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Intertemporal MPC and Shock Size

Discussion paper n. 24/2025

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Keywords: Intertemporal Marginal Propensity to Consume; Income Shocks; Shock Size

JEL: D12, D14, D15, C8, C99

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Tullio Jappelli, Ettore Savoia, Alessandro Sciacchetano

29 April 2025

Abstract

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1. Introduction

The response of consumption to income changes is a key statistic for evaluating the validity of modern consumption theories, and for estimating the effectiveness of fiscal policy. Recent literature uses a range of approaches from structural models, quasi-natural experiments, and direct survey evidence to study the short-run effect of transitory income shocks.[1] The present paper builds on this body of work to analyze the intertemporal Marginal Propensity to Consume (iMPC), a key function to evaluate assess modern macroeconomic models and to gauge the size of fiscal multipliers in general equilibrium models (Auclert et al., 2024).

The novelty of our approach is that for the same individual, we elicit the consumption response over many periods as the result of different sized hypothetical shocks. To analyze these issues, we exploit data from the Italian Survey of Consumer Expectations (ISCE) which surveys 5,000 individuals representative of the Italian resident population aged between 20 and 75. The survey question asked respondents to allocate three different amounts of hypothetical lottery winnings (€1,000, €10,000, and €50,000) between consumption and saving in the year following the survey and over the long run.

The responses provide data on planned consumption up to 20 years and allow the construction of an empirical impulse response function to positive, unexpected, and transitory income shocks of different sizes. The richness of the data enables us to determine whether the shape of the iMPC varies across socioeconomic groups, levels of income risk, and cash-on-hand, and macroeconomic and idiosyncratic uncertainty.

Our examination provides several interesting findings. In the first year the iMPC from a hypothetical €1,000 prize is 28%, compared to 19% and 15% respectively for €10,000 and €50,000 wins. In the following periods this pattern is reversed. The response to a small shock is weaker than the response to a larger shock showing that shocks of different size induce different intertemporal consumption reallocations. Small shocks are likely to be consumed more immediately, resulting in a relatively small iMPC in later years. Large shocks are smoothed over time, showing a lower short run impact but higher planned consumption in future years, assuming the absence of other shocks in later periods. In all cases, the bulk of the consumption response is concentrated in the initial periods: the first two years in the case of the €1,000 win, four to five years in the case of the larger win amounts.

[1] See Jappelli and Pistaferri (2010), Havranek and Sokolova (2020), Gelman (2021) and Crawley and Theloudis (2024) for recent surveys.

The relation between the iMPC and the size of the shock adds an important and so far unexplored dimension of iMPC heterogeneity, and has implication for models with precautionary saving and liquidity constraints. A relatively small positive income shock generates a large, short run consumption response for the fraction of the population that is liquidity constrained or myopic. A large shock is more likely to overcome these constraints, implying a lower iMPC in the current period but a higher iMPC in subsequent periods.

Based on subjective expectations of income growth, we find that higher expected income volatility is associated with a lower short run iMPC and a higher response in the long run.[2] We find also that the short run consumption response to a shock is correlated positively with age, and weakly negatively correlated with uncertainty about future GDP and cash-on-hand.

In the second step of our analysis, we compare our empirical results with simulations of the iMPC for different sized shocks with the predictions of intertemporal consumption models that include income risk, borrowing constraints, and heterogeneous agents. Our analysis attempts to select the model (or model class) that best fits the empirical iMPC. We find that a one-asset model with precautionary saving and liquidity constraints is a good predictor of the decline over time in the iMPC, the negative relation between the iMPC and the shock size, and the relation between the iMPC and income risk. The accuracy of the predictions increases for larger shocks. In contrast to the empirical iMPC, the simulations show a clear negative relation between cash-on-hand and the propensity to consume, particularly for small shocks.

We simulated other models and compared the empirical and theoretical iMPC using the Mean Squared Error (MSE) and Mean Absolute Error (MAE) statistics. The data strongly reject the quadratic utility model which predicts a constant iMPC over time and shock size. A model with hand-to-mouth consumers captures the short-run iMPC for small shocks, but don't account for any relation between iMPC and shock size. A model with two assets as in Kaplan et al. (2014) and Auclert et al. (2021) underpredicts the short-run iMPC for larger shocks. Overall, our analysis suggests that liquidity, precautionary saving, and constraints are key ingredients to explain the iMPC that we observe in our data.

Our analysis complements recent empirical and theoretical work. Empirically, it is linked to the growing literature on economic expectations and survey experiments. Bachmann

[2] A negative association between the short run propensity to consume and income risk is consistent with Savoia (2023).

et al. (2022) provide a review of the design of survey experiments which ask respondents to make hypothetical decisions. The paper by Stantcheva (2023) examines a large body of work which shows that the approach has been used in several different fields such as education, labor, health, and macro-finance. In the stream of work on consumption, our paper adds to recent attempts to estimate the iMPC; for example, Fagereng et al. (2021), Golosov et al. (2024), and Andersen et al. (2024) which use administrative data over realized lotteries, Druedahl et al. (2022) which uses transaction data, and Colarieti et al. (2024) which use survey data. Our paper provides two contributions to this literature: (i) unlike studies using realized lotteries, which observe different individuals facing different shocks, our survey elicits data for three shocks for the same individual; (ii) we provide information about the long run iMPC (up to 20 years), expanding the evidence in Andreolli and Surico (2024) who show that shock size affects propensity to consume in the short run and Fagereng et al. (2021) who examine the response to lottery wins in the first five years.

We do not view our approach as superior to approaches estimating the iMPC using real lottery data or other survey experiments , but rather as a complementary tool in the empirical researchers' toolkit for addressing important research questions. In general, this research has important implications for evaluating fiscal policy interventions. Indeed, we confirm findings that small and transitory fiscal shocks have mostly short-term effects, while larger fiscal shocks have lower consumption impact in the short run, but more persistent effects.

In terms of adding to the theory, our experiment adds to work evaluating the validity of intertemporal consumption models with incomplete markets; for example, see the surveys by Attanasio and Weber (2010), Jappelli and Pistaferri (2017), Kaplan and Violante (2022), and Violante (2024). Our simulations are inspired by Auclert et al. (2024), who evaluate the performance of general equilibrium models in matching the size-unconditional iMPC estimated by Fagereng et al. (2021). Our contribution is to evaluation the models' accuracy in capturing the iMPC dynamics across shocks of different sizes. While our partial equilibrium models are not directly comparable with Auclert et al. (2024), the strong link between the iMPC and fiscal multipliers makes our findings valuable also to evaluate the dynamic outcomes of fiscal interventions of varying sizes.

The paper is organized as follows. Section 2 presents our empirical framework. Section 3 describes the survey data and the format of the questions used to elicit the iMPC. Section 4 presents the empirical iMPC and how it varies with shock size and individual characteristics.

Sections 5 and 6 compare our findings with the predictions of incomplete market models with heterogeneous agents. Section 7 concludes.

2. Intertemporal MPC

In this paper, we define the short-run MPC or simply the MPC as the change in consumption induced by a transitory and unanticipated income shock of a given size which occurs in the first period. A large body of empirical evidence indicates that in the U.S. the average MPC non-durable goods and services from a real windfall gain of $500-$1,000 is between 15% and 30% in the first year after the shock.[3]

This average value hides substantial heterogeneity since for many households the MPC is close to zero and for some it is close to one, with considerable variation in between these two values. Previous studies show that the short-run MPC varies with the direction and size of the income shocks. In particular, the MPC produced by a negative income shock tends to be higher than the MPC for a positive shock, and the MPC from a small shock tends to be higher than for a large shock (Fuster et al., 2021; Christelis et al. 2019). Some papers show that the MPC tends to be higher for low-wealth individuals or individuals with illiquid assets while other studies show that the wealth-MPC relation is flat. Still others, study responses to different shock sizes (Andreolli and Surico, 2024)[4]

While most studies focus on the short run (1-12 months) impact of income shocks on consumption, there are a few recent studies that use lottery data and examine the impact in later periods. To our knowledge, Colarieti et al. (2024) is the only survey that includes direct questions on the MPC in more than one period. They rely on a hypothetical lottery and focus on the quarter-by-quarter dynamics of how the household would allocate $1,000 (or 10% of its income) to spending, debt repayments, and savings over the following four quarters. They find that the MPC was 0.16 in the first quarter, and 0.42 cumulated over a year. Initially, the MPC varies little among households, but over the whole year heterogeneity increases, with liquid households reporting a larger MPC. However, the iMPC horizon in this study is only one year.

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[3] See Jappelli and Pistaferri (2010), Havranek and Sokolova (2020), Gelman (2021), and Crawley and Theloudis (2024) survey.

[4] Chetty et al. (2024) is a very recent paper which uses high quality data to estimate the MPC. The authors focus on the response to a stimulus payment the first month after receipt, and find that stimulus payments increase spending for low-income households but have minor impact on high-income households' spending.

Golosov et al. (2024) analyzed the consumption responses of U.S. lottery winners of prizes over \$30,000 and found that \$1 extra unearned income increased consumption expenditure by 60 cents over the prize-winner's remaining life. Fagereng et al. (2021) used administrative data for Norway and found that households spent about half of their lottery winnings in the first year, and about 90% over the first five years. They also found that the short run MPC is negatively correlated with liquid assets and size of the lottery win. Their evidence suggests that spending is tilted more to the present (higher MPC) than standard models would predict. Andersen et al. (2024) used customer records from a large retail bank in Denmark to track investors' consumption responses to stock market wealth shocks. They found that the accumulated MPC over one year was around 4%, and 16.4% over three years.[5]

Based on our survey data we define $iMPC_{i,j,t} = \frac{\partial c_{i,j,t}}{\partial L_j}$, where L_j is a lottery win of size j and $iMPC_{i,j,t}$ is the change in consumption of individual i $(i = 1, ...N)$ in period t $(t = 1, ...T)$ induced by lottery win L_j $(j = 1, 2, 3)$. Since for each individual we observe the MPC for several periods, we create a data set that includes $(N \times T)$ observations. Dropping the j index, we estimate regressions based on the following simple specification for each of the three shocks:

$$iMPC_{i,t} = \sum_{t=1}^{T} \beta_t D_t + \gamma X_i + \varepsilon_{i,t} \tag{1}$$

where D_t is a time dummy that equals 1 if reported consumption refers to year t. The main coefficients of interests are β_t, that is, the iMPC in year t in response to the hypothetical shock. The β_t coefficients are comparable to how the MPC is calculated in the literature and have a direct counterpart in our calibrated model. The X_i variables include cash-on-hand, expected income growth, income risk and demographic variables. We assume that the error term $\varepsilon_{i,t}$ is a classical measurement error in reported iMPC and estimate separate regressions

[5] Druedahl et al. (2022) study the consumption response of Danish borrowers with adjustable-rate mortgages, and exploit the fact that the bank sends a letter in advance of the annual interest rate reset advising borrowers about the expected change to their mortgage payments. They find that unconstrained households adjust consumption immediately, while liquidity-constrained households adjust closer to the arrival of the cash flow.

for each of three shocks as described in Section 4.[6]

Notice that in regression (1) the β_t are identified because we have repeated observations of iMPC for each individual. Furthermore, since X_i does not depend on t, the Frisch-Waugh-Lovell theorem applies: the estimate of β_t is numerically identical if we include the X variables or partial them out, or if we replace the X variables with a set of individual fixed effects, see for instance Hayashi (2000, p. 18).

In a frictionless permanent income model with quadratic utility the iMPC is constant overtime, regardless of the size of shock. Therefore, testing whether the β_t parameters are constant over time and identical for different shock sizes is a joint test of the validity of the quadratic utility model.[7] Models with precautionary saving, borrowing constraints, liquidity, and myopia introduce non-linearities in the iMPC over time and over the shock size, possibly inducing higher responses in the short-run and a weaker impact in future periods.

For instance, if consumers are liquidity constrained in the period in which the shock occurs, the iMPC will be one in the initial period and zero in all subsequent periods. If the shock is large enough to overcome the liquidity constraint, the iMPC will be less than 1 in the initial period, and positive afterwards. Precautionary saving and expectations of future borrowing constraints have opposing effects, in the short run reducing the iMPC, and in future periods increasing it. The survey allows us to evaluate some of these important and so far unexplored implications of the iMPC statistics.

3. The survey

Our data on iMPC come from the responses to the Italian Survey of Consumer Expectations (ISCE), a representative survey of the Italian resident population aged between 18 and 75 years. It is administered quarterly and collects data on demographic variables, income, wealth and consumption. The ISCE also asks respondents about intentions and expectations. In our study context, a useful question is on the expected distribution of income growth in the 12 months following the interview. In each quarter, the sample size is approximately 5,000 individual observations.

[6] Note that the regressions identify the iMPC by comparing, for each individual, different horizons for each winning. Therefore, there is no need to cluster the standard errors. Clustering would be necessary only if we estimated a single regression pooling the three shocks.

[7] If the regression has a constant term, the hypothesis is that the parameters are jointly equal to zero.

The survey builds on two international projects of online, high-frequency surveys that collect both realized variables and also expectations, preferences, and perceptions. The New York Fed Survey of Consumer Expectations collects information on consumers' views and expectations regarding inflation, employment, income, and household finances, while the European Central Bank Consumer Expectation Survey collects monthly data on households' expectations from about 20,000 individuals from 11 euro-area economies.

The ISCE sampling scheme is similar to that employed for the Bank of Italy Survey of Household Income and Wealth (SHIW). The sample stratifies the Italian resident population along: area of residence in Italy (North-East, North-West, Central, South), age group (18-34, 35-44, 45-54, 55-64, over 65), gender, education (college degree, high school degree, less than high school), and occupation (working, not working). All interviews are enabled by a Computer Assisted Web Interviewing (CAWI) method. The average response rate (ratio of completed interviews to invitations) across waves is around 40%. We use sample weights to make the descriptive statistics population-representative.

The Online Appendix presents information about the survey. It also compares the sample means of ISCE selected variables with the most recent available Bank of Italy Survey of Household Income and Wealth (2022 SHIW). Samples are well aligned in terms of gender, family size and region. ISCE features a slightly lower proportion of respondents with primary education (12% against 14% in the SHIW), and correspondingly a higher proportion of high school graduates (50% against 46%). Also, the ISCE sample includes a higher proportion of young respondents. These characteristics are likely to reflect that ISCE samples a segment of the population which is more likely to have internet access and is more able to respond to online questionnaires. The Appendix shows also that median values of income, consumption, and financial wealth are well aligned between ISCE and SHIW. Table 1 reports the sample means and medians for the expected income growth and the other variables used in the estimation. It also shows that the sample of respondents reporting iMPC data drops by about 10% of the potential 5,001 observations original , depending on the shock size.

In January 2024 ISCE includes a sequence of questions about the iMPC for a transitory and positive income shock. The first set of questions asks respondents how they would spend three hypothetical lottery winnings over time:

Imagine winning a lottery prize of €1,000 / €10,000 / €50,000 today. Think about how you would spend this sum in the coming years. You are free to choose how to distribute the sum over the next 10 years and beyond.

Respondents can choose how much to consume in each of the five years following the win. After the fifth year, the periods are presented in three intervals of five years, although respondents can also choose to use the prize beyond the 20th year ("*use in subsequent years*"). The order in which the three hypothetical wins are presented could introduce some framing effects in the iMPC estimates. Therefore, we created six randomized groups, and each group presented different permutations of the three prizes. The randomized groups are well balanced in terms of the demographic and economic variables. In the regression analysis, we control also for these potential framing effects.

There might be concern that a hypothetical shock might not reproduce real behavioral response to an actual shock. For instance, respondents might be tempted to offer socially desirable responses or might be influenced by perceived societal norms (e.g., reporting high saving rates) while their responses might not reflect their actual behavior. To mitigate these concerns, for the same individual we compare the responses to the same shock over time, and the responses to different shocks in the same periods. If these potential biases are randomly distributed within the population, we can still make causal inferences about the time and size dimensions of the consumption response.[8]

Since we reckon some respondents might find these questions quite challenging, we do not distinguish between durables and non-durables consumption. In the first step of the analysis, we estimate three intertemporal marginal propensities to spend (iMPX), where each respondent reports data for nine periods. As already mentioned, the first five periods are the yearly iMPX, the next three are five-year intervals, and the last period is an open interval. Background variables—such as age, gender, education, and cash-on-hand - are fixed at baseline, defined as the point in time when individuals received their hypothetical lottery win and were asked to plan their future (hypothetical) expenditures.

The second step in the analysis was estimating the iMPC from the distribution of iMPX, relying on a rough estimate of the overall amount likely to be spent on durable goods

[8] The questionnaire was administered in early February 2024, two years after the post-pandemic recovery. In 2023, real GDP growth in Italy was 0.9%, slowing from the 4% growth rate in the previous year, and was projected to grow at 0.7% in 2024. Although we cannot rule out business cycle effects, the period in which the survey was administered should not be affected by the post-pandemic recovery.

(without asking for the period break-down). We asked the respondents how much of the total prize they would allocate to durable consumption (cars, appliances, computer/electronic equipment, furniture, etc.).[9] We converted this qualitative indicator into a quantitative variable that is coded 0 ("I don't plan to spend anything on durables"), 0.25 ("less than half"), 0.5 ("half the amount"), 0.75 ("more than half") and 1 ("spend all of it on durables").

Table 2 shows that the proportion of total consumption spent on durable goods is higher for small shocks. For instance, the fraction of those who would spend the entire prize on durables purchases is 45% for the smallest prize, 26% for the intermediate amount, and 17% for the largest prize. To estimate the iMPC, we assume that the amount that people allocate between non-durables and durables is the same over time and multiply the iMPX by one minus the share of durable consumption reported in Table 2.[10]

We are aware that the imputation is questionable, because within the same size shock, the share of expenditure devoted to durables is likely to vary over horizons due to lumpiness and discreteness of durable goods investment. We therefore present results for a subset of respondents who don't plan to spend anything on durables.

4. The empirical propensity to consume

In this section we present the main results of the iMPX and iMPC analyses for each of the three lottery win values. We also show that the propensity to consume varies with age, cash-on-hand, income risk, and other demographic variables.

4.1. iMPX

In Figure 1 we plot the cross-sectional average of the marginal propensity to spend for each of the nine periods following the shocks. The consumption amounts reported are standardized by the lottery win. Figure 1 shows high propensity to spend in the first year for the €1,000 prize (77%), intermediate spending for the €10,000 prize (50%), and lower

[9] We do not include home repair expenditures in the list of durable consumption, as such activities are classified in the national accounts as necessary to maintain dwellings in usable condition. However, structural improvements that significantly extend the life or enhance the value of the dwelling —unlike routine repairs—are considered investments.

[10] Another concern is that the question does not include debt repayment as a use of a lottery win. Since not everyone equates debt repayment with saving, in the robustness checks we test whether the results change if we exclude individuals with debts.

spending for the €50,000 prize (35%). The spending horizon spans the entire range of the periods presented to the respondents.

These high spending propensities are broadly consistent with previous findings. Fagereng et al. (2021) found that in the case of Norway households spent about 50% of their lottery winnings in the first year (and even higher for small wins). Jappelli and Pistaferri (2014) studied the case of Italy and the propensity to spend a hypothetical and unanticipated bonus equivalent to one month's income was 48% while Christelis et al. (2019) reported that following a one-month income increase the average Dutch respondent allocated 48.8% of this additional income to total consumption.

In the second period, the ranking is reversed, with the iMPX equal to 9% for the smallest prize and 19% for the two larger prizes. Most of the consumption impact of the shock vanishes after a few years: adding up the propensities to consume in the first five years results in a cumulative iMPX of 92.3% for the smallest prize and 87.6% for the intermediate prize. These results are in line with Fagereng et al (2021), showing that after 5 years households have on average spent about 90 percent of their windfall. For largest win, the cumulative consumption response in the fir five years is 80%, and respondents plan to spend 5% of the prize 20 years after the shock.

4.2. iMPC

Figure 2 plots our estimates for the three iMPC, that is, planned non-durable consumption standardized by the lottery prize value. The shape of each of the three curves is a scaled down version of those in Figure 1. In the first year, the iMPC is 26.5% for the smallest shock, 18.9% for the intermediate shock, and 15.5% for the largest shock. In the short run, the magnitude of the MPC is comparable with the findings of the literature. The surveys by Jappelli and Pistaferri (2010), Havranek and Sokolova (2020), Gelman (2021), and Crawley and Theloudis (2024) indicate that in the U.S. the average MPC non-durable goods and services from a windfall gain of \$500-\$1,000 was of the order of 15% to 25%. Christelis et al. (2019) found that in the Netherlands the average MPC nondurables is 19%.

The iMPC distributions include two features that are worth noticing. First, similar to the iMPX, in the second year the consumption response to a small shock is weaker (4%) than the response to a large shock (9%). In other words, small prizes tilt the consumption profile towards the present, while large prizes are more likely to be spent in future periods. Second, after five years spending on non-durable consumption is limited (between 5% for the €1,000 prize and 12% for the €50,000 prize). Therefore, in the theory section we consider the five-year iMPC as a sufficient statistic to characterize the dynamics of consumption.

Figure 3 shows another interesting dimension of the iMPC distributions. The proportion of respondents that consume the entire €1,000 prize in the first year (MPC=100%) is 15%, and is much lower for the two larger prizes (5% maximum). This suggests that shock size is an important dimension of heterogeneity in the empirical iMPC. A natural explanation of this is that myopia or liquidity constraints have the greatest effect on winners of the smallest value prize and vanish or are less important for larger shocks which are more significant and are more likely to overcome liquidity constraints.

Figures 4, 5, and 6 explore sources of heterogeneity associated with age, liquid resources (the sum of monthly income plus liquid financial assets), and income risk. Splitting the sample by age (below or above 40 years) Figure 4 shows that in the first period the iMPC is about 5% higher for the older group, regardless of the size of the shock. In the later periods, the iMPC is similar for the two groups, with a tendency for the younger group to report a slightly higher propensity to consume in the last period, and especially for the largest prize (about 2%). Figure 5 shows that cash-on-hand makes little different to the iMPC in any of the periods considered.

The ISCE also asks about the subjective probability distribution of expected earnings and retirement income growth 12 months ahead. Respondents are asked to indicate probabilities over 11 intervals of possible income growth values, ranging from less than 8% to more than 8%. We use the mid point of the intervals chosen by the respondent to construct the subjective distribution of income growth moments. For the lowest and highest open intervals we assume the respective values -10% and 10%. The standard deviations of the individual distributions are the income risk measures used in our iMPC analysis.

Figure 6 plots the iMPC splitting the sample between high and low-income risk respondents (standard deviation of expected income growth below or above 0.5%). In the short run, higher income risk is associated with a lower iMPC, while in later periods the relation is reversed. For instance, for a €10,000 win, in the first year the average iMPC of the low-risk group is 28% and of the high-risk group is 23%. This empirical regularity is in line with the predictions of models with precautionary saving and a concave consumption function. In the short run, prudent individuals save a larger fraction of their prize compared to individuals with the same preferences but lower risk. Section 5 analyzes the effect of income risk on the simulated iMPC and compares it to the empirical iMPC.

4.3. Regression analysis

Table 3 presents the regression results for the three iMPC distributions. Due to missing observations for iMPC, the ISCE sample size drops by about 10% (depending on the shock) from the original potential sample. Since for each individual we have nine repeated observations of the iMPC, to estimate regression (1) we organize our data in a panel framework of 40,509 year-individual observations.

The model also addresses potential biases arising from framing effects—specifically, the influence of the random ordering of the three iMPC questions. The ordering is random across individuals, but a fixed effect for the sequence of individual responses. Therefore, the iMPC estimates are unaffected by potential framing issues.

The coefficients of the year dummies in Table 3 (the β_t) represent the deviation from the benchmark "year 5" dummy. The coefficients reproduce quite closely the unconditional means plotted in Figure 2 and show a large response in the first year (especially for the smallest prize), followed by a decline in the later periods.

The control variables include standard demographic characteristics (age, gender, education, family size, region of residence), expected income growth, income risk, and log of cash-on-hand. For the €1,000 the effect of age is negative and statistically different from zero, showing that older respondents report higher propensities to spend. The coefficients of log cash-on-hand are negative in all regressions, and statically different from zero for the two largest wins, possibly reflecting that cash-on-hand is measured with error.[11] The coefficients of expected income growth are not statistically different from zero. The effect of income risk (proxied by the standard deviation of expected income growth) is negative and statistically different from zero in all three regressions. In the robustness checks, we found no significant differences for the other economic variables such as occupation, proxies for credit access, and financial literacy (understanding of interest rates, stocks, and inflation). Notice also that iMPC coefficients are numerically identical if we replace the demographic variables with a full set of individual fixed effects.

[11] Notice that our definition of cash-on-hand is coarse because our survey elicits monthly income in a single question with 11 brackets, and financial wealth in one question with 5 brackets.

Respondents were asked to report planned expenditure, and a coarse measure of expenditure on durables, but were not asked directly about possible use of the prize through debt repayment. Since some individuals might consider consumption in the form of debt repayment rather than saving, we estimate the iMPC regressions dropping all individuals with a positive debt in January 2024 (55% of the original sample).[12] Table 4 shows that the year coefficients barely changed. Since the estimated iMPC is quite similar in the two specifications, we assume that respondents allocate the hypothetical lottery win between consumption and saving rather than debt repayment.[13]

Our imputation of iMPC from iMPX is questionable because it assumes that in each period durable expenditures are proportional to total expenditures. As a robustness check, we restrict the sample to respondents who declared to spend the entire lottery win in non-durable consumption. Table 5 shows that the size of the β_t coefficients is obviously higher than for the iMPC, as respondents allocate the entire prize in nondurables. However, two features are similar: the response is strong in the first year and declines quickly over time. For instance, for the €10,000, almost 80% is spent in the first year, and after the third year the effect almost vanishes. For the other two shocks, the response is between 40% and 50% in the first two years and becomes small after the fifth year.

One remaining issue is whether the iMPC are statistically different across shock size within the same period. To address it, we pool the data and estimate in the same regression a model for the three shocks, which include time dummies interacted with shock size dummies (not reported for brevity). Results suggest that the β_t are statistically different from each other for different shocks within the same period across all the three shocks.

5. Simulated iMPC

In this section we compare our empirical estimates of the iMPC with simulated consumption profiles produced by standard intertemporal consumption models. Our baseline model is a one-asset, incomplete market model with heterogeneous agents. In Section 6 we check the sensitivity of the numerical simulations of the iMPC to other models.

[12] Respondents with debt exhibit slightly lower annual disposable income (€27,288 vs. €27,432), are younger on average (46.7 vs. 49.7 years), and are marginally less likely to have completed college education (22% vs. 24%). While these differences are statistically significant, their magnitudes are modest in absolute terms.

[13] Regression in Table 4 and 5 include also demographic variables and dummies for the ordering the questions.

Our baseline framework assumes that the economy is populated by a continuum of households of measure 1 which are heterogeneous in their initial wealth *a* and income *y*. Time is discrete, and household *i* maximizes its expected utility according to:

$$max_{c_{i,t}} \ E_0 \sum_{t=0}^{\infty} \beta u\left(c_{i,t}\right) \tag{2}$$

$$s.t. \qquad a_{i,t} - a_{i,t-1} = r a_{i,t-1} + y_{i,t} - c_{i,t} \tag{3}$$

$$a_{i,t} \geq 0 \tag{4}$$

In equation (2) we assume that the utility function is isoelastic, $u\left(c_{i,t}\right) = \frac{c_{i,t}^{1-\gamma}}{1-\gamma}$. The respective parameters β and γ represent the discount factor and the intertemporal elasticity of substitution. Equation (3) is the dynamic budget constraint. In each period the change in wealth equals disposable income (earnings plus interest income) minus consumption. Equation (4) is a borrowing constraint which prevents wealth from being negative.[14] Log income follows an AR(1) process:[15]

$$log y_{i,t} = \rho log y_{i,t-1} + \varepsilon_{i,t} \tag{5}$$

where $\varepsilon_{i,t}$ is an i.i.d. normal process with mean zero and standard deviation σ_{ε}.

We calibrate the discount factor to match the empirical ratio of average financial wealth to average income (1.11 in our data). We denote this ratio as the liquid ratio. The parameters used in the calibration are reported in Table 6.[16] To mimic the three hypothetical wins (€1,000, €10,000, €50,000) we take as reference the average annual income reported in the ISCE (€27,000).[17] Therefore in the simulations we consider a small shock of approximately

[14] The iMPC simulations are similar if we allow limited borrowing setting the constraint (4) at a negative and exogenous value of wealth.

[15] In Section 6 we also consider a log income process given by the sum of a transitory and a permanent income component. In this case we calibrate the process using estimates by Jappelli and Pistaferri (2010) based on the SHIW.

[16] The model is calibrated at annual frequency. The income process is discretized using Rouwenhorst's (1995) method. The stationary distribution is calculated using the lotteries algorithm, as in Auclert et al. (2021). For the income process, we adopt the AR(1) process parametrization from Auclert et al. (2024). This parametrization facilitates convergence to the same wealth-to-income ratio across different models, allows matching empirical and theoretical iMPC, and ensures a fair comparison of different frameworks.

[17] The results do not change if wealth shocks are calibrated using median (€21,000) rather than average income.

5% of income, a medium shock of 40% of income, and a large shock of twice average income.

As explained in Section 3, the largest planned spendings occur in the first five years after the hypothetical shock, and after the fifth year the responses are quite small. Therefore, to provide an interesting comparison, we consider the simulated iMPC up to the fifth year. We focus on non-durable consumption as the most informative for current macroeconomic policy debate (see Kaplan and Violante, 2022).

Figure 7 compares the theoretical and empirical iMPC for the three prizes. In line with our data, in the short run the theoretical iMPC is larger for small shocks. While the model closely matches the short-run iMPC for the smallest prize, it underestimates the short-run iMPC for the two larger prizes by approximately 7 percentage points. From the second year onwards, the model overestimates the iMPC across all prize sizes but the gap between the theoretical and empirical iMPCs reduces with the size of the prize.

As noted in Section 4.2, for the smallest prize, our data show a large consumption response. In the model, this response is captured by constrained agents with low resources and high consumption responses. In the long run, the model features greater persistence than evident from our data; this persistence is driven by agents with high cash-on-hand who do not spend the entire prize immediately. For the two largest prizes, the data show lower but more persistent responses compared to the smallest prize. In the model, this pattern arises because large positive shocks are more likely to overcome borrowing constraints.

Our data also allow us to simulate the iMPC of individuals with low and high cash-on-hand. Consistent with the empirical iMPC plotted in Figure 5, we calibrate the discount factors for a group of impatient low-cash households (liquid ratio of 0.77) and a group of patient and high-cash households (ratio of 1.49). Figure 8 shows that the consumption response to the €1,000 prize in the first year is about 10 percentage points higher for low-cash households. In the case of the €10,000 and €50,000 shocks, the responses are, respectively, 5 points and 2 points higher than in the low-cash group.

Comparing these simulations with Figure 5, we see that the model fails to replicate the observed lack of relation between the empirical short-run iMPC and cash-on-hand. Despite this, for both groups we observe a convergence over the long run between the empirical and theoretical iMPC. Consistently with Bardoczy et al. (2024), our simulations also indicate that over time the iMPC converges between low and high-cash groups. This outcome is due to the fact that once low-cash individuals have spent their winnings, they have less to spend in the long run, implying a weak relationship between iMPC and cash-on-hand in the long-run.

Next, we investigate whether the theoretical iMPC is related to income risk, and if it matches the iMPC observed in Figure 6 for the two groups of respondents with expected standard deviations of income growth below and above 0.50%. These results are more easily presented in tabular form. Table 7 compares iMPCs for two versions of the baseline model. Columns (1) and (2) report the numbers used to construct figure 6 for low and high risk households. To mimic these differences, we report the simulated iMPC setting $\sigma_{\varepsilon} = 0.48$ in column (3) and $\sigma_{\varepsilon} = 0.58$ in column (4). To isolate the effect of higher uncertainty on the iMPC, we calibrate both cases using the same discount factor and the parameters reported in Table 6.

We find that compared to the model with relatively low risk the model with higher risk has a lower iMPC, particularly for impact and for a relatively small shock which is in line with the empirical findings. This result stems from the fact that income risk strengthens the precautionary motive for saving, which increases target wealth and reduces the consumption response. Indeed, the ratio of target wealth to income is higher in the higher income risk group (2.08 against 1.11).

In Table 7, we observe that in the first year the simulated iMPC induced by a €1,000 shock is 25% for the low-risk group and 17% for the high risk group, a gap similar to the gap in the data. In the simulations the difference between the high and low risk groups is lower for larger shocks: 14% for the low-risk group and 11% for the high-risk group for the €10,000 shock, and 9% and 8% respectively for the €50,000 shock. As in the data, in the second and third years the simulated iMPC gap between the high and low-risk groups shrinks, and disappears in years 4 and 5.

Overall, the empirical and theoretical iMPCs are fairly consistent in terms of the income risk dimension over the short run in the case of a relatively small shock. However, the model is not a good fit with the other aspects. In contrast with the simulated iMPC, over the short run, the gap between the two groups in the empirical iMPC is much less sensitive to shock size. Also Table 7 shows that the simulated iMPC depends on a particular parametrization of income risk and the assumption that income levels and preferences are the same in both groups.

6. Comparing the models

To compare our baseline simulations with alternative models in this section we present iMPC simulations of different intertemporal models, and use Mean Squared Error (MSE) and Mean Absolute Error (MAE) to check their consistency with the empirical iMPC. In addition to our baseline one-asset model, we consider a quadratic utility model, a model with two types of agents (hand-to-mouth and unconstrained as in Campbell and Mankiw, 1989), a one-asset model with transitory and permanent income shocks, and a two-asset model as in Kaplan et al. (2014, 2018) and Auclert et al. (2021).

In the quadratic utility model, consumers solve the standard problem of equations (2) and (3) with a quadratic utility function, an AR(1) income process, and no borrowing constraints. Both the discount factor and the interest rate are equal to 0.02. It can be shown immediately that the MPC is constant in this model, regardless of the shock size.

A significant modification to this model is positing that a fraction μ of hand-to-mouth (or myopic) agents follows the simple rule-of-thumb $c_t = y_t$. The remaining fraction $(1 - \mu)$ of unconstrained agents has quadratic utility and solves the problem presented above. The survey does not provide details of wealth and its composition; therefore, we rely on SHIW data and estimate the share of hand-to-mouth agents using the approach in Kaplan et al. (2014). We define the share of hand-to-mouth consumers as the sum of the shares of poor and wealthy hand-to-mouth. Poor hand-to-mouth (9.59%) are households with no illiquid asset holdings and liquid assets equal to less than half their monthly income. Wealthy hand-to-mouth (11.81%) are households with positive amounts of illiquid assets and liquid wealth equal to less than half their monthly income. Accordingly, we set μ=0.214.

In another experiment we replace the AR(1) income process in equation (5) with a more flexible process based on the sum of a random walk and a transitory i.i.d. component:

$$ln y_t = p_t + \varepsilon_t \tag{6}$$

$$p_t = p_{t-1} + \eta_t \tag{7}$$

where ε_t and η_t are independently and identically distributed normal processes with mean zero and standard deviations σ_{ε} and σ_{η}. Based on the SHIW estimates in Jappelli and Pistaferri (2010), we set the respective transitory and permanent shock variances to 0.025 and 0.080. The remaining parameters are the same as in Table 6.

The baseline model can be extended also by assuming that households can save in two assets: a high-return illiquid asset a that incurs a transaction cost on deposits and withdrawals, and a low-return liquid asset b . Households solve the following problem:

$$max_{c_{i,t}} \; E_0 \sum_{t=0}^{\infty} \beta u\left(c_{i,t}\right) \quad (8)$$

s.t. $$c_{i,t} + a_{i,t} + b_{i,t} = y_{i,t} + \left(1 + r_a\right)a_{i,t-1} + \left(1 + r_b\right)b_{i,t-1} - \psi\left(a_{i,t}, a_{i,t-1}\right) \quad (9)$$

$$a_{it} \geq 0\,, \qquad b_{it} \geq 0 \quad (10)$$

$$\psi\left(a_{i,t}, a_{i,t-1}\right) = \frac{\chi_1}{\chi_2}\left|\frac{a_{i,t}-\left(1+r_a\right)a_{i,t-1}}{\left(1+r_a\right)a_{i,t-1}+\chi_0}\right|^{\chi_2}\left[\left(1 + r_a\right)a_{i,t-1} + \chi_0\right] \quad (11)$$

In the dynamic budget constraint (9), r_a is the interest rate paid on the illiquid asset *a,* and r_b is the interest rate paid on the liquid asset *b.* Income follows the AR(1) process in equation (5). In each period the change in total wealth equals disposable income (earnings plus interest income on both assets) net of consumption and portfolio adjustment costs. Equation (10) defines the borrowing limit and the minimum value of the illiquid asset both of which are set to zero.

As in Auclert et al. (2021), the transaction costs of deposits and withdrawals from the illiquid asset are a convex portfolio adjustment cost function defined in (11). The term χ_0 (assumed to be 0.15) is the marginal cost of transacting, the parameter χ_1 (assumed to be 6.5) allows calibration of the desired wealth ratio, and χ_2 (2.0) gives the desired curvature of the adjustment cost function. The utility function is isoelastic and the other model parameters are the same as in the baseline model. In the simulation, we target the liquid asset ratio of 1.11 as in our baseline model, and the illiquid asset ratio from the 2020 SHIW (6.24).

Table 8 reports the iMPC for each model in the five years after the shock, for each of the three shocks. Column titles refer to the quadratic utility model, hand-to-mouth and unconstrained consumers ("two-agents") model, the one-asset model presented in section 5 ("baseline"), the model with transitory and permanent shocks ("two shocks"), and the model with liquid and illiquid assets ("two assets"). For comparison, column (1) reports the empirical iMPC. To evaluate the performance of the different models, we compute the MSE and MAE of the iMPC for the first five years following the shocks.

The quadratic utility model (column 2) predicts a constant iMPC of 2% across shock size and time period, and is the least consistent with the empirical iMPC. It also features the highest MSE and MAE. The other models are good predictors of the short-run iMPC for the €1,000 prize. After the first year, with the exception of the quadratic utility model and the two-agent model in column (3), all the models overestimate the consumption response.

In the two-agent model (column 3) the shock has a large impact only in the first year, because hand-to-mouth consumers spend the entire prize upfront. In later periods, the consumption response is an average of the propensity to consume of the hand-to-mouth (zero) and of the constant MPC of unconstrained households (2%), weighted by the share of hand-to-mouth households (21%). As a result, after the first year the iMPC is 1.5% for each period and each shock. The model provides a good representation of the iMPC for the €1,000 prize (MSE is only 0.039, and MAE is 0.014) but does not capture the iMPC of larger shocks quite so well. Most importantly, the two-agent model fails to capture the relation between the empirical iMPC and the size of the shock.[18]

The model with two shocks (column 5) generates more precautionary savings than the other models. As a result, the simulated iMPC in the first year is lower than in the baseline model but consumption is more persistent in the long run, with a slower decline of the iMPC over time. Since the empirical iMPC declines quickly over time, the MSE and MAE associated with this model are considerably higher than in the other models, and especially for small shocks (0.86 and 0.09, respectively, for the €1,000 win).

The simulated iMPC of the model with two assets (column 6) is similar to the baseline model (column 4) for each of the three shocks. The baseline model performs slightly better for the smallest and the intermediate shocks. In the baseline model, the MSE associated with the €1,000 shock is 0.269 in the baseline model against 0.199 in the two-asset model (0.212 against 0.173 for the €10,000 shock). For the largest prize, the simulated and empirical iMPC are close but the baseline model outperforms the two-asset model (MSE 0.120 against 0.142). Using the MAE statistic, the pattern is similar.

Therefore, with the exception of the quadratic utility model, no single model clearly outperforms the others in terms of MSE or MAE. The model with hand-to-mouth consumers captures the short-run iMPC for the €1,000 well but does not account for any relation between iMPC and shock size. Other models tend to underpredict the short-run iMPC for larger shocks. Our tentative conclusion from this investigation is that precautionary saving

[18] The model with two agents (hand-to-mouth and unconstrained) replicates the empirical iMPC only under the assumption that the fraction of hand-to-mouth individuals who spend the entire shock declines with the size of the shock. This assumption is clearly ad hoc and unrealistic.

and liquidity constraints (features of the baseline and two-asset models) capture several features of the iMPC distribution, both over time and across shocks.[19] Nevertheless, both of these models predict a negative relation between the consumption response and cash-on-hand for which we find limited evidence in the data, possibly due to measurement error.

7. Summary

This paper provides new empirical evidence on the iMPC based on an analysis of how Italian households allocate hypothetical lottery wins of varying sizes between consumption and saving over different time horizons. The key advantage of our direct survey evidence approach is that we measure the responses to different shocks by the same individuals which allows for a rigorous identification strategy to assess the impact of different sized shocks over time.

Our findings show that the iMPC from a relatively small shock declines quickly over time. Larger shocks have a smaller immediate impact but are more persistent over the long-run. Additionally, we find that the empirical iMPC is negatively related to income risk and weakly negatively related to initial cash-on-hand.

Comparison of the empirical and simulated iMPC suggests that models with quadratic utility or inclusion of a combination of unconstrained and rule-of-thumb consumers are unable to explain the features of the iMPC distributions over time and across different sized shocks. Models with precautionary saving and liquidity constraints capture several features of the iMPC distribution, both over time and across shocks. However, this class of models produces a negative correlation between cash-on-hand and iMPC, especially in the short-run, which is not evident in the data, possibly due to error in our measure of cash-on-hand.

An important caveat of our analysis is that we focus on partial equilibrium models, abstracting from the potential impact of the shocks on asset prices and labor supply. Although our analysis is in partial equilibrium, the strong link between iMPC and fiscal multipliers makes our findings valuable for researchers studying the dynamic effects of government spending and taxes in more complex and realistic general equilibrium models with incomplete markets and household heterogeneity. On this front, we find that the iMPC's is not

[19] We also check the sensitivity of the baseline one-asset model for different values of the intertemporal elasticity of substitution (assumed to be 1 in the simulations). In general, assuming lower values of the elasticity of substitution (0.5 or 0.25) modifies the iMPC only slightly: the consumption response is slightly lower in the short run, and slightly higher in the long run.

the same across shocks of different sizes. Indeed, we suggest that small and transitory fiscal shocks have mostly short-term effects, while larger shocks have lower consumption impact in the short run, but more persistent effects.

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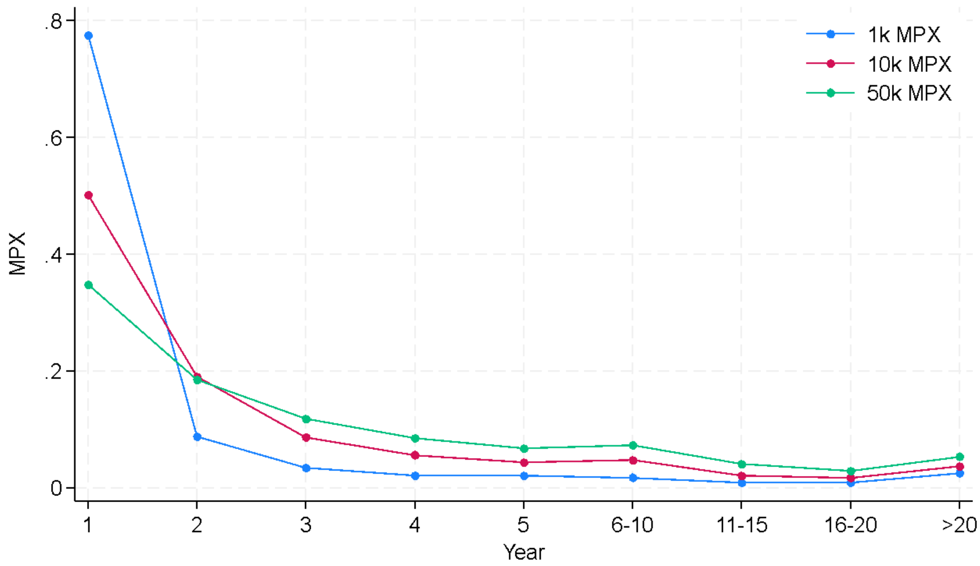
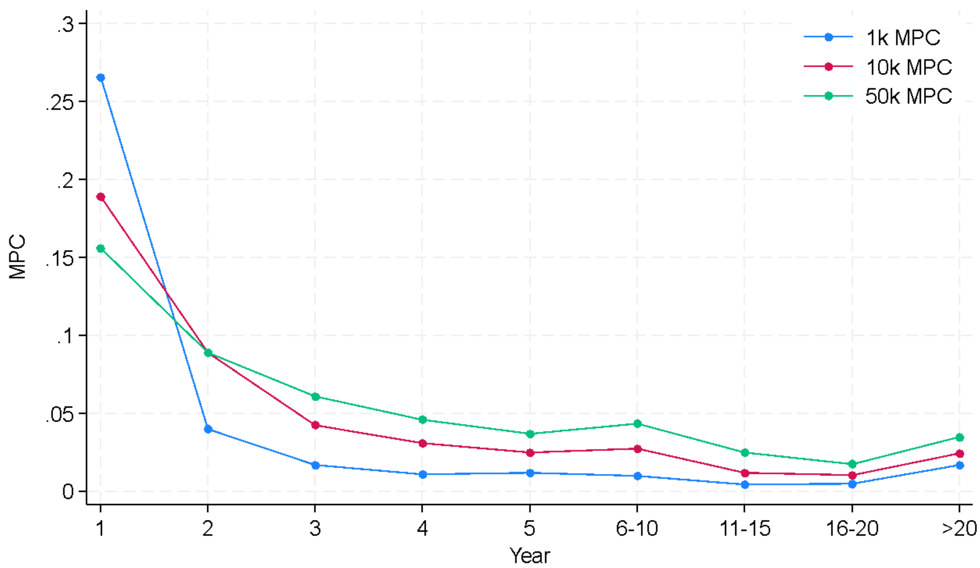
Figure 1. The intertemporal Marginal Propensity to Spend (iMPX)



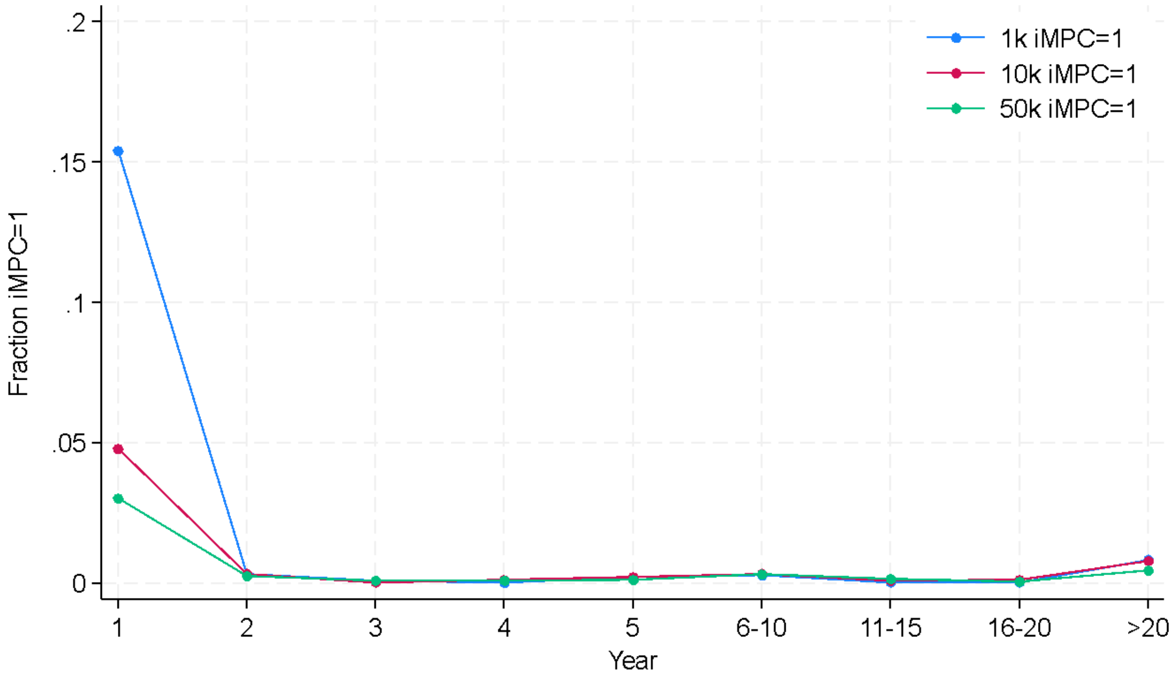
Note. The figure plots the average intertemporal Marginal Propensity to Spend (iMPX) from three hypothetical lottery prizes.

Figure 2. The intertemporal Marginal Propensity to Consume (iMPC)



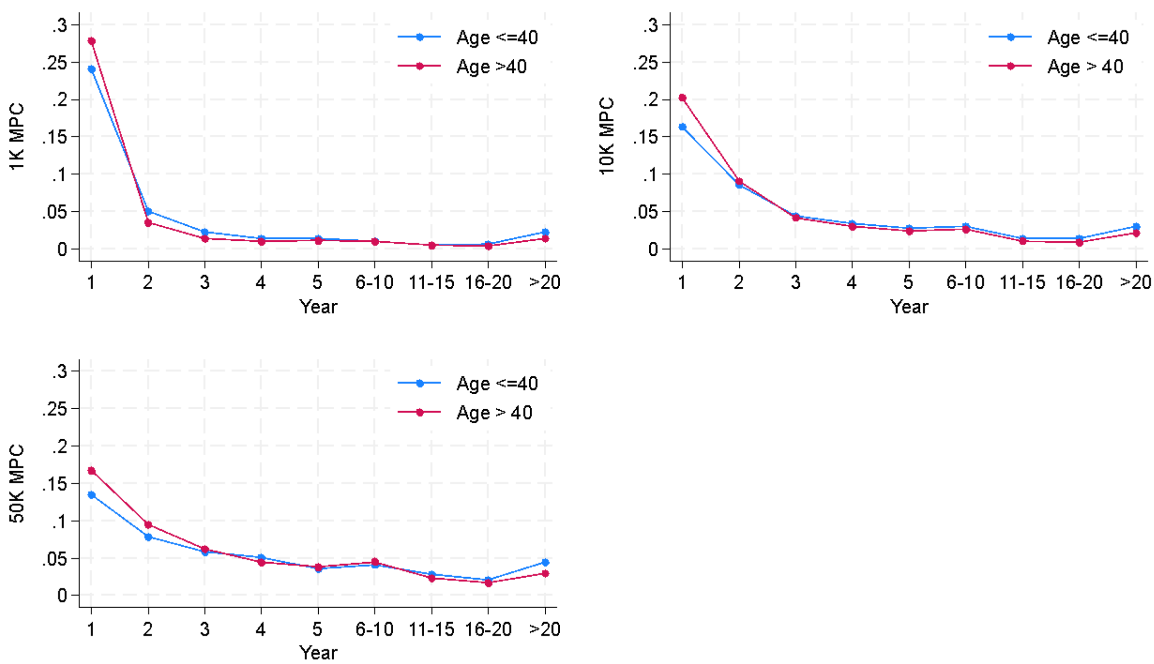
Note. The figure plots the average intertemporal Marginal Propensity to Consume (iMPC) from three hypothetical lotteries.

Figure 3. Proportion of respondents with iMPC=1



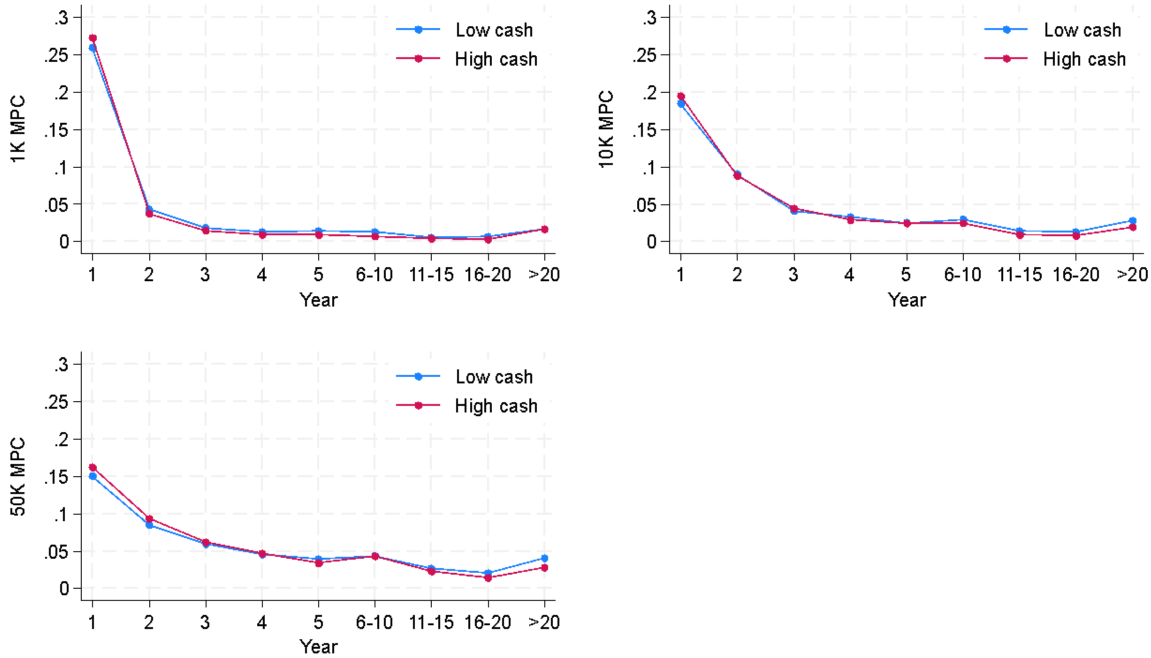
Note. The figure plots the fraction of respondents reporting MPC=1 at different horizons and for different size of the hypothetical prize.

Figure 4. iMPC for different age groups and shock size



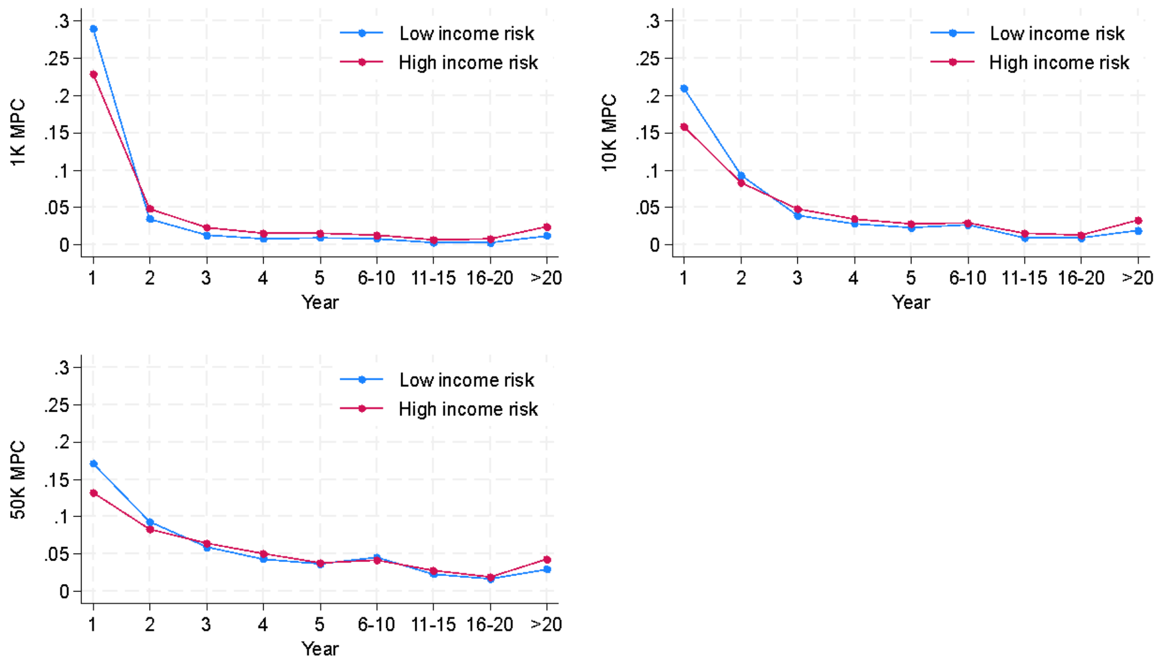
Note. The figures plot the iMPC for different lottery winnings in two age groups. The sample includes 34% of respondents with age less than or equal to 40 years, and 66% respondents older than 40.

Figure 5. iMPC for different levels of cash-on-hand and shock size



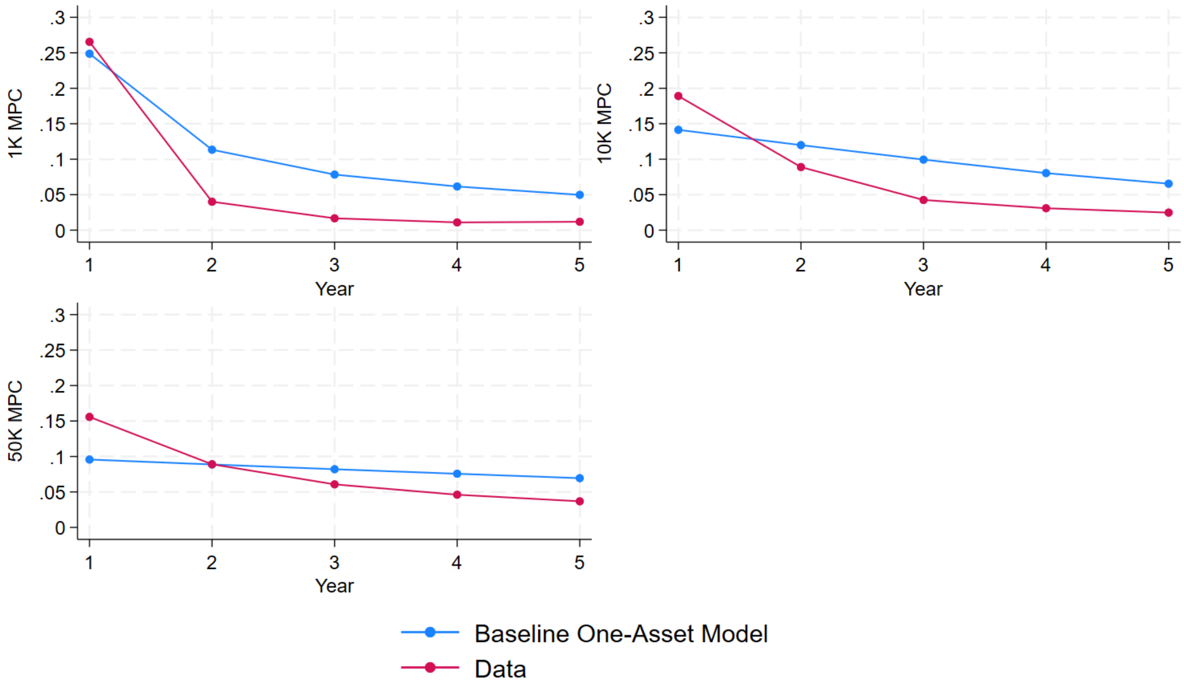
Note. The figures plot the iMPC for high and low levels of cash-on-hand (below or above the median) and different lottery winnings. Cash-on-hand is the sum of monthly income plus financial assets.

Figure 6. iMPC for different levels of income risk and shock size



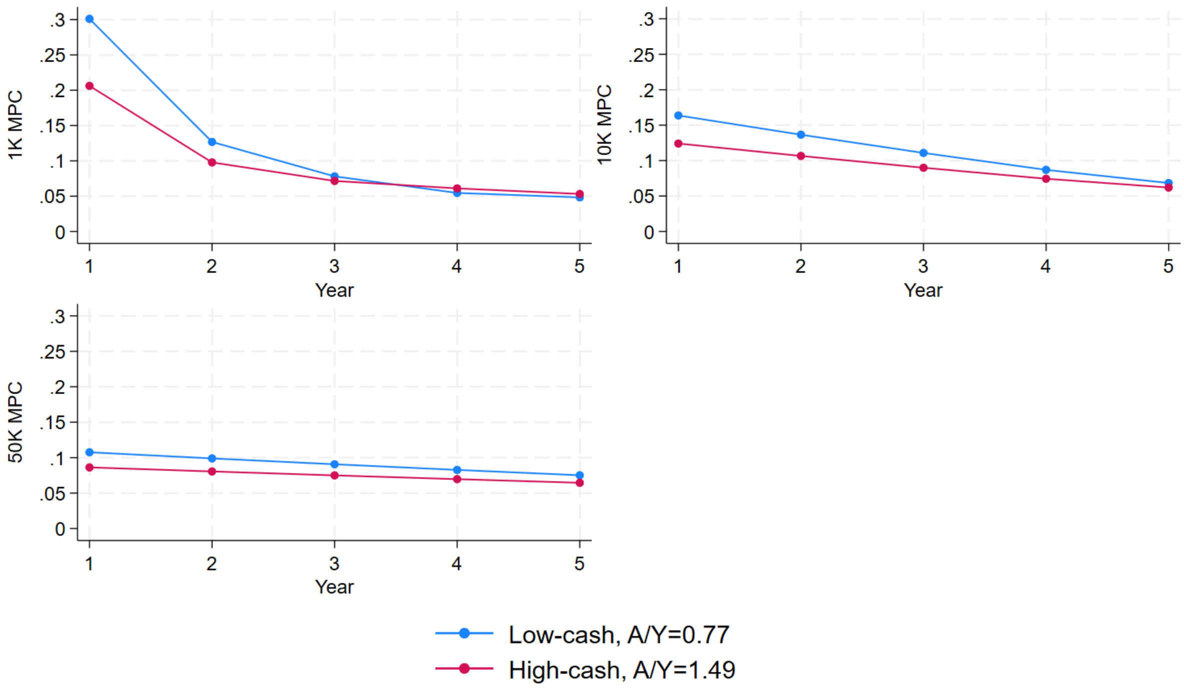
Note. The figures plot the iMPC for high and low levels of income risk and different lottery winnings. The group with low income risk (61% of the sample) reports a standard deviation of future income growth of 0.5% or less, the group with relatively high income growth (39% of the sample) reports a standard deviation above 0.5%.

Figure 7. Simulated iMPC for different shock size



Note. The figures plot the empirical iMPC and the simulated iMPC obtained from the one-asset model of equations (2)-(5). The model is calibrated to match the empirical ratio of the ratio of average financial wealth to average income (1.11 in the data).

Figure 8. Simulated iMPC for different shock size and cash-on-hand group



Note. The figures plot the simulated iMPC obtained from the one-asset model of equations (2)-(5) for the three lottery winnings. We calibrate the discount factors of a group of low cash-on-hand and impatient households (liquid asset to income ratio of 0.77) and of a group of patient and high cash-on-hand households (ratio of 1.49).

Table 1. Descriptive statistics

	Mean	Standard deviation	Observations
Male	0.495	0.5	5001
Age	48.07	14.464	5001
Family size	2.779	1.137	5001
College	0.232	0.422	5001
Cash-on-hand	29.435	23.135	5001
South	0.318	0.466	5001
Expected income growth	-0.565	3.47	5001
S.d. income growth	1.255	1.938	5001
iMPC in year 1 for €1,000	26.552	37.763	4501
iMPC in year 1 for €10,000	18.909	26.189	4436
iMPC in year 1 for €50,000	15.581	21.721	4462

Note. The table reports the means of demographic variables and the medians of income, consumption and wealth in the ISCE and in the SHIW. It also reports the reported iMPC in the first year. Data for income, consumption and wealth are expressed in euros.

Table 2. Fraction of consumption that respondents intend to spend on durable goods

	€1,000	€10,000	€50,000
0.00	24.1	16.6	12.5
0.25	8.3	20.1	33.0
0.50	8.5	16.3	16.7
0.75	14.2	20.5	21.0
1.00	44.9	26.4	16.6
Total	100.0	100.0	100.0

Note. The table shows the fraction of total consumption that respondents plan to spend to purchase durable goods. Statistics are computed using sample weights.

Table 3. iMPC regressions, baseline estimates

	€1,000	€10,000	€50,000
Year 1	25.371	16.434	11.899
	(0.570)***	(0.408)***	(0.343)***
Year 2	2.826	6.424	5.223
	(0.193)***	(0.235)***	(0.214)***
Year 3	0.489	1.780	2.390
	(0.135)***	(0.166)***	(0.173)***
Year 4	-0.085	0.613	0.928
	(0.118)	(0.156)***	(0.163)***
Year 6-10	-0.182	0.258	0.674
	(0.141)	(0.189)	(0.203)***
Year 11-15	-0.737	-1.302	-1.183
	(0.108)***	(0.141)***	(0.161)***
Year 16-20	-0.719	-1.447	-1.924
	(0.110)***	(0.140)***	(0.141)***
Year >20	0.499	-0.057	-0.216
	(0.187)***	(0.208)	(0.213)
Male	-0.420	-0.267	-0.193
	(0.143)***	(0.124)**	(0.116)*
Age	-0.009	0.000	0.004
	(0.005)*	(0.005)	(0.004)
Family size	-0.117	0.005	-0.009
	(0.065)*	(0.054)	(0.051)
College	0.016	0.068	-0.055
	(0.177)	(0.154)	(0.141)
Log Cash-on-hand	-0.080	-0.159	-0.109
	(0.065)	(0.057)***	(0.053)**
South	-0.432	-0.322	-0.362
	(0.155)***	(0.134)**	(0.124)***
Expected income growth	0.003	-0.004	0.005
	(0.021)	(0.019)	(0.018)
S.d. income growth	-0.073	-0.077	-0.094
	(0.033)**	(0.030)**	(0.029)***
Constant	2.923	3.390	4.268
	(0.452)***	(0.386)***	(0.356)***
R2	0.24	0.16	0.11
N	40,509	39,924	40,158

Note. The table reports OLS regressions of the iMPC. The excluded category is “Year 5”. The iMPC is multiplied by 100. Regressions also include dummies for the random groups with the question ordering. Standard errors are reported in parenthesis. One star indicates significant at the 10% level, two stars at 5%, three stars at 1%.

Table 4. iMPC regressions, individuals with no debt

	€1,000	€10,000	€50,000
Year 1	25.560	17.509	12.963
	(0.762)***	(0.557)***	(0.468)***
Year 2	2.311	5.975	5.490
	(0.238)***	(0.296)***	(0.288)***
Year 3	0.571	1.741	2.353
	(0.189)***	(0.214)***	(0.222)***
Year 4	-0.019	0.500	1.043
	(0.164)	(0.192)***	(0.213)***
Year 6-10	-0.250	0.223	0.664
	(0.186)	(0.238)	(0.260)**
Year 11-15	-0.808	-1.253	-0.980
	(0.140)***	(0.174)***	(0.209)***
Year 16-20	-0.647	-1.322	-1.716
	(0.157)***	(0.180)***	(0.186)***
Year >20	0.150	-0.165	-0.246
	(0.222)	(0.253)	(0.268)
Constant	2.477	2.960	3.837
	(0.593)***	(0.510)***	(0.472)***
R^2	0.24	0.18	0.12
N	23,175	23,130	23,229

Note. The table reports OLS regressions of the iMPC dropping respondents with positive debt. The excluded category is "Year 5". The iMPC is multiplied by 100. Regressions also include demographic variables and dummies for the random groups for the ordering of the questions. Standard errors are reported in parenthesis. One star indicates significant at the 10% level, two stars at 5%, three stars at 1%.

Table 5. iMPC regressions, only non-durable consumption

	€1,000	€10,000	€50,000
Year 1	74.518	43.716	34.858
	(1.205)***	(1.556)***	(1.799)***
Year 2	4.077	10.885	7.816
	(0.634)***	(0.969)***	(1.058)***
Year 3	-0.047	1.357	2.846
	(0.445)	(0.674)**	(0.853)***
Year 4	-0.790	0.442	0.390
	(0.397)**	(0.683)	(0.771)
Year 6-10	-0.270	0.483	2.261
	(0.507)	(0.830)	(1.027)**
Year 11-15	-1.572	-2.262	-0.520
	(0.390)***	(0.660)***	(0.848)
Year 16-20	-1.697	-2.327	-2.108
	(0.386)***	(0.670)***	(0.734)***
Year >20	2.507	2.849	4.336
	(0.708)***	(1.036)***	(1.203)***
Constant	2.586	4.984	5.569
	(1.137)**	(1.650)***	(1.992)***
R^2	0.65	0.32	0.21
N	9,756	6,633	5,004

Note. The table reports regressions of the iMPC in the sample of individuals declaring they would spend the entire prize in nondurable goods. Regressions also include demographic variables and dummies for the random groups for the ordering of the questions The excluded category is “Year 5”. The iMPC is multiplied by 100. Standard errors are reported in parenthesis. One star indicates significant at the 10% level, two stars at 5%, three stars at 1%.

Table 6. Model calibration

Parameters	Value	Description
r	0.02	Interest rate
γ	1	elasticity of intertemporal substitution
β	0.96	Implied discount factor
a_{min}	0.0	Minimum value of assets grid
N_v	7	Points in Markov chain for the income process
N_a	500	Points on asset grid
ρ	0.95	Autocorrelation of log earnings
$\sigma\epsilon$	0.50	Standard deviation of log earnings

Note: The table reports the parameters of the baseline model presented in equations (2)-(5). We target the asset ratio $\frac{A}{Y} = 1.11$ to match the liquid asset ratio in ISCE.

Table 7. iMPC for different income risk groups and shock size

	Data		Model	
	Low risk	**High risk**	**Low risk**	**High risk**
	(1)	(2)	(3)	(4)
iMPC from €1.000				
Year 1	0.29	0.23	0.25	0.17
Year 2	0.04	0.05	0.11	0.08
Year 3	0.01	0.02	0.08	0.07
Year 4	0.01	0.02	0.06	0.06
Year 5	0.01	0.02	0.05	0.05
iMPC from €10.000				
Year 1	0.21	0.16	0.14	0.11
Year 2	0.09	0.08	0.12	0.09
Year 3	0.04	0.05	0.10	0.08
Year 4	0.03	0.04	0.08	0.07
Year 5	0.02	0.03	0.07	0.06
iMPC from €50.000				
Year 1	0.17	0.13	0.09	0.08
Year 2	0.09	0.08	0.09	0.08
Year 3	0.06	0.06	0.08	0.07
Year 4	0.04	0.04	0.07	0.07
Year 5	0.04	0.04	0.07	0.06

Note. The table compares the iMPC for low and high-risk households. Columns (1) and (2) display the empirical iMPC for respondents whose income growth standard deviation is above and below the median. Columns (3) and (4) show the simulated iMPC of two versions of the baseline model. In column (3) we set $\sigma_\varepsilon = 0.48$, while in column (4) $\sigma_\varepsilon = 0.58$. The remaining parameters are the same as the baseline model and are reported in Table 6.

Table 8. Models' performance

	Data	Quadratic utility	Two-agents	Baseline	Two shocks	Two assets
	(1)	(2)	(3)	(4)	(5)	(6)
€1.000						
Year 1	0.265	0.020	0.229	0.249	0.204	0.202
Year 2	0.040	0.020	0.015	0.113	0.163	0.081
Year 3	0.017	0.020	0.015	0.078	0.124	0.059
Year 4	0.011	0.020	0.015	0.062	0.101	0.050
Year 5	0.012	0.020	0.015	0.050	0.081	0.044
MSE		**1.220**	**0.039**	**0.269**	**0.866**	**0.199**
MAE		**0.057**	**0.014**	**0.048**	**0.090**	**0.043**
€10.000						
Year 1	0.189	0.020	0.229	0.141	0.189	0.116
Year 2	0.089	0.020	0.015	0.120	0.155	0.098
Year 3	0.043	0.020	0.015	0.100	0.121	0.080
Year 4	0.031	0.020	0.015	0.080	0.100	0.064
Year 5	0.025	0.020	0.015	0.065	0.083	0.053
MSE		**0.684**	**0.162**	**0.212**	**0.375**	**0.173**
MAE		**0.056**	**0.033**	**0.045**	**0.054**	**0.036**
€50.000						
Year 1	0.156	0.020	0.229	0.096	0.150	0.078
Year 2	0.089	0.020	0.015	0.089	0.131	0.073
Year 3	0.061	0.020	0.015	0.082	0.113	0.068
Year 4	0.046	0.020	0.015	0.076	0.100	0.063
Year 5	0.037	0.020	0.015	0.069	0.085	0.058
MSE		**0.521**	**0.286**	**0.120**	**0.194**	**0.142**
MAE		**0.058**	**0.049**	**0.029**	**0.040**	**0.028**

Note. The table reports the iMPC and the Mean Squared Error and Mean Absolute Error of the simulated iMPC against the empirical iMPC. "Quadratic utility" is the permanent income model with quadratic utility. "Two-agents" is a model where the share of hand-to-mouth consumers is 21.4%. "Baseline" is the one-asset model of equations (2)-(5). "Two shocks" is the one-asset model with permanent and transitory income shocks described in equations (6)-(7). "Two-assets" is the model with liquid and illiquid assets of equations (8)-(11).

Appendix. Survey questions

1. Imagine having a winning lottery ticket worth €1,000 / €10,000 / €50,000 today. Think about how you would spend this sum in the coming years. You can choose how to distribute the sum over the next 10 years and beyond. *The order of the questions is randomized in six different permutations.*

	€1,000	**€10,000**	**€50,000**
2024	g1_1_1	g1_1_2	g1_1_3
2025	g1_2_1	g1_2_2	g1_2_3
2026	g1_3_1	g1_3_2	g1_3_3
2027	g1_4_1	g1_4_2	g1_4_3
2028	g1_5_1	g1_5_2	g1_5_3
2029-2023	g1_6_1	g1_6_2	g1_6_3
2034-2038	g1_7_1	g1_7_2	g1_7_3
2029-2043	g1_8_1	g1_8_2	g1_8_3
Use in subsequent years	g1_9_1	g1_9_2	g1_9_3

2. In the coming years, would you spend the €1,000 / €10,000 / €50,000 prize on durable goods? (cars, household appliances, computer/electronic equipment, furniture/furnishings, etc.). *The order of the questions follows the same randomization as question 1.*

	€1,000	**€10,000**	**€50,000**
Yes, I would spend the full amount	1	1	1
Yes, I would spend a good part of the amount (more than 50%)	2	2	2
Yes, I would spend half the amount (50%)	3	3	3
Yes, I would spend less than half the amount (less than 50%)	4	4	4
No, I would not spend anything on durable goods	5	5	5
Don't know	6	6	6

3. Income risk. In the next 12 months, you expect your **household's total annual earned and retirement income**, after tax, compared to last year ...

	Percentage
Will decrease by more than 8%	X
Will decrease between 6 and 8%	X
Will decrease between 4 and 6%	X
Will decrease between 2 and 4%	X
Will decrease between 0 and 2%	X
Will remain constant	X
Will increase between 0 and 2%	X
Will increase between 2 and 4%	X
Will increase between 4 and 6%	x
Will increase between 6 and 8%	x
Will increase more than 8%	x
Total	**100**