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Household electricity contract and provider switching in the EU

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Abstract

Using a representative sample of more than 11,000 households from eight European countries, this paper empirically studies the factors related to household electricity contract switching by distinguishing between households that switched contracts but stayed with the same supplier (internal switching) from those that switched to a new supplier (external switching). The econometric analysis includes a wide range of individual preferences, structural factors, and socio-demographic characteristics; in particular, it is the first paper to explicitly explore the role of time and risk preferences on switching behaviors. The main results suggest that internal and external switching are not related to the same factors, that risk and time preferences affect switching behaviors, and that renters are less likely to switch than homeowners.

Keywords: electricity supplier switching; inertia; liberalization; time preferences; risk preferences

Table of Contents

1 Introduction

Since the 1980s, many countries have liberalized their electricity markets. In the European Union (EU), the “Electricity Directive” 96/92/EC has defined common rules for an internal EU electricity market, with the aim of enabling all consumers to freely choose their preferred suppliers. Greater retail competition was expected to lead to more varied supplier offers that would reflect variations in customer preferences, thus enabling efficiency gains. Indeed, besides lower electricity prices, the liberalization of electricity markets in the EU has spurred new offers from both existing and new electricity providers. Often, such offers include welcome bonuses, instant discounts, limited price-guarantees, and prepaid offers. To compensate for these low-priced initial offers though, providers often increase prices later (ACER 2015). Also, liberalization has been shown to lead to more offerings of green tariffs, but with substantial variation across countries (e.g. Markard and Truffer 2006). The expected effects on supply variety therefore appear to have occurred; however, whether welfare gains also occur depends on customers’ willingness to switch contracts.

Despite the increased variety of electricity contracts, empirical studies typically find that household switching rates are low and differ across countries. Between 2013 and 2015, less than five percent of households, on average, switched their electricity contract in the roughly 20 EU countries that had liberalized their electricity markets within the previous ten years (ACER 2016). In the EU countries with a longer history of market liberalization (including the United Kingdom, Germany, the Netherlands, and Sweden), more contract variety can be observed, and the average switching rate is about ten percent. Similarly, low product variety and switching rates are observed in markets (including Bulgaria, Hungary or Romania) where the incumbent electricity supplier is dominant and where competitive pressure in the retailing sector is low (ACER 2015).

Households may be reluctant to switch electricity contracts even though doing so would be profitable to them because of switching costs, such as transaction costs (Klemperer 1995), uncertainty about the quality of the new service, or lack of trust in the new provider. A recent EU-wide survey among energy consumption experts identifies insufficient monetary gains, lack of trust in new providers, hassle costs, perceived complexity of the switching process, and satisfaction

with the current provider as the main barriers to household electricity supplier switching (ACER 2015)[1]. Defeuilley (2009) argues that household-level risk aversion and behavioral biases, such as status quo bias, may explain observed sluggish switching behavior. Similarly, households may (erroneously) believe that the frequency of power outage events, service during power outage events, or other facets of customer support (e.g. reliability of metering or ease of billing) differ across providers, resulting in a preference for the current provider.[2]

The scant but growing empirical literature exploring household electricity contract switching using multivariate analysis typically finds that supplier switching is governed by expected electricity cost savings, switching costs, and trust in providers. Relying on a (non-representative) survey of Dutch households prior to liberalization, Wieringa and Verhoef (2007) infer that intended supplier switching is driven by perceived switching costs and the quality of the relationship between households and provider (building on trust, or service quality). Ek and Söderholm (2008) analyze the switching behavior of owner-occupied dwellings and conclude that internal switching (switching to a new contract with the current provider) and external switching (switching to a contract with a new provider) are both positively related with expected financial benefits. In addition, external switching was negatively related with perceived uncertainty about the financial consequences. For a representative United Kingdom (UK) household sample, Flores and Waddams Price (2013) conclude that external switching is mostly driven by expected financial savings, but not by switching costs. For a representative sample of households in Denmark, Yang (2014) finds that the main barriers to external switching include lack of financial benefits and psychological lock-in. In a recent study, Daglish (2016) employs household data provided by the main distribution grid company in New Zealand at the level of meshblocks (corresponding to about 50 households). His findings tentatively suggest that external switching (or lack thereof) is related to customers' concern for price, for taking a moral stance, and by a strong preference for staying with their current provider. Similarly, employing household-level data from the residential electricity market in the state of Texas, Hortaçsu et al (2015) conclude that when households search for alternative electricity providers, they attach a

1 For the UK, Wilson and Waddams Price (2010) find that consumers generally fail to select the most beneficial electricity contract. At least one out of five consumers chose a contract that made them worse off than before switching.

2 Shin and Managi (2017) provide a comprehensive review of the literature on the significance and the determinants of electricity provider switching.

substantial brand advantage to their current provider. Drawing on a (convenience) sample of households in Vienna (Austria), Six et al. (2017) find that lack of information about tariffs and about providers is associated with lower external provider switching. The large sample analysis for Japan by Shin and Managi (2017) confirms that provider switching is related to expected cost savings, trust in new providers, and environmental preferences. Finally, He and Rainer (2017) focus on household attitudes towards energy issues and their perceptions of the costs and benefits of switching their gas or electricity provider; relying on a representative survey for the UK, they find that external switching is positively related with stated support for simplifying energy tariffs and ease of understanding energy bills. Conversely, external switching is negatively related with the expected difficulty of changing suppliers and with stated lack of attention to energy prices. Overall, these studies bring to the fore similar barriers that keep households from switching to external providers: lack of information, behavioral loyalty to old provider, and perceived risk of switching. Interestingly, with the exception of Ek and Söderholm's study (2008), the factors related to internal switching have not been studied, even though a large proportion of contract switches consist of new tariffs with the same provider (60% of all tariff switches in our sample).

In this paper, we rely on a representative survey in eight EU countries (France, Germany, Italy, Poland, Romania, Spain, Sweden, and the (UK) to econometrically analyze the factors associated with both internal and external electricity contract switching. These eight countries account for about 80 percent of electricity use in the EU. The study contributes to the literature through its explicit comparison of internal and external switching. Failing to account for internal switching means neglecting significant dimensions of household switching activity and of the liberalization of the electricity market. For example, as new suppliers enter the electricity market, incumbent providers extend their portfolio to keep their customers as well as acquire new customers. Furthermore, we expect that the factors related with internal and external switching may differ, for instance because households trust their current provider more than competing providers. Finally, a sole focus on external switching means that internal and non-switchers are considered to be homogenous; this may lead to erroneous conclusions. Our data allows us to employ a multinomial probit model to jointly estimate the equations governing internal and external switching. In addition to our focus on internal and external switchers, our rich set of covariates includes parameters of time and risk preferences, elicited via incentivized experiments and self-assessment scales. The role of risk and time preferences has been

explored in explaining household adoption of energy efficiency technology adoption (e.g. Bradford et al. 2014, Qiu et al. 2014, Cohen et al. 2017, or Schleich et al. 2017), but has been neglected when studying household electricity contract switching behavior. For example, risk-averse individuals may be less prone to switch providers due to a lack of trust in the new provider. Risk-averse individuals may also prefer contracts with price guarantees. Individuals who discount the future more strongly (are less patient) may be more likely to switch to a new contract that involves lower tariffs now versus higher payments in the future; however they may be reluctant to switch contracts if it involves cancellation fees. On the other hand, individuals who are generally more patient may be more likely to incur transaction costs associated with contract switching, in particular with external switching. Time and risk preferences therefore appear particularly relevant factors related to electricity contract switching. Furthermore, to our knowledge, this study is also the first to make multiple country comparisons, with information about switching behaviors from electricity markets that are at very different stages of the liberalization process. Finally, unlike most previous studies, we rely on large representative household samples. In summary, this paper contributes to the literature through its focus on internal and external switching, the inclusion of time and risk preferences as factors explaining contract switching, and the utilization of multi-country representative samples.

The remainder of the paper is organized as follows. Section 2 develops a theoretical framework governing household electricity contract choice and motivates the statistical model employed. Data and variables are described in Section 3. Section 4 presents and discusses the results of the econometric analysis. Section 5 concludes.

2 Theoretical framework and statistical model

This section first develops a theoretical framework governing household electricity provider and contract choice, and then derives a statistical model.

2.1 Framework

Our framework assumes that a utility maximizing household is facing the decision of whether to switch its electricity contract[3]. The household has three options: 1) no switching, i.e. stay with the current provider and current contract (NO); 2) stay with the current provider but switch to a new contract (INTERNAL); 3) switch to a new provider and a new contract (EXTERNAL). We further assume that the household utility associated with electricity contract choice may be captured from net income (after contract choice) y, and $T^t(p,e)$, which reflects the utility specific to contract *t*. This utility is derived from provider-specific characteristics *p* (e.g. perceived reliability) and electricity contract-specific characteristics *e* (e.g. greenness of electricity).[4]

$$U(y,T^t(p,e)) \qquad \text{where } t = NO, INTERNAL, EXTERNAL \qquad (1)$$

Net income after the contract decision consists of base income y^0, provider-specific costs $F^t(p)$ (e.g. switching costs such as search costs, hassle), and electricity contract-specific costs $C^t(e)$ (e.g. costs for electricity, capacity, metering). The household budget constraint then becomes

$$y = y^0 - F^t(p) - C^t(e) \qquad (2)$$

Household maximization of (1) subject to (2) yields the optimal choice of electricity contract characterized by *p*, e** where

$$\frac{\partial U}{\partial T^t(p^*,e^*)}\frac{\partial T^t(p^*,e^*)}{\partial p} = \frac{\partial U}{\partial y}\frac{\partial F^t(p^*)}{\partial p} \qquad (3a)$$

3 The theoretical framework extends the framework proposed by Mills and Schleich (2014) to model household choice of a new light bulb.

4 The utility derived from all other goods not influenced by the electricity tariff decision is assumed constant.

$$\frac{\partial U}{\partial T^t(p^*,e^*)}\frac{\partial T^t(p^*,e^*)}{\partial e}=\frac{\partial U}{\partial y}\frac{\partial C^t(e^*)}{\partial e} \tag{3b}$$

Equation (3a) implies that the marginal utility of a change in the provider equals the marginal utility of income associated with the provider-specific costs. Similarly, equation (3b) reflects that the marginal utility of a change in the electricity contract characteristics equals the marginal utility of income associated with the electricity contract-specific costs. When deciding on the electricity contract, a household chooses the highest ratio of marginal utility to marginal costs. Consider two electricity contracts *t*, *k* ∈ {*NO, INTERNAL, EXTERNAL*}. Contract *t* is preferred to contract *k* if

$$\frac{\frac{\partial U}{\partial T^t(p^*,e^*)}\left[\frac{\partial T^t(p^*,e^*)}{\partial p}+\frac{\partial T^t(p^*,e^*)}{\partial e}\right]}{\frac{\partial U}{\partial y}\left[\frac{\partial F^t(p^*)}{\partial p}+\frac{\partial C^t(e^*)}{\partial e}\right]}>\frac{\frac{\partial U}{\partial T^k(p^*,e^*)}\left[\frac{\partial T^k(p^*,e^*)}{\partial p}+\frac{\partial T^k(p^*,e^*)}{\partial e}\right]}{\frac{\partial U}{\partial y}\left[\frac{\partial F^k(p^*)}{\partial p}+\frac{\partial C^k(e^*)}{\partial e}\right]}\quad \forall\ k\neq t \tag{4}$$

The marginal utility terms in the numerator underline potential trade-offs that households face when switching electricity provider and contract. For example, a household switching from its old “grey” electricity provider to a new green tariff provider may receive additional benefits from pro-social preferences (e.g. Frey and Stutzer 2008) or feelings of warm glow (Andreoni 1989), but perceived reliability of the new provider may be lower. If the household switched to a green tariff offered by its current provider, $\frac{\partial T^t}{\partial p}$ would be zero. Similarly, the marginal cost terms in the denominator emphasize potential trade-offs when switching electricity provider and contract. For example, a household switching to a new provider incurs switching costs, but may benefit from lower energy prices. If the household switched to a new contract offered by its current provider, $\frac{\partial F^t}{\partial p}$ would be zero.

2.2 Statistical Model

As discussed, the household chooses the electricity contract (i.e. provider and electricity contract) providing the highest marginal utility to marginal cost ratio (see equation (4)). In the statistical model, we denote this (latent) ratio R^* with $R_t^* > \max(R_k^*) \; \forall \, k \neq t$. The choice of contract *t* for individual *i* may be modeled as a linear function of covariates *X* and a random error term ε and can be estimated by a multinomial probit model.

$$R_{it} = \beta_t X_{it} + \varepsilon_{it} \tag{5}$$

where β_t stands for the vector of coefficients for contract choice t, and ε_{it} is the error term. In a multinomial probit model, $\varepsilon_{it} \sim N(0,1)$.

3 Data and variables

This section first describes the survey before presenting the dependent and explanatory variables.

3.1 Survey

Data were collected between July and August 2016 through an online survey distributed to members of the Ipsos GmbH online access panel. Roughly 15,000 respondents from France, Germany, Italy, Poland, Romania, Spain, Sweden, and the UK participated in the survey. In each country, quota sampling was used in order to obtain representative samples in terms of gender, age (between 18 and 65 years), and regional population distribution. To ensure qualified responses, only respondents who reported being involved in their household's investment decisions for utilities, heating, and household appliances were selected for the survey. To ensure consistency across countries, the original English surveys were professionally translated to each of the target languages; back translation was then used to check (and eliminate) inconsistencies.

To elicit risk and time preferences, the survey included incentivized non-contextualized multiple price list experiments. Besides questions on electricity contract switching behavior, the survey also asked for dwelling characteristics, and assessed environmental preferences via established scales. Socio-demographic information was gathered both at the beginning of the questionnaire (to ensure that quota requirements were met), and at the end.

3.2 Dependent Variable

The survey included the following question to measure respondents' switching of electricity contracts and suppliers: "In the past 10 years, did you change to a different electricity contract (for instance going to a cheaper rate or a day-night tariff) within your current residence?" The response categories were: (1) "No"; (2) "Yes, but stayed with the same supplier" (*internal switching*); and (3) "Yes, when switching to a new supplier" (*external switching*). Thus, our dependent variable may take on three outcomes. The survey did not include information on characteristics of the old or new contract.

	8 countries	FR	DE	IT	PL	RO	ES	SE	UK
(1) No switching	7,315 (48.59%)	1,149 (57.45%)	812 (40.56%)	708 (35.40%)	1,291 (64.29%)	859 (56.18%)	1,064 (53.17%)	798 (52.67%)	634 (31.70%)
(2) Internal switching	4,520 (30.02%)	688 (34.40%)	420 (20.98%)	766 (38.30%)	587 (29.23%)	624 (40.81%)	577 (28.84%)	301 (19.87%)	557 (27.85%)
(3) External switching	3,220 (21.39%)	163 (8.15%)	770 (38.46%)	526 (26.30%)	130 (6.47%)	46 (3.01%)	360 (17.99%)	416 (27.46%)	809 (40.45%)

Table 1: Number of observations (and shares) by switching behavior

Table 1 shows heterogeneity across countries in propensities to switch electricity contracts and suppliers. While at the aggregate level, more than half the households reported to have switched contracts in the past ten years, in France, Italy, Poland, Romania, and Spain the majority of households did not switch contracts. On average, internal switching accounted for almost 60 percent of all contract switching, with the highest shares of internal switching observed for France, Italy, and Romania. In comparison, the share of external switching was particularly high in Germany, Italy, Sweden and the UK.

3.3 Explanatory variables

The set of explanatory variables captured household financial motives, environmental preferences, risk and time preferences, structural factors and standard socio-economic characteristics. Table 2 provides more detailed information about each explanatory variable. Descriptive statistics appear in Table A1 in Annex A.

Financial benefits

This set of variables included two proxies to capture the financial benefits of contract switching discussed in the literature. First, *relevance energy costs* reflects the importance a household attaches to energy costs. Second, household *size* stands for the cost-savings potential when switching to a cheaper tariff[5].

Environmental preferences

The variable *environmental_ID* (items adapted from Whitmarsh and O'Neill 2010) was used to reflect households' environmental preferences, which are expected to be related to the propensity to choose green tariffs.

Risk and time preferences

Particular attention was given to variables reflecting preferences for risk and time. We employ two types of measures reflecting preferences for time and risk, scale-based and experiment-based measures. First, preferences for risk aversion and time discounting were elicited and estimated jointly via non-contextualized multiple price list experiments (MPLEs) adapted from Coller and Williams (1999) and Holt and Laury (2002), for which more than half the participants were incentivized. The theoretical model underlying the calculation of the parameters reflecting time and risk preferences is provided in Annex B. Annex B further describes in detail the MPLEs and the procedure employed to jointly calculate the individual parameters for each participant. Equation (A1) illustrates the need to jointly estimate the parameters reflecting preferences over time and risk to derive internally consistent parameters for given functional forms (e.g. Abdellaoui et al. 2007; Andersen et al. 2008). For example, estimating the parameter reflecting time preferences without simultaneously accounting for risk preferences would have resulted in underestimating the value of the time preference parameter for a risk-averse individual. Second, the survey also elicited time and risk preferences using the self-assessment scales employed and validated by Dohmen et al. (2011) or Falk et al. (2015) to construct *WTRisk* and *WTWait* (see Table 2). In particular, Dohmen et al. (2011) argue that eliciting individuals' general assessment of their willingness to take risks yields a good predictor of behavior in several domains. In comparison, the experiment-based risk measures are good predictors of behavior in the financial domain, but may

5 Information on household actual electricity consumption or electricity costs was not available.

be less informative for risk-taking in non-financial situations (Dohmen et al. 2011, p. 543).

Structural factors

First, we accounted for the effects of past and planned future moving behavior, i.e. *moved* and *future_move*. Past moving behavior is expected to lead to more external switching: first, when moving to a new town, households are often forced to switch to a new provider if the old provider does not service the new town; second, households changing residency are usually automatically serviced by the local default provider, and would therefore incur transaction costs if they wanted to switch back to their old provider. In contrast, households planning to move in the near future might be less likely to switch contracts than households not planning to move because a future move lowers their chances to recover the switching costs. Second, we included the dummy variable *tenant* to allow for effects of dwelling ownership. For tenants, costs for energy and water use are often included in the rent; in such cases, the landlord rather than the household chooses the electricity contract. Thus, tenants may be less prone to switch providers than homeowners. Note that switching behaviors of tenants and homeowners has been considered by Flores and Waddams Price (2013) and by He and Rainer (2013) for external switching, but neither found tenancy to have an effect. Third, *urban* was included to control for potential differences in the level of competition between urban and non-urban areas with typically more electricity suppliers (and therefore competition) available in urban areas compared to non-urban areas. Daglish (2016) and Shin and Managi (2017) find urban households more likely to have switched suppliers than non-urban households.

Socio-economic characteristics

Household *income* has been found to be positively correlated with external switching in the literature (Ek and Söderholm 2008, Hortaçsu et al. 2015, Daglish 2016, Shin and Managi 2017). Similarly, higher *education* has mostly been found to be positively associated with external switching behavior (Hortaçsu et al. 2015, He and Reiner 2017).

Label	Description
Relevance energy costs	Z-score based on unweighted average of respondent stated importance of energy costs in a decision (either real or hypothetical) to buy a light-bulb and an appliance (1= played no role to 5= very important).
Size	Number of persons living in the household.
Environmental_ID	Z-score to equally weighted items: "Please rate how much you agree with the following statements (i) To save energy is an important part of who I am. (ii) I think of myself as an energy conscious person. (iii) I think of myself as someone who is very concerned with environmental issues. (iv) Being environmentally friendly is an important part of who I am" (1 = strongly disagree to 5 = strongly agree).
α	Parameter reflecting risk preferences; elicited via multiple price list experiments; higher value means lower risk aversion.
WTRisk	Z-score to item: "In general, how willing are you to take risks?" (1 = "not at all willing" to 5 = "very willing").
δ	Parameter reflecting time preferences; elicited via multiple price list experiments; higher value means lower time discounting.
WTWait	Z-score to item: How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future? (1 = "not at all willing" to 5 = "very willing").
Moved	Dummy = 1, if the household changed residence in the last ten years.
Future_move	Ordered categorical variable (0 = "I will likely not change my primary residence within the next 10 years", 1 = "I will likely change my primary residence in the next 5 to 10 years", 2 = "I will likely change my primary residence within the next 5 years").
Tenant	Dummy = 1, if the household is renting the current dwelling.
Urban	Dummy = 1, if respondent lives in the center of a major town or in a sub-urban town.
Income	Household annual income (after taxes) in 1000 euro per year (using midpoint of eleven income categories, and the lower level of the highest income category).
Education	Dummy = 1 if level equal to or higher than country median. Considered levels: no degree or certificate/trade or vocational certificate /high school or equivalent/higher education.
Age	Respondent age in years.
Male	Dummy = 1, if respondent is male.

Table 2: Description of covariates

In comparison, the results for *age* are rather ambiguous. Daglish (2016) and Hortaçsu et al. (2015) find a negative relation of age and external switching behavior, Shin and Managi (2017) find a small positive relation, and He and Rainer (2017) find no relation between age and external switching behavior. In Ek

and Söderholm (2008), age is positively associated with internal switching, but not related to external switching. Finally *male* is included to control for the gender of the survey respondent.

We estimated two types of models. In the *8-countries model,* observations from all countries were pooled and country-specific effects (e.g. reflecting especially different outcomes of the liberalization of the electricity markets) were captured by country dummies (using Germany as the benchmark). Further, we also ran eight individual country models.

4 Results

Table 3 reports the findings (average marginal effects)[6] for the multinomial probit model (using robust standard errors). To save space, we limit our discussion to statistically significant results (i.e. p-value ≤ 0.1), thereby typically highlighting findings for the *8-countries model*. In general, we found more statistically significant coefficients in the *8-countries model* than in the models for individual countries, most likely because the degrees of freedom are substantially higher in the former.

Financial benefits

For the *8-countries model*, *relevance of energy costs* was negatively related with no contract switching, i.e. positively related with contract switching in general. An increase in *relevance of energy costs* by *one standard deviation* decreased the probability of observing no-switching by 1 percentage point. Similarly, *relevance of energy costs* was positively associated with external switching. In the *8-countries model,* larger households were also more likely to have switched electricity contracts, and also to be internal switchers. Qualitatively, the findings for *relevance of energy costs* and *size* also held for most individual country models, but only few parameter estimates turned out to be statistically significant. Thus, in line with the finding of most other studies, our results generally confirm that household electricity contract switching is motivated by finan-

6 We show the marginal effects on the probability of choosing a particular contract rather than the coefficients of the model output since the latter refer to the latent utility and are therefore hard to interpret. Also, these coefficients depend on the type of contract chosen as the base outcome in the multinomial model. For dummy variables and z-score transformed variables (i.e. non-marginal changes), Table 3 reports the discrete changes in probabilities.

cial benefits. While households that attach a strong weight to energy costs in household energy decision-making tend to be external switchers, larger households (with a presumably higher electricity bill) are more likely to be internal switchers.

Environmental preferences

For the *8-countries model* and for most individual country models, higher environmental identity was positively associated with contract switching in general and with internal switching, but with rather modest effect sizes. In addition, for France and Spain, we found that higher environmental identity correlated positively with external switching. Thus, the findings for *environmental_ID* confirm that environmental preferences are related to household electricity contract switching in general. Interestingly, in the *8-countries model* and several individual country models, higher environmental identity appeared to be related with internal switching (rather than external switching). Based on these results, we speculate that internal switching may frequently involve a switch to a greener tariff.

Risk preferences

Regarding findings on risk preferences, the results for the *8-countries model* and most individual country models suggested that more risk-averse individuals (higher *WTRisk*) were less likely to have switched their electricity contracts. Qualitatively, this result is supported by the findings for α, but the associated coefficient is shy of being statistically significant in all models. In general, the findings for our risk measures support the view that individuals perceive that the decision to switch electricity contracts involves risk. Thus, risk aversion appears to help explain low contract switching rates. For the *8-countries model,* and for six of the eight individual country models*,* we found that less risk-averse individuals (i.e. higher α or lower *WTRisk*) were more likely to be internal switchers. Thus, our findings for risk preferences do not corroborate the view that internal switching was preferred over external switching because households bestowed more trust in the old provider than in other providers. Instead, risk-averse individuals may prefer contracts with price guarantees, often offered by new market entrants to attract new customers.

Time preferences

In comparison, standard time preferences elicited through experiments were generally not found to be related with electricity contract switching in general,

nor with internal or external switching. However, based on the results for the scale-based measures to elicit time preference, more patient individuals (i.e. higher *WTWait*) were less likely to be non-switchers in the *8-country model*, and in the individual country models of France and Spain. Thus, our findings for *WTWait* (but not for δ) provide evidence that impatience also helps explain sluggish electricity contract switching behavior. Arguably, individuals who are generally more patient are more likely to bear the switching costs. More patient individuals were more likely to be external and internal switchers in the *8-country model* and in Spain, and to be external switchers in the UK. We only found evidence in the UK sample that more patient individuals are more likely to be external rather than internal switchers.

Structural factors

The results for *move* in the *8-countries model* and in France, Germany, and Spain confirmed that households who had changed their residence during the preceding ten years were more prone to have changed their electricity contract. Likewise, these households were more likely to be external switchers. In comparison, whether households plan to move in the future did not appear to be related with past electricity contract switching behavior. Arguably, these results may be due to the rather long time frame used in the questionnaire. For shorter time frames, contract switchers would have had less time to recover the transaction costs associated with contract switching. Households that rent rather than own their dwelling appeared less likely to have switched contracts and less likely to be internal and external switchers in the *8-countries model.* Qualitatively, this finding also held in most individual country models, yet parameter estimates were not always statistically significant. Typically, the effect size of *tenants* was rather large. For example, in the *8-countries model,* being a tenant rather than an owner increased the probability of being a non-switcher by 7.3 percentage points. Thus, our findings on *tenants* differed from previous studies (Flores and Waddams Price, 2013; He and Rainer, 2013) that did not find tenancy to affect external switching. Since both studies had much smaller samples, this difference may be explained by the difference in degrees of freedom. Our variable controlling for level of competition (i.e. *urban*) was not found to be statistically significant in the *8-countries model* and was only significant for individual countries in a few instances. Urban households were more likely to be external switchers in Romania and Sweden, more likely to be internal switchers in Germany and Italy, and less likely to be internal switchers in France.

Socio-economic characteristics

As suggested by the findings for the *8-countries model*, and in line with the extant literature, higher income households were more likely to be external switchers. This outcome also held for the individual country models for Germany, Italy, and the UK. On the other hand, higher income households seemed less prone to be internal switchers, as suggested by the findings in the *8-countries model* and for France. For Germany and the UK, we further found that household income was positively related to switching electricity contracts in general, while for France the relationship was negative. In comparison, education did not appear to be systematically related with contract switching. As far as age is concerned, for the *8-countries model,* we found that older individuals were more likely to have switched electricity contracts, and also to be external switchers, yet – similar to the extant literature – there appeared to be some heterogeneity across countries. Notably for Romania, the results suggest that older individuals were less likely to have switched contracts or to be internal switchers.

Households with male respondents were more likely to have switched contracts and also to be external switchers in the *8-countries model.* The findings for gender in individual countries tended to follow the same pattern.

Country-specific effects

Finally, the results for the dummies in the *8-countries model* suggest that there are substantial differences among countries in electricity contract switching behavior, which were not controlled for by the covariates. Compared to the base country (i.e. Germany), household propensity to be non-switchers and to be internal switchers was generally higher in countries where the liberalization of the electricity sector started late (notably Poland and Romania) or resulted in little competition (e.g. France).

	8 countries			France			Germany			Italy			Poland			Romania			Spain			Sweden			United Kingdom		
	No switching	Internal switching	External switching	No switching	Internal switching	External switching	No switching	Internal switching	External switching	No switching	Internal switching	External switching	No switching	Internal switching	External switching	No switching	Internal switching	External switching	No switching	Internal switching	External switching	No switching	Internal switching	External switching	No switching	Internal switching	External switching
Relevance energy cost	-0.010*	-0.004	0.014***	-0.011	0.005	0.006	-0.011	-0.011	0.022	0.004	-0.005	0.001	0.023	-0.024*	0.001	-0.008	0.010	-0.003	0.001	-0.004	0.003	-0.025	0.019	0.006	-0.039***	-0.020*	0.060***
	(0.058)	(0.423)	(0.002)	(0.428)	(0.703)	(0.448)	(0.439)	(0.324)	(0.112)	(0.797)	(0.748)	(0.947)	(0.102)	(0.069)	(0.890)	(0.624)	(0.510)	(0.578)	(0.936)	(0.762)	(0.806)	(0.126)	(0.139)	(0.698)	(0.002)	(0.089)	(0.000)
Size	-0.009**	0.005	0.004	-0.015	0.005	0.010	-0.002	-0.007	0.009	-0.014	0.005	0.010	-0.050***	0.044***	0.006	-0.002	0.001	0.002	-0.015	0.006	0.008	-0.012	0.004	0.008	0.009	0.011	-0.020*
	(0.010)	(0.104)	(0.183)	(0.158)	(0.617)	(0.106)	(0.835)	(0.393)	(0.341)	(0.167)	(0.643)	(0.344)	(0.000)	(0.000)	(0.277)	(0.686)	(0.879)	(0.289)	(0.207)	(0.549)	(0.342)	(0.357)	(0.658)	(0.495)	(0.363)	(0.232)	(0.052)
Environmental_ID	-0.017***	0.015***	0.002	-0.030**	0.016	0.014*	-0.008	0.014	-0.006	-0.018	0.018	0.000	-0.024	0.031**	-0.007	-0.025	0.027	-0.002	-0.010	-0.011	0.022*	0.011	-0.020	0.009	-0.029**	0.044***	-0.015
	(0.001)	(0.003)	(0.565)	(0.034)	(0.258)	(0.062)	(0.568)	(0.230)	(0.679)	(0.189)	(0.206)	(0.995)	(0.101)	(0.025)	(0.306)	(0.133)	(0.103)	(0.715)	(0.502)	(0.401)	(0.069)	(0.485)	(0.102)	(0.519)	(0.022)	(0.001)	(0.297)
α	-0.009	0.015***	-0.006	-0.003	0.025	-0.022*	-0.023	0.019	0.004	-0.021	0.023	-0.002	-0.020	0.010	0.011	-0.017	0.020	-0.003	-0.011	0.039***	-0.028**	0.013	-0.012	-0.001	0.019	-0.002	-0.017
	(0.120)	(0.005)	(0.241)	(0.849)	(0.121)	(0.065)	(0.135)	(0.124)	(0.771)	(0.265)	(0.204)	(0.904)	(0.193)	(0.525)	(0.122)	(0.251)	(0.161)	(0.580)	(0.479)	(0.003)	(0.022)	(0.442)	(0.409)	(0.925)	(0.247)	(0.905)	(0.368)
WTRisk	-0.029***	0.024***	0.005	-0.037***	0.034***	0.002	-0.023*	0.032***	-0.009	-0.031**	0.035**	-0.003	-0.033**	0.019	0.014**	-0.064***	0.058***	0.006	-0.015	-0.007	0.022*	-0.021	0.007	0.014	-0.003	0.013	-0.010
	(0.000)	(0.000)	(0.195)	(0.004)	(0.006)	(0.738)	(0.072)	(0.003)	(0.495)	(0.024)	(0.013)	(0.808)	(0.012)	(0.122)	(0.050)	(0.000)	(0.000)	(0.209)	(0.319)	(0.604)	(0.059)	(0.183)	(0.584)	(0.328)	(0.788)	(0.260)	(0.452)
δ	-0.003	0.028	-0.026	0.073	-0.037	-0.036	-0.006	-0.042	0.047	-0.079	0.097	-0.018	-0.031	0.013	0.018	-0.018	0.046	-0.029	-0.063	0.115	-0.052	0.013	0.066	-0.078	0.154*	-0.027	-0.128
	(0.937)	(0.328)	(0.331)	(0.458)	(0.689)	(0.577)	(0.946)	(0.536)	(0.574)	(0.411)	(0.308)	(0.839)	(0.700)	(0.866)	(0.641)	(0.831)	(0.568)	(0.362)	(0.459)	(0.128)	(0.436)	(0.905)	(0.469)	(0.414)	(0.077)	(0.753)	(0.186)
WTWait	-0.013***	0.008*	0.005	-0.022*	0.019	0.003	-0.006	-0.001	0.007	-0.001	0.017	-0.016	-0.014	0.013	0.001	0.012	-0.011	-0.001	-0.039***	0.034**	0.005	-0.016	0.002	0.014	-0.009	-0.015	0.024*
	(0.009)	(0.071)	(0.255)	(0.089)	(0.128)	(0.671)	(0.666)	(0.924)	(0.610)	(0.933)	(0.211)	(0.218)	(0.294)	(0.292)	(0.919)	(0.479)	(0.533)	(0.768)	(0.010)	(0.011)	(0.702)	(0.317)	(0.855)	(0.341)	(0.463)	(0.209)	(0.073)
Moved	-0.033***	0.000	0.033***	-0.109***	0.074***	0.034**	-0.065**	-0.003	0.068***	-0.060**	0.030	0.030	-0.020	0.004	0.016	0.051*	-0.054*	0.003	-0.045	0.008	0.037*	-0.006	-0.033	0.039	-0.021	-0.019	0.039
	(0.001)	(0.957)	(0.000)	(0.000)	(0.003)	(0.027)	(0.014)	(0.887)	(0.010)	(0.022)	(0.253)	(0.227)	(0.456)	(0.880)	(0.228)	(0.090)	(0.073)	(0.808)	(0.102)	(0.762)	(0.082)	(0.847)	(0.176)	(0.164)	(0.393)	(0.423)	(0.128)
Future_move	0.003	0.002	-0.005	-0.010	0.002	0.008	0.029*	-0.019	-0.010	0.011	-0.000	-0.010	-0.008	0.003	0.004	-0.020	0.017	0.003	-0.017	0.033**	-0.016	0.016	0.009	-0.025	0.013	-0.006	-0.007
	(0.615)	(0.751)	(0.326)	(0.544)	(0.919)	(0.370)	(0.067)	(0.153)	(0.550)	(0.490)	(0.978)	(0.493)	(0.631)	(0.832)	(0.594)	(0.261)	(0.330)	(0.635)	(0.295)	(0.025)	(0.203)	(0.400)	(0.528)	(0.139)	(0.376)	(0.661)	(0.660)
Tenant	0.070***	-0.049***	-0.022**	0.030	-0.052*	0.022	0.045	0.024	-0.069**	0.073**	-0.096***	0.023	0.140***	-0.135***	-0.005	0.057	-0.069*	0.012	0.168***	-0.112***	-0.056**	0.003	-0.014	0.012	0.106***	-0.019	-0.087***
	(0.000)	(0.000)	(0.020)	(0.319)	(0.072)	(0.206)	(0.121)	(0.331)	(0.017)	(0.034)	(0.007)	(0.497)	(0.000)	(0.000)	(0.811)	(0.138)	(0.071)	(0.312)	(0.000)	(0.001)	(0.049)	(0.937)	(0.586)	(0.690)	(0.000)	(0.445)	(0.002)
Urban	-0.005	0.005	0.000	0.035	-0.054**	0.018	-0.028	0.043**	-0.015	-0.021	0.055**	-0.033	-0.028	0.038	-0.010	0.025	-0.049	0.024**	0.004	0.018	-0.021	-0.035	-0.026	0.061**	-0.006	0.012	-0.006
	(0.564)	(0.549)	(0.978)	(0.170)	(0.030)	(0.216)	(0.267)	(0.043)	(0.565)	(0.419)	(0.039)	(0.186)	(0.300)	(0.140)	(0.473)	(0.432)	(0.115)	(0.037)	(0.897)	(0.471)	(0.314)	(0.238)	(0.259)	(0.022)	(0.799)	(0.588)	(0.804)
Income	-0.000	-0.000	0.001***	0.001**	-0.001**	-0.000	-0.002***	0.000	0.001**	-0.001	-0.000	0.001*	0.000	-0.001	0.001	0.000	-0.000	0.000	0.001	-0.001	-0.000	-0.000	0.000	0.000	-0.001*	-0.000	0.001*
	(0.577)	(0.107)	(0.006)	(0.034)	(0.039)	(0.801)	(0.006)	(0.425)	(0.035)	(0.324)	(0.543)	(0.089)	(0.858)	(0.382)	(0.199)	(0.977)	(0.819)	(0.517)	(0.209)	(0.428)	(0.495)	(0.808)	(0.982)	(0.801)	(0.071)	(0.854)	(0.063)
Education	-0.014	0.007	0.007	-0.014	-0.016	0.030**	-0.024	0.006	0.019	-0.018	-0.009	0.027	-0.032	0.052**	-0.021	-0.050	0.040	0.010	-0.009	0.036	-0.027	-0.015	0.048	-0.033	0.009	-0.050**	0.040
	(0.159)	(0.435)	(0.404)	(0.578)	(0.527)	(0.044)	(0.359)	(0.801)	(0.478)	(0.607)	(0.799)	(0.423)	(0.234)	(0.037)	(0.113)	(0.109)	(0.193)	(0.389)	(0.747)	(0.169)	(0.231)	(0.747)	(0.203)	(0.415)	(0.701)	(0.032)	(0.125)
Age	-0.001**	-0.000	0.001***	-0.000	0.000	0.000	-0.001	-0.001	0.002	-0.002	0.000	0.002	-0.002	0.001	0.001*	0.006***	-0.005***	-0.001	-0.001	0.000	0.000	-0.005***	0.001	0.004***	-0.001	0.000	0.001
	(0.017)	(0.700)	(0.001)	(0.968)	(0.980)	(0.977)	(0.417)	(0.459)	(0.154)	(0.104)	(0.868)	(0.128)	(0.142)	(0.644)	(0.057)	(0.000)	(0.001)	(0.189)	(0.547)	(0.723)	(0.712)	(0.000)	(0.172)	(0.001)	(0.139)	(0.997)	(0.164)
Male	-0.021**	0.010	0.011	-0.042*	0.042*	0.000	-0.032	0.042**	-0.010	0.002	-0.004	0.002	-0.006	-0.016	0.022*	0.022	-0.017	-0.005	0.029	-0.034	0.005	-0.061**	-0.001	0.062**	-0.072***	0.038*	0.034
	(0.023)	(0.250)	(0.135)	(0.085)	(0.076)	(0.973)	(0.196)	(0.042)	(0.696)	(0.926)	(0.864)	(0.935)	(0.801)	(0.516)	(0.086)	(0.465)	(0.571)	(0.619)	(0.274)	(0.153)	(0.802)	(0.037)	(0.964)	(0.020)	(0.001)	(0.086)	(0.161)
FR	0.178***	0.108***	-0.287***																								
	(0.000)	(0.000)	(0.000)																								
IT	-0.017	0.102***	-0.085***																								
	(0.370)	(0.000)	(0.000)																								
PL	0.272***	0.056***	-0.328***																								
	(0.000)	(0.003)	(0.000)																								
RO	0.258***	0.156***	-0.414***																								
	(0.000)	(0.000)	(0.000)																								
ES	0.147***	0.024	-0.171***																								
	(0.000)	(0.163)	(0.000)																								
SE	0.117***	-0.043**	-0.075***																								
	(0.000)	(0.024)	(0.000)																								
UK	-0.075***	0.061***	0.015																								
	(0.000)	(0.000)	(0.238)																								
Log likelihood	-10862.785			-1399.660			-1588.966			-1496.465			-1086.051			-866.959			-1376.188			-1153.296			-1715.915		
Prob>χ2	0.000			0.000			0.000			0.020			0.000			0.000			0.000			0.003			0.000		
Observation	11256			1607			1534			1390			1379			1136			1407			1166			1637		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Results (average marginal and discrete effects) for contract switching behavior (p-value in parentheses).

5 Conclusion

This paper empirically studies the factors related to household electricity contract switching. We distinguish between households that switched contracts but stayed with the same supplier (internal switching) and those that switched to a new supplier (external switching). The analyses rely on more than 11,000 observations drawn from eight EU countries which differ in terms of state of liberalization. The econometric analysis includes a broad set of individual preferences, structural factors, and socio-demographic characteristics. Regarding individual preferences, our paper is the first to explicitly explore the role of time and risk preferences on switching behaviors. We find that less-risk averse individuals were more likely to have switched contracts. Among contract switchers, less risk-averse contract-switching individuals were more likely to be internal switchers than external switchers. Time preferences were also shown to affect switching behaviors, with more patient households being more likely to have switched contracts.

The empirical results are consistent with previous literature and suggest at the aggregate eight-country level that household electricity contract switching is positively related with financial benefits (i.e. relevance of energy costs in energy-related decision making, and household size as a proxy for the cost saving potential), environmental preferences, previous moving, renting (renters being less likely to switch), and age. In addition, risk-aversion and impatience were found to inhibit contract switching. The impact of renting appeared particularly strong; previous studies had speculated such an effect but did not find significant effects probably due to small sample size. Our results therefore point to the necessity to separate renters from homeowners when studying contract switching.

We further found that internal and external switching are generally not correlated with the same factors. For external switching, the probability to switch to a new electricity provider was positively associated with perceived relevance of energy costs, previous moving, income, and age, and negatively associated with renting. For internal switching (which with the exception of Ek and Söderholm (2008) has not been studied so far), we found the propensity to switch to a new electricity contract with the former provider to be positively associated with household size, environmental preferences, risk-taking, and patience. Further, internal switching was found to be negatively associated with renting and in-

come. Because previous literature has typically only focused on external switching, it has implicitly treated internal switching and no switching to be the same. Our results however show that no contract switching and internal switching appear to be driven by different factors. Clearly, whenever possible, external, internal, and non-switching should be distinguished. While the data allowed us to distinguish factors related to internal and external switching, information on the attributes of current or previous electricity contracts (e.g. tariff, price guarantees, cancellation fees, welcome bonuses) or of household perceptions of former and new provider (e.g. of trust, reliability), was not available. Future research could incorporate such factors to provide greater understanding of switching behaviors. Most of the findings on the factors related to contract switching in general also held at the level of individual countries, but often lacked statistical significance, arguably because of lower degrees of freedom than in the aggregate model with observations from eight countries. For the factors driving internal and external switching, we observed substantial heterogeneity across countries. This highlights the need to infer implications for regulation or provider business models from the individual country models rather than the aggregate model.

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Annex A: Descriptive statistics

	All countries	*France*	*Germany*	*Italy*	*Poland*	*Romania*	*Spain*	*Sweden*	*United Kingdom*
Relevance energy costs	0.000 (1.000)	0.001 (0.883)	0.112 (0.948)	0.429 (0.744)	0.142 (0.968)	0.067 (1.044)	0.016 (0.963)	-0.428 (1.057)	-0.274 (1.062)
Size	2.781 (1.498)	2.647 (1.256)	2.423 (1.434)	3.091 (1.268)	3.093 (1.318)	3.183 (2.533)	2.955 (1.172)	2.318 (1.337)	2.625 (1.273)
Environmental_ID*	14.499 (3.293)	14.788 (3.032)	14.038 (3.223)	15.484 (2.867)	14.540 (3.223)	14.960 (3.175)	15.025 (3.084)	13.028 (3.596)	13.861 (3.565)
α	0.832 (1.092)	0.794 (0.998)	0.852 (1.106)	0.861 (1.106)	0.737 (1.085)	0.975 (1.376)	0.872 (1.122)	0.909 (1.079)	0.719 (0.927)
WTRisk*	3.073 (0.964)	2.985 (0.909)	2.843 (0.907)	2.947 (0.950)	3.213 (0.963)	3.434 (0.976)	3.209 (0.905)	3.074 (0.973)	2.964 (1.015)
δ	0.847 (0.197)	0.866 (0.170)	0.856 (0.199)	0.826 (0.201)	0.844 (0.203)	0.813 (0.248)	0.834 (0.204)	0.858 (0.175)	0.866 (0.177)
WTWait*	3.542 (0.877)	3.361 (0.872)	3.495 (0.829)	3.611 (0.838)	3.582 (0.916)	3.774 (1.018)	3.555 (0.811)	3.432 (0.862)	3.556 (0.831)
Moved	0.534 (0.498)	0.616 (0.486)	0.561 (0.496)	0.489 (0.500)	0.503 (0.500)	0.460 (0.498)	0.519 (0.499)	0.597 (0.490)	0.513 (0.499)
Future_move	0.895 (0.891)	0.990 (0.892)	0.758 (0.883)	0.722 (0.859)	0.865 (0.893)	0.949 (0.890)	0.827 (0.890)	1.081 (0.882)	0.995 (0.882)
Tenant	0.312 (0.463)	0.352 (0.477)	0.560 (0.496)	0.184 (0.387)	0.155 (0.362)	0.203 (0.402)	0.223 (0.416)	0.458 (0.498)	0.332 (0.471)
Urban	0.588 (0.492)	0.485 (0.499)	0.496 (0.500)	0.635 (0.481)	0.613 (0.487)	0.672 (0.469)	0.626 (0.483)	0.560 (0.496)	0.643 (0.479)
Income	30.679 (23.304)	29.775 (19.701)	36.533 (21.263)	29.661 (17.684)	14.566 (10.077)	10.540 (10.462)	27.884 (16.959)	42.562 (25.384)	48.433 (29.009)
Education	0.641 (0.479)	0.573 (0.494)	0.508 (0.500)	0.821 (0.383)	0.538 (0.498)	0.661 (0.473)	0.609 (0.488)	0.885 (0.319)	0.609 (0.487)
Age	41.367 (12.765)	42.345 (13.480)	42.935 (12.978)	43.073 (12.584)	38.745 (11.770)	36.277 (10.259)	41.902 (12.246)	43.048 (13.374)	41.572 (13.140)
Male	0.508 (0.499)	0.502 (0.500)	0.520 (0.499)	0.495 (0.500)	0.520 (0.499)	0.504 (0.500)	0.513 (0.499)	0.503 (0.500)	0.504 (0.500)
N	11,256	1,607	1,534	1,390	1,379	1,136	1,407	1,166	1,637

* Descriptive statistics are reported for original items (rather than the z-score). Calculating means and standard deviations assumes that the points on the inherently ordinal scale are equidistance and the data can be interpreted as interval.

Table A1: Summary statistics, mean and standard deviation of the covariates

Annex B: Eliciting risk and time preferences via multiple price list experiments

Modelling risk and time preferences

To model individual preferences for risk and time, we rely on a standard version of the expected utility framework, using the following utility function: $u(x) = x^{\alpha}$, where *x* reflects wealth and α (≥0) is the parameter reflecting risk preferences. To capture individual preferences for wealth at different points in time, we use the standard model of discounting

(A1) $\boldsymbol{U_t}(x_t, \dots, x_T) = E[\sum_{k=0}^{T-t} \delta^k u(x_{t+k})]$,

where $\boldsymbol{U_t}(x_t, \dots, x_T)$ is the expected utility of a stream of wealth gains $x_0, \dots, x_T$ at different points in time from 0 (now) to T. $u(x_t)$ is the utility of the wealth x at time t, and δ is the annual time discounting factor.[7]

Joint elicitation and calculation of preferences for risk and losses, present bias and standard time discounting

In all Multiple Price List experiments (MPLs), participants faced a list of choices between two options, A and B, and were asked for each choice to indicate their preferred option.[8] The monetary amounts displayed to participants were adjusted across countries with different currencies to keep the relative value similar in terms of purchasing power. The following rates were applied: Poland: 1€ = 3 PLN; Romania: 1€ = 3 RON; Sweden: 1€ = 10 SEK; UK: 1€ = 1£. In all Eurozone countries, the monetary amounts shown to participants were identical.

Elicitation of time preferences

Option A in Table A2 specified a monetary gain to be paid in six months and one week and Option B a monetary gain to be paid in 12 months. In general, the more often Option A is chosen, the greater the respective participant discounts future gains.

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7 δ=1 / 0<δ<1 means that the participant is not discounting future outcomes / discounting future outcomes.

8 To avoid order bias, we randomized the order of the decisions presented to participants. Thus, participants had a 50% chance of seeing AB and a 50% chance of seeing BA.

Line	Option A	Option B
1	Receive 98€ in 6 months and one week	Receive 100€ in 12 months
2	Receive 94€ in 6 months and one week	Receive 100€ in 12 months
3	Receive 90€ in 6 months and one week	Receive 100€ in 12 months
4	Receive 86€ in 6 months and one week	Receive 100€ in 12 months
5	Receive 80€ in 6 months and one week	Receive 100€ in 12 months
6	Receive 70€ in 6 months and one week	Receive 100€ in 12 months
7	Receive 55€ in 6 months and one week	Receive 100€ in 12 months

Table A2: Multiple price list for eliciting time preferences (MPL 1)

Elicitation of risk preferences

In MPL 2, participants selected among a series of 14 choices between two options A and B. In both options in Table A3, respondents faced a lottery that paid either a high or a low monetary gain with equal probability of 0.5 (this probability was introduced as a coin flip). Note that Option A had a lower variance compared to Option B, but a higher expended value in Lines One to Seven; after Line Seven, Option B had a higher expected value.

Line	Option A		Option B	
	Coin shows Heads	Coin shows Tails	Coin shows Heads	Coin shows Tails
1	50€	40€	54€	10€
2	50€	40€	58€	10€
3	50€	40€	62€	10€
4	50€	40€	66€	10€
5	50€	40€	70€	10€
6	50€	40€	74€	10€
7	50€	40€	78€	10€
8	50€	40€	82€	10€
9	50€	40€	87€	10€
10	50€	40€	97€	10€
11	50€	40€	112€	10€
12	50€	40€	132€	10€
13	50€	40€	167€	10€
14	50€	40€	222€	10€

Table A3: Multiple price list for eliciting risk preferences (MPL 2)

Different stakes

For about 10% (7%) of the total sample, all values shown in the MPLEs were multiplied by 10 (divided by 10), relative to the baseline treatment.

Incentivization

To mitigate hypothetical bias, 54% of the participants were incentivized (only for medium and low stakes). Among those incentivized, a random subset of 1% of participants was paid based on their actual choices. The selected participants were sent a prepaid credit card (MasterCard) with the amount they had won by postal mail; they could use this card in any online or offline shop accepting MasterCard. In total, 75 participants won an average of 54.43 euros (ranging from 0 to 250 euros).

Calculation of preference parameters

We calculated preference parameters individually for each respondent by use of their switch-points, i.e. the points at which a given respondent started to prefer Option B over Option A in each of the MPLs. Subjects with monotonous preferences should have had at most one switch-point in each of the MPLs. We assumed that respondents were indifferent at the mean values of the lines between which they switched: a participant who chose Option A in Line One of MPL 1 and Option B in the remaining lines was assumed to be indifferent between 96€ in six months and one week and 100€ in twelve months. Participants who never (immediately) switched, i.e. always chose A (B) in one MPL, were assumed to be indifferent at the last (first) line of this MPL. The switch-points thus provided two equations (one for each MPL) that could be solved for the two unknown preference parameters. We also note that, unlike the approach of using individual switch points to calculate the two preferences parameters, the joint estimation has no implications for the sign of the correlation between those preference parameters. Participants with multiple switch-points were dropped, resulting in a loss of 10.75% of the sample. This share is lower than in most other studies and comparable to Har

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