WHAT STOPS DUTCH HOUSEHOLDS FROM TAKING UP MUCH NEEDED BENEFITS?

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It is common for individuals not to take up welfare benefits. The most common explanation is that people make a rational choice between the utility they expect from the benefit and the effort required to take-up. Most studies utilize surveys, which are subject to misreporting and measurement errors, to determine eligibility and non-take-up rates. This study uses a novel dataset based on administrative data sources, which provides a more accurate identification of eligible households and take-up. Furthermore, this study documents non-take-up of a compensation to which nearly 5 million Dutch households are entitled. The richness of the data allowed us to conduct a detailed analysis of key drivers of non-take-up. The analysis largely confirms the transaction-costs hypotheses. However, we found an unexpected effect. Although, in general, the probability of take-up increases when income decreases, those with the lowest income or wealth do not have the highest probability of take-up.

1. INTRODUCTION

Non-take-up is the extent to which households do not collect the benefits to which they are entitled. In general, non-take-up has been explained as the result of an implicit cost–benefit analysis made by the eligible household. The lower the expected utility of the benefit and the higher its transaction costs, the more likely the household will decide for non-take-up. This explanation has been confirmed in many studies across different countries, types of benefits, and characteristics of intended recipients. Studies have also revealed different factors that determine the utility. These include the level of the benefit and expected duration of receiving it.

This paper analyzes non-take-up behavior of Dutch households with respect to an income-dependent health-care allowance. The main contribution of this paper is twofold. First, most studies on the non-take-up of benefits utilize surveys to determine the eligibility and non-take-up rates. These are subject to misreporting and measurement errors (Hernanz *et al.*, 2004; Hernandez and

Pudney, 2007). Income, in particular, is subject to several measurement problems, such as underreporting of income sources, misreporting of income amounts, non-response, and others (Moore *et al.*, 2000). Income is crucial in determining the eligibility and the level of the allowance. Our data contain the income measure (taxable income) registered and used by tax authorities to establish eligibility, which results in a very accurate determination of eligibility and non-take-up in this study. This study uses a novel dataset based on administrative data sources, such as tax records, which results in a more accurate identification of eligible households and take-up. Second, in most studies the number of eligibles is limited, reducing the statistical power. In this case, almost 5 million Dutch households are entitled to the allowance, resulting in a rich dataset that allows for thorough examination of key drivers of take-up and subpopulations.

Our analysis shows that one in six households refrain from take-up. The analysis largely confirms the expected utility and transaction-costs hypotheses found in the literature. Information is found to be a strong driver for take-up. People who are well informed have much higher take-up rates, and people who are likely to believe that they are not entitled to the allowance have much lower take-up rates. These effects hold for all eligible households as well as a sample of poor households. An additional unexpected effect indicated that the probability of take-up is not a monotonic function of income. Although, in general, the probability of take-up increases when income decreases, those with the lowest income or wealth do not have the highest probability of take-up. This means that households who need the benefit the most do not have the highest take-up rates.

2. EMPIRICAL EVIDENCE

The positive effect of benefit amount on take-up is one of the most solid findings in the literature on means-tested programs (Hernanz *et al.*, 2004). Anderson and Meyer (1997) studied take-up rates of unemployment insurance in the United States before and after these benefits became subject to income tax. They found that a decline of the after-tax value of the benefits decreased take-up. Their estimates suggested that a 10 percent increase in the weekly benefit level would increase the take-up rate by 2 to 2.5 percentage points. Furthermore, the duration of the benefit also influenced take-up. An individual will take up benefits if the expected duration of the benefit exceeds the costs. Anderson and Meyer (1997) found that a 10 percent increase in the potential benefit duration would increase the take-up rate by an additional 0.5 to 1 percentage point. Additional evidence for this direct relation between the expected utility of the benefit and the take-up rate was found in a study of benefits related to water consumption offered by the city of Jerusalem (Dahan and Nisan, 2010). Here, households consisting of more than four persons are entitled to an additional amount of annual water consumption per person at a lower rate. The study found a take-up rate of 65 percent. Moreover, take-up rates were proportional to the level of the benefit in that take-up rates are twice as high in four-member with twin children compared to four-member households with non-twin children. A third study investigated non-take-up of subsidies for the public health-care premium among over 2 million persons in British Columbia (Warburton, 2005). Here, take-up rates were higher

among households that qualified for a higher subsidy percentage. Conversely, non-take-up increased when employers rather than the members of the household received the subsidies meant to compensate for health-care premiums, resulting in a lower utility for households. A study of social-assistance benefits among German households also confirms the effect of benefit level and duration of assistance on take-up (Riphahn, 2001). Riphahn found that a 10 percent increase in benefits increases take-up by about 2 percentage points. She examined the effect of the benefit level by using the relative value of the benefit as opposed to the absolute value. This accounts for the fact that the marginal utility of the benefit influences take-up. Based on the law of diminishing marginal utility, lower income households will have a higher marginal utility compared to households that are more affluent. That is, they attach more value to an additional euro received and therefore are more likely to take up benefits. Next to this, she found that homeowners have much lower take-up rates. Home ownership is interpreted as the outcome of a superior earnings profile, and homeowners are therefore expected to need assistance for shorter periods.

Studies on take-up usually analyze the effects of transaction costs on non-take-up rates. These costs reflect the effort required by individuals to apply for a benefit, such as the number of forms that need to be filled in and the time needed to search for information about the existence of benefits and the individual's eligibility. Bitler *et al*. (2003) studied non-take-up for a program called WIC offered across the United States. WIC provides nutrition education and food supplements to low-income pregnant and lactating women and to children younger than five who are at nutritional risk. Participation is found to be higher in states that reduce the transaction costs of using the program, for example by requiring fewer visits from the household. Lower participation rates were found in states that require proof of income or that impose stricter program rules. Finally, participation of married couples who can split transaction costs is higher compared to that of single-parent households in which the head of the household has to bear all costs associated with program participation. A review of literature regarding the take-up of social programs in the U.S. and U.K. indicates higher take-up rates on automatic or default enrollment and lower rates when administrative barriers are imposed (Currie, 2006). The aforementioned study of social-assistance benefits for German households (Riphahn, 2001) found higher non-take-up rates among immigrant households and explained this result in terms of the higher transaction costs incurred (i.e., effort required for obtaining the benefit) by immigrants. The review of social programs in the U.S. and U.K. (Currie, 2006) mentioned the same effect; specifically, conditional on poverty, Hispanic children were less likely to be enrolled in the SSI program in the U.S. (see also Duggan and Kearney, 2007). Conditional on eligibility, immigrant children in the U.S., many of whom are Hispanic, were less likely to be enrolled in Medicaid. Take-up rates among immigrant households in Canada, Germany, the U.S., and U.K. were found to increase significantly after assimilation (Blau, 1984; Borjas and Trejo, 1991, 1993; Baker and Benjamin, 1995; Borjas and Hilton, 1996; Riphahn, 2001). Finally, access to information plays a role in take-up. Currie (2006) found that take-up of a tax benefit increased after the poor were seen as potential income generators by tax advisors. These advisors actively searched for those entitled to

receive the benefits and familiarized them with the take-up procedure. Their fee was a share of the benefits. Daponte *et al.* (1999) found that informing people about their eligibility for the U.S. Food Stamps Program significantly increased the probability of participation.

In sum, a robust result in the empirical literature on take-up is the positive correlation between the amount of benefits (and its duration) and take-up. Other factors that have been found to influence take-up are information and application costs. This study largely confirms these findings for the take-up of the Dutch health-care allowance.

3. Dutch Health-Care System

3.1. *General Features of the Dutch Health-Care System*

It is compulsory for all Dutch residents to have health insurance based on the Health Care Insurance Act introduced in 2006. Private health insurance companies must offer a package, which includes standard cover, such as the cost of consulting a general practitioner or a medical specialist. The government regulates the cover of this standard package. The costs of this basic cover are partly paid by a wage-dependent premium and partly by a nominal contribution. Additionally, insurers can offer supplemental health insurance packages to reimburse expenses that are not covered by the basic insurance, such as extensive physiotherapy or dental care.

A key feature of the Dutch system is that insurers must offer the standard package at a fixed (nominal) price for all, regardless of age or health status. This was a new policy introduced in 2006; previously, the health-care premium was almost completely wage-dependent. The fixed price can vary across insurance companies. Health insurers are obliged to accept anyone who applies for the standard insurance. In order to create a level playing field and handle risk selection, a system of risk equalization compensates insurers for clients with unfavorable risks (e.g., the elderly or chronically ill). The risk equalization system is used to distribute the central pool of funds created by the wage-related contributions. Premiums paid by the insured for the basic package were on average about €1100 in 2008 with a deductible of €150 a year. Children under 18 are covered free.

3.2 *The Health-Care Allowance*

To help alleviate the costs of health insurance, the government provides a health-care allowance. To be eligible for this, individuals must meet certain requirements. First, only individuals 18 years of age and older can apply for the allowance (individuals who reach 18 years of age must start paying an insurance premium). Second, one must have health-care insurance. Although insurance is compulsory, there are a few exceptions. For example, military personnel and people who consciously object for religious reasons may be exempt. Clearly, they also lose the right to obtain the health-care allowance. Third, people must have Dutch nationality or a residence permit. Finally, yearly (household) income must be below a certain threshold. In 2008, the income threshold was €29,069 for a single-person household and €47,520 for a couple. This results in about 5 million

eligible households. Households consist of single-person households or couples. Adult children living with their parents are considered to be separate single-person households.

The level of the allowance depends on income, in that the lower the income, the higher the allowance, with a maximum of €553 a year for a single-person household and €1475 for a couple. A single person is entitled to the maximum allowance if his income is below €18,500 per year. The allowance is paid if the allowance is at least €24 a year. The Dutch Tax Authority administers payment of the allowance. When applying for the allowance, individuals must estimate their next year's annual income. The tax authorities then make advance payments of the benefits based on this estimate. When the annual income is verified later on and found to deviate from the estimate, people may have to repay (part of) their benefit or may receive an additional allowance.

4. Measurement of Take-Up

The data used for this analysis are based on administrative data sources collected by the Dutch Statistical Office (Statistics Netherlands). The advantage of using administrative data is that the take-up measures and eligibility conditions are not biased by misreporting or measurement errors. This allows for a more accurate identification of eligible households and take-up compared to identification based on surveys, which is subject to reporting or recall error.

The data provided demographic information from the Dutch municipal registration for 2008. Nearly all people residing in the Netherlands are registered through the Dutch municipal registration system, with the exception of people without a home address, such as those who are homeless. This dataset contains information about gender, age, civil status, nationality, type of residence permit, the number of children in the household, and municipality for more than 16 million individuals. The data from tax records can be matched using the individuals' personal registration numbers. The tax records contain information about personal and household income, the most relevant source of income (e.g., labor, welfare benefits, pensions), household wealth, housing status, and use of the health-care allowance. Finally, publicly available data (population size, job vacancy rate, etc.) on municipalities were merged with this dataset. After removing records with missing data or obvious registration errors, the remaining dataset contained a little over 15 million individuals, excluding students. This represents approximately 90 percent of the total Dutch population.

In addition to 2008 data, the data for 2006 and 2007 are also available. The data for 2006 were used to determine whether people eligible in 2006, when the law came into effect, were also eligible in 2008. Other dynamic information was not used, and the estimates are based on a cross-sectional model for 2008. The reason for not estimating a panel model is that there is little time variance in the data with regard to both take-up and individual characteristics. Most people eligible in 2006 were eligible in 2008. When the law came into effect, they decided to take up benefits, and in the following years, tax authorities automatically extended take-up of benefits. We estimated a model for 2008 because we were interested in the effects of new eligibility for take-up. Newly eligible individuals decided to take up benefits

in the latter years (2007 or 2008). In addition, we were mostly interested in the effects of individual characteristics on take-up, such as marital status, ethnic background, home ownership, and income. These characteristics do not show much variance over time in such a short period.

For each individual, we determined whether he was entitled to a health-care allowance. First, we selected individuals 18 years of age and older. Second, only individuals with health insurance are entitled to the allowance. Unfortunately, our dataset does not provide information on health insurance status. As health insurance is obligatory, we assume that each individual is insured. In practice, some individuals are exempt from the obligation and some are uninsured even though they are required to have health insurance. This results in a small overestimation of eligibility and consequently an underestimation of take-up, as these individuals cannot claim the allowance and would be identified as non-take-up. Based on the statistics from the Dutch Statistical Office, we believe that this error is small. In 2008, about 330,000 individuals were uninsured (approximately 2 percent of the total population). Third, only individuals with a Dutch nationality or a residence permit are entitled to the allowance. As residence status is registered in the municipal records, the selected individuals had to meet this eligibility requirement. Fourth, we had to establish whether persons meet the income requirements. To do this, we first had to identify single individuals and couples. The resulting household income was tested against the income threshold. The income reported in the tax records met the income definition used to assert eligibility (taxable income). In the tax records, however, households are defined somewhat differently. The tax records add income of adult children living with their parents to the total household income. These adult children have separate entitlements to the health-care allowance, which means that solely their income should be used to establish their eligibility. With regard to parental eligibility, the children's income should not be added to household income either. Unfortunately, individual taxable income is unknown. For these types of households, the total taxable household income was subdivided based on personal income shares. Personal income is recorded by the tax authorities and available for each individual. It is defined differently from taxable income, but indicates the contribution of each individual to household income. For most households, no income correction is necessary, as three-quarters of Dutch households consist of singles, couples, or couples with minor children. In the sensitivity analysis, the households with adult children were omitted to ascertain the effect of estimating taxable income. Finally, the level of the allowance was calculated. Since the allowance is paid once it exceeds €24 per year, only households entitled to more than €24 were assumed eligible.

After establishing eligibility, use of the health-care allowance was assessed. The Dutch Tax Authority administers the health-care allowance, so the tax records also contain allowance payments. A person takes up the allowance if he (or his partner) receives payments. For couples, only one individual receives the complete allowance. It has been found that almost 5 million households are eligible. Around 800,000 do not apply for the allowance, resulting in a non-take-up rate of 17 percent.

Descriptives in the Supplementary Appendix show that the average age of head of eligible households is 48 years. Most are single and native Dutch. Approxi-

mately a quarter of the households have children and almost half own their own home. For most households, the main source of income is wage from paid work or income from self-employment, followed by pensions. Only a few eligible households depend on social welfare (4 percent). The median household income is around €19,000 yearly. Households are also categorized according to their income with regard to the so-called social minimum. According to the government, this is the amount that the households need to satisfy their basic living needs.[1] Households with an income up to 120 percent of this social minimum are considered poor. Poor households represent 18 percent of eligible households for the healthcare allowance. The median assets of eligible households are approximately €11,000, and these assets exclude the value of a household's home. About 15 percent of eligible households have no assets or a debt, and 30 percent of them have assets that are worth more than €30,000. Finally, a quarter of the households are newly eligible. These people were eligible in 2008, but not in 2006 when the law was first introduced. Newly eligible households were added when they met the income requirements or turned 18. About 6 percent of the sample was newly eligible due to turning 18 in 2007 or 2008.[2]

Table 1 shows the non-take-up rates for different household types. The rates vary greatly among different types of households. It can be seen that the non-take-up rate first increased with the age of the household head and then slowly decreased. The lowest non-take-up was found amongst the elderly (7 percent). The non-take-up rates for singles are lower compared to those for couples. The take-up rates for foreign or native households do not seem to differ much. A striking result is that people who own their home have a much higher non-take-up rate of 24 percent compared to the average. The source of income is also of major importance. People receiving benefits (disability, unemployment, welfare) have much higher take-up rates compared to people who receive income from work. Table 1 also shows that with a higher household income, a greater number of assets, or a lower allowance, the take-up rate decreases. Finally, newly eligible people have an extremely high non-take-up rate (41 percent), except when their eligibility is due to turning 18.

5. Hypotheses

In the subsequent analyses, we estimated regression models on take-up in order to disentangle the joint effects of different possible determinants. The level of benefit was applied to evaluate the effect of benefit amount. In addition to this, income and household wealth categories were added to account for differences in marginal utility. We expected households with higher levels of income and wealth to have lower levels of take-up. Although income was standardized in terms of required minimum income by household composition, whether this minimum income is sufficient for households with children is debatable. The costs of children

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[1]The level of the social minimum depends on household characteristics, such as age, the presence (and number) of children, and marital status. For a couple with children the social minimum varied from €16,279 to €18,084 yearly in 2008.

[2]This number refers to both young adults living alone as well as young adults living with their parents, as they are separately entitled to the health care allowance.

TABLE 1

Non-Take-Up Rate by Household Characteristics

Household Type	Non-Take-Up Rate (%)
All eligible households	17
25 years old or younger	11
Between 25 and 45 years old	25
Between 45 and 65 years old	21
Between 65 and 80 years old	10
Older than 80	7
Single	15
Couple	21
Dutch native	17
Western background (excl. Dutch)	19
Non-Western background	16
Children living in the household	16
Homeowner	24
Main source of income:	
Wage from work	21
Self-employed	28
Unemployment benefits	17
Disability benefits	9
Pension	11
Social welfare	4
Other social assistance	4
Income ≤120% of social minimum	8
Income between 120% and 160% of social minimum	6
Income between 160% and 200% of social minimum	14
Income between 200% and 240% of social minimum	27
Income >240% of social minimum	27
No assets or debt	14
Assets between €0 and €5000	14
Assets between €5000 and €10,000	16
Assets between €10,000 and €30,000	16
Assets > €30,000	21
Allowance less than €40 yearly	66
Allowance less than €80 yearly	62
Newly eligible	41
Newly eligible due to turning 18	17

(food, clothing, personal care, leisure activities) are claimed to be higher compared to the costs accounted for in the social minimum income figure. This means that households with children have a higher need for the benefit. We therefore expect households with children to have higher take-up rates. The effect of expected duration of the benefit is approximated by home ownership and job vacancy rate in the municipality. Following Riphahn (2001), homeowners are expected to have a higher earnings potential and will therefore need assistance for shorter periods. Municipalities with high job vacancy rates have more job opportunities, offering people a greater chance of finding a (better paid) job in the near future and therefore have a higher earnings potential, leading to a shorter expected benefit duration.

Age, main source of income, size and wealth of the municipality, and new eligibility serve as proxies for information costs. Although the health-care allowance is well known in the Netherlands, people may still be unaware of the allow-

ance. Elderly people are expected to be better informed because organizations serving the elderly will inform them about the allowance. Furthermore, young adults are expected to be best informed. First, individuals automatically receive information from the government regarding the allowance once they turn 18. Second, these young adults often apply for health-care insurance for the first time. While children live with their parents (even if they are older than 18), they can be insured through their parents' insurance. Once they leave home, they need to apply for their own insurance. During the application procedure, people are informed about the allowance. With respect to the main source of income, we expect high take-up rates for households on social welfare. The municipality provides social welfare, and municipalities are known to actively approach welfare recipients to inform them about all available income allowances. The larger the municipality, the larger the gap between government and citizens. This makes it harder for municipalities to inform inhabitants about available allowances, resulting in lower take-up rates. Municipalities with a higher average home value have on average wealthier individuals compared to municipalities with a lower average home value. They are expected to put less effort into informing citizens, as the overall need for assistance is lower. There will also be less word of mouth because fewer people use the allowance. People are also misinformed in that they know about the allowance but mistakenly believe that they are not entitled to it. We tested this by applying an indicator for newly eligible households. Newly eligible households are households that became entitled to the allowance in 2008, but were not entitled in 2006. The rationale behind this is that when the law came into effect in 2006, there was a huge campaign to make people aware of the allowance. People who were not eligible in 2006 probably believed that they were still not eligible in 2008, even though the income thresholds changed or some people may have suffered a loss of income. Another indication of the issue of unknown eligibility is home ownership. Home-owners are more likely to believe that they are not entitled to the allowance, as they might consider that their house is an asset, which makes them ineligible. In reality, this is not the case. Entitlement to most allowances, except the health-care allowance, depends on assets in the Netherlands. Application costs are operationalized by ethnic background and marital status. Non-native households may have language difficulties, which increase the effort required to obtain the benefit. Couples are expected to make more use of the allowance compared to singles because they can split the application costs.

6. Estimation Results

To estimate the joint effects of the possible determinants, we estimated a logit model with take-up of the health-care allowance as the dependent variable. Besides the logit specification, we also estimated probit and OLS models (not shown), which led to similar results.[3] The estimation results for the logit model are presented in Table 2. To facilitate interpretation, average marginal effects are reported. Three alternative specifications are estimated, starting with a model with household and socio-economic characteristics and subsequently adding benefit

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[3]Estimation results can be obtained from the first author on request.

TABLE 2

ESTIMATION RESULTS, DEPENDENT VARIABLE IS TAKE-UP OF THE HEALTH-CARE ALLOWANCE

| | | | Marginal Effects | | | |
| | | All Eligible Households | | | Poor Households (income ≤120% of social minimum) | |
Variables	(1)	(2)	(3)	(2b)	(3b)
Household characteristics					
25 years old or younger	0.178*	0.126*	0.125*	0.026*	0.025*
Between 25 and 45 years old (reference)	–	–	–	–	–
Between 45 and 65 years old	0.013*	0.020*	0.019*	0.040*	0.040*
Between 65 and 80 years old	0.110*	0.062*	0.062*	0.081*	0.080*
Older than 80	0.125*	0.067*	0.066*	0.081*	0.080*
Male	–0.013*	–0.015*	–0.016*	–0.022*	–0.022*
Female (reference)	–	–	–	–	–
Single	–0.031*	0.017*	0.018*	0.017*	0.017*
Couple (reference)	–	–	–	–	–
Youngest child in the household <6 years	–0.021*	–0.008*	–0.008*	0.020*	0.020*
Youngest child in the household 6 to 12 years	–0.001	0.012*	0.012*	0.024*	0.023*
Youngest child in the household ≥12 years	0.007*	0.019*	0.019*	0.018*	0.018*
No children (reference)	–	–	–	–	–
Western background (excl. Dutch)	–0.039*	–0.035*	–0.033*	–0.028*	–0.028*
Non-Western background	–0.030*	–0.032*	–0.023*	–0.014*	–0.012*
Dutch native (reference)	–	–	–	–	–
Socio-economic characteristics					
Own home	–0.060*	–0.058*	–0.061*	–0.057*	–0.059*
Rental home (reference)	–	–	–	–	–
Main source of income:					
Self-employed	–0.020*	–0.074*	–0.073*	0.006*	0.007*
Wage from work (reference)	–	–	–	–	–
Unemployment benefits	–0.018*	–0.004	–0.004	0.040*	0.039*
Disability benefits	0.059*	0.034*	0.034*	0.057*	0.056*
Pension	–0.016*	–0.008*	–0.008*	0.031*	0.030*
Social welfare	0.098*	0.070*	0.070*	0.065*	0.064*
Other social assistance	0.086*	0.051*	0.050*	0.064*	0.064*
Other	–0.093*	–0.065*	–0.064*	0.013*	0.014*

Table 2 continued on next page

TABLE 2 (*continued*)

Marginal Effects

Variables	All Eligible Households			Poor Households (income ≤120% of social minimum)	
	(1)	(2)	(3)	(2b)	(3b)
Income ≤120% of social minimum	0.207*	0.051*	0.050*		
Income between 120% and 160% of social min.	0.229*	0.079*	0.078*		
Income between 160% and 200% of social min.	0.169*	0.050*	0.050*		
Income between 200% and 240% of social min.	0.056*	0.011*	0.011*		
Income >240% of social min. (reference)	—	—	—		
No assets or debt	−0.010*	−0.012*	−0.012*	0.015*	0.013*
Assets ≤€5000	0.008*	0.006*	0.006*	0.031*	0.030*
Assets between €5000 and €10,000	0.010*	0.007*	0.007*	0.028*	0.027*
Assets between €10,000 and €30,000	0.011*	0.008*	0.008*	0.019*	0.018*
Assets >€30,000 (reference)	—	—	—	—	—
Benefit characteristics					
Level of the allowance (ln)		0.078*	0.078*	0.035*	0.034*
Newly eligible		−0.203*	−0.201*	−0.106*	−0.105*
Municipality characteristics					
No. of inhabitants (ln)			−0.008*		−0.003*
Average home value (ln)			−0.021*		−0.023*
Job vacancy rate			−0.001*		−0.000*
N	4,729,036[a]	4,729,036	4,729,034	845,989	845,989
Log likelihood	−1,841,247	−1,592,964	−1,589,756	−159,873	−159,548
Pseudo R-square	0.14	0.26	0.26	0.22	0.22

Notes: This table reports average marginal effects, that is, changes in the probability of take-up following a change in the independent variables from 0 to 1 for categorical variables and an infinitesimal change in continuous variables when holding all other independent variables equal.
*Significant at the 0.01% level. Due to the large sample size, small differences were significant. Therefore, coefficients are considered significant at the 0.01% level.
[a]About 200,000 eligible households were dropped from the analysis due to (partially) missing characteristics.

characteristics (2) and municipality characteristics (3). Although the health-care allowance is a national allowance, municipalities may influence take-up rates through their poverty policies, for example, by providing information on the allowance or the take-up procedure. For all specifications, we observed few changes in signs or level of significance, supporting the robustness of the results. Specifications (2) and (3) perform best in terms of model fit, and they are discussed in detail below. Next to the complete selection of eligible households, it is also interesting to observe drivers of take-up of the health-care allowance among poor households. These households constitute a vulnerable population. By Dutch standards, households are considered poor if they have an income up to 120 percent of the social minimum. Even though the take-up rate is high, with 92 percent of poor households receiving the health allowance, some of these vulnerable households still do not take up the allowance. Columns (2b) and (3b) present the estimation results of specifications (2) and (3) for poor households. Our findings are generally in line with previous empirical literature. We will discuss the results in terms of the two main determinants of take-up behavior, expected utility (level of the benefit, need for benefits, and expected duration of the benefit) and transaction costs.

It is confirmed that the higher the allowance, the higher the probability of take-up. The effect is small, however. A 10 percent increase in the benefit level increases the overall take-up rate by about 0.8 percentage points. This effect is smaller compared to the effects reported by Anderson and Meyer (1997) and Riphahn (2001) (approximately 2 percentage points). For poor households, although the benefit amount still influences take-up, the effect has decreased. This is not surprising, as 93 percent of eligible poor households are entitled to the maximum allowance.

We found, in general, that the probability of take-up increases when household income decreases. There is also a somewhat surprising result. The probability of take-up for households with the lowest income is lower than for households with an income between 120 and 160 percent of the social minimum. This implies that the people who need the allowance the most are less likely to take up the allowance.[4] A similar result was found for household assets, although the effect is smaller. In this case, people with debt or zero assets have the lowest probability of take-up. This means that they take up the allowance even less often compared to people with assets exceeding €30,000 (a 1 percentage point difference). This is a striking result, even though the effect is small. For the poor households in the lowest income category, we still found that households without assets or with a debt have a lower take-up probability compared to households with assets (with the exception of households with assets over €30,000). This is a remarkable result, as these people are assumed to need the benefit the most. With respect to the expected higher need of eligible households with children, this analysis only found a higher probability of take-up for households with children aged 6 and over compared to households without children. Households with children younger than 6 years old are found to have lower take-up rates compared to households without

[4]That the level of the allowance depends on income does not pose collinearity problems in the analysis as income categories are used and the allowance cannot become higher than a certain maximum.

children. This is unexpected. The effects are quite small; however, having a child does not influence take-up strongly. For poor households, we found that having a child under 6 years old increases take-up probability. Apparently, the increased needs of households with children are more apparent for poor households. The effect remains quite modest. Regarding the effect of expected benefit duration, home ownership leads to a lower probability of take-up, that is, having a home decreases the take-up probability by approximately 6 percentage points. The effect is the same for poor households and all eligible households. Riphahn (2001) also found this effect, although the effect she found was much bigger—34 percentage points. The fact that the rate of job vacancies in the municipality leads to a lower take-up probability is another demonstration that a superior earnings profile results in a shorter expected benefit duration and lower take-up. The effect is similar for poor households and all eligible households.

Information issues appear to play a key role in taking up the health-care allowance. Elderly people and young adults were expected to be best informed, which was confirmed by the analysis. The effect was strong; specifically, the take-up rate for young adults was almost 13 percentage points higher compared to that of people aged between 25 and 45 years. This effect is much smaller for the poor. Individuals who are not in the lowest income category influenced the age effect found for young adults. These individuals probably have a better understanding of costs and benefits and have more abilities to complete the take-up procedure. The effect of awareness is further supported by the different take-up rates for households with different sources of income. The probability of take-up is highest for people on social welfare, which was expected, as municipalities are known to actively inform welfare recipients about available allowances. For poor households, not only being on welfare, but also having other forms of assistance (disability and unemployment benefits) increases take-up probability. We believe this is because the government organization that pays these benefits (the employee insurance agency) informs low-income households about allowances. We did not find a strong effect for all eligible households, as people on unemployment or disability benefits are not automatically entitled to the health-care allowance; unemployment and disability benefits depend on previously earned income. The employee insurance agency is therefore expected to refer only low income households to the allowance. The effect of the municipality size and wealth also supports the lack of information hypothesis. The larger the municipality, the lower the take-up probability, as it is harder for large municipalities to inform citizens. The effect is smaller for poor households; they tend to be informed almost equally well by large and small municipalities. Municipalities with a higher average home value are expected to put less effort into informing citizens. This also shows up in the empirical results. The strongest (negative) effect on take-up was found to be caused by new eligibility. Newly eligible households have a much lower probability of take-up compared to households that were also eligible in 2006, with take-up rates differing by 20 percentage points. This effect also held for the poor households and remained substantial with 10 percentage points. We believe that this might be because newly eligible households may be unaware of their eligibility, as they were not entitled to the allowance in 2006. The existence of the health-care allowance has been widely advertised in 2006, when the law was introduced. In later years,

adjustment of the eligibility criteria has not been widely announced. As mentioned earlier, we also believe that home ownership is associated with limited awareness, as home owners are more likely to believe they are not entitled to the allowance. Entitlement to most allowances in the Netherlands depends on assets as well, but the health-care allowance incorporates only income.

With respect to application costs, we found that foreign households have a lower probability of take-up compared to Dutch natives. This is explained by higher application costs, as was also found by Riphahn (2001) and Currie (2006). These effects are modest in that non-natives have a take-up rate that is approximately 3 percentage points lower than natives. This effect also holds true for poor households. We did not find that couples have a higher take-up probability compared to singles. In fact, the opposite holds; specifically, single-person households have a higher probability of take-up compared to couples. We think this is because couples have a superior earnings profile and therefore a lower expected benefit duration. Couples are expected to have more opportunities to generate additional income, as they can both search for a (better) job or try to work extra hours. Once they both find work, the household income is likely to exceed that of the single-person household.

7. Analysis of Subpopulations

Our analysis assumed that the same mechanism of rational choice based on the expected utility of the benefit and information costs governs the behavior of all individuals. Information costs are proxied by age, main source of income, and new eligibility, which are found to have a substantial effect on take-up. The question arises whether this mechanism is indeed similar across informed versus uninformed individuals. We therefore selected subgroups in the population that are either thought to be well informed (i.e., young adults and welfare recipients) or to be poorly informed (new eligibles) and re-estimated the model to assess the determinants of expected utility (see Table 3). Most effects found for the full sample were also the same for young adults. We found that the probability of take-up increases with benefit amount and decreases when expected duration (home ownership and higher job vacancy rate) is shorter, as was the case for the full sample. The biggest difference between young adults and the full sample was found with regard to the need for the benefit, proxied by income and wealth. For young adults, take-up in the low income and wealth categories is lower compared to take-up in the reference category. The unexpected effect indicated that people who are thought to need the allowance the most are less likely to take up the allowance, and this effect appeared to be stronger for young adults.

Another subpopulation thought to be well informed is welfare recipients. In this case, most findings about the determinants of expected utility also hold. The probability of take-up again increases as the benefit amount increases, although the effect is smaller, similar to the poor households, as most recipients are entitled to the maximum allowance. As welfare benefit equals social minimum, all recipients will fall in the lowest income category. With respect to need for the benefit according to wealth, the findings showed that take-up decreases when wealth decreases, similar to the full sample. A higher need is also expected to arise for

TABLE 3

ESTIMATION RESULTS ON SUBPOPULATIONS, DEPENDENT VARIABLE IS TAKE-UP OF THE HEALTH-CARE ALLOWANCE

Variables	Marginal effects				
	Full Sample	Young Adults	Welfare Recipients	Newly Eligibles	Excluding Households with Adult Children
Household characteristics					
25 years old or younger	0.125*		-0.020*	0.265*	0.106*
Between 25 and 45 years old (reference)	—		—	—	—
Between 45 and 65 years old	0.019*		0.013*	-0.020*	0.014*
Between 65 and 80 years old	0.062*		-0.017*	-0.017*	0.045*
Older than 80	0.066*		-0.069*	-0.083*	0.043*
Male	-0.016*	-0.025*	-0.023*	-0.022*	-0.007*
Female (reference)	—	—	—	—	—
Single	0.018*	0.038*	0.014*	0.068*	0.008*
Couple (reference)	—	—	—	—	—
Youngest child in the household <6 years	-0.008*	-0.011*	0.013*	-0.012*	0.004*
Youngest child in the household 6 to 12 years	0.012*	0.012	0.017*	0.019*	0.016*
Youngest child in the household ≥12 years	0.019*		0.016*	0.037*	0.016*
No children (reference)	—	—	—	—	—
Western background (excl. Dutch)	-0.033*	-0.043*	-0.007*	-0.045*	-0.028*
Non-Western background	-0.023*	-0.037*	-0.003*	-0.017*	-0.011*
Dutch native (reference)	—	—	—	—	—
Socio-economic characteristics					
Own home	-0.061*	-0.024*	-0.033*	-0.088*	-0.075*
Rental home (reference)	—	—	—	—	—
Main source of income:					
Self-employed	-0.073*	-0.064*		-0.074*	-0.074
Wage from work (reference)	—	—		—	—
Unemployment benefits	-0.004	0.004		0.005	0.001
Disability benefits	0.034*	0.018*		0.055*	0.044*
Pension	-0.008*			-0.030*	0.013*
Social welfare	0.070*	0.039*		0.132*	0.085*
Other social assistance	0.050*	0.028*		0.064*	0.056*
Other	-0.064*	-0.081*		-0.044*	-0.018*

Table 3 continued on next page

TABLE 3 (*continued*)

			Marginal effects		
Variables	Full Sample	Young Adults	Welfare Recipients	Newly Eligibles	Excluding Households with Adult Children
Income ≤120% of social minimum	0.050*	−0.075*		0.014*	0.092*
Income between 120% and 160% of social min.	0.078*	−0.017*		0.079*	0.122*
Income between 160% and 200% of social min.	0.050*	0.000		0.055*	0.084*
Income between 200% and 240% of social min.	0.011*	0.010*		0.027*	0.033*
Income >240% of social min. (reference)	–	–		–	–
No assets or debt	−0.012*	−0.038*	−0.006*	−0.002	−0.003*
Assets ≤€5000	0.006*	−0.018*	0.010*	0.010*	0.015*
Assets between €5000 and €10,000	0.007*	−0.007*	0.011*	0.001	0.013*
Assets between €10,000 and €30,000	0.008*	0.002	0.010*	0.000	0.009*
Assets >€30,000 (reference)	–	–	–	–	–
Benefit characteristics					
Level of the allowance (ln)	0.078*	0.101*	0.034*	0.111*	0.060*
Newly eligible	−0.201*	−0.101*	−0.063*		−0.204
Municipality characteristics					
No. of inhabitants (ln)	−0.008*	−0.001*	−0.003*	−0.012*	−0.008*
Average home value (ln)	−0.021*	−0.019*	−0.012*	−0.039*	−0.021*
Job vacancy rate	−0.001*	−0.000*	0.000*	−0.002*	−0.001*
N	4,729,034	954,019	291,814	1,086,584	3,388,842

Notes: This table reports average marginal effects, that is, changes in the probability of take-up following a change in the independent variables from 0 to 1 for categorical variables and an infinitesimal change in continuous variables when holding all other independent variables equal.
*Significant at the 0.01% level. Due to the large sample size, small differences were significant. Therefore, coefficients are considered significant at the 0.01% level.

households with children, resulting in higher take-up rates. This effect was found for the poor households and welfare recipients, but not for families with small children in the full model. The increased need for households with children appears to be more apparent for low-income households. Shorter expected benefit duration proxied by home ownership resulted in lower take-up rates. The results concerning job vacancy rate did not remain. In this case, the sign changed, although the effect was small.

Finally, newly eligible participants are thought to be poorly informed. Benefit amount still has a positive effect on take-up. Furthermore, take-up increases when income decreases, except for the lowest income households. In fact, the effect is more pronounced for the newly eligible participants. The effect of household assets became insignificant for these participants. Take-up for newly eligible households with children showed a similar pattern to the full sample. Shorter expected benefit duration (proxied by home ownership and job vacancy rate) had a negative effect on take-up.

Although some differences were observed, most results with regard to expected utility of the benefit remained for both informed and uninformed individuals. Benefit amount had a positive effect on take-up and a shorter expected benefit duration had a negative effect. The unexpected finding that individuals in the lowest income or wealth category do not have the highest take-up rates also holds for both informed and uninformed individuals.

8. Sensitivity Analysis

The advantage of using administrative data is that eligibility can be established with a great amount of accuracy. In our analysis, few assumptions need to be made. One assumption concerns the way in which taxable household income is divided across parents and adult children. The taxable household income in the tax records corresponds to the total income of all adult household members. Adult children have separate entitlements to the health-care allowance, which means that only their income should be used to establish their eligibility. With regard to parental eligibility, the children's income should not be added to household income either. For these types of households, the total taxable household income is currently subdivided based on personal income shares, which are available at the individual level. Table 3 (final column) shows the estimation results when omitting households with at least one adult child. Although the magnitude of the effects differs, these estimates provide similar results as the estimates on the complete dataset. Young adults and welfare recipients had much higher take-up rates, and new eligibility had a substantial effect. The result that individuals in the lowest income or wealth category have a lower take-up rate compared to individuals who are slightly better off was also supported. Two coefficients, specifically, coefficients of the effect of having an income from pensions and having a child under 6 in the household, changed the sign. In the subset, pensioners had a higher take-up rate compared to households that earn wages from work as the main source of income. In the full dataset, the effect was opposite. We believe this change in sign is due to a higher expected benefit duration for pensioners without adult children in the household. The income from pensions is fixed, and it is difficult to supplement this

TABLE 4

Parametric and Semi-Parametric Coefficient Estimates on the Effect of Income on Take-Up

	Logit		Nearest Neighbor Matching	
	Estimate	S.E.	Estimate	S.E.
Income ≤120% of social minimum	0.049	0.011	0.108	0.044
Income between 120% and 160% of social min.	0.077	0.010	0.134	0.026
Income between 160% and 200% of social min.	0.051	0.008	0.110	0.018
Income between 200% and 240% of social min.	0.012	0.009	0.058	0.015
Income >240% of social min. (reference)	–	–	–	–
N	23,651		23,651	

Note: This table reports average marginal effects for the logit model and the average treatment effect for the nearest neighbor matching the model on a sample of households. Subjects are matched using the Mahalanobis distance defined by the covariates of the full model. A bias-corrected estimator is used. The results are based on 15 replications.

income after retirement. This means that pensioners are expected to receive benefits for the rest of their lives, resulting in higher take-up. For pensioners who share their household with adult children, it is expected that their income can be supplemented more easily with income from their children. This group was omitted in the subset analysis. The change in the sign for households with a child under the age of 6 was also believed to be due to expected duration of the benefit. Households with both minor and adult children have a shorter expected duration, as the adult children may be able to contribute to household income in the near future. In the subset analysis, these types of households were omitted.

A disadvantage of the logit estimator is that a restrictive functional form is assumed. To analyze the sensitivity of the outcomes, especially with regard to the unexpected effect of income on take-up, a semi-parametric estimator is used where these restrictions are relaxed. We used the nearest neighbor-matching estimator. Unfortunately, due to computational issues, this estimator can only be applied to a subsample of our dataset. Therefore, we drew a random sample of approximately 24,000 individuals. This procedure is replicated 15 times. Table 4 presents the estimation results of the effect of income on take-up for the full model. Table 4 shows that the mean estimates for the logit model are very similar to the logit estimates for the full sample. However, the effect of income turned out to be substantially larger for the nearest neighbor estimates. Based on the nearest neighbor estimates, the take-up rate of poor households is 11 percentage points higher compared to households with income above 240 percent of the social minimum. Based on the logit model, this difference is 5 percentage points. The range of the nearest neighbor estimates is much larger across replications, as shown by the standard error. The implications of both models are similar. Take-up increased as income decreased, except for individuals in the lowest income category, in both models. Furthermore, the relative difference between income categories was similar for both models. Thus, take-up in households with an income slightly above the poverty line was almost 3 percentage points higher compared to take-up in poor households, for both the parametric and the semi-parametric estimation strategy.

9. DISCUSSION

This study documents non-take-up of an income-dependent compensation of the health-care premium in the Netherlands. The data analysis of almost all 5 million Dutch households entitled to such income-dependent compensation showed that one in six households refrain from take-up. The most common explanation is that people make a rational choice between the utility they expect from the benefit and the effort required for take-up (transaction costs). The analysis largely confirmed the transaction-costs hypotheses. Information issues appear to be key drivers of take-up behavior. People who are better informed (young adults, elderly people, welfare recipients) have much higher take-up rates. Unknown eligibility is also expected to have a substantial effect on take-up. The overall take-up rate of people who are newly eligible is 20 percentage points lower compared to that of people who were eligible in previous years. However, an unexpected effect also emerged. Although, in general, the probability of take-up increases when income decreases, those with the lowest income or wealth do not have the highest probability of take-up. This means that although take-up of the health-care allowance is generally high, some vulnerable groups have lower take-up rates than would be expected. This effect also emerged for subpopulations that are expected to be either well or poorly informed and when a semi-parametric estimator is applied.

There are three possible explanations for this unexpected effect. First, wealth and income may affect take-up rates indirectly through education, as we did not control for education in our regressions. A wealthier household is usually more educated and may incur lower costs of collecting and processing information about allowances, resulting in a higher net benefit and higher take-up. This explanation only holds if there are differences in education between the two lowest income categories. Second, people may not be able to analyze the costs and benefits of take-up in all relevant circumstances and conditions. Addiction and psychiatric disorders or other conditions may not only result in low incomes, creating a need for benefits, but may also affect the afflicted individuals to such extent that they lack the conditions (such as strength, motivation, or capabilities) required for take-up. Baicker *et al.* (2012) discussed behavioral barriers to explain incomplete take-up of health insurance in the United States. They argued that the traditional economic perspective on costs and benefits could not explain total non-take-up, as the costs of obtaining health insurance are very low. They used the findings from psychology and behavioral economics, suggesting that certain factors, such as choice overload, lack of understanding of costs and benefits, cognitive constraints, and the fact that individuals find it hard to act optimally (for example, to incur costs in the present to obtain gains in the future), discourage take-up of benefits (see also Bertrand *et al.*, 2004). Finally, specific rules for applying for the health-care allowance might pose problems, especially for those with low incomes or debt. When applying for this benefit, people are required to, among other things, provide information about their family situation. This includes making an estimate of next year's annual income. The advance payments of the benefits are based on this estimate. When the annual income is verified later on and found to exceed the estimate, people have to repay (part of) their benefit. In several

interviews with municipalities, it was pointed out to us that this might create serious financial problems for people in debt or without (large) savings who have already spent the benefits. These people might therefore want to protect themselves from having to repay the benefit by not taking it up in the first place. The national organization of social counselors, which advises people on taxes and legal matters, also emphasized this problem. The organization reported that approximately 30 percent of the paid health-care allowances are adjusted afterwards because the advance payment was either too high or too low (NOSC, 2009). Further investigation is needed to determine why households with the lowest income and wealth do not have the highest take-up rates. Future research could try to identify potential behavioral barriers that may be associated with non-take-up.

This study has some limitations. Although we used high-quality register data, establishing eligibility remains a challenging task. First, the means on which the entitlement is tested need to be derived. The tax records contain the correct income definition (taxable household income), but the way households are defined differs from the health-care allowance definition. In the latter case, young adults living with their parents are seen as separate households with a separate household income. We derived the household income for these households according to the shares of personal income of the parents and their adult children. We believe that the resulting measurement error is small, as omission of these households does not lead to substantially different estimation results. Another limitation is that we did not have information on individual insurance status. As health insurance is obligatory, everyone in the dataset is assumed to have insurance. In practice, about 2 percent of the Dutch population does not have health insurance and is not entitled to the health-care allowance. A final shortcoming is that we did not account for individual unobserved heterogeneity. Education, preferences, motivation, and cognitive abilities might influence both take-up and explanatory factors, such as wealth, overstating the effect of wealth on take-up. Disciplined people are more likely to have savings and are also more likely to take up the allowance. Further research should control for this unobserved heterogeneity.

Take-up of social benefits can be increased by lowering transaction costs and removing barriers for eligible individuals. As information issues are found to be key drivers of take-up, it may be increased by notifying households of their eligibility during their tax declaration. Most Dutch households, especially home-owners and people who work, declare taxes and might be unaware of their eligibility. Besides this, health-care insurers could be asked to actively inform their insured about the allowance. People in debt or with no assets may refrain from take-up to avoid the risk of having to repay (part of) the benefit when their estimate of next year's income is incorrect. This can be avoided by basing the benefit on last year's income, which is known by the tax authorities. Finally, transaction costs for households can be lowered by paying the premium directly to the care insurer rather than to the individual households.

<div align="center">References</div>

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix: Descriptive statistics