The price of risk in residential solar investments

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Abstract

Households are key actors in decarbonizing our economy, especially when it comes to investments in a decentralized energy system, such as solar photovoltaics (PV). The phasing-out of feed-in tariffs, and unexpected policy changes in the wake of an increasingly polarized climate debate, require residential PV investors to bear new risks. Conducting a discrete choice experiment coupled with a randomized informational treatment among potential residential solar investors in Switzerland, we test whether policy and market risks deter households from investing in solar. We find that salient policy risk reduces households' intention to invest in solar, especially for risk-averse individuals. Conversely, households seem less sensitive to market risk: residential solar investors accept volatile revenues, as long as a price floor for excess electricity sold to the grid is guaranteed. Our study suggests that keeping perceived policy uncertainty low is more important for residential solar investors than fully hedging against electricity market risk.

Highlights

- Policy risk negatively affects Swiss households' willingness to invest in solar
- Households may underappreciate policy risk due to information asymmetries
- If new information makes policy risk salient, some are likely to leave the market
- Households are rather insensitive to market risk, if a positive price floor exists
- Residential solar investors care more about stable policies than secure revenues

JEL classifications

D1, D81, O33, Q42

Keywords

residential solar investors; risk preferences; policy risk; market risk; discrete choice experiment; information asymmetries

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1 Introduction

Transitioning from fossil to renewable electricity generation is necessary to successfully address climate change. Among all renewable energy solutions, solar photovoltaics (PV) are expected to expand globally the most over the next 5 years, with small-scale solar PV systems playing a key role (IEA 2018b). Over the last ten years, households, in particular, have contributed substantially to the financing of small-scale solar capacity (Bergek, Mignon, and Sundberg 2013; Karneyeva and Wüstenhagen 2017; Clean Energy Wire 2018), by investing in solar PV systems installed on residential buildings. Households tend to represent the lion's share in terms of the number of installed systems and often also play an important role in terms of installed capacity.

Households are hence important actors in the energy transition – not just as consumers, but also as investors. A predictable and stable framework is deemed critical for attracting investment (Baker, Bloom, and Davis 2016; World Bank 2019), and the energy sector is no exception. Past literature has shown that reducing policy and market risk is an important feature of effective and efficient policy design (Mitchell, Bauknecht, and Connor 2006; Butler and Neuhoff 2008; Barradale 2010; Lüthi and Wüstenhagen 2012; Salm 2018; Botta 2019; Ostrovnaya et al. 2020). In this literature, and by extension in this paper, "policy risk" is defined as the risk emerging from the uncertainty around future energy and climate policies and their potential to worsen the investment case for renewable energy producers, while "market risk" refers to the risk emerging from the fact that future monetary benefits from renewable electricity generation depend on the uncertain evolution of market variables, such as the price of electricity.

However, despite the importance of residential investors in financing decarbonization of the energy system, past empirical studies assessing the role of risk in investment decisions have traditionally focused mostly on corporate and institutional investors. With this paper, we contribute to closing this research gap by investigating to what extent households' willingness to invest in solar PV systems depends on policy and market risk.

This question is especially relevant in a situation where recent policy developments have made the investment environment risky for owners of residential solar PV systems. For instance, recently, a number of European countries unexpectedly, and in some cases retrospectively, reduced subsidies to solar producers (IEA 2018a). Policy uncertainty has also concerned federal renewable support schemes in the United States (Barradale 2010). When policy risk materializes, it leads to unexpected losses for solar investors. Looking ahead, the increasing polarization of the climate change debate (Pidgeon 2012; Fisher, Waggle, and Leifeld 2013; Fisher and Leifeld 2019) could make U-turns in energy and climate policy more likely, thus increasing policy risk perceived by investors. Moreover, the change in the policy design from promotion instruments that provide residential solar investors with long term state-guaranteed revenues (e.g. feed-in tariffs) to investment grants, feed-in premia, and incentives for self-consumption (REN21 2017), implies a higher degree of uncertainty around the monetary benefits of solar investments, which now depend on the uncertain evolution of electricity market variables. That is, residential solar investors are also becoming increasingly subject to market risk.

In this risky environment, would households continue to invest in decentralized energy, and hence provide a key contribution to decarbonization? We investigate this question by analyzing stated preferences for intention to invest in residential solar PV systems under different levels of policy and market risk. Stated preferences are obtained through a discrete choice experiment, which we couple with a randomized informational treatment to test for information asymmetries on the assessment of policy risk. In our choice experiment, participants have to tradeoff between hypothetical solar PV systems for their house, each of which is characterized by different levels of policy- and market-driven investment risk. In the treatment condition, additional information from publicly available sources is provided to participants to make them aware of the possibility of policy changes that can potentially affect the payment of future financial support for existing solar PV systems. Hence, we can test directly whether policy risk is entirely factored in to households' expectations or if, instead, households proceed to a revision of their beliefs when new information makes policy risk salient. The study was realized online with a sample of 750 Swiss households, selected to represent a realistic segment of potential PV investors. Switzerland, with more than 80,000 installations, is one of Europe's fastest growing residential solar markets and one of the countries in the world with the highest density of solar PV (IEA 2018a; Swiss Federal Office of Energy 2019). Switzerland is also one of the countries transitioning from feed-in tariffs to investment grants and one of the countries in which policy changes occurred leading to the materialization of policy risk. In particular, it has been characterized by policy risk ever since the introduction of feed-in tariffs in 2009, since both the timing and the amount of the subsidy were characterized by uncertainty (Karneyeva and Wüstenhagen 2017). Furthermore, Switzerland is a very interesting context to analyze households' (voters') expectations, due to the high permeability of its democratic system.

We find that households interested in purchasing a solar system in the near future are not correctly informed about the materiality of policy risk and tend to underestimate it. Therefore, if policy risk becomes salient to them and it is factored in in their investment decisions, it significantly reduces their intention to invest in solar PV. Households who have stronger risk aversion are less likely to invest in solar PV systems and are more sensitive to changes in policy risk and its salience. When becoming aware of policy risk, some individuals go as far as to shy away from an investment in solar altogether, rather than reducing the amount of money they invest in the technology. Moreover, we find that, compared to other categories of renewable investors, households are less sensitive to market risk. Therefore, we conclude that keeping perceived policy uncertainty low is more important for residential solar investors than fully hedging them against market risk.

This paper contributes to two strands of literature. First, we contribute to an emerging literature on the role of risk in renewable energy investment decisions, which has focused so far mainly on corporate and institutional investors. This literature identifies two main sources of risk that significantly deter investment decisions of professional investors: policy and market changes. As for market risk, the success of FITs in creating viable markets for emerging renewable energy technologies has been explained by their ability, with respect to business as usual, to reduce market risk borne by producers (Mitchell et al. 2006, Butler & Neuhoff 2008). In fact, exposure to market risk, understood as uncertainty about the future revenue stream from a renewable energy project due to volatile electricity market prices, raises the cost of capital for renewable generators and deters investment decisions (Botta 2019; Ostrovnaya et al. 2020). In particular, using a discrete choice experiment design, Salm (2018) and Salm and Wüstenhagen (2018) find that professional investors demand significant risk premiums, in the order of 7 %-9 % higher internal rate of return, for full exposure to electricity price risk. Further, Salm (2018) finds that 56 % of European institutional investors and 30 % of electric utilities would regard a renewable energy project that is fully exposed to electricity price risk as unacceptable. As for policy risk, European and US-based professional investors tend to be very sensitive to policy uncertainty. In particular, Lüthi and Wüstenhagen (2012), using evidence from a discrete choice experiment with professional solar PV developers, quantify significant "price tags" that can be attached to specific policy risks, including uncertainty on future incentive payments induced by an approaching capacity cap. Barradale (2010) concludes that uncertainty on investment returns generated by the unpredictability of support policy can deter US-based energy professionals from taking positive investment decisions. We contribute to this strand of literature by assessing the impact of policy and market risk on households' intention to invest in solar PV, which is still unexplored despite the fact that this investor type plays a key role in financing the decarbonization our economy, especially when it comes to investments in a decentralized energy system.

Second, we contribute to a broader literature on the diffusion of new technologies and adoption of green innovations in the residential sector. The literature on the diffusion of energy efficient technologies shows that risk considerations are important determinants of households' investment decisions concerning energy efficient technologies. In particular, a number of studies have shown that risk-averse individuals are less likely to invest in energy efficiency (Sutherland 1991; Hassett and Metcalf 1993; Farsi 2010; Qiu, Colson, and Grebitus 2014; Schleich et al. 2019). These findings are consistent with learning by doing and learning from others in the adoption of new technologies (Bass 1969; Mansfield 1961), which play an important role in the market for residential solar PV (see Carattini, Levin, and Tavoni 2019 for a survey of the evidence on peer effects in the adoption of solar PV, which also includes a study for Switzerland, namely Baranzini, Carattini, and Péclat 2017). As in the case of energy efficiency technologies, investment in solar PV systems combines an upfront cost with future benefits that depend on uncertain developments, including changes in government incentives and electricity market prices. There is therefore good reason to believe that risk considerations could be important deterrent factors for households' intention to invest in residential solar. Yet, to the best of our knowledge, this relationship has not been studied so far. Our study fills this gap in the literature. Suggestive evidence on a potential role of risk in households' solar investment decisions, however, can be found in recent empirical studies on residential solar adoption, showing that households significantly discount subsidies for solar if these are not paid immediately to them (Bollinger et al. 2018; De Groote and Verboven 2019). This finding could be attributed to present bias or intrinsic consumer myopia (i.e. systematic overvaluation of the present compared to the future, leading to hyperbolic discounting of future payoffs, see Thaler 1981). Very high observed implicit discount rates may, however, not be entirely driven by time preferences. Aversion to the risk connected to policy uncertainty may also play a role (see Frederick and Loewenstein 2002; Andreoni and Sprenger 2012). That is, risk-averse households may anticipate that a longer time span over which subsidies are received may imply a higher risk of policy change, and could therefore discount financial support that is not paid immediately to them. Our study provides novel evidence on the underlying factors explaining households' discounting of renewable energy subsidies.

The remainder of this paper is structured as follows: Section 2 provides an overview of the relevance of policy and market risk for solar investments; Section 3 presents methodology and data; results are presented and discussed in Section 4; finally, Section 5 concludes.

2 Policy background

A number of countries recently implemented policy changes impacting the profitability of solar investments. Italy and Spain reduced the level of financial support promised to already existing PV systems in 2016; Bulgaria, the Czech Republic, and Romania have discussed or applied such measures in the last three years (IEA 2018a); Switzerland's new Energy Law, passed in 2017, reduced the amount of financial support for already existing PV systems that were in the waiting list for feed-in tariffs (Swiss Federal Office of Energy 2018; *Beobachter* 2018). In the United States, renewal uncertainty concerning the federal production tax credit has deterred long-term investment in wind energy (Barradale 2010). Despite growing awareness of the urgency of addressing climate change and increasing cost-competitiveness of renewable energy sources, the increasing polarization of the climate change debate (Pidgeon 2012; Fisher, Waggle, and Leifeld 2013; Fisher and Leifeld 2019) could make U-turns in energy and climate policy more likely, thus increasing risk for investors. This makes our examination of policy risk all the more relevant.

Recent policy developments have also implications for the level of market risk[1] borne by households investing in solar PV systems. In light of a dramatic decrease in PV technology cost (Creutzig et al. 2017), several governments are reconsidering their policies supporting renewables. In particular, all over Europe we observe the phase-out of policies that provide solar investors with a secure revenue stream such as feed-in tariffs, or FITs (IEA 2018a). Currently discussed or recently implemented alternative support schemes include investment

[1] In line with the literature, we use these two broad categories, "policy risk" and "market risk", while recognizing that the evolution of market variables, such as the retail and wholesale electricity prices, is partly influenced by policy decisions. In this dichotomy, market risk comprises situations whereby unexpected policy changes affect the investment case via their influence on market variables; while policy risk occurs, for instance, in the case of retrospective cuts to an incentive scheme.

grants, feed-in premia, auctions, and incentives for self-consumption of solar energy (REN21 2017). This change has implications in terms of risk borne by solar producers: compared to FITs, the risk related to fluctuating electricity prices (market risk) is shifted from electricity consumers onto residential adopters. The new instruments imply that solar producers have to recover their upfront investment cost through future revenue streams that are uncertain: energy cost savings from self-consumption and revenues from sales of excess electricity production. The amount and stability of electricity sales depend on the characteristics of the agreement that solar investors have with the counterparty purchasing excess solar power (local electric utility, grid operator, or other private entity). The realized amount of energy cost savings from self-consumption is also uncertain at the time of the investment decision, as it depends on the evolution of retail electricity prices and rules on grid charges.

3 Material and Methods

As highlighted in the Introduction, previous studies suggest that households, similarly to professional investors, form perceptions on policy and market risk, which enter their calculations when investing in clean technologies. However, perceived risk may differ from actual risk for households who underestimate or fail to take into account some risk elements when evaluating investment opportunities. Information asymmetries may lead individuals to overestimate risk, slowing down adoption of a new technology (Conley and Udry 2010), or to underestimate risk, which might lead to disappointment and under-investment in a later stage, for instance after the technology hype cycle has peaked (Linden, and Fenn 2003). Underappreciation of risk may be especially likely when such risk is not particularly salient (Simon 1955; 1959), and when the feedback necessary to correct beliefs is relatively infrequent, as it may be the case with policy reversals.

Based on the literature, we expect that, everything else equal, households' likelihood to invest in solar PV systems decreases when policy or market risk increases. Moreover, we conjecture that households tend to be not correctly informed about the actual degree of policy risk and thereby, everything else equal, households' willingness to invest in solar decreases when policy risk becomes more salient. To what extent variation in risk affects people's decisions under uncertainty should depend on their risk preferences, in line with economic theory (Arrow

1951); therefore we expect that, everything else equal, households who have stronger risk aversion are less likely to invest in solar PV systems and are more sensitive to changes in policy and market risk, or in its salience.

To investigate the impact of risk on households' solar investment decisions, we use a discrete choice experiment (DCE) coupled with a randomized informational treatment. DCEs are an indirect method of eliciting individual stated preferences for different product features. It is rooted in the marketing and transport literatures (Green and Srinivasan 1990; Train 2009) and enjoys growing popularity in energy and environmental economics (Johnston et al. 2017), political science (Bechtel and Scheve 2013; Hainmueller, Hopkins, and Yamamoto 2014), and investor research (Masini and Menichetti 2012; Salm 2018). Previous studies have adopted DCEs to investigate energy investment decisions of households, including the purchase of a residential solar PV system (Islam 2014; Bao et al. 2017; Hille, Curtius, and Wüstenhagen 2018), the purchase of a product bundle of an electric vehicle with a residential solar PV system (Priessner and Hampl 2020) and energy efficiency investments in the home (Alberini, Banfi, and Ramseier 2013; Dharshing, Hille, and Wüstenhagen 2017). Participants in DCEs have to choose repeatedly between two, or more, hypothetical product alternatives which randomly vary on a number of dimensions, known as "product attributes", such as price, brand etc. (Green and Srinivasan 1990; Train 2009). The analysis of participants' choices over a large number of rounds ("choice tasks"), where the levels of the attributes are randomly combined across the presented alternatives, allows to estimate the impact of each attribute on the likelihood to purchase the product, as well as the influence of changes in attribute levels on respondents' utility, and hence ultimately willingness to pay (Green and Srinivasan 1990; Train 2009).

In what follows we describe the data and sampling procedure, the randomized informational treatment, the DCE design, and the empirical approach for the data analysis. Appendix D shows the full survey questionnaire, translated to English.[2]

3.1 Data and Sampling procedure

We carefully identified a sample of 750 potential residential solar PV investors in Switzerland, who participated in our online survey in December 2018. In our study, potential residential

[2] The original questionnaire was available in French, German, and Italian.

solar PV investors are defined as households who report to be capable of and interested in purchasing a solar PV system for their own house in the next 5 years. This is important because the external validity of stated preference studies is maximized by the verisimilitude of hypothetical choices (Lancsar and Swait 2014). We selected our sample of Swiss potential residential solar PV investors by stratifying survey invitations and implementing precise screening rules for participation in the survey. Our sample was recruited by a professional Swiss market research firm, that operates an actively recruited panel of 100'000 people living in Switzerland. The market research firm remunerated the respondents who successfully completed the survey by means of 'credit points' that they can spend in designated online shops. A quality control question was added to exclude inattentive respondents.[3]

The survey was accessed by 1'492 homeowners, contacted through invitations stratified according to language region, age, gender, political orientation, and education, in order to match the distribution of these variables in the Swiss population. In order to be included in our final sample, respondents had to own a house, have not installed solar photovoltaics yet, and be interested in purchasing a solar PV system in the next 5 years[4] (Figure A.1 in Appendix A). About 8 % of the homeowners who accessed our survey stated that they already owned a solar PV system and were excluded from the final sample; of the remaining respondents, 53 % reported interest in investing in a solar system and were included in the final sample. Note that this expression of interest came after the respondents were informed about the cost range for a typical solar PV system for a residential house in Switzerland (CHF 15,000-30,000) and saw pictures showing how it could realistically look like. Figure A.2 in Appendix A reports the relative importance of each of the possible motives for not being interested in solar as indicated by the respondents. Figure A.2 is based on the 585 observations that were screened out by our survey design and responded our question about lack of interest in solar PV systems.[5] In particular, collected responses point to perceived liquidity and structural barriers to solar adoption. While over a third of households who reported no interest in solar PV systems indicated that

[3] Our "trap question" consisted of a simple attention check asking: "Please select the word 'energy' from the following list." Respondents were given a list of four items to choose from, including 'energy', 'politics', 'environment' , 'buildings' and 'I do not know'. Observations of 42 respondents who selected the wrong answer to this question were not included in the sample.
[4] The corresponding screening question was: "Would you consider installing a solar PV system in the next 5 years? Please consider that the cost range for a typical solar PV system for a residential house in Switzerland is CHF 15,000-30,000, depending on capacity, preferred features, installer etc". Respondents who answered negatively were excluded from the survey.
[5] More precisely, as illustrated in Figure A.1 in Appendix A, 1'492 homeowners accessed the questionnaire: 115 (8 %) were screened out as they own solar already; of the remaining ones, 585 (39 %) were screened out as they reported no interest in solar and all of them responded to the follow up question on lack of interest in solar PV systems.

this investment option was too expensive for them, about another third deemed their house or place of residence not fit for a solar PV system.

Strong actual readiness to invest in solar energy by respondents in our final sample is confirmed by the fact that many respondents were willing to take tangible action towards the purchase of a solar PV system after completing the survey. In particular, 26 % of the survey respondents chose to be redirected to an online platform, run by the Swiss Federal Office of Energy, that provides non-binding quotes for the actual purchase of a solar PV system.

Of course, not all prospective investors become actual investors. However, the relatively high interest observed in our data is consistent with Switzerland being one of the countries in the world with the highest density of solar PV and one of Europe's fastest growing residential solar markets, with about 80,000 installations in 2018 (IEA 2018; Swiss Federal Office of Energy 2019). Using data from the Swiss Federal Office of Energy (see Baranzini, Carattini, and Péclat 2017 for a description), Müller & Trutnevyte (2020) provide forecasts for about the same quinquennial to which our study refers (2018-2022), pointing to continued growth in the Swiss solar market. The level of interest observed in our data is also consistent with another recent survey on building-scale renewable energy technologies in Switzerland (Cousse, Kubli, and Wüstenhagen 2020) and with online traffic to the platform for prospective solar owners run by the Swiss Federal Office of Energy.[6]

Relevant covariates for our sample were measured in the final section of the survey. In particular, we elicited individual risk preferences (i.e. whether respondents tend to be risk-seeker or risk-averse, as per standard procedure in a context unrelated to solar investments) and time preferences (i.e. how much respondents discount future certain gains and so how patient they are) following the approach developed by Falk et al. (2016, 2018) and used in the Global Preference Survey. This approach is experimentally validated and allows to obtain credible estimates of risk and time preferences without incentivized tasks (see Falk et al. 2016, 2018 for more details about the methodology). Respondents' environmental preferences were measured through a standard survey item developed for the World Value Survey (Inglehart et al. 2014).

[6] The total number of unique visitors of this online platform, and in particular of the calculator of solar profitability (energieschweiz.ch/page/de-ch/solarrechner, last accessed June 30, 2020), was about 10,000 visitors per month in 2018. Over a period of 5 years, that would correspond to about 30 % of Swiss homeowners, showing interest in purchasing solar PV systems, based on this platform alone.

Other socio-demographic and psychographic features were gathered through the market research agency. Table A.1 in Appendix A presents the corresponding descriptive statistics for our sample and compares them with the distribution in the entire Swiss population.

3.2 Treatment

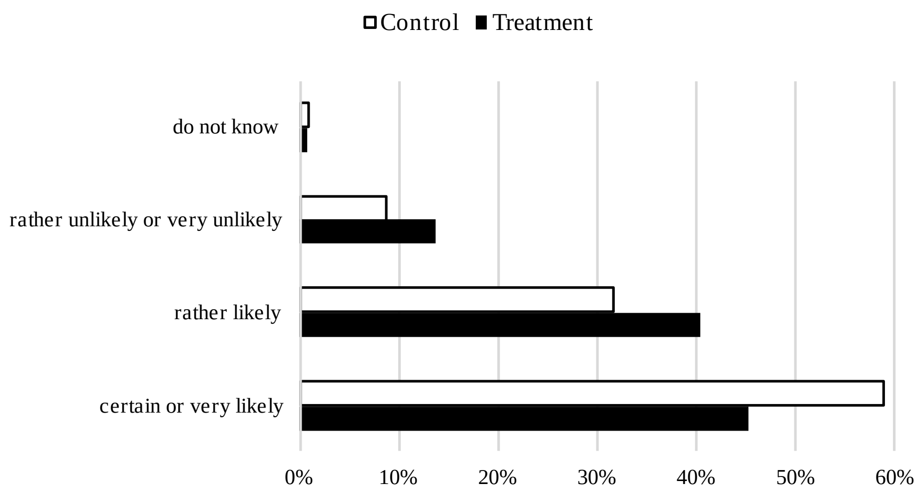
In the first section of the survey, all respondents in our sample read a short introductory text, explaining the features of solar PV systems and informing about existing federal incentives for residential solar PV investors in Switzerland. In particular, they were told about the existence of a one-off investment grant that covers a share of the system cost and is paid after the system is commissioned. All respondents were told that the waiting time for the payment of the grant may exceed two years.[7] Then, respondents were randomly assigned to one of two groups (treatment and control group), with only one group (treatment group) been provided additional information about policy risk connected to solar investments in Switzerland. The randomized provision of information aimed at testing the role of policy risk's salience and existence of information asymmetries in the assessment of risk, consistent with the principles of causal inference (Duflo, Glennerster, and Kremer 2007). Treated respondents were told about policy changes to solar subsidies that actually took place in Switzerland and were informed about factors that could reduce the promised amount of financial support for solar PV systems. Subjects in this group saw a snapshot of an article in one of the most frequently read Swiss online news portals reporting about long delays in the payment of solar subsidies.[8] Table A.2 in Appendix A compares the information set between the treatment and control group. The information that we provided was publicly available, so in principle, if respondents were rational and perfectly informed on risk-adjusted returns from investment in a solar PV system, they would factor in the actual level of policy risk in their choices and our informational treatment would not change their decisions.

[7] Note that in 2018 the Swiss federal government committed to significantly shorten the waiting time for solar incentives, reducing the waiting time for small solar PV systems to 1.5 years. All respondents were informed about this after completing the questionnaire (see Appendix D).
[8] The article was a real article published on the swissinfo.ch portal in December 2017 and available in German, French and Italian (https://www.swissinfo.ch/fre/solaire--des-ann%C3%A9es-d-attente-pour-des-subventions-f%C3%A9d%C3%A9rales/43725970; https://www.swissinfo.ch/ger/alle-news-in-kuerze/jahrelange-wartezeit-fuer-subventionen-des-bundes-fuer-solaranlagen/43725688; https://www.swissinfo.ch/ita/sussidi-per-impianti-solari--tempi-di-attesa-si-allungano/43726218).

Table A.3 in Appendix A shows that the two groups which respondents were randomly assigned to (control and treatment group) are very well, albeit not perfectly, balanced in terms of covariates. As per standard procedure, we include covariates as control variables in our empirical estimations.

Responses to a question on perceived policy risk connected to solar investments, placed after the choice experiment section, suggest that our treatment led to an update of people's beliefs on policy risk, consistent with the presence of information asymmetries. In particular, we asked each respondent: "If you buy a solar system today and the federal government promises you to pay an investment grant after a certain waiting time, how likely do you think it is that you are indeed going to be reimbursed?". The share of people who responded "sure" or "very likely" drops from 59 % to 45 % for the treatment compared to the control group, while the share of people who responded "rather unlikely" or "very unlikely" increases from 9 % in the control group to 14 % in the treatment group (Figure 1). All these differences are statistically significant at the 95% confidence level (Table A.4 in in Appendix A).

Figure 1. Perceived policy risk connected to solar investments, by experimental group (% of respondents)



Y-axis labels represent possible answers to the survey question: "If you buy a solar system today and the federal government promises you to pay an investment grant after a certain waiting time, how likely do you think it is that you are indeed going to be reimbursed?"

3.3 Discrete choice experiment

In the second section of the survey, respondents faced 8 consecutive choice tasks. In each choice task, the respondents had to choose one out of three hypothetical solar PV systems for their own house or select the opt-out option ("I would not choose any of these options"). By giving to respondents the possibility to reject all displayed options, we are able to measure not only the relative preference for a given attribute, but also the overall likelihood that a solar PV system would be accepted. Right before making their choices, respondents were asked to assume that all the proposed solar PV systems could be installed on their house as it was and were asked to answer in the way they would if they were actually taking a real investment decision, as well as reminded about their budget constraint, in line with standard recommendations in the literature on how to reduce hypothetical bias (Arrow et al. 1993).

Displayed solar PV systems were described by a set of 5 attributes, each featuring 4 levels (Table 1). Attribute levels were randomly combined between and across the triplets.[9] Two attributes were chosen to simulate different degrees of policy and market risk. The levels of the attribute "waiting time for grant" simulated increasing policy risk (from "immediate reimbursement" to "undetermined" waiting time), while the levels of the attribute "payment for surplus electricity" simulated increasing market risk (from a fixed compensation to variable payments with increasing volatility). The other attributes were: the total investment cost that an household has to pay upfront, excluding any government support; the percentage of the investment cost covered by the grant and the share of own yearly electricity consumption that the household could supply with her own solar production. We deliberately chose not to show financial performance indicators (such as net present value or payback period) for each investment option, to keep the approach as realistic as possible. In fact, while later in the decision process people are likely to require detailed financial calculations, and possibly external advice, to make their final choice, in the initial screening of investment options the information set of a household is typically limited. Moreover, survey evidence shows that, in the context of similar energy investment decisions, some individuals do not apply sophisticated net present value calculations at all (Sallee 2014; Ebers and Wüstenhagen 2015; Salm, Hille, and Wüstenhagen

[9] All combinations between attribute levels were allowed, with the only exception of the combination between the lowest system cost level (CHF 15,000) and the highest self-consumption level (100 %). The constraint was introduced to rule out a combination that might have otherwise seemed unrealistic, even with a 5-year horizon, according to expert interviews. An efficient DCE design was generated with Sawtooth Software. 900 versions of the choice experiment were created and randomly assigned to the 750 respondents.

2016) and that most households have limited energy-related finance literacy (Brounen, Kok, and Quigley 2013; Blasch et al. 2017; 2018). The selection of attributes and corresponding levels is further discussed in Appendix C. Figure A.3 in Appendix A provides an example of a choice task.

Table 1. Attributes and attribute levels for the choice experiment

Attribute	Levels	Explanatory text shown to respondents
Investment cost	CHF 15,000 CHF 20,000 CHF 25,000 CHF 30,000	This is the total cost of the solar PV system including installation and grid connection. You have to pay this upfront. It excludes government support (see below under "investment grant").
Self-consumption	25 % 50 % 75 % 100 %	Thanks to your solar PV system, a share of your yearly electricity consumption will be covered by your own production; you will buy less electricity from the grid and have lower electricity bills over the lifetime of the solar system (20 years).
Investment grant	10 % 20 % 30 % 40 %	The federal government reimburses you this share of the total cost you spend for the solar PV system. This sum is paid after the system is commissioned (see below under "waiting time for investment grant").
Waiting time for investment grant	No waiting time (immediate reimbursement) Shorter than 1 year 1-2 years Undetermined	The federal government reimburses you part of the total upfront cost, this is the time that you have to wait to receive the money from the government.
Payment for surplus electricity	Fixed: 8 cent/kWh Variable: ranging from 6 to 10 cent/kWh Variable: ranging from 4 to 12 cent/kWh Variable: ranging from 0 to 16 cent/kWh	When you produce more electricity than you use, surplus electricity goes directly into the grid and you will receive a payment for the electricity you send to the grid. The payment can be fixed or variable. A fixed payment remains the same over the lifetime of the solar system. A variable payment depends on the market price of electricity.

3.4 Empirical approach

We estimate a conditional logit model (McFadden 1973; Hoffman and Duncan 1988) for the likelihood to invest in a solar PV system, based on 5,784 choices made by 750 respondents. In the model, the likelihood to invest is a function of the solar PV system characteristics (i.e. the alternative-specific variables for attribute levels in the choice experiment), the characteristics of the individual making the choice (i.e. the respondent-specific covariates measured in the survey), and the experimentally controlled situational factor (i.e. receiving additional information that could make the policy risk more salient to the respondent, or not). Formally, the probability that respondent *n* invests in solar PV system *i* in choice task *t* is:

$$P_{nit} = \frac{e^{\beta' X_{nit}}}{\sum_j e^{\beta' X_{njt}}}$$

whereby X_{nit} represents a vector containing the alternative-specific variables for attribute levels of the solar system *i* presented to respondent *n* in choice task *t*, a set of characteristics of respondent *n*, and a dummy variable equal to 1 if respondent *n* received the treatment.

All alternative-specific variables for attribute levels are dummy coded. We included a large set of respondent-specific characteristics in the model to control for observable factors that, according to the literature, can influence the probability to adopt a residential solar PV system. This choice enables robust estimation of other parameters in the model (for a similar approach, see Newell and Siikamäki 2014). More specifically, the respondent-specific covariates included in our model were: socio-economic characteristics such as age, gender, education, income, financial assets, region of residence, environmental preferences, political orientation, whether the respondent reports to be always among the first ones to buy new technologies and whether the respondent knows anybody among acquaintances and neighbors who has a solar PV system.

In order to control also for unobservable sources of heterogeneity, we complement the conditional logit specification with a mixed logit model (McFadden and Train 2000; Train 2009), following a similar approach to the one adopted by Scarpa and Willis (2010) and Newell and Siikamäki (2014). The mixed logit model assumes a probability distribution for the β coefficients over respondents and so can account for random taste variation in the population (Train 2009). In our mixed logit specifications, coefficients for the alternative-specific variables are assumed to be normally distributed, while the coefficients for respondent-specific covariates are assumed to be fixed. Consistent with the conditional logit estimations, alternative-specific variables are dummy coded in all mixed logit specifications.

The estimation of all our model specifications rests on three assumptions, in line with the theory of consumer behavior developed by Lancaster (1966). First, individuals, when facing different product alternatives, choose the one that maximizes the latent utility they obtain from the product; second, each attribute level can have a distinctive impact on the overall product utility, which is, therefore, the sum of utilities from each product attribute; third, there is some degree of randomness in choices, captured by the error term. Formally, the utility function is defined as:

$$U_{ni} = V_{ni}(X_{ni}) + \varepsilon_{ni}$$

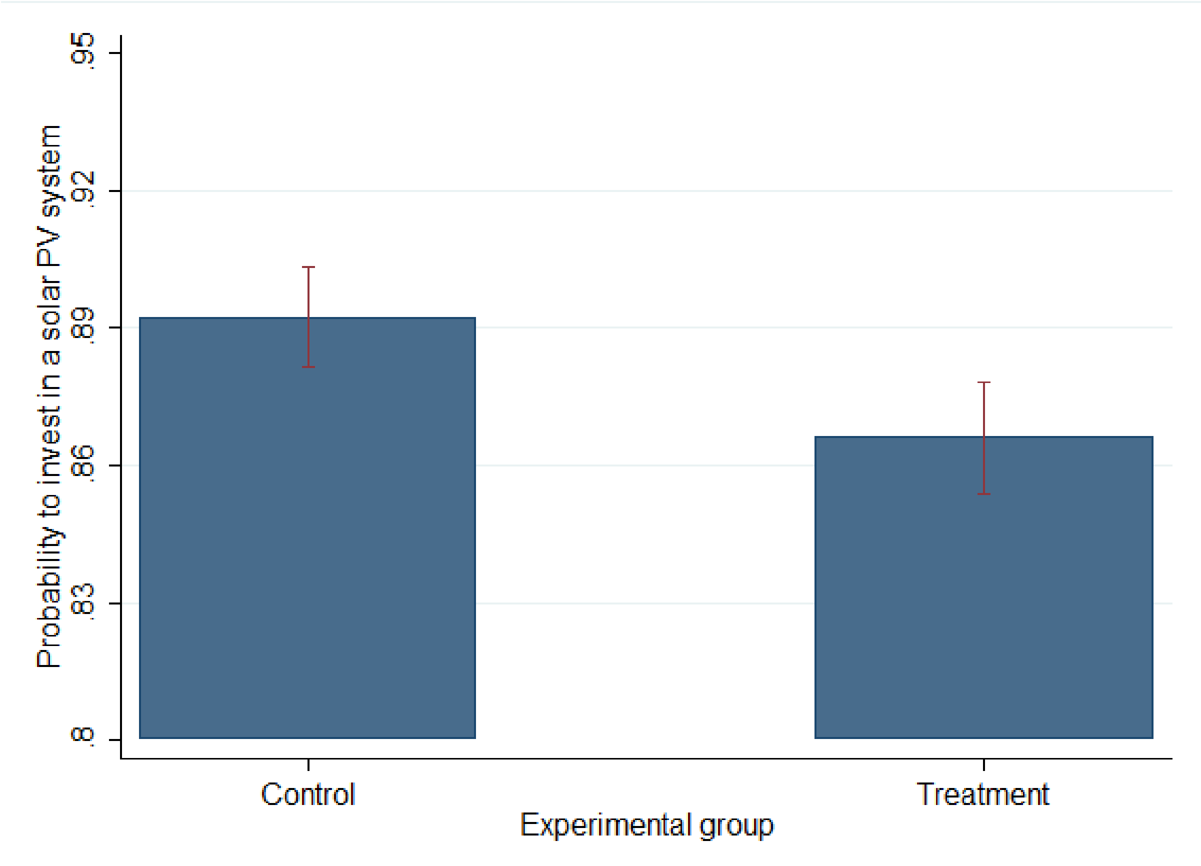
whereby U_{ni} is the latent utility that respondent *n* associates with solar system *i*; V_{ni} is the deterministic part of utility that respondent *n* associates with solar system *i*, which depends linearly on the solar system's attributes and on respondent-specific variables (X_{ni}); ε_{ni} is the error term associated with respondent *n* and solar system *i*. Under the standard assumption that error terms are independent and identically distributed according to a Type 1 extreme value distribution across all individuals and choice tasks, the probability that solar system *i* is chosen over alternatives in the choice task can be modelled as a logistic distribution (McFadden 1973) and estimates interpreted causally, as done in this study.

4 Results and Discussion

4.1 Empirical results

Potential residential solar investors tend to underestimate policy risk. In fact, if Swiss households factored in the risk of solar subsidy cuts in their decisions, we should not observe any difference in likelihood to invest between the treatment and the control group. Instead, our data show that, when policy risk becomes more salient, regardless of the actual level of policy risk, the probability to invest in a solar PV system moderately declines, going from from 89.2 % to 86.6 % (Figure 2). More specifically, receiving just one piece of information on policy risk at the time of the investment decision, as in our experimental treatment condition, increases by 3 % ($p = 0.002$) the probability that a Swiss homeowner, even if he or she initially declared to be interested in solar, eventually decides not to invest in a PV system for her house, after seeing realistic options for it. At current adoption levels, this would be equivalent to 2,000 fewer solar installations over a period of five years for Switzerland alone. Our estimate for the marginal effect of investment cost on solar adoption probability (Table 2) implies that if policymakers wanted to counter the negative effect of a salient policy risk on residential solar adoptions, they would need to subsidize solar to decrease its price by about 10 %, which is definitely non-negligible for policymakers (and taxpayers alike).

Figure 2. Probability to invest in a solar PV system, by experimental group



Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals (p = 0.002, Chi-squared test). Figure B.13 in Appendix B provides the same result, rescaled.

The treatment effect is only slightly smaller (2.7 %, p = 0.021) when we control for our set of respondent-specific covariates[10], individual time preferences and the characteristics of the solar system in the DCE (column 3 of Table 2). Treated respondents become more sensitive to policy risk compared to those in the control group (Figure B.10 in Appendix B).

[10] Socioeconomic characteristics (age, gender, education, income, financial assets, region of residence), environmental preferences, political orientation, whether the respondent reports to be always among the first ones to buy new technologies and whether the respondent knows or is aware of anybody among acquaintances and neighbors who has a solar PV system (see Table A.1 in Appendix A for details).

Table 2. Choice experiment: estimated marginal effects from conditional logit model

			Without controls	With controls	With controls, time preferences	With controls, time preferences, and treatment/risk preference interaction
Waiting time	Immediate	(baseline)				
	<1 year		-0.04*** (0.009) *<0.001*	-0.02*** (0.01) *0.02*	-0.03*** (0.010) *0.01*	-0.03*** (0.010) *0.01*
	1-2 year		-0.09*** (0.009) *<0.001*	-0.07*** (0.01) *<0.001*	-0.08*** (0.010) *<0.001*	-0.08*** (0.010) *<0.001*
	Undetermined		-0.17*** (0.010) *<0.001*	-0.15*** (0.01) *<0.001*	-0.15*** (0.009) *<0.001*	-0.15*** (0.009) *<0.001*
Payment for surplus electricity	Fixed: 8 cent/kWh	(baseline)				
	Variable: 6 - 10 cent/kWh		-0.03*** (0.009) *<0.001*	-0.01 (0.01) *0.17*	-0.02 (0.01) *0.10*	-0.02 (0.01) *0.11*
	Variable: 4 - 12 cent/kWh		-0.03*** (0.009) *<0.001*	-0.02* (0.01) *0.06*	-0.02** (0.010) *0.03*	-0.02** (0.010) *0.04*
	Variable: 0 - 16 cent/kWh		-0.07*** (0.01) *<0.001*	-0.05*** (0.01) *<0.001*	-0.05*** (0.010) *<0.001*	-0.05*** (0.010) *<0.001*
Investment cost	CHF 15,000	(baseline)				
	CHF 20,000		-0.05*** (0.01) *<0.001*	-0.03*** (0.011) *0.01*	-0.03*** (0.011) *0.01*	-0.03*** (0.011) *0.01*
	CHF 25,000		-0.11*** (0.01) *<0.001*	-0.10*** (0.01) *<0.001*	-0.10*** (0.010) *<0.001*	-0.10*** (0.010) *<0.001*
	CHF 30,000		-0.17*** (0.01) *<0.001*	-0.15*** (0.010) *<0.001*	-0.16*** (0.010) *<0.001*	-0.16*** (0.010) *<0.001*
Investment grant	10 %	(baseline)				
	20 %		0.09*** (0.011)	0.12*** (0.013)	0.12*** (0.013)	0.12*** (0.013)

		<0.001	*<0.001*	*<0.001*	*<0.001*
	30 %	0.18***	0.20***	0.20***	0.20***
		(0.013)	(0.013)	(0.013)	(0.013)
		<0.001	*<0.001*	*<0.001*	*<0.001*
	40 %	0.26***	0.29***	0.29***	0.29***
		(0.014)	(0.014)	(0.013)	(0.014)
		<0.001	*<0.001*	*<0.001*	*<0.001*
Self-consumption	25 %	(baseline)			
	50 %	0.21***	0.26***	0.26***	0.26***
		(0.017)	(0.017)	(0.017)	(0.017)
		<0.001	*<0.001*	*<0.001*	*<0.001*
	75 %	0.44***	0.49***	0.48***	0.48***
		(0.017)	(0.015)	(0.015)	(0.015)
		<0.001	*<0.001*	*<0.001*	*<0.001*
	100 %	0.61***	0.64***	0.64***	0.64***
		(0.016)	(0.013)	(0.013)	(0.013)
		<0.001	*<0.001*	*<0.001*	*<0.001*
	Treatment	-0.071***	-0.025**	-0.027**	0.007
		(0.018)	(0.012)	(0.012)	(0.019)
		<0.001	*0.03*	*0.02*	*0.69*
	Time preferences			0.025***	0.023***
				(0.004)	(0.004)
				<0.001	*<0.001*
	Treatment and high risk aversion				-0.047**
					(0.021)
					0.025
	Choice tasks	6000	5272	5272	5272
	Respondents	750	659	659	659
	Controls	NO	YES	YES	YES

Standard errors in parentheses, clustered by respondent in specification in the first column, heteroskedasticity-consistent standard errors in the others. P-values are reported in italics. All models without case-specific constant term. Estimates report marginal effects (at means) from alternative-specific conditional logit model. Dependent variable is the probability to invest in solar PV system. The reduction in number of observations in specifications in the second, third and fourth columns, compared to specification in the first column, follows from missing data for some of the covariates included in the model. Table B.4 in Appendix B shows all control variables included in the model. *** p<0.01, ** p<0.05, * p<0.1.

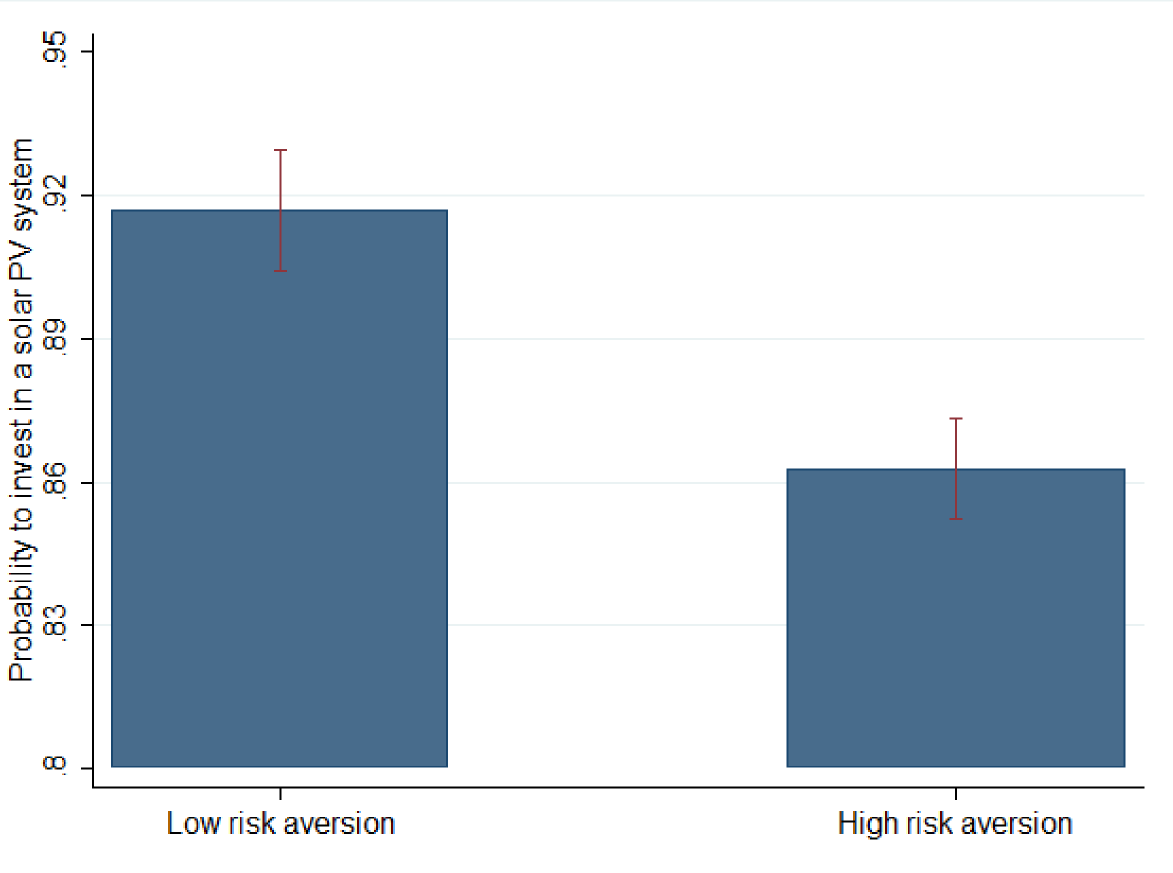
As shown in Table B.6 in Appendix B, our results on the significant impact of treatment are, as expected, larger when accounting for compliance rates according to the Local Average

Treatment Effect framework developed by Imbens and Angrist (1994). Additional robustness tests are provided in Figure B.11 in Appendix B and suggest that the impact of our informational treatment does not vary depending on the strength with which households state their interest in investing in residential solar over the next 5 years.

Hence, revision of beliefs related with policy risk could reduce intention to invest in solar. Figure 2 focuses on the extensive margin, i.e. whether policy risk influences the intention to invest in solar energy. We now turn to the intensive margin, i.e. whether households are more likely to select cheaper installations as policy risk becomes more salient. On the intensive margin, we find that, while salience of policy risk reduces the probability to invest, the amount that a household is willing to invest per solar PV system is not significantly lower for households in the treatment group (Figure B.7, Figure B.8, Figure B.9 and Table B.2 in Appendix B). That is, households exposed to the treatment are less likely to adopt solar panels, no matter how expensive. This finding suggests that policy risk increases the likelihood that some individuals drop their intention to invest in solar altogether, rather than reduce the size of their investment.

We then investigate how the treatment changes intentions to invest in solar energy depending on the respondent's risk preferences. Straightforwardly, if some individuals in our sample were indifferent to risk, changing the salience of policy risk should have no effect whatsoever on their behavior. First, however, we need to determine whether we observe a general relationship between risk preferences and adoption of solar PV. We do so in Figure 3. Most people in our sample, as in the underlying population, care about risk: risk-averse households represent 70 % of our sample (Table A.1 in Appendix A). Figure 3 shows that this segment displays, in general, a lower-than-average intention to adopt solar. All else equal, risk-averse households are less likely to invest in a solar PV system than individuals more prone to risk: the probability to invest in a solar PV system ranges from 86 % for the most risk-averse individuals to 92 % for the least risk-averse ones, that is a 6 % reduction ($p < 0.001$, Chi-squared test, Figure 3). This relationship is confirmed when only looking at the control group, to control for any effect of the treatment (Figure 4). The relationship between risk aversion and intention to invest in solar energy contributes to explaining why some people do not invest in solar PV systems, even when the expected monetary gain for the residential solar producer is positive.

Figure 3. Probability to invest in a solar PV system, by individual risk aversion



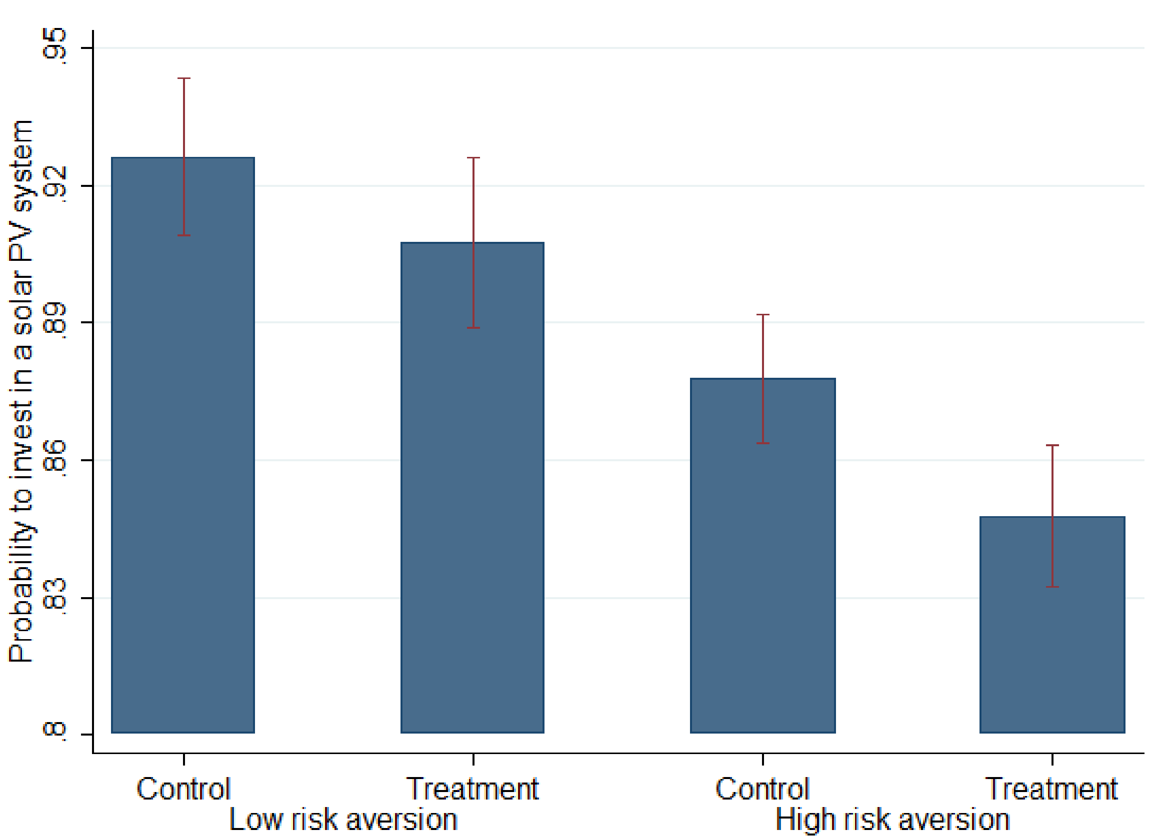
Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. ($p < 0.001$, Chi-squared test). Figure B.14 in Appendix B provides the same result, rescaled. Low risk aversion indicates individuals with a risk preference score equal to 5, 6, 7, or 8; high risk aversion indicates individuals with a risk preference score equal to 1, 2, 3 or 4. Risk preference score goes from 1 to 8, the higher the lower the risk aversion. See Table A.1 in Appendix A for more details.

When we look at how our informational treatment affects people's responses depending on their risk aversion (Figure 4), we observe, consistent with economic intuition, that for people who have low risk aversion, increasing the salience of policy risk does not reduce their intention to adopt solar. In contrast, highly risk-averse individuals react the most to the informational treatment: within this group, treated individuals are 3.4 % less likely to invest in solar than those in the control group ($p = 0.005$, Chi-squared test, Figure 4). When controlling for our set of respondent-specific covariates and the characteristics of the solar system in the DCE, the treatment effect on risk-averse individuals amounts to 5 % ($p = 0.025$, column 4 of Table 2).[11] That is, the average effect of 2.7 % is the sum of a relatively larger reaction by individuals with

[11] Note that the impact of the treatment is not significantly different between more and less patient households (Figure B.4 in Appendix B). This suggests that the information we gave to the treatment group had the desired impact: making people aware of the risk that they will not receive the governmental subsidy, rather than making them simply aware that the reimbursement time becomes longer than what initially expected.

high risk aversion and no reaction by individuals with low risk aversion. This finding about the relationship between risk preferences, revision of beliefs about policy risk, and intention to invest in solar energy is qualitatively similar when we classify individuals into three categories for risk aversion, rather than two (see Figures B.1 and B.2 in Appendix B), is robust to splitting the sample according to the strength of risk aversion (Table B.1 in Appendix B) or according to the strength with which households state their interest in investing in residential solar (Figure B.12 in Appendix B).

Figure 4. Probability to invest in a solar PV system, by individual risk aversion and experimental group



Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. Results of Chi-squared test for the difference in probability to invest between experimental groups: p= 0.148 for low risk aversion, p= 0.005 for high risk aversion. Figure B.15 in Appendix B provides the same result, rescaled. Low risk aversion indicates individuals with a risk preference score equal to 5, 6, 7, or 8; high risk aversion indicates individuals with a risk preference score equal to 1, 2, 3 or 4. Risk preference score goes from 1 to 8, the higher the lower the risk aversion. See Table A.1 in Appendix A for more details.

Our result on the impact of the treatment on the probability to invest in solar is robust to accounting for any remaining unobserved heterogeneity in individual preferences for solar systems' characteristics, as shown when fitting a mixed logit model with random coefficients for attribute-level dummy variables and fixed coefficients for respondent-specific covariates (Table B.5 in Appendix B). More specifically, even when allowing for heterogeneous random tastes towards solar systems' characteristics, the impact of the treatment on investment probability remains significant and of similar magnitude to the specifications presented in Table 2.

Our analysis also shows that, when policy risk increases, regardless of its salience, the probability that a household invests in a solar PV system declines. The marginal effects for the "waiting time" attribute in Table 2 show that the longer the waiting time for receiving the grant is, the more likelihood to invest in residential solar declines (see also Figure B.10 in Appendix B for a visual illustration of this effect). In particular, all else equal, when waiting time is undetermined, and therefore policy risk is at its maximum, the probability to invest drops by 15 % ($p < 0.001$), as opposed to when reimbursement is immediate (or within one year) and hence policy risk is relatively low (columns 2, 3, and 4 in Table 2). Paying out the financial support within one year, instead of after an undetermined period of time, would have about the same positive impact on residential solar adoption as increasing the amount of financial support from 30 % to 40 %, or could compensate for a reduction in financial support from 30 % to 20 %.

We can attribute this effect to increasing policy risk connected to longer waiting time, rather than exclusively to households' impatience, for two reasons. First, coefficients for the "waiting time" attribute do not change when controlling for individual time preferences (columns 3 and 4 in Table 2).[12] Second, coefficients for the "waiting time" attribute are only slightly different when considering only people with a low intertemporal discount rate (i.e. more patient individuals), compared to people with a high intertemporal discount rate (i.e. less patient individuals), as done in Table B.3 in Appendix B. Even for the most patient households, having to wait for the subsidy payment for 1-2 years reduces intention to invest in solar by 7 % ($p < 0.001$), compared to immediate subsidy payment, and not knowing when the subsidy is eventually paid reduces it by 15 % ($p < 0.001$).

The negative impact of a longer waiting time gets larger the stronger the household's risk aversion is (Table B.1 in the Appendix B), confirming that the negative effect of the "waiting time"

[12] In line with economic intuition, the coefficient of the time preference score is positive and significant, implying that the more patient the household is, the more likely she is to invest in a solar PV system, as also confirmed by the comparison of probability to invest between people with low and high intertemporal discount rate (Figure B.3 in Appendix B).

attribute on investment probability is motivated by aversion to policy risk. In particular, individuals with low risk aversion, in contrast to those with high risk aversion, tend to be indifferent between an immediate payment and a payment within one year. For more risk-averse households, waiting for the subsidy for 1-2 years reduces intention to invest by 9 % ($p < 0.001$, column 1 in Table B.1 in the Appendix B), compared to a 6 % reduction ($p < 0.001$, column 2 in Table B.1 in the Appendix B) for the less risk-averse ones.

While policy risk matters to households, they do not seem to be very sensitive to market risk: a variable price for electricity sold to the grid does not reduce (or only reduces marginally) intention to invest in solar PV compared to a fixed price, unless the former foresees the possibility that reimbursement can go down to zero cents per kilowatt hour. When the interval for variable payment for surplus electricity includes zero, households are 5 % less likely to invest in solar PV compared to payment schemes that guarantee a positive price floor, no matter how volatile the payment is ($p < 0.001$, columns 2, 3 and 4 in Table 2). The negative impact of the risk of not getting any compensation at all for electricity fed into the grid holds true also for individuals who feature low risk aversion (Table B.1 in Appendix B).

4.2 Discussion

We find that perceived investment risk, especially when driven by policy uncertainty on incentive schemes, can significantly deter households from adopting a solar system. This finding enlarges our understanding of how risk considerations affect households' decisions in the energy domain, by providing novel evidence that complements previous studies focusing on energy efficiency investments and energy consumption decisions (Sutherland 1991; Hassett and Metcalf 1993; Farsi 2010; Qiu, Colson, and Grebitus 2014; Volland 2017; Schleich et al. 2019).

Our results also show that the high implicit discount rates for solar subsidies found in the literature (Bollinger et al. 2018; De Groote and Verboven 2019) are not only driven by time preferences, but also by the presence of policy risk, to which people are averse. Financial support spread over time is therefore discounted by households not just because they are impatient or liquidity constrained, but also because they tend to factor in the risk that the government may fail to pay the promised amounts. This finding is consistent with the literature on intertemporal choice showing that discounting behavior cannot be solely explained by individual time preferences, but it also significantly depends on factors that diminish the expected utility generated by a future consequence, including uncertainty (Frederick and Loewenstein 2002; Andreoni and Sprenger 2012).

Our results expand existing literature on the role of risk in renewable energy investment decisions, by suggesting that a substantial difference in risk sensitivity exists between households and professional investors. Whereas previous studies show that exposure to market risk is a key concern for professional investors (e.g. Salm 2018, Botta 2019), we find that volatile revenues from electricity sales are less of a concern for households investing in solar energy. We relate this finding to the “absolute magnitude effect” in choices under risk: people tend to be less risk-averse when the stakes are low (Prelec and Loewenstein 1991). In the context of residential solar investments in a post-feed-in-tariff regime, market risk is typically framed as uncertainty around small gains (expressed in terms of cents per kWh), whereas policy risk relates to larger monetary amounts (expressed in thousands of Swiss francs per system).

Our study informs policymakers on options to maintain a sustained adoption of residential solar in a post-feed-in-tariff regime while correctly managing citizens’ expectations. In particular, two sets of policy implications can be drawn from our findings.

As to policy risk, governments that incentivize private investments in renewables incur a cost represented by the risk premium asked by households to compensate for their rational expectations of potential policy changes. This cost makes it harder to achieve renewable targets within a given budget. In order to lower this cost and correct for the potential detrimental impact of perceived policy risk on residential solar adoption decisions, policymakers should aim at keeping perceived policy risk low for residential solar investors. This objective can be achieved in three ways. First, policymakers could shorten waiting times for receiving financial support or paying it upfront through investment grants. Investment grants can therefore be an effective instrument for the promotion of residential solar, as already suggested by recent contributions (e.g. De Groote and Verboven 2019). Investment grants that are paid upfront appear to be especially effective based on our study. Second, as the impact of policy risk on investment decisions depends on the information that people receive, policymakers should signal clearly to prospective solar adopters their commitment not to worsen the business case for solar by changing the “rules of the game” retrospectively. In the European context, this could be done by informing prospective residential solar investors about an explicit ban for retrospective policy changes, as foreseen in the new European Union Renewable Energy Directive that shall be implemented by Member States by the end of 2021. Third, when governments have strong preferences against immediate payments, and are not willing to tie their hands across political cycles in the provision of incentives, other market participants, such as installers or local authorities, could offer pre-financing to households. Such a risk transfer from residential solar investors to other players may or may not reduce the overall cost of solar PV deployment, depending on the risk premium charged by the latter. In any case, our study suggests that policy risk is not particularly salient for potential residential solar investors, who tend to underestimate it. Underestimation of policy risk may not be good for long-run solar adoption. In fact, households who are initially not aware of this kind of risk and invest in solar may then regret their decisions, in case the policy risk materializes. This, in turn, might erode general trust in solar promotion policies, and climate policy in general. Hence, to avoid this, policymakers should transparently communicate about policy changes that could impact the business case for residential solar investors.

As to market risk, our findings suggest that moving from a regulatory framework where households receive a fixed price for each kWh fed into the grid (e.g. feed-in tariffs) to one where remuneration is volatile and indexed to electricity market prices (e.g. feed-in premia), would not substantially reduce residential solar investors' willingness to invest. However, policy schemes that introduce full exposure to electricity market risk, including the possibility that remuneration for solar generators drops to zero, can reduce households' intention to invest in solar. Hence, setting a positive price floor for power purchase agreements that involve residential solar producers would contribute to ensure sustained interest in residential solar adoption.

4.3 Avenues for future research

Our study is subject to some limitations, which can serve as starting points for further research. First, institutional features may matter for the formation of beliefs and their adjustment when new information is released. This study focuses on a single country, Switzerland, which shows a relatively high level of trust in the government. Extending our approach to other contexts would provide variation in terms of formal and informal institutions. Second, the point estimates provided in this study are conditional on the study design. While the levels of the market and policy risk attributes in our DCE have been designed for the Swiss context, the level of risk faced by residential solar investors in other countries might actually be different. For instance, the regulatory framework might foresee negative prices for surplus electricity fed into the grid by solar producers. Experimenting with a wider range of price scenarios may be a promising avenue for future research. Third, we designed our experiment to carefully reflect the risks that residential investors are facing, but this specificity limits the extent to which our findings can be directly compared to prior research on other investor groups. Future research could try to simultaneously survey both residential and professional investors, applying the same measures for policy and market risk. Such a direct comparison would be beneficial for policymakers who are mindful about the way in which policy design influences the willingness of different investor groups to provide capital for low-carbon projects. Furthermore, differences in retail prices and their evolution, for instance due to different plans or geographical coverage of utilities, could be leveraged to examine how past exposure to different degrees of market risk may influence sensitivity to such risk. Future research could also compare preferences of investors in different stages of the decision-making process and explore whether residential investors' risk assessment and sensitivity change as they move closer to the actual investment decision, and in what direction they change depending on the source of information to which they are exposed. In particular, on the one hand, paying more attention to publicly available information, as in our informational treatment, may lead households to better account for policy risk. On the other hand, risk assessments by specific sources, whose incentives may not be entirely aligned with those of the homeowners', might not be accurate. In the solar industry, as in the energy efficiency industry (Fowlie, Greenstone, and Wolfram 2018; Giraudet, Houde, and Maher 2018), contracts are not written in a way that includes penalties for a failure to deliver the promised returns. Further, belief revision may not occur in the case that households choose to ignore relevant information, after accounting for the costs of acquiring and mentally process it, as it happens in the case of energy efficiency investments (Sallee 2014).

5 Conclusions

Households are important actors in the decarbonization of our economy – not just as consumers, but also as investors. In fact, in an increasingly decentralized energy system, one of the most promising solutions for decarbonization are solar photovoltaic (PV) systems installed on residential buildings. Recent policy developments in many countries have made the investment environment riskier for owners of residential solar PV systems. First, policy changes impacting the profitability of solar investments recently implemented in a number of countries have shown that policy risk is not negligible for investors. The increasing polarization of the climate change debate could exacerbate this trend. Second, in many jurisdictions, governments are phasing out policies that provide residential solar investors with long term secure revenues (e.g. feed-in tariffs), replacing them with policies that imply exposure to market risk.

In this risky environment, would households continue to invest in solar PV systems, and hence contribute to decarbonizing the energy system? We investigated this question focusing on the context of Switzerland and measured households' intention to invest in a residential solar PV system under different levels of policy and market risk. Stated preferences for investment in solar were obtained through a discrete choice experiment, which we coupled with a randomized informational treatment to test for information asymmetries in the assessment of policy risk. Our study included a sample of 750 Swiss households, selected to represent a realistic segment of potential residential solar PV investors.

Policy uncertainty matters to households: their likelihood to invest in solar PV systems drops when perceived policy risk increases. All else equal, when there is full uncertainty around when the government incentive is paid, the probability to invest drops by 15 %, compared to an upfront payment, even for the most patient households in the sample. Mitigating policy risk for residential solar investors could more effectively foster investment decisions than increasing the level of financial incentives. In particular, paying out the full financial support to a residential solar producer within one year, instead of after an undetermined period of time – hence minimizing the materiality of policy risk – would have the same positive impact on residential solar adoption as increasing the amount of financial support from 30 % to 40 % of the initial investment, or could compensate for a reduction of the investment grant from 30 % to 20 %.

The impact of policy risk on investment decisions depends on the information households receive at the time of their investment decision. Households interested in investing in a solar system in the near future are generally not fully aware of policy risk and this type of risk tends not to be salient to them. However, when policy risk becomes salient, the probability that a household decides to invest in solar PV drops by 2.5 %, all else equal, and the reduction is larger for risk-averse households (5 %). In such circumstances, households are less likely to adopt solar PV systems, suggesting that a salient policy risk makes some individuals less likely to invest in solar altogether, rather than reduce the size of their investment. Conversely, if the policy risk was not salient, households were willing to take more risk in investing in solar energy than they may have been comfortable with in hindsight if policy reversals occur.

While policy risk does matter to households, we show that, in comparison, households appear to be less sensitive to market risk. Uncertainty around future monetary benefits of solar, and in particular around revenues from electricity sales to the grid, deters households' investment in solar to a lesser extent than policy risk. Compared to a fixed price for the electricity sold to the grid, only a payment that includes the possibility of remuneration dropping to zero significantly reduces the probability to invest in solar energy. Other types of variable remuneration do not significantly change households' willingness to invest, compared to the fixed price option. This turns out to be a substantial difference between households and professional investors: whereas previous studies show that market risk is one of the key deterrent factors in renewable investment decisions for professional investors, we find that volatile revenues from the sale of electricity are less of a concern for households investing in solar energy. Our study suggests that, for fostering residential solar investment, keeping perceived policy uncertainty low is more important than fully hedging against electricity market risk.

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Appendix A. Supplementary material

Table A.1 Sample descriptive statistics and comparison with the Swiss population

Variable name	Description	% in sample	% in Swiss population		P-value	Note
Household income	Household monthly income					
	Up to 6'000 CHF	12.0	30	***	<0.001	(a)
	6'001 to 9'000 CHF	26.0	25	***	<0.001	(a)
	9'001 to 12'000 CHF	26.4	19	***	<0.001	(a)
	More than 12'000 CHF	25.2	27	***	<0.001	(a)
Household assets	Household assets					
	Up to 100'000 CHF	44.9	65.0	***	<0.001	(d)
	100'001 to 500'000 CHF	29.2	22.6	***	<0.001	(d)
	500'001 to 1'000'000 CHF	6.8	6.7		0.54	(d)
	More than 1'000'000 CHF	8.4	5.7	***	<0.001	(d)
Age	Age (years)					
	18-29	9.5	14.9	***	<0.001	(b)
	30-44	18.5	17.1	***	<0.001	(b)
	45-59	46.9	31.9	***	<0.001	(b)
	>59	25.1	36.1	***	<0.001	(b)
Female	1 if female, 0 if male	48.5	51.1	***	<0.001	(b)
University degree	1 if holds university degree, 0 otherwise	38.7	30.6	***	<0.001	(b)
German-speaking region	1 lives in German-speaking region, 0 otherwise	77.5	72.7	***	<0.001	(b)
Environmental preferences	Environmental preference 5-level score, the lower the stronger the environmental preferences					
	1	32.5	27.5	***	<0.001	(e)
	2	46.0	39.2	***	<0.001	(e)
	3	18.4	30.4	***	<0.001	(e)
	4	2.8	2.5	***	<0.001	(e)
	5	0.3	0.3		0.35	(e)
Technical affinity	1 if reports being always among the first ones to buy new technologies	18.2	15.8	***	<0.001	(c)
Political party	Self-reported preference for political party (1)					
	right-wing	42.6	49	***	<0.001	(a)
	centre	18.3	17	***	<0.001	(a)
	left-wing	26.8	26	***	<0.001	(a)
	other	12.0	8	***	<0.001	(a)
Does not have solar peers	1 if does not know or not aware of anybody among acquaintances and neighbors who has a solar PV system	8.5	n.a.			

Time preferences	Time preferences 8-level score, the higher the more patient		
	1	0.7	n.a.
	2	1.6	n.a.
	3	5.3	n.a.
	4	10.4	n.a.
	5	21.3	n.a.
	6	36.0	n.a.
	7	22.4	n.a.
	8	2.3	n.a.
Low discount rate	1 if individual intertemporal discount rate is low (time preference score higher than 4)	82.0	n.a.
High discount rate	1 if individual intertemporal discount rate is high (time preference score lower or equal to 4)	18.0	n.a.
Risk preferences	Risk preferences 8-level score, the higher the more risk taker		
	1	3.1	n.a.
	2	15.1	n.a.
	3	24.5	n.a.
	4	27.1	n.a.
	5	19.7	n.a.
	6	8.3	n.a.
	7	2.0	n.a.
	8	0.3	n.a.
Low risk aversion	1 if risk aversion is low (Risk preference score higher than 4)	30.3	n.a.
High risk aversion	1 if risk aversion is high (Risk preference score lower or equal to 4)	69.7	n.a.

*, ** and *** imply statistically-significant differences in the proportion between our sample and the Swiss population at 10%, 5%, and 1%, respectively. We used one-sample test of proportion. Due to missing data, some categories do not sum up to 100%.
(a) Percentage in the fourth column refers to the Swiss population. Source: Swiss Federal Statistical Office (2017).
(b) Percentage in the fourth column refers to the population of Swiss homeowners. Source: Swiss Federal Statistical Office (2017).
(c) Percentage in the fourth column refers to the population of Swiss homeowners. Source: own estimate based on pool of 1,492 households who received survey invitations for this study.
(d) Percentage in the fourth column refers to the Swiss population. Source: Swiss Federal Department of Finance (2015).
(e) Percentage in the fourth column refers to the sample of the Swiss population of the World Value Survey, 5th Wave. Source: Kriesi and Hug (2007).
(f) Right-wing parties: SVP, FDP, BDP; Center parties: GLP, CVP, EVP; Left-wing parties: GPS, SP; declared no party preference and information intentionally not disclosed added to residual category (Other).

Methodological note on risk and time preferences elicitation

Risk and time preferences were elicited through a combination of survey items, following the experimentally validated approach developed by Falk et al. (2016, 2018) for the Global Preference Survey.[13] This approach involves one qualitative item, relatively abstract and self-reported on a Likert-scale, and one quantitative item, which puts the respondent into a precisely defined hypothetical (i.e. non-incentivized) lottery/intertemporal choice sequence, using the staircase method. Following the procedure used for the Global Preference Survey, resulting individual risk/time preference scores are a linear combination between the self-reported score and the quantitative item's outcome. The relative weight of the former is 47% and 71% for risk and time preferences, respectively. Applying this approach, we obtain an 8-level score for risk preferences (the higher the score the more risk taker the individual is) and an 8-level score for time preferences (the higher the score the more patient the individual is). Categories for risk aversion used in the main body of this paper (including Figures 3 and 4) are defined as follows. "High risk aversion" indicates risk preference scores lower or equal to 4; "low risk aversion" indicates risk preference scores higher than 4.

Methodological note on environmental preference elicitation

We measured individual environmental preferences through a standard survey item, using the exact wording (translations included) as in the 5th wave of the World Value Survey (Inglehart et al. 2014): "Would you please indicate for the following description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you? Looking after the environment is important to this person; to care for nature and save life resources".
Switzerland was included in World Value Survey 5th wave, ran in 2007, which allows comparing our sample with theirs.

Table A.2 Informational treatment: exact wording used in the questionnaire (translated to English)

	Treatment group	Control group

[13] Falk et al. (2018) report risk and time preference scores for 76 countries, including Switzerland, based on responses by representative population samples collected in 2012. For Switzerland the sample included 1000 respondents, who were interviewed by phone. The questionnaire was asked in German, French, or Italian, depending on the language region.

Information about financial support for solar PV systems provided in the survey	IMPORTANT: Since 2008, the Swiss Federal Government has been supporting solar PV systems through monetary incentives. Until 2018 the Government offered the owners of solar PV systems a fixed monetary amount (“feed-in tariff”) for each kWh fed into the grid by their solar systems to be paid for 20 years. With the new energy law, starting from January 2018 owners of small solar PV systems receive instead a one-off investment grant (“investment grant”) that covers a share of the system cost. The investment grant is paid after the system is commissioned. The waiting time for the payment may exceed two years. Note that if rules about incentives for solar PV systems change while one is still in the waiting list, the new rules may apply. For instance, under the previous support scheme, the promised amount of support was reduced for PV project owners who entered the waiting list after 2012, due to a change in the law. Recently, concerns have arisen about limited financial resources for the support of solar PV systems resulting in continuously growing waiting times for receiving the monetary support, as you can read in the newspaper article below.	IMPORTANT: Since 2008, the Swiss Federal Government has been supporting solar PV systems through monetary incentives. Until 2018 the Government offered the owners of solar PV systems a fixed monetary amount (“feed-in tariff”) for each kWh fed into the grid by their solar systems to be paid for 20 years. With the new energy law, starting from January 2018 owners of small solar PV systems receive instead a one-off investment grant (“investment grant”) that covers a share of the system cost. The investment grant is paid after the system is commissioned. The waiting time for the payment may exceed two years.

Table A.3 Balance of covariates: descriptive statistics by experimental group

Variable name	Description	Sample mean or share of respondents for whom variable equals 1			
		Control group	Treatment group		P-value
Household income	Household monthly income, in 6 classes: 1: < CHF 3000; 2: CHF 3000-4500; 3: 4501-6000 CHF; 4: CHF 6001-9000; 5: CHF 9001-12000 CHF; 6: >CHF 12000	4.6	4.7	***	<0.001
Household assets	Household assets, in 4 classes: 1: <=100 kCHF, 2 :101-500 kCHF,3: 501-1000 kCHF, 4: > 1000kCHF	1.8	1.7	***	<0.001
Age	Age (n.years)	50.3	50.6	**	0.05
Female	1 if female, 0 if male	48%	49%		0.39
University degree	1 if holds university degree, 0 otherwise	40%	37%	***	<0.001
German-speaking region	1 lives in German-speaking region, 0 otherwise	75%	80%	***	<0.001
Time preferences	Time preferences 8-level score, the higher the more patient	5.6	5.6		0.67
Low risk aversion	1 if risk aversion is low	30%	31%		0.42
High risk aversion	1 if risk aversion is high	70%	69%		0.42
Environmental preferences	Environmental preference 5-level score, the lower the stronger the environmental preferences	1.9	1.9		0.66
Techie	1 if reports being always among the first ones to buy new technologies	19%	18%		0.13
Right-wing voter	1 if self-declared right party supporter	42%	43%	**	0.01
Does not have solar peers	1 if does not know or not aware of anybody among acquaintances and neighbors who has a solar PV system	10%	7%	***	<0.001
N. respondents		**373**	**377**		

*, ** and *** imply statistically-significant differences in the mean/proportion between experimental groups at 10%, 5%, and 1%, respectively. We used two-tailed T-test for interval, ordinal and ratio variables; Chi-squared test for binary variables.

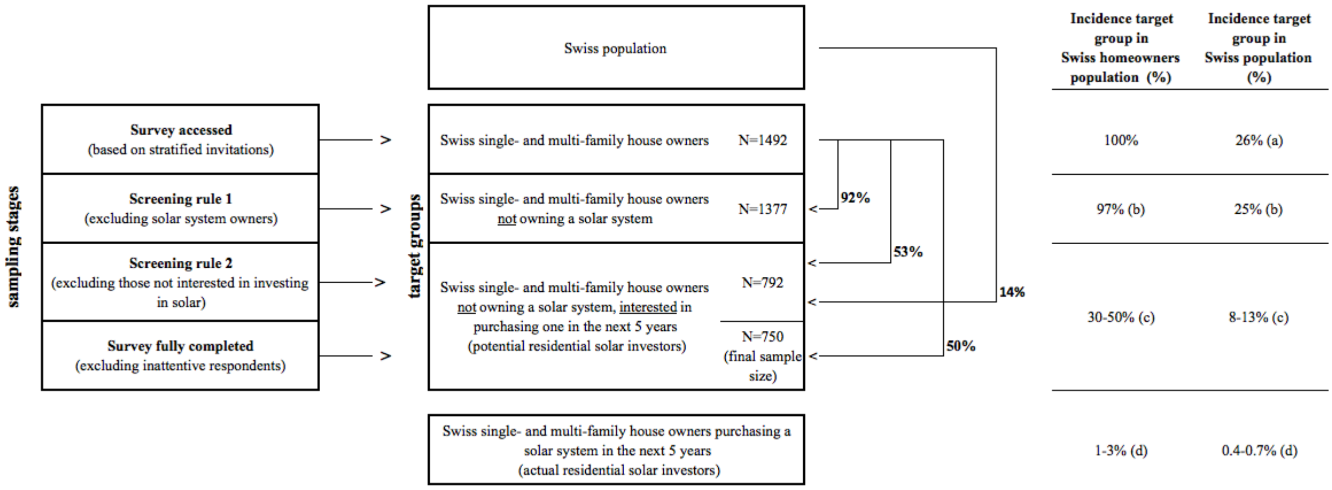
Table A.4 Perceived policy risk by experimental group

	Control	Treatment		P-value
Certain or very likely	59%	45%	***	<0.001

Rather likely	32%	40%	***	<0.001
Rather unlikely or very unlikely	9%	14%	***	<0.001
Do not know	1%	1%		0.94

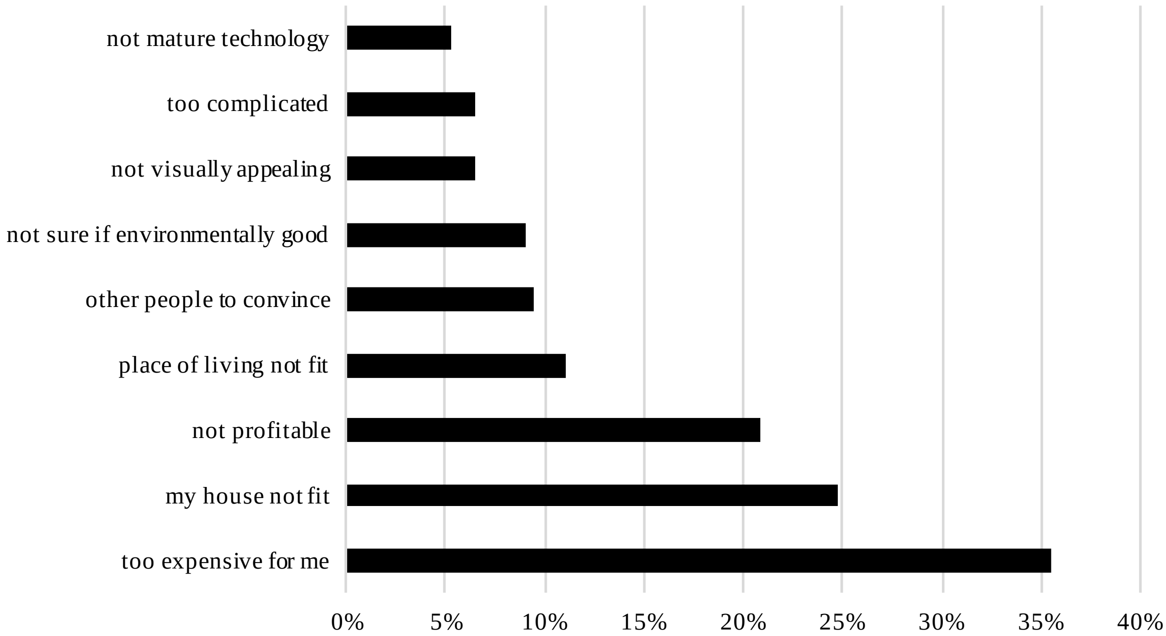
Row labels present possible answers to the survey question: "If you buy a solar system today and the federal government promises you to pay an investment grant after a certain waiting time, how likely do you think it is that you are indeed going to be reimbursed?"
*, **, and *** imply statistically-significant differences in the proportion between experimental groups at 10%, 5% and 1%, respectively. We used Chi-squared test.

Figure A.1 Sampling stages (response funnel)



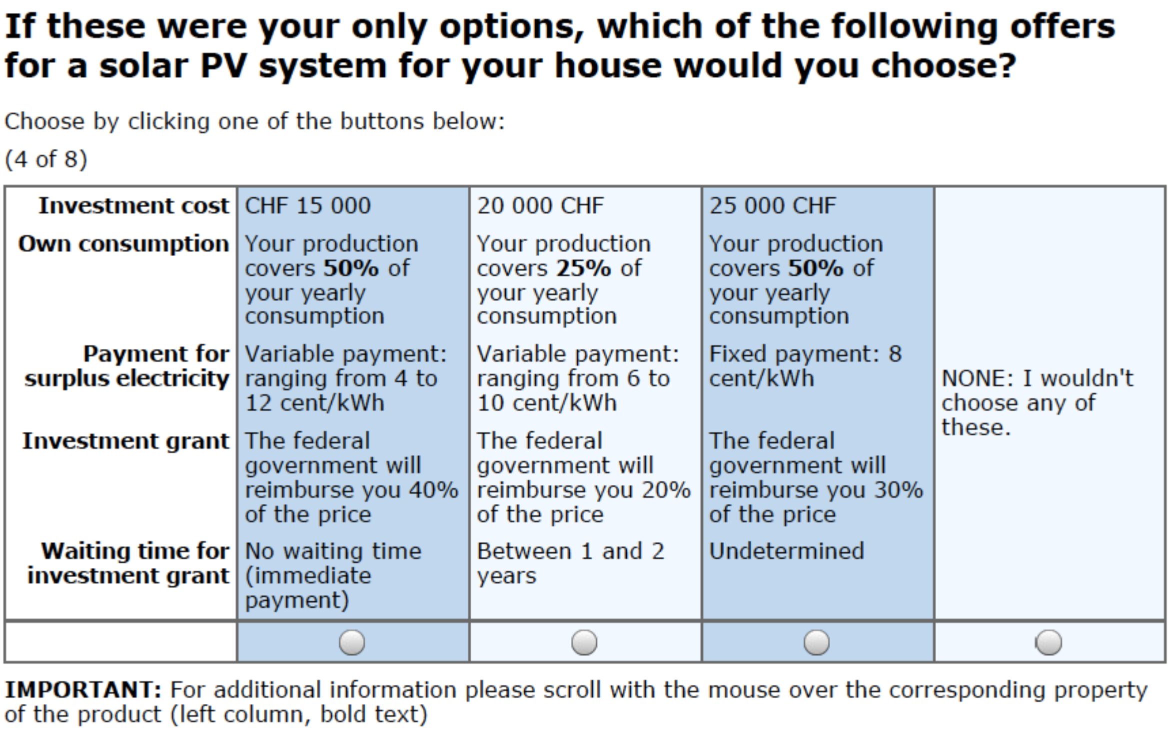
(a) Source: Swiss Federal Statistical Office 2017.
(b) Estimate based on historical data on number of solar PV systems sold to single-family and multi-family houses in Switzerland (Swissolar 2013; 2014; 2015; 2016; 2017; 2018; 2019).
(c) Upper bound estimate based on the % of homeowners who stated that they have already thought about installing a solar PV system in their home, but have not decided yet, in a representative study of the Swiss population (Cousse, Kubli, and Wüstenhagen 2020); lower bound estimate based on number of unique visitors to the "Solar Rechner" page in 2018 (energieschweiz.ch/page/de-ch/solarrechner).
(d) Upper bound estimate based on number of residential solar PV systems sold in Switzerland in 2018 (Swissolar 2019); lower bound estimate based on forecasts for Swiss solar capacity growth up to 2022 (Müller and Trutnevyte 2020).

Figure A.2 Main reasons not to be interested in purchasing a solar PV system for own house (% respondents indicating each option)



Percentage shares computed over total number of homeowners who do not own a solar PV system, accessed the survey and stated that they would not consider installing a solar PV system in the next 5 years (N=585). These respondents were excluded from the final sample on which all other analyses are based. The corresponding question was: “Please indicate the main reason(s) why you are not interested in purchasing a solar system”.

Figure A.3 Example of a choice task screen



If these were your only options, which of the following offers for a solar PV system for your house would you choose?

Choose by clicking one of the buttons below:

(4 of 8)

Investment cost	CHF 15 000	20 000 CHF	25 000 CHF	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **50%** of your yearly consumption	Your production covers **25%** of your yearly consumption	Your production covers **50%** of your yearly consumption	
Payment for surplus electricity	Variable payment: ranging from 4 to 12 cent/kWh	Variable payment: ranging from 6 to 10 cent/kWh	Fixed payment: 8 cent/kWh	
Investment grant	The federal government will reimburse you 40% of the price	The federal government will reimburse you 20% of the price	The federal government will reimburse you 30% of the price	
Waiting time for investment grant	No waiting time (immediate payment)	Between 1 and 2 years	Undetermined	

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

Appendix B. Additional analysis

Table B.1 Choice experiment: estimated marginal effects from conditional logit model by degree of risk aversion

			High risk aversion	Low risk aversion
Waiting time	Immediate	(baseline)		
	<1 year		-0.05***	-0.01
			(0.010)	(0.02)
			<0.001	*0.497*
	1-2 year		-0.09***	-0.062***
			(0.010)	(0.018)
			<0.001	*<0.001*
	Undetermined		-0.17***	-0.15***
			(0.010)	(0.017)
			<0.001	*<0.001*
Payment for surplus electricity	Fixed: 8 cent/kWh	(baseline)		
	Variable: 6 - 10 cent/kWh		-0.02	-0.043**
			(0.01)	(0.018)
			0.14	*0.02*
	Variable: 4 - 12 cent/kWh		-0.04***	0.00
			(0.011)	(0.02)
			<0.001	*0.92*
	Variable: 0 - 16 cent/kWh		-0.06***	-0.05***
			(0.011)	-0.02
			<0.001	*<0.001*
Investment cost	CHF 15,000	(baseline)		
	CHF 20,000		-0.04***	-0.02
			(0.011)	(0.02)
			<0.001	*0.27*
	CHF 25,000		-0.10***	-0.10***
			(0.011)	(0.019)
			<0.001	*<0.001*
	CHF 30,000		-0.18***	-0.13***
			(0.011)	(0.019)
			<0.001	*<0.001*
Investment grant	10 %	(baseline)		
	20 %		0.099***	0.11***

		(0.013)	(0.022)
		<0.001	*<0.001*
	30 %	0.181***	0.189***
		(0.014)	(0.022)
		<0.001	*<0.001*
	40 %	0.265***	0.28***
		(0.015)	(0.022)
		<0.001	*<0.001*
Self-consumption	25 % (baseline)		
	50 %	0.208***	0.28***
		(0.018)	(0.029)
		<0.001	*<0.001*
	75 %	0.45***	0.47***
		(0.016)	(0.025)
		<0.001	*<0.001*
	100 %	0.62***	0.62***
		(0.014)	(0.021)
		<0.001	*<0.001*
	Treatment	-0.07***	-0.04
		(0.014)	(0.017)
		<0.001	*0.026*
	Time preferences	-0.01***	0.00
		(0.003)	(0.00)
		0.004	*0.26*
	Choice tasks	4184	1816
	Respondents	523	227
	Controls	NO	NO

Heteroskedasticity-consistent standard errors in parentheses. P-values are reported in italics. All models without case-specific constant term. Estimates report marginal effects (at means) from alternative-specific conditional logit model. Dependent variable is the probability to invest in solar PV system. *** p<0.01, ** p<0.05, * p<0.1.

Table B.2 Selected investment options in the DCE by investment cost and experimental group (%)

Investment cost (CHF)	Control	Treatment	Overall
15,000	20%	21%	21%
20,000	33%	31%	32%
25,000	26%	26%	26%
30,000	21%	21%	21%

Table B.3 Choice experiment: estimated marginal effects from conditional logit model, by intertemporal discount rate

			Low intertemporal discount rate	High intertemporal discount rate
Waiting time	Immediate	(baseline)		
	<1 year		-0.02	-0.05**
			(0.011)	(0.022)
			0.17	*0.02*
	1-2 year		-0.07***	-0.09***
			(0.011)	(0.021)
			<0.001	*<0.001*
	Undetermined		-0.15***	-0.16***
			(0.011)	(0.020)
			<0.001	*<0.001*
Payment for surplus electricity	Fixed: 8 cent/kWh	(baseline)		
	Variable: 6 - 10 cent/kWh		-0.01	-0.01
			(0.01)	(0.02)
			0.22	*0.68*
	Variable: 4 - 12 cent/kWh		-0.02	-0.02
			(0.01)	(0.02)
			0.12	*0.34*
	Variable: 0 - 16 cent/kWh		-0.06***	-0.01
			(0.011)	(0.02)
			<0.001	*0.70*
Investment cost	CHF 15,000	(baseline)		
	CHF 20,000		-0.02	-0.05**
			(0.01)	(0.022)
			0.16	*0.01*
	CHF 25,000		-0.09***	-0.13***
			(0.012)	(0.021)
			<0.001	*<0.001*
	CHF 30,000		-0.14***	-0.19***
			(0.012)	(0.023)
			<0.001	*<0.001*
Investment grant	10 %	(baseline)		
	20 %		0.13***	0.09***
			(0.015)	(0.028)
			<0.001	*<0.001*
	30 %		0.21***	0.17***
			(0.015)	(0.031)
			<0.001	*<0.001*
	40 %		0.31***	0.24***
			(0.015)	(0.030)

			<0.001	*<0.001*
Self-consumption	25 %	(baseline)		
	50 %		0.28***	0.20***
			(0.020)	(0.037)
			<0.001	*<0.001*
	75 %		0.51***	0.41***
			(0.017)	(0.035)
			<0.001	*<0.001*
	100 %		0.66***	0.56***
			(0.014)	(0.033)
			<0.001	*<0.001*
	Treatment		-0.01	-0.07**
			(0.013)	(0.035)
			0.300	*0.040*
	Choice tasks		4296	976
	Respondents		537	122
	Controls		YES	YES

Heteroskedasticity-consistent standard errors in parentheses. P-values are reported in italics. All models without case-specific constant term. Estimates report the marginal effects (at means) from alternative-specific conditional logit model. Dependent variable is the probability to invest in solar PV system. High intertemporal discount rate refers to individuals with a time preference score equal to 1, 2, 3 or 4. Low intertemporal discount rate refers to individuals with a time preference score equal to 5, 6, 7 or 8. Time preference score goes from 1 to 8, the higher the lower the individual intertemporal discount rate (i.e. the more patient the individual is). See Table A.1 in Appendix A for more details. *** p<0.01, ** p<0.05, * p<0.1.

Table B.4 Choice experiment: estimated marginal effects from conditional logit model (showing all control variables)

			Without controls	With controls	With controls, time preferences	With controls, time preferences, and treatment/risk preference interaction
Waiting time	Immediate	(baseline)				
	<1 year		-0.04***	-0.02**	-0.03**	-0.03**
			(0.009)	(0.01)	(0.010)	(0.010)
			<0.001	*0.02*	*0.01*	*0.01*
	1-2 year		-0.09***	-0.07***	-0.08***	-0.08***
			(0.009)	(0.01)	(0.010)	(0.010)

			<0.001	*<0.001*	*<0.001*	*<0.001*
	Undetermined		-0.17***	-0.15***	-0.15***	-0.15***
			(0.010)	(0.01)	(0.009)	(0.009)
			<0.001	*<0.001*	*<0.001*	*<0.001*
Payment for surplus electricity	Fixed: 8 cent/kWh	(baseline)				
	Variable: 6 - 10 cent/kWh		-0.03***	-0.01	-0.02	-0.02
			(0.009)	(0.01)	(0.01)	(0.01)
			<0.001	*0.17*	*0.10*	*0.11*
	Variable: 4 - 12 cent/kWh		-0.03***	-0.02*	-0.02**	-0.02**
			(0.009)	(0.01)	(0.010)	(0.010)
			<0.001	*0.06*	*0.03*	*0.04*
	Variable: 0 - 16 cent/kWh		-0.07***	-0.05***	-0.05***	-0.05***
			(0.01)	(0.01)	(0.010)	(0.010)
			<0.001	*<0.001*	*<0.001*	*<0.001*
Investment cost	CHF 15,000	(baseline)				
	CHF 20,000		-0.05***	-0.03***	-0.03***	-0.03***
			(0.01)	(0.011)	(0.011)	(0.011)
			<0.001	*0.01*	*0.01*	*0.01*
	CHF 25,000		-0.11***	-0.10***	-0.10***	-0.10***
			(0.01)	(0.01)	(0.010)	(0.010)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	CHF 30,000		-0.17***	-0.15***	-0.16***	-0.16***
			(0.01)	(0.010)	(0.010)	(0.010)
			<0.001	*<0.001*	*<0.001*	*<0.001*
Investment grant	10 %	(baseline)				
	20 %		0.09***	0.12***	0.12***	0.12***
			(0.011)	(0.013)	(0.013)	(0.013)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	30 %		0.18***	0.20***	0.20***	0.20***
			(0.013)	(0.013)	(0.013)	(0.013)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	40 %		0.26***	0.29***	0.29***	0.29***
			(0.014)	(0.014)	(0.013)	(0.014)
			<0.001	*<0.001*	*<0.001*	*<0.001*
Self-consumption	25 %	(baseline)				
	50 %		0.21***	0.26***	0.26***	0.26***

	(0.017)	(0.017)	(0.017)	(0.017)
	<0.001	*<0.001*	*<0.001*	*<0.001*
75 %	0.44***	0.49***	0.48***	0.48***
	(0.017)	(0.015)	(0.015)	(0.015)
	<0.001	*<0.001*	*<0.001*	*<0.001*
100 %	0.61***	0.64***	0.64***	0.64***
	(0.016)	(0.013)	(0.013)	(0.013)
	<0.001	*<0.001*	*<0.001*	*<0.001*
Treatment	-0.071***	-0.025**	-0.027**	0.007
	(0.018)	(0.012)	(0.012)	(0.019)
	<0.001	*0.03*	*0.02*	*0.69*
Time preferences			0.025***	0.023***
			(0.004)	(0.004)
			<0.001	*<0.001*
Treatment and high risk aversion				-0.047**
				(0.021)
				0.025
Household income		0.02***	0.01	0.008
		(0.005)	(0.01)	(0.01)
		<0.001	*0.12*	*0.110*
Households assets		0.01	0.00	0.002
		(0.01)	(0.01)	(0.01)
		0.43	*0.62*	*0.760*
Age		-0.002***	-0.003***	-0.003***
		(0.0004)	(0.0004)	(0.0004)
		<0.001	*<0.001*	*<0.001*
University degree		-0.016	-0.022*	-0.019
		(0.013)	(0.013)	(0.01)
		0.22	*0.08*	*0.130*
Female		-0.04***	-0.04***	-0.04***
		(0.012)	(0.012)	(0.012)
		<0.001	*<0.001*	*<0.001*
German-speaking region		-0.01	-0.03**	-0.026*
		(0.013)	(0.013)	(0.013)
		0.53	*0.02*	*0.050*
Environmental preferences		-0.026***	-0.023***	-0.022***
		(0.007)	(0.007)	(0.007)
		<0.001	*<0.001*	*<0.001*
"Techie"		0.04**	0.03**	0.028*
		(0.015)	(0.015)	(0.015)

		0.01	*0.04*	*0.050*
Right-wing voter		-0.03**	-0.03**	-0.03**
		(0.012)	(0.012)	(0.012)
		0.02	*0.02*	*0.010*
Does not have solar peers		-0.03	-0.04	-0.04
		(0.023)	(0.022)	(0.022)
		0.14	*0.07*	*0.07*
Choice tasks	6000	5272	5272	5272
Respondents	750	659	659	659
Controls	NO	YES	YES	YES

Heteroskedasticity-consistent standard errors in parentheses. P-values are reported in italics. All models without case-specific constant term. Estimates report the marginal effects (at means) from alternative-specific conditional logit model. Dependent variable is the probability to invest in solar PV system. *** p<0.01, ** p<0.05, * p<0.1.

Table B.5 Choice experiment: estimations from mixed logit model

			Mixed logit attributes and treatment (without controls)			Mixed logit attributes, treatment and controls			Mixed logit attributes, treatment and controls, time preferences			Mixed logit attributes, treatment, controls, time preferences, and treatment/risk preference interaction		
			coefficients Mean	coefficients Std. dev.	marginal effect (at means)	coefficients Mean	coefficients Std. dev.	marginal effect (at means)	coefficients Mean	coefficients Std. dev.	marginal effect (at means)	coefficients Mean	coefficients Std. dev.	marginal effect (at means)
Waiting time	Immediate	(baseline)												
	<1 year		-0.26***	-0.28***	-0.04	-0.12**	0.35***	-0.02	-0.14**	0.35***	-0.02	-0.14**	0.35***	-0.02
			(0.05)	(0.11)		(0.06)	(0.11)		(0.06)	(0.11)		(0.06)	(0.11)	
	1-2 year		-0.51***	0.57***	-0.07	-0.41***	0.59***	-0.06	-0.42***	0.57***	-0.06	-0.42***	0.57***	-0.06
			(0.06)	(0.09)		(0.06)	(0.09)		(0.06)	(0.09)		(0.06)	(0.09)	
	Undetermined		-1.12***	0.97***	-0.14	-0.99***	0.90***	-0.12	-0.99***	0.88***	-0.12	-0.99***	0.88***	-0.12
			(0.07)	(0.08)		(0.07)	(0.09)		(0.07)	(0.09)		(0.07)	(0.09)	
Payment for surplus electricity	Fixed: 8 cent/kWh	(baseline)												
	Variable: 6 - 10 cent/kWh		-0.17***	-0.06	-0.02	-0.06	-0.06	-0.01	-0.07	-0.06	-0.01	-0.07	-0.06	-0.01
			(0.05)	(0.12)		(0.06)	(0.11)		(0.06)	(0.11)		(0.06)	(0.11)	
	Variable: 4 - 12 cent/kWh		-0.21***	0.46***	-0.03	-0.10*	0.38***	-0.01	-0.11*	0.34***	-0.01	-0.11*	0.34***	-0.01
			(0.06)	(0.09)		(0.06)	(0.10)		(0.06)	(0.11)		(0.06)	(0.11)	
	Variable: 0 - 16 cent/kWh		-0.40***	-0.41***	-0.05	-0.29***	0.33***	-0.04	-0.30***	0.36***	-0.04	-0.30***	0.36***	-0.04
			(0.06)	(0.08)		(0.06)	(0.12)		(0.06)	(0.12)		(0.06)	(0.12)	
Investment cost	CHF 15,000	(baseline)												

	CHF 20,000		-0.27***	-0.15	-0.04	-0.16***	-0.27***	-0.02	-0.18***	-0.26***	-0.02	-0.18***	-0.26***	-0.02
			(0.06)	(0.10)		(0.06)	(0.09)		(0.06)	(0.09)		(0.06)	(0.09)	
	CHF 25,000		-0.66***	-0.09	-0.09	-0.57***	0.10	-0.08	-0.58***	0.09	-0.08	-0.58***	0.09	-0.08
			(0.06)	(0.10)		(0.06)	(0.09)		(0.06)	(0.09)		(0.06)	(0.09)	
	CHF 30,000		-1.09***	-0.55***	-0.14	-0.96***	0.46***	-0.12	-0.97***	0.47***	-0.13	-0.97***	0.47***	-0.13
			(0.06)	(0.08)		(0.07)	(0.08)		(0.07)	(0.08)		(0.07)	(0.08)	
Investment grant	10 %	(baseline)												
	20 %		0.45***	0.02	0.06	0.62***	-0.20**	0.08	0.61***	-0.20**	0.07	0.61***	-0.20**	0.07
			(0.06)	(0.07)		(0.06)	(0.08)		(0.06)	(0.08)		(0.06)	(0.08)	
	30 %		0.87***	0.11	0.11	1.02***	-0.05	0.13	1.00***	-0.05	0.13	1.00***	-0.05	0.13
			(0.06)	(0.07)		(0.06)	(0.07)		(0.06)	(0.07)		(0.06)	(0.07)	
	40 %		1.26***	-0.05	0.17	1.43***	0.04	0.19	1.40***	0.03	0.19	1.40***	0.03	0.19
			(0.06)	(0.08)		(0.06)	(0.07)		(0.06)	(0.07)		(0.06)	(0.07)	
Self-con-sumption	25 %	(baseline)												
	50 %		0.97***	-0.27***	0.10	1.26***	-0.04	0.12	1.22***	-0.08	0.11	1.22***	-0.08	0.11
			(0.07)	(0.08)		(0.08)	(0.13)		(0.08)	(0.13)		(0.08)	(0.13)	
	75 %		2.10***	-0.15**	0.26	2.35***	0.00	0.28	2.31***	-0.01	0.28	2.31***	-0.01	0.28
			(0.06)	(0.06)		(0.08)	(0.07)		(0.08)	(0.07)		(0.08)	(0.07)	
	100 %		3.07***	-0.25***	0.44	3.30***	-0.31***	0.45	3.26***	-0.30***	0.45	3.26***	-0.29***	0.45
			(0.07)	(0.06)		(0.09)	(0.07)		(0.09)	(0.07)		(0.09)	(0.07)	
	Treatment		-0.63***		-0.054	-0.18*		-0.016	-0.19**		-0.017	0.08		0.01
			(0.08)			(0.09)			(0.10)			(0.15)		
	Time preferences								0.19***		0.028	0.18***		0.025
									(0.03)			(0.03)		
	Treatment and high risk aversion											-0.36**		-0.034

				(0.16)
Choice tasks	6000	5272	5272	5272
Respondents	750	659	659	659
Controls	NO	YES	YES	YES

Standard errors in parentheses. All models without case-specific constant term. Estimates report the coefficients and the marginal effects (at means) from mixed logit model. Dependent variable is the probability to invest in a solar PV system. The reduction in number of observations in specifications in the second, third and fourth columns, compared to specification in the first column, follows from missing data for some of the covariates included in the model. *** p<0.01, ** p<0.05, * p<0.1.

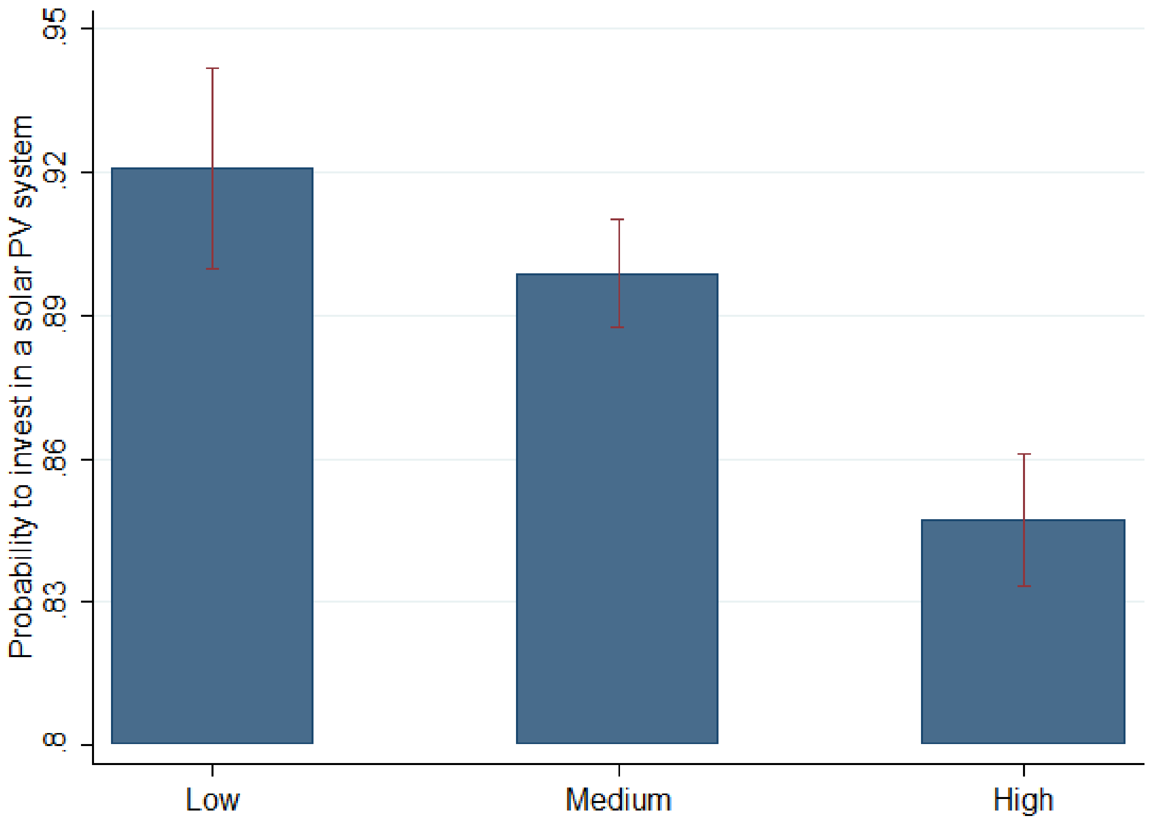
Table B.6 Choice experiment: estimations from conditional logit model correcting for compliance to the treatment

			Without controls	With controls	With controls, time preferences	With controls, time preferences, and treatment/risk preference interaction
Waiting time	Immediate	(baseline)				
	<1 year		-0.02**	-0.02**	-0.02**	-0.02**
			(0.009)	(0.009)	(0.010)	(0.010)
			0.01	*0.04*	*0.04*	*0.04*
	1-2 year		-0.07***	-0.07***	-0.07***	-0.07***
			(0.009)	(0.010)	(0.010)	(0.010)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	Undetermined		-0.15***	-0.15***	-0.15***	-0.15***
			(0.009)	(0.009)	(0.010)	(0.010)
			<0.001	*<0.001*	*<0.001*	*<0.001*
Payment for surplus electricity	Fixed: 8 cent/kWh	(baseline)				
	Variable: 6 - 10 cent/kWh		-0.01	-0.01	-0.01	-0.01
			(0.010)	(0.01)	(0.01)	(0.01)
			0.30	*0.30*	*0.26*	*0.27*
	Variable: 4 - 12 cent/kWh		-0.01	-0.02	-0.02	-0.02
			(0.010)	(0.01)	(0.01)	(0.01)
			0.19	*0.11*	*0.10*	*0.10*
	Variable: 0 - 16 cent/kWh		-0.05***	-0.05***	-0.05***	-0.05***
			(0.010)	(0.010)	(0.010)	(0.010)
			<0.001	*<0.001*	*<0.001*	*<0.001*
Investment cost	CHF 15,000	(baseline)				
	CHF 20,000		-0.02**	-0.02**	-0.02**	-0.02**
			(0.010)	(0.010)	(0.010)	(0.010)
			0.02	*0.03*	*0.03*	*0.03*
	CHF 25,000		-0.09***	-0.09***	-0.09***	-0.09***
			(0.010)	(0.010)	(0.010)	(0.010)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	CHF 30,000		-0.15***	-0.15***	-0.15***	-0.15***
			(0.010)	(0.010)	(0.010)	(0.010)
			<0.001	*<0.001*	*<0.001*	*<0.001*
Investment grant	10 %	(baseline)				
	20 %		0.12***	0.13***	0.13***	0.13***
			(0.012)	(0.013)	(0.013)	(0.013)

			<0.001	*<0.001*	*<0.001*	*<0.001*
	30 %		0.21***	0.21***	0.21***	0.21***
			(0.012)	(0.013)	(0.013)	(0.013)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	40 %		0.29***	0.30***	0.30***	0.30***
			(0.013)	(0.014)	(0.014)	(0.014)
			<0.001	*<0.001*	*<0.001*	*<0.001*
Self-consumption	25 %	(baseline)				
	50 %		0.28***	0.27***	0.27***	0.27***
			(0.017)	(0.018)	(0.018)	(0.018)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	75 %		0.50***	0.50***	0.50***	0.50***
			(0.015)	(0.016)	(0.016)	(0.016)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	100 %		0.65***	0.65***	0.65***	0.65***
			(0.012)	(0.013)	(0.013)	(0.013)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	Treatment		-0.06***	-0.07***	-0.14***	-0.11***
			(0.007)	(0.016)	(0.019)	(0.020)
			<0.001	*<0.001*	*<0.001*	*<0.001*
	Time preferences				0.04***	0.03***
					(0.004)	(0.004)
					<0.001	*<0.001*
	Interaction between treatment and high risk aversion					-0.02***
						(0.006)
						<0.001
	Choice tasks		6000	5272	5272	5272
	Respondents		750	659	659	659
	Controls		NO	YES	YES	YES

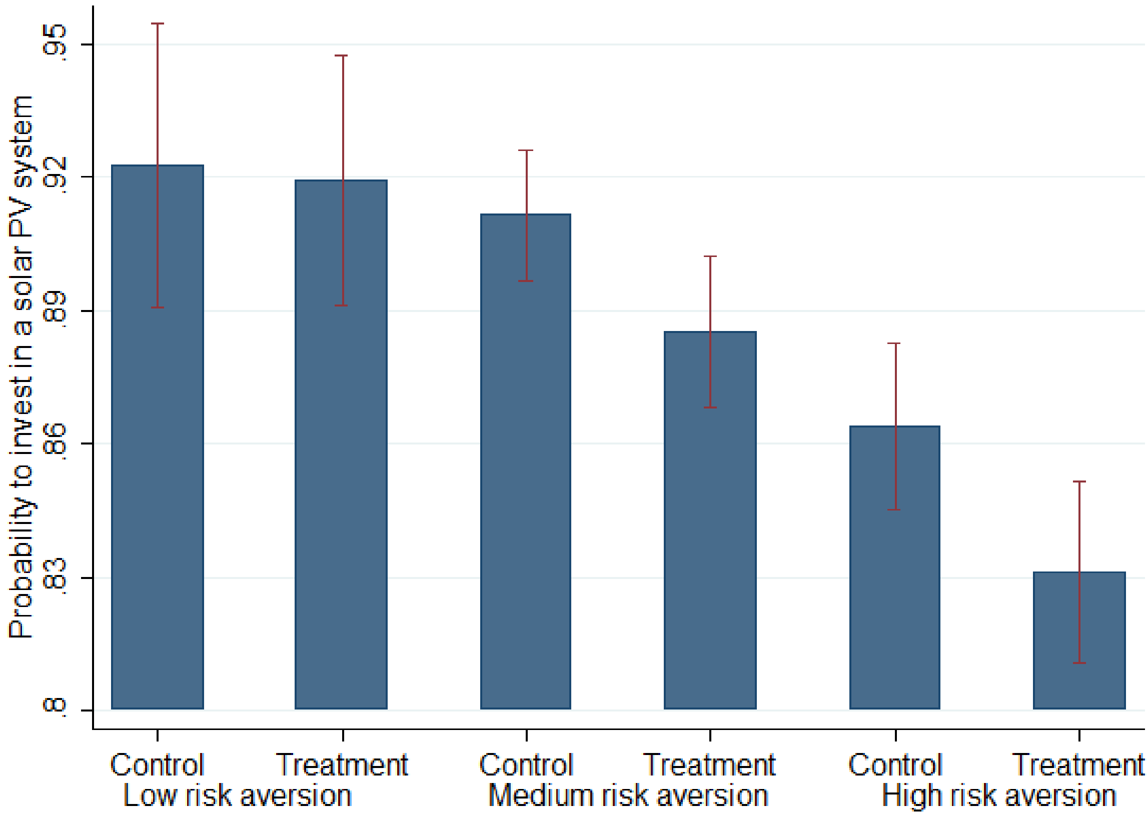
Heteroskedasticity-consistent standard errors in parentheses. P-values are reported in italics. All models without case-specific constant term. Estimates report marginal effects (at means) from alternative-specific conditional logit model. Dependent variable is the probability to invest in solar PV system. The correction for compliance to the treatment is based on the Local Average Treatment Effect (LATE) framework developed by Imbens and Angrist (1994) and relies on the measure for individual perceived policy risk elicited in the questionnaire. The reduction in number of observations in specifications in the second, third and fourth columns, compared to specifications in the first column, follows from missing data for some of the covariates included in the model. *** p<0.01, ** p<0.05, * p<0.1.

Figure B.1 Probability to invest in a solar PV system, by individual risk aversion (3 categories)



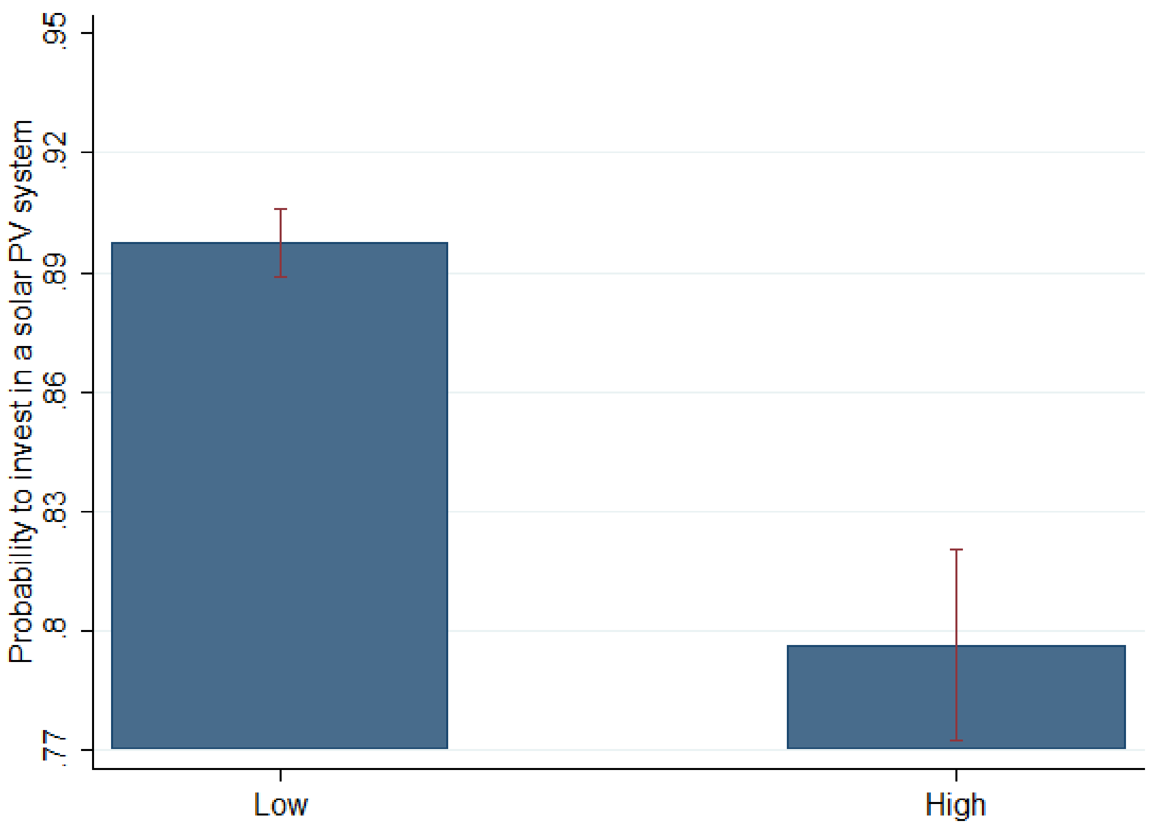
Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. Low risk aversion indicates individuals with a risk preference score equal to 6, 7, or 8; medium risk aversion indicates individuals with a risk preference score equal to 4 or 5; high risk aversion indicates individuals with a risk preference score equal to 1, 2, or 3. Risk preference score goes from 1 to 8, the higher the lower the risk aversion.

Figure B.2 Probability to invest in a solar PV system, by individual risk aversion (3 categories) and experimental group



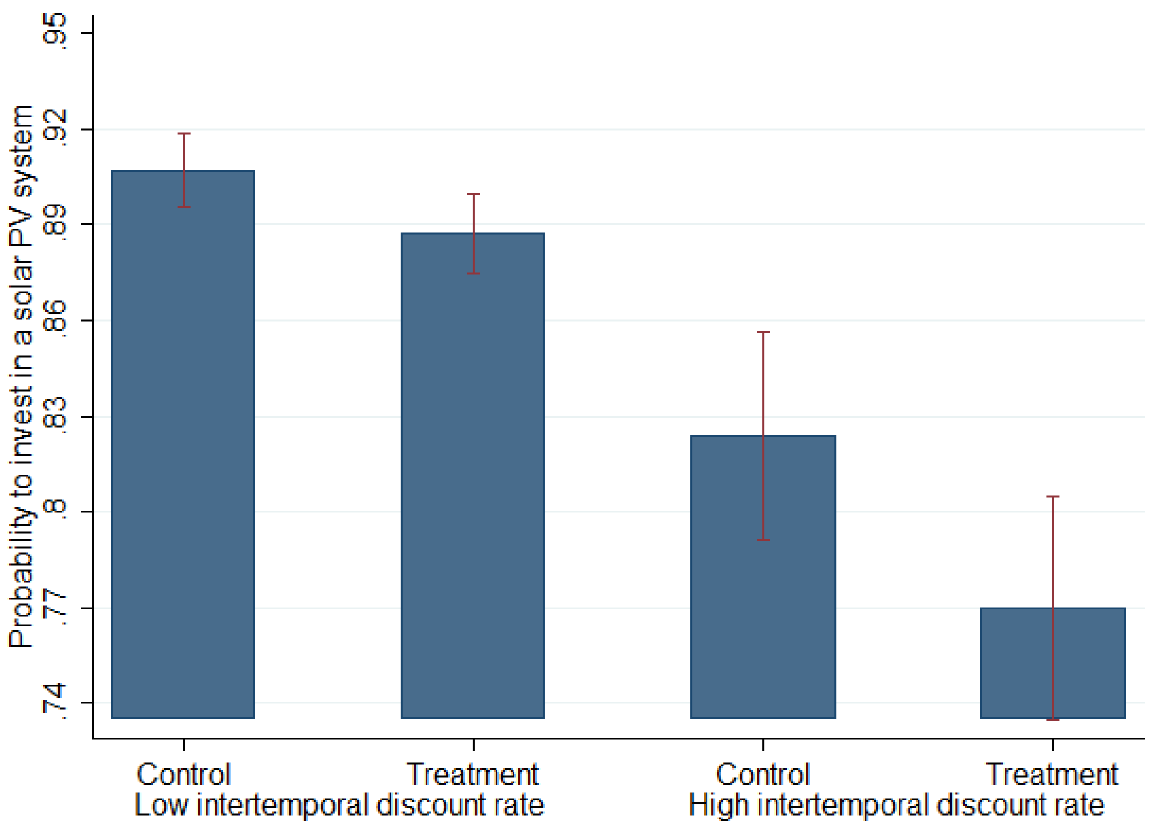
Probability to invest in a solar PV system is the frequency of NOT choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. Low risk aversion indicates individuals with a risk preference score equal to 6, 7, or 8; medium risk aversion indicates individuals with a risk preference score equal to 4 or 5; high risk aversion indicates individuals with a risk preference score equal to 1, 2, or 3. Risk preference score goes from 1 to 8, the higher the lower the risk aversion.

Figure B.3 Probability to invest in a solar PV system, by individual intertemporal discount rate (2 categories)



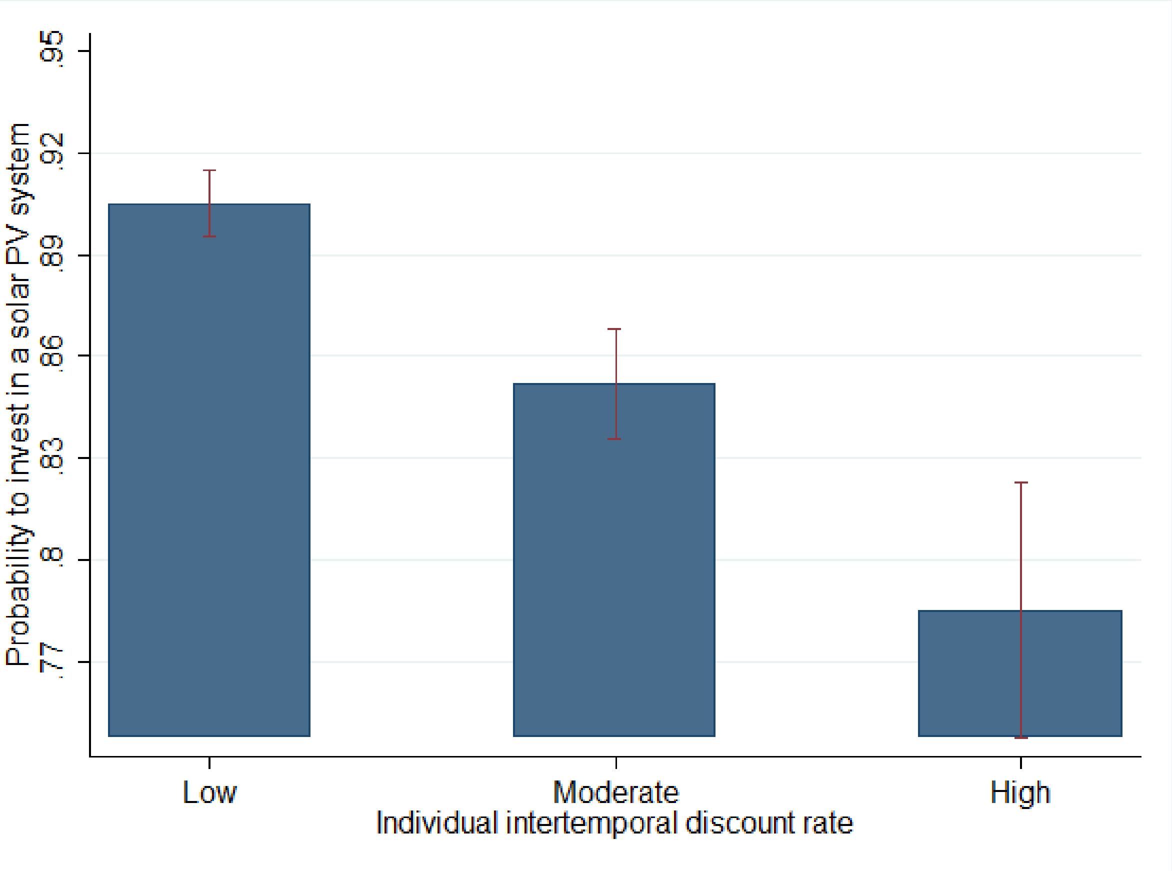
Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. High intertemporal discount rate indicates individuals with a time preference score equal to 1, 2, 3 or 4; low intertemporal discount rate indicates individuals with a time preference score equal to 5, 6, 7, or 8. Time preference score goes from 1 to 8, the higher the lower the individual intertemporal discount rate (i.e. the more patient the individual is).

Figure B.4 Probability to invest in a solar PV system, by individual intertemporal discount rate (2 categories) and experimental group



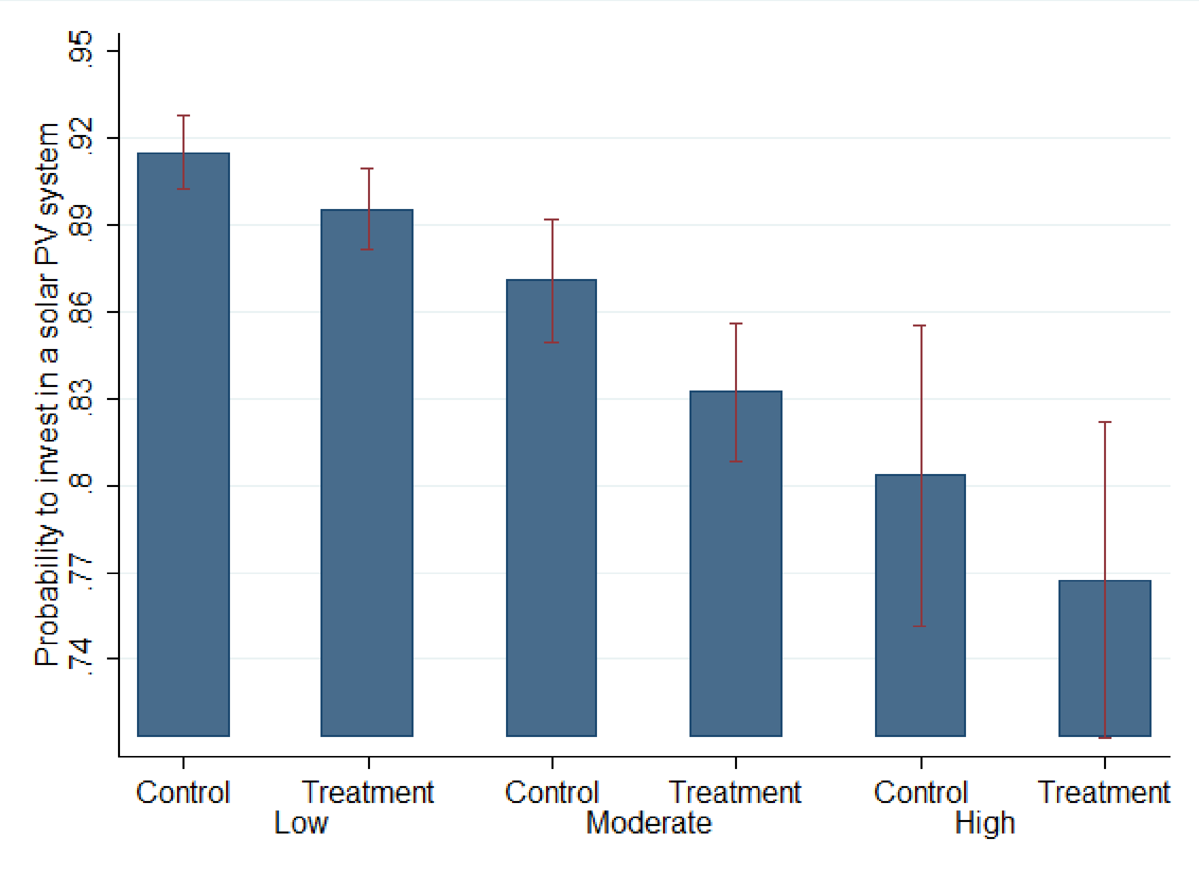
Probability to invest in a solar PV system is the frequency of NOT choosing the opt-out option (“NONE: I would not choose any of these options”) in the choice task. Whiskers represent 95 percent confidence intervals. High intertemporal discount rate indicates individuals with a time preference score equal to 1, 2, 3 or 4; low intertemporal discount rate indicates individuals with a time preference score equal to 5, 6, 7, or 8. Time preference score goes from 1 to 8, the higher the lower the individual intertemporal discount rate (i.e. the more patient the individual is).

Figure B.5 Probability to invest in a solar PV system, by individual intertemporal discount rate (3 categories)



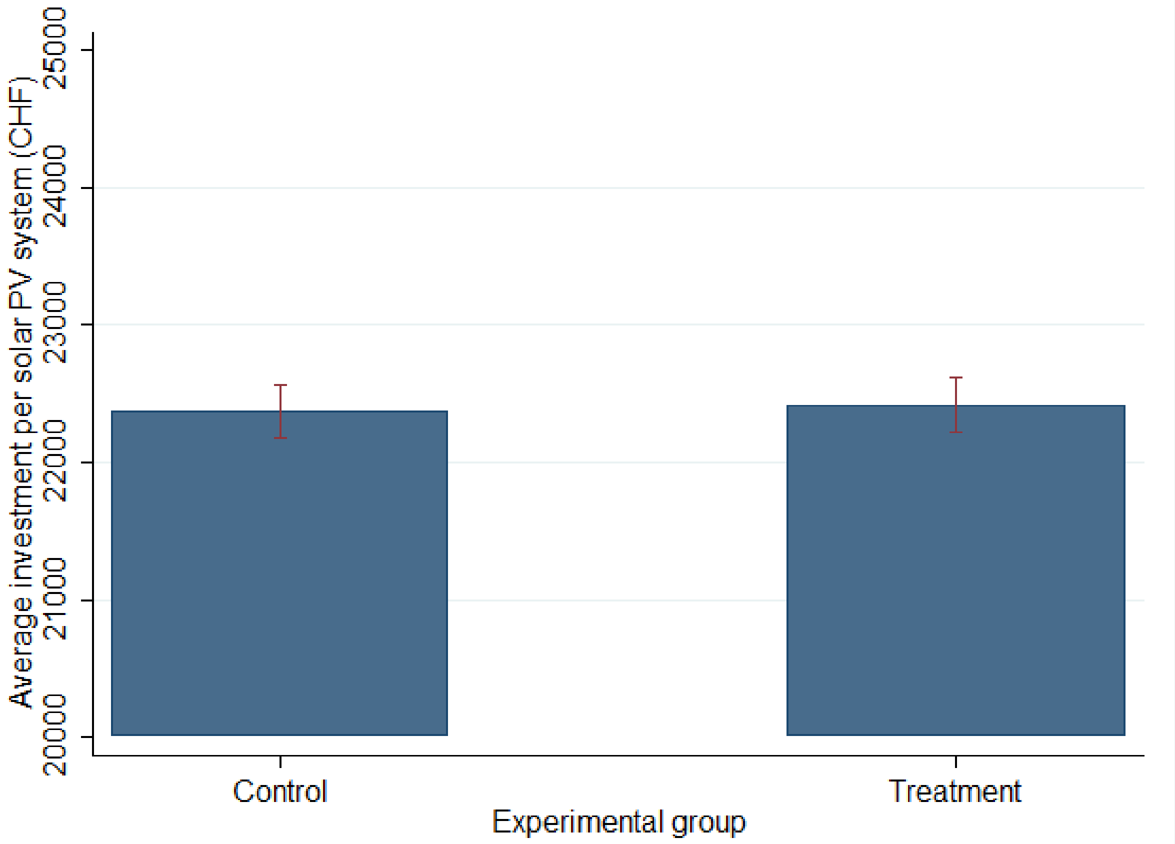
Probability to invest in a solar PV system is the frequency of NOT choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. High intertemporal discount rate indicates individuals with a time preference score equal to 1, 2, 3 or 4; low intertemporal discount rate indicates individuals with a time preference score equal to 5, 6, 7, or 8. Time preference score goes from 1 to 8, the higher the lower the individual intertemporal discount rate (i.e. the more patient the individual is).

Figure B.6 Probability to invest in a solar PV system, by individual intertemporal discount rate (3 categories) and experimental group



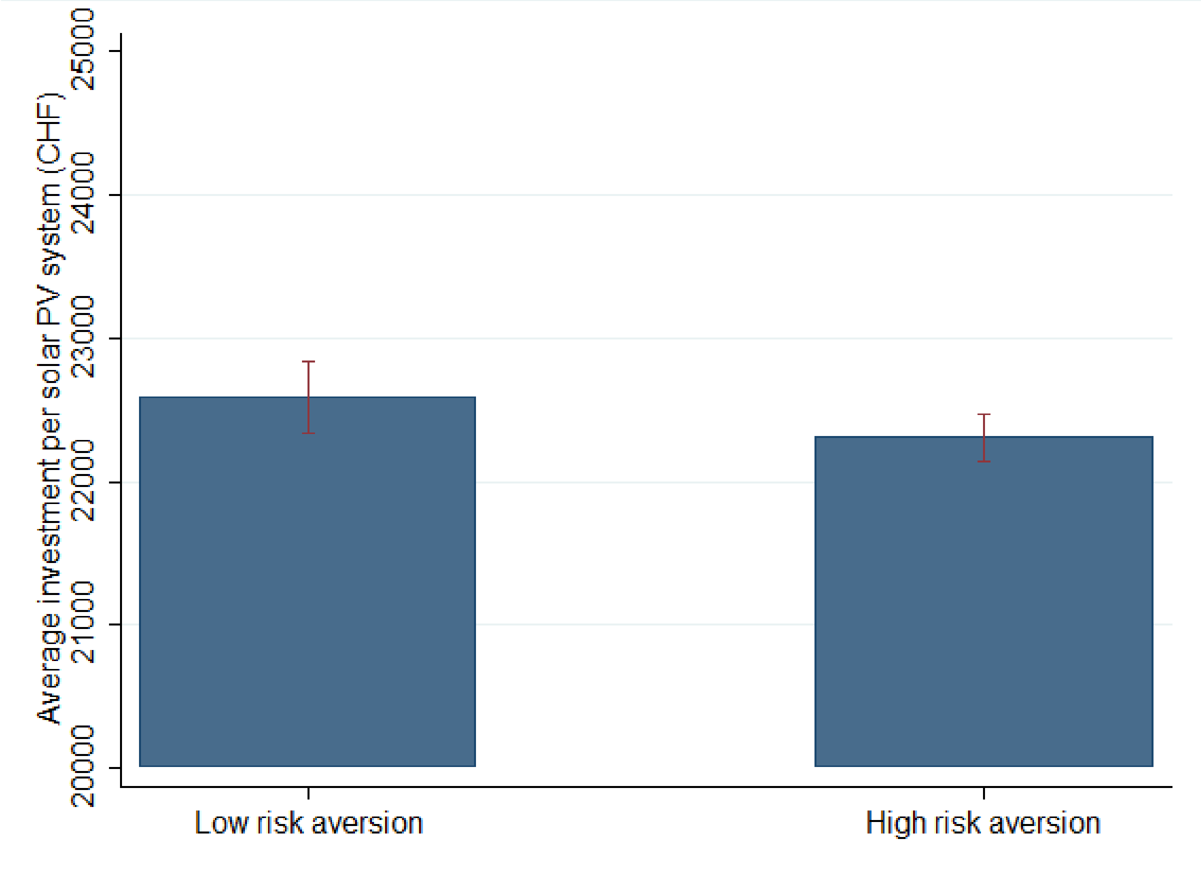
Probability to invest in a solar PV system is the frequency of NOT choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. High intertemporal discount rate indicates individuals with a time preference score equal to 1, 2, 3 or 4; low intertemporal discount rate indicates individuals with a time preference score equal to 5, 6, 7, or 8. Time preference score goes from 1 to 8, the higher the lower the individual intertemporal discount rate (i.e. the more patient the individual is).

Figure B.7 Average investment per solar PV system, by experimental group



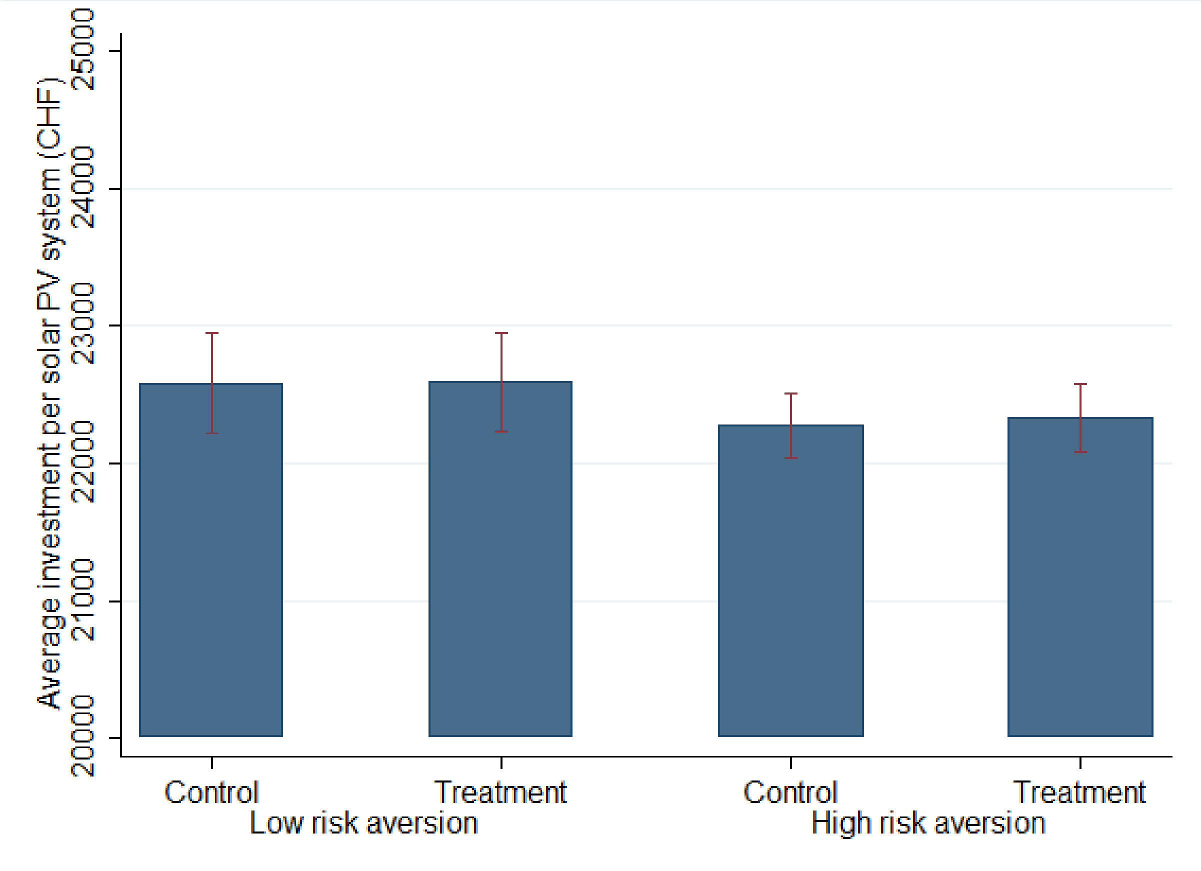
Whiskers represent 95 percent confidence intervals.

Figure B.8 Average investment per solar PV system, by individual risk aversion (2 categories)



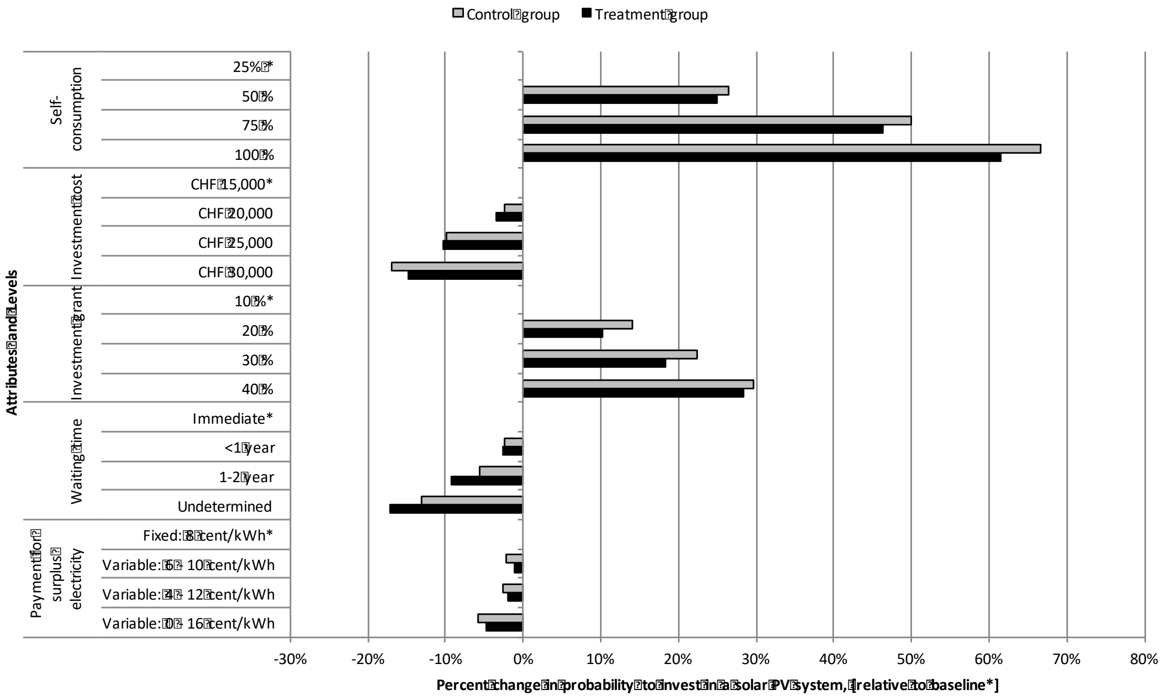
Whiskers represent 95 percent confidence intervals.

Figure B.9 Average investment per solar PV system, by individual risk aversion (2 categories) and experimental group



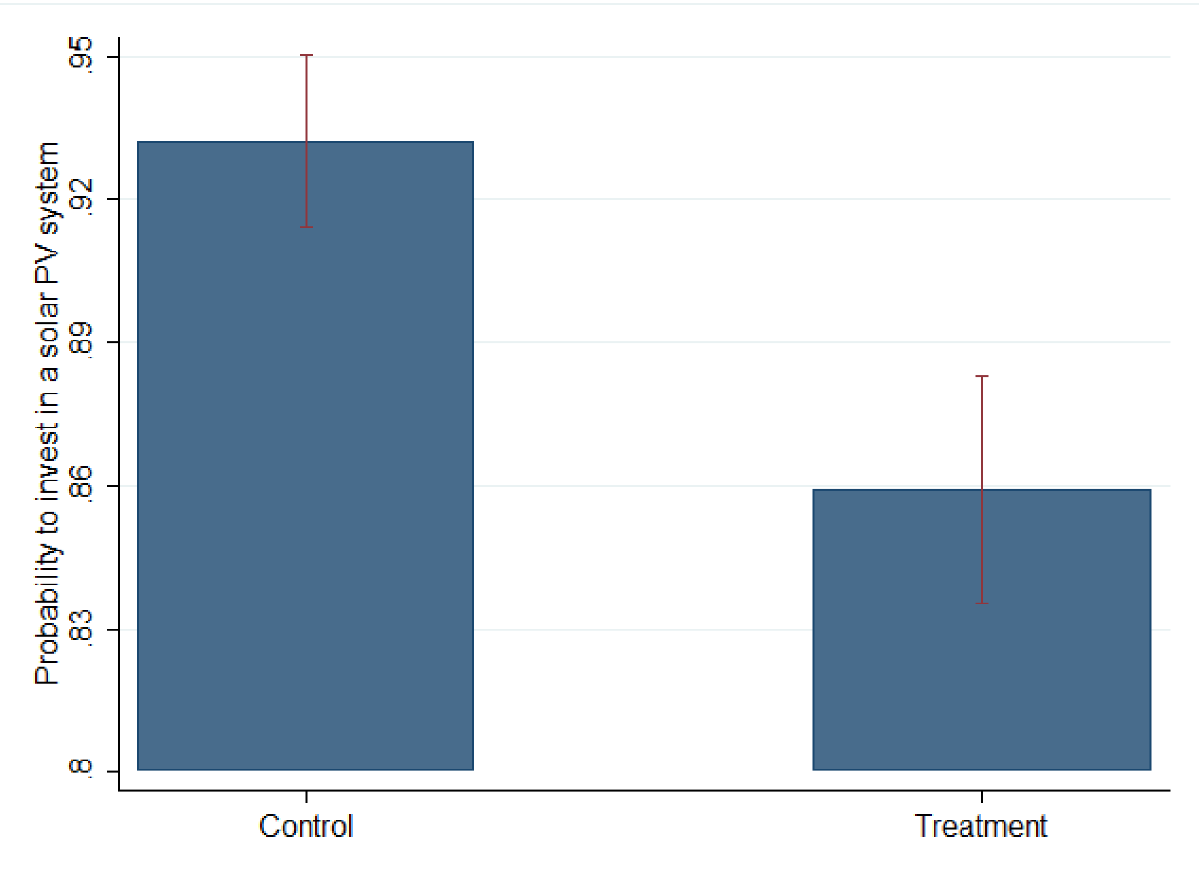
Whiskers represent 95 percent confidence intervals.

Figure B.10 Impact of policy risk salience on the probability to invest in a solar PV system



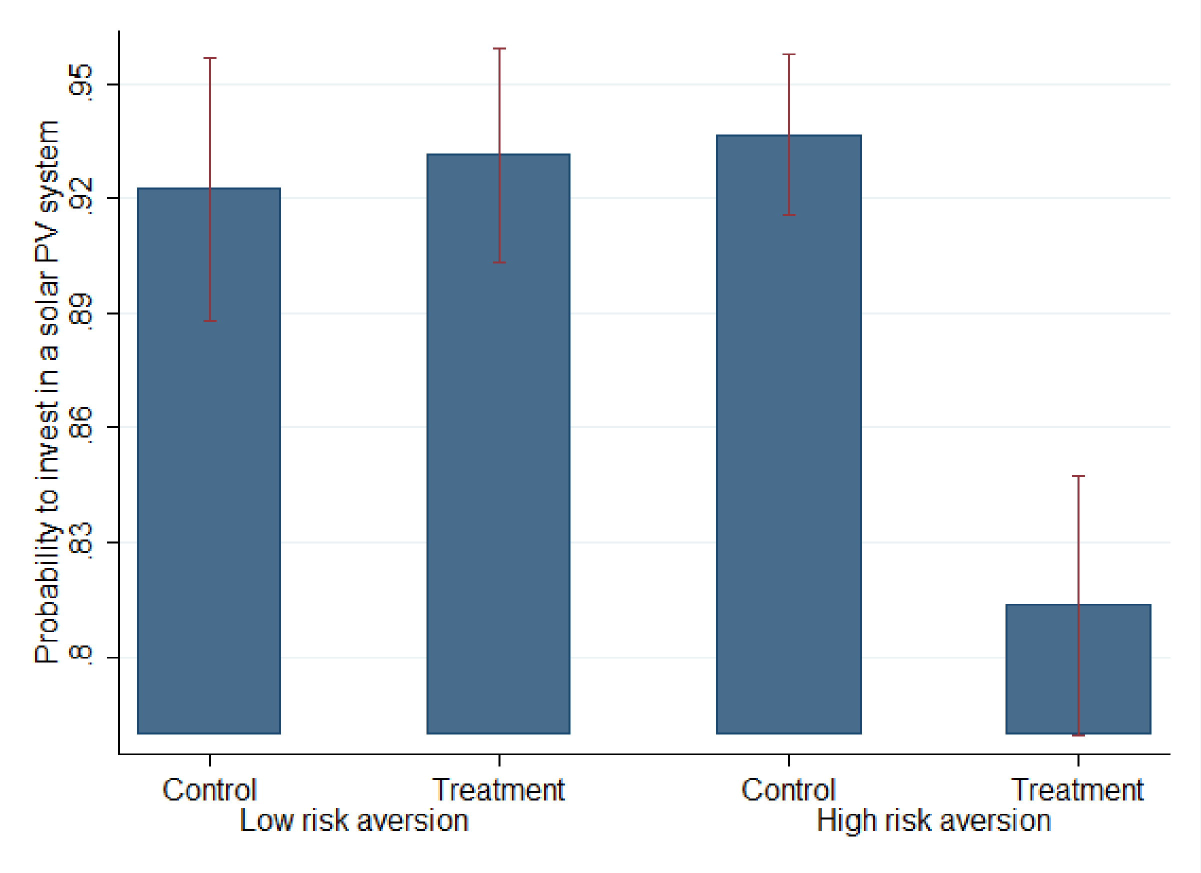
Estimates report the marginal effects (at means) from alternative-specific conditional logit model. Dependent variable is the probability to invest in solar PV system.

Figure B.11 Probability to invest in a solar PV system, by experimental group



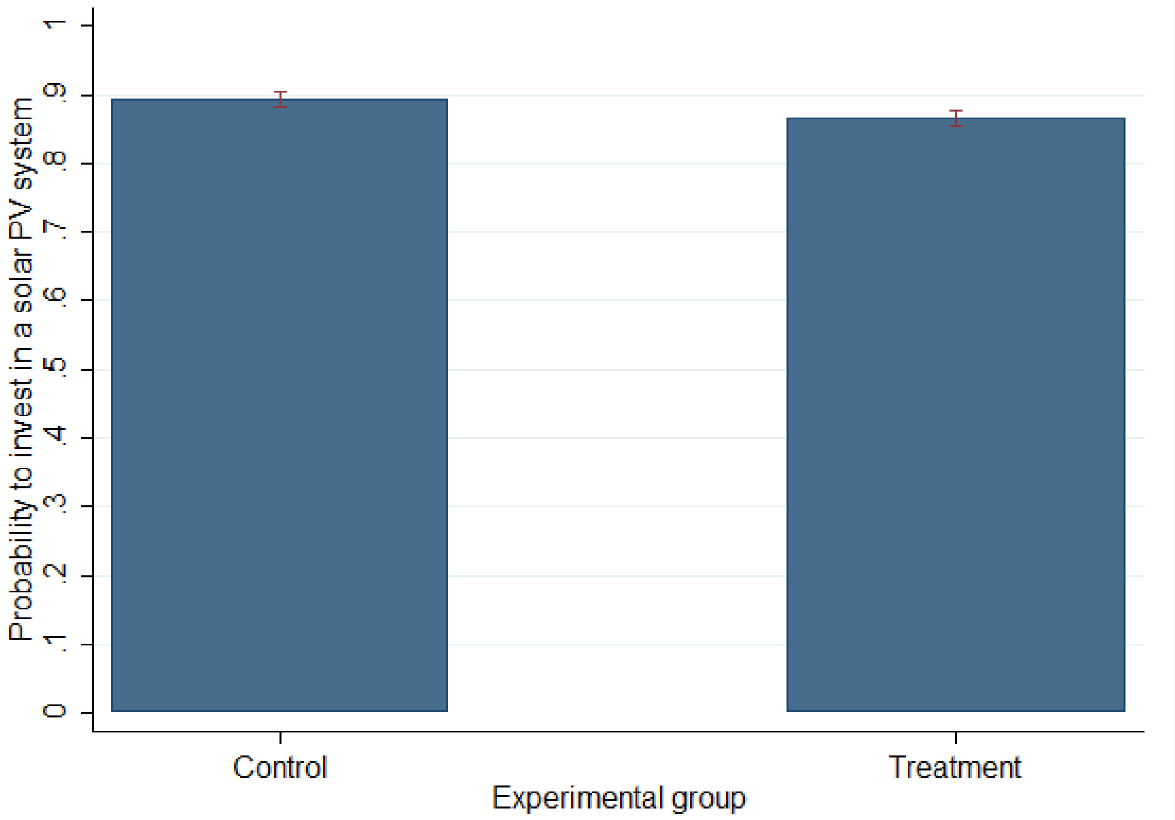
Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals.
Sample limited to those respondents who answered "yes" (instead of "maybe" or "not") to the screening question on interest in purchasing a solar PV system in the next 5 years (N = 197).

Figure B.12 Probability to invest in a solar PV system, by individual risk aversion and experimental group



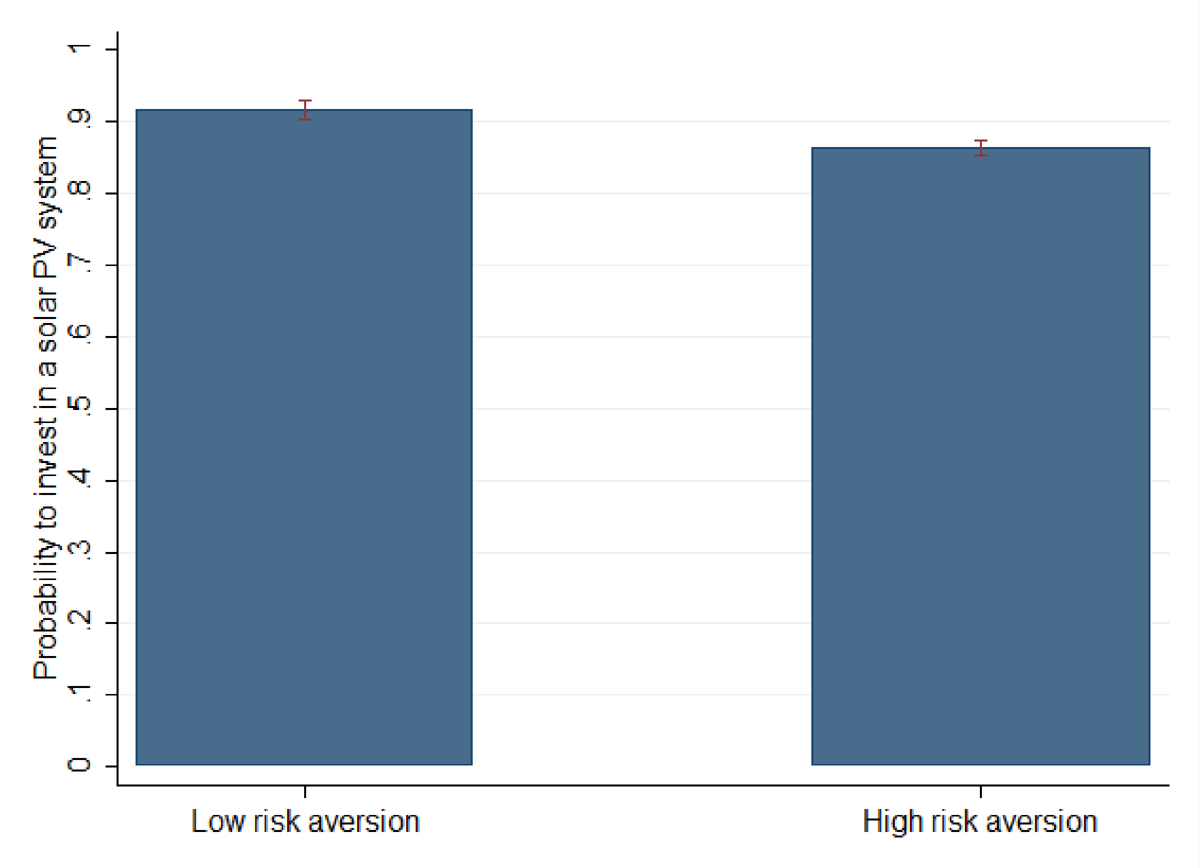
Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals.
Low risk aversion indicates individuals with a risk preference score equal to 5, 6, 7, or 8; high risk aversion indicates individuals with a risk preference score equal to 1, 2, 3 or 4. Risk preference score goes from 1 to 8, the higher the lower the risk aversion. See Table A.1 in Appendix A for more details.
Sample limited to those respondents who answered "yes" (instead of "maybe" or "not") to the screening question on interest in purchasing a solar PV system in the next 5 years (N = 197).

Figure B.13 Probability to invest in a solar PV system, by experimental group (rescaled)



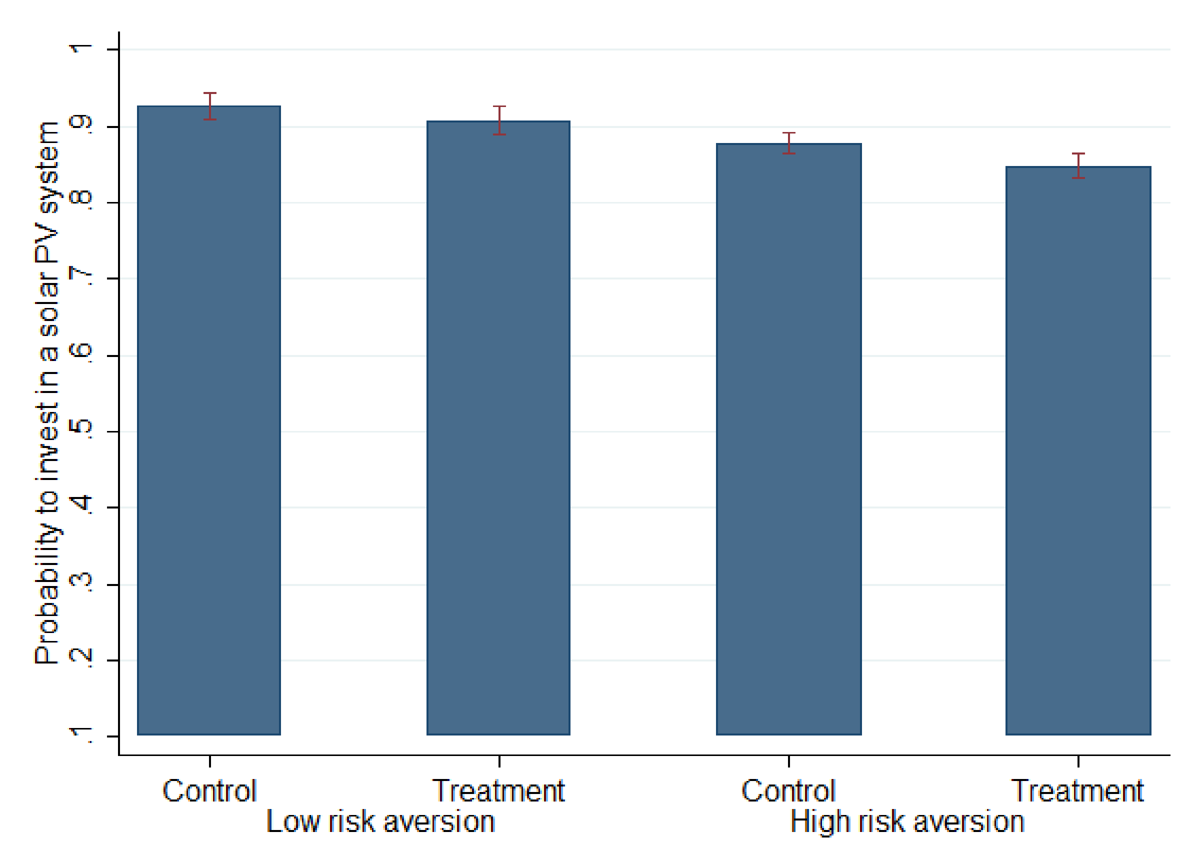
Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals (p = 0.002, Chi-squared test).

Figure B.14 Probability to invest in a solar PV system, by individual risk aversion (re-scaled)



Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. ($p < 0.001$, Chi-squared test). Low risk aversion indicates individuals with a risk preference score equal to 5, 6, 7, or 8; high risk aversion indicates individuals with a risk preference score equal to 1, 2, 3 or 4. Risk preference score goes from 1 to 8, the higher the lower the risk aversion. See Table A.1 in Appendix A for more details.

Figure B.15. Probability to invest in a solar PV system, by individual risk aversion and experimental group (rescaled)



Probability to invest in a solar PV system is the frequency of not choosing the opt-out option ("NONE: I would not choose any of these options") in the choice task. Whiskers represent 95 percent confidence intervals. Results of Chi-squared test for the difference in probability to invest between experimental groups: p= 0.148 for low risk aversion, p= 0.005 for high risk aversion. Low risk aversion indicates individuals with a risk preference score equal to 5, 6, 7, or 8; high risk aversion indicates individuals with a risk preference score equal to 1, 2, 3 or 4. Risk preference score goes from 1 to 8, the higher the lower the risk aversion. See Table A.1 in Appendix A for more details.

Appendix C. Selection of attributes and levels

Attributes were limited to 5, in order to avoid cognitive overload for respondents. We selected attributes and levels after reviewing existing choice experiment studies analyzing other research questions on the purchase of residential solar PV systems (Islam 2014; Bao et al. 2017; Hille, Curtius, and Wüstenhagen 2018) and based on 10 semi-structured interviews conducted between July and October 2018 with solar PV experts, Swiss households who adopted solar, and solar PV installers. The resulting set of attributes and levels was pre-tested in a small pilot study with 30 Swiss homeowners declaring to be interested in installing solar PV systems in the next 5 years. The choice of each attribute and corresponding levels is discussed below.

Investment cost. This monetary attribute is the upfront total investment cost of the solar PV system including installation and grid connection and excluding any investment grant. Its levels reflect the observed price range for residential solar PV systems in Switzerland. In particular, according to the interviews with solar PV installers, in 2018 most residential installations are of 7-8 kW and the typical system cost was around CHF 20,000. Deviations from this amount are typically driven by the choice of installer, origin of modules, modules' color and type (building-integrated or building attached).

Self-consumption. This attribute states what share of the household's annual electricity consumption the PV solar system can cover on average. Based on interviews and the literature (Balcombe et al. 2014, Palm 2018), the possibility to produce own energy and be independent of incumbent utilities is something that may matter to many households. The attribute levels were linearly increased starting from an estimate of the standard yearly average level that a Swiss household can reach without self-consumption optimization, which is 25 %. Higher levels would be made possible by the so-called self-consumption optimization solutions (EnergieSchweiz 2017), ranging from: solutions that run electric appliances (e.g. heat pump, washing machine, tumble drier, dishwasher) according to when solar is produced; a combined solar-storage system; a solar system coupled with an electric vehicle domestic charging station; virtual storage (also known as "storage on the grid"). This attribute is typically strongly positively correlated with expected cost energy savings, even if regulation could substantially weaken this correlation.[14] In our design we ruled out the combination between the highest self-consumption level (100 %) and the lowest system cost's level (CHF 15,000). The constraint was introduced to rule out a combination that looked quite unrealistic, even in a 5-year horizon according to the literature review and the expert interviews.

Payment for surplus electricity. In the choice experiment, market risk is reflected in the attribute "payment for surplus electricity", which features the following levels: fixed payment: 8 cents/kWh; variable payment: ranging from 6 to 10 cent/kWh, depending on electricity market price; variable payment: ranging from 4 to 12 cent/kWh, depending on electricity market

[14] On-bill savings also depend on how grid fees are charged to prosumers and on the pricing of retail electricity, i.e. fix versus volumetric (Kubli 2018). For instance, energy cost savings would be null in a scenario, where, similarly to the telcom industry, electricity customers pay a fixed "all-you-can-eat" monthly amount for withdrawing electricity from the grid and residential solar PV producers do not go off-grid.

price; variable payment: ranging from 0 to 16 cent/kWh, depending on electricity market price. The levels of this attribute have the same "certainty equivalent" (i.e. the same average value, assuming a normal probability distribution for the electricity market price) but different variability (in terms of min-max range). We assume that higher variability is associated with higher perceived market risk. The variation in the price of electricity exported to the grid across alternative solar investment options is realistic in the light of the ongoing move away from long term state-guaranteed fixed payments (e.g. feed-in tariffs). Current regulation in the European Union mandates that monetary compensation for excess electricity fed back by prosumers into the grid should reflect its market value, possibly including a premium for its long-term value for the environment and society (Art. 21 para. 2 lit. d Renewable Energy Directive). As long as the contract agreement between the prosumer and her counterparty fulfills this requirement, any payment scheme is possible. In Switzerland local energy suppliers buy electricity from decentralized solar producers at different prices (for more details: https://www.vese.ch/pvtarif/, last accessed June 30, 2020).

Investment grant. This attribute describes the share of the total investment cost reimbursed by the federal government, paid after the system is commissioned and possibly after a time lag, as detailed in the attribute "waiting time for investment grant". The choice of simulating an investment subsidy, rather than a production subsidy (e.g. feed-in tariff), is consistent with the current policy environment in many developed countries, Switzerland included.

Waiting time for investment grant. In the choice experiment, policy risk is reflected by a longer waiting time for receiving the investment grant, which features the following levels: no waiting time (immediate reimbursement); shorter than 1 year; 1-2 years; undetermined. Such levels appeared realistic for Switzerland and are consistent with policy designs in many other developed countries.

Appendix D. Questionnaire (translated to English)

Institute for Economy
and the Environment

University of St.Gallen

Thank you for your participation.

This survey is part of a research project carried out by the University of St. Gallen in cooperation with the Swiss Federal Office of Energy.

This survey will take about 15 minutes of your time.

Your responses will remain anonymous, treated confidentially and used for research purposes only. For any questions, you could send an email to : energie@unisg.ch

Have you ever seen a house with a photovoltaic solar system* in your neighborhood?

- Yes
- Yes, I have installed a solar photovoltaic system on my house
- No

* A solar photovoltaic (PV) system generates electricity from sun's energy

Houses with a solar PV system @ CC BY 2.0 Vicent Li ©IWÖ-HSG Luca Schmid

0% 100%

Would you consider installing a solar PV system in the next 5 years?

Please consider that the cost range for a typical solar PV system for a residential house in Switzerland is 15 000-30 000 CHF*.

- Yes
- Maybe
- No

* depending on capacity, preferred features, installer etc.

0% 100%

Please imagine you are considering purchasing a solar photovoltaic (PV) system for your house.

Solar PV systems generate electricity from the sun's energy.

By purchasing a solar PV system for your house, you pay once and you will produce your own electricity for about 20 years.

You will use the electricity you produce for your needs, you will **buy less electricity from the grid**
and can save money on your future energy bills.

When your production is not sufficient to cover your consumption, you will buy electricity from the grid. When you produce more electricity than you need, surplus electricity will go directly into the grid and you will receive a **payment for the electricity you send to the grid**.

Even when your average yearly self-consumption is less than 100%, you will be able to sell electricity to the grid, e.g. on a sunny summer day.

0% 100%

IMPORTANT: Since 2008, the Swiss Federal Government has been supporting solar PV systems through **monetary incentives**.

Until 2018 the Government offered the owners of solar PV systems a fixed monetary amount (“feed- in tariff”) for each kWh fed into the grid by their solar systems to be paid for 20 years.

With the new energy law, starting from January 2018 owners of small solar PV systems receive instead a **one-off investment grant** (“investment grant”) that covers a share of the system cost.

The investment grant is paid after the system is commissioned. The **waiting time** for the payment may exceed two years.

Note that if rules about incentives for solar PV systems change while one is still in the waiting list, the new rules may apply. For instance, under the previous support scheme, the promised amount of support was reduced for PV project owners who entered the waiting list after 2012, due to a change in the law.

Recently, concerns have arisen about limited financial resources for the support of solar PV systems resulting in continuously growing waiting times for receiving the monetary support, as you can read in the newspaper article below.

Blick News Sport Meinung Politik Wirtschaft People Leben Digital

News Schweiz Energie: Jahrelange Wartezeit für Subventionen des Bundes für Solaranlagen

Energie

Jahrelange Wartezeit für Subventionen des Bundes für Solaranlagen

09:55 Uhr 04.12.2017 00:50 Uhr 05.10.2018

Wer von einer Einmalvergütung des Bundes für eine Solaranlage profitieren will, muss künftig statt Monate Jahre auf das Geld warten. Die Wartefristen für kleine Anlagen steigen laut BFE auf mindestens zweieinhalb Jahre, für grosse Anlagen gar auf sechs Jahre.

Es würden viel mehr Anlagen und auch grössere Anlagen von der Einmalvergütung profitieren können. Deshalb müsse man mit längeren Wartezeiten für die Auszahlung rechnen, erklärte Sabine Hirsbrunner, Sprecherin des Bundesamts für Energie (BFE), am Montag in der Sendung «Heute Morgen» von Schweizer Radio SRF.

Die längeren Wartezeiten sind die Folge der neuen Energiestrategie. Diese hatte das Volk im Mai mit 58 Prozent Ja-Stimmenanteil angenommen. Diese sorgt dafür, dass insgesamt mehr Fördermittel zur Verfügung stehen. Diese reichen aber nicht aus, um die Warteliste vollständig abzubauen.

0% 100%

<u>IMPORTANT:</u> Since 2008, the Swiss Federal Government has been supporting solar PV systems through **monetary incentives**.

Until 2018 the Government offered the owners of solar PV systems a fixed monetary amount ("feed- in tariff") for each kWh fed into the grid by their solar systems to be paid for 20 years.

With the new energy law, starting from January 2018 owners of small solar PV systems receive instead a **one-off investment grant** ("investment grant") that covers a share of the system cost.

The investment grant is paid <u>after</u> the system is commissioned. The **waiting time** for the payment may exceed two years.

0% 100%

In the next section, we'll be asking you to choose among a number of offers for a **solar PV system for your house**. Please assume that all the proposed solar PV systems can be installed on your house as it is.

IMPORTANT: **answer in the way you would if you were actually taking a REAL spending decision**, consistent with your budget constraint: the amount you spend for the PV system will not be available to you for other expenditures!

If you wouldn't purchase any of the offers shown, you can indicate that by choosing "None".

0% 100%

If these were your only options, which of the following offers for a solar PV system for your house would you choose?
Choose by clicking one of the buttons below:

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

(1 of 8)

Investment cost	30 000 CHF	20 000 CHF	25 000 CHF	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **50%** of your yearly consumption	Your production covers **100%** of your yearly consumption	Your production covers **75%** of your yearly consumption	
Payment for surplus electricity	Variable payment: ranging from 6 to 10 cent/kWh	Fixed payment: 8 cent/kWh	Variable payment: ranging from 0 to 16 cent/kWh	
Investment grant	The federal government will reimburse you **30%** of the price	The federal government will reimburse you **20%** of the price	The federal government will reimburse you **40%** of the price	
Waiting time for investment grant	Between 1 and 2 years	Shorter than 1 year	No waiting time (immediate payment)	
	○	○	○	○

0% 100%

If these were your only options, which of the following offers for a solar PV system for your house would you choose?
Choose by clicking one of the buttons below:

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

(2 of 8)

Investment cost	CHF 15 000	30 000 CHF	20 000 CHF	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **25%** of your yearly consumption	Your production covers **25%** of your yearly consumption	Your production covers **75%** of your yearly consumption	
Payment for surplus electricity	Fixed payment: 8 cent/kWh	Variable payment: ranging from 4 to 12 cent/kWh	Variable payment: ranging from 4 to 12 cent/kWh	
Investment grant	The federal government will reimburse you **10%** of the price	The federal government will reimburse you **20%** of the price	The federal government will reimburse you **40%** of the price	
Waiting time for investment grant	No waiting time (immediate payment)	Undetermined	Between 1 and 2 years	
	○	○	○	○

0% 100%

If these were your only options, which of the following offers for a solar PV system for your house would you choose?
Choose by clicking one of the buttons below:

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

(3 of 8)

Investment cost	30 000 CHF	CHF 15 000	25 000 CHF	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **100%** of your yearly consumption	Your production covers **75%** of your yearly consumption	Your production covers **25%** of your yearly consumption	
Payment for surplus electricity	Variable payment: ranging from 4 to 12 cent/kWh	Variable payment: ranging from 0 to 16 cent/kWh	Variable payment: ranging from 6 to 10 cent/kWh	
Investment grant	The federal government will reimburse you **30%** of the price	The federal government will reimburse you **10%** of the price	The federal government will reimburse you **10%** of the price	
Waiting time for investment grant	Shorter than 1 year	Undetermined	Shorter than 1 year	
	○	○	○	○

0% 100%

If these were your only options, which of the following offers for a solar PV system for your house would you choose?
Choose by clicking one of the buttons below:

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

(4 of 8)

Investment cost	CHF 15 000	20 000 CHF	25 000 CHF	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **50%** of your yearly consumption	Your production covers **25%** of your yearly consumption	Your production covers **50%** of your yearly consumption	
Payment for surplus electricity	Variable payment: ranging from 4 to 12 cent/kWh	Variable payment: ranging from 6 to 10 cent/kWh	Fixed payment: 8 cent/kWh	
Investment grant	The federal government will reimburse you **40%** of the price	The federal government will reimburse you **20%** of the price	The federal government will reimburse you **30%** of the price	
Waiting time for investment grant	No waiting time (immediate payment)	Between 1 and 2 years	Undetermined	
	○	○	○	○

0% 100%

If these were your only options, which of the following offers for a solar PV system for your house would you choose?
Choose by clicking one of the buttons below:

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

(5 of 8)

Investment cost	30 000 CHF	25 000 CHF	20 000 CHF	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **50%** of your yearly consumption	Your production covers **75%** of your yearly consumption	Your production covers **100%** of your yearly consumption	
Payment for surplus electricity	Variable payment: ranging from 0 to 16 cent/kWh	Variable payment: ranging from 6 to 10 cent/kWh	Variable payment: ranging from 0 to 16 cent/kWh	
Investment grant	The federal government will reimburse you **40%** of the price	The federal government will reimburse you **20%** of the price	The federal government will reimburse you **30%** of the price	
Waiting time for investment grant	Shorter than 1 year	Undetermined	No waiting time (immediate payment)	
	○	○	○	○

0% 100%

If these were your only options, which of the following offers for a solar PV system for your house would you choose?
Choose by clicking one of the buttons below:

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

(6 of 8)

Investment cost	30 000 CHF	CHF 15 000	20 000 CHF	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **75%** of your yearly consumption	Your production covers **25%** of your yearly consumption	Your production covers **100%** of your yearly consumption	
Payment for surplus electricity	Fixed payment: 8 cent/kWh	Fixed payment: 8 cent/kWh	Variable payment: ranging from 4 to 12 cent/kWh	
Investment grant	The federal government will reimburse you **30%** of the price	The federal government will reimburse you **20%** of the price	The federal government will reimburse you **10%** of the price	
Waiting time for investment grant	Undetermined	Between 1 and 2 years	Between 1 and 2 years	
	○	○	○	○

0% 100%

If these were your only options, which of the following offers for a solar PV system for your house would you choose?
Choose by clicking one of the buttons below:

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

(7 of 8)

Investment cost	30 000 CHF	25 000 CHF	25 000 CHF	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **25%** of your yearly consumption	Your production covers **50%** of your yearly consumption	Your production covers **100%** of your yearly consumption	
Payment for surplus electricity	Variable payment: ranging from 6 to 10 cent/kWh	Variable payment: ranging from 0 to 16 cent/kWh	Variable payment: ranging from 6 to 10 cent/kWh	
Investment grant	The federal government will reimburse you **10%** of the price	The federal government will reimburse you **20%** of the price	The federal government will reimburse you **40%** of the price	
Waiting time for investment grant	Shorter than 1 year	No waiting time (immediate payment)	Undetermined	
	○	○	○	○

0% 100%

If these were your only options, which of the following offers for a solar PV system for your house would you choose?
Choose by clicking one of the buttons below:

IMPORTANT: For additional information please scroll with the mouse over the corresponding property of the product (left column, bold text)

(8 of 8)

Investment cost	20 000 CHF	20 000 CHF	CHF 15 000	NONE: I wouldn't choose any of these.
Own consumption	Your production covers **75%** of your yearly consumption	Your production covers **100%** of your yearly consumption	Your production covers **50%** of your yearly consumption	
Payment for surplus electricity	Variable payment: ranging from 6 to 10 cent/kWh	Fixed payment: 8 cent/kWh	Variable payment: ranging from 4 to 12 cent/kWh	
Investment grant	The federal government will reimburse you **10%** of the price	The federal government will reimburse you **40%** of the price	The federal government will reimburse you **30%** of the price	
Waiting time for investment grant	No waiting time (immediate payment)	Undetermined	Shorter than 1 year	
	○	○	○	○

0% 100%

How do you see yourself: are you generally a person who is very willing to take risks or do you try to avoid taking risks?

Please tick a box on the scale, from ‘not at all willing to take risks’ to ‘very willing to take risks’.

	not at all willing to take risk									very willing to take risk
	○	○	○	○	○	○	○	○	○	○

0% 100%

Please imagine the following situation. You can choose between a sure payment of a certain amount of money, or a draw, where you would have an equal chance of getting 750 CHF or getting nothing.

We will present three different situations to you.

First situation. What would you prefer:

- receiving 400 CHF for sure
- a 50% chance of receiving 750CHF, and the same 50% chance of receiving nothing

0% 100%

Second situation. What would you prefer

- receiving 200 CHF for sure
- a 50% chance of receiving 750 CHF, and the same 50% chance of receiving nothing

0% 100%

Third situation. What would you prefer

○ receiving 100 CHF for sure

○ a 50% chance of receiving 750 CHF, and the same 50% chance of receiving nothing

0% 100%

Second situation. What would you prefer

- receiving 600 CHF for sure
- a 50% chance of receiving 750 CHF, and the same 50% chance of receiving nothing

0% 100%

Third situation. What would you prefer

◯ receiving 500 CHF for sure

◯ a 50% chance of receiving 750 CHF, and the same 50% chance of receiving nothing

0% 100%

Third situation. What would you prefer

○ receiving 300 CHF for sure

○ a 50% chance of receiving 750 CHF, and the same 50% chance of receiving nothing

0% 100%

Third situation. What would you prefer

- receiving 700 CHF for sure
- a 50% chance of receiving 750 CHF, and the same 50% chance of receiving nothing

0% 100%

How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?

Please tick a box on the scale, from 'not at all willing' to 'very willing'.

	not at all willing									very willing
	○	○	○	○	○	○	○	○	○	○

0% 100%

Suppose you were given the choice between receiving a payment today or a payment in 12 months.

We will now present 5 situations to you.

The payment today is the same in each of these situations. The payment in 12 months is different in every situation.

For each of these situations we would like to know which you would choose.

Please assume there is no inflation, i.e., future prices are the same as today's prices.

First situation. What would you

choose? ○ 200 CHF today

○ 308 CHF in 12 months

Second situation. What would you choose?

- 200 CHF today
- 370 CHF in 12 months

0% 100%

Second situation. What would you choose?

- 200 CHF today
- 251 CHF in 12 months

0% 100%

Third situation. What would you choose?

- ○ 200 CHF today
- ○ 403 CHF in 12 months

0% 100%

Third situation. What would you choose?

- 200 CHF today
- 338 CHF in 12 months

0% 100%

Third situation. What would you choose?

- 200 CHF today
- 278 CHF in 12 months

0% 100%

Third situation. What would you choose?

- 200 CHF today
- 412 CHF in 12 months

0% 100%

Fourth situation. What would you choose?

- ◯ 200 CHF today
- ◯ 421 CHF in 12 months

0% 100%

Fourth situation. What would you choose?

- 200 CHF today
- 386 CHF in 12 months

0% 100%

Fourth situation. What would you choose?

- ◯ 200 CHF today
- ◯ 354 CHF in 12 months

0% 100%

Fourth situation. What would you choose?

- 200 CHF today
- 323 CHF in 12 months

0% 100%

Fourth situation. What would you choose?

- 200 CHF today
- 293 CHF in 12 months

0% 100%

Fourth situation. What would you choose?

- 200 CHF today
- 265 CHF in 12 months

0% 100%

Fourth situation. What would you choose?

- 200 CHF today
- 238 CHF in 12 months

0% 100%

Fourth situation. What would you choose?

- 200 CHF today
- 212 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 429 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 412 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 395 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 378 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 362 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 346 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 330 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 315 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 300 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- ○ 200 CHF today
- ○ 286 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 271 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 258 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 244 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 231 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- ○ 200 CHF today
- ○ 218 CHF in 12 months

0% 100%

Fifth situation. What would you choose?

- 200 CHF today
- 206 CHF in 12 months

0% 100%

Do you know how much you spend monthly for electricity in your house?

- Yes
- I do not know, I would have to check

0% 100%

If yes, please indicate

- ◯ <50 CHF / month
- ◯ 50-100 CHF / month
- ◯ 100-150 CHF / month
- ◯ > 150 CHF / month

How would you describe the amount you pay for electricity:

- very high
- rather high
- fair
- rather low
- very low
- I do not know

0% 100%

Do you have a heat pump?

- yes
- no

Do you have an electric car?

- no, and I am not interested in buying one in the next 5 years
- no, but I am interested in buying one in the next 5 years
- yes

Please select the word "energy" from the list below

- environment
- energy
- politics
- building
- I do not know

Thank you, the third question was a little attention check.

What do you think about how **electricity prices for Swiss households** will develop over the next five years?

I think that the price of electricity for Swiss households...

- will go up
- will stay about the same as it is now
- will go down
- no idea

0% 100%

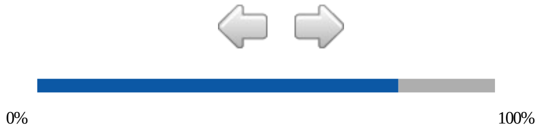
About how much do you think the price of electricity for Swiss households will increase during the next five years compared to now?

- It will raise sharply (increase by more than 10%)
- It will raise slightly (increase up to 10%)

0% 100%

About how much do you think the price of electricity for Swiss households will decrease during the next five years compared to now?”

- ◯ It will decrease sharply (decrease by more than 10%)
- ◯ It will decrease slightly (decrease up to 10%)



If you buy a solar system today and the federal government promises you to pay an investment grant after a certain waiting time, how likely do you think it is that you are indeed going to be reimbursed?

	certain	very likely	rather likely	rather unlikely	very unlikely	I do not know
	○	○	○	○	○	○

0% 100%

Do you think there will be more or less **government support available for solar systems** 5 years from now?

- Much more than today
- A little more than today
- The same as today
- A little less than today
- Much less than today
- I do not know

0% 100%

Would you please indicate for the following description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you?

Looking after the environment is important to this person; to care for nature and save life resources

- ◯ very much like you
- ◯ like you
- ◯ somewhat like you
- ◯ not like you
- ◯ not at all like you

How many of the people you know (**friends, family members, colleagues**) have already adopted solar system?

- none
- a minority
- about half
- the majority
- all
- I do not know

How many of **your neighbors** have already adopted a solar system?

- none
- a minority
- about half
- the majority
- all
- I do not know

0% 100%

One of the ways to increase the share of self-consumption is to combine solar PV system with battery storage. What do you think about battery storage?

I find **battery storage**…

	fully agree	rather agree	rather not agree	not agree at all	I do not know
Not harmful for the environment	○	○	○	○	○
a mature technology	○	○	○	○	○
already a profitable investment today	○	○	○	○	○

0% 100%

If you would like to gather information on buying a solar system, which **information channel** would be

reliable for you?

If you would not use the source, answer “not relevant”

	not reliable at all	rather not reliable	rather reliable	very reliable	not relevant
Information event in your municipality	○	○	○	○	○
Swissgrid/Pronovo	○	○	○	○	○
Exhibition/Showroom/Shop	○	○	○	○	○
Cantonal/regional energy agency	○	○	○	○	○
Architect	○	○	○	○	○
Friends, colleagues or relatives who already have a solar system	○	○	○	○	○
Online search	○	○	○	○	○
SwissEnergy	○	○	○	○	○
Installer	○	○	○	○	○

If you would use information channels different from those mentioned above, what

are these? Please enter your answer below.

0% 100%

Please enter your **ZIP code**

Please indicate which is your **household monthly income**

(please note responses are completely anonymous and will be treated confidentially)

- less than 3'000 CHF
- between 3'000 and 4'500 CHF
- between 4'501 and 6'000 CHF
- between 6'001 and 9'000 CHF
- between 9'001 and 12'000 CHF
- more than 12'000 CHF
- No answer

What is the value of **your household's assets**?

(please note responses are completely anonymous and will be treated confidentially)

- less than 10'000 CHF
- 10'000 - 100'000 CHF
- 100'001 - 500'000 CHF
- 500'001 - 1'000'000 CHF
- 1'000'001 - 2'000'000 CHF
- over 2'000'000 CHF
- No answer

0% 100%

Thank you for your participation in this survey. We have just two short final questions for you.

Do you have any comments?

Please use the following box to share your **comments**

0% 100%

This is our last question.

Since you are interested in purchasing a solar system in the foreseeable future, we can redirect you to a non-for-profit platform, **SwissEnergy***, that allows you to receive three non-binding quotes for a solar installation, and compare them with the help of SwissEnergy's experts.

Would you like to be redirected to SwissEnergy's website?

- yes,please
- no,thanks

*__EnergieSchweiz__ is the platform for renewable energy and efficiency created by the **Swiss Federal Office of Energy.**

0% 100%

Many thanks!

Click HERE to open SwissEnergy's website in a new tab.

This survey was about solar PV systems and Swiss energy policy. If you are indeed interested in producing your own solar power, it might be important for you to know that the federal government has announced, in November 2018, that they are committed to reducing the waiting times for incentives for solar.[15]

Please click HERE to terminate the survey.

If you have any questions, send an email to: energie@unisg.ch.

0% 100%

[15] From here, respondents could access the corresponding official press release issued on the 9th of November 2018 by the Swiss Federal Office of Energy (https://www.bfe.admin.ch/bfe/de/home/news-und-medien/medienmitteilungen/mm-test.msg-id-72851.html).

Many thanks!

Please click HERE to terminate the survey.

This survey was about solar PV systems and Swiss energy policy. If you are indeed interested in producing your own solar power, it might be important for you to know that the federal government has announced, in November 2018, that they are committed to reducing the waiting times for incentives for solar.

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0% 1