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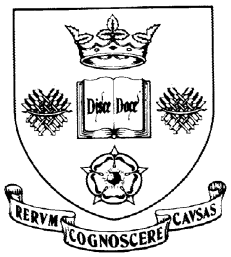

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Out-of-Pocket Health Care Expenditure in Turkey: Analysis of the Household Budget Surveys 2002-2008

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Abstract: This paper analyses the prevalence of 'catastrophic' out-of-pocket health expenditure in Turkey and identifies the factors which are associated with its risk using the Turkish Household Budget Surveys from 2002 to 2008. A sample selection approach based on Sartori (2003) is adopted to allow for the potential selection problem which may arise if poor households choose not to seek health care due to concerns regarding its affordability. The results suggest that poor households are less likely to seek health care as compared to non-poor households and that a negative relationship between poverty and experiencing catastrophic health expenditure remains even after allowing for such selection bias. Our findings, which may assist policy-makers concerned with health care system reforms, also highlight factors such as insurance coverage, which may protect households from the risk of incurring catastrophic health expenditure.

JEL Classification: I10, C25

Keywords: Catastrophic Health Expenditure; Health Care Financing; Sample Selection.

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1. Introduction

Out-of-pocket health care expenditure, where individuals and households pay for health care out of their own resources, is an important feature of health care systems all over the world. Furthermore, the impact of health care financing systems on the welfare of households, particularly poor households, is regarded as an important issue faced by policy makers when developing health care systems and insurance mechanisms (Xu et al., 2003). It is widely accepted that financial protection against high levels of out-of-pocket health expenditure should be one of the primary goals in designing health sector reform strategies since it has been argued that high levels of out-of-pocket health expenditure violate the vertical equity principle, which requires that payment should be related to ability to pay (World Health Organisation, 2000).

It is apparent that, in order to reform health care systems in line with this objective, it is necessary to define what is meant by an unacceptably high level of out-of-pocket health expenditure, frequently referred to as 'catastrophic' in the existing literature. There is, perhaps unsurprisingly, no consensus over the specific definition of catastrophic health expenditure in the existing literature. Russel (2004), however, does provide a comprehensive definition of catastrophic health expenditure: 'the term catastrophic implies that such expenditure levels are likely to force household members to cut their consumption of other minimum needs, trigger productive asset sales or high levels of debt and lead to impoverishment.' (p. 147). The premise is that households should not spend more than a specific percentage of their income on health care to allow them to maintain other basic needs (Wagstaff and Doorslaer, 2003).

The most common approach is to set a threshold in terms of out-of-pocket health expenditure as a percentage of income (e.g. Berki, 1986, Wyszewianski, 1986). However, it is not clear what threshold levels of income can be considered catastrophic. As Wyszewianski (1986) argues, high out-of-pocket health expenditure is not always catastrophic in terms of

imposing a severe financial burden on a household, whereas a small amount of expenditure on health care can be financially devastating for poor households. Therefore, in the existing literature, a range of threshold values has been commonly used. Health care expenditure has typically included co-payments, consultation fees, purchase of medicine, hospital bills and other types of out-of-pocket expenditure on health and generally excludes insurance premiums (e.g. Ranson, 2002; Wagstaff and van Doorslaer, 2003).[1] A further area of debate concerns the choice of denominator used to define the catastrophic level of expenditure. Some studies use total household income as the denominator (e.g. Pradhan and Prescott, 2002; O'Donnell and Doorslaer, 2005), whereas other studies use disposable household income defined as household income remaining after the deduction of food expenditure (e.g. Xu et al., 2003).

This paper contributes to the existing literature on catastrophic health expenditure by analysing the prevalence and determinants of catastrophic health expenditure in Turkey using the Turkish Household Budget Surveys (HBS) from 2002 to 2008. Turkey is a particularly interesting case for investigating such issues due to two main reasons. Firstly, out-of-pocket health expenditure appears to be relatively high in Turkey accounting for 17.4% of total expenditure on health care in 2008 (Turkish Statistical Institute, 2011), compared to, for example, 7.4% in France, 13% in Germany, 5.7% in Netherlands and 11.1% in the UK in 2008 (OECD, 2010). Secondly, the Turkish health care system has been restructured with the Health Transformation Programme (HTP) and ongoing health reforms since 2003, which potentially affect out-of-pocket health care expenditure. One of the most important health reforms is related to improved access to private health care facilities through contracts with private hospitals for all members of the various health insurance schemes. The HTP also

[1] The reason for excluding insurance premiums and taxation is that this type of health expenditure is arguably not made at the time the household received the service and, moreover, can be anticipated in advance. Any reimbursement from a health insurance scheme is also deducted from the out-of-pocket health expenditure of households. However, there are some studies which do include insurance premiums and social insurance contributions in the numerator (e.g. Knaul, 2000; Murray et al., 2000).

includes the implementation of a Universal Health Insurance system, which unifies all insurance schemes under the Social Security Institute. However, implementation of unifying all insurance schemes has not yet been completed and a large proportion of the population still does not have adequate financial protection. In this respect, one of the main aims of the HTP is to ease the burden on households by decreasing the proportion of out-of-pocket health expenditure in total health expenditure. Hence, the time period of the study is particularly interesting in the context of such reform.[2] In this regard, Erus and Aktakke (2012) investigated the effect of health care reforms on out-of-pocket health expenditure for public insurees in Turkey using the Household Budget Surveys for 2003 and 2006. They found that health reforms improved access to health care facilities and decreased the incidence of high levels of health care expenditure but these reforms were found to particularly benefit the households with higher income levels.

Our paper makes a potentially important methodological contribution to the literature on catastrophic health expenditure by controlling for the potential selection bias related to health care seeking behaviour. Arguably, one of the most important shortcomings of many of the existing studies (including Erus and Aktakke, 2012) is the failure to account for the potential selection problem which may arise if poor households choose not to seek health care due to concerns regarding its affordability. Although the potential selection problem may bias the estimation results, most of the existing studies ignore households that do not seek treatment and this measurement problem is accepted as a limitation (e.g. Russell, 2004; Xu et al. 2003). As Kawabata et al. (2002) emphasise, the highest proportion of catastrophic health expenditure is not always experienced by the lowest income group, which may reflect the fact that catastrophic health expenditure can only be incurred if the household seeks and spends

[2] The Turkish health care system is aligned with that of the EU countries (OECD, 2008) and the area of financial protection in terms of responding to the health needs of the population on the basis of financial accessibility is among the most important issues in Turkey's EU membership negotiations (European Commission, 2010).

money on health care.[3] Ignoring such issues may bias the estimation results since poor households, which arguably have the most need of financial protection, are essentially excluded from the measurement (Pradhan and Prescott, 2002). In this respect, this paper makes a methodological contribution by investigating the determinants of the probability of incurring catastrophic health expenditure in Turkey whilst attempting to adjust for the medical care seeking behaviour of households by using the sample selection approach introduced by Sartori (2003).

No clear pattern of the socioeconomic distribution of health expenditure within developing countries has been found in the existing literature. For example, Makinen et al. (2000) reviewed household survey data from eight developing countries and countries in transition and found that there was no distinctive pattern in health expenditure as a proportion of income by income quintiles. In Burkina Faso, Paraguay and Thailand, regressive trends were found (i.e. the wealthier quintiles spend a lower percentage of their total consumption on health care than poorer quintiles), whereas in Guatemala and South Africa, progressive trends were identified. Moreover, wealthier households were found to be more likely to seek health care when they need it than poorer households, which may reflect concerns regarding its affordability amongst the poor.

In a similar vein, Xu et al. (2003) used household survey data from 59 countries to investigate the levels and determinants of catastrophic health expenditure.[4] The findings indicated different patterns of catastrophic health expenditure across countries. In countries with advanced social protection systems such as Canada, the Czech Republic, Denmark, the

[3] Pradhan and Prescott (2002) used a simulation model to construct a distribution of needed health expenditure using household survey data for Indonesia. Catastrophic health expenditure was defined as out-of-pocket health expenditure exceeding 10% of the household's total expenditure. The distribution of catastrophic health expenditure by expenditure quintiles indicated that richer households are more likely to spend 10% of their income on health care as compared to poor households in Indonesia. The results of their simulation analysis indicated that subsidising inpatient care would result in the greatest decrease in the proportion of households with catastrophic health expenditure while subsidising outpatient care would provide benefits particularly for the very poor segment of the population.

[4] Turkey was not included in the analysis, which may reflect a lack of suitable data.

UK, Germany and France, the proportion of households incurring catastrophic health expenditure was less than 0.1%. Catastrophic health expenditure was found to be common in some countries in transition, middle-income countries, in certain Latin American countries and several low-income countries with over 10% in Vietnam and Brazil. Lower income groups were generally found to be more likely to incur catastrophic health expenditure as compared to higher income groups. However, the highest rate of catastrophic health expenditure was not observed in the lowest income group, which may again reflect issues regarding the affordability of health care.

With respect to the factors that are likely to be associated with the risk of catastrophic health expenditure, in general, catastrophic health expenditure is associated with poverty or low income, unemployment, low levels of insurance coverage and having disabled, chronically ill or aging household members. Wyszewianski (1986), for example, found that ageing, unemployment and poverty were the most important risk factors in the U.S. for incurring catastrophic health expenditure. Similarly, Berki (1986) stated that poverty and not having health insurance coverage were among the risk factors associated with catastrophic expenditure on health care. O'Donnell and Doorslaer (2005) investigated sources of variation in the incidence of catastrophic expenditure on health care across six Asian countries using household surveys. They found that having a highly educated household head, insurance coverage and living in an urban area were all inversely associated with the probability of incurring catastrophic health expenditure. The relationship between health insurance and its effect on out-of-pocket health expenditure is a widely discussed issue in the existing literature (e.g. Sepehri et al., 2006). Although it is expected that insurance coverage provides financial protection from catastrophic health expenditure, it is also possible for health insurance to create demand inducement, which may result in high levels of out-of-pocket health expenditure (Wagstaff and Lindelow, 2008). As Kawabata et al. (2002) argue, under

insurance coverage, catastrophic health expenditure may not simply go away if the benefit package does not cover all of the health expenditure.

There are only a small number of studies exploring catastrophic health expenditure in Turkey. For example, Yardim et al., (2009) investigated the factors associated with the risk of catastrophic health expenditure in Turkey using the 2006 Household Budget Survey. The results indicated that the health insurance coverage of the household head and living in an urban area were closely related to the risk of catastrophic health expenditure. Sulku and Bernard (2009), on the other hand, examined the role of the health insurance system in providing adequate financial protection against high out-of-pocket health expenditure amongst individuals aged less than 65 years using Turkey's 2002/2003 National Household Health Expenditure Survey. They found that 19% of the non-elderly population were living in households where health expenditure exceeds 10% of their income. For poor households, 23% of the non-elderly population were living in households whose expenditure on health care is more than 20% of their income. Finally, Kisa et al. (2009) investigated the delayed use of health care services among the urban poor in Turkey. Their findings indicated that about 63% of poor households did not seek health care due to inability to pay, suggesting that the medical care seeking behaviour of poor households is an important issue in Turkey.

2. Data and Methodology

The empirical analysis is based on data drawn from the nationally representative Turkish Household Budget Surveys (HBS), 2002 to 2008, which are a time-series of repeated cross-sections. The surveys include four main groups of variables: variables relating to household assets (e.g. type of dwelling and ownership, facilities in the house, ownership of durables and transportation vehicles); expenditure on consumption; variables related to individuals (e.g. age, gender and education); and, finally, variables related to employment and income (e.g. occupation, profession and income from main economic activity). The data set, which is

pooled over the seven years, comprises 78,067 observations. In the health category, information is available on out-of-pocket health care expenditure including expenditure on medicine and pharmacy products, treatment equipment, dentistry services, laboratories and X-ray services, nursing care services and hospitalisation.

Catastrophic health expenditure is defined at five threshold levels, 2.5%, 5%, 10%, 15% and 20% of total household expenditure[5], where the choice of these threshold levels is based on the existing literature, allowing us to provide a comprehensive picture of catastrophic health expenditure and to explore the sensitivity of the results. Table 1 presents the distribution of catastrophic health expenditure by the seven survey years. It is apparent that the proportions of households incurring catastrophic health expenditure are similar across the years with the exception of 2008. The proportion of households with catastrophic health expenditure noticeably decreases in 2008, which is the year in which the Universal Health Insurance system was implemented. From 2002 to 2008, between 16% and 18% of households spent more than 2.5% of their income on health care and between 1% and 2% of households reported health expenditure exceeding 20% of their total expenditure.

A standard probit model is initially estimated, where the dependent variable takes the value of 1 if the household's total out-of-pocket health expenditure exceeds the threshold level (i.e. if the household experienced catastrophic health expenditure) and 0 otherwise. The probit model takes the following form (see, Greene, 2012):

$$y^* = x'\beta + e \quad (1)$$

[5] All types of household expenditure are aggregated to obtain total household expenditure and all monetary values are adjusted for price inflation using the general Consumer Price Index. In addition, the reason for using total household expenditure as a proxy for income is that expenditure tends to be more accurately reported, is easier to measure and is measured with less error relative to current income measures particularly in developing countries (Deaton, 1997). Furthermore, it has been argued that total household expenditure is a better proxy for household income since savings allow smoothing of expenditure over time whereas income may be subject to transitory fluctuations (Deaton, 1997; Tansel, 2002).

where y^* denotes a latent or unobserved variable, β is a set of parameters, x is a vector of explanatory variables and the error term is normally distributed with zero mean and unit variance, $e \sim N(0,1)$. We observe $y = 1$ if $y^* > 0$ and $y = 0$ otherwise.

As discussed above, it may be the case that some poor households delay dealing with their medical needs as they cannot afford out-of-pocket health care expenditure and, thus, they are not regarded as incurring catastrophic health expenditure as their health expenditure is zero. The standard probit approach outlined above does not take such considerations into account. The medical care seeking behaviour of households should ideally be accounted for in order to accurately assess the risk factors associated with incurring catastrophic health expenditure. In order to account for the health care seeking behaviour of households, we create a binary indicator for whether the household reports positive health expenditure. Since all members of all the health care insurance schemes in Turkey are required to pay a co-payment for drug expenditure, this indicator provides information on their medical visits and serves as a proxy for health care seeking behaviour (Erus and Aktakke, 2012).[6]

In order to control for the potential sample selection issue associated with the fact that households can only incur catastrophic health care expenditure if they actually seek and purchase health care, we follow the approach proposed by Sartori (2003). A more common approach to adjusting for selection bias in the economics literature is that proposed by Heckman (1979). A drawback of the Heckman selection model, however, is that the identification of the parameters in the model is based solely on the assumed distribution of the error terms unless there is an explanatory variable that affects the selection equation but not the outcome equation (Sartori, 2003). When theory suggests identical explanatory variables for both the selection and the outcome equations, Sartori (2003) argues that authors often try to identify an arguably theoretically 'unjustifiable' exclusion restriction for the selection

[6] Unfortunately, the HBS do not include information on the utilisation of health services or the health status of household members.

equation to meet the modelling requirements. To overcome this problem, Sartori (2003) develops an estimator where identical explanatory variables are used in the selection and outcome equations and the identification is based on the assumption of identical error terms in both equations for a given observation:

$$U_{1i} = x_i\gamma' + v_{1i} \quad (2)$$

$$U_{2i} = x_i\beta' + v_{2i} \quad (3)$$

Equation (2) is the selection equation, equation (3) is the outcome equation and *U* represents an unobserved continuous dependent variable. The explanatory variables, x, are the same in both equations, but the coefficients, γ and β are usually different. Each equation contains a normally distributed mean zero error term, v_1 and v_2. The key difference between the Sartori and the Heckman approaches to modelling selection is that the former makes the assumption that $v_1 = v_2$ while the latter assumes that the error terms follow a bivariate normal distribution with a freely estimable correlation parameter.[7] Rather than observing the *U* terms, two dichotomous variables, Z_{1i} and Z_{2i}, are observed

$$Z_{1i} = 0 \; if \; U_{1i} < 0, \; Z_{1i} = 1 \; if \; U_{1i} \geq 0 \quad (4)$$

$$Z_{2i} = 0 \; if \; U_{2i} < 0, \; Z_{2i} = 1 \; if \; U_{2i} \geq 0 \quad (5)$$

where Z_{1i} indicates whether or not the observation is selected (i.e. whether the household seeks health care) and Z_{2i} represents the observed outcome (i.e. whether the household incurs catastrophic health expenditure). Following Sartori (2003) we define three random variables, Y_{ij}, such that

$$Y_{i0} = 1 \; if \; Z_1 = 0 \text{ and } 0 \text{ otherwise;} \quad (6)$$

$$Y_{i1} = 1 \; if \; Z_1 = 1 \text{ and } Z_2 = 0 \text{ and } 0 \text{ otherwise;} \quad (7)$$

$$Y_{i2} = 1 \; if \; Z_1 = 1 \text{ and } Z_2 = 1 \text{ and } 0 \text{ otherwise;} \quad (8)$$

[7] The Sartori model can be thought of as a Heckman selection model with the correlation parameter constrained to 1. Sartori also discusses an alternative model in which the correlation is set to -1 but that is less relevant in the present context.

where Y_{i0} takes the value 1 if the observation is not selected, Y_{i1} takes the value 1 if the observation is selected and the value of the outcome variable is 0 and Y_{i2} takes the value 1 if the observation is selected and the value of the outcome variable is 1. The probability that $Y_{ij} = 1$ in each case is defined as

$$Pr(Y_{i0} = 1) = \Phi(-x_i\gamma') \quad (9)$$

$$Pr(Y_{i1} = 1) = \Phi(-x_i\beta') - \Phi(-x_i\gamma') \ if \ (\gamma' - \beta')x_i = 0 \text{ and 0 otherwise} \quad (10)$$

$$Pr(Y_{i2} = 1) = \Phi(x_i\beta') \ if \ (\gamma' - \beta')x_i > 0 \text{ and } \Phi(x_i\gamma') \text{ if } (\gamma' - \beta')x_i \leq 0 \quad (11)$$

where *Φ(.)* denotes the cumulative standard normal distribution. Sartori argues that the assumption of identical error terms is more likely to hold if the processes behind the selection and outcome of interest are similar, if the selection and outcome have the same causes and if the two processes are close to each other in time and space. In the current application, it seems reasonable to assume that the processes behind seeking health care and incurring catastrophic health expenditure are similar. Indeed, the primary determinant for both seeking health care and incurring catastrophic health expenditure is poor health. Further, when calculating households' health expenditure we exclude insurance premiums, which are arguably anticipated in advance. As a consequence, seeking health care and experiencing catastrophic health expenditure arguably occur at the same time and place. It can therefore be argued that this setting largely satisfies the conditions set out by Sartori to justify the assumption of identical error terms.[8]

The household-level covariates used in the analysis follow the existing literature and include controls for: household size including its squared term; urban residence; the household head not having health insurance[9]; the presence of a disabled or ill member in the household; a dummy indicator for a male household head; the highest level of education of

[8] In order to explore the robustness of the results we also estimated a Heckman selection model without exclusion restrictions. The results, which are consistent with the results of the Sartori selection model, are available on request.

[9] This variable includes both public and private health insurance.

the household head (distinguishing between primary education or less including elementary education, secondary education including any secondary level education and vocational schools and higher education including any post-secondary education, where primary education or less is the omitted category); a poor household[10]; the number of preschool children in the household (aged under 5 years); the number of school children in the household (i.e. children aged 6-14 years); the number of elderly household members (aged 65 and over); the employment status of the household head (where the omitted category is not employed or self-employed); and year (where 2002 is the omitted category).

Table 2 presents descriptive statistics for the continuous variables and percentage distributions for selected categorical variables across the survey years used in the empirical analysis.[11] There are significant differences in the mean values of total monthly household expenditure across years but a consistently increasing trend across the years is not apparent. Total monthly expenditure decreases from £412.7 in 2002 to £328.4 in 2003 and decreases from £491.7 in 2005 to £396.9 in 2006. The mean value of monthly total (out-of-pocket) health expenditure ranges from £6.8 to £10.7, which initially appears quite small. The definition of catastrophic health expenditure, however, implies that out-of-pocket health expenditure can become catastrophic when the numerator (the magnitude of out-of-pocket health expenditure) is large or the denominator (the household's total income) is small. With respect to household characteristics, the average household size is around 4 over the 7 year period. The mean number of preschool children is about 0.4 and the mean number of school children is between 0.7 and 0.8 across the survey years. Similarly, the average number of elderly members living in the household does not change significantly over the period. In

[10] The relative poverty definition of the OECD is used to denote poor households. According to this definition, the poverty line is set at 60% of equivalised median total expenditure. In order to obtain equivalised median expenditure, the total expenditure of each household is divided by the OECD equivalence household size which is an aggregate indicator of household size. This equivalence approach assigns a value of 1 to the first adult, of 0.5 to each additional adult aged 14 and above and of 0.3 to each child under the age 14. Then, the median value of equivalised expenditure is calculated. If the household's equivalised total expenditure does not exceed 60% of equivalised median total expenditure, it is labelled a poor household.

[11] All values in Turkish Lira (TL) were converted to the British Pound (£) using 2002 as the base year.

2002, 20% of the sample is labelled as 'poor' and this rate has increased to 22.6% in 2004. After 2004, there is a consistently decreasing trend in the poverty rates. Interestingly, across the sample period, 64% of poor households report zero expenditure on health care. Finally, there has been a marked decrease over time in the proportion of households in which the household head does not have health insurance. We return to this issue in the Results section.

3. Results

The marginal effects from the probit and Sartori selection models are presented in Tables 3 and 4, respectively. It can be seen from Tables 3 and 4 that the risk factors associated with experiencing catastrophic health expenditure are robust across all definitions (i.e. different threshold levels) of catastrophic health expenditure in both models. There are only some slight differences in the statistical significance levels of the effects of the highest educational attainment and the employment status of the household head.

The results of the probit model presented in Table 3 indicate that poor households are less likely to experience catastrophic health expenditure as compared to non-poor households. In accordance with *a priori* expectations, households with a disabled or ill member and households with more preschool and/or elderly members are more likely to incur catastrophic health expenditure. In accordance with the findings in the existing literature, higher levels of educational attainment, living in an urban area and insurance coverage are all found to be protective factors against the risk of catastrophic health expenditure. The results also indicate that there is a statistically significant and negative association between the likelihood of catastrophic health expenditure and household size.[12]

Many of the statistically significant risk factors in the Sartori selection model, which are presented in Table 4, are similar to those in the probit model. The selection part of the model represents the probability of seeking health care whereas the outcome part represents

[12] The marginal effect of household size represents one unified marginal effect for household size and its squared term.

the probability of experiencing catastrophic health expenditure adjusted for the selection process.

The most pronounced finding relates to the association between the poverty status of the household and the likelihood of incurring catastrophic health expenditure after accounting for the household's health care seeking position. The results from the selection equation indicate that poor households are much less likely to seek health care than non-poor households for all threshold levels, which is consistent with the hypothesis that poor households may not seek health care due to affordability concerns. However, the results also suggest that poor households are less likely to experience catastrophic health expenditure as compared to non-poor households even after accounting for the potential selection problem. This finding may reflect a particular aspect of the Turkish health care system related to the fact that it is commonly accepted that patients receive a better quality service in private health care facilities (Savas et al., 2002). Before the health reforms, patients using private health care were paying for services out-of-pocket, even if they had health insurance. After the health reforms, however, access to private facilities was improved. Although using private facilities still requires paying an extra charge imposed by the private provider, this charge was reduced by the reforms.[13] It can be argued that this improvement in access to private health care particularly benefited the non-poor segment of the population who can afford to pay the extra charge imposed by the private provider. As Wagstaff and Lindelow (2008) argue, it is possible for health insurance to create demand inducement, and this demand increase may result in high levels of out-of-pocket health expenditure. It is possible, therefore, that the improvements in access to private health facilities have increased the demand among non-poor households who prefer private health care to public health care. This increase in demand

[13] The extra charge was limited to 30% of the payment by the government to the provider (Erus and Aktakke, 2011).

could have the knock-on-effect of causing a higher probability of incurring catastrophic health expenditure.

The results from the Sartori selection model presented in Table 4 confirm the results from the probit model in terms of the protective effect of health insurance coverage against catastrophic health expenditure. Furthermore, as expected, the results of the selection equation indicate that households without any health insurance coverage are less likely to seek health care as compared to households with health insurance coverage. This finding confirms the important role of insurance coverage in terms of providing financial protection. However, 19.7% of household heads do not have any health insurance in this sample and only 15.6% of poor household heads have health insurance. This highlights the vulnerability of poor households to the risk of catastrophic health expenditure.

The results further indicate that the presence of a disabled or ill individual in the household is positively associated with the probability of seeking health care and has the largest marginal effect in the outcome equation. This finding indicates that the presence of a disabled or ill individual in the household appears to be the most important risk factor for incurring catastrophic health expenditure for the period considered in this study. The results also support the protective effects of educational attainment and living in an urban area on the probability of incurring catastrophic health expenditure. Urban residence is also associated with a higher probability of seeking health care as compared to rural residence which may be due to, for example, better access to health care facilities.

The age composition of the household is also important in terms of the risk of experiencing catastrophic health expenditure. The number of members of the household belonging to more risky groups in terms of health status, i.e. those aged under 5 or above 65, are both positively associated with a high risk of experiencing catastrophic health expenditure. Further, the results from the selection equation indicate that an increase in the number of

preschool children and elderly household members are both positively related to the household's health care seeking propensity. These findings are not surprising since elderly household members generally need more frequent, as well as expensive, health care and, in addition, they tend to have significantly reduced income (or they may be living as a dependent of other family members). Similarly, having more preschool children may lead to an increased demand for health care since they may experience early age illnesses as well as needing more preventive health care services.

Finally, the results of the Sartori selection model reinforce the results of the probit model in terms of the negative association between the likelihood of catastrophic health expenditure and household size. In general, larger households are more likely to be concentrated in the lower socioeconomic quintiles and have more dependent individuals and, thus, they are more likely to have limited resources for health care. However, it may also be the case that large households may pool their income which may decrease the risk of experiencing catastrophic health expenditure. Having more income earners in the household, for example, may also lead to such an association. The results from the selection equation indicate that larger households have a higher probability of seeking health care compared to smaller households. This finding highlights the possibility that a risk factor resulting in a higher probability of seeking treatment does not necessarily lead to a higher probability of experiencing catastrophic health expenditure.

Additionally, the year controls indicate that the ongoing health reforms since 2003 are negatively associated with the probability of incurring catastrophic health expenditure. This relationship is statistically significant for the years of 2003, which is the first year of the HTP, and 2008, which is the year that the implementation of the Universal Health Insurance system was started. Further, the results suggest that households are more likely to seek health care in the later years of the HTP, which is consistent with the health reforms having a positive

impact on access to health care services. A related point on access to health care services and the health reforms concerns the decline in the proportion of heads of household with no health insurance over the period of analysis. This trend may reflect the fact that one of the aims of the HTP is to increase insurance coverage rates, with a series of reforms introduced encouraging firms to insure their workers as well as auditing workplaces to check the insurance coverage status of employees. The trend observed in our data suggests that such policies may have been successful in leading to an increase in the number of individuals having health insurance.

4. Conclusion

This paper has explored the risk factors associated with experiencing catastrophic health expenditure at the household level in Turkey, which is an area of particular policy interest given the ongoing reforms to the Turkish health care system. This study is the first attempt to investigate the determinants of catastrophic health expenditure in Turkey which takes the medical care seeking behaviour of households into account and hopefully will serve to stimulate further research in this area. Our results suggest that poor households are less likely to seek health care relative to non-poor households, which highlights the vulnerability of poor households in terms of health care availability and implies that special attention should be devoted to overcoming the health care barriers faced by poor households in Turkey. On the other hand, the results indicate that poor households are less likely than non-poor families to incur catastrophic health expenditure even after accounting for the medical care seeking behaviour of households. This may arguably be attributed to preferences in favour of private health care facilities among the non-poor, which in itself reflects an important existing inequality between poor and non-poor households in Turkey. We also find that attempting to adjust for the potential selection bias does not in general have a qualitative impact on the results, but allowing for selection does increase the effects of the risk factors in terms of

magnitude. Finally, health insurance is found to be an important protection factor against the probability of incurring catastrophic health expenditure.

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Table 1: Percentage of Households with Catastrophic Health Expenditure by Survey Year and Threshold

Threshold/Year	2002	2003	2004	2005	2006	2007	2008
2.5%	17.8	15.6	17	17.5	17.6	17.1	15.7
5%	10.6	9.8	10.8	10.8	10.8	10.5	8.4
10%	5	4.7	5.4	5.4	5.2	5	3.8
15%	2.8	2.5	3	3.1	2.8	2.9	2
20%	1.6	1.5	1.9	1.7	1.6	1.7	1.2

Note: For the denominator, all types of household expenditure are aggregated to obtain total household expenditure and all monetary values are adjusted for price inflation using the general Consumer Price Index.

Table 2: Descriptive Statistics for the Continuous Variables and Percentage Distributions for the Categorical Variables across Survey Years

Continuous Variables							
	2002	2003	2004	2005	2006	2007	2008
Total expenditure*	412.7	328.4	400.7	491.7	396.9	419.6	451.9
(St. Dev.)	(449.8)	(293.9)	(341.7)	(407.8)	(317.3)	(320.7)	(338.2)
(Min)	11.7	8.7	26.2	11.1	11.9	16.1	6.4
(Max)	18993	7328.9	7473.2	6126.7	4535.9	7852	4782.8
Total health exp.*	8.6	6.8	8.8	10.7	8.5	9.1	8.1
(St. Dev.)	(32.3)	(32.9)	(34.5)	(45.4)	(37.4)	(42)	(43.4)
(Min)	0	0	0	0	0	0	0
(Max)	1017.2	2174.5	1022.3	2197.5	1671	1290.7	2922.6
Household size	4.25	4.17	4.14	4.14	4.08	4.04	3.89
(St. Dev.)	(2.01)	(2.04)	(2.02)	(2.04)	(1.89)	(1.99)	(1.83)
(Min)	1	1	1	1	1	1	1
(Max)	20	23	19	22	23	22	23
Children: <5 yrs	0.47	0.43	0.42	0.41	0.41	0.39	0.37
(St. Dev.)	(0.74)	(0.72)	(0.72)	(0.70)	(0.69)	(0.69)	(0.66)
(Min)	0	0	0	0	0	0	0
(Max)	6	6	6	6	7	8	5
Children: 6-14 yrs	0.81	0.78	0.78	0.80	0.76	0.74	0.69
(St. Dev.)	(1.08)	(1.05)	(1.05)	(1.07)	(1.03)	(1.02)	(0.97)
(Min)	0	0	0	0	0	0	0
(Max)	10	9	7	11	9	8	10
Elderly: 65+ yrs	0.22	0.25	0.24	0.25	0.24	0.24	0.26
(St. Dev.)	(0.52)	(0.56)	(0.54)	(0.55)	(0.54)	(0.55)	(0.56)
(Min)	0	0	0	0	0	0	0
(Max)	4	4	3	3	3	3	3
Categorical Variables (%)							
Education of household head (reference: primary or less)							
Primary (or less)	74.8	74	72.8	74.6	73.8	73.3	70
Secondary	16.2	16.6	17.7	16.3	16.5	17.2	18.2
Higher	9	9.4	9.5	9.1	9.7	9.5	11.8
Employment status of household head (reference: not employed)							
Not employed	29.8	30.1	30.6	30.3	28.6	31.2	32
Employed	45.6	40	41.1	41.6	44.6	42.8	42.8
Self-employed	24.6	29.9	28.3	28.1	26.8	26	25.2
Poverty							
Poor	20	20.5	22.6	21.7	21.5	20.7	20.8
Gender of the household head							
Male	89.9	90.5	89.4	89.7	89.9	89.3	88.6
Presence of disabled or ill member in the household							
Yes	4.1	3.7	11.1	10.8	11.5	11.9	13.0
Health insurance status of the household head							
No	23.2	26.1	21.9	18.9	13.9	11.5	8.9
Location of the residence							
Urban	84.7	70.9	70.0	69.9	69.3	68.9	69.7
Num. of Obs.	9555	25764	8544	8559	8558	8548	8549

**Notes: ***Turkish Lira (TL) values are converted to British Pound (£) values using 2002 as a base year.

Table 3: Estimation Results of the Probit Model

Variables/Threshold	2.5%		5%		10%		15%		20%	
	Marg.Eff.	**St Err.**	**Marg.Eff.**	**St Err.**	**Marg.Eff.**	**St Err.**	**Marg.Eff.**	**St Err.**	**Marg.Eff.**	**St Err.**
Poor	-0.065***	0.003	-0.046***	0.002	-0.023***	0.001	-0.013***	0.001	-0.008***	0.000
No health insurance	0.027***	0.003	0.024***	0.003	0.016***	0.002	0.012***	0.001	0.008***	0.001
Disabled/ ill member	0.096***	0.005	0.068***	0.005	0.045***	0.003	0.027***	0.002	0.017***	0.002
Secondary education	-0.008**	0.003	-0.007***	0.002	-0.004**	0.002	-0.004***	0.001	-0.002**	0.001
Higher education	0.007	0.004	-0.002	0.003	-0.009***	0.002	-0.006***	0.001	-0.002*	0.001
Employed	0.005	0.003	0.001	0.003	-0.002	0.002	-0.001	0.001	-0.001	0.001
Self-employed	0.019***	0.004	0.015***	0.003	0.007***	0.002	0.003**	0.001	0.001	0.001
Male	0.001	0.004	0.004	0.003	0.002	0.002	0.0004	0.001	0.0002	0.001
Household size	-0.004***	0.001	-0.004***	0.000	-0.004***	0.000	-0.003***	0.000	-0.002***	0.000
Urban	-0.007**	0.003	-0.008***	0.002	-0.010***	0.001	-0.007***	0.001	-0.005***	0.001
Preschool (under age 5)	0.029***	0.002	0.020***	0.001	0.011***	0.001	0.005***	0.000	0.002***	0.000
Children (age 6 to 14)	-0.002	0.001	-0.001	0.001	0.0001	0.001	0.0003	0.000	0.0006	0.000
Elderly (age 65+)	0.033***	0.002	0.022***	0.001	0.012***	0.001	0.007***	0.000	0.005***	0.000
2003	-0.024***	0.004	-0.010***	0.003	-0.005**	0.002	-0.004***	0.001	-0.002*	0.001
2004	-0.013***	0.005	-0.002	0.004	-0.0006	0.002	-0.001	0.002	0.0007	0.001
2005	-0.008	0.005	-0.003	0.004	-0.001	0.002	-0.0002	0.002	-0.0009	0.001
2006	-0.007	0.005	-0.002	0.004	-0.001	0.002	-0.002	0.002	-0.001	0.001
2007	-0.012**	0.005	-0.004	0.004	-0.003	0.002	-0.001	0.002	-0.0008	0.001
2008	-0.026***	0.005	-0.025***	0.003	-0.014***	0.002	-0.009***	0.001	-0.005***	0.001
Log Likelihood	-34572.23		-25174.335		-14835.239		-9342.382		-6133.818	
LR chi2	1161.49 (20)		984.53 (20)		826.85 (20)		608.53 (20)		466.17 (20)	
Prob>chi2	0.0000		0.0000		0.0000		0.0000		0.0000	
Pseudo R Square	0.016		0.019		0.027		0.031		0.036	
Number of Obs.	78077		78077		78077		78077		78077	

Notes: (1) ***p<0.01, **p<0.05, *p<0.1; (2) The marginal effects are calculated at the mean values of the explanatory variables.

Table 4: Estimation Results of the Sartori Selection Model

Variables/Threshold	2.5%		5%		10%		15%		20%	
	Selection	**Outcome**	**Selection**	**Outcome**	**Selection**	**Outcome**	**Selection**	**Outcome**	**Selection**	**Outcome**
Poor	-0.174***	-0.071***	-0.174***	-0.050***	-0.175***	-0.025***	-0.175***	-0.015***	-0.175***	-0.009***
	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.002)	(0.005)	(0.001)	(0.005)	(0.001)
No health insurance	-0.009*	0.025***	-0.009**	0.022***	-0.010**	0.015***	-0.010**	0.010***	-0.010**	0.006***
	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)	(0.000)
Disabled/ ill member	0.110***	0.084***	0.111***	0.057***	0.112***	0.034***	0.111***	0.019***	0.112***	0.011***
	(0.006)	(0.004)	(0.006)	(0.003)	(0.006)	(0.002)	(0.006)	(0.001)	(0.006)	(0.001)
Secondary education	-0.022***	-0.008**	-0.022***	-0.007***	-0.022***	-0.005**	-0.022***	-0.004***	-0.022***	-0.002**
	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.002)	(0.005)	(0.001)	(0.005)	(0.001)
Higher education	-0.003	0.007	-0.003	-0.003	-0.003	-0.010***	-0.003	-0.006***	-0.003	-0.002*
	(0.006)	(0.004)	(0.006)	(0.003)	(0.006)	(0.002)	(0.006)	(0.002)	(0.006)	(0.001)
Employed	0.012**	0.004	0.012**	0.001	0.012**	-0.002	0.012**	-0.001	0.012**	-0.001
	(0.005)	(0.003)	(0.005)	(0.002)	(0.005)	(0.002)	(0.005)	(0.001)	(0.005)	(0.001)
Self-employed	0.024***	0.018***	0.024***	0.014***	0.024***	0.007***	0.023***	0.003**	0.023***	0.001
	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.002)	(0.005)	(0.001)	(0.005)	(0.001)
Male	0.009	0.002	0.009	0.005	0.009	0.003	0.009	0.0009	0.009	0.0005
	(0.006)	(0.004)	(0.006)	(0.003)	(0.006)	(0.002)	(0.006)	(0.001)	(0.006)	(0.001)
Household size	0.020***	-0.004***	0.020***	-0.005***	0.020***	-0.005***	0.020***	-0.003***	0.020***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Urban	0.022***	-0.007**	0.022***	-0.008***	0.022***	-0.010***	0.022***	-0.006***	0.022***	-0.004***
	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)	(0.000)
Preschool (under age 5)	0.029***	0.030***	0.029***	0.021***	0.029***	0.011***	0.029***	0.005***	0.029***	0.002***
	(0.003)	(0.002)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.000)	(0.003)	(0.000)
Children (age 6 to 14)	-0.010***	-0.002	-0.010***	-0.001	-0.010***	0.0003	-0.010***	0.0004	-0.010***	0.0006
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)
Elderly (age 65+)	0.050***	0.033***	0.050***	0.022***	0.050***	0.012***	0.050***	0.007***	0.050***	0.005***
	(0.003)	(0.002)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.000)	(0.003)	(0.000)
2003	-0.052***	-0.024***	-0.052***	-0.010***	-0.053***	-0.005**	-0.053***	-0.004**	-0.053***	-0.002*
	(0.006)	(0.004)	(0.006)	(0.003)	(0.006)	(0.002)	(0.006)	(0.001)	(0.006)	(0.001)
2004	-0.005	-0.013**	-0.005	-0.002	-0.006	-0.0003	-0.006	-0.0008	-0.006	-0.0008
	(0.007)	(0.005)	(0.007)	(0.004)	(0.007)	(0.002)	(0.007)	(0.002)	(0.007)	(0.001)

Table 4 continued: Estimation Results of the Sartori Selection Model

Variables/Threshold	2.5%		5%		10%		15%		20%	
	Selection	**Outcome**	**Selection**	**Outcome**	**Selection**	**Outcome**	**Selection**	**Outcome**	**Selection**	**Outcome**
2005	0.043***	-0.008	0.043***	-0.003	0.043***	-0.001	0.043***	-0.0003	0.043***	-0.001
	(0.007)	(0.005)	(0.007)	(0.004)	(0.007)	(0.002)	(0.007)	(0.002)	(0.007)	(0.001)
2006	0.062***	-0.007	0.061***	-0.002	0.062***	-0.001	0.062***	-0.003	0.062***	-0.001
	(0.007)	(0.005)	(0.007)	(0.004)	(0.007)	(0.002)	(0.007)	(0.002)	(0.007)	(0.001)
2007	0.047***	-0.012**	0.047***	-0.004	0.047***	-0.003	0.047***	-0.001	0.047***	-0.0008
	(0.007)	(0.005)	(0.007)	(0.004)	(0.007)	(0.002)	(0.007)	(0.002)	(0.007)	(0.001)
2008	0.077***	-0.027***	0.077***	-0.027***	0.077***	-0.015***	0.078***	-0.010***	0.078***	-0.005***
	(0.007)	(0.005)	(0.007)	(0.004)	(0.007)	(0.003)	(0.007)	(0.002)	(0.007)	(0.001)
Log Likelihood	-76018.249		-71344.212		-64450.686		-60317.626		-57763.305	
Number of Obs.	78077		78077		78077		78077		78077	

Notes: (1) ***p<0.01, **p<0.05, *p<0.1 and standard errors are presented in brackets; (2) The marginal effects are calculated at the mean values of the explanatory variables.