Intergenerational Preferences of the Portuguese Population

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FUTURE FORUM

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1.
INTRODUCTION

How intergenerationally fair is Portuguese society? Are citizens solely concerned about defending the interests of their own generation, or do they have an intrinsic concern for the well-being of other generations – present or future? The notion of intergenerational equity held by individuals varies because it reflects judgement values and preferences. Obtaining more in-depth knowledge about these preferences, notably through their measurement, is of the utmost importance in order to design, implement and evaluate public policies with a redistributive effect.

Sustainable development "contemplates the needs of the present generations without compromising the ability of future generations to satisfy their own needs" (Brundtland Report, the United Nations World Commission on Environment and Development, 1987). Or to use the very pragmatic definition offered by Stavins et al. (2002), sustainable development consists of "dynamic efficiency accompanied by intergenerational equity". These convergent objectives, namely economic development that is intergenerationally fair, should play a wide-ranging and cross-cutting part in the political agenda.

In particular, the sustainability of public debt, the welfare system and the national health system, as well as the sustainability of ecological resources have fomented public debate on intergenerational justice. For example, in relation to public debt and the budget deficit, questions are raised about whether it is fair to leave debt contracted by the present generation to be paid by future generations through an even heavier tax burden in the future. As for the sustainability of the welfare system, which is at risk due to both the ageing population and low birth rates, the debate focuses on measures such as raising the retirement age and/or adjusting the value of pensions in line with longevity, thereby limiting the transfer of income between the active and the retired generations. There is also discussion on the potential intergenerational imbalances caused by the coexistence of the private and public pension systems. The debate on the sustainability of the national health system revolves around the increasing need for permanent health care due to the growing number of old people living to advanced ages. This raises a fundamental question: who can and should pay for this increase in the demand for health care services from the baby boomer generation? Equally, we can ask how far the principle of intergenerational solidarity has been applied when the millennials are up against an increasingly precarious situation in both employment and housing.

Ecologically, the ethical premise of responsibility to future generations and to all species has been highlighted. For example, efforts have been made at the European level to establish national targets for the reduction of greenhouse gases, which can prejudice the health and well-being of future generations; these targets require the present generations to adopt measures that will mitigate future consequences, such as changes in behaviour caused by taxes on emissions. However, such policy measure and institutional solutions have diachronic redistributive consequences that directly affect the available income of the present generations and, indirectly, the available income of future generations. Moreover, if the present generations bear the financial costs involved in reducing emissions in a differentiated way, it generates a redistribution of income that is not only diachronic but also synchronic.

Despite the intense and long-lasting debate on intergenerational justice and sustainable development, it is impossible to know exactly which conditions are required to guarantee that the new and future generations have the same quality of life enjoyed by the present generations. We can only be sure that intergenerational altruism is indispensable if we are to attain this goal.

But how intergenerationally fair is Portuguese society? Is the current political debate in line with citizens' intergenerational preferences? Are citizens concerned exclusively about defending the interests of their generation, or do they have an intrinsic concern for the well-being of other generations – present or future? Which specific redistributive policies and institutional solutions do citizens support to correct eventual generational imbalances?

The notion people hold of generational equity varies because it reflects value judgements and preferences. Obtaining more in-depth knowledge about these preferences, notably through their measurement, is of the utmost importance in order to design, implement and evaluate public policies with a redistributive effect. Firstly, knowledge of intergenerational preferences allows measures to be defined that are more consistent with citizens' preferences. Secondly, the quantification of current intergenerational preferences acts as a reference threshold for the social effects of possible interventions aimed at fostering greater intergenerational justice. Lastly, the measurement of intergenerational preferences allows distributive weights to be incorporated in the cost/benefit analyses of public policies.

There are some practical examples of the application of distributive weights in the analysis of public policies (Markandya, 1998, Harberger and Jenkins, 2002), generally justified from the perspective of efficiency gains. Nevertheless, their application is limited. On one hand, given that there is no precise knowledge of individuals' preferences of social well-being, the weighted choices must be based on valuation, subjective or political criteria. On the other hand, the lack of public debate on the matter means there are few opportunities for the population to express their preferences through social choices.

With a view to filling this gap, the Calouste Gulbenkian Foundation conducted an innovative survey which not only obtained a qualitative and descriptive analysis of the respondents' concerns and intergenerational preferences, but also provided a statistical measurement of these preferences. To this end, a Discrete Choice Experiment (DCE) was applied; this is an empirical method to elicit preferences.

The survey comprises four sections and will be analysed in detail in this report. In section A, the respondents answer multiple choice questions about intergenerational justice. For example: *"On a scale of 1 to 10, quantify your concern about the well-being of the generations not yet born"* and *"In your opinion, should parents have an additional vote for each child under the age of 18?"*. These questions allowed inferences to be made about the respondents' concerns in relation to their own generation, the other contemporary generations and future generations. Moreover, they revealed the individuals' preferences on the policies and institutional solutions aimed at correcting generational imbalances.

The discrete choice experiment (DCE) was conducted in section B. Here, the respondents were asked to make choices about hypothetical alternative scenarios. Each scenario corresponded to a different environmental programme with diverse distributive consequences for different generations.

Section C of the survey implemented an experimental method developed by Holt and Laury (2002) that allows inferences to be drawn on the respondents' preferences when confronted with risk. It is important to measure these preferences in the context of intergenerational justice to avoid making biased estimates of the preferences. More specifically, given that one cannot be sure of the redistributive consequences of policy measures and institutional solutions in most cases, citizens may demonstrate some reluctance about implementing certain measures simply because they are averse to risk, and not necessarily due to a lack of altruism.

Lastly, section D is comprised of a series of sociodemographic questions. These questions permit the analysis of the heterogeneity of the intergenerational preferences, notably the preferences of the different age groups.

It should be noted that this is the first time that a Discrete Choice Experiment has been applied to the measurement of the intergenerational preferences of the Portuguese population. To the best of our knowledge, it is also the first time risk preferences have been measured using the Holt & Laury test in a representative sample of the Portuguese population.

ORGANISATION OF THE REPORT

Chapter 2 of this report describes the methodology used for both the selection and analysis of the sample. Chapter 3 sets out the socioeconomic characterisation of the respondents. Chapter 4 presents a detailed analysis of the respondents' answers to each of the specific questions on conceptions and intergenerational preferences, discriminating the results in accordance with some sociodemographic characterisation variables whenever relevant. Chapter 5 provides a detailed description of the Holt & Laury test, together with the results obtained and the measurement of the relative risk coefficient of the population. Lastly, chapter 6 focuses on the discrete choice experiment. After presenting a theoretical framework for intergenerational preferences, a description is given of the experimental method of intergenerational choice and the design applied in this project. Finally, the results of the estimation and calculation of the marginal rates of intergenerational replacement are presented and analysed. Chapter 7 concludes the report.

2.

METHODOLOGY

The Survey of Intergenerational Preferences involved constructing a questionnaire script in collaboration with experts in intergenerational justice. GFK, a company specialising in opinion studies, provided the necessary support to define the sample and conduct the interviews in the field. The GFK staff responsible for the field work were given specific training by the author of this study.

SURVEY

The survey of the conceptions and preferences of the Portuguese population, found in Appendix A., is made up of four distinct sections:

Section A: Multiple choice questions on intergenerational preferences

Consists of 21 questions with the purpose of:

a) knowing the respondents' opinion on the existence of intergenerational inequalities;

b) knowing the respondents' opinion about policy makers' concern in relation to defending the interests of the various (present and future) generations;

c) gauging the respondents' concern about defending the interests of their own generation and of other present and future generations;

d) identifying preferences on the various public policy options and institutional solutions aimed at reducing intergenerational inequalities.

Section B: Discrete Choice Experiment (DCE)

This section applies a quantitative technique that allows the estimation of respondents' preferences. This method involves asking the respondents to make choices about hypothetical alternative choices. Each alternative corresponds to a government programme, defined in abstract terms, which will have redistributive implications for the different generations once applied. By choosing between the implementation of a specific programme or not implementing any programme (i.e. maintaining the status quo), the respondents are revealing their preferences on a certain income distribution between the generations.

Relative to direct questions, this technique allows preferences to be effectively disclosed and not simply stated, which generally eliminates the potential bias associated to direct questions. A detailed description of the methodology employed in the DCE can be found in chapter 6.

Parte C: Risk experiment

The Holt and Laury (2002) method was used in this section to study preferences in the face of risk. This method involves presenting a menu of 10 distinct choices between two options, one relatively safe and the other riskier. The respondents' risk aversion is inferred by the total number of safe choices, or the tipping point between the preference for a safe choice and a risky choice. A detailed description of this method is found in chapter 5.

Parte D: Sociodemographic questions

These questions ensure that the respondents meet the sample criteria and permit their sociodemographic characterisation.

THE SAMPLE

The research **Universe** is formed by a set of individuals, of both genders, aged 18 years or over, living in private households in Continental Portugal. The respondents were selected using a **quota method**, based on a matrix that crosses:

Gender (2 groups) vs. Age (6 groups) vs. Region (7 groups)

Based on an initial matrix of *Region vs. Habitat*, a statistically significant number of sample points was randomly selected, where the interviews were conducted using the above-mentioned quotas.

The sample was made up of **801 respondents**, 53.2 % of whom were female and 36.8% male. Figure 2.1. presents the age distribution of the respondents. Most respondents were aged between 25 and 64 years (60.1%). A total of 8.6% were between the ages of 18 and 24 years, while 31.3% were 65 years old or over. Figure 2.2. shows the geographic distribution of the respondents: 27.6% of the interviews took place in Greater Lisbon and 12.7% in Greater Porto; 59.7% of the interviews were conducted in the rest of the country, including the coast and the interior.

Figure 2.1.
Age distribution

10% 18 to 24 years
16% 25 to 34 years
18% 35 to 44 years
18% 45 to 54 years
55 to 64 years **16**%
65 years or over **22**%
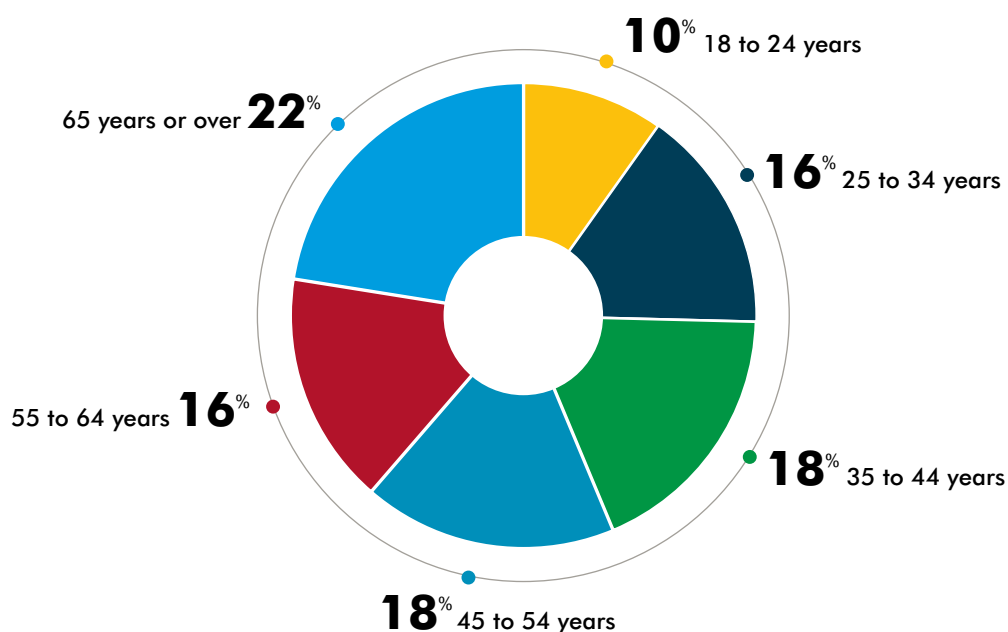
Figure 2.2.
Geographic distribution

4% Algarve

5% Alentejo

20% North Coast

28% Greater Lisbon

13% Greater Porto

14% Interior

16% Centre - Coast
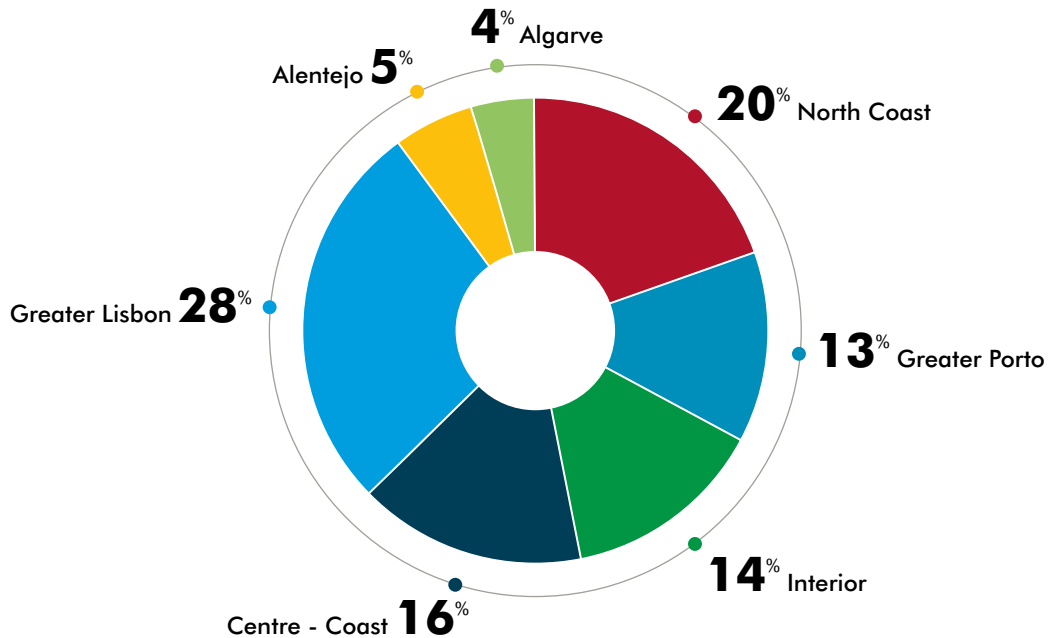
DATA COLLECTION

The data was collected by means of direct and personal interviews at the respondents' place of residence, in total privacy, using the Computer Assisted Personal Interviewing (CAPI) system. The field work took place between 15 June and 12 July 2018 and involved 34 interviewers. The interviewers were recruited and trained by GFK, in cooperation with the author of this study. The data was collected at weekends between 10 a.m. and 10 p.m., and on weekdays between 5 p.m. and 10 p.m.. A 10-interview pre-test was conducted in Greater Lisbon and Greater Porto aimed primarily at the timely identification of problems and difficulties in understanding the questionnaire.

3.

SOCIODEMOGRAPHIC CHARACTERISATION OF THE RESPONDENTS

Starting with **level of education**, 5.2% of the respondents do not have primary education, 29.3% have primary education (4 years of education), 25.7% have the 9-year basic education, 29.6% have 12 years of education, 7.7% have a bachelor's degree and 2.5% have a master's/PhD. In the distribution of the respondents by age group and level of education (Table 3.1.), the highest levels of education are found in the 25 to 44 year age group (51.6% of graduates are in this group). The lowest levels of education are in the 65 years and over age group. In particular, it is noted that 78.1% of the 41 respondents without primary education are 65 years old or more and 47.2% of those with just primary education are in the 65 or over age group.

Table 3.1.
Distribution of respondents by age group and level of education

	No primary education	Primary education (4 years)	Basic Education (9 years)	High School education (12 years)	Bachelor's degree	Master's/ PhD
18 to 24 years	0,0%	0,9%	7,8%	21,9%	12,9%	0,0%
25 to 34 years	2,4%	2,6%	16,5%	26,2%	27,4%	25,0%
35 to 44 years	4,9%	8,9%	23,8%	23,6%	24,2%	25,0%
45 to 54 years	7,3%	13,2%	27,7%	16,9%	14,5%	10,0%
55 to 64 years	7,3%	27,2%	16,0%	6,8%	12,9%	20,0%
65 or over	7,1%	47,2%	8,3%	4,6%	8,1%	20,0%
Total	100% (41)	100% (235)	100% (206)	100% (237)	100% (62)	100% (20)

Turning to the **employment situation**, 69.2% of the reporting population are active, distributed as follows: 42.6% employed by a third party; 12.0% self-employed; 8.9% unemployed; 3.4% retired/but in active employment; 1.3% employed by third party and self-employed; 0.8% study and work part-time; and 0.4% have another employment situation. The vast majority of the 30.8% of the sample not in active employment are retired and not in active employment (21.9%); 4.5% are full time students, 3.6% family carers, and the remaining 0.9% are in another non-active situation. Figure 3.1. summarises the employment situation of the respondents.

Figure 3.1
Employment Situation
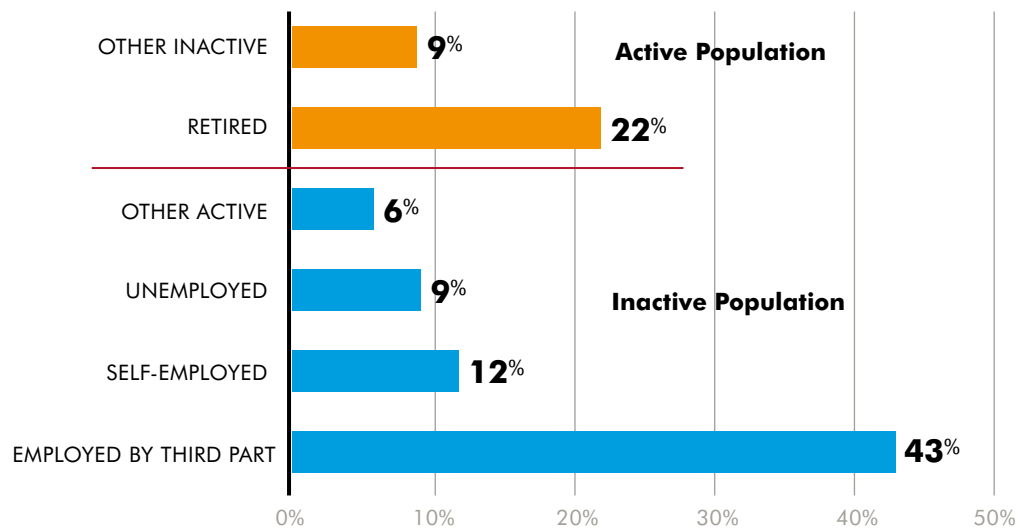
In relation to **marital status**, 24.5% of the surveyed population are single, 60.3% are married or in a civil partnership, 5.9% are divorced and 9.4% are widowed. As for **parenthood** (Figure 3.2.), 29.3% have no offspring, 27.7% have children and grandchildren and 43% have just children. Regarding the number of **dependent children in the family unit**, 61.6% of the respondents have no dependents, 19.5% have just one, 15.6% have two and 3.4% have three or more children living in the family unit.

Figure 3.2.
Parenthood
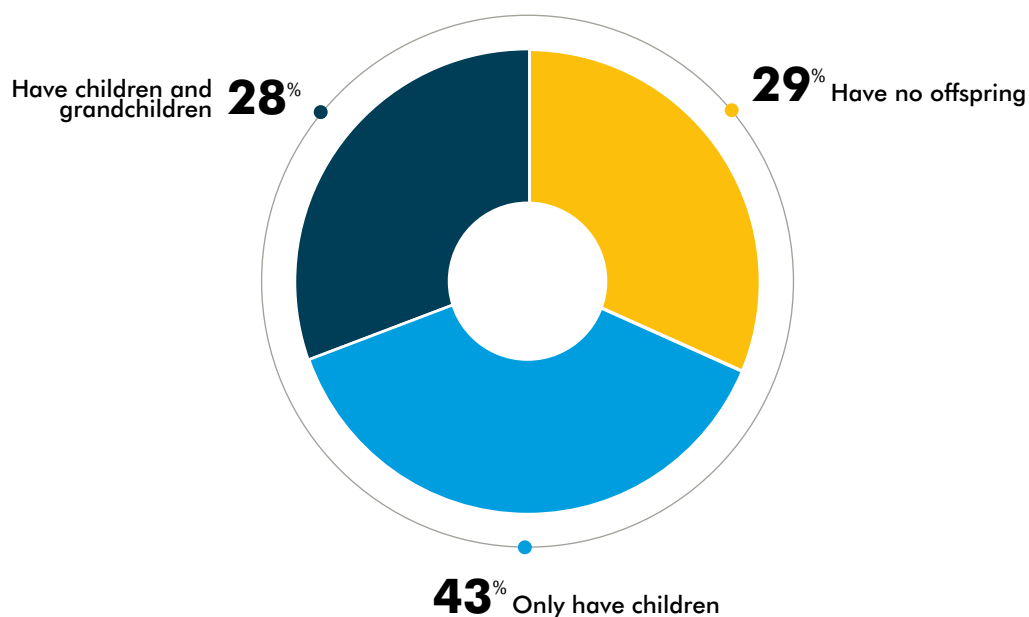
There is some diversity in the composition of the **family unit/household** (Figure 3.3.). The majority (63.8%) live with their spouse/partner, 26.2% of households have no children, 33.2% have children and 4.4% include other family members and/or friends (in addition to the spouse/partner).

Figure 3.3.
Composition of household
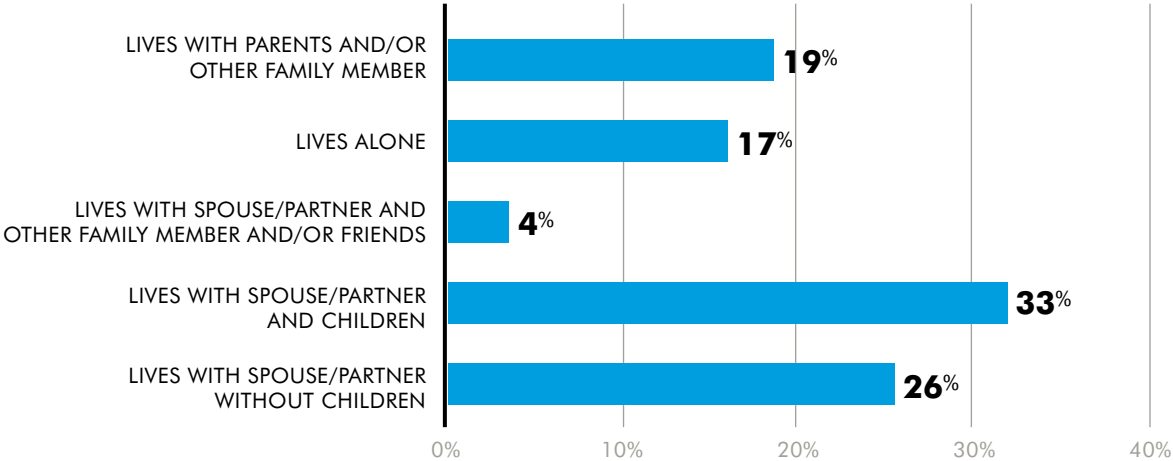
Analysing the **type of housing**, 57.6% live in their own home, 35.7% live in rented property and 6.1% live with relatives or friends without paying rent. A difference is found between generations, namely the older generations mainly live in their own home. Figure 3.4. shows the age distribution of tenants. If there were no imbalance, the percentage of tenants would be the same, 33.3%, which is not the case. More specifically, 43% of all tenants are aged between 18 and 39 years and 23% are aged 65 or over.

Figure 3.4.
Age distribution of tenants
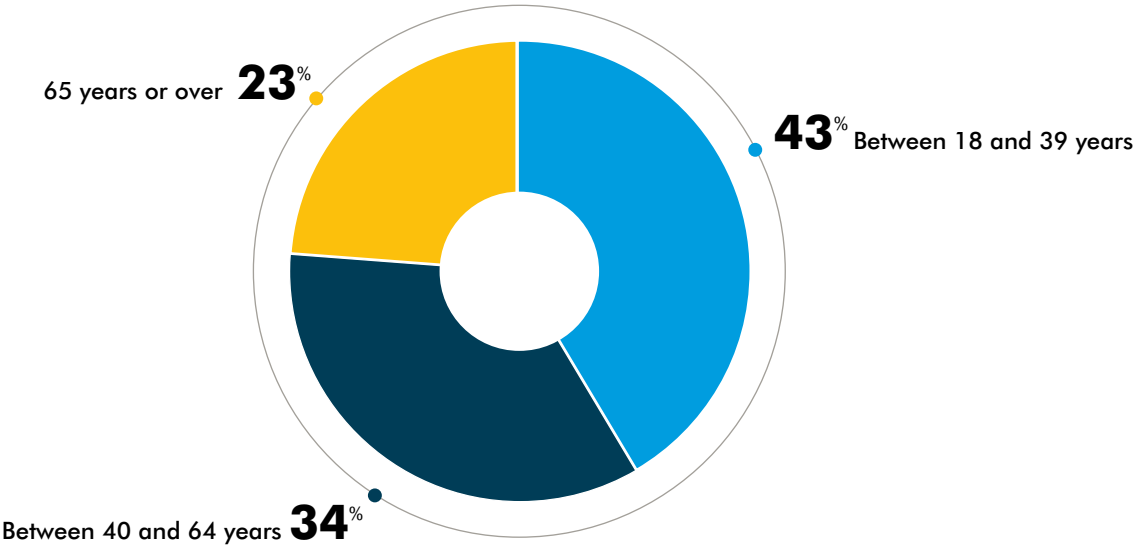
Regarding the management of the **household budget**, most of the respondents (55.6%) stated they were responsible for this and it should be stressed that 39.1% of these respondents do not live alone. In 23.5% of the cases, the household budget is managed by someone other than the respondent, while 20.6% stated it was jointly managed.

In most cases, the respondents also stated they were the **main contributor to the household income** (58.1%). On the other hand, 20.2% of respondents stated that they contributed the same amount as their spouse/partner/family members, while 10.2% say parents are the main contributor.[1]

It should be noted that 43.2% of respondents did not answer the question on the **household's net monthly income**. Figure 3.5. shows the distribution of household income of the 455 respondents who did answer this question. While a large percentage of the respondents (34%) earn between 300 and 800 euros of the household's monthly net income, around 27% earn between 800 and 1200 euros of the household's monthly net income.

Figure 3.5.
Distribution of family income

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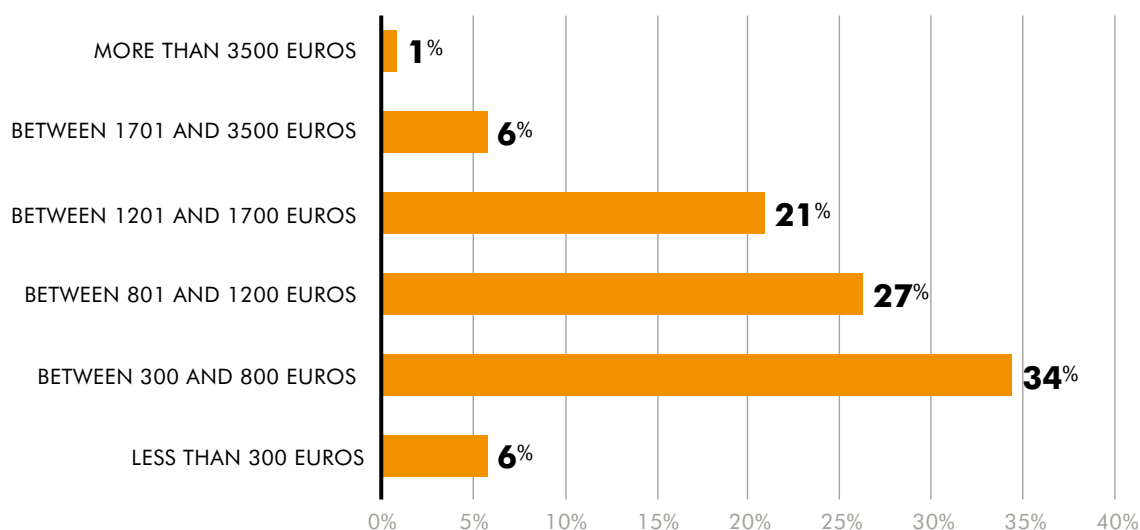
1 0.6% of the respondents did not answer this question

4.

DESCRIPTIVE ANALYSIS OF THE SURVEY (SECTION A)

The aim of this document is to answer four key questions: (1) In the opinion of the Portuguese population, are there intergenerational imbalances in our society? (2) How do citizens evaluate policy makers' concern in relation to intergenerational challenges? (3) Are the Portuguese population worried about defending the interests of the younger generations and of those not yet born, or are they focussed on the interests of their own generation? (4) Which institutional solutions would the Portuguese population support to correct eventual intergenerational imbalances?

The answer to these questions is obtained through **the analysis of Section A of the survey**, which consists of 21 questions specifically on conceptions and intergenerational preferences. The following analysis prioritises the systematic treatment of the above questions and does not necessarily follow the order in which they were presented to respondents.

4.1.
LIVING CONDITIONS BETWEEN GENERATIONS

In order to make inferences about the possible existence of intergenerational imbalances, we start by addressing questions A7-A9 which compare the living conditions of people born after 1983 with that of their parents' generation. Subsequently, we analyse the answers to questions A20 and A21; the answers to these questions on the labour market have implications for the living conditions of the different generations. More specifically, question A20 asks: "do you think one can expect to buy a house on the basis of what one earns?" and question A21 asks "how important is seniority and merit in career progression?". The different answers, notably between the generations, are indicative of different living conditions. Lastly, we analysed question A19, which allows us to evaluate the perception about intergenerational imbalances from an extremely important perspective: Social Security's ability to provide future generations with the same benefits as they give to the generations that are now retired.

As we can see in Figure 4.1., most of the respondents (55.9%) think that people born after 1983 (i.e. currently under the age of 35) enjoy better living conditions than their parents' generation. However, a significant percentage (28.6%) of respondents believe that people born after 1983 are in a worse economic situation than their parents' generation experienced.

Figure 4.1.

**You think the lives of people born after 1983
(those now UNDER the age of 35), relative to their parents' generation,
are now economically…:**

Worse **29**% · · **56**% Better · The same **15**%
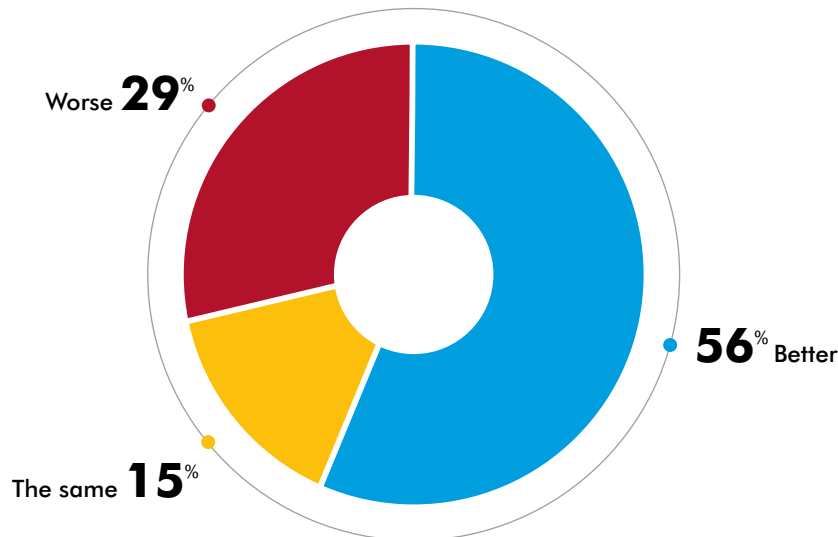
Generally speaking, the younger the respondents, the less optimistic they are about the quality of life of the younger generations. This could be because the younger generations overestimate the living conditions of the period before they were born. To explore this possibility, we divide the respondents into those born in or before 1977 (i.e. were aged 6 or more in 1983 and can remember the living conditions of that era) and those born after that date (i.e. were very young or had not yet been born in 1983).

It is interesting to confirm that, relative to the generations born in or before 1977, the younger generations (born after 1977) have a less positive perception of the quality of life of people born after 1983. Among the respondents born after 1977, 52.4% think that the people born after 1983 (i.e. now under 35 years of age) are in a better economic situation today than their parents. On the other hand, 57.9% of the people born in or before 1977 think that those born after 1983 are in a better economic situation today than their parents. In addition, the older the respondents, the stronger the conviction that the generations born after 1983 have a better quality of life. In particular, 62.2% of those now aged 65 or more believe that generations born after 1983 have a better quality of life than their parents had.

Traditionally, it was thought that a stable job is a major contributory factor to a satisfactory quality of life as it minimises labour insecurity and gives access to career progression through seniority. This notion has been steadily weakened with the growing flexibilization of the labour market and the increased use of meritocracy as a criterion for career progression. It is found that even though the majority of respondents believe that the younger generations have a better

life, economically speaking, than their parents did, when it comes to the possibility of finding a stable job, 60.7% of respondents think that it is not possible for people born after 1983 to find such a stable job as the previous generations (Figure 4.2.).

Figure 4.2.
**You think that people born after 1983
(those now UNDER the age of 35), relative to previous generations,
can now find a job:**

20% More stable

19% As stable

Less stable **61**%
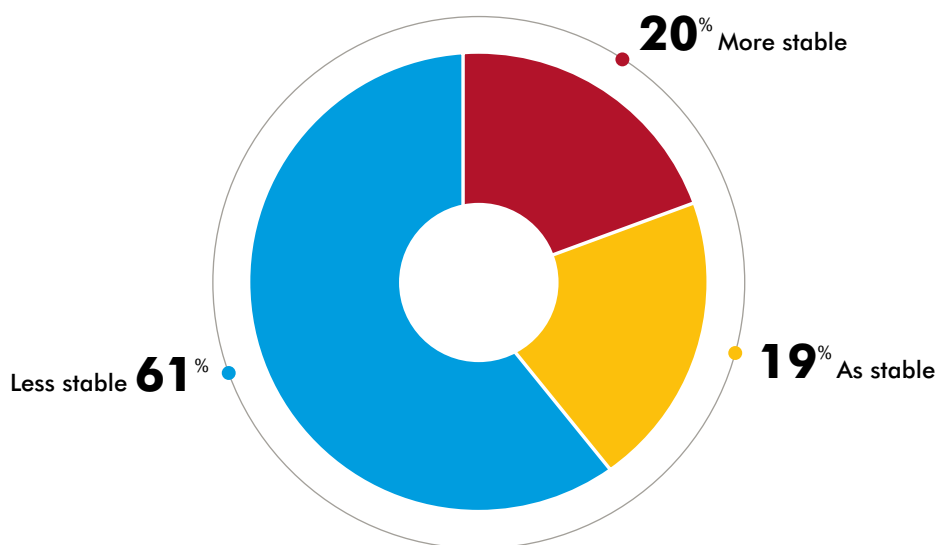
Figure 4.3. analyses the same question as Figure 4.2. but shows the differences between the perception of people who actually experienced the past and that of people who have only heard about it. Once again, the younger respondents are the most pessimistic. However, this is a qualitative difference given that there are no statistically significant differences.[2]

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2 Kolmogorov–Smirnov test of the equality of distributions with a p-value of 0.621.

Figure 4.3.

You think that people born after 1983, relative to previous generations, can find a more or less stable job - Differences between people born after 1977 and those born in or before 1977.

LESS STABLE
64,1%
58,7%

EQUALLY STABLE
18,6%
19,6%

MORE STABLE
17,2%
21,7%

0.0% 10.0% 20.0% 30.0% 40.0% 50.0% 60.0% 70.0%

● People who only have a notion of what it was like
● People who lived through "that era"
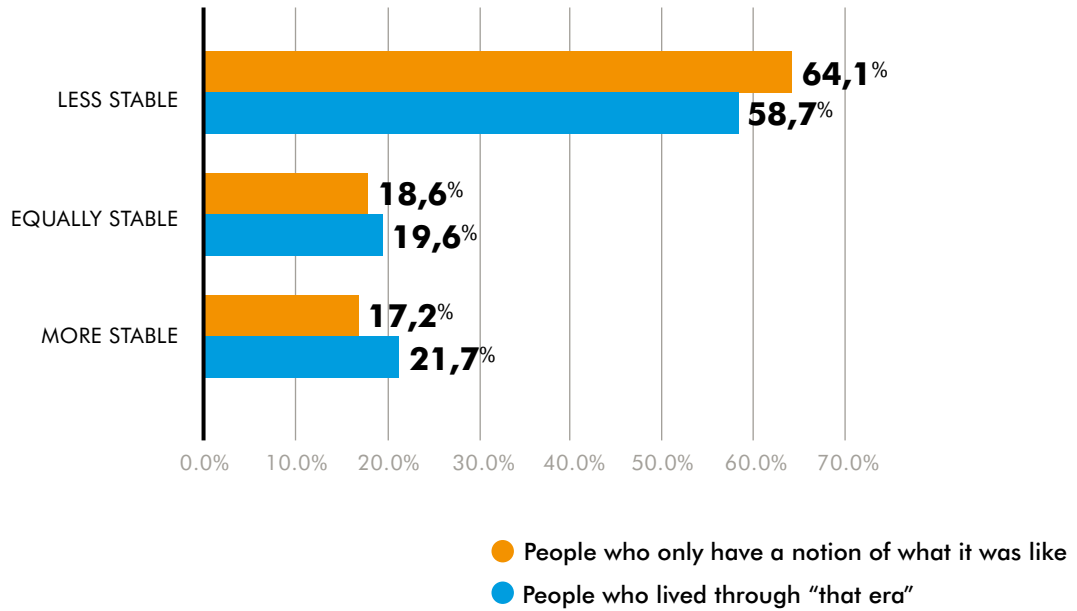
In relation to the possibility of buying a house, 55.8% think that the people born after 1983 find it more difficult to buy a house than the previous generations (Figure 4.4.).

Figure 4.4.
**You think that the people born after 1983
(those now UNDER the age of 35), relative to previous generations,
are able to buy a house:**

27% More easily

Not so easily **56**%
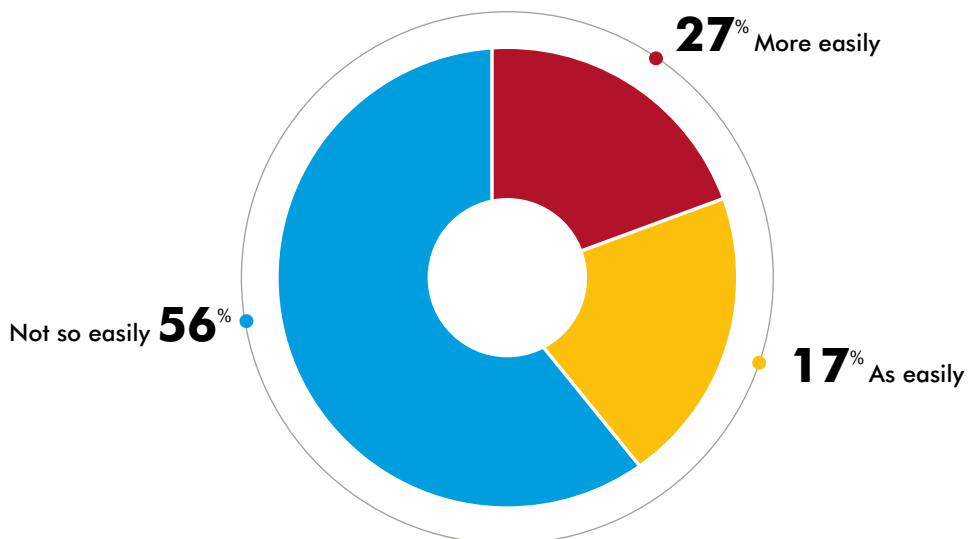
17% As easily

As before, we find a difference in the perceptions when we analyse the respondents born before and after 1977 separately (Figure 4.5.). Whereas 62.1% of the respondents born before 1977 believe that those born after 1983 cannot buy a house as easily as previous generations, 52.3% of the respondents born in or after 1977 are of this opinion. The difference between these percentages is statistically significant.[3]

Figure 4.5.
**You think that the people born after 1983
(those now UNDER the age of 35), relative to previous generations,
are able to buy a house: Differences between those born after 1977
and those born in or before 1977.**
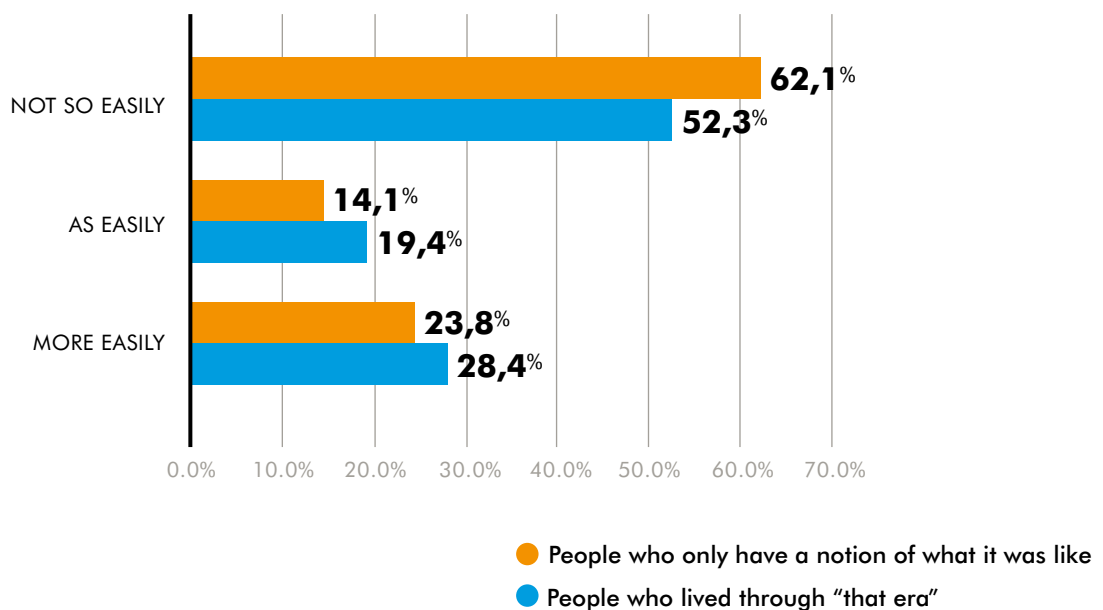
Questions A20 and A21 on the respondents' opinions about the ability to buy a house based on their own earnings and the weight of seniority and merit in career progression, respectively, are relevant when evaluating living conditions and may be indicative of intergenerational imbalances.

In relation to the ability to buy a house using one's own earnings, 58.4% of the respondents think there is a low probability of this. However, there is more optimism among the younger generations, given that 63.9% of those aged 65 or over believed there was little probability of buying a house with one's own earnings. This optimism may be explained by the fact that many of the younger respondents have not yet bought a house but hope to do so, and/or because the older respondents, most of whom are home-owners, are aware of just how difficult it would be if they were buying a house in the current circumstances.

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3 Test z of the equality of the proportions has a value of 2.052, p-value=0.04.

The analysis of question A20, which differentiates homeowners and tenants (or those living "rent-free" in the home of relatives/friends), reveals that people who do not live in their own home think being able to buy a house with one's own earnings in less likely. However, there is also some pessimism among homeowners, albeit slightly less. It should be noted that women are more pessimistic than men; 61.8% of women think there is little likelihood of buying a house with one's own earnings vis-à-vis 54.7% of men. Table 4.2. summarises these results.

Table 4.1.
Percentage of respondents who do NOT think one can expect to buy a house with one's own earnings

Characteristics of respondents	Percentage
Generation born between 2000 and 1979	54,74%
Generation que born between 1978 and 1954	58,50%
Generation born before 1954	63,88%
Female	61,81%
Male	54,71%
Lives in own home	61,79%
Lives in rented property or with family/friends	55,97%

The respondents have varying opinions on the weight of seniority and merit in career progression. Roughly one third think that progression depends equally on seniority and merit, about one third think it depends more on merit and the remaining third think it depends more on seniority.

Figure 4.6.
Weight of seniority and merit in career progression

- 🔴 100% weight of seniority
- 🟡 seniority – much weight; merit – little weight
- 🔵 same weight of seniority and merit
- 🔵 merit - much weight; seniority – little weight
- 🔵 100% weight of merit
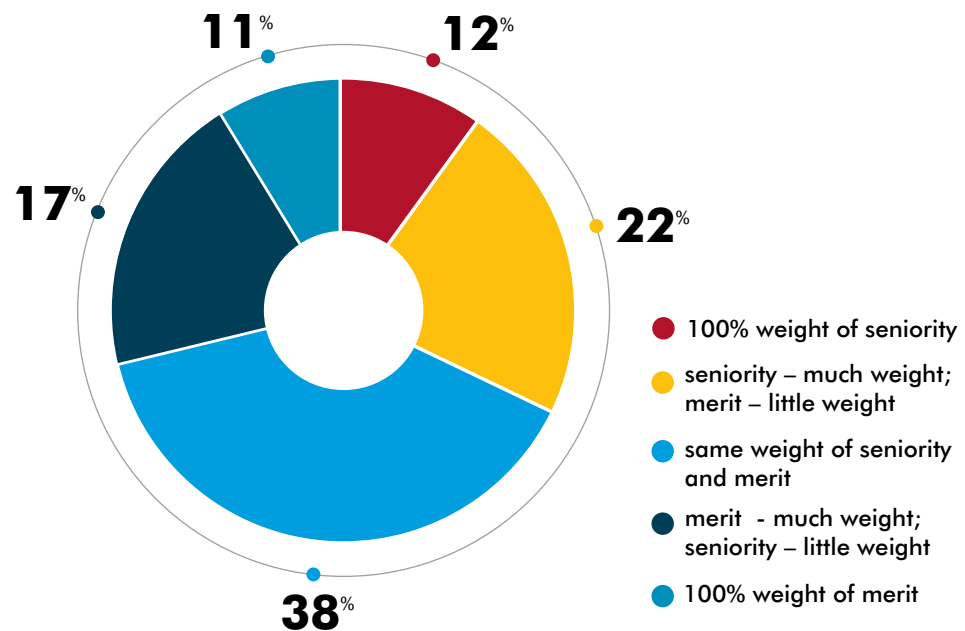
The living conditions of future pensioners

The previous questions allow us to make inferences on the respondents' opinions about whether there are potential intergenerational imbalances between contemporary generations. Moreover, question A19 allows an assessment to be made of **potential imbalances between present and future generations** in an extremely relevant dimension: the ability of Social Security to be intergenerationally fair. The large majority of respondents (84.9 %) believe that the pensioners of the future will be at a disadvantage, that is, Social Security will not be able to give the future generations the same benefits that they are giving those who are now retired. Moreover, the respondents from generations now aged between 40 and 64 years are the least confident in Social Security's ability to maintain the level of well-being of the pensioners of the future, unlike the current pensioners who are more optimistic. Figure 4.7. presents these results in percentage terms. More specifically, it shows the generational distribution of the respondents who "do not believe in Social Security's ability to guarantee future pensioners the same benefits as it gives to people who are now retired". The percentage of each generation in Figure 4.7 would be 33.3% if the perception was the same across the generations.

Figure 4.7.

**Generational distribution of the respondents
that do NOT believe in the ability of Social Security to guarantee
the benefits of today to future pensioners**

23%
Generation born
before 1954

33%
Generation born
between 2000 and 1979

44%
Generation born between
1978 and 1954
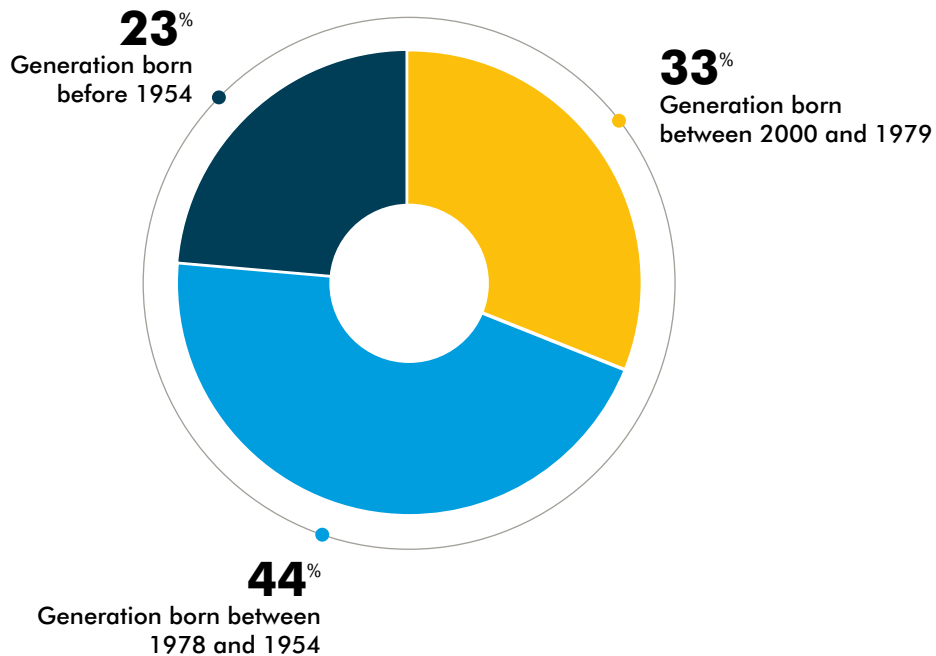
4.2.
PERCEPTION OF POLICY MAKERS' CONCERN

Three questions were analysed that allowed inferences to be drawn on the respondents' opinion about the policy makers' concern with regards defending: (1) the interests of their generation – question A1; (2) the interests of the different present generations – question A2; (3) the interests of the future generations– question A4.

Figure 4.8. presents the distribution of the responses to question A1 by age group, namely: "**On a scale of 1 (little) to 10 (much), how do you evaluate policy makers' concern with defending the interests of your generation?**"

Generally speaking, it is found that the generation currently aged 65 or over has the least belief in the policy makers' concern as regards defending the interests of their own generation. Younger generations make a less negative evaluation. In fact, over 50% of respondents aged 65 or more classified the decisionmakers' concern with defending the interests of their generation between 1 and 3. Parallel to this, the same evaluation is made by 33% of respondents aged between 18 and

39 years and by 38% of the generation now aged between 40 and 64 years. This difference may be explained by the fact that the generation aged 65 or more may give this question more serious consideration as they have already reached retirement age, whereas the other generations, for whom retirement is a distant reality, tend to have a less definite opinion so their responses are concentrated in a middle point.

Figure 4.8.
Evaluation of the policy makers' concern with defending the interests of your generation

Generation born between 2000 and 1979

Generation born between 1978 and 1954
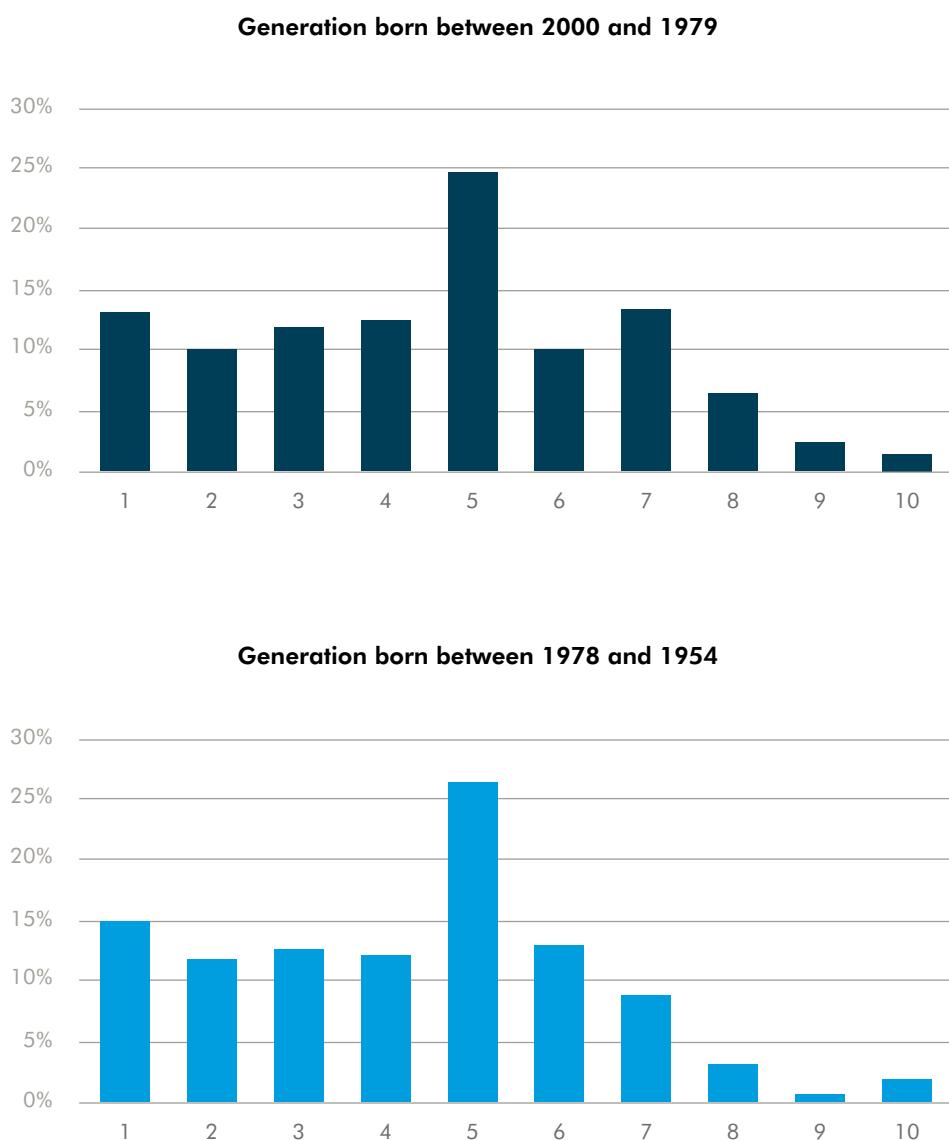
Generation born before 1954
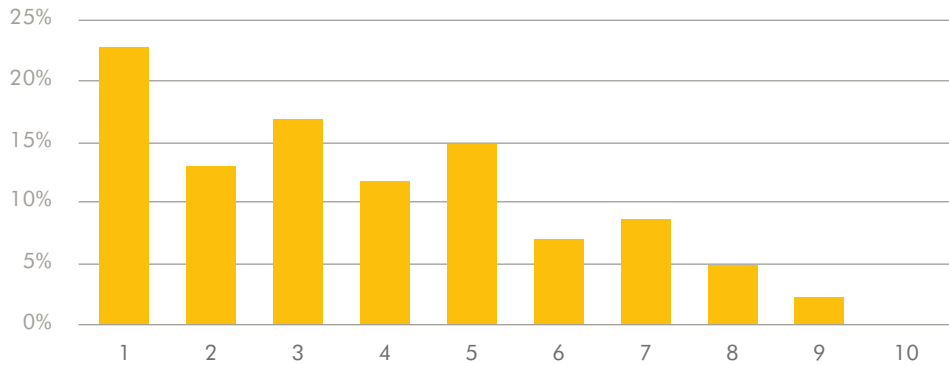
Figure 4.9. presents the distribution of responses to question A2: "**On a scale of 1 (little) to 10 (much), how do you evaluate policy makers' concern with defending the interests of the <u>various present generations</u>**".

Overall, the respondents make an average/low assessment of the policy makers' concern with defending the current generations. In particular, they think that there is greater concern for the generations currently aged between 18 and 39 years. The majority (50.7%) think that policy makers show little concern for defending the interests of the generations now over 65 years. To a certain extent, this opinion does not match the reality given that public expenditure in many western countries is biased in favour of the older generations (see, for example, Vanhuysse, P., 2013).

Figure 4.9.
Evaluation of the policy makers' concern with defending the interests of the current generations
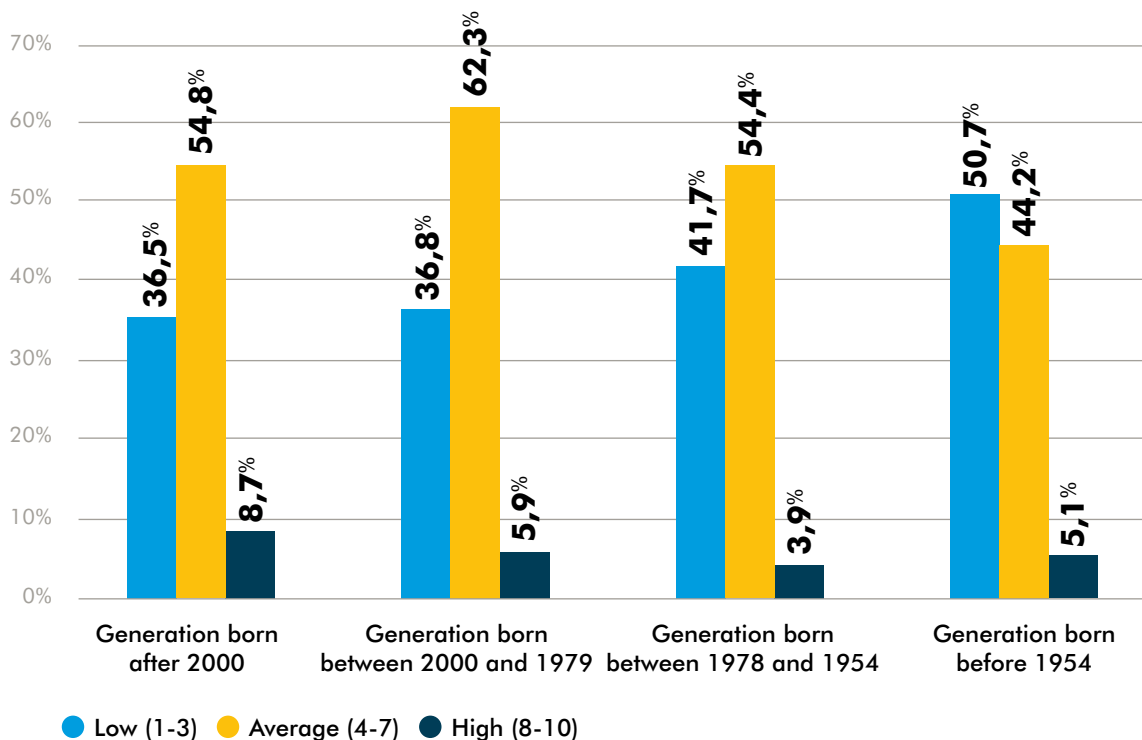
Figure 4.10. summarises the responses to question A2: "**On a scale of 1 (little) to 10 (much), how do you evaluate policy makers' concern with defending the interests of the generations not yet born?**". The opinion of the large majority of respondents is divided between an average concern (49.2%) and little concern (40.4%) among policy makers for the interests of the future generations. It is noteworthy however that, in comparison with the results presented in Figure 4.9., a larger percentage of respondents (in this case 10.4%) think policy makers are very concerned about generations not yet born.

Figure 4.10.

**Evaluation of policy makers' concern with defending
the interests of the generations not yet born**
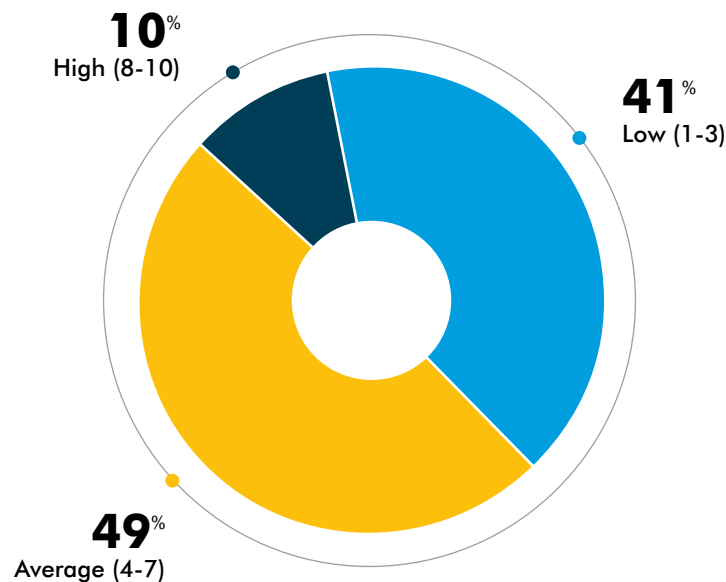
As questions A2 to A4 are structured on a scale of 1 (little concern) to 10 (very concerned) points, it is possible to calculate the total points which the respondents attribute overall to the policy makers' concern with defending the interests of the various generations (future and present). The minimum number of points is 801 (1*801) and the maximum is 8010 (10*801). Table 4.1. presents the results, which confirm the qualitative evaluation presented in Figures 4.9 and 4.10. A test of proportions shows that there are statistically significant differences between the percentages of the generation now aged 65 or over and the younger generations. This significance is particularly marked for the difference between the generations now aged 65 or over and the under 18 years generation.

Table 4.2.
Numerical evaluation of the policy makers' concern with defending the interests of the current and future generations

	Total number of points	Percentage (points/8010)*100
Generations not yet born*	**3346**	**41,77%**
Generation now under the age of 18*	3506	43,77%
Generation now between 18 and 39 years**	3378	42,22%
Generation now between 40 and 64 years	3203	39,99%
Generation now aged 65 or over	2965	37,01%

Test of proportions between lines compared, in particular, the difference of proportions between the generation now aged 65 or over and that of other generations. Statistical significance: $*p < 0.1$, $** p < 0.05$, $*** p < 0.01$.

Question A11 is also related to the respondents' perceptions of the policy makers' concern with defending the interests of the younger and future generations by asking "**Are the interests of those under 18 and also of future generations taken into account in the Portuguese political process?**" The respondents' answers show that 43.4% think the interests of both those under 18 and future generations are never or rarely taken into account in the Portuguese political process. Only 18.2% think that these interests are often or always taken into consideration in our political process (Figure 4.11.).

Figure 4.11.
Are the interests of both those under 18 and future generations taken into consid-eration in the Portuguese political process?
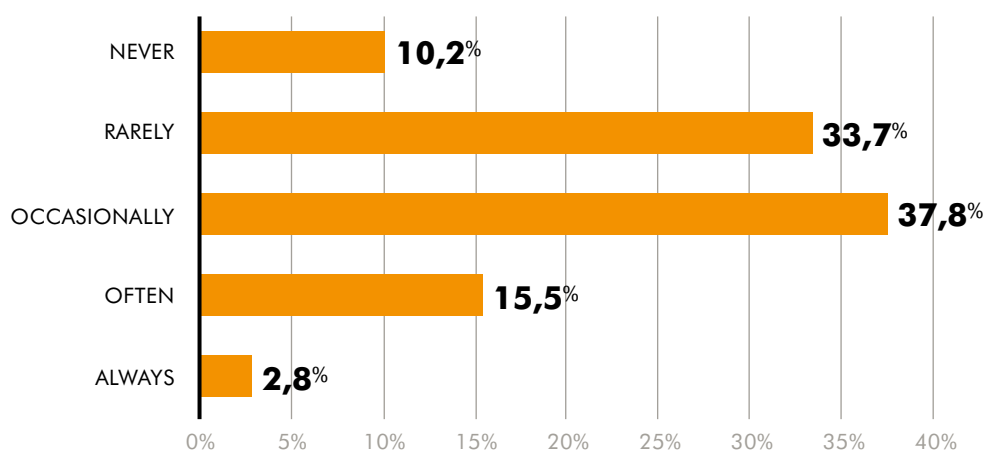
4.3.
STATED INTERGENERATIONAL PREFERENCES

This section addresses the concern that the respondents explicitly state they feel in relation to future generations (question A3), as well as their opinion on intergenerational transfers (question A6).

Most respondents state that they have intergenerational concerns. More specifically, nearly 20% say that the well-being of the generations not yet born is a major concern. Around 50% of respondents rate their concern about the well-being of future generations as 8 (Figure 4.12.).

The respondents' concern about the well-being of future generations is compared with their perception of policy makers' concern by comparing Question A3 with A4.

Figure 4.12.
**The respondents' concern about the well-being
of the generations not yet born**
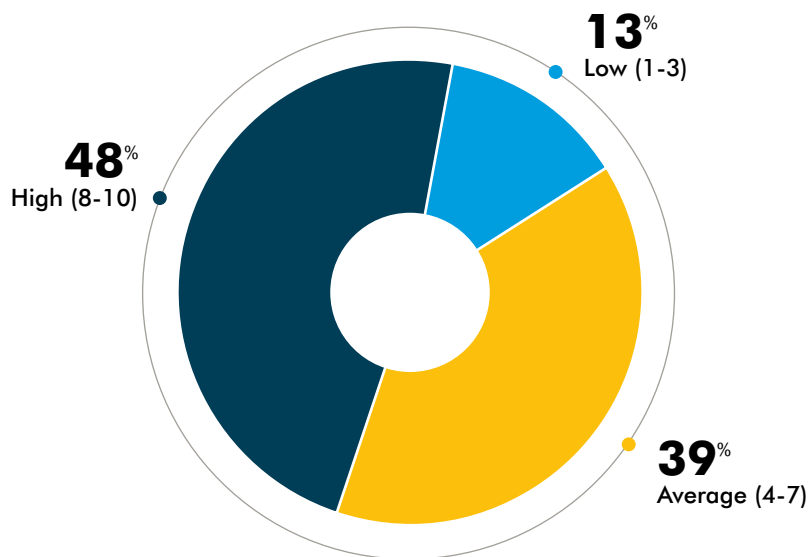
The respondents' concern about the well-being of the future generations is not, in their opinion, matched by policy makers' concern. A large proportion of the respondents (41%) classify the policy makers' concern as low and just 10% classify it as high (compare Figures 4.11. and 4.12.).

Following the process used with Table 4.2, the respondents' concern with defending the interests of future generations is calculated based on the answers to A3. Overall, the stated concern of the respondents reaches a total of 5466 (68.4% of 8010), which contrasts with the total points the respondents as a whole attribute to the policy makers' concern about the well-being of the

future generations (3346, that is 41.77% of 8010). It can therefore be said that the policy makers' concern about the future generations is roughly 61.2% of the respondents' concern about these generations.

When asked about the transfers between generations, the respondents also express a high level of intergenerational concern (Figure 4.13.). In particular, 77.4% of respondents consider that each generation should transfer more resources than they received from the previous generation. On the other hand, 18.6% of respondents think the same resources should be transferred. Just 3.8% of respondents say that fewer resources should be transferred. It should be noted that there are no significant differences in the preferences reported between generations.

Figure 4.13.

In your opinion, each generation should transfer to the future generation...

- the same resources as they received from the previous generation
- more resources than they received from the previous generation
- fewer resources than they received from the previous generation
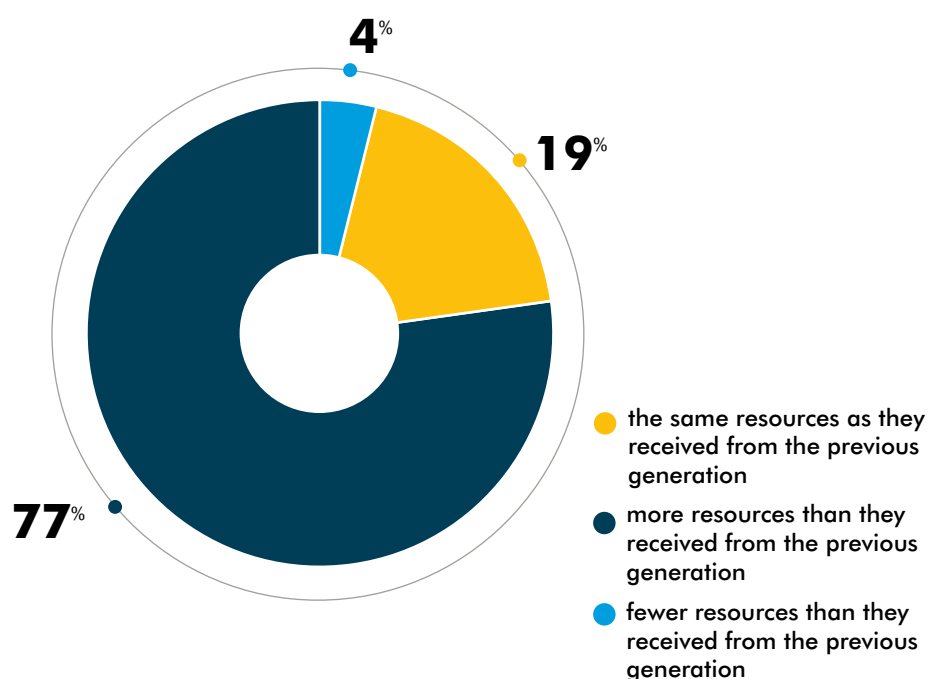
These results offer an encouraging perspective on the role of intergenerational justice in Portuguese society. However, it is highly probable that the respondents exaggerated their answers as this tends to happen when people are asked about topics that may involve the interviewer making a moral judgement. To be more precise, the answers are generally positively biased if the question involves something positive, and negatively biased in the case of something negative such as the tendency to lie (Chakravarty and Maximiano, 2016). Therefore, the fact that it was a face-to-face interview may have encouraged the respondents to answer in such a way that they would create a better image of themselves in the eyes of the interviewer. By implementing a Discrete Choice Experiment (chapter 6), this bias can be largely corrected as the preferences are not stated but disclosed through choices.

4.4.
POLICY MEASURES AND INSTITUTIONAL SOLUTIONS

Lastly, we try to identify the policy measures and institutional solutions the respondents support most in order to correct eventual intergenerational imbalances.

In question A5, the respondents were asked to distribute 100 points across different areas of public policy to indicate the areas in which it was most important to protect the interests of future generations. Education, followed by employment, are the two areas that were given most points. On the other hand, the fewest points went to emigration and immigration. Reference should also be made to the relative sensitivity to areas such as Climate and Natural Resources. The results are set out in Figure 4.14.

Figure 4.14.
Policy intervention areas

9% Public expenditure and Public debt

29% Education

25% Employment

5% Emigration

5% Immigration

8% Defence

9% Climate

10% Natural Resources
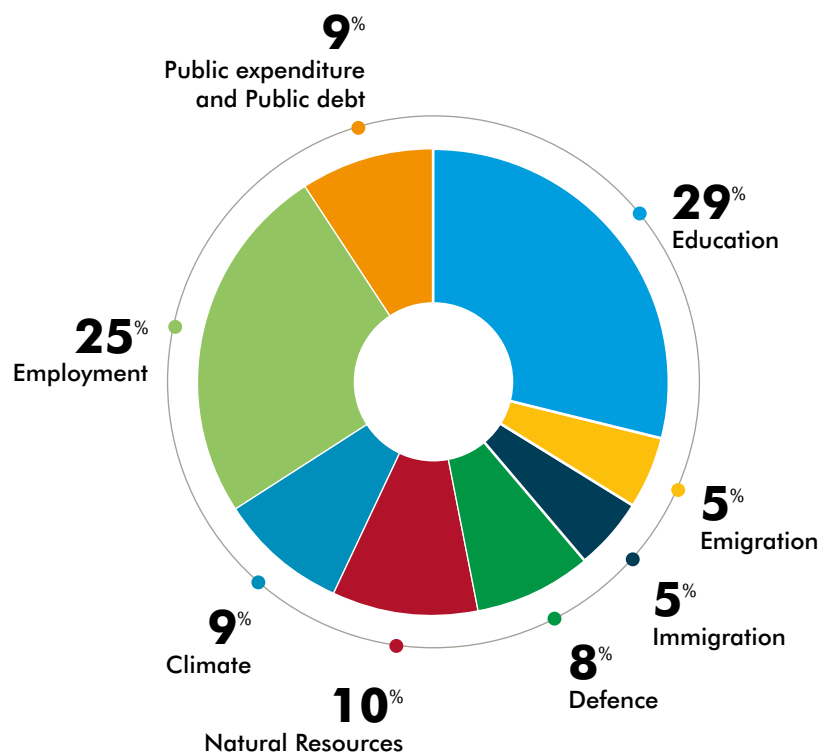
Note: The maximum number of points that any area can receive is 80100, that is 100*801 respondents. The percentages were calculated by dividing the total number of points received for a specific area by 80100.

Although 77.4% of respondents state that each generation should transfer more resources than they received from the previous generation (Question A6, Figure 4.13.), when asked whether higher taxes should be paid to ensure a more sustainable environment for the future generations, less than one third agree. The measure that seems to enjoy the most support is the closure of polluting industries, even if this means fewer jobs. Moreover, most of the respondents think that the future generations should learn to live with fewer resources. Table 4.3. summarises the opinions of the respondents on the four measures suggested to foster a more sustainable environment for future generations.

Table 4.3.
Percentage of respondents that agree/disagree with the following measures for a sustainable environment for the future generations

Environmental Measures	Respondents' answer
Close polluting industries, even if it implies fewer jobs	41,6% agree 34,2% disagree
Impose higher tariffs and taxes on the present generations so as to restrict the consumption of goods and the use of non-renewable energies	25,1% agree 50,6% disagree
Raise taxes to invest in new technologies that guarantee that future generations have at least the same environment as the present generations	24,5% agree 52,9% disagree
The future generations should learn to live with fewer resources and use fewer resources and energy	57,9% agree 19,4% disagree

Questions A12-A18 propose a series of measures to protect future generations. Generally speaking, the respondents agree with the introduction of measures and the institutional solutions proposed. However, some measures are more consensual than others. Limiting public expenditure is one of the measures that enjoys most support. Figure 4.15. presents the distribution of responses to question A12: "Should limits be placed on public indebtedness so that we do not leave future generations too heavy a burden?". The level of agreement is very high, totalling 81.4% of respondents. Differences are found between the active and inactive population; more specifically, 85.2% of the active population surveyed agree with the measure vis-à-vis 72.9% of the inactive population.

Figure 4.15.
**Should limits be placed on public indebtedness
so that we do not leave future generations too heavy a burden?**
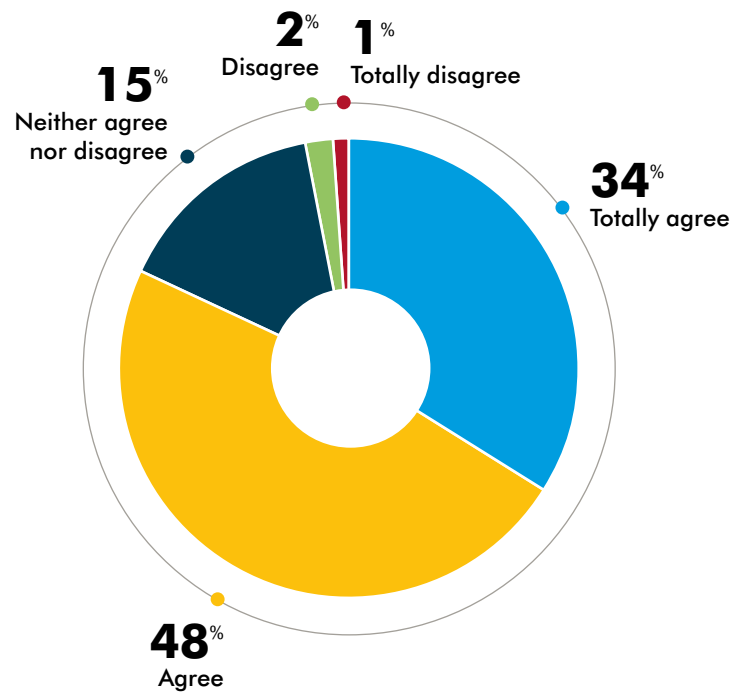
Question A13, namely, "Do you think inheritances should be taxed so as to create a fund to be used for future generations?", is less consensual. A narrow majority of respondents (50.4%) do not think inheritance should be taxed to create such a fund. Among those who agree with this measure, 8.2% think all inheritance should be taxed, 21.7% think the level of wealth of those receiving the inheritance should be taken into consideration, while 19.6% think that the amount of the inheritance should be taken into account (Figure 4.16).

Figure 4.16.
Do you think inheritance should be taxed so as to create a fund to be used for future generations?

8% Yes, all

22% Depends on the level of wealth of the person receiving the inheritance

50% No

20% Depends on amount inherited
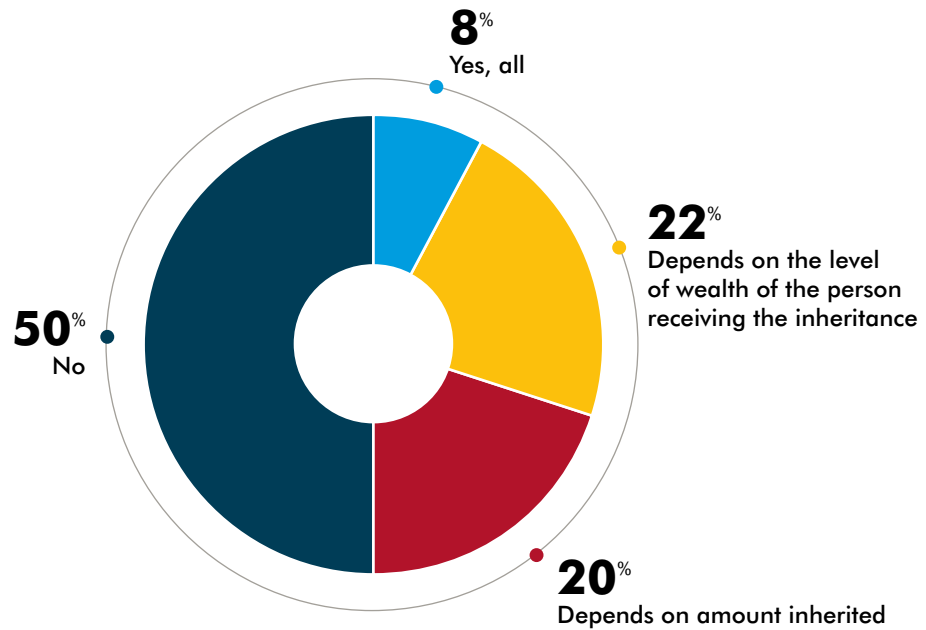
In relation to restricting the privatisation of national heritage (water, oil, cultural buildings) to finance the spending of the current generations (Question A14), 62.7% agree with this measure while 13.6% disagree (Figure 4.17.).

Figure 4.17.
The State should not privatise assets/heritage (water, oil, cultural buildings...) to finance current spending because this will leave future generations without these assets.

6% Totally disagree

8% Disagree

24% Totally agree

19% Neither agree, nor disagree

43% Agree
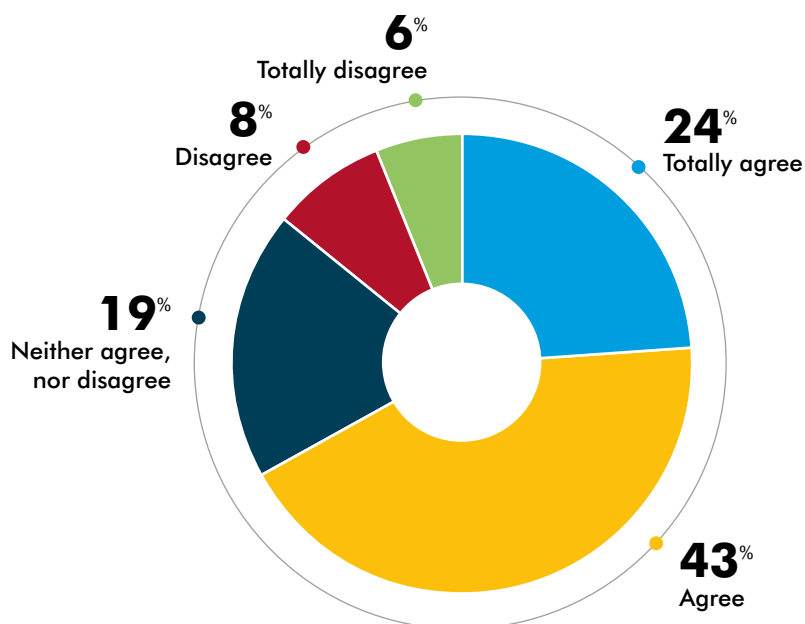
Question A15 proposes the creation of an organism to defend the interests of future generations. Yet again, most respondents (68.2%) agree with the proposal. Figure 4.18. shows the percentage distribution of the responses.

Figure 4.18.
Should there be a state organism to defend the interests of future generations?

10% No

22% Perhaps

68% Yes
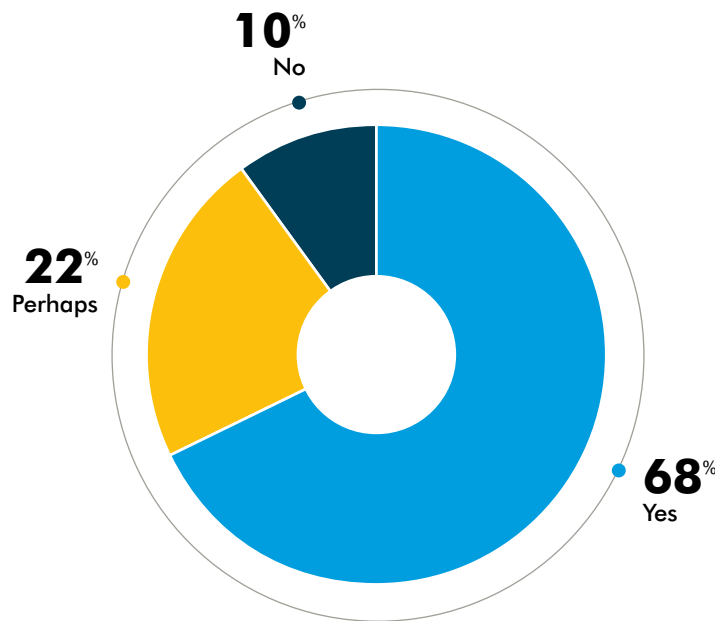
Questions A16-A18 raise the issue of potential changes related to democratic institutions and collective choices. Question A16 addresses the possibility of lowering the minimum voting age to under 18, with a view to giving the younger generations a voice. Even though respondents state that they are concerned about defending intergenerational interests, a large majority (72.9%) would not be willing to change the minimum voting age. In fact, faced with the possibility of changing the minimum voting age, 15.8% think it should be raised, and not lowered. Only 11.5% of respondents think the minimum voting age should be less than 18 years, 8.9% of whom suggest changing it to 16 years (Figure 4.19.)
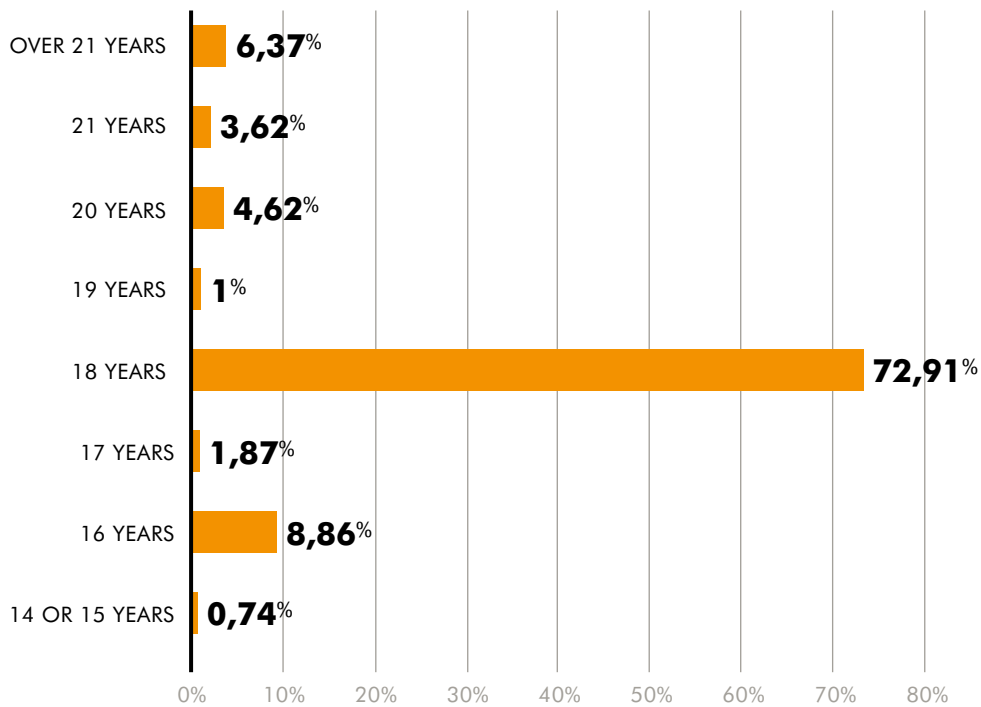
Question A17 asks whether parents should have an additional vote per child under the age of 18. A large majority (79% of respondents) disagree with this measure. It should be stressed that there is a negative correlation between the number of dependent children and the disagreement with the measure. Figure 4.20 shows the percentage of respondents who disagree with the measure by number of dependent children.

Figure 4.20.
**Percentage of respondents that think that parents
should not have an additional vote for each child under the age of 18**

Number of children	Percentage
3 DEPENDENT CHILDREN	64,70%
2 DEPENDENT CHILDREN	71,20%
1 DEPENDENT CHILD	79,50%
NO DEPENDENT CHILDREN	81,30%
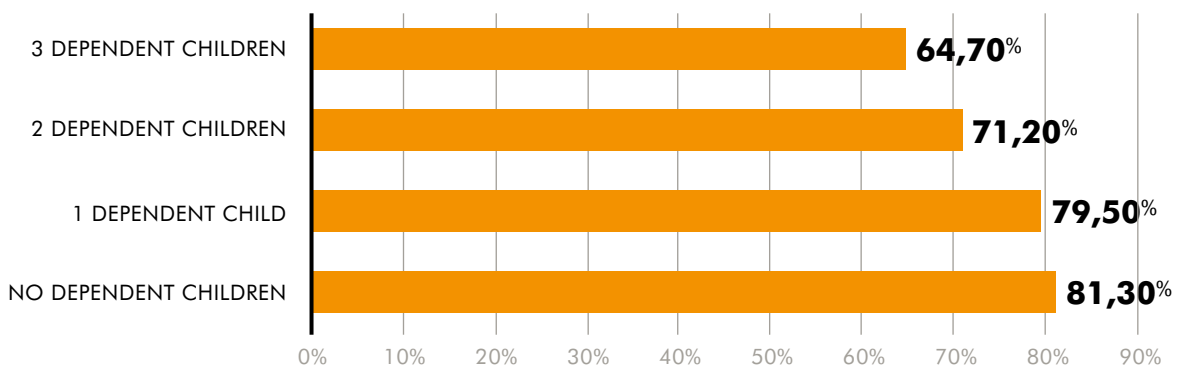
Lastly, question A18 addresses an extremely important aspect in the scope of intergenerational justice that has been on the public agenda, particularly since the Brexit referendum. Should the younger generations suffer the consequences of the older generations' preferences? Should age limits be imposed for voting in certain referenda, when these will essentially have long-term consequences?

Figure 4.21. shows the distribution of responses to the question: "Do you think everyone should be allowed to vote in a referendum that will only have an impact in 25 years?" The respondents have divergent opinions: 46.1% do not think there should be restrictions of this kind and that everyone should have the right to vote in referenda, irrespective of the issue in question, while 29.6% think that only the generations affected by the results of a specific referendum should be allowed to vote in it.

Figure 4.21.

**Do you think everyone should be allowed to vote
in a referendum that will only have an impact in 25 years?**

30% No, only the people who will be affected by the referendum

46% Yes, on all issues

24% Yes, on some issues
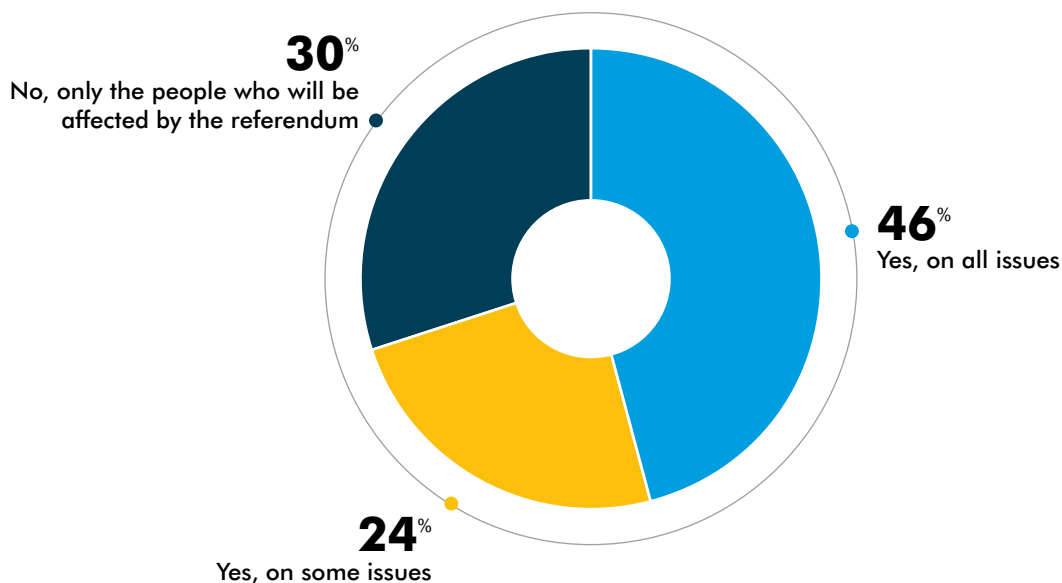
Contrary to what one would expect, a higher percentage of older respondents think that not everyone should vote in a referendum that will only have an impact in 25 years. More specifically, the percentages are 25.2% for respondents currently aged between 18 and 39 years, 30.8% for those currently aged between 40 and 64, and 33.9% for those aged 65 and over. These are qualitative results and are not statistically significant.

5.

ATTITUDES TOWARDS RISK

Guaranteeing the quality of life of future generations and correcting the intergenerational imbalances entails having public policies and institutional solutions that affect the well-being of the present generations. Intergenerational justice therefore requires the willingness to exchange current well-being, which is more or less certain, for the well-being of younger and future generations, which is associated to greater uncertainty. In other words, intergenerational justice implies decisions that involve risk. If we are to make a correct characterisation of the population's intergenerational preferences, it is also necessary to take their preferences in relation to risk into consideration. For example, imagine a person disagrees with the suggestion of introducing an environmental tax now that will be used to create a fund to conduct research into holes in the ozone layer. A biased judgement may be made of this disagreement, namely it might be thought to reflect little concern about the future generations. In fact, the disagreement with this solution might (also) reflect such a high level of risk aversion that it overrides any sense of responsibility to future generations.

In this chapter, a survey is conducted of the preferences of the reporting population in relation to risk. To that end, section C of the survey applies a method that is widely used in the scope of experimental economics, developed by Charles Holt and Susan Laury (2002). After describing the method, the results are presented together with the estimation of the risk aversion coefficient for the reporting population.

5.1.
METHODOLOGY

The respondents were asked to choose between two options, each with different potential profit but also with distinct levels of risk. Option A could result in a gain of between 32 and 40 euros, while option B could lead to gains of between 2 and 77 euros, depending on the choice made and the result of an eventual lottery. Options A and B thus differ in terms of the value of the remuneration and the difference between the lowest and highest remuneration. As the difference between 40 and 32 euros is smaller than the difference between 2 and 77 euros, option A is safer than option B.

The respondents had to make 10 consecutive choices between option A and option B, and the probability of success varied constantly. In each choice, the probability of winning the highest remuneration varied between 10% (decision 1) and 100% (decision 10). In other words, in the first choice the respondent had a 10% probability of winning 40 euros if he/she chose option A, and a 10% probability of winning 77 euros if he/she chose option B. In decision 2, the respondent had a 20% probability of winning 40 euros if he/she chose option A, and a 20% probability of winning 77 euros if he/she chose option B. Similarly, in decision 5, the respondent had a 50% probability of winning 40 euros, if he/she chose option A, and a 50% probability of winning 77 euros, if he/she chose option B. Table 5.1. summarises the 10 decisions.

Table 5.1.
Ten decisions of the Holt & Laury method (2002)

	Option A	Option B
Decision 1	10% probability of winning 40€ 90% probability of winning 32€	10% probability of winning 77€ 90% probability of winning 2€
Decision 2	20% probability of winning 40€ 80% probability of winning 32€	20% probability of winning 77€ 80% probability of winning 2€
Decision 3	30% probability of winning 40€ 70% probability of winning 32€	30% probability of winning 77€ 70% probability of winning 2€
Decision 4	40% probability of winning 40€ 60% probability of winning 32€	40% probability of winning 77€ 60% probability of winning 2€
Decision 5	50% probability of winning 40€ 50% probability of winning 32€	50% probability of winning 77€ 50% probability of winning 2€
Decision 6	60% probability of winning 40€ 40% probability of winning 32€	60% probability of winning 77€ 40% probability of winning 2€
Decision 7	70% probability of winning 40€ 30% probability of winning 32€	70% probability of winning 77€ 30% probability of winning 2€
Decision 8	80% probability of winning 40€ 20% probability of winning 32€	80% probability of winning 77€ 20% probability of winning 2€
Decision 9	90% probability of winning 40€ 10% probability of winning 32€	90% probability of winning 77€ 10% probability of winning 2€
Decision 10	100% probability of winning 40€	100% probability of winning 77 €

After making their ten choices, one of the decisions was selected at random in the respondent's presence. One in every 40 surveys was selected and the respondent received a voucher to the value of his/her choice. The incentives attributed in this part of the survey are important because the results are not biased. As shown by Holt and Laury (2002), if individuals make merely hypothetical choices in the absence of incentives, they are more likely to make risky choices – in this case, this would mean choosing option B more often than they would if the rewards were in fact real.

How are the decisions analysed?

Firstly, the expected value of each option is calculated for each decision.[4] Table 5.2. shows the results of these calculations. If the respondent had a neutral attitude towards **risk**, he/she would always choose the option with the highest expected remuneration – that is, he/she would choose option A in decisions 1, 2, 3 and 4 and option B in decisions 5, 6, 7, 8, 9 and 10. On the other hand, if the respondent was **prone to risk**, he/she would also select option B in the decisions prior to decision 5. In this case, the turning point between option A and B would be before decision 4. Finally, if the respondent was **risk averse**, he/she would choose option A more often. The turning point between option A and B here would be as of decision 5.

Table 5.2.
Expected value of options

	Expected value of lotteries/options	
	Lottery A	**Lottery B**
Decision 1	**32,8**	9,5
Decision 2	**33,6**	17,0
Decision 3	**34,4**	24,5
Decision 4	**35,2**	32,0
Decision 5	36,0	**39,5**
Decision 6	36,8	**47,0**
Decision 7	37,6	**54,5**
Decision 8	38,4	**62,0**
Decision 9	39,2	**69,5**
Decision 10	40,0	**77,0**

It is important to note that, irrespective of the preferences in the face of risk, the respondents would always be expected to choose option B in decision 10. As there is no risk involved in this decision, it would simply be a question of choosing between winning 40 euros or 77 euros. As such, if the respondents wanted to maximise their gains, they would necessarily choose the 77 euros.

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4 For example, for decision 4, the value of option A is equal to 0.4*40+0.60*=35.2 and the expected value of option B is equal to 0.4*77+0.66*2=32

5.2.
DESCRIPTIVE RESULTS

In order to make a more thorough characterisation of the preferences when faced with risk, respondents with an erratic random behaviour were excluded from the analysis: (1) all those who chose option A in decision 10 (131 respondents); (2) all those who did not make monotonic choices, that is, who alternated randomly between option A and B. In total, 257 respondents were excluded.

Table 5.3 presents the percentage of respondents who chose option A. First and foremost, it must be stressed that there was a considerable level of risk aversion. Indeed, if all the respondents had a neutral attitude towards risk, 0% of them would choose lottery A after decision 5. Instead, around 56% still prefer lottery A in decision 7, and 44% even in decision 8.

Table 5.3.
Percentage respondents who chose Lottery A

	Lottery A
Decision 1	83,09
Decision 2	81,80
Decision 3	80,51
Decision 4	78,49
Decision 5	70,77
Decision 6	63,79
Decision 7	56,43
Decision 8	44,12
Decision 9	37,13
Decision 10	0,00

Figure 5.1. shows the frequency of choices in lottery A. The heterogeneity of the respondents' risk preferences is evident: 92 respondents (16.9%) always chose the riskiest lottery– that is, option B –, 42 respondents (7.7%) had a neutral attitude towards risk and 202 respondents (37.1%) always chose option A until decision 9, showing a high level of risk aversion.

Figure 5.1.
Frequency of choices in Lottery A
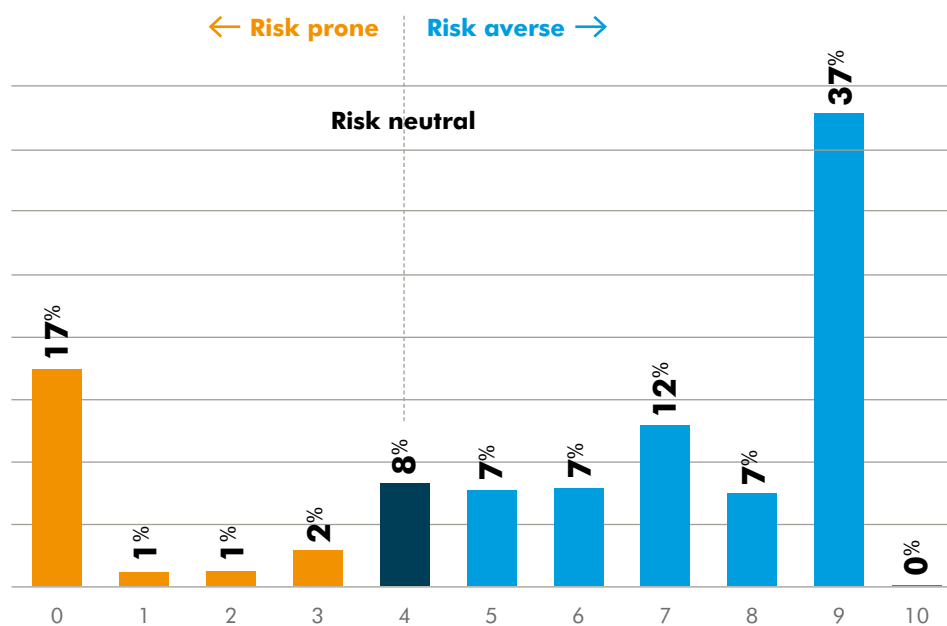
The following figures (5.2. and 5.3.) show the differences in attitudes towards risk by sex and by generation. Based on the empirical evidence available from both the laboratory and fieldwork, the women surveyed are consistently more risk averse than the men (Croson and Gneezy, 2009, Sebai, 2014, Fossen, 2012). Whereas 75.2% of women are risk averse, the percentage for men is 65.8%. A test of proportions shows that this difference is statistically significant.[5] Although the respondents from the generations born before 1954 are more risk averse, the differences are only qualitative and not statistically significant.

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5 Test z of the proportions has a value of 2.410, p-value=0.017.

Figure 5.2.
Preferences in the face of risk, by sex

	Women	Men
Propensity to Risk	17,6%	26,0%
Neutrality to Risk	7,2%	8,3%
Aversion to Risk	75,2%	65,7%

● Women ● Men
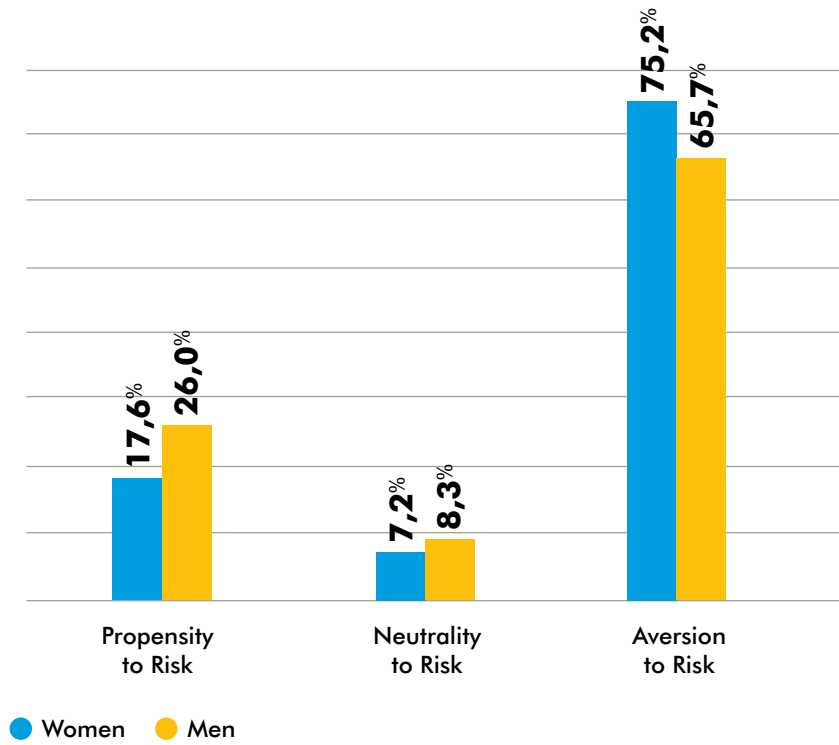
Figure 5.3.
Preferences in the face of risk, by generation

	born between 2000 and 1979	born between 1978 and 1954	born before 1954
Propensity to Risk	20,8%	21,5%	13,4%
Neutrality o Risk	6,3%	8,2%	9,2%
Aversion to Risk	70,3%	68,7%	75,6%

● born between 2000 and 1979 ● born between 1978 and 1954 ● born before 1954
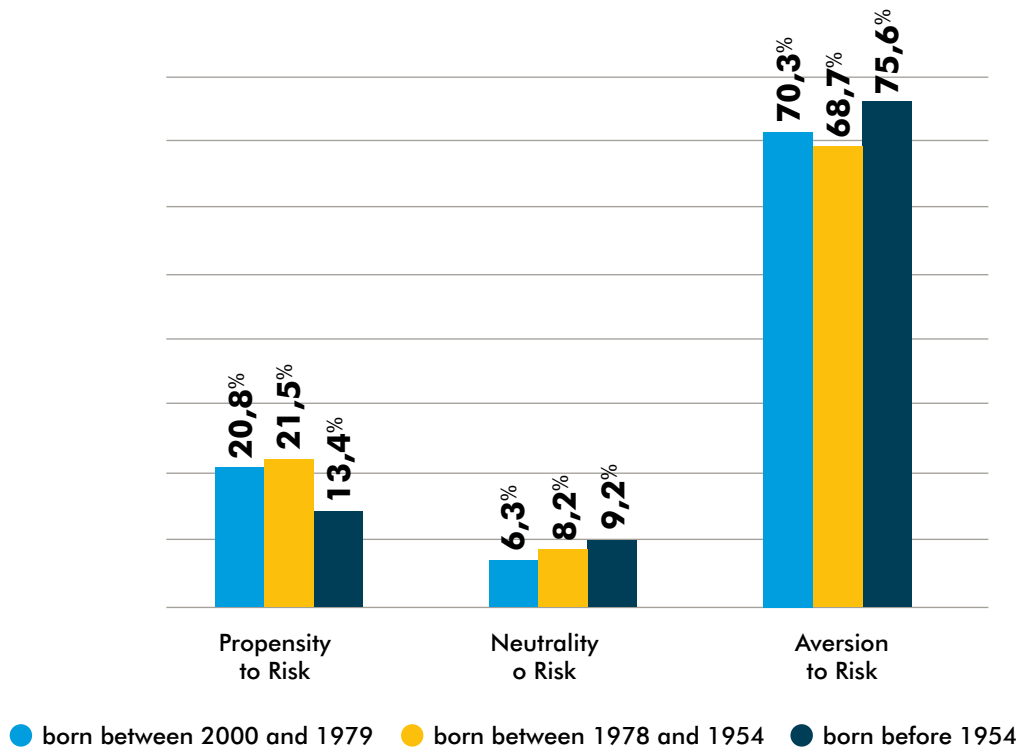
5.3.
ESTIMATION OF THE RISK AVERSION COEFFICIENT

As in Holt and Laury (2002), the risk aversion coefficient was estimated assuming a nonlinear measure for the respondents' satisfaction with the rewards potentially associated with the choices. This measure is represented by the following utility function: $U(x) = (x^{1-r}) / (1-r)$, where x is the monetary value of the rewards. This measure implies a propensity to risk if r < 0, neutrality to risk if $r = 0$ and aversion to risk if $r > 0$. As already noted, for the values considered in the survey, in options A and B, if the respondents were risk neutral, they would make 4 safe choices in option A (decision 1-4), and 6 risky choices in option B, (decision 5-10). The turning point allows us to estimate the interval of neutrality to risk, which is [-0,15; 0,15] of individuals that are neutral. Table 5.4. presents the intervals for this coefficient and the percentage distribution of the respondents in relation to the intervals.

The analysis of the risk aversion coefficient shows that 63.8% of the respondents considered for this test are risk averse, with 56.4% having a relative risk aversion coefficient above 0.68. The average of r is 0.429[7], which is consistent with the estimates found in auctions and games of uncertainty (Holt and Laury, 2002). This average risk aversion coefficient will be used in the parametrisation of the respondents' utility in the estimation of their intergenerational preferences (Chapter 6).

A linear regression of the risk aversion coefficient r was also calculated with the following explanatory variables: sex, age, parenthood, number of children, region, individual is/is not the main contributor to the family income, marital status, home-owner/tenant, employment situation and income. Sex is the only statistically significant variable, strengthening the results presented in Figure 5.2. The risk aversion coefficient is, on average, 0.272 higher for women. [8] Although the differences are not statistically significant, it is important to note that the older the respondents, the more risk averse they are.

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6 This function implies a constant risk aversion coefficient. The denominator (*1-r*) is merely functional and serves to guarantee that the utility is growing when r > 1.

7 The risk aversion coefficient was calculated for each individual assuming the midpoint of the interval.

8 p-value=0.006.

Table 5.4.
Risk aversion coefficient and percentage distribution of respondents

Number of times lottery was chosen	Interval of risk aversion coefficient, r	Percentage of respondents	Classification of risk preferences
0	$r < -1.713$	16,73	Extremely prone to risk
1	$-1.713 < r < -0.947$	1,47	Very prone to risk
2	$-0.947 < r < -0.487$	1,29	Prone to risk
3	$-0.487 < r < -0.143$	1,84	Relatively prone to risk
4	$-0.143 < r < 0.146$	7,90	**Risk neutral**
5	$0.146 < r < 0.412$	6,99	Relatively neutral to risk
6	$0.412 < r < 0.676$	7,35	Risk averse
7	$0.676 < r < 0.971$	12,32	Very risk averse
8	$0.971 < r < 1.368$	7,35	Extremely risk averse
9-10	$r > 1.368$	36,76	Totally risk avers

Finally, an analysis was made of the correlation between the risk coefficient and the answer to the questions in section A of the survey. Special note is given to the questions where some significant differences were found between the risk averse and non-risk averse respondents. First, looking at question A5: "Suppose a programme is set up to protect the interests of future generations. Imagine that 100 points are attributed and that you can distributed them across the following areas. How many points would you attribute to each one?". Table 5.5 presents the average points attributed by the risk averse and non-risk averse respondents to the different areas. The risk averse respondents attribute more points, on average, to employment and expenditure and public debt, and fewer points, on average, to immigration and, curiously, also to natural resources and climate.

Table 5.5.
**Average points attributed to policy intervention areas
as per attitude to risk**

	Risk prone or risk neutral	Risk averse
Education	30,43	29,54
Emigration	5,50	4,86
Immigration	5,22	4,30***
Defence	7,92	7,22
Natural resources	10,25	9,02***
Climate	9,97	8,75***
Employment	22,13	26,35*
Public expenditure and public debt	8,58	9,97***

A statistically significant difference between risk averse and non-risk averse respondents was also found for A18: "Suppose there is a referendum on a matter that will have an impact in 25 years, do you think everyone should be able to vote in that referendum?" The results are set out in Figure 5.4. Around 37.7% of the risk neutral and risk prone respondents think that only the people affected by the referendum should vote. A significantly lower percentage of risk averse respondents (28.3%) are of this opinion.

Figure 5.4.

Do you think that everyone should be able to vote in a referendum on something that will only have an impact in 25 years?

(distribution of responses as per attitude to risk)

Legend:
- ● Risk neutral or risk prone
- ● Risk averse
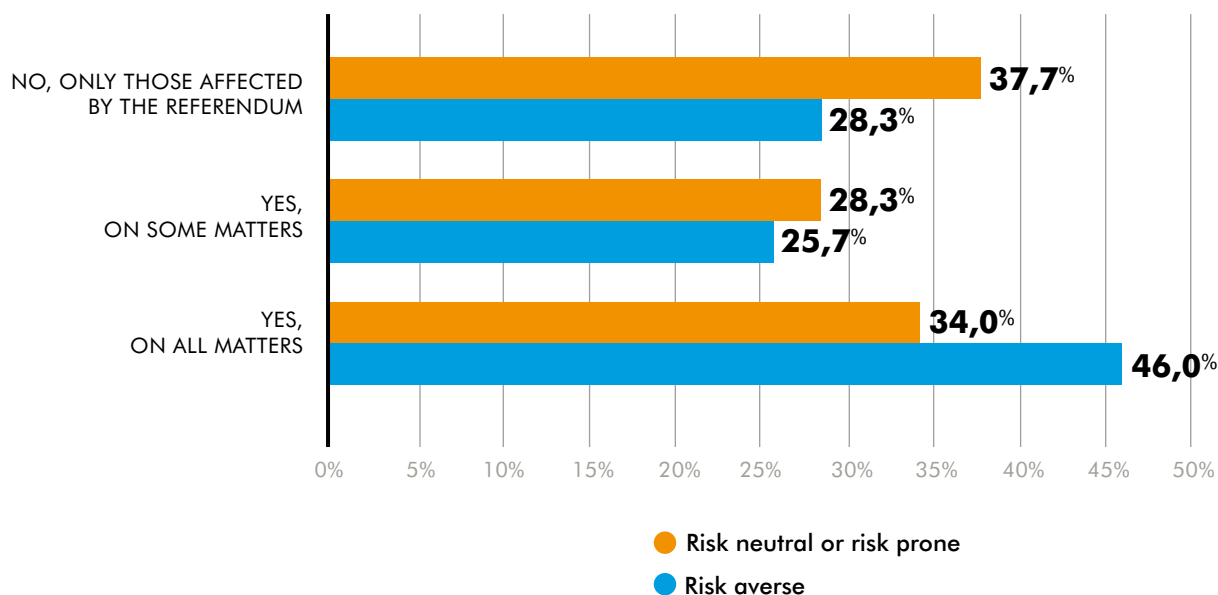
Lastly, looking at question A19: "In your opinion, do you think Social Security will give future generations the same benefits as it is giving to the generations who are now retiring?". The risk averse respondents are more pessimistic; 89% of respondents do not believe that Social Security will give the future generations the same benefits as it is giving to the generations that are retiring now; within the group of risk averse respondents, 83% are of this opinion.

Figure 5.5.

In your opinion, do you think Social Security will give future generations the same benefits it is giving to the generations who are retiring now?

(distribution of responses as per attitude to risk)

Risk averse

Risk neutral or risk prone
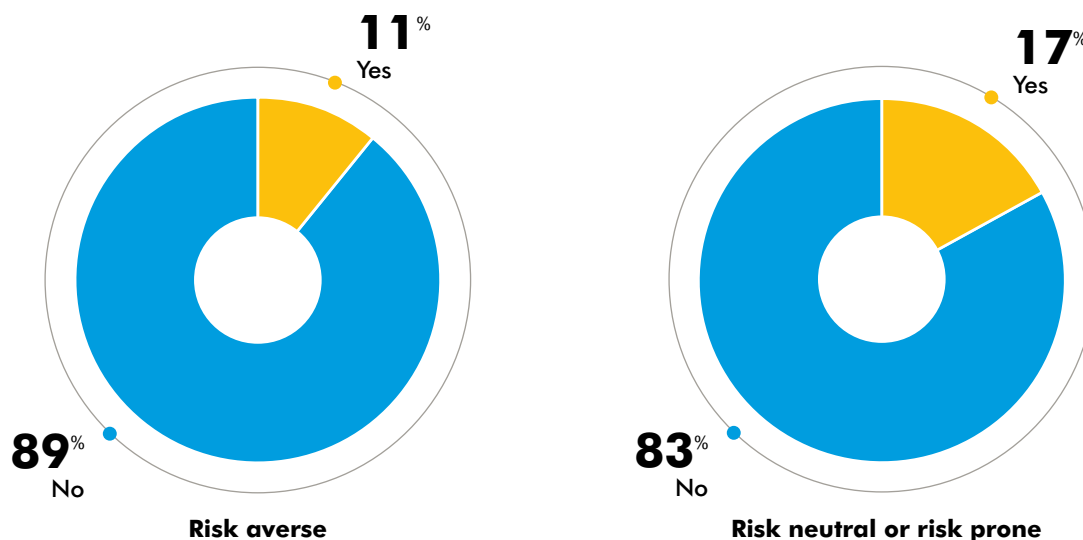
6.

ESTIMATION OF INTERGENERATIONAL PREFERENCES

This chapter presents and analyses the results of the discrete choice experiment (DCE). It starts by setting out the theoretical model of intergenerational social preferences. Then, a description is given of the methodology used and the design of the DCE implemented in the scope of this project. Thirdly, the descriptive results are analysed. Finally, the statistical model and the estimation of the results are presented, highlighting the calculation of the marginal rates of intergenerational replacement.

6.1.
THEORETICAL MODEL OF INTERGENERATIONAL PREFERENCES

Our theoretical reference is that of the behavioural economics theory of social preferences. Whereas the neoclassical economic model assumes that individuals are selfish and concerned exclusively with their well-being, behavioural and experimental economics has shown that a substantial fraction of individuals have preferences of a social nature, that is, are concerned about the resources allocated to other relevant agents (see, for example, Kahneman et al., 1986, Fehr and Fischbacher, 2002, Maximiano et al. 2007, 2013, Charness and Kuhn, 2007). In the context of this project, the "other relevant agents" are understood to be the individuals from other generations. It is also assumed that the individuals can have distributive concerns between different generations, and that their preferences are not exclusively oriented towards their own generation. As such, decision making is seen in the broader context of the maximisation of well-being within a social structure in which the individual has a personal vision of social justice based on their distributive preferences. This theoretical framework is consistent with the distinction made by Nyborg (2000) between *homo economicus*, an individual that maximises his/her personal well-being, and *homo politicus*, an individual that expresses his/her preference for social justice. The existence of the *homo politicus* is vital to the functioning of a democratic society.

Formally, an altruistic individual is understood (Andreoni, 1989, Andreoni and Miller, 1991, Andreoni et al. 2007, Cox et al. 2008) to be one that is unconditionally concerned about other generations, supporting public policies and institutional solutions that maximise the well-being between generations. The "intergenerational utility" function attributes weightings to the utilities of the different generations, and can be represented by the following function:

$$W^i = \alpha_1^i \, U_1 \, (x_1) + \dots + \alpha_j^i \, U_j \, (x_j) + \dots + \alpha_n^i \, U_n \, (x_n)$$

where W^i is the intergenerational utility function of individual i, and U_j is the intergenerational utility" function j, and x_j is the income (or change in income) of the individuals of generation j, and α_j^i are weightings/distributive weights of individual i in relation to generation j.[9]

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[9] The model presented provides the DCE with a theoretical framework. Given that this is based on choices that have an effect only in a given period, the possibility of intertemporal preferences is excluded, that is, a concern about well-being at different points in time.

The weightings are determined by two components: (1) change in the intergenerational prefer-ences when there is a marginal increase in the utility of generation j ($\partial W^i / \partial U_j$); (2) the marginal utility of generation j in relation to the income of this generation ($\partial U_j / \partial x_j$).[10] These two com-ponents can be influenced by the individuals' socioeconomic characteristics, such as income, ethnicity, sex, education, age group.

Different theories of social justice entail different weightings. In a selfish society, where the individuals are solely concerned with the welfare of their own generation, $\alpha_j^i = 0$ for all $j \neq i$ and $\alpha_i^i = 1$. In a utilitarian society, where all generations are equal, $\alpha_i^i = 1$ for all. In a Rawlsian society, individuals maximise the well-being of the poorest generation, that is, $\alpha_i^i \neq 0$ only for the gener-ation in the worst situation in terms of well-being.

Aversion to inequality is another type of social preference in the economic theory of social pref-erences (Fehr and Schmidt, 1999). In these preferences, it is understood that an individual does not like unequal distributions of income. Therefore, in the case of a public measure or institu-tional solution that has redistributive effects, an individual that is averse to inequality prefers a distribution of costs and benefits that mitigates the differences between generations.[11]

6.2.
THE DISCRETE CHOICE EXPERIMENT METHOD APPLIED TO ELICITING INTERGENERATIONAL PREFERENCES

6.2.1. General description of the model

The Discrete Choice Experiment method was used to estimate intergenerational prefer-ences. This is a quantitative technique that originated in the Marketing area, used to evalu-ate the consumer's choice on products with multiple attributes (Earl and Kemp, 1999). Nowadays, the technique is used in many other areas to elicit preferences. In the health area, for example, it can be used to determine the relative importance of a work post's different characteristics for health professionals. The method goes beyond traditional qual-itative evaluations by providing quantitative information that can guide policy makers – for example, when deciding the most suitable strategies to recruit professionals for areas in need. DCEs can also be used to estimate the effect of public policies that have not yet been implemented.

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10 Normalmente, considera-se utilidade marginal decrescente, $(\partial U_j)/(\partial x_j) < 0$, ou seja, atribuir um euro extra a um indivíduo de baixo rendimento tem maior impacto na sua utilidade do que atribuir um euro extra a um indivíduo cujo rendimento é alto.

11 Fehr and Schmidt's (1999) represent the preferences by: $UU_i (x) = x_i - \alpha_i [1/(n-1)] \sum_{j \neq i} max [x_j - x_i, 0] - \alpha_i [1/(n-1)] \sum_{j \neq i} max [x_j - x_i, 0]$, where there are n agents, $x = (x_1,...,x_n)$ is the income vector, and $\alpha_i \geq 0$ and $0 \leq \beta_i \leq 1$ are parameters of the model that measure how far individual i rejects inequality. In the case of inequality, an individual prefers inequality in his/her favour than inequality in favour of the other.

In practice, the decision-maker must make a discrete choice between a set of finite and mutually exclusive alternatives. In general, each alternative represents a good or service that is defined in accordance with different attributes. The objective is to observe the indi-vidual's choice when there are changes in the levels of attributes. Each combination con-structed with the various attributes and associated levels comprises a hypothetical alterna-tive/scenario. The individual should feel they can make switches between scenarios so that their choice maximises utility to the full.

6.2.2. Design of the DCE

Framework

In the context of this project, and to elicit intergenerational preferences, Section B of the survey asks individuals to consider the following hypothesis:

"Imagine the government is thinking of introducing an environmental programme that will imply costs and benefits for the different generations. The benefits involve an increase in income and the costs a reduction in income. In each of the following situations, you will have to choose between implementing programme X, Y or not implementing any programme."

Table 6.1. provides an example of a choice set. The individuals were presented with two environmental programmes, X and Y, that have different distributive effects for the different generations. In other words, some programmes benefit specific generations and are financed by others. In terms of efficiency, the programmes are the same and can be seen as a zero-sum game: what some generations lose, others gain. In addition to these programmes, the respondents can also decide not to implement any programme, that is, to maintain the status quo; in this scenario, the income of each generation will not be subject to any alteration.

The choice experiment was designed in such a way as to simplify the decision. Firstly, the aim was that the respondents focussed on the distribution of intergenerational income and not on the environmental policy *per se*. In light of this objective, it was decided to give the programmes an abstract framework. identifying them only with generic numbers.[12] The number of possible alternatives per choice set was limited to three: two programmes and one alternative in which the current situation is maintained (that is, no programme is adopted). It was decided to include a status quo option so that the respondents were not forced to choose between the two alternatives, which could bias the results. Lastly, the total value of the costs and benefits is zero for all the programmes, which means the implementation of a specific programme implies a redistribution of costs and benefits in relation to the status quo.

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[12] This abstract presentation of the programmes does not stop the respondents making value judgements in the act of choosing and. if this is the case, it will be part of the preferences.

Table 6.1.
Example of a choice set

	Programme 32	Programme 26	w/o environmental programme
Income of generations born after 2000 (now under age of 18)	+500 euros	-500 euros	0 euros
Income of generations born 2000 and 1979 (now aged 18 to 39)	-500 euros	+1500 euros	0 euros
Income of generations born between 1978 and 1954 (now aged between 40 and 64)	+1000 euros	-500 euros	0 euros
Income of generations born before 1954 (now aged 65 or over)	-1000 euros	-500 euros	0 euros

There are two implications to the simplification of the hypothetical scenario that warrant emphasis. Firstly, it is assumed that when making a choice, the individual simultaneously considers the value of an extra unit for a specific generation and the weight of this generation in its well-being function.[13] Secondly, it is assumed that the individual knows about the generations' well-being as regards the status quo, that is, "without an environmental programme".

Attributes and levels

One of the main goals of the Discrete Choice Experiment is to estimate the individuals' predisposition to transferring utility between generations, that is, the marginal rate of intergenerational replacement. As such, four attributes were considered: the income levels of four generations. Table 6.2. presents the attributes and the respective five levels that each attribute can assume.

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[13] This simplification does not permit the separate estimation of the following components underlying the well-being function, $W^i = \alpha_1^i U_1(x_1) + \ldots + \alpha_j^i U_j(x_j) + \ldots + \alpha_n^i U_n(x_n)$: (1) alteration of the intergenerational preferences when there is a marginal increase in the utility of a certain generation j and (2) the marginal utility of generation j in relation to the income of this generation. That is, there is no segmentation between the way in which the respondents rank the different generations in their well-being function and the way in which they evaluate the value of a marginal change in the income of one generation vis-à-vis the other.

Table 6.2.
Attributes and levels used in the DCE

Attributes	Levels (euros)				
Income of generations born after 2000 (now under the age of 18)	-1000	-500	+500	+1000	+1500
Income of generations born between 2000 and 1979 (now aged between 18 and 39)	-1000	-500	+500	+1000	+1500
Income of generations born between 1978 and 1954 (now aged between 40 and 64)	-1000	-500	+500	+1000	+1500
Income of generations born before 1954 (now aged 65 or over)	-1000	-500	+500	+1000	+1500

To ensure that the respondents had fully understood, the impact of the programme was described in terms of income. However, in estimating the model, it was decided to transform income into utility.

Only generations currently living were considered and the number of generations was restricted to a maximum of four. These simplifications aimed to limit the cognitive burden placed on respondents and increase the number of valid responses (Louviere et al. 2000). Moreover, a multiplicity of generations could result in an increase in the choice of the status quo.

The values of the attribute represented a one-off loss or gain, in relation to the status quo, for the individual who represents the group described by the specific characteristic that determines the attribute. The levels of the attributes were described in "Euros" given that the individuals can relate to this metric. The number of levels chosen was defined so as to ensure a balanced design in that the number of possible combinations was not extremely high[14].

The DCE design used in this project was based on Scarborough and Bennett (2008). Notwithstanding, there are fundamental differences in relation to this model. Firstly, more generations are considered in this model and it is not limited to people of specific ages but to society as a whole. Conceptually, the definition of generation also differs. Whereas Scarborough and Bennett understand generation as *age group*, this project defines generation as the period in which the person is born. Secondly, Scarborough and Bennett present the impact of a possible pro-

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14 The DCE pre-test showed there was a sufficient degree of variation in the level of attributes to be significant for the respondents.

gramme to the respondents in terms of utility rather than income because it was thought that respondents would find it difficult to understand the concept of utility, even in face-to-face interviews (the surveys were not conducted in person in Scarborough and Bennett). Finally, for simplification purposes and to reduce the cognitive burden on respondents, the sum of the value of attributes in all the alternatives in this project is zero, that is the effects of the programme are only redistributive.

Construction of the choice sets

The definition of the attributes and respective levels was followed by the construction of the choice sets. Having chosen the number of attributes and levels, the number of possible scenarios is $5^4 = 625$. As two programmes were considered in each choice set, the possible number of choice sets (full factorial design) is extremely high, that is (625×624)/2. Therefore, a fractional factorial design was adopted to reduce the number of choice sets presented to the respondents.

The design used guaranteed the identification of the preferences for all the scenarios. To assure the optimisation of the design, the following properties needed to be verified: (1) **Orthogonality**: the difference in the levels of each attribute should vary independently in the choice sets; (2) **Equilibrium in the levels**: each level of attributes should appear approximately the same number of times, assuring that all the levels have the same probability of being chosen; and (3) **Minimal overlapping**: the levels should not be repeated in a choice set. It may be necessary to sacrifice some level of orthogonality to assure statistical efficiency, that is, the minimum variation around the estimations of parameters, minimising the estimated standard errors.[15] The design's statistical efficiency was assured by using the *dcreate* module in STATA. Twenty-five choice sets were created that guaranteed the most important properties of the full factorial design. Each respondent answered just 5 blocks.

6.3.
DESCRIPTIVE RESULTS

Some results of the descriptive analysis of the choice sets are presented before proceeding to the analysis of the statistical model. Three possible universes are considered for the data: (1) the number of respondents, equal to 801; (2) the number of choices made, equal to 4005 (the 801 respondents made 5 choices each); (3) the total number of possible choices, equal to 12015 (The 801 respondents made 5 choices and there were three alternatives for each choice).

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15 Statistical efficiency is defined as D-efficiency, and minimises the geometric average of the eigenvalues of the covariance matrix.

Maintaining the status-quo

The choice of the status quo option ("without a programme") is an important point of the analysis. The respondents may choose to maintain the status quo for various reasons. Firstly, they may simply consider the other alternatives difficult in cognitive terms. Secondly, the choice of the status quo may be a protest choice if the respondents have any objection to the choice sets. Thirdly, the choice of the status quo may reflect a bias caused by an aversion to loss (Kahneman and Tversky, 1979). More specifically, the individuals maintain the status quo because they understand the implicit disadvantages of the other alternative and they weight these more heavily than the advantages (Salmuelson and Zechhouser, 1988). Lastly, the choice of the status quo may reflect an aversion to inequality (Fehr and Schmidt, 1999), given that this choice is apparently more egalitarian. However, it should be noted that the individuals' point of reference is not known and depends on the evaluation each of them makes of the well-being of the other generations before the implementation of any policy.

From the 4005 choices made,[16] 1053 indicated the status quo (26.3%). Two hundred and ninety respondents chose the "without a programme" option at least once. Table 6.3. shows the percentage of people that chose this option in choice sets 1, 2, 3 4 and 5. The percentage of choices for the status quo in choice set 3 (30.1%) is slightly higher than the average (26.3%). This difference may be due to the fact that some people decided to choose "without programme" in the middle of the process just to do something different. They may also have felt the need for a break in the cognitive process of comparing programmes. The percentage of individuals who chose the "without programme" option was slightly higher than average in choice set 5 (28.8%), which may be indicative of tiredness in the case of some respondents.

Table 6.3.
**Number and percentage of persons
who chose the "Without programme" alternative**

Choice set	Number (a)	Percentage (a/801)
Choice 1	180	22,5%
Choice 2	201	25,1%
Choice 3	241	30,1%
Choice 4	200	25,0%
Choice 5	231	28,8%
		100%

16 The 801 respondents made 5 choices each. In total, we have 4005 complete choice sets.

Figure 6.1 shows the frequency with which the respondents chose the status quo. Of the 290 individuals who chose the status quo at least once, the majority (157, that is, 54.1%) did so always, while 19.3% did so only once.[17]

Figure 6.1.
Frequency of the choice of status-quo
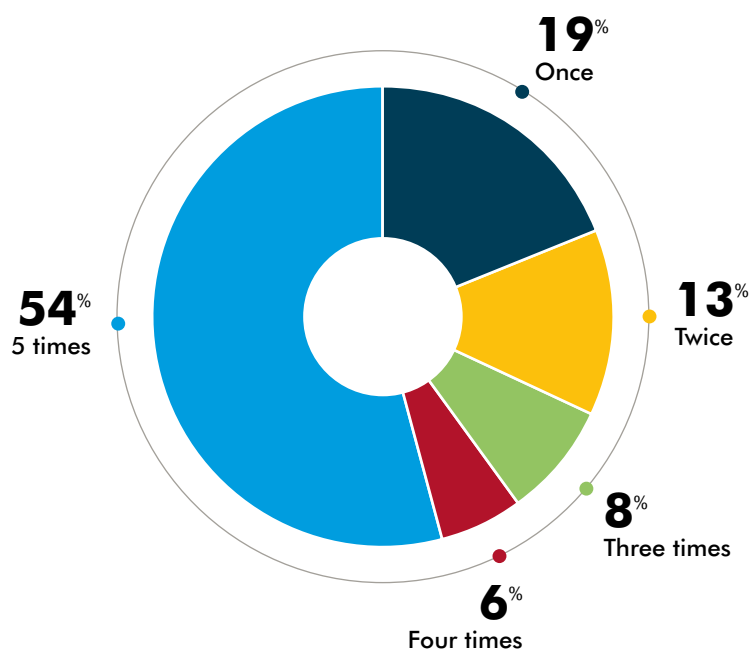
As already referred above, the choice of the status quo could result simply from the respondents' cognitive inability to compare programmes. If this is the case, the older respondents – who have on average a lower level of education - would have a higher percentage of the "without programme" option. To test this, an analysis was made of the percentage difference in the choice of the "without programme" option between the generations surveyed (Table 6.4.). It was concluded there were no statistically significant differences.

Lastly, it is important to note that there were no significant differences between the respondents who chose or not to maintain the status-quo and the concern expressed for the well-being of other present and future generations in Section A of the survey.

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17 157 respondents represent 19.6% of the total sample. For 19.6%, there was no change in choice.

Table 6.4.
Percentage of choices of the "Without programme" alternative by generation

Respondents born	Percentage
Between 2000 and 1979	25,6%
Between 1978 and 1954	26,1%
Before 1954	27,7%

Who reaps the benefits and who bears the costs?

Choosing to implement a programme has redistributive effects: while some generations carry the costs, others reap the benefits. The following analysis permits an assessment of the respondents' preferences with regards the intergenerational distribution of the costs and the benefits.

Figure 6.2. presents the percentage of choices made by the respondents that imply costs or benefits for the different generations. First, we find a balance in the distribution of costs and benefits for the different generations. This balance is more marked for the generations born after 1979. Secondly, the respondents show a preference for the programmes that affect the costs more than the benefits of the generations born between 1978 and 1954 (now aged between 40 and 64 years). A test of proportions reveals that the percentages for the generations born between 1978 and 1954 are significatively different (z = 3.735, p-value = 0.000). Thirdly, the respondents demonstrate a preference for programmes that affect the benefits more than the costs of the generations born before 1954 (now aged 65 or over). A new test of proportions shows that the percentages for the generations born after 1954 are also significantly different (z = -4.53, p-value = 0.000).

Figure 6.2.
**Percentage of choices that imply costs or benefits
for the different generations**
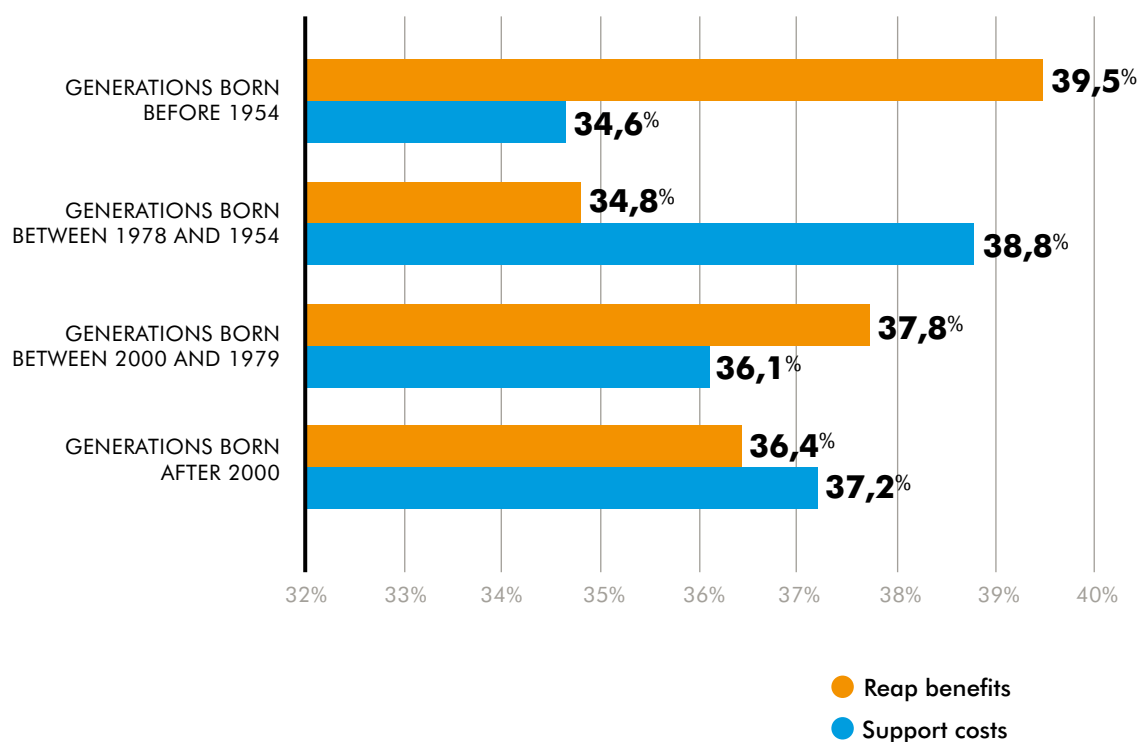
If the respondents were selfish from the intergenerational standpoint, they would tend to choose programmes that benefited their own generation more, that is, programmes that imply a positive transfer to their own generation.[18] Figure 6.3. shows the percentage of choices that imply costs or benefits for the respondent's own generation. The respondents from generations born between 1978 and 1954 (now aged between 40 and 64 years) choose programmes that can benefit them financially just as much as those that could be prejudicial, showing a considerable level of altruism. On the other hand, a higher percentage of respondents born between 2000 and 1979 (now aged between 18 and 39 years) and those from generations born before 1954 (now aged 65 or over) tend to choose programmes to their benefit. In particular, the generation currently over the age of 65 benefited financially from 43.3% of the choices they made. This percentage goes up to 49.7% if we only consider the respondents from these generations without children.

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18 In the case of both programmes implying costs for their generation, in one choice set, they tend to choose the status-quo.

Figure 6.3.
Percentage of choices that benefit or prejudice the respondents

RESPONDENTS OF GENERATIONS BORN BEFORE 1954	43,3% / 30,2%
RESPONDENTS OF GENERATIONS BORN BETWEEN 1978 AND 1954	37,5% / 36,5%
RESPONDENTS DE GENERATIONS BORN BETWEEN 2000 AND 1979	42,6% / 32,6%

● Own generation reaps benefits
● Own generation supports costs
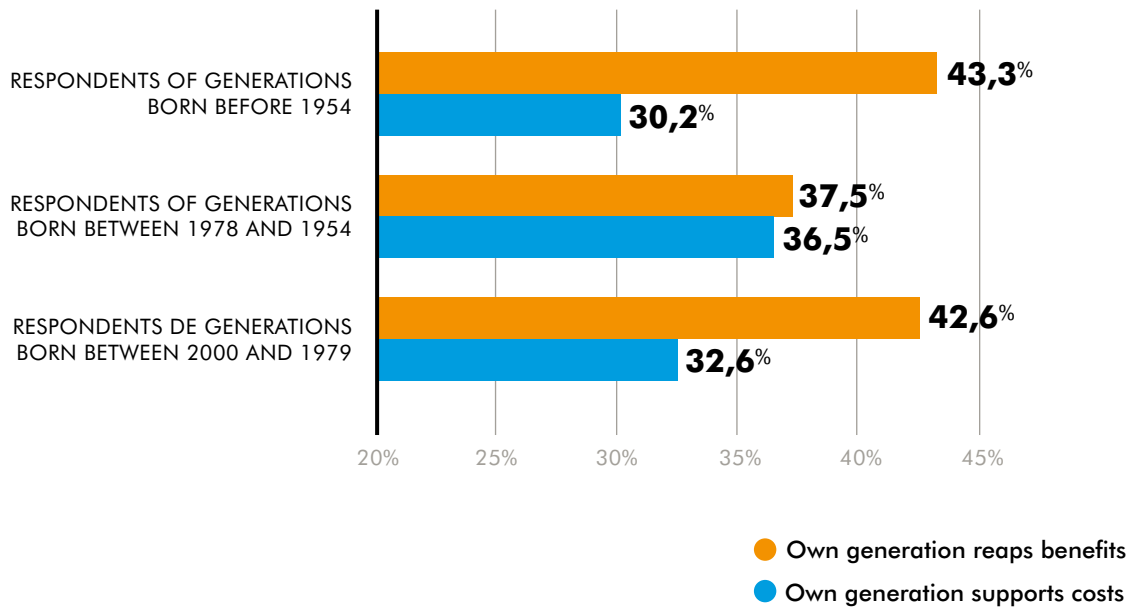
Note: The choices that benefit or prejudice the generations born after 2000 are not contemplated in this figure as individuals under the age of 18 were not surveyed.

6.4.
ESTIMATION OF THE INTERGENERATIONAL PREFERENCES MODEL

6.4.1. The model equations

The discrete choice model is based on the **stochastic utility theory** which permits the estimation of preference models on the basis of the choices expressed (see Appendix B which presents an overview of this theory and also its application to DCE). The stochastic utility theory assumes that each alternative has a utility to the decision-maker and that the set of decisions includes a range of preferences.

It was assumed that the individuals have a function of intergenerational well-being that attributes weightings to the utilities of the different generations (see section 6.1). As such, the well-being function of individual i for alternative A (Programme A) may be expressed in accordance with the individual's attributes and sociodemographic characteristics:

$$W_A{}^i = \beta_0 D + \beta_{G1}{}^A V(X)_{G1}{}^A + \beta_{G2}{}^A V(X)_{G2}{}^A + \beta_{G3}{}^A V(X)_{G3}{}^A + \beta_{G4}{}^A V(X)^A{}_{G4\_1} + \delta_1 D \times Z^i, \text{ where}$$

$W_A{}^i$: well-being function of individual i if he/she chooses to implement Programme A

$\beta_0 D$: alternative-specific constant. D=0 for status quo and D=1 for an alternative other than the status-quo. It estimates the change in well-being in the case of a choice other than the status quo[19]

$V(X)_G{}^A$: utility of the individuals from generation "G" if Programme A is implemented

Z^i: sociodemographic characteristics of individual i[20]

$G1$: represents individuals from generations born after 2000 (now under the age of 18)

$G2$: represents individuals from generations born between 2000 and 1979 (now aged between 18 and 39 years)

$G3$: represents individuals from generations born between 1978 and 1954 (now aged between 40 and 64 years)

$G4$: represents individuals from generations born before 1954 (now aged 65 or over)

The βs coefficients indicate the marginal changes in the well-being of individual i caused by a change in the utility of a given generation. The overriding aim of the estimation of this model is to calculate the marginal rates of intergenerational replacement. The MRIR is estimated through the ratio:

$$MRIR{}^i{}_{AG1/G2} = -\beta_{G1}{}^{iA} / \beta_{G2}{}^{iA}$$

If individual i chooses to implement programme A, the marginal rate of intergenerational replacement indicates the extent to which the individual is willing to reduce the utility of the generations born after 2000 (G1) to increase by one unit the utility of the generations born between 2000 and 1979 (G2). Specifically, if:

$| MRIR{}^i{}_{AG1/G2} | = 1$, the generations born after 2000 and the generations born between 2000 and 1979 have the same weight in the well-being function of individual i.

$| MRIR{}^i{}_{AG1/G2} | > 1$, the generations born after 2000 have a greater weight than the generations born between 2000 and1979 in the well-being function of individual i.

$| MRIR{}^i{}_{AG1/G2} | < 1$, the generations born after 2000 have less weight than the generations born between 2000 and 1979 in the well-being function of individual i.

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19 $\beta_0 D$ contain the systematic change in choices that cannot be explained either by the attributes or the sociodemographic characteristics of the respondents (Bennett and Blamey, 2001).

20 The sociodemographic characteristics do not vary with the choice and are therefore multiplied by D.

Utility versus Income

The model used assumes that the individuals' well-being function depends on the utility of the various generations. However, in the survey, the attributes consist of the generations' income and not their utility. Moreover, as the impact of the programmes with regards income can be either positive or negative, the individuals may have varying reactions to these changes if they are averse to risk. A non-linear transformation of the attributes will be performed to incorporate both aversion to risk and aversion to loss. To this end, the value function (utility) proposed by Kahneman & Tversky (1979) will be considered:

$$V(X) = \begin{cases} X^{1-r}, & X \geq 0 \\ -\lambda(-X)^{1-r} & X < 0 \end{cases}$$

Where X represents income, r is the risk aversion parameter and λ is the parameter for the aversion to loss. The risk coefficient considered was estimated for the average of the population, which was equal to 0.429 (see Chapter 5). The loss aversion coefficient is assumed to be between 1.5 and 2.25, which is consistent with the estimations obtained in various studies.[21]

6.4.2. Results

Table 6.5. (column 2) presents the estimates of the coefficients of the model for the attributes of the respondents' well-being function, that is, the utility for the different generations[22]. Table C2 in Appendix C also presents the estimates for the sociodemographic variables, as well as the remaining statistics of the model.

The results show that, in general, the respondents are not focussed exclusively on their own utility, but that the utility of each generation contributes positively to their well-being. All the attributes are statistically significant. The fact that the standard deviation is also statistically significant indicates heterogeneity in the preferences in relation to attributes.

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[21] Kahneman & Tversky (1992) estimate that the level of aversion to loss is 2.25. However, authors have obtained lower estimates: Schmidt and Traub (2002), 1.43; Pennings and Smidts (2003), 1.81; Booij and van de Kuilen (2006), 1.74-1.79

[22] The value function presented in chapter 5 was considered, com $\lambda=2$. Robustness tests were conducted with $\lambda=1.5$ and $\lambda=2.25$. The results changed significantly.

Table 6.5.
Estimation of the coefficients, Mixed Logit Model

	Coefficient	$\varnothing(\beta/\delta)* 100$
Average (β)		
Utility of generations born after 2000	**0,0038*****	62,4%
Utility of generations born between 2000 and 1979	**0,0047*****	69,7%
Utility of generations born between 1978 and 1954	**0,0037****	63,6%
Utility of generations born before 1954	**0,0058*****	68,1%
Standard deviation (δ)		
Utility of generations born after 2000	0.0120***	
Utility of generations born between 2000 and 1979	0.0091***	
Utility of generations born between 1978 and 1954	0.0106***	
Utility of generations born before 1954	0.0123***	
Nr. observations	12015	

Note: * Significance at 10%; ** Significance at 5%; *** Significance at 1%

Assuming a normal distribution for the attributes, the calculation was made for the proportion of respondents for whom an attribute has a positive impact on the choice of a programme that is not the status quo. The results are set out in column 3 of Table 6.5. For example, for 68.1% of the respondents, the utility of generations born before 1954, that is, those now aged 65 or over, positively influenced the choice of implementing an environmental programme with redistributive effects.

To assess the intergenerational preferences, more specifically, the weight of each generation in the respondents' well-being function, the marginal replacement rate was calculated; this consists of the ratio of the coefficients estimated (see section 6.4). Table 6.6. shows these values and the respective confidence intervals are set out in Table C3 of Appendix C. Three conclusions can be drawn from this. Firstly, there is a clear preference for the generations born before 1954 (those now aged 65 or over), given that the ratio of the well-being parameters is greater than 1 for these generations vis-à-vis any others. Secondly, there is a preference for the generations born between 2000 and 1979 (those now aged between 18 and 39s) vis-à-vis the generations born between 1978 and 1954 (now aged between 40 and 64 years), and those born after 2000 (now under 18 years of age). Finally, the respondents demonstrate a preference for the genera-

tions born after 2000 vis-à-vis those born between 1978 and 1954. In short, these results imply the following ranking of preferences:

1st: generations of those born after 1954
2nd: generations born between 2000 and 1979
3rd: generations born after 2000
4th: generations born between 1978 and 1954

The results presented result from the estimation of a model that includes a series of demographic variables; more specifically: parenthood (have or do not have children), the number of dependent children, have or do not have grandchildren, age, sex, education and region (coast or interior).[23] Table C1 in Appendix C presents the variables in detail and Table C2 sets out the estimates of the respective coefficients and their statistical significance. It was found that having children and dependent children, having grandchildren, and also living on the coast influence the distribution of the respondents' intergenerational preferences, but that sex, age and education are not statistically significant. To gain a clearer understanding of the influence of the demographic characteristics, a model was estimated that includes the interactions between the sociodemographic variables and the attributes (utilities of the generations). Special emphasis goes to the interaction between age and the utility of generations born between 1978 and 2000. The negative coefficient indicates that the older the respondents, the less the weight given to these generations. It is also found that having more dependent children contributes negatively to the concern about older generations, specifically those now over 65 years of age.

Table 6.6.
Marginal Replacement Rate (MRR)

	MRR
(Utility of generations born between 2000 and 1979) / (Utility of generations born after 2000)	-1,249
(Utility of generations born between 1978 and 1954) / (Utility of generations born after 2000)	-0,980
(Utility of generations born before 1954) / (Utility of generations born after 2000)	-1,529
(Utility of generations born between 1978 and 1954) / (Utility of generations born between 2000 and 1979)	-0,790
(Utility of generations born before 1954) / (Utility of generations born between 2000 and 1979)	-1,234
(Utility of generations born before 1954) / (Utility of generations born between 1978 and 1954)	-1,561

23 Models with income as the explanatory variable were also estimated, but the results are not statistically different from those presented here. However, as a high percentage of respondents, 43.2%, preferred not to reveal their income, preference was given to presenting the results of a model that uses the information about all the respondents.

The intergenerational preferences for the different generations is the next subject of analysis. To that end, separate models are estimated for each generation. The full results of these estimations are presented in Tables C4-C6 of Appendix C. Table 6.7 summarises the estimates for the attributes and Table 6.8. presents the percentage of respondents for whom an attribute has a positive (or negative) impact on the choice of a programme, not the status quo[24].

For the generations of those born between 1979 and 2000 and between 1954 and 1978, that is, for all those now under the age of 65, the coefficients are positive, indicating that the well-being of the different generations contributes to the well-being of these respondents. However, it should be noted that the utility of generations born between 1978 and 1954 is not statistically significant for the generations born between 1979 and 2000. The generations born between 1954 and 1978 are concerned above all about the utility of those born in this generation and about the utility of generations born before 1954. The generations of those born after 1954 have significantly different intergenerational preferences. The older respondents among those born after 1954 show a strong bias towards their own well-being. In effect, the fact that the coefficient for the utility of the other generations is negative for these respondents implies that they perceive the increase in the well-being of the remaining generations as a threat to their own well-being; instead, they prefer not to implement any programme with redistributive effects. These results can be confirmed by the percentage of respondents for whom the utility of the various generations has a positive or negative impact (if the coefficient is negative) on the choice of implementing a programme other than the status quo (Table 6.8).

Table 6.7.
Estimation of the coefficients, Mixed Logit Model

	Born between 2000 and 1979	Born between 1978 and 1954	Born before 1954
Average (β)			
Utility of generations born after 2000	**0,0069***	0,0034	**-0,0015***
Utility of generations born between 2000 and 1979	**0,0096***	0,0028	**-0,0006***
Utility of generations born between 1978 and 1954	0,0046	**0,0049**	**-0,0018***
Utility of generations born before 1954	**0,0062***	**0,0049**	**0,0063***

24 If the coefficient β is positive, the impact is positive; if the coefficient is negative, the impact is negative.

Standard deviation (δ)			
Utility of generations born after 2000	0,0104***	0,0110***	0,0115***
Utility of generations born between 2000 and 1979	0,0088***	0,0085***	0,0051**
Utility of generations born between 1978 and 1954	0,0108***	0,0105***	0,0040
Utility of generations born before 1954	0,0100***	0,0104***	0,0169***
Nr. observations	4110	5205	2700

Nota: * Significance at 10%; ** Significance at 5%; *** Significance at 1%

Table 6.8.
Proportion of respondents for whom the attributes have a positive (negative) impact on the choice of programme $\phi(\beta/\delta)* 100$

	Born between 2000 and 1979	Born between 1978 and 1954	Born before 1954
Utility of generations born after 2000	74,7%	62,1%	44,8% (-)
Utility of generations born between 2000 and 1979	**86,2%**	62,9%	45,3% (-)
Utility of generations born between 1978 and 1954	66,5%	**68,0%**	32,6% (-)
Utility of generations born before 1954	72,2%	68,1%	**64,5%**

The marginal replacement rate was calculated for the different generations. The results can be found in Appendix C, Tables C7-C9. The analysis of these tables allows us to rank the intergenerational preferences of each generation; this is presented below in Table 6.9. Some conclusions should be highlighted. Firstly, the respondents are concerned about their own generation. Secondly, the younger generations, born after 2000, do not seem to be a priority for the respondents from the older generations. Thirdly, the well-being of generations born between 1954 and 1978 is the least relevant for the generations born between 1979 and 2000, and it is even more negative for the well-being of generations born before 1954. Lastly, the generations born between 1954 and 1978 are the most concerned about the generations now aged 65 or over.

Table 6.9.
Ranking of intergenerational preferences

	Born between 2000 and 1979	Born between 1978 and 1954	Born before 1954
Utility of generations born after 2000	2°	3°	3° (-)
Utility of generations born between 2000 and 1979	**1°**	4°	2° (-)
Utility of generations born between 1978 and 1954	4°	**1°**	4° (-)
Utility of generations born before 1954	3°	2°	**1°**

In relation to the sociodemographic variables, it is found that having children, the number of dependent children, the sex and the region are statistically significant to the distribution of preferences of generations born between 1979 and 2000. For the generations born between 1954 and 1978, the number of dependent children, having grandchildren, sex, age and region are the significant sociodemographic variables. Lastly, for the generation born before 1954, having children, having grandchildren, age and region have an impact on their intergenerational preferences.

7.
CONCLUSION

How fair is the Portuguese society from the intergenerational standpoint? Are citizens aware of intergenerational imbalances? What do they think about the policy makers' concern with defending the interests of the present and future generations? Which budgetary measures for synchronic redistribution and which diachronic institutional solutions affecting the various present and future generations are citizens willing to accept to correct eventual imbalances between generations?

These questions were answered in a face to face survey that included a section with multiple choice questions on intergenerational justice, as well as a discrete choice experiment to measure intergenerational preferences in a disclosed and undeclared manner and which is an experimental method for measuring preferences in the face of risk.

While the results are interesting, they are also somewhat disconcerting.

The respondents' perception of policy makers' concern about defending the current and future generations is generally negative. When this concern is quantified, we find that respondents believe that policy makers' concern, in the respondents' opinion, is 61.2% of their own intergenerational concern. Although a large majority of respondents state they have a high level of intergenerational concern and that they defend the interests of future generations, this concern is found to be more theoretical than real when respondents are asked to consider the implementation of some public policies that would guarantee the same quality of life for future generations as for the present generations.

There is some acceptance of the implementation of diachronic policies related to public debt and restricting privatisations, but little receptiveness to synchronic measures at the budgetary level, which directly affect the respondents' income, namely through increased taxes. In addition, although 77% of the respondents think that each generation should transfer more resources than they received from the previous generation, when faced with public policy proposals with redistributive consequences, the majority would prefer future generations to learn to live with fewer resources.

The results of the survey also reveal a bias in favour of the generation that was born after 1954. In general, the respondents think that policy makers do not defend the interests of these generations sufficiently. This result is rather worrying and comes in contrast to the growing proportion of public expenditure directed towards the older generations due to the ageing of the population in most developed countries. This bias in favour of the generations born before 1954 is confirmed by the analysis of the discrete choice experiment.

Notwithstanding, the estimated model showed that although the respondents are concerned primarily with their own generation, they are not completely selfish. In general, the utility of each generation contributes positively to the well-being of the respondents. In particular, we observed the following ranking of preferences: first, a preference for the well-being of generations born before 1954 (those now over 65 years of age); second. a preference for the well-being of generations born between 1979 and 2000 (those now aged between 18 and 39); third, for the well-being of generations born after 2000 (those now under the age of 18); and, lastly, for the well-being of generations born between 1954 and 1978.

When the estimated model was analysed separately for each generational group, it was found that the proximity between generations is important to intergenerational preferences. More specifically, the generations born between 1979 and 2000 exhibit a stronger preference for the utility of generations born after 2000, while the generations born between 1954 and 1978 show a stronger preference for the generations born before 1954.

It should be noted that the respondents born before 1954 have quite selfish preferences. In their well-being function, the well-being of other generations appears with a negative sign, which indicates that an increase in the income of the respondents from other generations has a negative effect on the well-being of the respondents aged over 65. In the context of the discrete choice experiment, this means that, in most cases, whenever the other generations present positive changes in income, the respondents favour maintaining the status quo and not implementing any programme with redistributive effects.

Lastly, in addition to providing a picture of intergenerational preferences for a representative sample of the population of Continental Portugal, this project also shows the importance of applying methods that go beyond direct questions on intergenerational preferences. It is necessary to ask questions about public policies and possible institutional solutions, as well as to use methods that disclose preferences without simply asking citizens about their level of concern for others. Asking direct questions, above all in circumstances where the respondents want to transmit a good image of themselves, can lead to biased results and paint a picture of intergenerational justice that does not correspond with reality.

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APPENDIX A

Survey of Intergenerational Conceptions and Preferences

SECTION A

EXPLANATORY NOTE: These two questions on the characterisation of the respondent should be answered at the very beginning as this will help the interviewer conduct a more personalised interview after explaining the concept of generation to the respondent, e.g. the generation of their children, grandchildren, parents, grandparents.

D4 - Age: _____ **THIS MUST BE AN OPEN QUESTION**

A0 - Do you have children and/or grandchildren?	
Yes, just children	1
Yes, children and grandchildren	2
No	3

A1 - In your opinion, on a scale of 1 to 10, how do you evaluate the policy makers' concern with defending the interests of <u>your</u> generation?
(SHOW SCREEN WITH SCALE. ONE ANSWER ONLY)

1 2 3 4 5 6 7 8 9 10
Little   **Much**

A2 - In your opinion, on a scale from 1 (little) to 10 (much), how do you evaluate the policy makers' concern with defending the interests of the following generations:
(SHOW SCREEN WITH SCALE. ONE ANSWER ONLY)

The generation born after 2000 (currently under the age of 18)	1 2 3 4 5 6 7 8 9 10
The generation born between 2000 and 1979 (now aged between 18 and 39)	1 2 3 4 5 6 7 8 9 10
The generation born between 1978 and 1954 (now aged between 40 and 64)	1 2 3 4 5 6 7 8 9 10
The generation born before 1954 (now aged 65 or over)	1 2 3 4 5 6 7 8 9 10

A3 - On a scale of 1 to 10, quantify <u>your concern</u> about the well-being of generations <u>not yet born</u>
(SHOW SCREEN WITH SCALE. ONE ANSWER ONLY)

1	2	3	4	5	6	7	8	9	10
Little									**Much**

A4 - In your opinion, on a scale of 1 to 10, how do you evaluate <u>the concern of policy makers</u> with defending the interests of the generations <u>not yet born</u>?
(SHOW SCREEN WITH SCALE. ONE ANSWER ONLY)

1	2	3	4	5	6	7	8	9	10
Little									**Much**

A5 - Suppose a programme is set up to protect the interests of future generations. Imagine that 100 points are attributed to it and that you can distribute them across the following areas. How many points would you attribute to each one?
(READ. THE SUM OF THE AREAS MUST TOTAL 100 POINTS)

Education	
Emigration	
Immigration	
Defence	
Natural resources	
Climate	
Employment	
Public expenditure and public debt	

A6 - In your opinion, each generation should transfer to the future generation...
(READ. ONE ANSWER ONLY)

The same resources as it received from the previous generation	1
More resources than it received from the previous generation	2
Fewer resources than it received from the previous generation	3

A7 - Do you think that the lives of people born after 1983 (those now aged UNDER 35), relative to what their parents had, are now economically...
(LER. ONE ANSWER ONLY)

Better	1
The same	2
Worse	3

A8 - Do you think that the lives of people born after 1983 (those now aged UNDER 35) relative to previous generations, can now find a job that is...
(READ. ONE ANSWER ONLY)

More stable	1
The same in terms of stability	2
Less stable	3

A9 - Do you think that people born after 1983 (those now aged UNDER 35), relative to previous generations, find buying a house ...
(READ. ONE ANSWER ONLY)

Easier	1
The same	2
Not so easy	3

A10 - Say how far you agree or disagree with the following statements:
In order to have a sustainable environment for the future generations (for those not yet born), it is necessary...
(READ. ONE ANSWER ONLY PER STATEMENT)

To close polluting industries even if it implies fewer jobs	Totally disagree -1 Disagree - 2 Neither disagree, nor agree - 3 Agree - 4 Totally agree - 5
To impose more tariffs and taxes on the present generations so as to restrict consumer goods and the use of non-renewable energies	Totally disagree - 1 Disagree - 2 Neither disagree, nor agree - 3 Agree - 4 Totally agree - 5
To increase taxes to invest in new technologies that guarantee future generations at least the same environment as present generations	Totally disagree - 1 Disagree - 2 Neither disagree, nor agree - 3 Agree - 4 Totally agree - 5
That the future generations should live with fewer and use fewer resources and less energy	Totally disagree - 1 Disagree - 2 Neither disagree, nor agree - 3 Agree - 4 Totally agree - 5

A11 - In your opinion, the interests of those under the age of 18, and also of future generations, are taken into account in the Portuguese political process?
(READ. ONE ANSWER ONLY)

Always	1
Often	2
Occasionally	3
Rarely	4
Never	5

A12 - Say how far you agree or disagree with the following statement:
Limits should be placed on public indebtedness so that we do not leave future generation too heavy a burden
(READ. ONE ANSWER ONLY)

Totally agree	1
Agree	2
Neither agree nor disagree	3
Disagree	4
Totally disagree	5

A13 - Do you think inheritances should be taxed so as to create a fund to be used for future generations?
(READ. ONE ANSWER ONLY)

Yes, all	1
Depends on the level of wealth of the recipient	2
Depends on the amount of the inheritance	3
No	4

A14 - How far do you agree with the following statement? *The State should not privatise heritage (water, oil, cultural buildings...) to finance the spending of today because this will mean future generations are left with no assets.*
(READ. ONE ANSWER ONLY)

Totally agree	1
Agree	2
Neither agree nor disagree	3
Disagree	4
Totally disagree	5

A15 - In your opinion, should there be a state organism that defends the interests of future generations?
(READ. ONE ANSWER ONLY)

Yes	1
Maybe	2
No	3

A16 - In your opinion, what should the minimum voting age be?
(READ. ONE ANSWER ONLY)

14 years	1
15 years	2
16 years	3
17 years	4
18 years	5
19 years	6
20 years	7
21 years	8
Over 21 years	9

A17 - In your opinion, should parents have an additional vote for each child under the age of 18?
(READ. ONE ANSWER ONLY)

Yes	1
Yes, but only on certain matters	2
No	3

A18 - Suppose there is a referendum on a matter that will have an impact in 25 years, do you think everyone should be able to vote in that referendum?
(READ. ONE ANSWER ONLY)

Yes, on all matters	1
Yes, on some matters	2
No, only people who will be affected by the referendum	3

A19 - In your opinion, do you think that Social Security will give future generations the same benefits as it is giving people who are now retiring?

Yes	1
No	2

A20 - Do you think one can expect to buy a house on the basis of what one earns?

Yes	1
No	2

A21 - In your opinion, in Portugal, how important is seniority and merit in career progression?
(READ. ONE ANSWER ONLY)

Career progression depends only on seniority	1
Career progression depends a lot on seniority and little on merit	2
Career progression depends equally on seniority and merit	3
Career progression depends a lot on merit and little on seniority	4
Career progression depends only on merit	5

SECTION B
DISCRETE CHOICE EXPERIMENT

Example of a Choice Set

Choice 1

	Programme 5	Programme 37	W/O environmental programme
Income of generations born after 2000 (those now under the age of 18)	-1000 euros	+1000 euros	0 euros
Income of generations born between 2000 and 1979 (those now aged between 18 and 39)	-500 euros	-1000 euros	0 euros
Income of generations between 1978 and 1954 (now aged between 40 and 64 years)	+1000 euros	-1000 euros	0 euros
Income of generations born before 1954 (now aged 65 or over)	+500 euros	+1000 euros	0 euros

SECTION C
MEASUREMENT OF PREFERENCES IN THE FACE OF RISK

In this part of the survey, you can win a shopping voucher; the value of the voucher will depend on the choices you make. You will have to make **10 choices (decisions)**. From the choices you make, one will be chosen at random; if your survey is selected, <u>you will receive a voucher for an amount in the range corresponding to your choice. This amount depends of the probabilities of the decision that was selected</u>. 1 in 40 surveys is selected! It could be yours!

The choices/decisions are simple and consist of **choosing between two OPTIONS: option A and option B**. In option A, you can win either 40 euros or 32 euros, and in option B you can win either 77 euros or 2 euros.

It is the probability of winning the highest amount and lowest amount in each of the options that changes in each choice/decision. In other words, in choice 1 there is a 10% probability of winning 40 euros if you choose option A and 90% probability of winning 32 euros if you choose option A, and 10% probability of winning 77 euros and 90% probability of winning 2 euros if you choose option B.

In decision 2, there is 20% probability of winning 40 euros and 80% probability of winning 32 euros if you choose option A, and 20% probability of winning 77 euros and 80% probability of winning 2 euros if you choose option B.

After making your 10 choices, one of the decisions is randomly chosen in front of you. One in every 40 surveys will be chosen and the respondent will receive the amount in accordance with the choice he/she made.

	Lottery A	Lottery B
Decision 1	10% probability of winning 40€ and 90% probability of winning 32€	10% probability of winning 77€ and 90% probability of winning 2€
Decision 2	20% probability of winning 40€ and 80% probability of winning 32€	20% probability of winning 77€ and 80% probability of winning 2€
Decision 3	30% probability of winning 40€ and 70% probability of winning 32€	30% probability of winning 77€ and 70% probability of winning 2€
Decision 4	40% probability of winning 40€ and 60% probability of winning 32€	40% probability of winning 77€ and 60% probability of winning 2€
Decision 5	50% probability of winning 40€ and 50% probability of winning 32€	50% probability of winning 77€ and 50% probability of winning 2€
Decision 6	60% probability of winning 40€ and 40% probability of winning 32€	60% probability of winning 77€ and 40% probability of winning 2€
Decision 7	70% probability of winning 40€ and 30% probability of winning 32€	70% probability of winning 77€ and 30% probability of winning 2€
Decision 8	80% probability of winning 40€ and 20% probability of winning 32€	80% probability of winning 77€ and 20% probability of winning 2€
Decision 9	90% probability of winning 40€ and 10% probability of winning 32€	90% probability of winning 77€ and 10% probability of winning 2€
Decision 10	100% probability of winning 40€	100% probability of winning 77 €

SECTION D
PROFILE OF THE RESPONDENT

Lastly, we will collect some demographic data:

D1.0 - Region (to be registered automatically by the interviewer)	
North Coast	1
Greater Porto	2
Interior	3
Centre Coast	4
Greater Lisbon	5
Alentejo	6
Algarve	7

D1.1 - Area (to be registered internally)	
Interior	1
Coast	2

D2 - Council/Borough (to be registered automatically by the interviewer)
Council:
Borough:

D2.1 - Size of Locality (to be registered by the interviewer)	
Less than 2000 inhabitants	1
From 2000 to 9999 inhabitants	2
From 10,000 to 99,999 inhabitants	3
100,000 inhabitants or more	4
Lisbon city	5
Porto city	6

D3 - Sex (to be registered by the interviewer)	
Female	1
Male	2

D5 - What is your level of education?	
Without primary education	1
Primary education (current 4th year)	2
Basic education (current 9th year)	3
High school education (current 12th year)	4
Bachelor's degree	5
Master's/PhD	6
No answer (DO NOT READ)	0

D6 - What is your employment or occupational situation?	
Active – Employed by a third party	1
Active – Self-employed	2
Active – Employed by third party and self-employed	3
Active – Study and work part time	4
Active – Unemployed	5
Active – Retired WITH activity	6
Not active – Full time studies	7
Not active – Work at home caring for family	8
Not active – Retired WITHOUT activity	9
Active - Other	10
Not active – Other	11
No answer (DO NOT READ)	0

D7 - What is your marital status?

Single	1
Married/Civil partnership	2
Divorced	3
Widowed	4
No answer (DO NOT READ)	0

D8 - How many dependent children do you have living in the same household?

Number: _____

D9 - Who do you live with?

Alone —> Go to question D11	1
With parents and/or other family member	2
With spouse/partner, without children	3
With spouse/partner, with children	4
With spouse/partner, (w/o children) and other family member	5
With spouse/partner, (with children) and other family member	6
With friends	7
No answer (DO NOT READ)	0

D10 - Who is <u>in charge of</u> managing your household budget?

You	1
Someone else (spouse/partner, family member)	2
Nobody is in charge, it is jointly managed	3
No answer (DO NOT READ)	0

D11 - Who contributes most to the household income?

You	1
You and spouse/partner/ family member equally	2
Spouse/partner/ family member	3
Parents	4
Don't know	5
No answer (DO NOT READ)	0

D12 - What is the household's monthly net income after deducting all taxes?

Less than 300 euros	1
Between 300 and 800 euros	2
Between 801 and 1200 euros	3
Between 1201 and 1700 euros	4
Between 1701 and 3500 euros	5
More than 3500 euros	6
No answer (DO NOT READ)	0

D13 - What is your housing situation?

Live in own home	1
Live in rented property	2
Live with family/friends w/o paying rent	3
No answer (DO NOT READ)	0

APPENDIX B

Stochastic utility theory applied to DCE

Stochastic utility theory assumes that individual i maximises utility and that this can be separated into two parts: an observable deterministic part that describes the individual's preferences, and a stochastic part that represents the influences in the individual choice that cannot be observed. The size of the stochastic component depends on how informative the deterministic part is and on the range of preferences in the population. The utility function is given by the following expression:

$$U_{qi} = V_{qi} (X_{qi}, c_i) + \varepsilon_{qi} (X_{qi}, c_i)$$

where U_{qi} is the utility of individual i when he/she chooses alternative q, V_{qi} is the observable component and ε_{qi} is the random component. X_{qi} are the attributes of alternative q and c_i the individual's characteristics. It is assumed that individual i only chooses alternative q if the utility taken from choosing this alternative is greater than the utility taken from choosing any other available option. Given that $Y_{qi}i$ is a random variable that expresses the individual's choice and assuming a joint probability distribution for the error, ε_{qi}, the probability of alternative q being chosen over any other alternative j is given by:

$$P(Y_{qi}=1) = P\ [(V_{qi} + \varepsilon_{qi}) > (V_{ji} + \varepsilon_{ji})] = P(V_{qi} - V_{qj} > \varepsilon_{qi} - \varepsilon_{qj})$$

That is, the difference in the deterministic part must be greater than the difference in the stochastic part. V_{qi} is considered a linear function:

$$V_{qi} = \beta_0 + \beta_1 X_{1qi} + \beta_2 X_{2qi} + ... + \beta_m X_{mqi} + \gamma c_i$$

where X_{mqi} are the various attributes of the alternative q. β_0 is the constant specific to the alternative. It represents the average of the difference between the non-observable factors in the random component and the base case. The model estimates the coefficients β_s , which maximises the probability of obtaining the observed choice.

Certain conditions are required in relation to the distribution of the error. In particular, it is assumed that the errors are independent and identically distributed and that they follow the Gumbel distribution (exponential pair), that can be expressed in the following manner:

$$P_{qi} = (exp(\mu V_{qi})) / (\sum_{k=1}^{k} exp (\mu V_{ki}))$$

where K is the choice set available to the decision maker.

$$V_{qi} = \sum_{q=1}^{m} \mu\beta_{qi} X_{qi}$$

Where $\mu\beta_{qi}$ is the estimated weight of attribute X_q in utility V_q. μ is a parameter of scale that is inversely proportional to the standard deviation of the distribution of the random component.

This multinomial model must satisfy the Principle of Independence of Irrelevant Alternatives: the ratio of the probabilities of two alternatives is not affected by the presence or absence of other alternatives in the choice set. This property can be restrictive whenever there are correlated alternatives.

Whereas the multinomial and conditional logit models assume that the variations associated to the random component of each alternative are identical, the mixed logit model does not have this restriction. This model allows for the correlation of the non-observable factors over time. Additionally, it does not require that the Principle of Independence of Irrelevant Alternatives is satisfied; in other words, there can be a correlation between alternatives. Lastly, it permits heterogeneity in the coefficients, that is, the coefficients β_s are not necessarily equal for all the individuals, and they follow the distribution, $\beta_s \sim F(b,\Omega)$.

The coefficients in the mixed logit can assume different distributions (normal, log-normal, uniform or triangular). Two moments of the distribution are estimated: average and standard deviation.

APPENDIX C

Results of the DCE estimation

Table C1.
Variables used in the model

ATTRIBUTES	DESCRIPTION
Generation 1	Utility of generations born after 2000 (those now under the age of 18)
Generation 2	Utility of generations born between 2000 and 1979 (those now aged between 18 and 39 years)
Generation 3	Change in income of generations born between 1978 and 1954 (now aged between 40 and 64 years)
Generation 4	Change in income of generations born before1954 (now aged 65 or over)
SOCIODEMOGRAPHIC VARIABLES	
Children	children=1, No children=1
Dependent children	number of dependent children=0,1,2, 3, …
Grandchildren	grandchildren=1, no grandchildren=0
Woman	woman=1, man=0
Age	Age of respondent in years (continuous variable)
Education	Without primary education =0 Primary education (current 4th year) =4 Basic education (current 9th year) =9 High School (current 12th year) =12 Bachelor's degree=16 Master's/PhD=18
Coast	coast=1, interior=0

Mixed Logit Model

	Coefficient	Standard error	z	P>z	
Average					
Children	-0,2078	0,150	-1,39	0,165	
Dependent children	**0,4426**	0,074	5,96	0,000	***
Grandchildren	**0,2853**	0,152	1,87	0,061	*
Woman	-0,0189	0,094	-0,20	0,840	
Age	-0,0049	0,004	-1,26	0,208	
Education	-0,0053	0,013	-0,42	0,672	
Coast	**-1,8821**	0,159	-11,82	0,000	***
Constant	**2,3815**	0,317	7,51	0,000	***
Generation 1	**0,0038**	0,001	2,55	0,011	***
Generation 2	**0,0047**	0,001	3,14	0,002	***
Generation 3	**0,0037**	0,002	2,04	0,041	**
Generation 4	**0,0058**	0,002	3,72	0,000	***
Standard deviation					
Generation 1	0,0120	0,001	13,04	0,000	***
Generation 2	0,0091	0,001	10,16	0,000	***
Generation 3	0,0106	0,001	9,21	0,000	***
Generation 4	0,0123	0,001	12,94	0,000	***
Log L	-4080,65				
Nr. observations	12015				

Note: * Significance at 10%; ** Significance at 5%; *** Significance at 1% Random parameters: Generation1, Generation2, Generation3, Generation4; Non-random parameters: sociodemographic characteristics

Marginal replacement rate and Confidence intervals

	MRR	Confidence interval
Generation2/Generation1	-1,249	(-1.70, -0.78)
Generation3/Generation1	-0,980	(-1.45, -0.52)
Generation4/Generation1	-1,529	(-2.17, -0.89)
Generation3/Generation2	-0,790	(-1.18, -0.40)
Generation4/Generation2	-1,234	(-1.62, -0.85)
Generation4/Generation3	-1,561	(-2.45, -0.67)

Note: 95% confidence intervals calculated using the delt method

Mixed Logit Model: Generations born between 2000 and 1979

	Coefficient	Standard error	z	P>z	
Média					
Children	**-0,5717**	0,259	-2,20	0,028	**
Dependent children	**0,6744**	0,149	4,53	0,000	***
Woman	**0,3257**	0,161	2,02	0,043	**
Age	-0,0071	0,015	-0,49	0,627	
Education	-0,0126	0,027	-0,47	0,642	
Coast	**-1,6819**	0,267	-6,31	0,000	***
Constant	**2,4097**	0,603	3,99	0,000	***
Generation 1	**0,0069**	0,002	2,76	0,006	***
Generation 2	**0,0096**	0,003	3,74	0,000	***
Generation 3	0,0046	0,003	1,50	0,133	
Generation 4	**0,0062**	0,003	2,40	0,016	***
Standard deviation					
Generation 1	0,0104	0,001	7,10	0,000	
Generation 2	0,0088	0,001	6,12	0,000	
Generation 3	0,0108	0,002	5,71	0,000	
Generation 4	0,0100	0,002	6,05	0,000	
Log L	-1384,31				
Nr. observations	4110				

Note: * Significance at 10%; ** Significance at 5%; *** Significance at 1% Random parameters: Generation1, Generation2, Generation3, Generation4; Non-random parameters: sociodemographic characteristics

Table C5.
Mixed Logit Model: Generations born between 1978 and 1954

	Coefficient	Standard error	z	P>z	
Média					
Children	0,0953	0,213	0,45	0,654	
Dependent children	**0,2822**	0,092	3,06	0,002	***
Grandchildren	**0,8819**	0,206	4,28	0,000	***
Woman	**-0,2679**	0,139	-1,92	0,054	**
Age	**-0,0338**	0,012	-2,84	0,005	***
Education	0,0008	0,017	0,05	0,964	
Coast	**-1,6989**	0,234	-7,25	0,000	***
Constant	**3,4367**	0,755	4,55	0,000	***
Generation 1	0,0034	0,002	1,56	0,118	
Generation 2	0,0028	0,002	1,28	0,201	
Generation 3	**0,0049**	0,003	1,85	0,064	*
Generation 4	**0,0049**	0,002	2,16	0,031	**
Standard deviation					
Generation 1	0,0110	0,001	8,24	0,000	
Generation 2	0,0085	0,001	6,43	0,000	
Generation 3	0,0105	0,002	6,22	0,000	
Generation 4	0,0104	0,001	7,39	0,000	
Log L	-1782,65				
Nr. observations	5205				

Note: * Significance at 10%; ** Significance at 5%; *** Significance at 1%
Random parameters: Generation1, Generation2, Generation3, Generation4; Non-random parameters:
sociodemographic characteristics

Mixed Logit Model: Generations born before 1954

	Coefficient	Standard error	z	P>z	
Average					
Children	0,4368	0,523	0,83	0,404	
Dependent children	**2,3336**	0,673	3,47	0,001	***
Grandchildren	**-1,4085**	0,417	-3,38	0,001	***
Woman	0,0006	0,207	0,00	0,998	
Age	**-0,0405**	0,016	-2,52	0,012	***
Education	-0,0061	0,025	-0,25	0,803	
Coast	**-2,5641**	0,378	-6,78	0,000	***
Constant	**6,0803**	1,380	4,41	0,000	***
Generation 1	**-0,0015**	0,003	-0,48	0,634	***
Generation 2	**-0,0006**	0,003	-0,19	0,848	***
Generation 3	**-0,0018**	0,004	-0,47	0,638	***
Generation 4	**0,0063**	0,003	1,83	0,068	***
Standard deviation					
Generation 1	0,0115	0,002	5,89	0,000	
Generation 2	0,0051	0,002	2,33	0,020	
Generation 3	0,0040	0,004	0,93	0,350	
Generation 4	0,0169	0,002	7,97	0,000	
Log L	-836,84				
Nr. observations	2700				

Note: * Significance at 10%; ** Significance at 5%; *** Significance at 1% Random parameters: Generation1, Generation2, Generation3, Generation4; Non random parameters: sociodemographic characteristics

Table C7.
Marginal replacement rate and Confidence intervals: Generations born between 2000 and 1979

	MRR	Confidence interval
Generation2/Generation1	-1,392	(-1.87, -0.92)
Generation3/Generation1	-0,664	(-1.17, -0.16)
Generation4/Generation1	-0,901	(-1.25, -0.55)
Generation3/Generation2	-0,477	(-0.89, -0.61)
Generation4/Generation2	-0,647	(-0.93, -0.37)
Generation4/Generation3	-1,357	(-2.32, -0.40)

Note: 95% confidence intervals calculated using the delt method

Table C8.
Marginal replacement rate and Confidence intervals: Generations born between 1978 and 1954

	MRR	Confidence interval
Generation2/Generation1	-0,825	(-1.43, -0.22)
Generation3/Generation1	-1,469	(-2.37, -0.57)
Generation4/Generation1	-1,442	(-2.37, -0.51)
Generation3/Generation2	-1,780	(-3.12, -0.44)
Generation4/Generation2	-1,747	(-3.26, -0.24)
Generation4/Generation3	-0,981	(-1.49, -0.48)

Note: 95% confidence intervals calculated using the delt method

**Marginal replacement rate and Confidence intervals:
Generations born between 1978 and 1954**

	MRR	Confidence interval
Generation2/Generation1	-0,401	(-3.11, 2.31)
Generation3/Generation1	-1,20	(-3.54, 1.14)
Generation4/Generation1	4,26	(-17.19, 25.70)
Generation3/Generation2	-2,99	(-22.44, 16.45)
Generation4/Generation2	10,63	(-107.50, 128.74)
Generation4/Generation3	3,55	(-14.60, 21.67)

Note: 95% confidence intervals calculated using the delt method