach can be attractive there are questions about it. Firstly, an accurate report of the spending on particular goods should be given by the respondents, which can be very difficult for general expenditure items. The second and more problematic issue is that the respondents are asked what they would have spent in the absence of disability. Thus, one problem is that the answers rely on hypothetical expenditures without any recent experience of the no disability environment leading to biased estimates. Similarly to the stated preference methods e.g. contingent valuation, the hypothetical nature and structure of the surveys and the lack of financial implications may lead to superficial and inaccurate answers (Kahneman et al., 1999). Regarding this approach the previous studies provide mixed results. The study by Martin and White (1998) using the Office of Population Censuses and Surveys (OPCS) in Great Britain estimated the annual disability costs at £580. On the other hand, the study by Thompson et al., (1998) using the Disablement Income Group (DIG) surveys in Great Britain found very different results, estimating the disability costs at £12,000 per year. The argument by Thompson et al., (1998) about the extreme differences in estimates lies on the fact that the OPCS made no attempt to quantify the additional disability costs, but it simply assumed that disability leads to extra costs. On the contrary the DIG surveys have been designed and developed with main purpose the in-depth analysis of the additional costs of disability. Other studies employing the direct survey approach have found that the associated costs with wheelchair are £14.13 per week (Hyman, 1977) corresponding to £72.89 in 2010 prices, while Stowell and Day (1983) found that shopping costs disabled people an extra £3.36 per week, corresponding to £9 in 2010 prices.

The second method includes the expenditure diary approaches (Matthews and Truscott, 1988; Jones and O'Donnell, 1995). This approach takes detailed measurements of the expenditures of a sample of disabled people and then the results are compared with the expenditures of non-disabled people. This approach can be more accurate that the direct survey, however there are major limitations and drawbacks. Firstly, the expenditures are measured on household and not individual level; thus the additional costs faced by the disabled individual can be cancelled out by the reduction of consumption and therefore of expenditures by the other members of the household in order to meet the total costs of the household. Secondly, it is assumed that disabled and non-disabled people face the same prices of goods and services. Actually, this might not be true as disabled people may face additional costs like using taxi for shopping. Finally, the level of consumption and expenditures is heavily determined by the composition of the household (e.g. employment status, household size, house quality and expenses) and the income level. Thus, disabled persons may not live in typical average households. Jones and O'Donnell (1995) using data from the Family Expenditure Survey (FES) in United Kingdom during the period 1986-1987 found significant consumption costs due to physical disability.

The third approach is to use the life satisfaction approach. Using this "subjective" equivalence approach the related costs are derived according to the individuals' reported satisfaction with their well-being or life. Two main types of subjective information have been employed. The first is the level of the income that the individuals believe it is necessary in order to reach a certain standard of living, while the second is the evaluation of standard of living using arbitrary numerical scales (Stewart, 2009). Morciano et al. (2015) argue that this approach has important issues including the quality of the subjective assessment and problems caused by measurement errors. This study similar to the study by Morciano et al. (2015) employed the standard of living approach, described below, using a structural equation modelling (SEM) framework to address the problem of the measurement error. On the other hand, Morciano et al. (2015) do not discuss the main issue of the subjective well-being approach. The issue is that it is very likely that life satisfaction or well-being is not significantly related to income given different levels of disability status as it will be discussed in more details in the methodology section.

However, the subjective approach can be improved by using also a SEM framework where the subjective well-being is a latent and unobserved variable. Nevertheless, the unavailability of relevant information does not allow us to employ this approach. In addition, the argument by Morciano et al., (2015) does not hold since also the disability measure in their study is based on self-reported questions, such as whether the respondent has mobility problems or not etc. Therefore, the SEM can be applied also in the "subjective" approach in order to address the problems coming from the measurement error. However, the main issue of the life satisfaction approach is not the measurement error but the ranking which may allow for indifference curves to be intersected, as it is discussed in more details in the methodology section. More specifically, while both people may have the same disability level and the same characteristics, such as income, age, wealth and others, may rank their life differently which results to different compensation and thus to intersection of the utility indifference curves.

The final method refers on the indirect approaches as the standard of living approach (SoL) (Tibble, 2005; Zaidi and Burchardt, 2005). This method is explained in more details in the methodology part. SoL has been examined in previous researches (Berthoud et al., 1993; Zaidi and Burchardt, 2005; Cullinan et al., 2011; Morciano et al., 2015). However, this project contributes to the literature by examining the relationship between SoL and disability costs in Turkey, which has not been examined before. Secondly, the effects of health insurance coverage and the association between them and disability is explored. Morciano et al. (2015) estimated the annual disability costs at £4,800, while Cullinan et al. (2011) found the short-run and long-run costs ranging between £4,900-£5,200 per annum. Overall, this study employs the

SoL approach using a structural equation modelling (SEM) since the standard of living variable is latent and unobserved.

3. Data

The Turkish Household Budget Surveys (HBS), available from TUIK during the period 2002 to 2013, which is a time-series of repeated cross sections, will be employed. The survey includes three main groups of variables: related to households, expenditures and individuals (Turkish Statistical Institute, 2013).

The SoL used in this study is based on material deprivation indicators that measure the relative poverty and have been introduced by Townsend (1979) and the SoL has been similarly employed in previous studies (Zaidi and Burchardt, 2005, Cullinan et al., 2011; Morciano et al., 2015). According to Townsend (1979) the living conditions are measured using a list of items that every household should have them and Townsend counted as poor those lacking three or more items, without considering which item. His work has been criticised because he did not distinguish whether respondents could not afford to have these items or simply they did not want them. In addition, another important point of criticism is the selection of the specific threshold, which is three or more items. In this study a SoL index is build using the principal components analysis proposed by Filmer and Pritchett (1998) using the items described below.

In table 1 the summary statistics for the main variables examined are reported. The majority of the respondents have public or compulsory social security at 75.6 per cent, followed by those with no insurance and with green card at 9.34 per cent and 14.10 per cent respectively. On the contrary only the 2 per cent states that it has private insurance.

In table 2 the correlation matrix between standard of living, household income, wage, education level, age and gender are reported. It should be noticed that the SoL in that case is derived by a factor analysis using principal components and whether the households possess the following items: bathroom, kitchen, dishwasher, computer, internet connection, air conditioner, mobile phone, car, television, refrigerator, washing machine. However, other items could be also important, such as whether the household can afford to pay one week holiday per annum, the capacity of having a meal with meat, vegetables or fish every second day if required, the lowest monthly income of household to make ends meet and arrears on utility bills, mortgage and hire purchase instalments, but these variables are not available in the survey.

It becomes obvious that disability reduces the SoL, while the latter is positively correlated with household income and education level. The negative correlation between age and SoL indicates that with aging the SoL is reduced; however the relationship might be non-monotonic as it will be shown in the regression analysis in the empirical results section. Similarly, the correlation between disability and education is negative and positively correlated with age.

As it has been mentioned the standard of livings index is based on the items that households possess. The SoL index is constructed on the number of items, such as the number of telephones, washing machines, cars and others taking value one for one or more items and 0 in the case that the households do not possess the specific item. The dummy variables are constructed in such as way where value 1 indicates if the household has the item and 0 if they do not possess it similarly with the study by Morciano et al. (2015). It could be said that those who do not wish to have the item can be different from those that cannot afford it. However, as this can be subject of criticism for creating selection bias, the analysis will include also those who do not wish to have this item, and the indicator will take value zero. The latter is followed as it is suggested by other studies that specific groups, such as the old and disabled people, may be less willing to admit the inability to afford an item (McKay, 2004, 2008; Berthoud et al., 2009).

Guio (2009) proposed that the indicators that can be used for the construction of the standard of livings or material deprivation are set in three categories. The first category includes situations that a household cannot afford: to pay for arrears on mortgage, loan or rent; to pay on utility bills; to pay for arrears on utility bills; to go for holiday at least one week from home every year; to face unexpected expenses; a meal with meat or fish every second day and to keep home warm. The second set is consisted of durable items and the household could not afford - if wanted to have: a colour TV; telephone; washing machine; personal car; computer; internet; kitchen; internet connection; hot water; piped water; mobile phone; refrigerator; dishwater; air conditioner. The third set consists of five housing indicators on whether there are: leaking roof, damp walls or rot in window frames problems; problems such as darkness of rooms or lack of day-light; shortage of space in the dwelling; no bath or shower; no indoor flushing toilet for sole use of the household; spending more than 40 per cent of income net on housing costs.

As it has been mentioned the SoL approach using SEM framework can be a proper tool for estimating the disability related costs, but the main question or argument which someone can raise is why the SoL approach can be more appropriate in order to estimate the health-disability related costs. The first argument is that household expenditures or income could be used in order to derive these costs; however, as it will be shown later in this section, the income is not significantly related to health, for those with disability. The same argument also holds for life satisfaction. For instance, there are two individuals, both highly disabled, but one is rich and the other is poor. The result is ambiguous, since the richer can be happier because of the income, but also both can be depressed or not happy at all because of their disability, indicating that income is not significant. Another example includes again two individuals, where the first is poor with low disability level, while the second is a very rich person, but with severe disability problems (e.g. blind or paralysed using a wheelchair etc.). Therefore, also the subjective well-being approach might not be the proper approach because it is not possible to derive the additional disability costs, as it can be a problem of measurement error, which can be accounted using the SEM framework.

In figure 1 the relationship between disability and household income for households with disabled members and non-disabled members respectively are presented. It becomes obvious that the relationship is insignificant for disabled households, while it is negative and significant for the households with non-disabled households. The same argument may be hold using other well-being indices, such as life satisfaction, happiness, mental health and EQ-5D EuroQol, which is a popular standardised instrument for use as a measure of health outcome,

4. Methodology

4.1 Structural equation modelling and standard of living (SoL) approach

The *SoL* refers on the household's economic growth. This approach is useful in order to identify and estimate the health costs related to the household's economic growth. In this case, the *SoL* approach examines the reduction in the *SoL* that disabled people attain from the income. In other words this method implies that because of the expenditure allocated to disability related expenses the standard of living for both the disabled person and the household will be reduced. Also this method shows that the disability related extra costs vary with the income. For example if the share of the disability related costs and the non-disabled related expenditures stay the same at every income level then the disability related costs will be higher in absolute terms at higher income levels. Thus, the disabled people can enjoy the same *SoL*, but they require a higher income for that. A theoretical framework of *SoL* based on the work by Berthoud et al. (1993) and Zaidi and Burchardt (2005) is presented in figure 2. In figure 2 S_0 represents the disability *SoL* at income level Y_0 represented by the curve disabled households (D). S_1^D is the *SoL* of households with disabled members which is equal with S_0^{ND}, which denotes the *SoL* of households with non-disabled members (ND) and how much is necessary to spend is order to

equivalize the *SoL* of the two types of households represented by income Y_1 and curve *ND*. In other words in order for the households with disabled members to enjoy the same level of *SoL* a higher income Y_1 is needed.

SoL is derived as a function of household ownership of a number of goods, which have been described in the previous section.

The underlying assumption of SoL adopted in this paper is that disabled people and households may experience a lower standard of living than the non-disabled counterparts with the same income level, resulted from the diversion and allocation of scarce monetary source to goods and services that are required due to disability. This approach estimates the additional costs of living that households with disabled members incur as a result of the disability, including extra costs related to transportation services, rehabilitation and home care services, heating, food, clothing, fuel and laundry. Thus, this approach shows that the standard of living of disabled households will be reduced because of the expenditures allocation due to disability. Moreover, the SoL approach shows how the costs of disability vary with the income levels. In other words, the households with disabled members can enjoy the same SoL levels with the non-disabled household; however, they require higher income levels to achieve that.

The main motivation of using the SoL approach is that it is possible to account for the property that indifferences curves never intersect (Decancq and Schokkaert, 2016). In figure 3 two indifference curves for health and income are presented, intersecting at point C. Then we take the point on the indifference curve IC2 and the point B on the indifference curve IC1, which is vertically below point A. Since by definition an indifference curve represented those combinations of health and income that give same utility or satisfaction, the points A and C will therefore give the same utility for the individual or household because both points lie on the same indifference curve IC2. Similarly, combinations B and C will give equal utility, since both lie on the indifference curve IC1. Concluding, if combination A is equal to combination C in terms of utility or satisfaction, and combination B is equal to combination C, it is implied that also combination A will be equivalent to B in terms of utility maximisation. However, looking at figure 3 this is an absurd conclusion, because combination A contains better health status (H1) than combination B (H2) while the income is equal in both combinations A and B. In that case the individual will definitely prefer combination A to B because A gives higher utility levels, but when the indifference curves are intersected, an illogical conclusion that A is equal to B in terms of utility is created. The study by Decancq and Schokkaert (2016) states this issue and they use equivalent income in order to explore the growth of well-being in Europe. However, their study does nothing to solve this issue where it is very likely that the indifference curves can be intersected. Decancq and Schokkaert (2016) do not present any of the estimated indifference curves.

The structural equation modelling (SEM) is followed in this study, which is an approach using latent variables and which provides a general framework for modelling relationships in multivariate data (Goldberger, 1973; Bollen, 1989). The estimation process is two-step consisting of the measurement model and the structural equation model. The measurement model shows how the latent and unobserved variables-in our case the disability and the SoL-are measured in terms of the observed variables. In the case examined the unobserved constructs are linked by two factor equations for observations i=1,…..,N:

$$d_i = \Lambda_d D_i + \varepsilon_i^d \tag{3}$$

$$s_i = \Lambda_s SoL_i + \varepsilon_i^s \tag{4}$$

$$D_i = b'\mathbf{W} + v_i \tag{5}$$

$$SoL_i = \beta_1 D_i + \beta_2 \log(y)_i + \beta' Z + e_i \quad (6)$$

Model (3) relates d or $d_i=(d_{i1},\ldots\ldots,d_{iq})'$ to an n-vector of the latent variable defining the disability status for $n \leq q$, through the $q \times n$ factor loadings matrix Λ_d. Similarly, model (4) relates the an m-vector of the latent variable $SoL_i=(SoL_{i1},\ldots\ldots, SoL_{im})'$ for $m \leq p$, through the $p \times m$ factor loadings matrix Λ_s. The vectors ε_i^d and ε_i^s are the measurement error terms, with dimensions q × 1 and $p \times 1$ respectively. Model (5)-(6) is the structural equation model, where (5) examines the determinants of disability controlling for characteristics in vector **W** and (6) explores the relationship between disability D and SoL given individual and household characteristics in vector **Z**. The last equation is the main interest of the study, which is used to estimate the disability costs.

Following Morciano et al. (2015) the measure of the household income in disability equation (5) excludes the disability and sickness benefits, since those can be considered as a consequence-effect of disability rather than a determinant. On the other hand, the income includes current income from rents, dividends, investments and returns on assets which are accumulated over the lifecycle and they can be considered as good indicators on the past resources that can have a positive impact on health. However, information on lifestyle, such as quality of leisure, sport activities, food diet, smoking and drinking are also good indicators, but are unavailable, which can be exploit for future research. In addition following Morciano et al. (2015) a dummy variable indicating home ownership and a financial wealth measure, which is defined as the deposits and savings accounts in banks, are included in the disability equation (5).

The criteria for the examination of the SEM estimates goodness of fit are: the comparative fit index (CFI) developed by Bentler (1990), the Tucker-Lewis index (TLI) proposed by Tucker and Lewis (1973), the root mean square error of approximation (RMSEA) and the root mean square residual (RMSR). CFI and TLI indices ranges between 0 and 1 and the larger they are the better the fit is. According to Bentler (1990) and Hu and Bentler (1999), a CFI and TLI value of greater than 0.90 can be expected for a very good fit to the data and values between 0.8-0.9 for a good fit. RMSEA measures the degree of model adequacy based on population discrepancy in relation to degrees of freedom and as a rule of thumb if its value is lower than 0.05 then a good fit is suggested, while values higher than 0.10 imply poor model fit (Hancock and Mueller, 2006). The last index is the root mean square residual (RMSR) and values less than 0.1 indicate favourable estimates. The SEM will be expanded in a panel framework.

The disability costs is the marginal effects of disability status over the marginal effects of net household income. More specifically, this is expressed by the partial derivatives of SoL with respect to disability over the partial derivative of SoL with respect to income which is just the marginal rate of substitution (MRS).

$$MRS = -\frac{\partial SoL}{\partial D} / \frac{\partial SoL}{\partial \log y} \quad (7)$$

In other words as the difference of Y_1-Y_0 in the terms of income in figure 2. It should be noticed that income in this case is assumed linear. However, non-linear relationship can be presented. For this reason polynomial orders in income are considered and their significance is tested.

It should be noticed that having a disability does not always imply a chronic condition and vice versa. For this reason regarding the HBS, there are two questions on disability; whether the respondent has problem or limited activities in daily activities that usually do and the first refers to limitations of activities related to work because of a health or mental problem. It should be noted that the disability does not refer only to people with physical or mobility problems, but

also to behavioural and cognitive. For instance, a very popular measure of disability is the EQ-5D, which is a generic instrument that assesses health in terms of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (EuroQol Group, 1990; Brooks, 1996; Dolan, 1997; Rabin and de Charro, 2001). However, the questions do not distinguish between mental or physical problems, which can be improved in future surveys. In this case the SEM will include two latent variables; the SoL and the disability.

Next the system (3)-(6) is expanded within a DID framework, where equations (3)-(5) are the same and equation (6) can be written as:

$$SoL_i = \beta_1 D_i + \beta_2 \log(y)_i + \beta_4 treat_i + \beta_5 post_i + \beta_6 treat * post_i + \beta' Z + v_i \qquad (8)$$

In this set up *treat* takes value 1 if the individual belongs to the treatment group, which is disabled households and 0 otherwise, *post* takes value 1 if the period is from 2008 and onwards and 0 before 2008 and the interaction term *treat*post* is the DID. In this case if the coefficient of DID is negative it implies that the difference of SoL levels between treatment and control group have been reduced indicating an improvement of the disabled households relation with the public health insurers and a reduction of the disability costs differences, since the SoL levels for those with disability are lower.

5. Empirical Results

This section presents and discusses the main empirical results of this study. In tables 3 the estimates of the SEM system (3)-(6) are reported. In the second column the estimates for the measurement equations of disability and SoL are presented and are all significant. Various concluding remarks can be derived by table 3. Following the procedure by Morciano et al. (2015) the coefficients reported in tables 3-4 are standardized suggesting that an increase of one standard deviation in disability reduce the SoL respectively by 0.0605 standard deviation units. A similar interpretation is followed for the remained coefficients.

Regarding the disability equation, the pre-benefit household income, being male, educated, married, belonging to a large family and being located in urban area reduces the possibility of disability occurrence. The association between education and SoL is positive and monotonic as it was expected. Finally, the results in table 3 show a significant and negative relationship between SoL, and disability, while richer households with more educated members, married and located in urban areas are more likely to report higher levels of standard of living. On the contrary, those with public social security are more likely to relish higher SoL levels, than the individuals who are green card holders.

Based on the CFI and TLI values the model fits the data rather well, while according to RMSEA which is lower than 0.05 and the SRMR which is lower than the suggested threshold of 0.1, it is concluded that the SEM fits the data very well. The table present the results considering the linear on logarithmic income relationship. In table 4 the specification of income, which is log-linear, as it has been presented in table 3, as well as, the specification with linear terms on income is presented. According to the information criteria AIC and BIC and the log-likelihood, the log-linear income specification is preferred.

Next step is the calculation of the disability costs using relation (7). The relationship also of the SoL-income for disabled and non-disabled households are presented in figures 4-5 based on the log-linear and linear income relationship. The figures show that the households with disabled members can enjoy the same SoL levels, but they require a higher income for that, according to the methodology discussion and figure 2. It is observed that the figures are not intersected. Moreover, test of base- independent equivalence scales could be applied (Lewbel, 1989, 1991; Pendakur, 1998). Moreover, the analysis can be expanded into an Engel curve analysis looking the relationship between health expenditures and income and considering the

SoL as the utility. The study by Tansel (1986) can be considered as a guide to follow this approach. The disability related costs are presented in table 3 and they consist the 24 per cent of the household income, corresponding to the annual cost of 4,000 TL.

The disability costs found in this study are consistent with previous studies in terms on the local currency. More specifically, in the study by Morciano et al. (2015) the disability costs were found equal at £4,800, while in this study the costs are found equal at 4,000 TL in basis year 2010. Nevertheless, the basis year is not mentioned in the study by Morciano et al. (2015) as well as in the study by Cullinan et al. (2011) who found the short-run and long-run costs range between £4,900-£5,200. The estimates are similar also with those found by Zaidi and Burchardt (2005), where the annual disability costs in United Kingdom for low, middle and severe limitations are estimated respectively at 1,500; 3,800 and 6,400

However, there is no clear explanation for these differences. One explanation may depend on the social security system and the health coverage. In Turkey even those who are not employed can enrol and enjoy the same health services as their partner who is employed and he/she has access to social security. This may not hold for the countries of Ireland and United Kingdom where the studies by Cullinan et al. (2011) and Morciano et al. (2015) explore.

In the study by Cullinan et al. (2011) the estimates take place in the case where disability are compared to a reference group of households, which have not contained a person with a disability at any point during the time of the survey. In this study similar to the study by Morciano et al. (2015) the study includes those who could have been healthy and then disabled during the time of the survey. As Cullinan et al. (2011) points out is that is not known whether households contained a disabled member prior to survey and thus it is difficult to control for that.

Next the estimates for the DID regression (8) are reported in table 5. In figure 6 the DID estimates are presented. It becomes clear that the difference between the treated group and the control group in terms of the SoL has been decreased. More specifically, while in the control group the SoL remains almost the same before and after the health reform of 2008, the standard of livings for the households belonging to the treatment group have been improved. In addition, the parallel line trend assumption holds as it can be seen in figure 6. It should be reminded that the households or individuals with no-health insurance are excluded from the analysis since this reform refers mainly to those with either public or private health insurance and those with green card.

In table 5 the disability costs for the whole period 2003-2013, as well as, for the sub-periods 2003-2007 (pre-reform) and 2008-2013 (post-reform) are reported. It becomes obvious that the SoL difference between the treated group-disabled households- and the control group-the non-disabled households has been decreased. This becomes clear from the disability costs before and after the reform in 2008. More specifically, while the disability costs before the reform are 51 per cent of the household income, corresponding to 6,900TL, they have been reduced at 17.0 per cent, corresponding to 3,500 TL, after the reform of 2008. In the whole period 2003-2013 the disability costs are 25.0 per cent of the household income and the monetary value is 4,250 TL. The results are very similar with those in table 3, even if the sample of those with non-health insurance has been excluded.

6. Conclusions

In this study the standard of living approach using structural equation modelling in Turkey has been applied in order to investigate the impact of the disability on SoL and to estimate the disability related costs. The findings suggest a significant negative effect of disability on SoL amounting at 4,000 TL per annum.

Additional models are suggested for future research applications, such as the quantile regressions and generalized ordered Logit model to account for the heterogeneous effects disability on SoL and wages. The findings of this study can be important if the effectiveness of the policies aiming to address the economic issues associated with disability and illnesses are considered. In addition, the findings may have important implications of the measurement of poverty in Turkey, since disability reduces the standard of living of households, then poverty measures based on income will generally underestimate the problem. This study proposes the introduction of the disability adjusted poverty and inequality estimates and it is proposed for future research.

However, as every research, this study is not without drawbacks. Most importantly the disability status of the individuals and the standard of living of households with and without disabled members is not known before the survey takes place. For this reason future research in Turkish case studies can be relied on longer panel surveys, such as the British Household Panel Survey (BHPS), the Swiss Household Panel (SHP) and the German Socio-Economic Panel (GSOEP) among others.

Another drawback is the measurement of disability which is a common weakness with the previous studies (Zaidi and Burchardt, 2005; Cullinan et al., 2011; Morciano et al., 2015). This study similar to the previous studies adopting the SoL approach, and the other mentioned approaches, use self-reported questions, as whether the person has chronic condition health problems or limitations to daily activities, which might not be precise instruments for measuring the disability. As it has been discussed previously, the EQ-5D, which measures daily activities, mobility, pain and depression among others, can be a more reliable and precise instrument to measure disability.

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Figure 1: Relationship between Disability and Household Income for Household with Disabled and Non-Disabled Members using the HBS

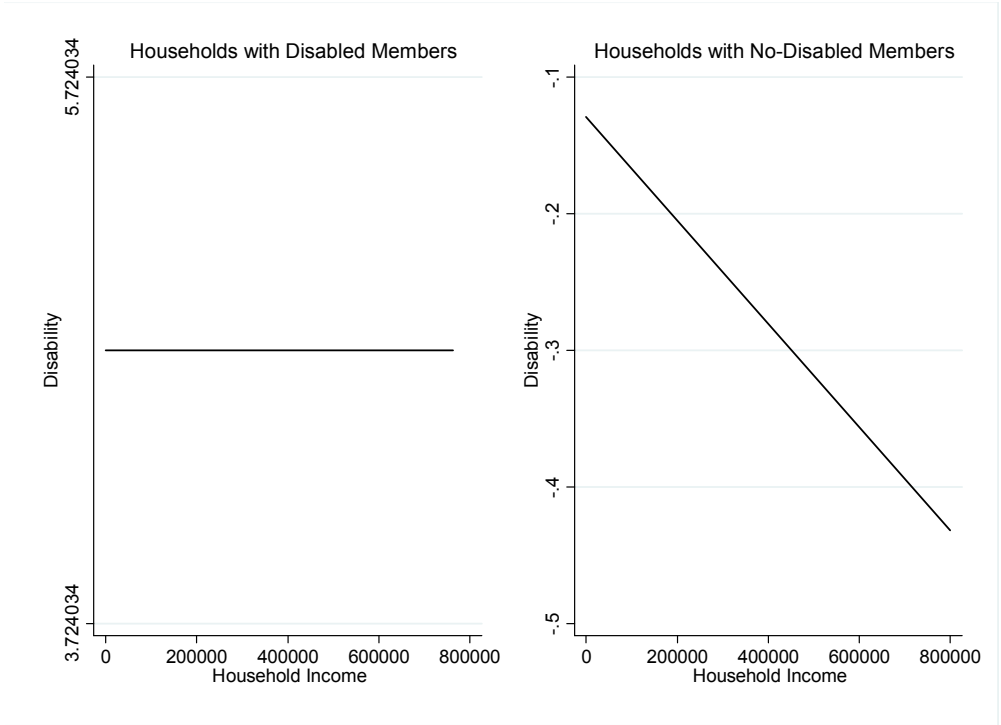
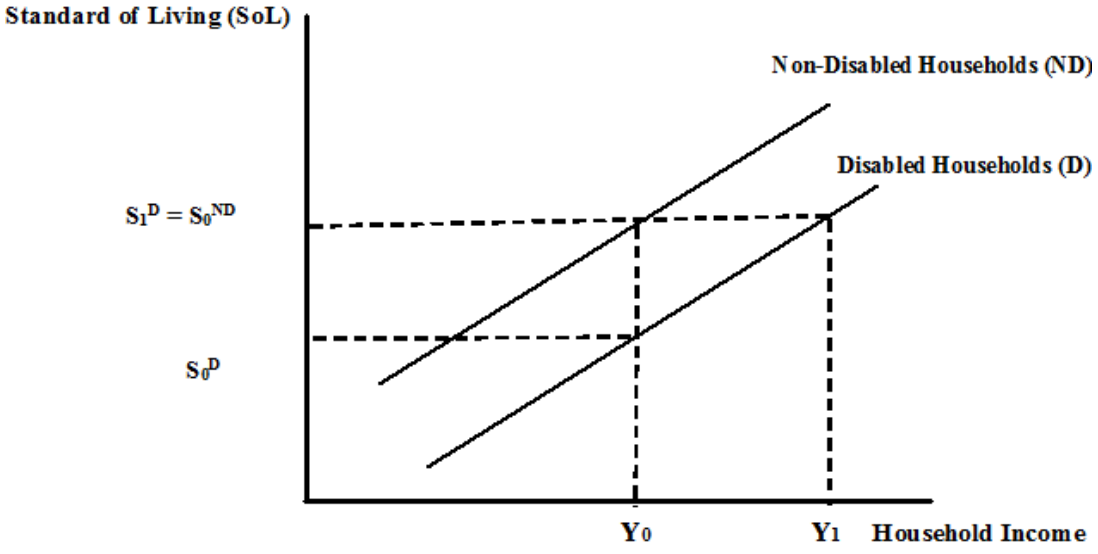


Figure 2: The Standard of Living Approach



Source: Zaidi, A. and Burchardt (2005)

Figure 3: Indifference Curves Cannot Intersect Each Other

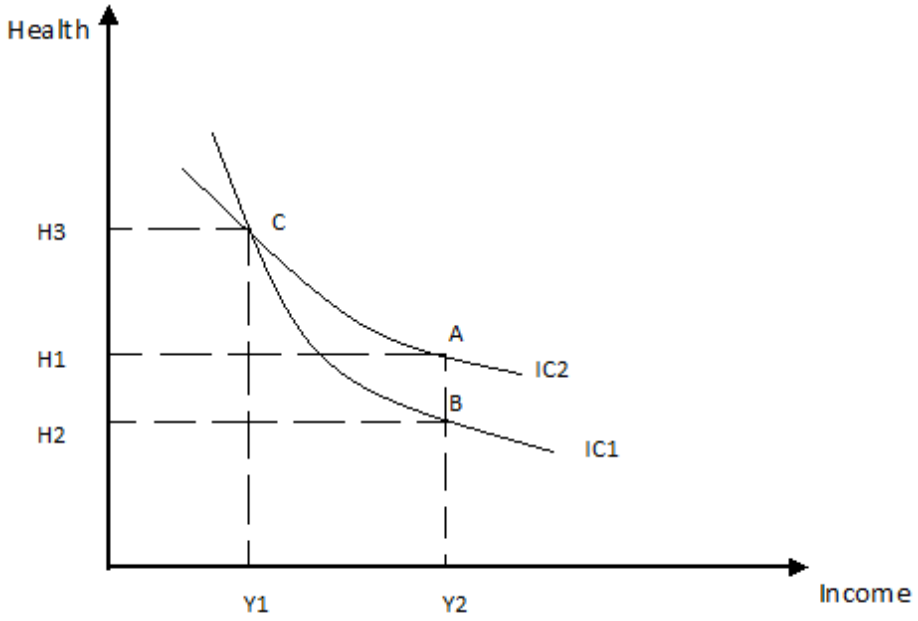


Figure 4: Estimated form of the SoL-Income Relationship using the HBS and the Log of Household Income

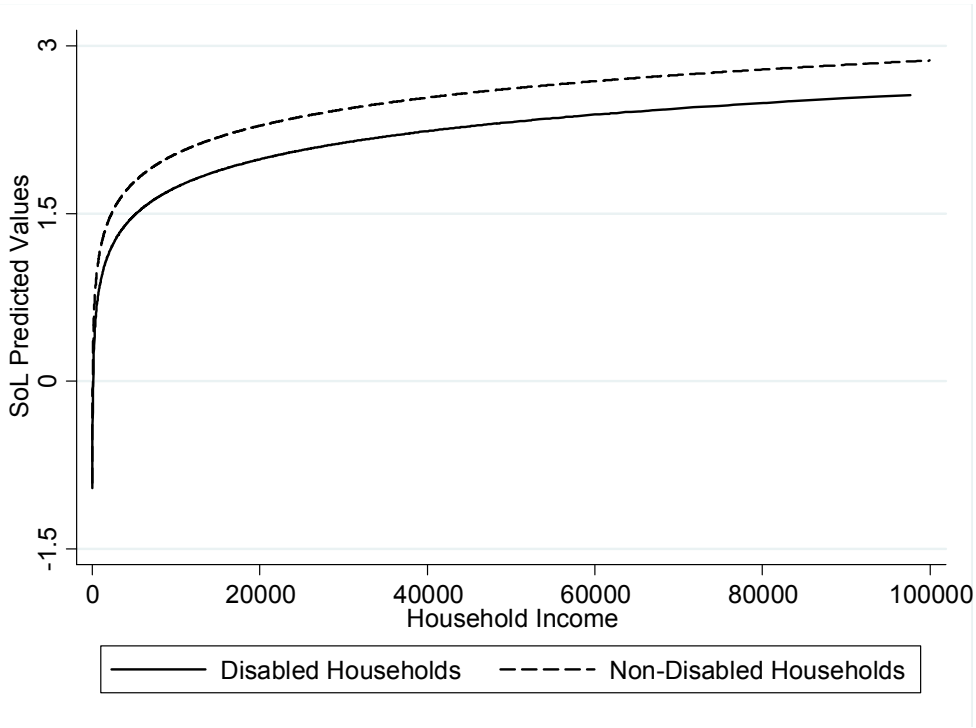


Figure 5: Estimated form of the SoL-Income Relationship using the HBS and the Household Income in Linear Terms

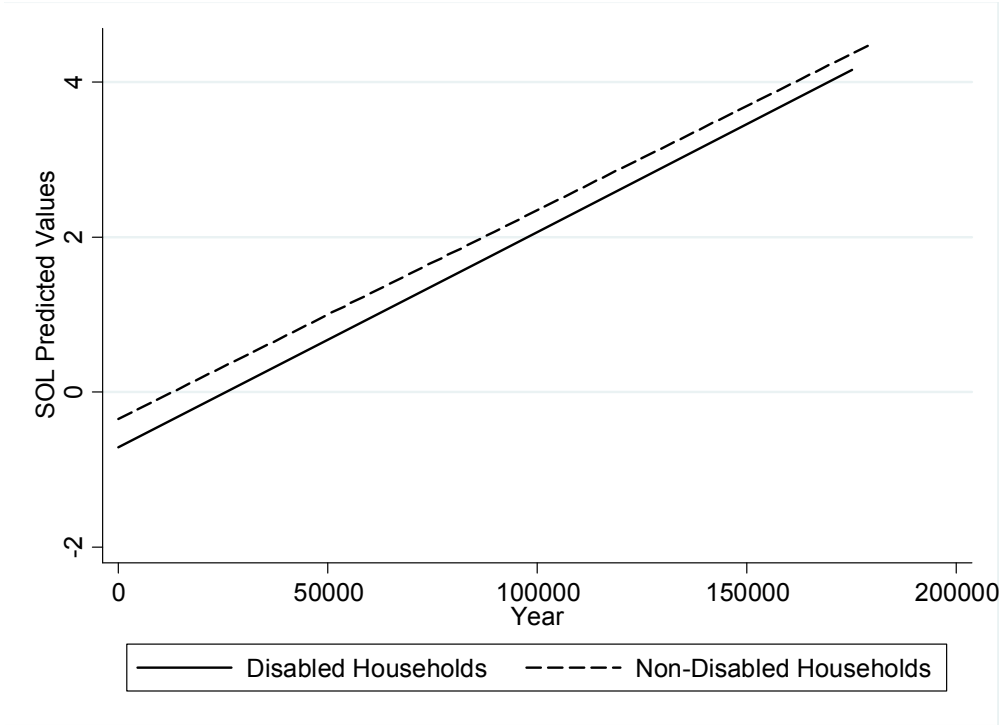


Figure 6: DID Estimates and Health Reform of 2008

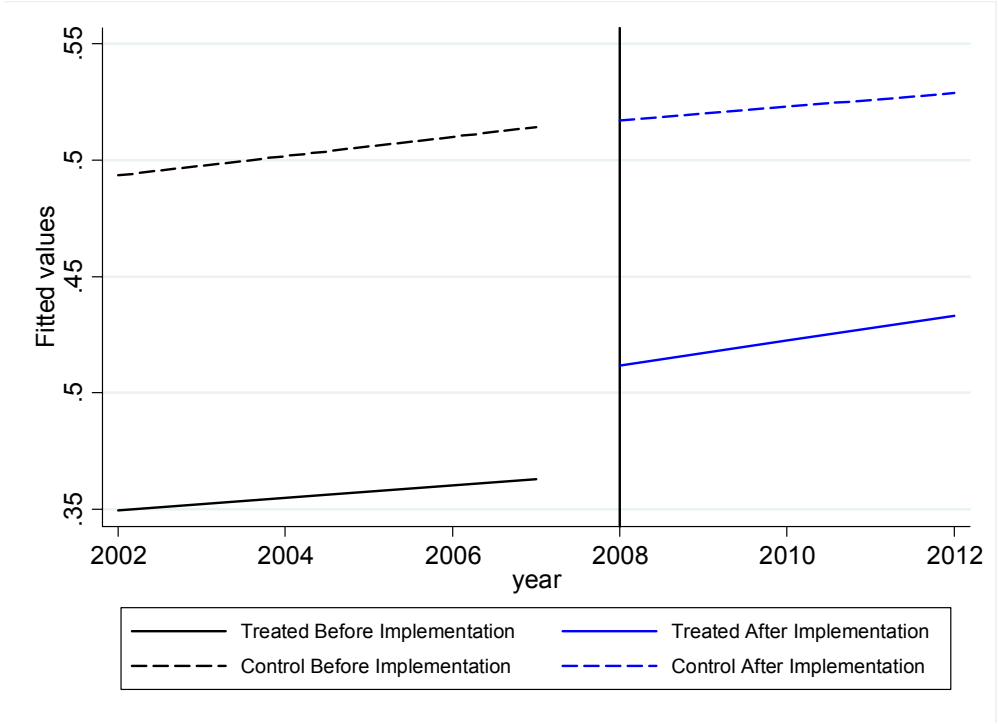


Table 1: Summary Statistics

Panel A: Household Budget Survey (HBS)				
Continuous variables	**Average**	**Standard Deviation**	**Minimum**	**Maximum**
Household Income	21,493.8	21,972.81	103	299,933
Wage	8,048.01	10,290.633	0	180,000
Weekly hours at work	47.761	16.414	1	89
Limited in daily activities due to mental or health problems	0.0338	0.1809	0	1
Limited in activities related to work due to mental or health problems	0.0452	0.2078	0	1
Transportation Expenditures	2,727.396	6,030.323	1	29,971
Age	36.875	16.372	15	99
Gender (Male)	0.4817	0.4996	0	1
Categorical variables				
Education		Health Insurance		
Illiterate	11.59	*Compulsory-Public*	74.56	
Literate – not completed a school	6.6	*Private*	1.99	
Primary school	39.34	*Green Card*	9.34	
Primary education	9.39	*No Insurance*	14.10	
Secondary school	7.32	Marital status		
High School	13.01	*Never married*	25.63	
Senior High School	4.87	*Married*	67.88	
college	2.46	*Widowed*	4.80	
University	5.42	*Divorced*	1.69	
Area		Employed		
Urban	66.43	*Yes*	48.07	
Rural	33.57	*No*	51.93	

Table 2: Correlation Matrix

Panel A: Household Budget Survey (HBS)							
	SoL	**Disability**	**Household Income**	**Wage**	**Working hours**	**Age**	**Gender**
Disability	-0.1260***						
	(0.000)						
Household	0.3720***	-0.0218***					
Income	(0.000)	(0.000)					
Wage	0.2452***	-0.0851***	0.3377***				
	(0.000)	(0.000)	(0.000)				
Working	0.0697***	-0.0271***	0.0278***	0.0855**			
hours	(0.000)	(0.000)	(0.000)	(0.0145)			
Age	-0.0760***	0.1049***	-0.0092***	0.1174***	-0.0660***		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Gender (Male)	0.0090***	-0.0081***	0.0131***	0.2459***	0.2827***	-0.0109***	
	(0.000)	(0.0001)	(0.000)	(0.000)	(0.000)	(0.000)	
Education	0.4060***	-0.1184***	0.2636***	0.4624***	0.0180***	-0.0929***	0.1885***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Notes: p-values within brackets, *** and ** denote significance in 1% and 5%

Table 3: SEM Estimates for SOL using the Household Budget Survey (HBS)

Measurement Equation for Disability	DV: Disability	Structural Equations	DV: Disability	DV: SoL
Limited in daily activities due to mental or health problem	0.8432*** (0.0032)	Disability (High)		-0.0605*** (0.0061)
Limited in activities related to work due to mental or health problem	0.9900*** (0.0041)	Log of Household Income		0.2610*** (0.0020)
Measurement Equation for SoL	DV: SoL	Log of Pre-benefit Household Income	-0.0057* (0.0031)	
Bathroom	0.4413*** (0.0021)	Gender (Male)	-0.0154*** (0.0066)	0.0290*** (0.0021)
Kitchen	0.3270*** (0.0023)	Age	0.00067*** (0.00001)	0.3168*** (0.0069)
Dishwasher	0.5841*** (0.0017)	Age squared		-0.2316*** (0.0070)
Air Conditioner	0.2585*** (0.0023)	Education (reference =Illiterate)		
PC computer	0.6129*** (0.0191)	Education -Literate – not completed a school	-0.0674*** (0.0015)	0.0474 *** (0.0045)
Internet	0.5537*** (0.0020)	Education -Primary School	-0.07709*** (0.0013)	0.0202*** (0.0008)
Mobile phone	0.3759*** (0.0021)	Education -Primary Education	-0.1000*** (0.0017)	0.0385*** (0.0007)
Refrigerator	0.2553*** (0.0023)	Education -Secondary School	-0.0867*** (0.0017)	0.0648*** (0.0009)
Piped water	0.4670*** (0.0021)	Education -High School	-0.0973*** (0.0164)	0.0585*** (0.0009)
Hot water	0.6223*** (0.0016)	Education -Senior High School	-0.0972*** (0.0018)	0.0706*** (0.0009)
Washing machine	0.5770*** (0.0019)	Education -College	-0.1026*** (0.0022)	0.0784*** (0.0010)
TV	0.0634** (0.0025)	Education -University	-0.1048*** (0.0019)	0.0886*** (0.0012)
Car	0.0714*** (0.0025)	Marital Status (reference=never married)		
No. Observations	196,983	Marital Status -Married	-0.0866*** (0.0138)	0.0027 (0.0004)
Log likelihood	-486,156.4	Marital Status -Divorced	0.0194 (0.0162)	0.0084*** (0.0009)
AIC	972,813.435	Marital Status -Widowed	0.0011 (0.0018)	-0.0075*** (0.0014)
BIC	973,944.187	Health Insurance (Reference=Public)		
Chi square/df	5.69	Health Insurance-Private	0.0217 (0.0149)	-0.0083*** (0.0013)
CFI	0.872	Health Insurance-Green Card	0.0192*** (0.0011)	-0.0676*** (0.0075)
TLI	0.815	Health Insurance-No Insurance	-0.0085*** (0.0009)	-0.0451*** (0.0056)
RMSEA	0.046	Household Size	-0.0336*** (0.0027)	-0.0053*** (0.0008)
SRMR	0.070	Deposits in bank	-0.0056 (0.0072)	
Percentage of Income	23.00%	Homeowner	-0.0052*** (0.0008)	
Monetary Values per annum	4,000 TL	Employed (No)		-0.0101*** (0.0004)
		Urban Area	-0.0020*** (0.0007)	0.0448*** (0.0006)

Note: Standard Errors within brackets, ***, ** and * denote significance in 1%, 5% and 10%

Table 4: Linear and Log Linear Income Specifications

	DV: SOL	**DV: SOL**
Disability	-0.0605***	-0.0588***
	(0.0061)	(0.0057)
Linear Income	0.2610***	
	(0.0020)	
Log Linear Income		0.2519***
		(0.0020)
Log likelihood	-486,156.4	-537,965.7
AIC	872,813.435	947,496.526
BIC	874,944.187	948,194.378

Notes: Standard Errors within brackets, ***, denotes significance in 1% level.

Table 5.: Standardized DID and SEM Estimates

	DV: SOL
Disability	-0.0727***
	(0.0022)
Log of Household Income	0.2899***
	(0.0022)
Treat	-0.4673***
	(0.0033)
Post (1 for >2007)	0.3170***
	(0.0026)
Treat*Post	0.1436***
	(0.0031)
Disability Costs as percentage of income in 2003-2011	25%
Disability Costs in monetary values in 2003-2011	4,250TL
Disability Costs as percentage of income before the health Reforms in 2008	51%
Disability Costs as percentage of income after the health Reforms in 2008	6,900TL
Disability Costs in monetary values before the health Reforms in 2008	17.0%
Disability Costs in monetary values after the health Reforms in 2008	3,500TL
No. Observations	164,774
Log likelihood	-471,108.9
AIC	860,304.520
BIC	862,522.953
Chi square/df	5.54
CFI	0.863
TLI	0.802
RMSEA	0.051
SRMR	0.066

Notes: Standard Errors within brackets, ***, denotes significance in 1% level.