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Abstract

There is a rising number of concepts that try to describe the broad perception of time poverty. Though detailed time poverty analyses are available, still little is said about its impacts on the individual behaviour. Within this article, a possible new implication is analysed: The author tests whether time poor individuals compare less between prices as a result of their time deficit, therefore do not identify "bargains or rip-offs" and pay on average more for identical products and services than not time poor individuals.

Using data drawn from the German Time Use Survey (GTUS) 2001/02, time use information is imputed into the German Sample Survey of Income and Expenditure (IES) 2003 to identify time poor individuals in the IES 2003. Instrumental variables estimations are arranged to account for an expected bias in ordinary least squares estimations – caused by the excluded variable (search) ability – and to catch the causal effect of time poverty on paid prices.

The results do not confirm a higher price paid by time poor individuals. The findings rather suggest that time poor persons find trust in stores with a fair price performance ratio, remain loyal to them and accordingly pay a similar amount for goods and services than not time poor individuals in most cases.

JEL: D12, D82, D83

***Keywords**: Time poverty, Time use and well-being, Price dispersion, Price Search, Asymmetric Information*

Zusammenfassung

Eine zunehmende Zahl von Ansätzen versucht die breite Wahrnehmung von Zeitarmut zu beschreiben. Obwohl detaillierte Analysen vorhanden sind, wird meistens wenig über die konkreten Konsequenzen auf das individuelle Verhalten gesagt. Im Rahmen dieses Artikels wird eine mögliche neue Auswirkung analysiert: Der Autor testet, ob zeitarme Individuen als eine Folge ihres Zeitdefizits weniger zwischen Preisen vergleichen, entsprechend keine „Schnäppchen" oder exorbitante Preise identifizieren und deshalb durchschnittlich mehr für identische Produkte und Dienstleistungen zahlen als nicht-zeitarme Individuen.

Unter Verwendung der deutschen Zeitbudgeterhebung (ZBE) von 2001/02 werden Zeitverwendungsinformationen in die Einkommens- und Verbrauchsstichprobe (EVS) 2003 imputiert, um auch dort eine Identifizierung von zeitarme Individuen zu ermöglichen. Instrumenten Variablen Schätzungen werden durchgeführt, um eine erwartete Verzerrung – hervorgerufen durch die ausgeschlossene Variable „Fähigkeiten" – in den üblichen Schätzungen nach der Methode der kleinsten Quadrate zu korrigieren und den kausalen Effekt von Zeitarmut auf die gezahlten Preise zu erfassen.

Die Ergebnisse bestätigen nicht, dass zeitarme Individuen einen höheren Preis für Waren und Dienstleistungen zahlen. Sie deuten eher darauf hin, dass zeitarme Personen vertrauen zu Geschäften aufbauen, die ein faires Preis-Leistungs-Verhältnis haben. Diesen Geschäften bleiben Sie treu und zahlen entsprechend einen ähnlichen Preis wie nicht-zeitarme Individuen.

JEL: D12, D82, D83

***Schlagwörter**: Zeitarmut, Zeitverwendung und Wohlfahrt, Preisunterschiede, Preissuche, Asymmetrische Information*

1 Introduction

A rising number of concepts try to describe the broad perception of time poverty. With "scarcity of time" (Linder 1970, Bonke and Gerstoft 2007), "paucity of leisure" (Bittman and Wajcman 1999), "time famine" (Robinson and Godbey 1999), "feeling rushed" (Bittman and Wajcman 1999) or just "time poverty" (Vickery 1977, Bardasi and Wodon 2006, Harvey and Mukhopadhyay 2007, Merz and Rathjen 2009, 2010) different terms can be identified in scientific literature. Though detailed analyses are available, still little is said about its impacts on the individual behaviour. Within this article, a possible new implication is analysed. By asking "Do Time Poor Individuals Pay More?" this analysis tests whether time poor individuals compare less between prices as a result of their time deficit, therefore do not identify "bargains or rip-offs" and pay in average more for identical products and services than not time poor individuals.

It is largely consensus that individual well-being strongly depends on the quantity and quality of consumed products and services (e.g. Haughton und Khandker 2009: 20). If so, a confirmation of the expected mechanism would mean that time poor individuals purchase less products and services than not time poor individuals given the same amount of income, and accordingly, have to suffer welfare losses. The importance of the time dimension for poverty and well-being analyses – also in a multidimensional context – would again be supported (Merz and Rathjen 2009, 2010, 2011).

Databases that are adequate to test the expected mechanism have to include information about the income, time use and expenditure situation. Though in Germany no database is available that fulfils all these three conditions at the same time, the imputation of the time poverty information from the German Time Use Survey (GTUS) 2001/02 into the German Sample Survey of Income and Expenditure (IES) 2003 solves the problem. This Extended German Sample Survey of Income and Expenditure (EIES) 2003 then allows instrumental variables estimations that catch the causal effect of time poverty on paid prices accounting for an expected bias in ordinary least squares estimations – caused by the excluded variable ability.

The article is organized as follows: In the next chapter, the theoretical background is presented, giving a short overview of existing models that explain price differences in markets with rational consumers before the main hypothesis is formulated. Chapter three describes the applied databases, the empirical strategy, estimation method and details of the operationalization process. Chapter four includes the relevant empirical findings. The article ends with some concluding remarks in chapter five.

2 Theoretical Background and Hypothesis

According to standard economic theory, competitive markets for homogeneous products suggest that the competition among firms will lead to the so-called “law of one price” (Baye et al. 2007). However, empirical studies consistently evidence price dispersion for identical goods and services (e.g. Stigler 1961, Pratt et al. 1979, Baye et al. 2001, Baye et al. 2004, Baye et al. 2006). Although some price differences could be traced back to differences in service or the like, “it would be metaphysical, and fruitless, to assert that all dispersion is due to heterogeneity" (Stigler 1961: 214). Therefore, a large number of theories are developed to explain price differences in markets with rational consumers. The concepts are similar in the sense that price search is connected with “costs”. Since individuals differ in these “costs”, only some compare prices and hence pay in average less than others.

Baye et al. (2007) present an overview and arrange concepts into “search-theoretic” models and models with “information clearinghouse”. “Search-theoretic” models assume that it is costly for consumers to gather information about prices. Each additional price quote causes costs. Therefore, the optimum amount of search is found if the costs of price search are equated to its expected marginal return (e.g. Stigler 1961). In contrast, models with “information clearinghouse” neglect marginal search costs as a source for price dispersion (e.g. Salop and Stiglitz 1977). Here, consumers decide to gain access to a list of prices charged by all firms and purchase at the lowest listed price (e.g. for newspapers with prices of a good or service offered by different firms).

Components of these “costs” could be direct monetary costs (e.g. expenditures for newspapers) as well as opportunity costs of time, the so-called “shoe-leather costs”. Though both components are recognized in both groups of concepts, the opportunity costs of time are more abound in the “search-theoretic” models. Trying to answer the question “Do Time Poor Individuals Pay More?” within this article, the “search-theoretic” models are more adequate.

Differences in the costs of price search between individuals are necessary condition for theories that try to explain price differences in markets with rational consumers. Assuming that the monetary expenditures (e.g. for newspapers) are the same among individuals, differences in the costs of price search are first and foremost caused by differences in opportunity costs of time as well as differences in (search) ability (Salop and Stiglitz 1977: 495).

Following Aguiar and Hurst (2004), individuals who earn high wages allocate relatively less time to price search since the marginal utility of time for price search is very soon exceeded by the marginal utility of labor time. In the same context, Stigler (1961: 216) stated that “time will be more valuable to a person with a larger income”. Accordingly, one could think that high earners compare less between prices and therefore pay in average more for identical goods and services. Analogue, time seems to be very valuable to the so-called time poor individuals. Time Poverty can be understood as the fact that some individuals do not have enough time left for rest or leisure after taking obligations and requirements – such as labor time, childcare or sleeping – into account (Bardasi and Wodon 2006, Merz and Rathjen 2009, 2010, 2011). The opportunity costs of time are relatively high since time for comparing prices has to “compete” against many other possible activities in the framework of the small free disposable time. Accordingly, the central hypothesis that “*Time poor individuals pay more for identical goods and services*.” is stated.

3 Data, Empirical Strategy, Method and Operationalization

3.1 Data

Income, time use and expenditure information are needed to test the previous formulated hypothesis. Income information is needed to capture high and low earners, time use information is needed to capture time poor and time rich individuals and expenditure information is needed to capture the amount that is paid for identical goods. Though in Germany no database is available that fulfils all three conditions at the same time, the connection of two databases solves the problem: With the German Time Use Survey (GTUS) 2001/02 detailed time use information is available and with the German Sample Survey of Income and Expenditure (IES) 2003 detailed income and expenditure information stands by.

German Time Use Survey (GTUS) 2001/02: The second German Time Use Survey (GTUS) (German name: "Zeitbudgeterhebung" (ZBE)) 2001/02 was conducted by the Federal Statistical Office in co-operation with the statistical offices of the Länder from April 2001 to May 2002 (Statistisches Bundesamt 2004, 2005a, Ehling 2003, Ehling et al. 2001). Therefore all household members with the age of ten years or older were asked to record their activities in a time use diary for a period of three days in own words. To standardise the information, the activities were coded on the basis of a list which encompasses more than 230 activities. Using quota sampling method, more than 5 400 households with over 12 000 persons and 37 000 descriptions of individual days were covered. Additionally, sociodemographic and socioeconomic variables were collected for all household members.[2]

German Sample Survey of Income and Expenditure (IES) 2003: The ninth German Sample Survey of Income and Expenditure (IES) (German name: "Einkommens- und Verbrauchsstichprobe" (EVS)) was conducted by the Federal Statistical Office in co-operation with the statistical offices of the Länder in 2003 (Statistisches Bundesamt 2005b). Every fifth year, households in Germany are asked to provide information on their income and expenditure situation. About 0.2% of all German households participate in each wave. The IES 2003 is created in three steps: First, an introductory interview is accomplished, in which all participating households fill out a questionnaire that asks for basic sociodemographic and socioeconomic data. Second, the households list their income and expenditures for three months in the so-called "Household Book". Finally, every fifth household in the sample notes all expenditures on food, beverages and tobaccos for one month listing price, amount and/or weight in the so-called "Supplementary FBT-Questionnaire". The IES 2003 is based on quota sampling.[3]

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[2] For further information about the German Time Use Survey (GTUS) 2001/02 see the content on the website of the Federal Statistical Office of Germany (http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/press/abisz/Zeitbudgeterhebung__e,templateId=renderPrint.psml)

[3] For further information about the German Sample Survey of Income and Expenditure (IES) 2003 see the content on the website of the Federal Statistical Office of Germany (http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/press/abisz/Einkommens__Verbrauchsstichprobe__e.psml).

3.2 Empirical Strategy

Using German Time Use Survey (GTUS) 2001/02, time poor individuals are identified and binary logit estimation of time poverty based on explanatory variables that are included in GTUS 2001/02 as well as in the German Sample Survey of Income and Expenditure (IES) 2003 is implemented. According to these results, the time-poverty-probability is calculated for each individual before defining a time-poverty-probability-threshold and identifying time poor individuals in IES 2003. This Extended German Sample Survey of Income and Expenditure (EIES) 2003 then allows instrumental variables estimations that catch the causal effect of time poverty on paid prices accounting for an expected bias[4] in ordinary least squares estimations – caused by the not available and therefore excluded variable ability.

3.3 Method

The time poverty variable is binary with the two possible outcomes time poor (coded as "1") and not time poor (coded as "0"). Trying to identify relevant determinants of time poverty, binary logit estimation seems appropriate. Binary logit models assume that a variable z exists which generates the binary characteristic value of the dependent variable y as a function of independent variables x_k (Backhaus 2011: 249 ff., Maddala 2006):

$$(1) \qquad y_i = \begin{cases} 1 \;\; if \;\; z_i > 0 \\ 0 \;\; if \;\; z_i \le 0 \end{cases} \qquad \text{with} \qquad z_i = \beta_0 + \sum_{k=1}^{K} \beta_k \cdot x_{ki} + u_i$$

After defining a probability function that generates the two possible characteristic values of the dependent variable as a function of the value z (0='not time poor'; 1='time poor'), the probability for each characteristic can be calculated. In the case of logit models, the logistic function is used as probability function (Wooldridge 2009: 575):

$$(2) \qquad P_i\left(y=1\right) = P_i\left('time \;\; poor'\right) = \frac{1}{1+e^{-z_i}}$$

Causal effect of time poverty on paid prices: Research on the consequences of time poverty is complicated by the endogeneity of time poverty. It is plausible to assume that the unobserved variable (search) ability is positive correlated with time poverty: Individuals with higher (search) ability are more often in high paid jobs with long weekly working hours (e.g. Goodin et al. 2008: 78, Burchardt 2008: 13). Furthermore, it is plausible to act on the assumption that the unobserved variable search ability has a negative impact on the paid prices per good: Individuals with a relative high search ability are more productive in comparing prices and accordingly need less time to compare prices, respectively compare more prices in the same time (McDonald and Wren 2009). Accordingly, ordinary least squares (OLS) estimations that exclude (search) ability as explanatory variable might present downward biased coefficients for the time poverty variable. Since the search ability information is not available in both databases, instrumental variables estimations are implemented next to OLS estimations.

Instrumental variables estimation: If unobserved variables are excluded in OLS estimations, biased coefficients of the treatment variable might result. Instrumental variables estimations

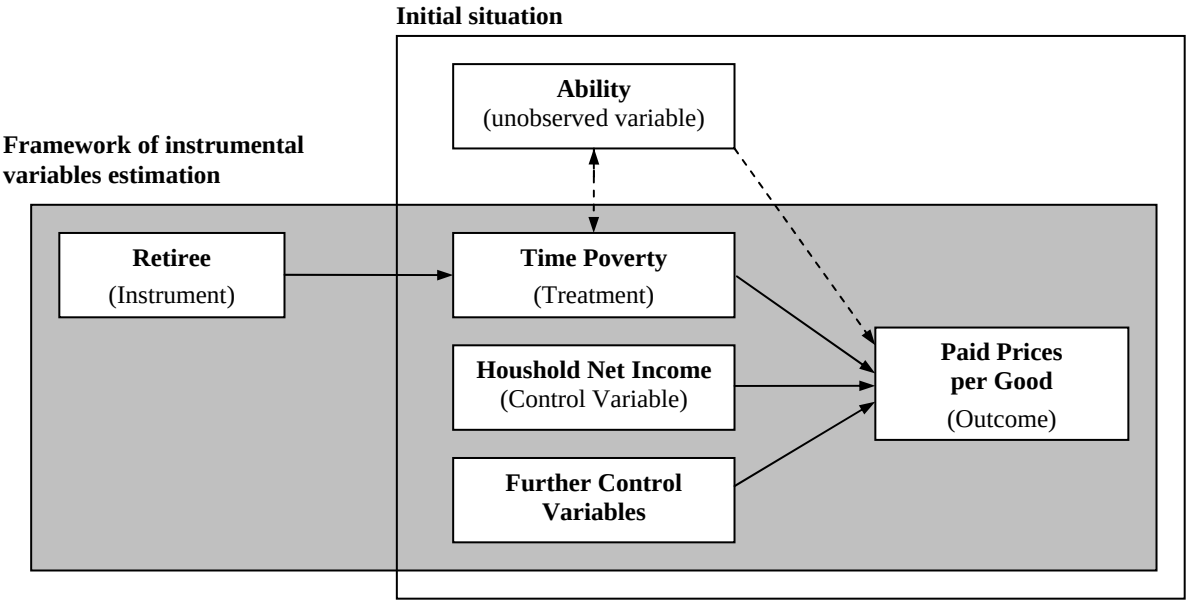
[4] See the next chapter for a more detailed description of the expected bias in ordinary least squares estimations.

capture that portion of the treatment variable that is not polluted by the unobserved variables and assess the true effect of the treatment on the outcome. A necessary condition for instrumental variables estimations is the existence of a valid and strong instrument (Greene 2003: 74 ff., 396 ff., Wooldridge 2009: 506 ff). First, an instrument has to be exogenous, meaning that the instrument should have no partial effect on the outcome next to the indirect effect over the treatment and should be uncorrelated with the omitted variables (instrument exogeneity). In our case, it is plausible to assume that the binary instrumental variable retiree (0='no retiree'; 1='retiree') is not correlated with – at least inherent – search ability and has no effect on the outcome next to the indirect effect over the treatment variable time poverty. Second, an instrument should be logically related to and strongly correlated with the treatment (instrument relevance). Within this paper, the treatment variable time poverty is understood as the fact that an individual has not enough time left for rest or leisure after taking obligations and requirements – such as labor time, childcare or sleeping – into account. It is plausible to assume that retirees have less obligations and requirements, and accordingly, are rarely time poor. Hence, the time poverty variable might be strongly (negative) correlated with the retiree variable. Whether a positive or negative correlation is present in the framework of an instrumental variable estimation does not cause any difficulties. Here, the often not time poor retirees serve as instrument for time poor individuals. The retiree variable therefore appears to satisfy the conditions for a valid and strong instrument.[5] While the instrument exogeneity assumption could not be tested empirically, a concrete correlation between the instrument retiree and the treatment time poverty will be reported and discussed in the empirical chapter.

Figure 1 shows the initial situation and the framework of the instrumental variables estimation that is established by appealing to the above arguments: Ability is assumed to be correlated with time poverty and to have an impact on paid prices per good. Since ability is unobserved, arrows from and to ability are dashed and an instrumental variables estimation is implemented. Here, retiree is used as instrument for time poverty since retiree is assumed not to be correlated with ability and not to have an impact on the paid prices next to the indirect effect over the time poverty variable. Accordingly, no arrows pointing from retiree to ability or paid prices per good.

[5] The binary character of the instrument and treatment variable do not cause any difficulties (Wooldridge 2009: 513 ff.).

Figure 1: Framework of the initial situation and instrumental variables estimation



Source: own figure.

3.4 Operationalization

Time Poverty (treatment variable): The member states of the European Union agree on a relative definition for income poverty (Bundesregierung 2005: 6). The concept judges those individuals as income poor whose net equivalent income is below 60% of median net equivalent income. The applied time poverty framework is straightforward as it simply make use of the traditional income poverty concept and judges those individuals as time poor ($g_i = 1$) whose personal leisure time (l) is below the time poverty line (z) of 60% median personal leisure time:[6]

$$g_i = \begin{cases} 0 & if \quad l \geq z \\ 1 & if \quad l < z \end{cases} \tag{3}$$

Dividing the number of time poor individuals (t) through the total number of observations (n), the percentage of time poor individuals (H), the time poverty head count ratio, results:

$$H = \frac{t}{n} \qquad \text{with } t = \sum_{i=1}^{n} g_i \tag{4}$$

The definition of personal leisure time mainly follows Merz and Rathjen (2009, 2010, 2011): Personal leisure time is defined as the remaining time after all paid and unpaid obligations. This is the sum of weekday activities that are allocated to one of the main categories “household budgeting and organisation”, “social life”, “participation at sportive activities or

[6] See Bittman (1999: 14) for a similar concept, suggesting 50% of median leisure time as time poverty threshold.

activities in the nature", "hobbies and games" and "mass media" as well as the activities "shopping" and "shopping for other households" in GTUS 2001/02.[7]

Retiree (instrumental variable): IES 2003 asks for the social situation. Accordingly, the retiree information is available.

Further control variables: I control for the most approved variables that are identified in the expenditure and time use literature (e.g. Merz, Hanglberger and Rucha 2010, Bardasi and Wodon 2006). The following variables are included next to the time poverty variable: Gender, age, education, occupation, labor time, income, country of origin and region.

Paid prices per good (endogenous variable): In the ordinary "Household Book" of IES 2003 the exact price that is paid for a good or service is not listed. However, the sum of expenditures in different domains within three month is available. For example, the information that an individual has bought a Porsche 911 for 100.000 Euro is missing, however, the information that an individual has spend 100.000 Euro within the expenditure domain "Purchase of new motor vehicles" (German translation: "Kauf von neuen Kraftfahrzeugen") in the three month of observation is at hand. According to this issue, a judgment has to be made from case to case to decide which expenditure domain is appropriate for the identification of individuals that might pay more for identical goods as a result of their time deficit. To remain as objective as possible, three requirements are formulated that must be met:

1. Requirement: *Time and not time poor individuals buy the same quantity.*
   Example 1: Expenditures for cinema tickets are inappropriate since one should assume that time poor individuals go less often to cinema. Accordingly, time and not time poor individuals do not purchase the same quantity of cinema tickets. Example 2: Expenditures for fridges are appropriate – concerning to this first requirement – since one should assume that time poor individuals purchase the same quantity as not time poor individuals within the three month if expenditures are bigger than zero.

2. Requirement: *Time and not time poor individuals buy the same quality.*
   Example 3: Expenditures for new cars might be inappropriate since one should assume that time poor individuals have to use the car more often and accordingly prefer a higher quality. Example 4: Expenditures for petrol are appropriate – concerning to this second requirement – since no differences in petrol quality exist between gas stations in Germany.

3. Requirement: *Price differences exist.*
   Example 5: Expenditures for garbage collection are inappropriate since no price differences exist for Germany in most areas. Example 6: Expenditures for clothes are appropriate – concerning to this third requirement – since price differences exist.

[7] German translation of the selected activity categories in GTUS 2001/02: "household budgeting and organisation" (German translation: "Haushaltsplanung und –organisation"; activity 370-379), "social life" (German translation: "Sozialleben und Unterhaltung"; activity 500-531), "participation at sportive activities or activities in the nature" (German translation: "Teilnahme an sportlichen Aktivitäten bzw. Aktivitäten in der Natur"; activity 600-649), "hobbies and games" (German translation: "Hobbies und Spiele"; activity 700-739) and "mass media" (German translation: „Massenmedien"; activity 800-849), "shopping" (German translation: "Einkaufen"; activity 361) and "shopping for other households" (German translation: "Einkaufen und Besorgungen für andere Haushalte"; activity 424).

The formulated requirements clarify that most expenditure domains in the "Household Book" of IES 2003 are inappropriate for the identification of individuals who pay more for identical goods and services. An aggregation of expenditures in different domains might also produce misleading results. Accordingly, total expenditures or expenditures for a basket of commodities should not be used as endogenous variable within our estimations. Thus, a judgment has to be made from expenditure domain to expenditure domain with regard to the three formulated requirements.

For the econometric analyses, the following domains fulfil the requirements in my view, respectively, do not obviously violate a requirement, and are applied as endogenous variables within the estimations that follow in the next chapter:

- Expenditures for communication services (phone, fax, telegram)
  (German translation: "Kommunikationsdienstleistungen – Telefon, Fax, Telegramme")

- Expenditures for hair care, shaving products, toilet paper as daily needs
  (German translation: "Haarpflege-, Rasiermittel, Toilettenpapier")

- Expenditures for furniture as household equipment
  (German translation: "Möbel- und Einrichtungsgegenstände")

Adjustments: Income is reallocated between household members. Hence, income poverty concepts do not account for individual income, but for the household net income (adjusted by household structure). Time poverty in contrast, should be measured on the individual level – in my view – since personal leisure time could not – or only to a very limited extend – be reallocated between household members (Merz and Rathjen 2009, 2010, 2011).[8] Because IES 2003 measures expenditures only on the household level, I do only account for single-person-households to pinpoint the consumption behaviour of time poor individuals in IES 2003 and GTUS 2001/02.[9] Besides, I only consider individuals with a minimum age of 20 years since there are no individuals younger than 20 years in IES 2003 that live in a single-person-household. Furthermore, I only account for individuals that are not married because – and as could be expected – there are no married individuals in IES that live in a single-person-household. The final IES-2003-database consists of 12715 persons while the final GTUS-2001/02-database consists of 1973 daily diaries which are treated like independent observations.

[8] Example: In a two-person-household consisting of husband and wife, only the woman is employed and earns a very high income by investing above-average time for her employment. Since both household members access to the woman's income, it would be inappropriate to judge the man income poor. Accordingly, income poverty is measured at the household level. However, it would be inappropriate to judge the husband time poor for the reason of the woman's time deficit. Accordingly, time poverty should in contrast to income poverty be measured at the individual level.

[9] See Pollak (2011: 16) for a similar strategy.

4 Results

Within this chapter, the results of the imputation process of the time poverty information from the German Time Use Survey (GTUS) 2001/02 to the German Sample Survey of Income and Expenditure (IES) 2003 are reported including intermediate steps. After confirmation of the well worked imputation process, the final estimations of time poverty on paid prices are presented.

Time poverty in GTUS 2001/02: Using the German Time Use Survey (GTUS) 2001/02 a median personal leisure time of 340 minutes per day is calculated (see Table 1). Applying my time poverty definition of 60% median personal leisure time, a time poverty threshold of 204 minutes results. 21.2% of all individuals (that live in a single-person-household, are older than 19 years and not married)[10] are judged to be time poor.

Binary logit estimation of time poverty with GTUS 2001/02: A binary logit of time poverty on explanatory variables that are included in GTUS 2001/02 as well as in IES 2003 (see Table 1) is estimated (see Table 2). The Results of goodness of fit measures are satisfactory with 'Cox & Snell'-Pseudo-R-squared of 0.158 and 'Nagelkerges'-Pseudo-R-squared of 0.245, lying in the range of other time poverty estimations (e.g. Bardasi and Wodon 2006). The coefficients have the expected algebraic sign.

Imputation of the time poverty information from GTUS 2001/02 to IES 2003: Having the results of the binary logit estimation (see Table 2), the time-poverty- probability could be calculated for each individual in GTUS 2001/02 as well as in the German Sample Survey of Income and Expenditure (IES) 2003 since only explanatory variables are included that are present in both databases.[11] Confirming the well worked imputation process, relevant location and dispersion parameters of the time-poverty-probability in GTUS 2001/02 and in the Extended German Sample Survey of Income and Expenditure (EIES) 2003 are close together (see Table 1). The average time-poverty-probability lies at 21.2% with standard deviation of 0.171 in GTUS 2001/02 and at 20.9% with standard deviation of 0.159 in the EIES 2003.[12] As described in the previous chapter, I judge those individuals time poor who have less than 60% median personal leisure time. In GTUS 2001/02, 21.2% are judged to be time poor.[13] It is obvious that a similar percentage of individuals should be judged to be time poor in the EIES 2003. Accordingly, the time-poverty-probability-threshold in the EIES 2003 is set at the time-poverty-probability of 37.5% to judge the same percentage time poor as in GTUS 2001/02 with 21.2% of all individuals.[14][15]

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[10] See the previous chapter for explanations of these adjustments.

[11] See chapter 3.3 for the concrete method.

[12] Location and dispersion parameter in Table 1 are cursive and bold since the time poverty information is imputed from GTUS 2001/02. The original IES-2003-Database does not include the time-poverty-probability or time poverty information.

[13] Please consider the random event that the average time-poverty-probability equals the percentage of time poor individuals.

[14] The average of 0.212 in Table 1 for the time poverty dummy in IES 2003 confirms our correct calculations.

[15] Robustness checks are accomplished for the imputation process by varying the time poverty threshold in GTUS 2001/02 and the time-poverty-probability-threshold in EIES 2003. The modified threshold do not change the results of the final estimations, respectively, the final hypothesis tests notably.

Table 1: Descriptive Results of dependent and independent variables

		GTUS 2001/02					IES 2003				
Variable Name	Variable Description	Mean	Median	St. D.	Min.	Max.	Mean	Median	St. D.	Min.	Max.
personal_leisure_time	personal leisure time in minutes per weekday	348.513	340	162.748	0	920	-	-	-	-	-
time_poverty	= 1 if time poor (< 204 minutes leisure time), 0 otherwise	0.212	0	0.409	0	1	***0.212***	***0***	***0.409***	***0***	***1***
prob_time_poverty	probability for time poverty	0.212	0.126	0.171	0.013	0.874	***0.209***	***0.169***	***0.159***	***0.001***	***0.794***
female	= 1 if female, 0 otherwise	0.655	1	0.476	0	1	0.641	1	0.480	0	1
age	age in years	55.687	58	15.914	20	81	51.613	52	17.337	20	85
single	= 1 if single, 0 otherwise	0.439	0	0.496	0	1	0.488	0	0.500	0	1
widowed	= 1 if widowed, 0 otherwise	0.228	0	0.419	0	1	0.189	0	0.391	0	1
divorced	= 1 if divorced, 0 otherwise	0.295	0	0.456	0	1	0.270	0	0.444	0	1
living_apart	= 1 if living apart, 0 otherwise	0.038	0	0.192	0	1	0.053	0	0.224	0	1
university_degree	= 1 if university degree, 0 otherwise	0.156	0	0.363	0	1	0.159	0	0.366	0	1
university_degree_as	= 1 if university degree of applied science, 0 otherwise	0.140	0	0.348	0	1	0.131	0	0.338	0	1
foreman	= 1 if foreman, 0 otherwise	0.047	0	0.212	0	1	0.154	0	0.361	0	1
apprenticeship	= 1 if apprenticeship, 0 otherwise	0.505	1	0.500	0	1	0.435	0	0.496	0	1
other_degree	= 1 if other degree, 0 otherwise	0.060	0	0.238	0	1	0.034	0	0.180	0	1
in_training	= 1 if in still in training, 0 otherwise	0.019	0	0.136	0	1	0.045	0	0.207	0	1
without_degree	= 1 if without degree, 0 otherwise	0.073	0	0.260	0	1	0.043	0	0.203	0	1
self_employed	= 1 if self-employed, 0 otherwise	0.070	0	0.254	0	1	0.036	0	0.187	0	1
civil_servant	= 1 if civil servant, 0 otherwise	0.074	0	0.262	0	1	0.071	0	0.256	0	1
white_collar	= 1 if white collar worker, 0 otherwise	0.271	0	0.445	0	1	0.318	0	0.466	0	1
blue_collar	= 1 if blue collar worker, 0 otherwise	0.086	0	0.281	0	1	0.054	0	0.225	0	1
unemployed	= 1 if unemployed, 0 otherwise	0.056	0	0.230	0	1	0.079	0	0.270	0	1
retiree	= 1 if retiree, 0 otherwise	0.4168	0	0.493	0	1	0.365	0	0.481	0	1
student	= 1 if student, 0 otherwise	0.012	0	0.108	0	1	0.048	0	0.214	0	1
other_inactivity	= 1 if other inactivity, 0 otherwise	0.015	0	0.120	0	1	0.030	0	0.170	0	1
labor_time	labor time in hours per week	16.636	0	20.252	0	90	18.034	0	19.560	0	80
household_net_income	household net income in Euro per month and prices 2003	1527.19	1383.36	831.79	310.29	6205.71	1902.15	1602.67	1277.58	7.67	17918
foreigner	= 1 if foreigner, 0 otherwise	0.012	0	0.108	0	1	0.014	0	0.118	0	1
east_germany	= 1 if living in East-Germany, 0 otherwise	0.178	0	0.382	0	1	0.180	0	0.384	0	1
expen_communication	expenditures for communication services (phone, fax,…)	-	-	-	-	-	91.522	81	64.163	0	1800
expen_care_products	expenditures for hair care, shaving products, toilet paper	-	-	-	-	-	21.592	15	25.839	0	498
expen_furniture	expenditures for furniture	-	-	-	-	-	92.237	0	501.878	0	14819

Notes: Individuals are included that live in a single-person-household, are not married, are older 19 years and have expenditures bigger than zero. Results for time_poverty and prob_time_poverty in IES are cursive and bold since they are imputed from GTUS. Descriptive results were obtained using statistical software ‘Stata 10’.

Source: own calculations with GTUS 2001/02 and IES 2003

Table 2: Binary Logit Estimation of Time Poverty

Method: Binar Logit Estimation			
Dependent Variable: time_poverty			
	female	0.330 **	(0.018)
	age	0.047	(0.134)
	age² / 100	-0.057 *	(0.071)
Reference: divorced	single	-0.022	(0.891)
	widowed	0.352	(0.119)
	living_apart	0.436	(0.166)
Reference: without_degree	university_degree	0.026	(0.931)
	university_degree_as	-0.156	(0.613)
	foreman	-1.198 ***	(0.006)
	apprenticeship	-0.321	(0.239)
	other_degree	-0.246	(0.494)
	in_training	-0.630	(0.282)
Reference: unemployed	self_employed	0.149	(0.739)
	civil_servant	0.161	(0.717)
	white_collar	0.361	(0.358)
	blue_collar	0.307	(0.460)
	retiree	-0.188	(0.629)
	student	1.110 *	(0.062)
	other_inactivity	1.089 *	(0.051)
	labor_time	0.042 ***	(0.000)
	household_net_income / 100	-0.017 *	(0.080)
	foreigner	-0.889	(0.130)
	east_germany	-0.035	(0.836)
	constant	-2.925 ***	(0.001)
Number of Observations		1973	
Cox & Snell R-squared		0.158	
Nagelkerkes R-squard		0.245	
Prob. Chi2		0.000	

Notes: p-value in brackets. * Significant at the ten percent level. ** Significant at the five percent level. *** Significant at the one percent level. Individuals are included that live in a single-person-household, are not married and older 19 years. Estimates were obtained using statistical software 'Stata 10'.

Source: own estimations with GTUS 2001/02

Final estimations: Table 3, 4 and 5 include the final ordinary least squares and instrumental variables estimations for the three expenditure domains 'communication services', 'care products' and 'furniture' as endogenous variables. Three ordinary least squares estimations (OLS (1) – (3)) and three instrumental variables estimations (2SLS (4) – (6)) are presented for each domain. The first ordinary least squares estimation includes only time poverty as explanatory variable. The second adds the household net income (divided through 100) next to the time poverty variable. Further control variables are included in the third estimation. The forth to sixth instrumental variables estimations are build up analogue to the first three ordinary least squares estimations. Here, retiree is used as instrument for the treatment variable time poverty. The F-statistic and R-squared of the first stage regression are reported below the ordinary least squares and second stage results. Besides, results of a Hausman Test are presented for instrumental variables estimations, giving an answer to the question whether differences between OLS and 2SLS coefficients are systematic. Therewith, the sixth estimation reports the relevant test results for each expenditure domain, while the first to fifth

estimation serves as auxiliary results, e.g. for the identification of a possible bias in the ordinary least squares estimations.

Expenditure domain 'communication services': Estimations on the first expenditure domain 'communication services' in Table 3 confirm our expected mechanism between time poverty and paid prices together with the expected bias in the ordinary least squares estimates primarily. The first estimation reports a significant constant together with a low and insignificant coefficient for the time poverty variable (OLS (1a)): If expenditures for 'communication services' exist, not time poor individuals spend in average 98.09 Euro for 'communication services' within three months while time poor individuals spend 98.63 Euro.[16] Controlling for household net income (divided through 100), the insignificant coefficient for time poverty decreases while the coefficient for household net income is statistically and economically significant (OLS (2a)): If household net income raises by 100 Euro, the expenditures for 'communication services' raise by 0.76 Euro. Controlling for further variables, the coefficient for household net income decreases slightly while the coefficient for time poverty remains insignificant (OLS (3a)).

As described in the previous chapter, I expect downward biased coefficients for the time poverty variable in the ordinary least squares estimations since the relevant and unobserved variable ability might be positive correlated with time poverty and paid prices per good. Instrumental variables estimations therefore are applied to clear bias in the time poverty coefficient using retiree as instrument for the treatment time poverty. F-statistic together with the R-squared of the first stage regression verifies retiree as strong instrument with a R-squared higher 0.16 (see Table 3). The Hausman Test confirms a systematic difference between OLS and 2SLS coefficients. Statistically and economically significant coefficients result for the time poverty variable using instrumental variables estimations (2SLS (4a) – (6a)). The time poverty coefficient decreases by controlling for household net income and further variables from 26.782 (2SLS (4a)) over 23.144 (2SLS (5a)) to 19.772 (2SLS (6a)), but remains statistically and economically significant: Time poor individuals spend in average 19.77 Euro more for 'communication services' than not time poor individuals within three month holding household net income and further control variables constant (2SLS (6a)).

Expenditure domain 'care products': Estimations on the second expenditure domain 'care products' in Table 4 affirm results of the first expenditure domain 'communication services'. Time poverty coefficients of OLS estimates seem to be downward biased (OLS (1b) – (3b)), nevertheless they are already positive and significant, decreasing with further control variables. Instrumental variables estimations confirm again a statistically and economically significant and positive coefficient for time poverty (2SLS (4b) – (6b)): Time poor individuals pay in average 9.26 Euro more for 'care products' within three months holding household net income and further control variables constant (2SLS (6b)).

[16] Please consider that estimations reported in Table 3, 4 and 5 include individuals only if the respective expenditure exceeds zero. Location and dispersion parameter in Table 1 include all individuals.

Table 3: OLS and 2SLQ estimations on the expenditure domain 'communication services'

Dependent variable: Expenditures for communication services (phone, fax, telegram)							
		Type of estimate					
		(1a) OLS	(2a) OLS	(3a) OLS	(4a) 2SLS	(5a) 2SLS	(6a) 2SLS
OLS and Second-Stage Results	time poverty	0.541 (0.694)	0.284 (0.835)	-1.081 (0.474)	26.782 *** (0.000)	23.144 *** (0.000)	19.772 *** (0.000)
	HNE / 100	-	0.757 *** (0.000)	0.657 *** (0.000)	-	0.749 *** (0.000)	0.675 *** (0.000)
	control variables	no	no	yes	no	no	yes
	constant	98.087 *** (0.000)	83.455 *** (0.000)	80.983 *** (0.000)	92.509 *** (0.000)	78.749 *** (0.000)	80.622 *** (0.000)
	Number of obs.	11850	11850	11850	11850	11850	11850
	R-squared	0.000	0.025	0.032	-	0.002	0.017
	F-statistic / chi2	0.15	152.35	28.05	59.82	343.79	412.38
	Prob. F / > chi2	0.694	0.000	0.000	0.000	0.000	0.000
First Stage Results and Hausman	F-statistic First Stage Estimation				2307.06	2308.73	2147.35
	R-squared First-Stage estimation				0.163	0.163	0.319
	Hausman (Ho: difference in coefficients OLS and 2SLQ not systematic)						
	chi2(1)				70.70	55.07	34.57
	Prob>chi2				0.000	0.000	0.000

Notes: p-value in brackets. * Significant at the ten percent level. ** Significant at the five percent level. *** Significant at the one percent level. 'retiree' is used as instrument for the treatment 'time poverty' within instrumental variables estimations. Control variables: Female, single, widowed, living_apart, university_degree, university_degree_as, foreman, apprenticeship, other_degree, in_training, foreigner, east_germany. Individuals are included that live in a single-person-household, are not married, are older 19 years and expenditures are bigger than zero. Estimates were obtained using software 'Stata 10'.

Source: own estimations with IES 2003

Expenditure domain 'furniture': Results for estimations on the third expenditure domain 'furniture' in Table 5 stand in contrast to the previous findings. Negative and significant coefficients for time poverty variable in ordinary least squares estimations (OLS (1c) – (3c)) become more negative by applying instrumental variables estimations: If expenditures for 'furniture' exist, time poor individuals pay in average 264.50 Euro less than not time poor people within three months holding household net income and further control variables constant (2SLS (6c)).

Estimations on further expenditure domains – that are not reported within this article – present variably results, e.g. estimations on the expenditure domains "food products", "auto liability insurances", "barber services", "TV" or "fridges": Most estimations evidence positive and significant coefficients for the time poverty variable, some estimations present negative coefficients while some bring out insignificant coefficients. All in all, I do not find a positive, statistically and economically significant coefficient for the time poverty variable that is robust over the vast majority of expenditure domains and could certainly confirm our hypothesis *'Time poor individuals pay more for identical goods and services.'*.

Table 4: OLS and 2SLQ estimations on the expenditure domain 'hair care, shaving products, toilet paper'

Dependent variable: Expenditures for hair care, shaving products, toilet paper							
		Type of estimate					
		(1b) OLS	(2b) OLS	(3b) OLS	(4b) 2SLS	(5b) 2SLS	(6b) 2SLS
OLS and Second-Stage Results	time poverty	4.783 *** (0.000)	4.713 *** (0.000)	4.226 *** (0.000)	10.769 *** (0.000)	10.283 *** (0.000)	9.261 *** (0.000)
	HNE / 100	-	0.125 *** (0.000)	0.147 *** (0.000)	-	0.121 *** (0.000)	0.150 *** (0.000)
	control variables	no	no	yes	no	no	yes
	constant	23.288 *** (0.000)	20.951 *** (0.000)	17.867 *** (0.000)	21.959 *** (0.000)	19.780 *** (0.000)	17.867 *** (0.000)
	Number of obs.	11275	11275	11275	11275	11275	11275
	R-squared	0.006	0.009	0.018	-	0.002	0.013
	F-statistic / chi2	65.34	52.79	14.67	50.47	87.78	192.02
	Prob. F / > chi2	0.000	0.000	0.000	0.000	0.000	0.000
First Stage Results and Hausman	F-statistic First Stage Estimation				2048.11	2043.23	1906.11
	R-squared First-Stage estimation				0.154	0.154	0.316
	Hausman (Ho: difference in coefficients OLS and 2SLQ not systematic)						
	chi2(1)				18.59	16.11	9.92
	Prob>chi2				0.000	0.000	0.002

Notes: p-value in brackets. * Significant at the ten percent level. ** Significant at the five percent level. *** Significant at the one percent level. 'retiree' is used as instrument for the treatment 'time poverty' within instrumental variables estimations. Control variables: Female, single, widowed, living_apart, university_degree, university_degree_as, foreman, apprenticeship, other_degree, in_training, foreigner, east_germany. Individuals are included that live in a single-person-household, are not married, are older 19 years and expenditures are bigger than zero. Estimates were obtained using software 'Stata 10'.

Source: own estimations with IES 2003

Discussion of findings: In chapter three, requirements are formulated that must be met before applying an expenditure domain as dependent variable in the final estimations. The second requirement is: "*Time and not time poor individuals buy the same quality.*" There are empirical findings that question the fulfilment of this requirement by underlying the existence of a further mechanism: Although one might suggest that time poor individuals are rarely price conscious and therefore purchase branded articles more often, empirical findings point out that time rich individuals – who invest relatively much time into shopping – are more likely to purchase branded goods with a higher product quality (Wehner 2004: 15). For example, the time poor individuals purchase at the discounter – half an hour before shop closing time – and accordingly pay less than time rich individuals who shop at wine and other specialty stores seeking advice from salespersons before deciding to purchase the high quality wine (Haller 2004: 31). With EIES-2003-database, differences in product quality could not be identified. Only information about the sum of expenditures in different domains is available. This may be a source for misleading results.

Table 5: OLS and 2SLQ estimations on the expenditure domain 'furniture'

Dependent variable: Expenditures for furniture							
		Type of estimate					
		(1c) OLS	(2c) OLS	(3c) OLS	(4c) 2SLS	(5c) 2SLS	(6c) 2SLS
OLS and Second-Stage Results	time poverty	-73.698 ** (0.024)	-55.730 * (0.082)	-62.113 * (0.090)	-280.901 *** (0.001)	-322.057 *** (0.000)	-264.504 *** (0.007)
	HNE / 100	-	13.540 *** (0.000)	13.247 *** (0.000)	-	13.109 *** (0.000)	12.734 *** (0.000)
	control variables	no	no	yes	no	no	yes
	constant	340.093 *** (0.000)	54.927 * (0.059)	-34.408 (0.721)	399.278 *** (0.000)	139.900 *** (0.000)	-37.674 (0.696)
	Number of obs.	3676	3676	3676	3676	3676	3676
	R-squared	0.001	0.040	0.044	-	0.022	0.036
	F-statistic / chi2	5.10	76.08	12.05	10.08	160.34	172.36
	Prob. F / > chi2	0.024	0.000	0.000	0.002	0.000	0.000
First Stage Results and Hausman	F-statistic First Stage Estimation				585.091	594.451	595.301
	R-squared First-Stage estimation				0.137	0.141	0.345
	Hausman (Ho: difference in coefficients OLS and 2SLQ not systematic)						
	chi2(1)				6.43	11.19	4.96
	Prob>chi2				0.011	0.001	0.026

Notes: p-value in brackets. * Significant at the ten percent level. ** Significant at the five percent level. *** Significant at the one percent level. 'retiree' is used as instrument for the treatment 'time poverty' within instrumental variables estimations. Control variables: Female, single, widowed, living_apart, university_degree, university_degree_as, foreman, apprenticeship, other_degree, in_training, foreigner, east_germany. Individuals are included that live in a single-person-household, are not married, are older 19 years and expenditures are bigger than zero. Estimates were obtained using software 'Stata 10'.

Source: own estimations with IES 2003

Besides, the instrument retiree in the framework of instrumental variables estimation should have no partial effect on the outcome next to the indirect effect over the treatment variable time poverty. This assumption could be questioned: It may be that retirees have a remarkable different consumption behavior than younger individuals independent of their time poverty status. It might be plausible that the often not time poor retirees prefer high quality products and are willing to pay more than individuals of the younger generation (Precht 2007: 333). Accordingly, the time poverty coefficient may be downward biased even in instrumental variables estimations.[17]

[17] Empirical studies often evidence a nonlinear influence of the household net income on expenditures (e.g. Zeng 2007: 123), and accordingly, claim for the logarithm of the household net income as explanatory variable. These nonlinear transformations were tested but do not produce notably other results and hence are not reported within this paper.

5 Concluding Remarks

Within this article, I test whether time poor individuals compare less between prices as a result of their time deficit, therefore do not identify "bargains or rip-offs" and pay in average more for identical products and services than not time poor individuals. Thereby, time use information is imputated from the German Time Use Survey (GTUS) 2001/02 into the German Sample Survey of Income and Expenditure (IES) 2003 to identify time poor individuals in IES 2003. Instrumental variables estimations are arranged to account for an expected bias in ordinary least squares estimations – caused by the excluded variable (search) ability – and to catch the causal effect of time poverty on paid prices.

The findings do not report a consistent picture for different expenditure domains: A positive, statistically and economically significant coefficient for the time poverty variable that is robust over the vast majority of expenditure domains and could certainly confirm our hypothesis '*Time poor individuals pay more for identical goods.*' was not found. Though two of the three reported estimations evidence the expected positive and significant coefficient for the time poverty variable (see the sixth estimation in Table 3 for the expenditure domain "communication services" and Table 4 for the expenditure domain "hair care, shaving products, toilet paper"), one estimation presents negative coefficients (see the sixth estimation in Table 5 for the expenditure domain "furniture"), while further estimations (e.g. on the expenditure domains "food products", "auto liability insurances", "barber services", "TV" and "fridges") – that are that are not reported within this paper – again produce variably results. A comprehensive mechanism that works well over the majority of the domains is not at hand. Accordingly, the stated hypothesis should be rather rejected. The effect of time poverty on the paid price seems to dependent strongly on the inspected expenditure domain.

All in all, one should rather not assume that time poor individuals suffer large welfare losses according to their small amount of time for comparing prices. One should rather suppose that time poor individuals find trust in stores at which they expect a fair price performance ratio (Wehner 2004: 15, Haller 2004: 31). For example, the time poor employed single father does not know the exact price for a litre milk that is offered by different supermarkets, but he found trust in and remains faithful to a specific store which was convenient in the past (e.g. German discounter „ALDI" or Swedish furniture store „IKEA"). Accordingly, the result suggest that time poor individuals do not invest much time into price search, but do nevertheless pay a similar amount for products and services than not time poor individuals – at least in certain expenditure domains.

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