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A Reminder to Pay Less for Healthcare: take-up of Increased Reimbursement in a large-scale randomized field experiment

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ABSTRACT

We evaluate how a simple letter and flyer sent to a low-income group stimulates the participation in a beneficial health insurance plan. Using a large-scale randomized field experiment we study the effect of contacting potential beneficiaries on the take-up of the Increased Reimbursement (IR) for healthcare in Belgium. We find a fourfold increase in the take-up of IR, with large differences across geographic areas. The group that remains without IR is, on average, less vulnerable than the group that takes up IR in response to the letter. As such, the mailing arguably succeeds in reaching out to the target population.

1   Introduction

In many countries there are policies in place to protect vulnerable members of society. However, since typically only a fraction of potential beneficiaries take up their rights, social policies risk to miss their purpose, and become ineffective (e.g. Hernanz, Malherbet, & Pellizzari, 2004). Therefore, non-take-up of social benefits has sparked interest in diverse fields, including taxation, social assistance and healthcare (Baicker, Congdon, & Mullainathan, 2012; Bhargava & Manoli, 2015; Currie, 2004). In this paper we present a large-scale field experiment to examine how informing people on the content and eligibility criteria of a beneficial health insurance scheme, by means of a letter and a flyer, affects its take-up. We focus on the Increased Reimbursement (IR) for healthcare expenditures in Belgium. Under this scheme, individuals pay lower copayments for healthcare and are entitled to other financial benefits, after an eligibility assessment that is partly based on household income. However, take up of IR is neither automatic, nor compulsory and many of the entitled individuals do not benefit from IR (Avalosse, Vancorenland, & Verniest, 2015).

Traditionally, economic analyses presume that health insurance decisions result from rational behavior by perfectly optimizing individuals. Recent empirical research, however, suggests that individuals experience severe difficulties in optimally deciding on health insurance plans with limited information (Baicker et al., 2012; B. Handel & Kolstad, 2015; B. R. Handel, Kolstad, & Spinnewijn, 2015; Kaufmann, Muller, & Boes, 2016; Ketcham, Lucarelli, Miravete, & Roebuck, 2012; Kling, Mullainathan, Shafir, Vermeulen, & Wrobel, 2012). People procrastinate (Madrian & Shea, 2001; O'Donoghue & Rabin, 1999), have limited attentional capacity (Kahneman, 1973; Kaufmann et al., 2016), get overwhelmed by choices (Iyengar & Lepper, 2000; Millett, Chattopadhyay, & Bindman, 2010) and do not fully understand the costs and benefits of certain programs (Liebman & Luttmer, 2011; Liebman & Zeckhauser, 2004). As a result, they may miss out on benefits to which they are entitled (Baird, Reardon, Cullinan, McDermott, & Landers, 2015). At the same time, behavioral interventions can be successful in counteracting these problems and steering people towards desired (health-related) behaviors (Goldhaber-Fiebert,

Blumenkranz, & Garber, 2010; Jacobson et al., 1999; Luoto, Levine, & Albert, 2011; Tarozzi et al., 2010).

One possible way to increase the take-up of IR is to inform individuals on the content and eligibility criteria of IR. The use of letters as a means to increase people's understanding and to encourage participation has been more widely documented across a variety of contexts. For example, Bhargava et al. (2015) demonstrated that an experimental mailing, a notice informing the recipient about a cash transfer program through income taxes and possible program eligibility, had a significant effect on applications for the cash transfer program. Also Dechausay, Anzelone, and Reardon (2015) and Farrell, Anzelone, Cullinan, and Wille (2014) showed that providing basic information (in the form of letters and postcards) can substantively alter the likelihood of claiming benefits. In Belgium, Huysentruyt and Lefevere (2010) found that a one-time informative mailing influenced individuals' decisions about the payment method for child benefit support. In addition, sending letters effectively increased the commitment to save (Karlan, McConnell, Mullainathan, & Zinman, 2016), improved compliance with mandatory payments (e.g. paying TV license fees) (Fellner, Sausgruber, & Traxler, 2013) and induced payment of overdue taxes (Deredactie.be, 2016, October 31)[6]. Although experimental evidence on the effect of letters is scarce in the field of healthcare, mailing has been found to positively impact health behaviors. For example, in a randomized experiment of Lantz et al. (1995), women that received a letter were significantly more likely to take part in cancer screening tests. In a field experiment by Kling et al. (2012), letters with personalized information on different prescription drug insurance plans in Medicare induced the treatment group to switch to the lowest-cost plan. As such, individuals' health-related behavior and decisions can be changed due to the mere receipt of a letter.

In addition, recent evidence shows that some groups are more responsive to information. In several studies, the positive effect of information was found to be significantly higher for foreigners and older persons (Aizer, 2003; Guthmuller, Jusot, & Wittwer, 2014; Huysentruyt et

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[6] This news item refers to work in progress entitled "Behavioural insights and tax compliance: Evidence from a field experiment" by Jan-Emmanuel De Neve, Clement Imbert, Maarten Luts, Johannes Spinnewijn, and Teodora Tsankova.

al., 2010; Kowalski, 2016; Piette et al., 2000). Overall, vulnerable groups (e.g. low-income households) seem to benefit the most from informative notices, indicating that these notices seem to succeed in reaching out to the target group (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2009; Bhargava et al., 2015). Specifically in the context of healthcare benefits, Guthmuller et al. (2014) found that people's response to information on healthcare benefits was mainly explained by healthcare needs. As such, people with higher healthcare needs were also more sensitive towards information on a public program for health care benefits. In addition, Guthmuller et al. (2014) found a positive impact of healthcare expenditures and retirement status on the uptake of health care benefits. In sum, variations in responsiveness to information usually seem to be explained by differences in need between individuals and in the information that they already have at their disposal.

So far, only a few studies have documented the potential of simple reminders and basic information to increase the uptake of health-related benefits, especially in the context of health insurance programs in developed countries. Moreover, randomized experiments are largely unavailable in health insurance, with the Rand and Oregon health insurance experiments as notable exceptions (Aron-Dine, Einav, & Finkelstein, 2013; Finkelstein et al., 2012). Most closely related to our study, Guthmuller et al. (2014) found in a randomized experiment that a meeting invitation with information on a subsidized complementary health insurance plan hampered take-up of the plan in France. This negative result could be driven by the failure of potential beneficiaries to attend the meeting, although this was not a requirement to take up the plan.

The aim of this paper is to assess if, and to what extent, informational letters and flyers influence the take-up of the IR. Further, we evaluate the characteristics of those who respond to the mailing and look at associations between IR, the mailing and a range of individual and household characteristics. Finally, we investigate whether there are regional disparities in the reaction to the stimulus. The letters and flyers can be considered as behavioral stimuli. The letters may have decreased the complexity of eligibility criteria for IR by outright stating that the potential beneficiaries were likely to qualify for IR. They also provide clear information about who they should contact to apply for IR. The complementary flyers may have mainly improved

the understanding of IR by listing its (financial) benefits. (Baicker et al., 2012; Bhargava et al., 2015; Currie, 2004)

The recent initiative of the largest Belgian health insurer, the National Alliance of Christian Mutualities (henceforth NACM), to send a letter and flyer to potential IR beneficiaries in order to encourage them to apply for the IR, provided us with an ideal setting to examine the impact of information on take-up behavior in a field experiment. With this paper, we contribute to the scarcely available experimental evidence on health insurance decisions outside of the lab, with a field experiment including over 50,000 persons. Overall, we find that the mailing has a 10 to 15 percentage-point effect on the take up of IR (i.e. a three to fourfold increase). This effect seems to last long in time and differs strongly across geographic areas, even when controlling for a range of background characteristics.

The remainder of this paper is organized as follows: In section 2 we briefly discuss the institutional context of this study. Subsequently, in section 3, we provide a detailed overview of the experimental setup. We present the main findings in section 4 and we conclude in section 5 with a brief discussion of the main findings and the limitations of our study.

2 institutional context: Increased reimbursement and the Proactive flux

In Belgium, mandatory health insurance has led to near universal coverage. Standard health insurance with extensive coverage is provided by seven nation-wide non-profit health insurers that are supervised by the National Institute for Health and Disability Insurance. Standard insurance can be supplemented, for instance with hospitalization insurance or privately organized additional insurance schemes (e.g. Schokkaert, Van Ourti, De Graeve, Lecluyse, & Van de Voorde, 2010). In this experiment we collaborated with NACM, a health insurer with approximately 4.5 million members, about 40% of the entire Belgian population.[7] NACM is organized in 19 regional departments that work closely together, but that also have a certain degree of administrative independence. Each regional department is responsible for a network

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[7] https://www.cm.be/lid-worden/waarom-aansluiten-bij-cm.jsp, last accessed May 2017).

of local offices. When filing an application for obtaining IR, clients would typically be in touch with NACM through their local office.

The predominant social safety net in Belgium's healthcare is the system of increased reimbursement. Eligibility for IR either is granted automatically on the basis of access to other social protection benefits[8], or requires passing an income test. In the latter case, clients have to file an application and are subjected to an investigation of household income at a local health insurance office. Under IR, beneficiaries pay lower copayments for a range of care provisions and, importantly, benefit from a third party payer system for GP visits. Overall, the reduction in copayments is significant. On average, for a 15-65 year old employed man (woman) copayments decrease from 16.03% (17.58%) to 6.55% (7.38%) under IR (De Graeve, Van Mechelen, Vandelannoote, & De Wilde, 2013)[9], corresponding to an average increase in reimbursements of 150 to 250 euros per year. Further, for most outpatient care non IR patients pay the full price of care on the spot and receive partial reimbursements afterwards. Under the third payer system, IR beneficiaries only pay the copayment on the spot. Although this third payer system does not strictly affect healthcare prices, it removes part of the hurdle to access care. Moreover, IR beneficiaries pay less for hotel costs during hospitalization and profit from lower deductibles in the population-wide Maximum Billing system. The Belgian scheme of Maximum Billing could be considered a stop-loss health insurance with an aggregate-claims deductible of around 459 euros per year for low income individuals, with the peculiarity that below the deductible healthcare costs are also partly reimbursed.[10] Next to benefits in the healthcare system, IR beneficiaries are also eligible for various discounts, including discounts on telephone bills, reductions in fuel prices for heating, and lower public transport fares. Once the IR is approved,

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[8] People receiving subsistence wages, guaranteed income for older persons, compensation for disabled persons and compensation for disabled children automatically qualify for IR without income investigation. Furthermore, orphans and non-accompanied underage migrants also automatically qualify for IR. (e.g. https://socialsecurity.belgium.be/sites/default/files/alwa-en.pdf , p. 83, last accessed April 2017).

[9] E.g. the copayment for a General Practitioner consultation amounts to 1.5€ with IR instead of 6€ without IR. For dental consultations the copayment is 0€ instead of 5€ without IR and for a kinesiology appointment of 30 minutes the copayment decreases from 5.89€ to 2.39€. http://www.cm.be/diensten-en-voordelen/ziekte-en-behandeling/terugbetalingen-behandelingen/index.jsp

[10] The deductible is 459€, 663€, 1020€, 1428€ or 1836€ in 2017 depending on income thresholds. (http://www.cm.be/diensten-en-voordelen/ziekte-en-behandeling/specifieke-regelingen/maximumfactuur/plafondbedragen.jsp, last accessed May 2017) Previous thresholds were 450€, 650€, 1000€, 1400€ or 1800€.

the right is retrospectively applied from the first day of the month or quarter of application onwards.

It is publicly known that many of the people who would be eligible for IR based on their low income, do not take up this benefit. Generally, NACM and other health insurers took an active part in suggesting proposals for improving this situation. Considering the input of health insurers, the royal decree of January 15th 2014[11] stipulated that potential beneficiaries of IR should be contacted proactively and be invited to file an application. For that purpose, the National Institute for Health and Disability Insurance, in collaboration with the tax administration, provided the health insurers with a list of potential beneficiaries. The list consisted of households that did not yet receive the IR, but had a low taxable income that would have qualified them for IR in 2013. All health insurers had to proactively contact these potential beneficiaries, an operation that was coined the 'proactive flux'. To soften the workload for its regional departments, the NACM decided to contact households in six different waves over the course of 18 months. This gave us the opportunity to set up a randomized field experiment to assess the impact of the proactive flux. To this end, we agreed with the NACM that the potential beneficiaries would be randomly assigned to the different waves.

3   Experimental setup

In this section, we describe (1) the treatment in the experiment; (2) the allocation of households to the intervention and the treatment groups; (3) the data extraction and available background variables; (4) the quality of the randomized assignment to mailing waves.

3.1   The treatment

All households in the intervention group received the same basic treatment, consisting of a letter and a flyer, both sent by regular mail. The content of the letter was very brief and formally explained that the household was potentially eligible for IR if their income was below a certain

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[11] Koninklijk besluit betreffende de verhoogde verzekeringstegemoetkoming (Hoofdstuk 4, afdeling 2). http://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=nl&la=N&table_name=wet&cn=2014011508 (last accessed January 2017)

threshold. It also invited them to make an appointment for filing an application. The flyer clearly listed the main benefits of IR, contact details for filing an application as well as a list of documents that should be brought for completing the application.[12]

Additional treatment varied across households and regions. Firstly, those with a known e-mail address (about one in six households) first received an e-mail through the digital platform of NACM a couple of days before the regular mailing. This e-mail contained the same information as the letter sent by regular mail. Secondly, some regional departments decided to additionally remind their members of the mailing by telephone. In the remainder of the text we use numbers (1 to 11) to indicate the different regional departments that participated in the study. Using this numbering, Departments 4, 5, 8 and 9 organized a follow-up by phone to improve responsiveness to the national mailing. Department 5 only reported follow-up calls for the first wave, and not for the next. All contacts took place in the principal language of the Community in which people lived (Dutch-speaking, French-speaking, or German-speaking), even though a sizeable part of the target population may not fluently speak and/or understand this language, as the share of migrants in the target population can be expected to be sizeable, even though there are no official statistics available.

The letter did not include typical suggestions from behavioral research (e.g. appealing to loss aversion, implementation prompting), but explicitly decreased complexity of IR by stating that the household was potentially eligible and how it could contact the local NACM office. The flyer provided more information on the benefits of IR and the application procedure and therefore reduced information costs.

Given the (non-random) variation between regional departments with regard to whether or not members received reminder phone calls, as well as likely selection bias in the availability of e-mail addresses, the focus in this study is not on evaluating the impact of a particular way of contacting people. We rather study the overall effectiveness of trying to convince low-income groups to undergo an income test through non-intrusive incentives.

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[12] A sample letter and flyer can be found in the appendix.

3.2 Allocation to intervention and treatment groups

The original list with potential beneficiaries to be contacted by NACM consisted of 183,024 household heads, spread over the 19 regional departments. 11 out of these 19 departments agreed to participate in the experiment. Reasons for non-participation were either the desired administrative independence or the will to contact all potential eligibles as soon as possible.[13] Further, household heads born after 1985 were not included in the first three mailings.[14] The reason for this was that NACM first wanted to define some additional targeting criteria, as it could be expected that especially for this group, the tax file data were too dated to function as a good proxy for current IR eligibility.[15] This selection left us with a sample of 55,407 household heads representing 92,312 household members included in the current study.

Households were randomly assigned to one of six waves spread over 18 months. To reduce sampling error and improve the allocation of households to treatment and control groups, household heads were stratified by regional department, zip code and age. Also, to avoid direct contamination through "household" network effects, we allocated all people living on the same address to the same wave.[16] For administrative purposes, the number of households and regional composition differed across waves. To ensure representativeness of each wave, inverse probability of selection weights were used throughout the analysis.

After wave 3, an extra exclusion criterion was added based on additionally available income data. Therefore, we compare the take-up of IR for households in the first three waves with take-

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[13] Most of the non-participating departments are French speaking. These regions have less members overall which makes it possible to contact members very quickly - this is a clear incentive to not participate in the experiment.

[14] This is with the exception of those born after 1985 living on the same address as another household head born before 1985 that needs to be contacted. In this case both household heads are contacted in the same wave.

[15] The income check by the fiscal administration was based on tax data of 2013, while the mailings were organised in 2015-2016. Therefore, for a high proportion of people in the population group born after 1985 tax administration data were either missing or displayed very low incomes, which caused them to be included on the list of potential beneficiaries. Yet, by the time of the mailing many of them were likely to have taken up paid employment and thus had a much higher income. To avoid sending too many redundant letters to households that would not qualify, NACM decided to contact this group at a later stage after applying additional exclusion criteria.

[16] Except for addresses with more than five potential beneficiaries. In this case all household heads were considered to be part of a separate sociological household and they could end up in different waves. Addresses with more than five household heads typically refer to local public centers for social welfare, prisons or elderly homes.

up by households originally allocated to waves 4-6. As such, waves 1 to 3 are the treatment group and waves 4 to 6 are the control group. The first wave was contacted on 25/11/2015 and waves two and three were contacted on 07/04/2016 and 26/05/2016. Overall, the first wave was the smallest with around 5,000 households, while more than 10,000 households were contacted in the second and third wave. Taken together, waves 4-6 account for about 45 percent of the sample included in the study. In the results presented below, the household head and his/her associated household is used as the unit of analysis.

Table 1: Number of households and number of household members by wave

Wave, date of contact	Total Households	Percent	Cum.	Total Individuals	Percent	Cum.
1, 25/11/2015	4,986	9.00	9.00	8,365	9.06	9.06
2, 07/04/2016	10,016	18.08	27.08	16,664	18.05	27.11
3, 26/05/2016	14,926	26.94	54.01	24,731	26.79	53.90
4, 22/09/2016	5,307	9.58	63.59	8,874	9.61	63.52
5, 14/03/2017	12,569	22.68	86.28	20,944	22.69	86.21
6, 05/05/2017	7,603	13.72	100.00	12,734	13.79	100.00
Total	55,407	100.00	-	92,312	100.00	-

3.3   Data

IR status and background variables were collected in September 2016, and refer to the situation before waves 4-6 were contacted. All data were retrieved from administrative data on NACM members.[17]

We have different measures related to take-up of IR at our disposal: application status for IR (yes/no), take-up of IR (yes/no), date of application and date of approval. Of these variables, effective take-up and date of approval are more reliable than the other two variables. In contrast, application status and date of application are not uniformly registered across local NACM offices. Even though we emphasized the importance of uniform registration, some office workers would register applications only when clients would have presented themselves with all

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[17] See Appendix A for a table with descriptive statistics.

required documents and were likely to receive IR, while at the other extreme office workers registered the application when clients made a phone call for an appointment to file an application, regardless of the likelihood of being eligible for IR. The registration of the date of application and application status can be expected to be clustered along the lines of regional departments of NACM. For these reasons, in the analyses below we focus primarily on effective take-up of IR, especially in the multivariate analyses.

The background characteristics could roughly be divided into three categories. Firstly, *socio-demographic* variables like age, gender (both for the head of household), the number of family members, the number of adults in the family and whether or not the family was a one parent household were included. All these variables referred to the situation in September 2016. These characteristics may be related both to the extent of awareness of IR and to opportunity costs to apply for IR. For example, older persons may, ceteris paribus, be less likely to be already informed on social safety benefits and IR before receipt of the letter and flyer. On the other hand, retirees may find it less bothersome and easier to apply for benefits at a local office.

Secondly, variables that define *healthcare use* were included. All these variables referred to the calender year 2015 and were aggregated at the household level. This category of variables contained health expenditures for both the health insurer and the household[18] (equal to copayments), the number of daily defined doses (DDD)[19] to measure pharmaceutical use, days in general hospitalization and number of days in a psychiatric institution in particular. In addition, we included an indicator of whether someone in the household had crossed the maximum billing threshold, which would automatically result in a cap on copayments to be paid by the household. Again, health care use might be related to take-up of IR in opposite ways. Possibly, frequent healthcare users face a higher incentive to apply for IR. On the other hand, their health status may impede them from going to a local office. In principle, intensive use of

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[18] The historic health expenditures delivered by NACM are "as if there is no maximum billing". This means that the total amount of expenditures is the same, but that in reality, the copayments are lower.
[19] A Daily Defined Dose (DDD) is the average use of the pharmaceutical considering the main therapeutical use. https://www.whocc.no/ddd/definition_and_general_considera/.

health care may point to a financially more vulnerable situation of households. Nonetheless, vulnerability may also result in under-consumption of health care.

Thirdly, information was available on two variables that describe *absence from work*. Both variables referred to the calender year 2015. A first variable measured days being unemployed whereas a second variable captured the number of days that an individual was unable to work because of sickness, a work accident or disability. Those who are absent from work (controlling for healthcare use) can be expected to face lower opportunity costs of applying for IR. Also, generally speaking, the longer household members are absent from work, the more vulnerable they are. As most variables can be either positively or negatively associated with take up of IR and reacting to the mailing, the sign and size of the responses required an empirical investigation.

3.4 Characteristics of contacted vs. non-contacted individuals

Comparing the characteristics of the intervention and control groups validates the randomization procedure and supports the internal validity of further analyses. Table 2 provides independent samples t-tests between the first three waves and the control group in waves 4 to 6 (=Contr.) for all variables that are available post-randomization. In this way we test whether sample characteristics in waves one to three differ with characteristics in the control group.

Table 2: Characteristics of household heads and associated households. Waves 1 to 3 compared with Waves 4-6 (=Contr.).

Variable	Wave 1		Wave 2		Wave 3	
	Contr.-W1	P-val.	Contr.-W2	P-val.	Contr.-W3	P-val.
*Man**	-0.002	0.834	0.007	0.234	0.001	0.846
Year of Birth	-0.028	0.923	-0.007	0.980	-0.075	0.786
*One parent household**	0.000	0.854	0.000	0.954	0.001	0.216
Family members	0.003	0.845	0.008	0.616	0.011	0.496
Adults	0.006	0.441	0.005	0.488	0.008	0.269
Historic expenditure by health insurer (HI)	125.571	0.214	107.303	0.281	111.868	0.255
Historic health care expenditure by household	18.905	0.024	14.937	0.074	13.588	0.101
Daily Defined Doses (DDD)	22.979	0.168	19.991	0.221	21.009	0.193
Gen. Hospitalization	0.312	0.125	0.300	0.132	0.202	0.308
Psych. Hospitalization	0.077	0.650	0.187	0.257	0.009	0.957
Unemployment (days)	0.677	0.560	0.616	0.587	0.272	0.808
Sickness and disability (days)	-0.640	0.441	-0.749	0.357	-0.492	0.539

* binary variables: comparison of proportions. T-tests on weighted data, stratification taken into account.

As expected, most results are statistically insignificant. Only one variable, historic household expenditures on health care in wave 1, is significant at the five percent confidence level. On average, household expenditures in 2015 were 18.9 euros higher in the control group. However, the significance does not transfer to the historic health insurer expenditures. Because of multiple simultaneous comparisons, it may be that we overestimate the significance of this result.[20] Also, the significant effect might be partly attributed to the definition of expenditure. In particular, the significance of household expenditures in the first wave might suggest that individuals postpone care as a reaction to the intervention. The variables refer to all expenditures in 2015 and wave 1 has been contacted on November 25th 2015. The result above may then indicate that households in the intervention group postpone their care, even though

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[20] The significance of this result is sensitive to multiple testing, with a Bonferroni correction for only 3 simultaneous tests, the result becomes insignificant. To maintain the family-wise error rate the significances at the 95% confidence level have to be compared to e.g. 0.0166 instead of 0.05 with three simultaneous tests.

the system of IR is retrospectively applied[21], implying that expenditures in the period before approval are also reimbursed. While the retrospective application of IR should remove the incentive to postpone care, awareness of this retrospectivity may be (too) low. Even with the retrospective application, the non-take up of IR should be considered as problematic. Without IR, the potential beneficiaries have higher immediate healthcare expenditures because of the third party payer system and the higher copayments. Both elements may cause individuals to postpone necessary care.

4   Results

4.1   Applications and approvals of IR

Results in Table 3 show that the intervention effect on applications (see column 'applied') is about 17 to 22 percentage points. The number of applications in the first three waves is substantially higher than in the control group (waves 4 to 6). As a result, there is also a significantly higher take-up rate of IR (see column 'approved'), which is about 10 to 15 percentage points higher in the intervention than in the control group. With overall take-up of IR increasing with a factor of three (wave 3) to four (wave 1), the treatment has a non-negligible effect on the number of low-income households that benefit from reduced copayments and the third payer system. Remarkably, the effect on the intervention on both application and approval is higher for the first as compared to the second and the third wave.

The lower approval rate in the intervention groups (see column 'appr./appl.') indicates that the treatment also induced more non-eligible households to apply for IR. Whereas the approval rate is as high as 80 per cent for households submitting an application in the control group, this drops to 64 per cent for the third wave. Furthermore, the approval rate is substantially lower in the third as compared to the first two waves.

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[21] In case of an investigation of last years' income, the right for IR is applied from the first day of the quarter in which the individual applied for IR onwards. When income was investigated for one month, the right opens on the first day of the month in which the individual applied for IR.

At least two factors could contribute to the decreasing effect of the intervention and a lower approval rate over time (from wave 1 to wave 3). First, by September 2016, when we collected our outcome variables, households assigned to later waves had less time to react to the incentives and complete their application. This may also have had some effect on the approval rate, given that some files may not yet have been completed. Second, the income information used to select households in the study population was increasingly outdated, and the suggestion in the letter that a household is potentially eligible was increasingly flawed; as time passed, the income situation of an increasing number of households in the population under study might have improved, making them ineligible for IR. Given the lower (and decreasing) approval rate, the use of up-to-date tax data could lower costs for households and Belgian health insurers in terms of mailing and personnel involved in the follow-up of applications. For the same reason, the time between receiving tax information and contacting households should be kept as short as possible. This could most likely improve the efficiency of similar initiatives in the future.

Table 3: Proportions take-up of IR and participation in eligibility test (results at the household level)

| Wave	Approved				Applied				Appr./Appl.	
	Estimate	SE	LB	UB	Estimate	SE	LB	UB	Estimate	SE
1	19.96	0.58	18.83	21.10	28.83	0.66	27.54	30.13	69.23	1.25
2	18.64	0.40	17.86	19.41	27.17	0.45	26.28	28.06	68.60	0.91
3	14.90	0.30	14.32	15.49	23.44	0.35	22.74	24.13	63.59	0.83
4	4.87	0.36	4.15	5.58	6.07	0.39	5.30	6.84	80.18	2.33
5	4.81	0.20	4.43	5.20	6.19	0.22	5.75	6.62	77.80	1.53
6	4.90	0.28	4.36	5.45	6.23	0.31	5.62	6.84	78.71	2.09

* Standard errors take account of sample design. LB= Lower Bound of the 95% Confidence Interval, UB= Upper Bound.

4.2 Timing of events

Figure 1 graphically displays the timing of the response of households to the intervention in the first as compared to the control group (waves 4-6). The graphs on the left show that the majority of applications and approvals in the first wave took place in the first thirty days after the treatment. After thirty days, the responsiveness steadily declines. Nevertheless, the tails of the distribution suggest that some households react even more than 100 days after having

received the letter. This may be explained in part by the fact that households may be more likely to apply for IR when they have healthcare expenditures after they received the intervention. The median amount of days until the first action and approval are 36 and 29, respectively, which implies that those applying earlier are also more likely to obtain IR.

Figure 1:Timing of Events: frequency and proportion of households that have applied for/ have been awarded IR across time (wave 1 vs. waves 4-6)
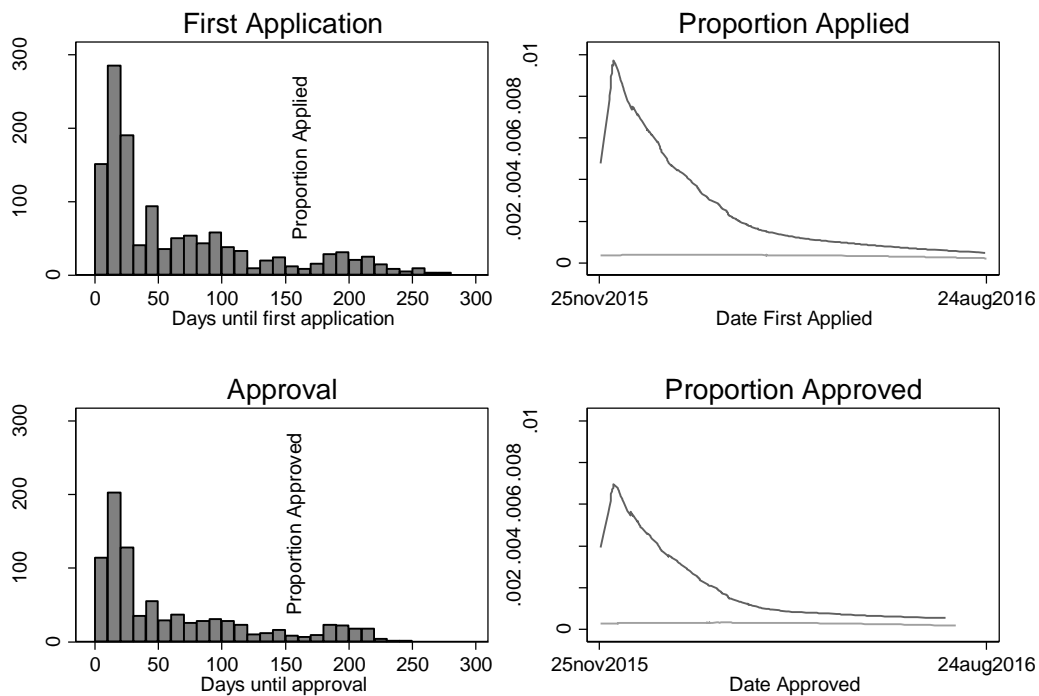
Note: Left panel: wave 1; right-hand side panel: wave 1 vs. waves 4-6. Graphs for wave 2 and 3 are provided in the Appendix.

The graphs at the right in figure 1 present smoothed fits[22] comparing the percentage of people applying for or taking up IR in wave 1 (the strongly skewed, dark grey lines) with the average take-up percentage in waves 4-6 (the flat, light grey lines). As expected, since people in wave 4-6 did not receive any intervention, take-up in this wave is constant at a relatively low level. Over the entire time span, take-up is higher in the intervention group although the difference in

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[22] These are lowess curves which non-parametrically fit the data.

applications/take-up converges over time. Remarkably, the intervention effect remains observable until nearly one year after intervention, even though the effect seems to fade away more quickly for waves 2 and 3 (see Annex).

4.3 Never takers, always takers and treated compliers of IR

It is impossible to directly observe the characteristics of those who take up IR in reaction to the intervention: households taking up IR in the intervention group (the 'intervention treated') are a mixture of households who would take up IR also without being contacted by NACM (the 'always takers') and households that take up IR in response to the intervention (the 'treated compliers'). In other words, the average of any characteristic of the intervention treated is a weighted average of the characteristics of the treated compliers and the always takers. Due to the random allocation of households to intervention and control groups, one could expect that the characteristics of the always takers in the intervention group (who would have taken up IR even without receiving the intervention), are similar to those of the always takers in the control group (i.e. all households taking up IR in the control group). Under this assumption it is possible to deduce the average characteristics of the treated compliers and compare them to the 'never takers' (households in waves 1-3 that do not take up IR) and always takers (as observed in wave 4-6).

More formally, following Kowalski (2016), the average of any characteristic of the treated compliers is equal to:

$$\frac{1}{p_I - p_B}[p_I E(X|D = 1, Z = 1) - p_B E(X|D = 1, Z = 0)].$$

Where p_I and p_B are the probabilities of take-up for the intervention and control (baseline) groups respectively. D is an indicator for take-up of IR (IR is approved) and Z is an indicator for receiving the intervention.

Table 4: Average characteristics of always Takers, Treated Compliers and Never Takers (take-up of IR), household head and household characteristics, wave 1 vs waves 4-6.

Variable	Always Takers	Treated Compliers	Never Takers	TC-AT		TC-NT	
				Diff.	P-Val.	Diff.	P-Val.
Man	0.51	0.51	0.58	-0.01	0.78	-0.07	0.00
Year of Birth	1956.84	1947	1961.58	-9.40	0.00	-14.14	0.00
One parent household	0.01	0.00	0.01	-0.01	0.03	0.00	0.44
Adults	1.33	1.33	1.30	0.00	0.95	0.03	0.19
Number of family members	1.71	1.55	1.70	-0.16	0.02	-0.15	0.01
Maximum Billing	0.33	0.30	0.14	-0.03	0.29	0.16	0.00
Historic expenditure by health insurer (HI)	4833.99	3190	2597.22	-1644.12	0.00	592.66	0.06
Historic health care expenditure by household	527.66	407	317.43	-120.86	0.00	89.37	0.00
Daily Defined Doses (DDD)	1108.97	1281	659.57	172.24	0.02	621.63	0.00
General Hospitalization	8.84	2.33	3.22	-6.51	0.00	-0.89	0.21
Psych. Hospitalization	2.19	1.01	0.41	-1.18	0.21	0.59	0.33
Unemployment (days)	53.27	29.09	28.89	-24.17	0.00	0.21	0.96
Sickness (days)	41.77	10.25	14.24	-31.52	0.00	-3.98	0.22

Notes: TC-AT = Treated compliers vs. always takers; TC-NT = Treated compliers vs. never takers. SE's and P-values obtained from a bootstrap using 250 replications. To bootstrap we employ the Stata programming approach suggested by Cameron and Trivedi (2009) (p. 426). Results for wave 1 are displayed, but results are robust across waves (see Table A2 and Table A3 in annex).

The results of the comparison of group characteristics of wave 1 with waves 4-6 are displayed in table 4. In first instance we compare the characteristics of the always takers and the treated compliers. Secondly, we compare characteristics of the never takers with the treated compliers. These comparisons give more information on the characteristics of the households that respond to the mailing relatively to households that always or never take up IR. When interpreting the results, it should be kept in mind that effective take-up depends both on filing an application and compliance with eligibility conditions. The differences between the groups under comparison are the combined result of both factors.

Compared to treated compliers, we find that always takers have considerably higher historic health care expenditures and spend substantively more days in unemployment, sickness and disability. In other words, insofar we can infer from the data at our disposal, the always takers seem to consist, on average, of the most vulnerable group of households. Households with higher historic expenditures might, given their incentive, take up IR more easily, but it might also indicate that always takers are informed by healthcare professionals when taking up care. Given the time spent out of work, their opportunity costs for applying for IR can be considered to be lower as well. The average profile of treated compliers is remarkably different from always takers: mostly older persons, the employed and those with lower healthcare use are reached by the proactive flux. On average, treated compliers are about 9 years older than always takers. Moreover, while having higher (non-significant) drug use, the treated compliers and their household members have fewer or shorter hospitalizations and they have lower historic healthcare expenditures. In comparison with the always takers, the treated compliers have fewer unemployed and/or sick days. The latter may partially be the effect of a higher average age (and more people in retirement).

In contrast, never takers (those who do not take up IR even with the intervention), are on average younger, have larger families and have lower healthcare use than the treated compliers. The difference in unemployment and sickness is rather small and non-significant. Even though the results are somewhat less clear-cut for waves 2 and 3 (see annex), arguably, the intervention succeeds in incentivizing the individuals that are most likely to be in need to take up IR, apart from those that already take up IR even without additional incentives.

4.4   Multivariate Analyses

Table 5 documents a number of regression analyses with the uptake of IR as the dependent variable and uptake of IR in wave 6 as the reference category. More specifically, the first regression consists of a linear probability model which reproduces the estimated effect of the intervention as compared to the uptake of IR in wave 6 (cf. section 4.1). In the subsquent models we refine the estimation by adding background characteristics of the household (LPM 1), dummies for the regional department (LPM 2), and removing outliers (values above the 99th

percentile) regarding health care use (LPM outliers 1), as well as regarding both health care use and variables related to absence from work (LPM outliers 2). Given the nature of the dependent variable we also present results of a logistic regression, including the same variables as in LPM 2.

Across all specifications, the coefficients on waves remain essentially constant. This signals a high quality randomization as the addition of possible confounders does not alter regression results. Most variables related to healthcare usage, i.e. days in general hospitalization, days in psychiatric hospital and daily defined doses are positively associated with uptake of IR. The same holds for the variables related to absence from work: days in unemployment and days in which the person is unable to work because of sickness, work accident or disability. Finally, living in a single parent household is also associated with a relatively high likelihood of taking up IR.

The other variables, related to healthcare use, indicate higher financial strain as well as higher benefits of taking up IR, which we would expect to be associated with higher uptake of IR. This is confirmed for the number of days in hospital as well as the daily defined doses. There is, however, a negative effect for health insurer and out-of-pocket health expenditures at the household level. In theory, this effect could occur as a result of the maximum billing system, which removes the incentive to apply for IR as soon as expenditures have crossed a threshold, but we do not find evidence of this effect when including interaction effects between maximum billing and historic expenditures. Furthermore, the results are robust to leaving out wave 1 (because of the possible "non-perfect randomization" indicated by table 2), and to dividing health expenditures by number of household members.

Table 5: Multivariate regressions of the uptake of IR on a range of background characteristics (analysis at the household level)

Variable	Basic	LPM 1	LPM 2	Logistic Regression	LPM Outliers1	LPM Outliers2
Constant	0.0490***	4.5777***	4.3604***	-	4.4706***	4.6813***
Wave 1	0.1506***	0.1507***	0.1508***	0.1519***	0.1497***	0.1475***
Wave 2	0.1373***	0.1373***	0.1372***	0.1431***	0.1354***	0.1302***
Wave 3	0.1000***	0.1005***	0.1005***	0.1172***	0.0977***	0.0953***
Wave 4	-0.0004	0.0001	0.0002	-0.0012	0.0001	0.0025
Wave 5	-0.0009	-0.0001	-0.0013	-0.0023	-0.0014	-0.0006
Man	-	-0.0089***	-0.0095***	-0.0112***	-0.0110***	-0.0119***
Year of Birth	-	-0.0023***	-0.0022***	-0.0026***	-0.0023***	-0.0024***
One parent	-	0.0633***	0.0636***	0.0637***	0.0595***	0.0552**
Number adults	-	-0.0143***	-0.0148***	-0.0137***	-0.0172***	-0.0153***
Number family members	-	0.0049***	0.0048***	0.0076***	0.0064***	0.0057***
Maximum Billing	-	0.0453***	0.0444***	0.0331***	0.0494***	0.0406***
Historic expenditure by health insurer	-	-0.0001***	-0.0001***	-0.0001***	-0.0002***	-0.0003***
Historic health care expenditure by household	-	-0.0008*	-0.0008*	-0.0004	-0.0018**	-0.0015*
DDD	-	0.0023***	0.0022***	0.0015***	0.0027***	0.0030***
General Hospitalization (Days)	-	0.0004**	0.0004**	0.0002**	0.0009***	0.0008***
Psychiatric Hospitalization (Days)	-	0.0005***	0.0005***	0.0004***	0.0009***	0.0011***
Unemployment (Days)	-	0.0003***	0.0003***	0.0003***	0.0003***	0.0003***
Sickness (Days)	-	0.0004***	0.0004***	0.0003***	0.0003***	0.0006***
Regional department fixed effects	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**
Obs.	53,474	53,474	53,474	53,474	51,781	48,112
R-squared	0.0385	0.0872	0.0908	-	0.0906	0.0921

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Household Expenditure, HI Expenditure and DDD in hundreds. Average Marginal Effects displayed for Logistic regression. LPM= Linear Probability Model. In the specifications "LPM Outliers1" and "LPM Outliers2" we remove outlying observations on healthcare use, and healthcare use and absence from work variables respectively (>99 percentile)

Table 6: Multivariate regression of the uptake of IR on a range of background characteristics, adding the interaction of intervention and characteristics (waves 1-3 vs. waves 4-6)

Variable	Interaction (1)	Interaction (2)
*Int. * Man*	-0.0015	-0.0013
*Int. * Year of Birth*	-0.0042***	-0.0042***
*Int. * One parent HH*	-0.0459	-0.045
*Int. * Number of adults*	-0.0202***	-0.0198***
*Int. * Number of family members*	0.0026	0.0027
*Int. * Maximum Billing*	0.0200*	0.0190*
*Int. * Historic expenditure by health insurer*	-0.0002***	-0.0002***
*Int. * Historic health care expenditure by household*	0.0009	0.0009
*Int. * Daily Defined Doses (DDD)*	0.0031***	0.0031***
*Int. * Days General Hospital*	-0.0013***	-0.0013***
*Int. * Days Psych. Hospital*	0.0003	0.0003
*Int. * Days Unemployed*	0.0002***	0.0002***
*Int. * Days Sickness*	0	0
Regional department Fixed Effects	**No**	**Yes**
Obs.	53,474	53,474
R-squared	0.108	0.1117

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. We employ a linear probability model as in models LPM1 and LPM2 above, controlling for all available background characteristics and adding in the interaction terms.

In Table 6 we use again the same Linear Probability Model as in Table 5 (LPM1 and LPM2), controlling for all available background characteristics, but now add extra interaction terms between the intervention and the background characteristics. To facilitate interpretation, in these analysis we lump all intervention groups together. Overall, older persons, families with fewer adults and the unemployed seem to have an increased take-up as a result of the intervention. The effect of healthcare use is ambivalent; whereas the effect of the intervention is higher for those under maximum billing and higher drug use, it is lower for those with higher historic expenditures and more days in hospital.

4.5   Regional disparities in take-up of IR

The overall effect found in Table 2 conceals large discrepancies between regional departments of NACM. Regional policies for contacting potential beneficiaries, past efforts to increase the

take-up of IR and different population characteristics may generate large differences in take-up of IR and responses to the intervention. From Table 7 we do indeed observe that there are sizeable differences in application rates and take-up across 11 regional departments.

Table 7: Proportions of take-up and application of IR by households per regional department

Department	1	2	3	4	5	6	7	8	9	10	11
Approved											
Wave											
1	15.46	19.23	14.11	30.39	19.29	27.88	20.93	36.47	9.77	12.31	14.55
2	15.52	17.6	14.6	29.26	21.23	18.4	18.47	33.48	9.11	10.53	15.15
3	13.43	16.06	12.51	18.66	15.87	18.5	17.65	18.64	7.38	10.97	16.45
4	6.81	5.63	2.62	5.04	4.11	5.07	4.48	3.33	3.27	-	-
5	4.73	4.67	4.66	5.61	4.86	4.19	5.68	3.76	5.2	-	-
6	4.92	4.93	5.31	4.12	3.86	4.73	5.1	5.09	5.54	4.54	6.17
Initiated											
Wave											
1	22.71	24.52	21.37	38.55	26.69	37.82	28.19	63.53	17.04	18.46	16.36
2	21.67	23.07	20.5	38.12	25.54	24.64	26.78	63.93	14.36	18.42	24.24
3	19.5	22.71	20.45	24.45	21.63	25.69	25.46	49.77	10.95	16.71	24.34
4	8.08	7.24	3.83	6.58	4.11	6.27	5.54	3.96	5.26	-	-
5	6.19	6.21	6.35	6.43	5.3	5.14	7.7	4.92	6.81	-	-
6	6.18	6.57	6.1	5.86	4.96	5.44	6.5	6.23	7.18	6.46	7.14
Approved/Initiated											
Wave											
1	68%	78%	66%	79%	72%	74%	74%	57%	57%	67%	89%
2	72%	76%	71%	77%	83%	75%	69%	52%	63%	57%	63%
3	69%	71%	61%	76%	73%	72%	69%	37%	67%	66%	68%
4	84%	78%	68%	77%	100%	81%	81%	84%	62%	-	-
5	76%	75%	73%	87%	92%	82%	74%	76%	76%	-	-
6	80%	75%	87%	70%	78%	87%	78%	82%	77%	70%	86%
Obs.	11,092	8,787	4,956	4,559	3,649	3,380	4,742	4,832	5,478	1,380	619

Note: the approval rate may differ across departments partially because of alternative policies with regard to digitally recording applications: in some departments applications are only recorded once clients have submitted all relevant documents, whereas others also keep track of partial applications.

Departments 4, 5, 8 and 9 organized a follow-up by phone to improve responsiveness to the national mailing. There seems to be a wide variance in the success of this follow-up strategy. Department 9 reported that their phone calls were found to be intrusive by most individuals. Their approach comprised a statement that data were obtained from the tax administration office. Further, Department 5 only reported follow-up calls for the first wave, even though this does not translate into a higher response rate in comparison with the second wave. At the same time, Department 6 has not organized additional reminders, while uptake of IR is relatively high, especially in the first wave. Finally, reminders by Department 8 were most successful in increasing the number of applications, reaching over 60 percent in waves one and two. Even though this resulted in a relatively high number of applications by non-eligible households, uptake of IR is remarkably high in the first and second wave.

We were not able to randomize different types of treatment and regional departments were free to decide upon actions with regard to additional reminders and information campaigns. Given the different composition of regional department membership, it is not unreasonable to believe that population characteristics drive the significant differences in take-up of IR between regional departments. To gain more insight into the potential confounding effect of variations in membership, in Table 8 we present results of multivariate regressions of the take-up of IR on department membership. We consecutively add the same variables (interacted with the intervention) as those included in the regression models above. The interaction term between intervention (=1 for waves 1-3, =0 otherwise) and regional department corresponds to the difference/gap in take-up induced by the intervention. We add control variables interacted with the intervention because the departments can have different populations (also captured in department fixed effects and control variables) and these different populations might react differently to the intervention. Taking the best performing department (8) as the baseline situation, we find that adding all individual and household variables to the model significantly (P-value=0.00)[23] decreases the gap between regional departments. More specifically, from Table 8 it can be observed that the interaction between department membership and

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[23] We test for equality of department*intervention interaction coefficients across specifications by obtaining parameter variance-covariances in a Seemingly Unrelated Regression. Here, we find that the largest gap (between departments 8 and 9) closes significantly when adding all background covariates.

intervention as compared to the effect in Department 8 decreases for all departments, especially after the addition of socio-demographic variables. The decrease is strongest for the difference between Department 8 and Department 9.

Table 8: Gap in take-up of IR between regional departments of NACM, multivariate linear probability models

Variable	Gap 1	Gap 2	Gap 3	Gap 4
Constant	0.0407***	0.0829	-0.3188*	0.1482
Intervention	0.2251***	8.6739***	7.8399***	7.9918***
Department 1 x intervention	-0.1326***	-0.1018***	-0.0991***	-0.0982***
Department 2 x intervention	-0.1036***	-0.0773***	-0.0796***	-0.0801***
Department 3 x intervention	-0.1347***	-0.1003***	-0.1016***	-0.1001***
Department 4 x intervention	-0.0340**	-0.0148	-0.0138	-0.0123
Department 5 x intervention	-0.0869***	-0.0690***	-0.0673***	-0.0670***
Department 6 x intervention	-0.0702***	-0.0466***	-0.0483***	-0.0467***
Department 7 x intervention	-0.0931***	-0.0723***	-0.0726***	-0.0718***
Department 9 x intervention	-0.1906***	-0.1343***	-0.1290***	-0.1301***
Department 10 x intervention	-0.1410***	-0.1104***	-0.1120***	-0.1205***
Department 11 x intervention	-0.1854**	-0.1689**	-0.1731**	-0.1697**
Socio-Demographic*	**No**	**Yes**	**Yes**	**Yes**
Healthcare Use*	**No**	**No**	**Yes**	**Yes**
Absence from Work*	**No**	**No**	**No**	**Yes**
Observations	53,474	53,474	53,474	53,474
R-squared	0.0495	0.0981	0.1053	0.1152

Note: *** p<0.01, ** p<0.05, * p<0.1. * Socio-Demographic, Healthcare Use and Absence from Work are all interacted with the intervention (see text).

As a result we conclude that the added variables are able to close part of the wide gap in responses to the intervention between regional departments. However, after controlling for available background variables, sizeable gaps in take-up of IR remain. Overall, this suggests that there may still be some room for reducing non-take up of the IR in departments that have implemented none or less effective additional strategies to convince clients to submit an application for IR, even though part of the remaining gap can probably be explained by important non-observed characteristics between departments. For example, there can be differences in the proportion of eligible members and past efforts to reach out to members may determine current success of the treatment. A more direct randomization of intervention types across regional departments could shed more light on this.

5 Discussion and Conclusion

The results from our field experiment among a low-income population suggest that a simple intervention such as sending a letter and flyer can be an effective strategy to increase the take-up of social benefits in general and a beneficial health insurance scheme in particular. Exploiting a large-scale randomization in collaboration with the largest Belgian health insurer, NACM, we find a fourfold increase in the total take-up of IR. Remarkably, the number of applications is higher in the intervention group for more than six months after the mailing. Although the intervention triggered a significant response, the efficiency of the mailing could be improved by using more up-to-date tax or social security data to identify potential beneficiaries of IR. The intervention also evoked a higher percentage of applications by non-eligible members, incurring costs both on households and NACM.

We identified characteristics of those who respond to the mailing by comparing always takers and treated compliers. We find that respondents to the mailing are on average older, have lower historic healthcare expenditures and are more at work compared to always takers. Households that were not reached by the mailing, the never takers, are on average younger and have lower healthcare use than households who take up IR. This could arguably indicate that the most vulnerable households are indeed, on average, reached by the system. These findings line up with results reported in Kowalski (2016) on the Oregon Health Insurance Experiment (OHIE). In the OHIE, a lottery defined eligibility for an expansion of Medicaid coverage. Results from the lottery indicate that never takers have less healthcare use than treated compliers and treated compliers in turn have less healthcare use than always takers. Older persons seem to respond more in both the OHIE and in Guthmuller, Jusot and Wittwer (2014). Furthermore, we find high variations in take-up between different regions that cannot be fully accounted for by available background characteristics on each region's population. These regional differences may stem from variations in regional policies and past and present efforts. This reasoning is for example explicitly considered as an identification strategy in Finkelstein (2007) where the impact and take-up of Medicare differs between states because of different and historic private insurance levels. Although this should be corroborated with additional experimental evidence,

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this regional variation suggests that there may be potential to further reduce non-take up of IR in regions with relatively low take-up rates.

Several limitations of our study should be kept in mind. First, the population under consideration is sizeable but also specific. The experiment focuses on a low-income population from which members were excluded that had already been contacted in the recent past or that had taken up the IR in previous actions by regional departments of NACM. As such, a similar intervention may have had a higher impact when no efforts had previously been taken to improve the take-up of of IR. Moreover, because of the distinct membership profile of NACM, the results should not be generalized to the Belgian population. Second, the intervention differed across regions and households. This requires that our results are interpreted as the overall impact of the `proactive flux´. Hence, we are unable to causally identify the effectiveness of different communication and information strategies used in the intervention. Third, we could not directly observe eligibility for those households that did not apply for IR (both among the treated and the non-treated). This implies that the profile of the never takers as well as some of the regression results could look different if the sample would be limited only to eligible households. Hence, there may be some scope to improve on targeting efficiency. Further, this implies that we are unable to determine how many eligible households did not apply for IR. However, the strong regional variation tentatively suggests that non-take up after the intervention in some regions still remains sizeable. Finally, one could wonder whether the effect of the intervention could be higher if NACM faces adverse incentives for increasing take-up of IR. Although health insurers and/or regional departments may be reluctant to proactively contact members to apply for IR, e.g. because the administrative burden may be higher in this population, (financial) incentives for limiting take-up are largely absent. This suggests that if adverse incentives would play a role, the effect would probably be limited.

Apart from these limitations, this study successfully randomized a real-world intervention involving more than 55,000 households in a developed country. We directly observed application and take-up rates of IR and show that non-intrusive interventions can effectively improve the take-up of social benefits in general, and a beneficial health insurance plan in particular. By carrying out the same experiment across regional departments, it is clear that

variations in effectiveness can be substantial, warranting more research on the effectiveness of specific intervention strategies.

Acknowledgements

References

Aizer, A. (2003). Low Take-Up in Medicaid: Does Outreach Matter and for Whom? *The American Economic Review, 93*(2), 238-241.

Aron-Dine, A., Einav, L., & Finkelstein, A. (2013). The RAND health insurance experiment, three decades later. *The Journal of Economic Perspectives, 27*(1), 197-222.

Avalosse, H., Vancorenland, S., & Verniest, R. (2015). De gezondheidsongelijkheid bij CM leden: stilstaan is achteruitgaan. *CM-Informatie, 262*.

Baicker, K., Congdon, W. J., & Mullainathan, S. (2012). Health Insurance Coverage and Take-Up: Lessons from Behavioral Economics. *The Milbank Quarterly, 90*(1), 107-134.

Baird, P., Reardon, L., Cullinan, D., McDermott, D., & Landers, P. (2015). *Reminders to pay: Using Behavioral Economics to Increase Child Support Payments* (OPRE Report 2015-20): Office of Planning, Research and Evaluation.

Bettinger, E. P., Long, B. T., Oreopoulos, P., & Sanbonmatsu, L. (2009). *The role of simplification and information in college decisions: Results from the H&R Block FAFSA experiment*. National Bureau of Economic Research.

Bhargava, S., & Manoli, D. (2015). Psychological frictions and the incomplete take-up of social benefits: Evidence from an IRS field experiment. *The American Economic Review, 105*(11), 3489-3529.

Cameron, A. C., & Trivedi, P. K. (2009). *Microeconometrics using stata* (Vol. 5). Texas: Stata press College Station.

Currie, J. (2004). *The take up of social benefits* (IZA Discussion paper series No. 1103).

De Graeve, D., Van Mechelen, N., Vandelannoote, D., & De Wilde, M. (2013). *Measuring health care expenditures in Belgium : the at-risk-household approach* (Flemosi discussion paper 23).

Dechausay, N., Anzelone, C., & Reardon, L. (2015). *The Power of Prompts: Using Behavioral Insights to Encourage People to Participate* (OPRE Report No. 2015-75). Washington DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Deredactie.be. (2016, October 31). Directere aanmaningsbrief levert fiscus 18 miljoen euro op. Retrieved from http://deredactie.be/cm/vrtnieuws/economie/1.2807919

Farrell, M., Anzelone, C., Cullinan, D., & Wille, J. (2014). *Taking the first step: Using behavioral economics to help incarcerated parents apply for child support order modifications* (OPRE Report No. 2014-37). Washington DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Fellner, G., Sausgruber, R., & Traxler, C. (2013). Testing enforcement strategies in the field: Threat, moral appeal and social information. *Journal of the European Economic Association, 11*(3), 634-660.

Finkelstein, A. (2007). The aggregate effects of health insurance: Evidence from the introduction of Medicare. *The Quarterly Journal of Economics, 122*(1), 1-37.

Finkelstein, A., Taubman, S., Wright, B., Bernstein, M., Gruber, J., Newhouse, J. P., . . . Oregon Health Study Group (2012). The Oregon health insurance experiment: evidence from the first year. *The Quarterly Journal of Economics, 127*(3), 1057-1106.

Goldhaber-Fiebert, J. D., Blumenkranz, E., & Garber, A. M. (2010). *Committing to exercise: contract design for virtuous habit formation* (NBER Working Paper Series No. 16624): National Bureau of Economic Research.

Guthmuller, S., Jusot, F., & Wittwer, J. (2014). Improving Takeup of Health Insurance Program A Social Experiment in France. *Journal of Human resources, 49*(1), 167-194.

Handel, B., & Kolstad, J. (2015). Getting the most from marketplaces: smart policies on health insurance choice. *Brookings Institution, October, 7*.

Handel, B. R., Kolstad, J. T., & Spinnewijn, J. (2015). *Information frictions and adverse selection: policy interventions in health insurance markets* (NBER Working Paper Series No. 21759): National Bureau of Economic Research.

Hernanz, V., Malherbet, F., & Pellizzari, M. (2004). *Take-Up of welfare benefits in OECD countries* (OECD Social, Employment and Migration Working Papers No. 17).

Huysentruyt, M., & Lefevere, E. (2010). Child benefit support and method of payment: evidence from a randomized experiment in Belgium. *American Economic Journal: Economic Policy, 2*(2), 163-184.

Iyengar, S. S., & Lepper, M. R. (2000). When choice is demotivating: Can one desire too much of a good thing? *Journal of personality and social psychology, 79*(6), 995-1006.

Jacobson, T. A., Thomas, D. M., Morton, F. J., Offutt, G., Shevlin, J., & Ray, S. (1999). Use of a low-literacy patient education tool to enhance pneumococcal vaccination rates: a randomized controlled trial. *JAMA, 282*(7), 646-650.

Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, New Jersey: Prentice-Hall.

Karlan, D., McConnell, M., Mullainathan, S., & Zinman, J. (2016). Getting to the top of mind: How reminders increase saving. *Management Science, 62*(12), 3393-3411.

Kaufmann, C., Muller, T., & Boes, S. (2016). *Does personalized information improve health insurance decisions when individuals are distracted?* (Working Paper).

Ketcham, J. D., Lucarelli, C., Miravete, E. J., & Roebuck, M. C. (2012). Sinking, swimming, or learning to swim in Medicare Part D. *The American Economic Review, 102*(6), 2639-2673.

Kling, J. R., Mullainathan, S., Shafir, E., Vermeulen, L., & Wrobel, M. (2012). Comparison friction: Experimental evidence from Medicare drug plans. *Quarterly Journal of Economics, 127*(1), 199-235.

Kowalski, A. E. (2016). *Doing More When You're Running LATE: Applying Marginal Treatment Effect Methods to Examine Treatment Effect Heterogeneity in Experiments* (NBER Working Paper Series No. 22363): National Bureau of Economic Research.

Lantz, P. M., Stencil, D., Lippert, M., Beversdorf, S., Jaros, L., & Remington, P. L. (1995). Breast and cervical cancer screening in a low-income managed care sample: the efficacy of physician letters and phone calls. *American Journal of Public Health, 85*(6), 834-836.

Liebman, J. B., & Luttmer, E. F. (2011). Would people behave differently if they better understood social security? Evidence from a field experiment. *American Economic Journal: Economic Policy, 7*(1), 275-299.

Liebman, J. B., & Zeckhauser, R. (2004). *Schmeduling* Harvard University and NBER.

Luoto, J., Levine, D., & Albert, J. (2011). *Information and persuasion: achieving safe water behaviors in Kenya* (RAND Labor and Population Working Paper Series): RAND Labor and Population.

Madrian, B. C., & Shea, D. F. (2001). The power of suggestion: Inertia in 401 (k) participation and savings behavior. *The Quarterly Journal of Economics, 116*(4), 1149-1187.

Millett, C., Chattopadhyay, A., & Bindman, A. B. (2010). Unhealthy competition: Consequences of health plan choice in California Medicaid. *American Journal of Public Health, 100*(11), 2235-2240.

O'Donoghue, T., & Rabin, M. (1999). Doing it now or later. *American Economic Review, 89*(1), 103-124.

Piette, J. D., Weinberger, M., McPhee, S. J., Mah, C. A., Kraemer, F. B., & Crapo, L. M. (2000). Do automated calls with nurse follow-up improve self-care and glycemic control among vulnerable patients with diabetes? *The American journal of medicine, 108*(1), 20-27.

Schokkaert, E., Van Ourti, T., De Graeve, D., Lecluyse, A., & Van de Voorde, C. (2010). Supplemental health insurance and equality of access in Belgium. *Health economics, 19*(4), 377-395.

Tarozzi, A., Bennear, L., Balasubramanya, S., Pfaff, A., Matin, A., & van Geen, L. (2010). *Subjective Risk Assessment and Reactions to Health-related Information: Evidence from Bangladesh*.

Appendix

Table A1: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
IR	53,474	0.115	0.001	0	1
Man	55,400	0.567	0.002	0	1
Year of Birth	55,400	1959.187	0.056	1907	2004
One Parent HH	55,407	0.005	0.000	0	1
Number of Family Members	55,407	1.664	0.005	1	13
Number of Adults	55,407	1.312	0.002	0	5
Maximum Billing	55,013	0.177	0.002	0	1
Historic expenditures Health Insurer	55,407	2,953.509	29.693	0	284,874.100
Historic expenditures on health care by household	55,407	356.862	2.663	0	13,679.880
Daily Defined Doses (DDD)	55,407	800.259	4.495	0	13,149.300
Days in General Hospital	55,407	3.555	0.060	0	486
Days in Psychiatric Hospital	55,407	0.619	0.047	0	452
Days Unemployed	55,407	29.844	0.365	0	626
Days Sickness	55,407	14.354	0.262	0	625

Table A2: Always Takers, Treated Compliers and Never Takers (take-up of IR), household head and household characteristics, 2 vs waves 4-6.

Variable	Always Takers	Treated Compliers	Never Takers	TC-AT Diff.	TC-AT P-Val.	TC-NT Diff.	TC-NT P-Val.
Man	0.51	0.54	0.58	0.03	0.30	-0.04	0.01
Year of Birth	1956.84	1945.64	1961.58	-11.20	0.00	-15.94	0.00
One parent household	0.01	0.00	0.00	-0.01	0.04	0.00	0.60
Adults	1.33	1.34	1.31	0.01	0.83	0.03	0.07
Family members	1.71	1.51	1.68	-0.20	0.00	-0.17	0.00
Maximum Billing	0.33	0.29	0.15	-0.04	0.08	0.13	0.00
Historic expenditure HI	4833.99	3674.34	2687.75	-1159.65	0.00	986.59	0.00
Historic expenditure by household	527.66	476.94	327.96	-50.72	0.25	148.98	0.00
Daily Defined Doses (DDD)	1108.97	1377.89	681.08	268.92	0.00	696.81	0.00
General Hospitalization	8.84	3.73	3.10	-5.11	0.00	0.63	0.26
Psych. Hospitalization	2.19	-0.56	0.33	-2.75	0.00	-0.90	0.00
Unemployment (days)	53.27	30.85	28.32	-22.42	0.00	2.53	0.42
Sickness (days)	41.77	16.24	13.16	-25.53	0.00	3.08	0.22

Table A3: Always Takers, Treated Compliers and Never Takers (take-up of IR), household head and household characteristics, wave 3 vs waves 4-6.

Variable	Always Takers	Treated Compliers	Never Takers	TC-AT		TC-NT	
				Diff.	P-Val.	Diff.	P-Val.
Man	0.51	0.54	0.57	0.03	0.32	-0.03	0.05
Year of Birth	1956.84	1944.24	1961.28	-12.60	0.00	-17.05	0.00
One parent household	0.01	0.00	0.01	-0.01	0.01	-0.01	0.03
Adults	1.33	1.35	1.30	0.01	0.62	0.05	0.01
Family members	1.71	1.48	1.67	-0.23	0.00	-0.20	0.00
Maximum Billing	0.33	0.30	0.15	-0.03	0.25	0.15	0.00
Historic expenditure HI	4833.99	4079.23	2651.36	-754.77	0.05	1427.87	0.00
Historic expenditure by household	527.66	526.03	327.62	-1.63	0.97	198.41	0.00
Daily Defined Doses (DDD)	1108.97	1521.48	685.53	412.51	0.00	835.95	0.00
General Hospitalization	8.84	4.92	3.18	-3.92	0.00	1.75	0.01
Psych. Hospitalization	2.19	1.40	0.61	-0.80	0.47	0.78	0.23
Unemployment (days)	53.27	32.26	28.86	-21.01	0.00	3.40	0.34
Sickness (days)	41.77	9.25	13.11	-32.52	0.00	-3.86	0.15

Figure A1:Timing of Events: frequency and proportion of households that have applied for/ have been awarded IR across time – Wave 2 compared to Waves 4-6
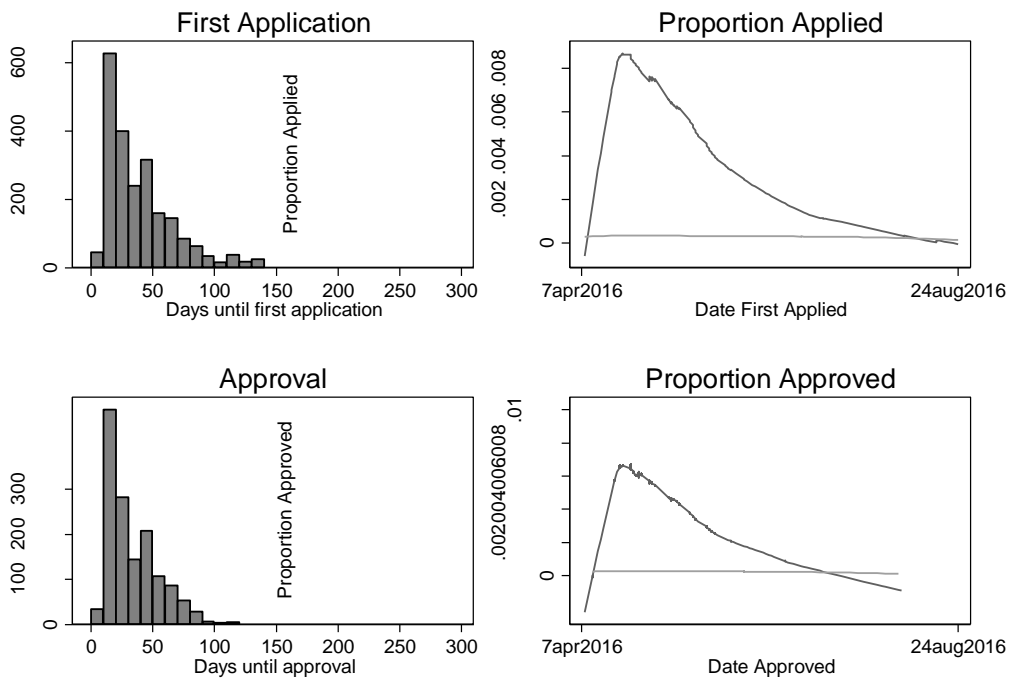

Figure A2:Timing of Events: frequency and proportion of households that have applied for/ have been awarded IR across time – Wave 3 compared to Waves 4-6
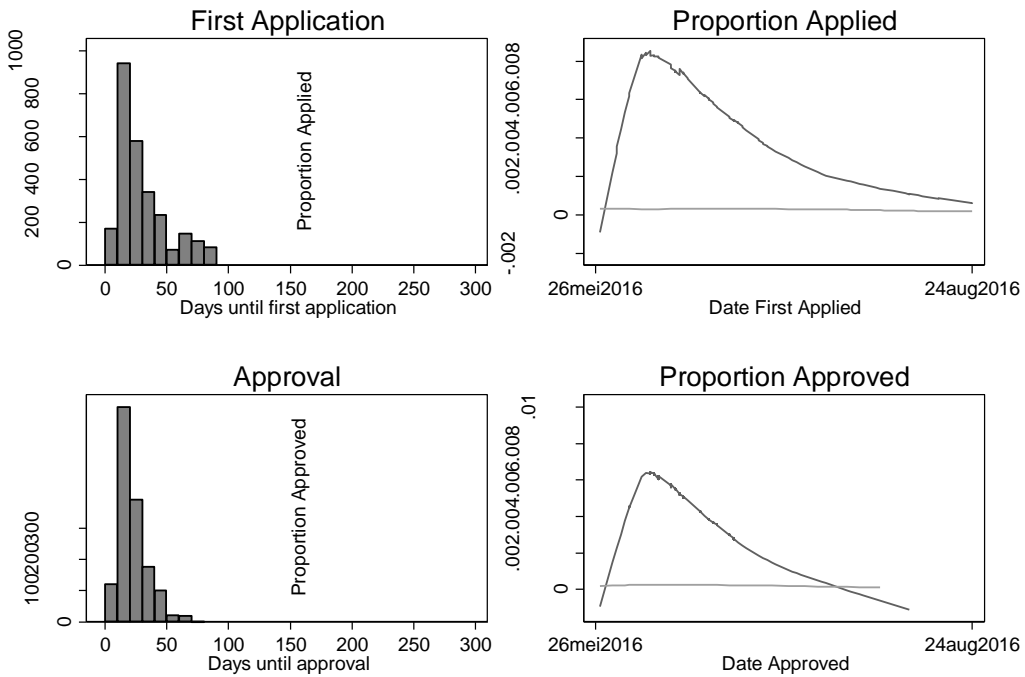
Figure A3: Example Letter:

To X

Date ...

Higher reimbursement for medical expenses

Dear X

According to the information of the Federal Public Service Finance you may be entitled to a higher reimbursement of your medical expenses. This right is called 'the Increased Reimbursement'.

Please find attached more information about the benefits of an 'Increased Reimbursement'.

You are eligible when your gross taxable household income for 2014 is less than 17 303,80 euros. For every additional household member, you may add 3203,40 euros to this amount.

CM would like to assist you with your application. Using below contact details, you can easily make an appointment to take care of your application together.

Best regards

Mr/Ms. Y
Managing Director

For more information, please contact our contact centre, 03 221 93 39, antwerpen@cm.be.

Figure A4: Example Flyer

The increased Reimbursement

Do you have a low income? Then you may be entitled to the increased reimbursement. With an increased reimbursement you pay less for healthcare but also for the train or bus.

What are the benefits?

You pay less

- ✓ For the doctor, dentist or physiotherapist, ...
- ✓ For some medicines
- ✓ In the hospital and rehabilitation centres
- ✓ For Flemish Health Insurance (25 instead of 50 euros)
- ✓ For the train and bus
- ✓ For your telephone and mobile phone
- ✓ For holidays with Kazou and Samana
- ✓ For information sessions and courses of CM on health

CHRISTELIJKE MUTUALITEIT

What should you do?

Make an appointment:

- Call 03 221 93 39
- Mail to antwerpen@cm.be
- Or pass by the nearest CM-office in your area

A CM-consultant will take care of your application.

Which documents do you bring?

- Most recent tax form on personal income tax
- Wage bills
- Bank accounts of all pensions (also foreign pensions)
- Bank accounts or evidence from interests, extra-legal pension, industrial accident, occupational disease
- Proof of payment of group and life insurance, pension savings
- Tax bill property tax showing the cadastral income
- Evidence of movable assets (assets, shares ...)
- Evidence of all other income (payment of employment benefit, end-of-the-year bonus, holiday bonus, alimony ...).

Please also bring your electronic ID and PIN number.

CHRISTELIJKE MUTUALITEIT

CM. Hoe gaat het met u?