Making Sense of Oil Stamp Saving Schemes

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January 2012

CWPE 1203 & EPRG 1202

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January 7, 2012

Abstract

An increasing number of households in Northern Ireland has started to collect oil stamps in recent years – i.e. small pieces of paper which can be purchased at specified outlets, collected on an oil stamps savings card, and used to pay in full or part for one's oil bill. In this paper, we explore why this is.

After ruling out high costs associated with more conventional savings vehicles (such as bank accounts) and the notion that oil stamps serve some purpose other than saving for heating oil as possible explanations, we test two main hypotheses: i) oil stamps as 'self-control' mechanism and ii) oil stamps as 'other-control' mechanism.

While we find little evidence for the first hypothesis, we do find evidence for the second one. More specifically, we find that collecting oil stamps is strongly correlated with differences in views among household members with regard to how much priority to give to saving for heating oil. To rule out 'salience effects' as an alternative explanation, we test whether oil stamps increase households' savings performance. We find that they do.

1 Introduction

In recent years, an increasing number of households in Northern Ireland has started to collect oil stamps.

Oil stamps (typically) cost £5 per stamp and can be purchased at specified outlets.[1] The way the stamps are supposed to work is that households purchase them on a regular basis over the course of a year; collect them on oil stamps savings cards; and then use them towards the payment – in full or part – of their oil bills.

The main oil stamp programmes are run by local councils. Each council runs its own programme (with its own stamps and savings cards). The first programme was launched in Ballymena in July 2005 by St Vincent de Paul – a voluntary organisation with the aim to help people in need. Following the positive response to the programme in Ballymena a number of neighbouring councils launched similar schemes.[2]

Not all local authorities keep track of who purchases oil stamps. A rough estimate is that every year between 1,000 and 2,000 households collect oil stamps in Northern Ireland.[3] This is still a small fraction of eligible households (approximately 1%) – but an increasing one. In addition – as we will discuss in more detail later – households collecting oil stamps make up a considerable fraction of economically weak households.

What is interesting about the oil stamps is that they are hard to make sense of in a traditional economic framework. After all households that collect oil stamps to save for heating oil could just as well use a bank account to do so. Using a bank account would have the advantage that households earn interest on their savings. In addition, their savings would be safe and could be used for things other than heating oil (e.g. in case of an emergency).

Of course, bank accounts come with costs: in a survey among households collecting oil stamps,[4] we find that 7.5% of these households do not have a bank account. Similarly, for 36% of households collecting oil stamps, the nearest

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[1] See e.g. Belfast Council (2009)

[2] These include: Antrim; Ballymoney; Belfast; Coleraine; Cookstown; Magherafelt; Moyle; Newtownabbey.

[3] Using sales data from the Belfast area and the average top-up amount stated in our survey, we can estimate that approximately 600 households collect oil stamps in the Belfast area - which corresponds to about 1% of low-income households (which we proxy by means of socio-economic status in the Northern Ireland Census). Assuming that in the other council areas the same share of low-income households collect oil stamps, we get that approximately 1,500 households collect oil stamps.

[4] The survey will be discussed in more detail later.

branch of their bank is more than 2 miles further away than the nearest outlet selling oil stamps. For these (two groups of) households, it may simply be less expensive/more convenient to collect oil stamps than to use a bank account.

However, even if costs can explain (in principle) why some households do not use a bank account to save for the purchase of heating oil, it cannot explain why they should use oil stamps instead. The reason is that these households could just as well save by collecting money in a cookie jar or a night drawer: this would have the advantage that they do not have to go through the hassle of collecting oil stamps. In addition, it would allow them to use their savings for things other than heating oil.

A different way to make sense of oils stamps (in a traditional economic framework) is by arguing that – rather than using them as a savings vehicle – households consider the stamps as an elegant way to help friends/family towards the payment of their fuel bills without having to give them cash.[5] The problem with this argument is that approximately 94% of households in our sample report that they collect the stamps for their own use.

What is more, 83% of households state that they collect oil stamps over the entire course of a year – purchasing stamps once a week (worth typically £10). If households used oil stamps for some reason other than to save (e.g. as a gift), there would be no reason why they should collect the stamps over the entire course of an year (rather than purchasing them all at once).[6]

In this paper, we make a first step towards better understanding why households collect oil stamps. The paper is organised as follows: In the first part, we provide some background information on who uses oil stamps. The second part discusses the idea that households use oil stamps as a 'self control' mechanism. The third part discusses the idea of oil stamps as an 'other-control' mechanism. In the fourth part, we evaluate the effectiveness of the stamps in terms of helping households to afford heating oil. The final part concludes – and draws out several policy implications.

2   Background

In this section, we provide some background information on who uses oil stamps in Northern Ireland.

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[5] See Waldfogel (1993)

[6] Again, if households wanted to save for the purchase of the stamps – they could use a bank account/cookie jar.

2.1 A Note on the data

To find out more about who uses oil stamps – and why – we surveyed customers in outlets selling oil stamps across five councils with oil stamp savings programmes: Antrim; Ballymoney; Coleraine; Magherafelt; and Newtownabbey.[7]

The programmes in the five councils were introduced between 2007 and 2010. They are similar to most other oil stamp programmes in Northern Ireland: oil stamps cost £5 per stamp; they can be purchased at specified outlets; and used towards payment – in full or part – of one's oil bill. The stamps are non-refundable and can only be used for the purchase of heating oil. If the stamps are lost or stolen, the councils are not liable.

To minimise administrative costs, we focused on the 3-5 most active outlets in each council area. Recruiting respondents solely from these outlets may have led to a selection bias. To the extent, however, that these outlets account for more than 90% of oil stamp sales and cover all major areas in the five councils, there is little reason to expect significant differences between our analysis and an analysis including (also) non-participating outlets.

Our survey was aimed at all customers shopping in one (or more) of the participating outlets (i.e. customers collecting oil stamps and customers not collecting oil stamps). The idea was to use customers not collecting oil stamps as a 'comparison group'.[8] The advantage is that – unlike a random sample of households for example – these households come from the same environment and are recruited in the same way as our 'treatment group' (which will be important for our regression analysis later).[9]

Customers could submit their survey between 1 April 2011 and 15 May 2011 and 15 July 2011 and 31 August 2011. All customers that completed the survey were included in a lottery to win one of 6 prizes with a total value of £600.[10] In total we received 202 completed surveys – 54 from customers collecting oil

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[7] The survey was developed in collaboration with Power NI and the five councils. It was administered by Power NI. The outlets included: Magherafelt Council: Swatragh post office; Ballinascreen credit union and Clady post office. Antrim Council: Vivo in Tommebridge; Mace shop Randalstown and Credit Union in Antrim. Coleraine Council: Spar Castlerock road; Coleraine; Portstewart post office and Portrush post office. Ballmoney Council: Cloughmills post office; Rasharkin post office and Supervalu in Ballymoney. Newtownabbey Council: Burnside Stores; Monkstown Community Forum; McMillan's News; Mossley Mill Reception; Sixmile Leisure Centre; Spar; The Paper Shop; Valley Leisure Centre; Morrow's XL Stop & Shop.

[8] Customers not collecting oil stamps were given the exact same survey as customers collecting oil stamps.

[9] See e.g. Smith and Todd (2005)

[10] Outlets were incentivised by either: i) £1 per returned survey or ii) a lump sum of £10. All incentives were paid by Power NI.

stamps and 148 (2) from customers not collecting oil stamps (from customers having stopped to collect oil stamps, respectively).[11]

2.2 Who uses the Stamps?

Table 1 below provides summary statistics for households collecting oil stamps (column 1); households shopping in one (or more) of the outlets selling oil stamps but not collecting oil stamps (column 2) and a representative sample of households (column 3)

Information on the third group comes from the 2009 Northern Ireland Continuous Households Survey. It is interesting because it allows us to compare the average household collecting oil stamps in our sample to the average household in Northern Ireland.

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[11] Using the same approach as before to approximate the number of households collecting oil stamps, we estimate that in the five councils approximately 520 households collect oil stamps. Given that almost all of them collected oil stamps at least once between 1 April and 15 May and 15 July and 31 August, this suggests a response rate for our survey of approximately 37%.

Variable	Oil Stamp	Non-Oil Stamp	p-value (diff.)	NI total	p-value (diff.)
Number of Obs.	54	148		2,632	
Age	52.70	54.65	0.43	50.94	0.85
	(14.10)	(15.55)		(18.27)	
Gender	0.70	0.62	0.32	X	X
(Female=1)	(0.46)	(0.49)		(X)	
Marital status	0.08	0.17	0.09	0.52	<0.01
(Single=1)	(0.27)	(0.38)		(0.50)	
Empl. status	0.40	0.55	0.06	0.48	0.23
(Empl.=1)	(0.49)	(0.50)		(0.50)	
Income	15,423	18,32	0.13	22,104	<0.01
(Annual gross)	(10,423)	(12,42)		(23,912)	
Education	0.09	0.23	0.03	0.11	0.68
(Higher=1)	(0.30)	(0.42)		(0.32)	
Number Adults	2.08	2.23	0.40	1.99	0.51
	(1.01)	(1.15)		(0.96)	
Number Children	0.75	0.51	0.16	0.55	0.15
	(1.18)	(0.94)		(0.98)	
Type of building	0.89	0.93	0.29	0.93	0.99
(House=1)	(0.32)	(0.25)		0.26)	
Detached	0.19	0.51	<0.01	0.61	<0.01
(Detached=1)	(0.39)	(0.50)		(0.49)	
Ownership	0.70	0.74	0.59	0.67	0.18
(Own house=1)	(0.46)	(0.44)		(0.47)	

Table1:Descriptive Statistics

The table reveals several pronounced differences between households collecting oil stamps and those 'just' shopping in one (or more) of the outlets: households collecting oil stamps are more likely to be married (or live with a partner); less likely to be employed; and they tend to be poorer than households 'just' shopping in one (or more) of the outlets.

The differences between households collecting oil stamps and our representative sample of households are even more pronounced: for example, while 92%

of households collecting oil stamps (in our sample) report being married/living with a partner, the corresponding share at the national level is 48%. Similarly, while the average annual (gross) income of households collecting oil stamps is £15,400, the average household income in Northern Ireland is £22,100.[12]

3 Self-Control Problems and Oil Stamps

In this part of the paper, we test our first hypothesis why households use oil stamps – which is oil stamps as a 'self-control' mechanism.

3.1 Intuition

One possible explanation why households use oil stamps is that they suffer from self-control problems: the idea is that the stamps allow households to remove the temptation of permanently available cash while they are saving (and so to cope with self-control problems).

According to traditional economic theory small-to-big transformations of money are straightforward: individuals simply save the cash they come by until they have accumulated enough to purchase whatever they are saving for (such as heating oil).

The psychology of planning and self-control, however, suggests that such savings may often be more difficult than traditional theory is prone to assume. The reason is that an individual saving over a longer period has large amounts of cash continuously accessible. And accessible cash can be extremely tempting and thus easy to spend on things that are mostly valued at the moment of spending.[13]

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[12]To ensure comparability between the surveys, we stuck as closely as possible to the phrasing of the questions in the CHS. Assuming the same distribution of incomes at the council level as at the national level, households collecting oil stamps make up approximately 7% of economically weak households (with an income below the median) and 11% of economically very weak households (with an income in the bottom quartile of all incomes).

[13]The iconic study of temptation is the famous 'marshmallow test' of Mischel and Ebbeson (1970), which in-vestigated the propensity of four-year-old children to delay gratification. In the experiment, the researchers offered each child (in the absence of other children) the choice between taking one marshmallow immediately or waiting fifteen minutes for a reward of two marshmallows. A few children actually did wait the entire fifteen minutes until the researchers returned without the child's signal, while others opted for the early reward almost immediately. Most interestingly, a third group of children waited significant periods of time before deciding to give up on the reward and taking the one marshmallow already offered. As Houser and Reiley (2008) point out, this third subset of subjects displayed a systematic deviation from economic rationality: according to standard economic models of maximising present discounted values of consumption a rational agent should either eat the marshmallow

It is easy to see – on an intuitive level – how such temptation can give households a strong incentive to use oil stamps (rather than a bank account or a cookie jar/night drawer) to save for the purchase of heating oil: because oil stamps are non-refundable and can only be used for the purchase of heating oil, they allow households to prevent themselves from spending their savings on anything else but heating oil.

3.2 A Simple Model

Gul and Pesendorfer (2001) were the first to provide foundations for a model of temptation and self-control which captures this logic. The basic idea of their model is to attribute two preference orderings to each individual:

An individual has a 'temptation preference' that captures her immediate desires and a 'normative preference' that captures her view of what choice she should make, that is, her view of what is best for her welfare (like saving for heating oil).

Formally, the individual's preferences take the following form:

$$W(A) = \max_{x \in A} u(x) + v(x) - \max_{y \in A} v(y) \ (1)$$

where both u and v are von Neumann Morgenstern utility functions. The functions u and v describe the individual's normative preferences and temptation preferences, respectively.

In Gul and Pesendorfer's model, an individual is said to experience temptation when her desires conflict with her judgement regarding the best course of action – that is, when her temptation preferences conflict with her normative preferences. She is said to have self-control problems when she cannot always resist the desires she judges to be 'bad' – that is, when her choices do not necessarily reflect her normative preferences.

One important implication of Gul and Pesendorfer's model is that – under certain conditions – an individual will have an incentive to reduce her choice set. To see this, consider the following example: suppose that there are two options

right away or else wait the entire period for the promised reward. In case of the third group, however, the children demonstrated an initial preference for delaying grati-fication to receive the larger consumption bundle, but then switched their decision – earning nothing for the time they had spent waiting. Mischel and Ebbeson (1970) interpreted this behaviour as the result of temptation – which is an individual's immediate desire (that can be in conflict with her judgement regarding the best course of action as in the case of the children who knew that it would be better to wait a bit). A large body of literature following Mischel and Ebbeson (1970) found similar 'irrational' behaviour among adults. See Frederick et al (2002); Loewenstein et al (2003); and Trope and Fishbach (2007) for recent reviews of the literature.

an individual can choose from: 'saving for heating oil' (s) and 'some other use of household savings' (o) – and that the individual prefers 's' to 'o', but that 'o' is tempting to her. That is, suppose $u(s) \succ u(b)$ and $v(b) \succ v(s)$.

In such a situation, the individual will prefer not to have 'o' in her choice set: confronted with the choice set $\{s, o\}$, she will either succumb to temptation and choose 'some other use of household savings'; or if she resists temptation, she will have to incur a psychological cost in the process. Anticipating these possibilities, the individual is better off if she restricts her choice set from the outset – and 'locks up' her savings (e.g. by means of oil stamps).

Formally, if the individual gives in to her temptation and chooses 'some other use of household savings' her utility is given by $u(o)$. Because $u(o) \prec u(s)$ she is better off if she commits to the smaller menu $\{s\}$ from the start. Similarly, if the individual chooses to 'save for heating oil': her utility is given by $u(s) + (v(o) - v(s))$. That is, her utility is the 'normative' value of 'saving for heating oil' less the difference in temptation values between the chosen option and the most tempting one.

Because the last term must be negative, it is always the case that $u(s) \succeq u(s; o)$. That is, it is always the case that the decision maker is better off to choose from the smaller menu $\{s\}$.

3.3 Testing for Self-Control Problems

One way to test whether households use oil stamps to deal with temptation and self-control problems is by checking whether – all else equal – individuals reporting temptation and self-control problems are more likely to collect oil stamps.

We implement this test by regressing whether an individual uses oil stamps on a measure of self-control problems (and a set of controls). To get a more detailed picture of the relationship between collecting oil stamps/not collecting oil stamps and self-control problems, we use a multinomial logit (MNL) framework for our test.

The advantage of a MNL framework is that it allows us to take into account several 'levels of engagement' with respect to oil stamps: 'never thought about collecting oil stamps'; 'thinking about collecting them'; and 'collecting them'. Formally, our model takes the following form:

$$OS_i = SC_i \alpha_1 + X_i \alpha_2 + \varepsilon_i \ (2)$$

where OS_i captures household i's 'level of engagement'; SC_i represents our measure of self control problems; and X_i is a vector of demographic and economic characteristics; ε_i is an error term.

3.4 Measuring Self-Control Problems

A challenge when it comes to implementing this test is: how to measure temptation and self-control problems?

We use an approach suggested by Ameriks et al (2007) to deal with this problem. The idea is to present individuals with (a version of) the following hypothetical scenario:

> "Suppose that you win 10 vouchers, each of which can be used for an evening out. On each such evening, you and a companion will get an unlimited budget for food and drinks at a place of your choosing. There will be no cost to you. The vouchers are available for immediate use, starting today and there is an absolute guarantee that they will be honoured by any place you select, if they are used within the next two years. However, if they are not used within this two year period, any vouchers that remain are valueless."

and then to ask them: how many of the vouchers would you ideally like to use in the first year? how tempted would you be to depart from this ideal? and what do you expect would you do in practice? We can then take the gap between expected and ideal consumption (EI Gap) as a measure of self-control problems.[14]

Table 2 below shows the distribution of this measure of self-control in our sample.

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[14] A simple special case serves to clarify the workings of the model. Let u and v be logarithmic - such that: $u(c_1; c_2) = i \ln(c_1) + (1-i) \ln(c_2)$; $v(c_1; c_2) = \lambda[\tau \ln(c_1) + (1-\tau) \ln(c_2)]$; with $0 < i$, $\tau < 1$, and $\lambda \geq 0$. In this case, the consumption profile most preferred by the individual as a singleton choice set involves consuming proportion i of the resource in the first period. On the other hand, with a larger choice set there is a temptation to consume a higher proportion τ in the first period. With $A = \Gamma(W)$, the actual choice is a compromise between these two functions, giving weight $\frac{\lambda}{1+\lambda}$ to the temptation as opposed to the ideal choice. The actual proportion of wealth consumed in period 1 is therefore: $a = [\frac{1}{1+\lambda}]i + [\frac{\lambda}{1+\lambda}]\tau$. Our specific interest is in the level of self-control. This can be identified as the difference between the actual and the ideal proportion of wealth consumed in period 1: $a - i = (\frac{\lambda}{1+\lambda})(\tau - i)$. Our questions aim at measuring this self-control parameter.

EI Gap	EI Gap – number	EI Gap – percent
9	0	0
8	0	0
7	0	0
6	0	0
5	4	2.30
4	1	0.57
3	1	0.57
2	7	4.02
1	13	7.47
0	117	67.24
-1	5	2.87
-2	5	2.87
-3	5	2.87
-4	6	3.45
-5	9	5.17
-6	1	0.57
-7	0	0
-8	0	0
-9	0	0
All	174	100

Table 2:Distribution EI Gap

The table shows that 67 in every 100 respondents have an EI gap of zero – corresponding to them having no self-control problem. It also shows that of those with a non-zero EI gap and a measured problem of self-control, roughly half expect to use fewer than their ideal number of certificates in the 1st year and half expect to use more than their ideal number.

3.5 Analysis Self-Control Problems

Table 3 below shows the results from our estimation of (2) – after adjusting for possible problems of censoring with regard to our self-control variable.[15]

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[15] One problem with our estimation is that our measure of self-control is censored. A simple example can help to see why: Consider two individuals with identical self-control problems but different ideal levels of consumption. Individual A wishes ideally to consume 3 meals this year in order to anticipate next year's meals with all the more pleasure. Taking account of her self-control problem, she expects to consume 7. Individual B is keener than is A to try new restaurants sooner rather than later, and picks an ideal 1st year consumption level of 9.

Category	Variable	Coefficient	Simul. Probability
	EI Gap	0.09	0.23
		(0.13)	(0.22)
Thinking About Collecting Oil Stamps	Income	-0.15	0.003
		(0.12)	(0.08)
	Income not stated	-1.52*	-0.10
		(0.87)	(0.10)
	EI Gap	-0.08	-0.26
		(0.11)	(0.24)
Collecting Oil Stamps	Income	-0.29**	-0.23**
		(0.11)	(0.11)
	Income not stated	-2.67***	-0.32***
		(0.80)	(0.08)

Table 3:Temptation Preferences - Statistically Significant at 1% ***; 5% **; 10% *.

To facilitate interpretation, column (3) provides the results from a series of simple Monte Carlo simulations approximating the change in predicted probabilities in our dependent variable – i.e. households' level of engagement – associated with a change in each variable from the 25th percentile to the 75th percentile in case of a continuous variable; from 0 to 1 in case of a dummy variable, respectively.[16]

Our findings suggest that – holding all other variables at their mean; at zero respectively: a change in the EI Gap from its minimum to its maximum[17] is associated with an increase in the predicted probability to think about collecting oil stamps by 23 percentage points and a decrease (rather than increase) in the predicted probability to collect oil stamps by 26 percentage points.[18]

Given her self-control problem she expects to consume all 10 in year 1. In this example, even though A and B have identical self-control problems, our survey fails to pick this up. A's EI gap is measured as 4, while B's is measured as 1. The corner constraint has censored our observations of B's self-control problem. We deal with this problem as follows: i) We first estimate the distribution of our self-control score conditional on a set of covariates; ii) We then replace each censored observation with a draw from this distribution and estimate our main regression (2); iii) We repeat this procedure several times and take as our estimate of α_1 the average of the different estimates.

[16] We use the procedure suggested by Tomz et al (2001).

[17] We use the minimum and maximum (instead of the 25th and 75th percentile) because of the large number of zeros in our sample.

[18] One way to think about this is in terms of partial sophistication (see e.g. O'Donoghue and Rabin, 1999): According to this view, we can imagine a respondent who is sophisticated

The table also shows, however, that neither of these estimates is statistically significant at any of the conventional levels – which means that we cannot reject the null-hypothesis that temptation preferences and self-control problems have no effect on households' level of engagement with respect to oil stamps.

3.6 Robustness Test

There are several possible explanations why we do not find a statistically significant relationship between households' self-control problems and their level of engagement – other than the absence of such a relationship:

First, self-control problems with respect to the timing of having a meal out may not be a good proxy for self-control problems with respect to saving for heating oil. The problem is: the same measure of self-control has been successfully applied to a series of problems in equally unrelated contexts – ranging from wealth accumulation to wealth composition to class performance at university (see Ameriks; 2007; and Wong, 2007).

In the same vein, various studies have shown that self-control problems are remarkably stable across contexts (and time): Mischel et al, 1988 and Duckworth et al (2005) find, for example, that self-control problems in pre-school children when it comes to eating sweets are highly correlated with self-control problems of the same individuals 10-15 years later – when it comes to academic work; financial planning; and social engagement.

A second possible explanation why we do not find a strong correlation between our measure of self-control problems and households' level of engagement is confusion: if respondents misunderstood our questions and so did not answer them correctly, the EI gap may not reflect their true level of self-control problems. The same is true if the food vouchers do/did not mean anything to them.

To test for these possibilities, we excluded all observations in our dataset where households seem to have mis-understood our questions and/or stated a zero valuation of the vouchers. In total, we excluded 14 observations in the process. Table 4 shows the results from our analysis – using only 'consistent/ meaningful responses'.[19]

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enough to realize a commitment device would help someone like him/her, but not sophisticated enough to follow through with the idea of using it. These "partially-naïve", or "partially-sophisticated" respondents, would think about using oil-stamps but not actually use them.

[19]We excluded all observations where households stated a high (low) level of temptation when asked about their temptation directly – but a lower (higher) than ideal use of food vouchers under temptation when asked about the number of vouchers they would want to

Category	Variable	Coefficient	Simul. Probability
	EI Gap	0.18	0.29
		(0.17)	(0.25)
Thinking About	Income	-0.05	0.03
Collecting Oil		(0.13)	(0.08)
Stamps	Income not stated	-0.84	-0.02
		(0.91)	(0.13)
	EI Gap	-0.04	-0.19
		(0.15)	(0.28)
Collecting Oil	Income	-0.20*	-0.17*
Stamps		(0.12)	(0.10)
	Income not stated	-2.38***	-0.31***
		(0.86)	(0.09)

Table 4:Robustness Test Temptation Preferences - Statistically Significant at 1% ***; 5% **; 10% *.

What we find is that – even after removing responses from our dataset which come from respondents who seem to have misunderstood our questions and/or stated a zero willingness to pay for the vouchers – we are not able to detect a statistically significant relationship between self-control problems and households' level of engagement with respect to oil stamps. This suggests that self-control problems are unlikely to be at the core of why households collect oil stamps.[20]

4   Other-Control Problems and Oil Stamps

In this part of the paper, we test our second hypothesis why households use oil stamps to save for the purchase of heating oil – which is oil stamps as an other-control mechanism.

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consume in the first year. In addition, we excluded all respondents from our sample who answered 'nothing' or 'zero' to the question: "How much would you be willing to pay for the ten vouchers?"

[20] It is possible that our sample size is too small to detect a statistically significant relationship between our measure of self-control problems and households' level of engagement in a MNL framework. To test if this is really the case, we re-estimated (2) using a simple logit framework - but could not detect a statistically signficant relationship either. See Appendix A for details.

4.1 Intuition

An alternative explanation why households might use oil stamps is: 'other control' problems.

Traditionally, economic theory assumes that households act as if they were a single entity with all members having shared preferences. Research in sociology (and more recently in economics) suggests, however, that individuals in the same household often have diverse and conflicting preferences (see, e.g. Dwyer and Bruce, 1988; Ashraf, 2009).

It is easy to see – on an intuitive level – how such differences in preferences can make oil stamps an attractive option for some households/household members to save for heating oil: since oil stamps are non-refundable and can only be used for the purchase of heating oil, they allow households to protect their savings from 'misuse' by members of the household with lower preferences for saving for heating oil.

4.2 A Simple Model

Conceputally the ideas of 'self-control' and 'other-control' are very similar – which is why we can lay them out within the same formal framework:

Suppose there are two options a household can choose from: 'saving for heating oil' and 'some other use of household savings'. Further, suppose that households are composed of two individuals: husband and wife. While both value 'saving for heating oil' only one, the husband, generates utility from 'some other use of household savings'.

$$W(A) = \max_{x \in A} u(x) + v(x) - \max_{y \in A} v(y) \ (3)$$

Given these assumptions and assuming that husbands and wives decide jointly about their consumption, equation (3) can be (re-)interpreted as follows: households choose consumption so as to maximise a compromise between the wife's and the husband's preferences (u and v) – where the relative power of each preference ranking depends on the relative scale of u and v.[21]

It follows from the same logic as before that – under certain conditions – it will be in the interest of households to exclude the option of spending their savings on 'some other use' from their choice set. The intuition is that – although it may be the preferred option for the household to save for heating

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[21] For instance, increasing the relative scale of u (e.g. by multiplying it by a constant number $\alpha > 1$) increases the wife's 'decision power'.

oil and avoid 'some other use of saving' – one household member may still be better off individually by taking the money and using it for 'some other use'.

4.3   Related Literature

Although conceptually very similar, it is important to keep the two concepts distinct:

- First of all, 'self-control' and 'other-control' may apply in very different circumstances (such as saving for heating oil).

- Secondly, they may require very different policy responses: while we know a lot about commitment savings devices in the context of 'self-control' problems, for example, little is known about the effectiveness of these devices in the context of 'other control' problems.[22]

A signficant body of literature suggests that 'other-control' problems are wide-spread: several studies have found for example that economic opportunities for females – by enhancing their relative bargaining power within the household – tend to lead to higher spending on goods for children and for general household consumption.[23]

The notion that one partner 'locks up' cash to prevent the other one(s) from 'misusing' it too features in several papers – providing additional evidence that 'other-control' problems are wide-spread: Mayoux and Anand (1995), in their study of women in 'Rotating Savings and Credit Associations' (roscas) in South India argue, for example, that the main reason why women use roscas is to increase their control over resources.[24]

The struggle of women to protect their (household) savings from the irresponsible spending of their husbands extends to other institutions: In their study of informal lending institutions in Bangldesh, Goetz and Sen Gupta (1996) argue, for example, that informal credit exchanges between women often take the form of loans in kind, particularly rice, as women are able to retain control over this resource and can often bring it into the household without alerting male household members.

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[22] This includes possible unintended consequences. In addition, we know how to best communicate a policy response to 'other-control' problems.

[23] Hashemi et al (1996) find, for example, that credit programs aimed at poor rural women (as opposed to men) tend to lead to significantly higher general household consumption (see also Folbre, 1986; Sen, 1990; Duflo and Udry, 2004).

[24] Hospes (1995) and Anderson et al (2002) note a similar rationale for roscas among urban women in Indonesia and Kenya, respectively.

Our hypothesis – that oil stamps act as an 'other-control' mechanism – builds directly on these studies and extends the previous literature in several ways: our analysis is – to the best of our knowledge – the first econometric analysis that tests for 'other-control' problems directly; it is the first test for 'other-control' problems in the context of household energy use; and the first evaluation of the effectiveness of a commitment savings device in the context of 'other-control' problems.[25]

4.4   Descriptive Evidence

The idea that oil stamps serve as an 'other-control' mechanism has some a priori appeal:

First, customers collecting oil stamps are significantly more likely to be married or to live with a partner: while 92% of customers collecting oil stamps in our sample are married or live with a partner, the corresponding share among customers just shopping at one (or more) of the outlets is 82%.

Second, the households in our sample which collect oil stamps in one (or more) of the five councils have all the characteristics (implied by our model) which give them an incentive to remove 'some other use of household saving' from their choice set.

The conditions are:

1. the household member collecting oil stamps prefers saving for heating oil over 'some other use of household savings';

2. his/her partner 'prefers some other use of household savings' over saving for heating oil; and

3. the first household member's utility weighs more heavily/he/she has a stronger bargaining position than his/her partner.

The right hand side of Figure 2a shows that in approximately 40% of households, the household member collecting oil stamps reports that he/she gives higher or much higher priority to saving for heating oil than his/her partner. This is in line with conditions 1) and 2).

The differences in priority among household members are not common: the left hand side of Figure 2a shows that the share of household members stating

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[25] Our focus here is only on the (direct) effect of improving households' savings performance.

that they give higher or much higher priority to saving for heating oil is significantly lower among households which do not collect oil stamps than among households which do collect oil stamps – 31% vs 41%.
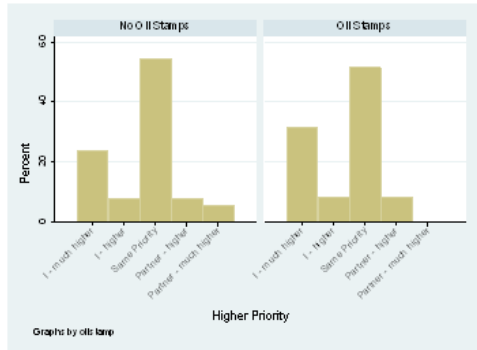

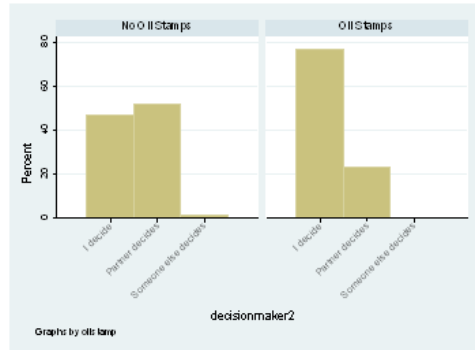Figure 2a: Who gives higher priority to saving for oil?

Figure 2b: Who tends to decide on when to buy exp. things?

The right hand side of Figure 2b shows that in 77% of households the household member collecting oil stamps is also the person 'who decides on when to buy expensive things for expenses other than heating'.[26] To the extent that we take 'who is in charge' as a proxy for whose utility tends to weigh more heavily /who tends to have a stronger bargaining position, this finding is in line with condition 3) of our simple model.

The distribution of bargaining power among household members in households collecting oil stamps is again not common: the left hand side of Figure 2b shows that the share of households in which the person shopping in one (or more) of the outlets 'decides on when to buy expensive things' is significantly lower for households which do not collect oil stamps than for households which do – 47% vs 77%.[27]

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[26] We used a tie breaker: if respondents replied that both decide, we asked them: who decides more often?

[27] What gives the idea that oil stamps serve as an 'other control' mechanism additional a priori appeal is that the characteristics implied by our simple model are particularly pronounced among households where a female household member collects oil stamps. The idea is that – because they tend to be physically weaker (see e.g. Folbre, 1986; Lundberg et al, 1996) – women (in low-income households) often have to be more creative when it comes to asserting themselves in the light of divergent preferences – which suggests that they should be more likely than men to use oil stamps as an 'other control' mechanism. What we find is that female household members collecting oil stamps are much more likely to state that they give higher or much higher priority to saving for heating oil than female household members just shopping at one or more of the outlets selling oil stamps (42% vs 25%). In addition, these women are much more likely to be the ones 'who decide on when to buy expensive things for expenses other than heating' (85% vs 61%).

4.5 Testing for Other Control

One way to test our hypothesis that oil stamps serve as an 'other-control' mechanism more formally is by checking whether (holding all else equal) households that satisfy conditions 1)-3) are more likely to use oil stamps.

We implement this test by regressing households' level of engagement on an interaction term between two variables: the first variable takes a value of '1' if the household member shopping in one (or more) of the outlets 'gives higher priority to saving for heating oil' and '0' otherwise; the second variable takes a value of '1' if the same household member 'tends to decide on when to buy expensive things' and '0' otherwise.

The interaction between the two variables then takes a value of '1' if the household member shopping in one (or more) of the outlets 'gives higher priority to saving for heating oil' and also 'tends to decide on when to buy expensive things' and '0' otherwise. Regressing households' level of engagement on this interaction, thus, allows us to test for a relationship between satisfying conditions 1)-3) and (thinking about) collecting oil stamps.

To control for the effect when the household member collecting oil stamps 'gives higher priority' to saving or has a stronger bargaining position – but not both – we also include the two variables from our interaction term in our regression analysis individually. In addition, to control for differences in demographic and economic characteristics across households, we include a set of background variables in our regression analysis.

Our model takes the following form:

$$OS_i = HP_i * DM_i\beta_1 + HP_i\beta_2 + DM_i\beta_3 + X_i\beta_4 + \varepsilon_i \ (4)$$

where OS_i captures household i's 'level of engagement'. $HP_i * DM_i$ represents our interaction term (capturing whether a household satisfies the main conditions implied by our model); HP_i and DM_i represent the two variables from our interaction term separately; X_i is a vector of background variables and ε_i an error term.

4.6 Analysis Other Control

Table 5 shows the results from estimating (4).[28]

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[28] Using the same multinomial logit specification as before.

Category	Variable	Coefficient	Simul. Probability
	Interaction	0.35	0.08
		(0.89)	(0.13)
	Higher Priority	0.11	0.08
		(0.64)	(0.13)
Thinking about	Decision maker	-0.63	-0.12
Collecting Oil		(0.55)	(0.08)
Stamps	Income	0.005	0.03
		(0.11)	(0.08)
	Income not stated	-0.32	0.01
		(0.71)	(0.13)
	Interaction	1.85*	0.33*
		(1.20)	(0.22)
	Higher Priority	-1.45	-0.15
		(1.10)	(0.11)
Collecting Oil	Decision maker	0.28	0.10
Stamps		(0.46)	(0.09)
	Income	-0.08	-0.07
		(0.09)	(0.08)
	Income not stated	-1.21*	-0.15*
		(0.67)	(0.09)

Table 5:Analysis Other Control - Statistically Significant at 1% ***; 5% **; 10% *.

Our results suggest that – in line with our hypothesis – a move from not satisfying all the conditions implied by our model to satisfying them is associated with an increase in the probability that households think about using oil stamps by 8 percentage points and an increase in the probability that they collect oil stamps by – a statistically significant – 33 percentage points.[29]

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[29] Our sample size is too small to re-estimate (4) only with households where a female household member collects oil stamps: a simple (rather than multinomial) logit version of (4) suggests, however, that satisfying all the conditions implied by our model is associated with a (statistically significant) 41-71 percentage point increase in the probability that households collect oil stamps. For details see Appendix A

4.7   Alternative Explanation - Salience

One way of interpreting our finding in the last section is that other control problems are an important driver for the use of oil stamps. An alternative interpretation is that collecting oil stamps makes divergent preferences among household members more salient.

The idea is that – because savings in households collecting oil stamps are less accessible and leave less room for compromise when it comes to the use of these savings – members in these households may be arguing more and so may be more aware of their divergent preferences than members in households which do not collect oil stamps.[30]

There are, however, (at least) three reasons which make this alternative explanation unlikely: First, households which are only thinking about using oil stamps are more likely to report divergent preferences (albeit not significantly): if households were more likely to report divergent preferences because their savings are 'locked up', there would be no reason why households that are only thinking about using oil stamps report a stronger divergence in preferences.

Secondly, it is important to note that what we find is an association between collecting oil stamps and our interaction term (and not just a measure of divergent preferences). What this means is that, if our results were driven by a salience effect, the effect would have to affect only those households in which the household member shopping in one (or more) of the outlets selling oil stamps also has a stronger bargaining position. It is not clear why this should be the case.

It is possible that household members (shopping in one or more of the outlets) with a weak bargaining power are less likely to report divergent preferences if their household collects oil stamps – e.g. because they are embarrassed that their (true) preferences do not prevail – but then why would these household members admit that they have a weak bargaining power in the first place (and not answer also this question strategically)?

Thirdly, and most importantly, if the association between collecting oil stamps and our interaction term were due to a salience effect, there would be no reason to expect that collecting oil stamps affects the probability that

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[30] As a result, it is possible that households collecting oil stamps respond differently to the question 'Who gives higher priority to saving for heating oil' than other households – which, in turn, may mean that we find a positive association between reporting a stronger divergence in preferences and collecting oil stamps even if divergent preferences do not actually affect whether households collect oil stamps.

households use oil/electricity for heating. The same is not true if the reason for the association is 'other-control problems'.[31]

In the next section, we show that collecting oil stamps does in fact affect the probability that households use oil/electricity for heating.

5 Other-Control and the Effect of Oil Stamps

In the last part, we asked why households use oil stamps to save for the purchase of heating oil – and provided some evidence for 'other-control' problems as a possible driver.

In this part, we present further (indirect) evidence for this hypothesis (and contra its main alternative) by exploring the causal relationship between collecting oil stamps and the probability that households use oil/electricity for heating.[32]

5.1 A naive approach

A naive approach to evaluate the (causal) effect of collecting oil stamps on the probability that households use oil/electricity for heating is by regressing whether a household uses oil/electricity for heating on whether it collects oil stamps and a set of control variables.[33]

The problem with this approach is, however, that it is likely to suffer from selection bias: To facilitate discussion of the econometric issue involved, consider a simple two equation system:[34]

$$OS_i = X_i\delta + v_i \text{ (5)}$$
$$OH_i + X_i\mu_1 + OS_i\mu_2 + u_i \text{ (6)}$$

where equation (5) describes the use of oil stamps (OS_i) and equation (6) the use of oil/electricity for heating (OH_i) for household i. X_i is a vector of observed attributes (with $E[X_iu_i] = E[X_iv_i] = 0$) and μ_2 has the interpretation

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[31] In this case, we would expect that collecting oil stamps improves households' savings performance and so affect their probability to use oil/ electricity for heating.

[32] The null hypothesis is that collecting oil stamps has no effect on the probability that households use oil/electricity for heating. The alternative hypothesis is that collecting oil stamps increases (drecreases) the probability that households use oil (electricity) for heating.

[33] We chose a binary variable as dependent variable, because we were afraid that – because people do not typically know this information off the top of their head – by asking about the exact oil/electricity expenditure/use, this would deter households from filling in our survey. In addition, we were worried about measurement error.

[34] See Card (1993) – for a similar argument.

of the 'true' (causal) effect of using oil stamps on the probability that households use oil/electricity for heating.

Gauss Markov tells us that a conventional estimation by OLS gives a consistent estimate of μ_2 if and only if u_i and v_i are uncorrelated (i.e. if OS_i is econometrically exogenous in 6). There are, however, at least three reasons why using oil stamps may be correlated with the unobserved component in the heating oil/electricity equation (6).

On the one hand, some households may have a stronger, unobserved preference to use oil for heating than others (e.g. because they have a more efficient central heating or because their heating pattern favours oil): if these households are more likely to collect oil stamps and, at the same time, more (less) likely to use oil (electricity) for heating, then the OLS estimate of μ_2 will be upward (downward) biased.

On the other hand, it is possible that some households are better able to borrow against future income than others (e.g. because of better access to informal lending or a better credit history) – but that we cannot observe this: if these households are less likely to collect oil stamps, but at the same time more (less) likely to use oil (electricity) for heating, then the OLS estimate of μ_2 will be downward (upward) biased.

Finally, an important possible source of correlation between u_i and v_i is measurement error in the use of oil stamps. Measurement error can arise if households which state that they collect oil stamps do so very irregularly (or households which state that they do not collect oil stamps, do in fact collect stamps from time to time). Such measurement error induces a negative (positive) correlation between the error components and so leads to a downward (upward) bias in our OLS estimate of μ_2, again.

5.2 Instrumental Variable Approach

To deal with these problems (and to identify the true causal effect of collecting oil stamps), we need a component of the vector X_i that affects whether households collect oil stamps but not whether they use oil/electricity for heating. If oil stamps were randomly assigned, for example, we could use the realisation of the randomising process to estimate (6).

In the absence of a pure randomised assignment, we need an alternative causal determinant of whether households collect oil stamps that can be legitimately excluded from the heating equation (6). Distance to the nearest outlet

selling oil stamps could be such a variable: the idea is that households living in an area further away from an outlet face higher costs of collecting stamps and so are less likely to collect oil stamps.
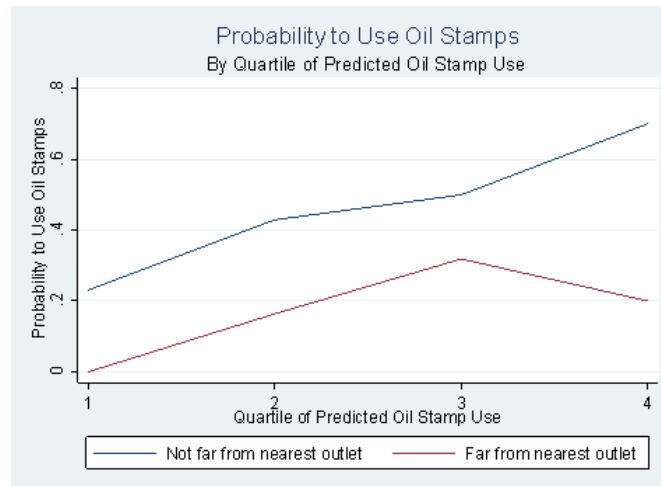
Figure 4 below supports this idea.

Figure 4: Probability to use oil stamps by quartile of pred.
probability

The figure shows the probability that households collect oil stamps – separately for households living less than 2 miles and household living more than 2 miles from the nearest outlet. We plot these probabilities for different quartiles of the predicted probability that households collect oil stamps (based on their background characteristics).[35]

The figure shows that – in line with our hypothesis – for every quartile the probability to collect oil stamps is higher for households living close to an outlet selling oil stamps. For households in the highest quartile the effect is largest: the difference is 50 percentage points. This suggests that the effect of living near an outlet selling oil stamps is largest for households which have a high propensity to collect oil stamps to start with.

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[35] Details about how we construct the probabilities/graph can be found in Appendix B.

5.3 Estimation

We can use the finding in Figure 4 to estimate the (causal) effect of collecting oil stamps on the probability that households use oil for heating.

The idea is to use only the exogenous part of the variation in our oil stamp variable to estimate the effect of collecting oil stamps on using oil/electricity for heating. That is, to use only that part in the variation in the oil stamp variable which is due to our instrument (distance) – and hence uncorrelated with unobserved preferences for heating oil/electricity; wealth effects; and/or measurement error.

We implement this idea using a two-stage-least-squares approach. As suggested by the name this is a two step regression technique:

- In the first step, we regress the endogenous right hand side variable (collecting oil stamps) on our instrument (distance from the nearest outlet) and a set of background variables.[36]

- In the second step, we regress whether households use oil/electricity for heating on the predicted values from the first stage – instead of our endogenous variable – and our background variables.[37]

As our baseline model, we use a linear probability specification for both steps of our two-stage-least-squares approach. This is adequate because the majority of covariates in our model – with the exception of income – are dummy variables which makes our model almost fully saturated.[38] To check the robustness of our specification, we also provide results from a semi-parametric estimation of (5) and (6).[39]

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[36] For the following estimations, households are coded as collecting oil stamps if they have done so for more than one year. This is to take into account that some households - stating that they do collect oil stamps - may have only just started to collect oil stamps.

[37] Taking into account the 2 stage procedure when calculating SEs

[38] In case of a fully saturated model – i.e. when all independent variables are discrete variables for mutually exclusive categories – a linear probability specification is completely general and the fitted probabilities lie with the interval [0.1]. See e.g. Angrist and Pischke (2008)

[39] Our (semi-parametric) estimator takes the following form (see Froelich, 2007):

$$\widehat{\mu}_2 = \frac{\sum_{i:Z_i=1}(Y_i - \widehat{m}_{\pi 0}((\widehat{\pi}_i))) - \sum_{i:Z_i=0}(Y_i - \widehat{m}_{\pi 1}((\widehat{\pi}_i)))}{\sum_{i:Z_i=1}(D_i - \widehat{\mu}_{\pi 0}((\pi_i))) - \sum_{i:Z_i=0}(D_i - \widehat{\mu}_{\pi 1}((\pi_i)))}(7)$$

which can be interpreted as the ratio of two matching estimators – with the numerator capturing the effect of the instrument (Z_i) on the outcome (Y_i) and the denominator capturing the effect of the instrument (Z_i) on our endogenous regressor (D_i) – controlling for a set of background variables in both cases. We estimate (7) using a mixed kernel to smooth over

5.4 Analysis

We start our analysis by first reporting the results from a (naive) estimation of (6) by means of OLS – in column (1) and (2) of Table 6.

Variable	Oil (OLS)	Electricity (OLS)	Oil (IV)	Electricity (IV)	Oil (IV2)	Electricity (IV2)
Oil Stamp	-0.04	-0.18	0.07	-0.24***	0.17	-0.46
	(0.06)	(0.11)	(0.05)	(0.09)	(0.73)	(1.06)
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Analysis of the Effectiveness of Oil Stamps - Statistically Sign. at 1% ***; 5% **; 10% *.

It suggests that collecting oil stamps tends to decrease the probability that households use oil by 4 percentage points and the probability that they use electricity for heating by 9 percentage points.Columns 3 to 6 present our structural estimates of the return to collecting oil stamps:

What we find is that the use of distance to the nearest outlet selling oil stamps as an exogenous determinant for whether households collect oil stamps yields instrumental variable estimates of the change in the probability that households use oil for heating in the range of 7 to 17 percentage points and instrumental variable estimates of the probability that they use electricity in the range of -23 to -46 percentage points.

These estimates are 275%-525% higher (33%-155% lower) than the corresponding OLS estimates in columns (1) and (2) – suggesting a significant under-estimation (over-estimation) by OLS of the effect of oil stamps on the probability that households use oil (electricity) for heating – which is in line with the idea of unobserved wealth effects and/or measurement error causing a violation of Gauss-Markov (and so affecting our OLS estimates).[40]

One way of interpreting the finding that collecting oil stamps has a stronger effect on the probability that households use electricity for heating (compared to the probability that they use oil) is that collecting oil stamps helps households trying to reduce the amount of complementary heating by means of electricity

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the continuous and categorical data. To guide the choice of the bandwidth, we use a cross-validation procedure (See Froelich and Melly, 2010). A mapping of the common support with respect to the instrument propensity score for treated and untreated observations is provided in Appendix C.

[40] A simple Hausman-Wu test suggests that we cannot reject the hypothesis that the difference between IV and OLS estimates are due to sampling error.

but not so much households struggling with the minimum purchase amount of heating oil to start with.

(Despite these differences across households) the main conclusion from our analysis is the same: our estimation results are in line with our hypothesis that households collect oil stamps to protect their savings from household members with a low preference for saving for heating oil – while being at odds with the view that our earlier findings were driven by a salience effect (instead). In other words, our results provide additional (indirect) evidence for oil stamps as an 'other-control' mechanism.

5.5 Caveat

One important caveat of our estimation results is that they should not be interpreted as the 'average treatment effect' of collecting oil stamps on whether or not households use oil as a primary heating fuel.

Instead, our results are estimates of the (causal) effect of collecting oil stamps on the subpopulation of households which is induced by our instrument (distance from the nearest outlet) to collect oil stamps. Following Imbens and Angrist (1994) and Angrist, Imbens, and Rubin (1996), we refer to this subgroup as 'compliers' and the effect on it as the local average treatment effect.[41]

The local average treatment effect is less general than the average treatment effect: it can vary by who the compliers are. Yet, it is meaningful nonetheless: to the extent that many (potential) policy options to promote the uptake of oil stamps – ranging from an expansion of outlets selling the stamps; to the

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[41]To see what is being estimated by the instrument, consider the following thought-experiment. Start with a random sample of households in a location far from an outlet selling oil stamps. Now randomly pick half of these households and force them to locate close to an outlet selling oil stamps. We now have two identical sets of households, one of which is located close to an outlet selling oil stamps and the other one far from such an outlet. Who are the households who will change their behaviour when they are forced to relocate near an outlet selling oil stamps? Those households which have very high returns to collecting stamps will probably choose to collect stamps anyway, and relocating next to an outlet selling oil stamps will not change their behaviour. Similarly, those households which have very low returns to collecting oil stamps may still not find it worthwhile to collect stamps, so their behaviour may not change either. What we're left with is a set of households with intermediate returns, which decided to collect oil stamps because of the cost-reduction associated with nearness of an outlet. In Angrist and Imbens terminology, these households are 'compliers'. When the instrument is binary, as in our example, the IV estimator is simply a scaled difference in mean outcomes between the two sets of households (i.e. at the two locations). As becomes clear from our discussion, the difference in average outcomes for the two groups is simply due to the bump in outcomes for the compliers – which makes clear that the IV estimator estimates the average effect of collecting oil stamps for a particular set of individuals whose returns are not necessarily representative of the population.

introduction of electronic stamps – involve a reduction in transaction costs, our estimates provide a good indication of their likely effect.

Moreover, by studying who the 'compliers' are in our sample, we can provide guidance with respect to the implementation of these policies: to give an example, if we find that households which are induced by our instrument to collect oil stamps tend to be younger, it makes sense (in terms of the effectiveness of a policy) to, say, expand the number of outlets in areas with a younger population (rather than an old one).

Table 8 below provides a characterisation of the 'complier' households in our sample. Specifically, it gives the relative likelihood that compliers have a particular characteristic (relative to all households) – using our 'distance from the nearest outlet instrument'. We construct the likelihood estimates using the method suggested by Angrist and Fernandez-Val (2010).[42]

Variable	Rel. Prob. of Charact.
	(Distance Instrument)
Female	1.14
Age>60	0.55
Children	2.18
Employed	1.05
College	0.68
Low-Income	0.86
Own House	0.95
PPM	1.41

Table 8: Complier Analysis

The table shows that compliers tend to be more likely to have children than the average household in our sample. In addition, they tend to be more likely to have a pre-payment meter; and to have a female household member collecting oil stamps. Finally, the compliers are less likely to be above age 60; to have a college degree or to have a low-income.

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[42] The calculation is straightforward: we simply take the ratio of the first stage for the group of interest (say households with a female household head) to the overall first stage. Formally, we calculate: $\frac{P[z=1|D1>D0]}{P[x=1]} = \frac{P[D1>D0|x=1]}{P[D1>D0]} = \frac{E[D|z=1,x=1]-E[D|z=0,x=1]}{E[D|z=1]-E[D|z=0]}$ where the second equality follows from Bayes rule. (Abadie, 2003 provides an alternative approach for describing complier characteristics – based on a kappa-weighting scheme).

6 Why Other Control Problems?

In the last sections, we provided direct and indirect evidence for 'other control problems' as an important driver of the use of oil stamps as a savings vehicle. In this section, we briefly discuss what is at the core of 'other-control' problems.

6.1 Three possible explanations

Given the high potential returns to saving for heating oil[43], there are three possible explanations why, in our sample, one household member often prefers to spend money on something else to saving for heating oil:

- The household member is myopic: he/she takes into account only his/her immediate needs and desires.

- He/ She suffers from self-control problems: that is, he/she takes into account his/her longer-term interest but sometimes cannot resist the temptation of spending money on something else.

- The household member is neither myopic nor does he/she suffer from self-control problems. Instead, he/she acts strategically: by spending money on something else, he/she tries to increase his/her influence over the total household budget.

The first explanation is straightforward: using Gul and Pesendorfer's framework, it simply means that the household member in question does not take into account his/her normative preferences (u) at all – but focuses on his/her temptation preferences (v) instead.

The underlying idea of the second explanation is that the household members not shopping in one (or more) of the outlets selling oil stamps does take into account his/her normative preferences (u) but still finds it hard (sometimes) to not give in to his/her temptation preferences (resulting in self-control problems).

The idea of the third explanation is that if household members have individual bank accounts (possibly on top of a joint account), it can be in the interest of one household member to spend everything in his/her individual account (and the joint account) to so force his/her partner to use his/her individual account to pay for heating oil.[44]

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[43]Using the same regression discontinuity design as in Brutscher (2011a) – but with expenditure on oil and electricity as the dependent variable – we estimate a lower bound for the savings potential from using oil instead of electricity for heating – of £260 per year.

[44]See Ashraf (2009) for a more detailed discussion of this mechanism.

6.2   Some indicative Evidence

We have no direct way of testing for the first explanation. We can show, however, that the other two explanations are at odds with the data – and so provide indirect evidence for the first one.

When regressing households' engagement level on our interaction term; the two variables of our interaction term and a set of controls earlier, we found (Table 5) that the variable 'I give much higher priority to saving for heating oil' is statistically significantly related to households' engagement level – if and only if it is interacted with the variable 'I decide when to buy expensive things'.

This means that 'giving much higher priority' to saving for heating oil matters for whether a household thinks about collecting/collects oil stamps if and only if the household member shopping at one (or more) of the outlets selling oil stamps also decides on 'when to buy expensive things' – i.e. has a stronger bargaining position.

This is difficult to reconcile with the underlying idea of the second explanation: if it were the case that the differences in preferences among household members were due to self-control problems, there would be no need for the household member collecting oil stamps to have a stronger bargaining position. After all, collecting oil stamps would be in the (long-term) interest of both household members.[45]

The third possible explanation why household members often have different preferences with respect to saving for heating oil seems (equally) unlikely: if one household member simply acted as if he/she were short sighted to so gain influence over a larger part of the household budget, then we would expect that divergent preferences with respect to saving for oil are strongest among households in which the household member collecting oil stamps has an individual bank account.

The idea is that if this household member does not have an (individual) bank account there is no struggle for influence over individual resources: the resources are either controlled by both household members (in a joint account) or all resources are controlled by the partner (anyway). Table 9 provides evidence which is at odds with this (third) explanation: It shows the results from a regression of our measure of divergent preferences on measures of how households organise their finances[46] – and a set of controls.

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[45] In other words, the household member suffering from self-control would be interested in 'controlling' him-/her-self.

[46] We use an ordered logit specification.

Variable	Coefficient	Simulated Probabilities[47]
Joint and Individual	-0.026	0.005
	(0.60)	(0.10)
Joint but no Individual	0.27	0.05
	(0.62)	(0.10)
No Account	0.89	0.11
	(1.00)	(0.14)
Controls	Yes	Yes

Table 9: Bank Accounts and Divergent Preferences - Statistically Significant at 1% ***; 5% **; 10% *.

The table shows that if the household member collecting oil stamps has an individual account, this has no significant effect on whether he/she reports divergent preferences.

7   Conclusion

In this paper, we looked at the question why an increasing number of households in Northern Ireland use oil stamps – instead of more conventional savings vehicles – to save for the purchase of heating oil.

We suggested that intra-household conflicts are an important driver of this phenomenon: in particular, we showed that in a significant number of households, household members have divergent views on how much priority to give to saving for heating oil.

In addition, we showed that these differences in views – when combined with a strong bargaining position of the household member who prefers to save for heating oil – are statistically significantly related to the desire to 'lock up' one's household savings by means of oil stamps.

We provided additional (indirect) evidence for the idea that households use oil stamps as an 'other control' mechanism by showing that collecting oil stamps has a positive (negative) causal effect on whether households use oil (electricity) for heating – since this is at odds with the main alternative explanation for our earlier finding (which is salience).

In the final part of the paper, we discussed what is at the core of the differences in preferences among household members with regard to saving for heating

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[47] Simulated probabilities refer to those of moving from 'I give higher priority' to 'We both give the same priority'.

oil: we suggested that the differences in preferences are typically driven by the fact that one household member (the husband in most cases) is myopic – taking into account only his/her immediate needs and desires.

Several policy implications follow from our analysis: one is that – looking at the benefits side only – the case can be made for introducing oil stamp schemes in councils which do not have such a scheme yet/for introducing a national oil stamp savings scheme.[48] Our characterisation of 'compliers' provides some guidance with regard to where local initiatives are likely to be most beneficial.

A second policy implication following from our analysis is that an effective way of promoting existing oil stamp schemes is by decreasing the transaction costs associated with collecting stamps: this could mean to increase the number of outlets selling the stamps; changing to an electronic scheme; or combining the existing scheme(s) with features of a regular savings account (e.g. the possibility of automated transfers etc).

Finally, an important policy implication is that: to the extent that collecting oil stamps is effective primarily with regard to helping households which would have been able to purchase heating oil even in the absence of oil stamps to increase the amount of heating oil they are able to afford, our findings suggest that oil stamps may not be sufficient to get households to purchase heating oil which struggle with the minimum purchase amount of oil to start with.

From a larger perspective, our research raises the question to what extent intra-household conflicts affect household decisions also in other circumstances (e.g. in the context of household retirement decisions) – and whether simple commitment devices comparable to oil stamps could help households to deal with these problems. A large literature looks at 'commitment devices' in the context of 'self-control' problems (see e.g. Bryan et al, 2010 and Brocas et al, 2004). Much less is known about the need for such vehicles in the context of 'other-control' problems.

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[48] To date oil stamp programmes are available in 9 of 26 Councils.

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9   Appendix A

Column (1) of Table 11 shows estimates of (2) using a simple logit specification (instead of a multinomial logit specification). Column (2) shows the corresponding simulated probabilities.

Variable	Coef	S. Pr	Coef	S. Pr	Coef	S. Pr	Coef	S. Pr
EI Gap	-0.08	-0.19	-0.06	-0.16	X	X	X	X
	(0.10)	(0.22)	(0.11)	(0.25)				
Interact.	X	X	X	X	18.1***	0.7***	20.9***	0.4***
					(0.58)	(0.08)	(0.66)	(0.13)
Higher Pr	X	X	X	X	-17.29	-0.29	-20.10	-0.59
					(9.48)	(0.08)	(18.89)	(0.13)
Decis. M	X	X	X	X	0.10	0.03	0.12	0.03
					(0.56)	(0.12)	(0.63)	(0.14)
Income	-0.18*	-0.20*	-0.09	-0.10	-0.02	-0.02	0.27	0.28
	(0.09)	(0.10)	(0.13)	(0.15)	(0.12)	(0.12)	(0.19)	(0.20)
Inc. N.S.	-1.9***	-0.3***	-1.58*	-0.33*	-0.68	-0.10	0.34	0.04
	(0.71)	(0.08)	(0.89)	(0.16)	(0.85)	(0.14)	(1.07)	(0.22)
Add. cont	No	No	Yes	Yes	No	No	Yes	Yes

Table 11: Robustness Tests - Statistically Signficant at 1% ***; 5% **; 10% *

What we find is - again - no statistically signficant relationship between self-control problems and whether or not households collect oil stamps (which suggests that our main results are not driven by mis-specification. Columns (3) and (4) show that adding a set of control variables makes not (big) difference.

Columns (5) to (8) show the results of estimating (4) using a simple logit specification - with and without additional controls. What we find is that our main results are robust to model specification and inclusion of additional controls.

10 Appendix B

In this section, we spell out how we constructed the (predicted) probabilities in Figure 4. The approach is similar to the one used in Card (1993):

To check the basic idea of our instrument – living near an outlet – we fit a simple logit model to whether households collect oil stamps (or not) – using only households in the subset of households which live far (i.e. more than 2 miles) away from the nearest outlet.

The determinants of collecting oil stamps included: whether households have low income; whether they are employed; whether they are single; their level of education; and our measure of other control issues.

We then divided the overall sample into quartiles of the predicted probability to collect oil stamp (in the absence of a nearby outlet) and calculated the probability that households collect oil stamps for each quartile – separately for households living far (i.e. more than 2 miles) from the nearest outlet and for households living close (i.e. less than 2 miles) from the nearest outlet.

Figure 4 (in section 4.2) shows the corresponding plot.

11   Appendix C

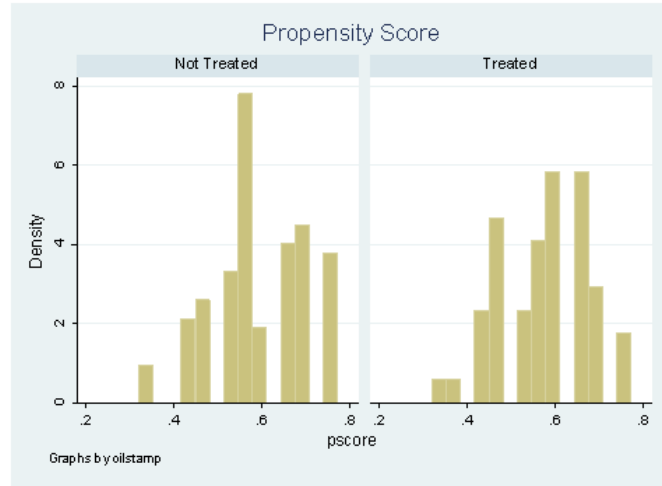Figure 5 below shows a mapping of the common support with respect to the instrument propensity score for treated and untreated observations:

Figure 5: Propensity by Treatment Status