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# Difference in Preferences or in Preference Orderings?

## *Comparing Choices of Environmental Bureaucrats, Recreational Anglers, and the Public*

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# Difference in Preferences or in Preference Orderings? Comparing Choices of Environmental Bureaucrats, Recreational Anglers, and the Public

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## Abstract

Do Environmental Protection Agency (EPA) bureaucrats represent the general public or are they more in line with an interest group? We study preferences for environmental policy using a choice experiment (CE) on three populations; the general public, Swedish EPA bureaucrats, and recreational anglers. We also test for existence of multiple preference orderings, i.e., whether responses differ depending on the decision role assigned. Half of the respondents were asked to choose the alternatives that best corresponded with their opinion, and the other half was asked to take the role of a policymaker and make recommendations for environmental policy. The SEPA bureaucrats have the highest marginal willingness to pay (MWTP) to improve environmental quality. These differences are robust and not due to differences in socio-economic characteristics across the populations. We found little evidence of multiple preference orderings, but in one case the difference in MWTP between the two roles was substantial.

**Key Words:** choice experiment, distribution, environmental valuation, Homo Economicus, Homo Politicus, multiple preference orderings, willingness to pay

**JEL Codes:** D61, H41, Q51, Q58

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# Difference in Preferences or in Preference Orderings? Comparing Choices of Environmental Bureaucrats, Recreational Anglers, and the Public

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## 1. Introduction

To what extent do bureaucrats' decisions represent the views of the public? Surprisingly little attention has been given to this question in the environmental economics literature. Politicians and bureaucrats make decisions on behalf of the public on how to manage environmental resources, but little is known about whether or not their decisions are in line with people's preferences. Politicians represent the public, but bureaucrats who carry out environmental policies are not elected. The only mechanism that ensures representativeness is that bureaucrats implement instructions from political decisions. However, a study of German environmental policy found that bureaucrats do not solely obey the directives of their minister, but "develop their own political orientations and conceptions of justice and the common good, and act according to them". In fact, German environmental bureaucrats were found to be able to significantly influence environmental policy (Faber et al. 2002).

As far as we know, there is only one study that compares the preferences for environmental goods and services between bureaucrats and the general public. Carlsson et al. (2011) used the choice experiment (CE) method, where bureaucrats at the Swedish Environmental Protection Agency (SEPA) were asked to choose the alternatives they would recommend as a policy, while a random sample of the general public was asked about their preferred alternatives. The results showed substantial differences in the marginal willingness to pay (MWTP), with SEPA administrators having higher MWTP for five out of the seven attributes. For some attributes, the differences were two- and threefold. Turning to the risk literature, Carlsson et al. (2012) compared preferences of risk reductions from accidents, where both a random sample of the general public and a

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group of public administrators were asked to answer as if they were policy makers. The results indicate very small differences in most cases. There are also some studies that compare preferences regarding environmental resources between the general public and environmental experts, although not those who are directly involved in administrating policy (e.g., Rogers 2013; Colombo et al. 2009; Alberini et al. 2006; McConnell and Strand 1997).[1]

In this study, we use the CE method and investigate whether the preferences of SEPA bureaucrats are in line with the public's when considering the abundance of coastal cod along the Swedish western coast. In addition, we collected data on recreational anglers to explore a stake-holder perspective and to empirically test whether the preferences of SEPA bureaucrats are closer to such an interest group than to the general public.

Does a difference in WTP between two individuals or groups of individuals necessarily reflect differences in preferences? The short answer to this question is no, unless the individuals have single (unique) preference ordering. There are, however, compelling arguments that individuals may have multiple preference orderings (Arrow 1951; Harsanyi 1955; Margolis 1982; Sen 1997; Nyborg 2000), where the same individuals can make different choices in different roles and contexts. In line with this, Sagoff (1988; 1994; 1998) argues that, for environmental decision-making, a decision-maker can either express her preferences in the role of a consumer or in the role of a citizen. Nyborg (2000) formalized the implication of different roles in the form of multiple preference orderings for the environmental valuation literature, where the consumer perspective is referred to as Homo Economicus while the citizen perspective is labeled as Homo Politicus. Homo Economicus is, in Nyborg (2000), non-altruistic and maximizes her own welfare, while Homo Politicus considers the best for society and

[1] Rogers (2013) compared private preferences of marine experts with private preferences of the general public, also using CE in a study applied in two marine reserves in Western Australia. She found significant differences in preferences between the two groups for one of the marine reserves, while not for the other reserve. Colombo et al. (2009) used CE to obtain general public preferences, and the Analytic Hierarchy Process method to obtain expert preferences, and found similar attribute rankings in the two groups. Alberini et al. (2006) used rating exercises, CE, and ranking exercises to measure preferences of general public and public officials/other stakeholders for a historic site in Italy. In some cases the opinions of general public sharply differed of the views of the stakeholders and public officials, while for other aspects the preferences were more similar between the groups. McConnell and Strand (1997) found differences in WTP between scientists and the general public, but those were mainly due to higher male representation among the scientists.

maximizes social welfare. Importantly, note that the same individual can answer as either Homo Economicus or Homo Politicus depending on the context in which the valuation question is posed. We will have a more careful look at this in Section 2 and show that asking the general public (as laypersons responsible for themselves) and civil servants (in their professional roles, with responsibilities beyond themselves) can result in different WTP, even though they have the same personal preferences for the environmental good.

To gain control over preference ordering when collecting data, we use a split sample approach where we, on the one hand, elicit the respondents' preferences when choosing the alternatives they prefer by asking them to make choices that best correspond with their opinion, and, on the other hand, ask all the respondents to make policy recommendations for society as if they were bureaucrats. Our approach facilitates a comparison between the preferences of the general public and the bureaucrats, where our framing attempts to control for preference orderings. Moreover, if framing of the CE question causes a change of preferences, we interpret it as evidence for multiple preference orderings. If preferences are stable across the framing, this could either be because the design is not powerful enough to detect a significant difference, or because there are no multiple preference orderings.

As far as we know, this is the first study investigating the interdependency between preference orderings and preference discrepancy between the general public and bureaucrats. This is important for two reasons; to confirm the results in previous studies that did not control for the same preference orderings, and to understand whether environmental valuation should be understood through the lens of single (unique) or multiple preference orderings in general.

As mentioned, the environmental problem we study in this paper is the abundance of coastal cod along the Swedish western coast. Healthy coastal cod stocks are part of the targets within the Swedish environmental objective A Balanced Marine Environment. SEPA coordinates efforts to meet Sweden's environmental objectives and forecasts that it is not possible to achieve the objective A Balanced Marine Environment by 2020 on the basis of policy instruments already decided on or planned (SEPA 2016). In particular, inshore coastal cod stocks along the Swedish western coast have been severely depleted since the 1970s. Tests by research trawl vessels indicate that the current stock levels of coastal cod correspond to 2-3 % of the levels found in the 1970s. The main reason is overfishing by commercial and recreational fishers (Svedäng et al. 2010; ICES 2010). To obtain a permanent increase in the coastal cod stock in Western Sweden, it is necessary to

reduce the current fishing pressure on the coastal cod stock in order to provide it an opportunity to recover.2

The rest of this article is structured as follows. In the next section, we discuss the theoretical framework used in this paper. Section 3 describes the survey, while Section 4 describes the three samples included in this study and how the surveys were administered. Section 5 presents the research hypothesis, Section 6 is the result section, and Section 7 concludes the paper.

## 2. Theoretical Framework

The theoretical framework used in this study was developed in Brekke et al. (1996) and Nyborg (2000). Each individual j's social welfare judgment is based on a Samuelson-Bergsonian social welfare function

$$W^j = V^j(\omega_1^j, \ldots, \omega_n^j)$$

where $\omega_i^j$ is is individual i's well-being as judged by observer j, $j \in N$, where $N = \{1, \ldots, n\}$ is the set of all individuals in society. It is assumed that the decision-maker j is able to make a subjective judgment of i's well-being, assuming that i's income $(x_i)$ and access to public goods $(y)$ are known.

$$\omega_i^j = v^j(x_i, y)$$

Every individual can have distinct preference orderings associated with different roles, i.e., what is known as multiple preference orderings. In the role as Homo Economicus, the decision-maker is assumed to be interested only in maximizing her own well-being. The decision-maker's MWTP can be derived as follows:

$$d\omega_i^j = \frac{\partial v^j}{\partial x_j} dx_j + \frac{\partial v^j}{\partial y} dy$$

$$MWTP_{Homo\ Economicus} = -dx_j/dy = \frac{\partial v^j}{\partial y} / \frac{\partial v^j}{\partial x_j} \quad (1)$$

2 The Swedish general public is fairly well informed about coastal and marine issues and the problems with coastal cod. The decrease in cod population has been intensively debated in the media over several years' time. In 2002, the Green Party made Baltic Sea cod stock recovery a major election issue in Sweden (Eggert and Olsson 2009), and in 2014 the WWF Sweden launched a campaign for a consumer boycott of Swedish shrimp, which received a lot of media attention. Moreover, fishing in coastal waters is open to all and more than 10 percent of the Swedes are recreational anglers (The Swedish Agency for Marine and Water Management 2016).

In the role of Homo Politicus, the decision-maker tries to consider what is best for society. For simplicity of the discussion, we will assume that the society consists of only two individuals, where $j = 1$ (for a more general treatment, see Nyborg (2000)). The decision-maker's MWTP can be derived as follows:

$dW^1 = 0 =$

$$= \frac{\partial V^1}{\partial \omega_1^1} \cdot \frac{\partial v^1}{\partial x_1} \mathrm{dx}_1 + \frac{\partial V^1}{\partial \omega_2^1} \cdot \frac{\partial v^1}{\partial x_2} \mathrm{dx}_2 + \left[ \frac{\partial V^1}{\partial \omega_1^1} \cdot \frac{\partial v^1}{\partial y} + \frac{\partial V^1}{\partial \omega_2^1} \cdot \frac{\partial v^1}{\partial y} \right] dy$$

The size of the income change for Individual 2 ($\mathrm{dx}_2$) will depend on how the public good will be financed. To mention a few principles on how the public good can be financed, we have 1) equally shared responsibility, 2) the decision-maker assumes sole responsibility or 3) all members of society pay equal proportions of income. Hence, the relative contribution of the two individuals can be expressed by

$$dx_2 = \mathrm{s} \cdot \mathrm{dx}_1$$

where $s = 1$ implies equally shared responsibility and $s = 0$ that the decision-maker assumes sole responsibility. Assuming that all members of society pay equal proportions of income would imply that $s = s(x_1, x_2)$. We now have that:

$$MWTP_{Homo\ Politicus} = -\frac{dx_1}{dy} = \frac{1}{\frac{\partial V^1}{\partial \omega_1^1} \cdot \frac{\partial v^1}{\partial x_1} + \frac{\partial V^1}{\partial \omega_2^1} \cdot \frac{\partial v^1}{\partial x_2} s} \left\{ \frac{\partial V^1}{\partial \omega_1^1} \cdot \frac{\partial v^1}{\partial y} + \frac{\partial V^1}{\partial \omega_2^1} \cdot \frac{\partial v^1}{\partial y} \right\} \quad (2)$$

Comparing the MWTP of Homo Economicus (Eq. 1) and Homo Politicus (Eq. 2), we see that they could differ even if the decision-maker's utility of own income ($\frac{\partial v^1}{\partial x_1}$) and the public good ($\frac{\partial v^1}{\partial y}$) is the same in the two settings. Hence, a difference in MWTP between two individuals (or groups of individuals) is not necessarily caused by a difference in preferences but could be caused by a difference in preference ordering, which in turn can differ for the same individual depending on the context and the role in which the decision is taken. The term $\frac{\partial V^1}{\partial \omega_1^1} \cdot \frac{\partial v^1}{\partial x_1}$ is what is commonly known as welfare or distributional weight, where the first factor is the decision-maker's subjective (ethical/political) judgment of how important a marginal utility change is for a certain individual, and the second factor reflects the marginal utility of income. The size of the effect will depend on which social welfare-function the decision-maker has in mind. Hence, the discrepancy between the MWTP of Homo Economicus and Homo Politicus is that Homo Politicus takes into account her own as well as others' marginal utility of

income and public goods when stating her MWTP, while the MWTP of Homo Economicus only takes care of her own well-being.

Notably, unless the decision-maker assumes sole responsibility ($s = 0$), in which case we see that the willingness to pay of Homo Politicus is higher, the model does not predict in which direction the two roles affect the willingness to pay measures. Finally, note that Homo Economicus does not imply that the decision-maker does not care about the environmental public good. Homo Economicus could be much more concerned about the environment than Homo Politicus. It's the lack of concern about how the level of the public good and the change in income affect the utility of other individuals in society that characterizes Homo Economicus.

## 3. The Choice Experiment

The survey had three independent sections. In the first section, the respondents were shown a map with the coastline of interest to our study, followed by questions about the respondents' location. In the second section, the respondents were provided with information about the coastal cod stock and about policy measures that could increase the cod stock. The second part also contained information about the attributes in the CE, an example of one choice set, and finally the CE itself. The third section contained questions to identify the respondents' socio-economic status.

In a CE, individuals are given a hypothetical setting and asked to choose their preferred alternative among several alternatives in a choice set. The participants are usually asked to answer a sequence of such choices sets. Each alternative is described by a number of attributes. This survey method thus allows us to estimate the marginal rate of substitution among different attributes. (For overviews of CE, see Louviere et al. 2000; Alpízar et al. 2003).

The CE consisted of three alternatives. Each alternative was described with four different attributes. The first attribute makes use of three levels to describe the size of the cod stock[3], while the second attribute uses two levels to describe the different fishing restrictions of when and where to fish. If the trawl boundary were moved farther out from

[3] Recent research using modern genetic tools have documented that there are several independent coastal cod stocks along the Swedish western coast (Svedäng et al. 2010), but we refer to these as the coastal stock throughout the paper.

the coast, commercial fishermen would be primarily affected, while a total ban on fishing inside the existing trawl boundary (a "stop fishing" policy) would affect commercial as well as non-commercial (recreational) fishermen.

The third attribute describes the distribution of the payment. Two levels are used: i) everybody pays the same amount irrespective of income level, or ii) everybody pays the same percentage of their income, so that the amount increases with income. Finally, a four-level cost attribute is included. The cost was stated as a monthly tax to finance measures to increase the coastal cod stock, and was formulated as "your tax increase per month." The attribute and levels are shown in Figure 1, followed by Figure 2, which shows an example of a choice set. The first alternative was always an opt-out alternative describing the current situation.

**Figure 1. Attributes and Levels (Opt-out Levels in Parentheses)**

| Attribute | Levels |
|---|---|
| Amount at least 5 year old cod[4] caught per trawl hour | (2), 25, 50, 100 kg |
| Restrictions of when and where to fish | (Like today)* |
| | No fishing at all for cod inside the existing trawl boundary |
| | The trawl boundary is moved 3.7 km further out from the coast. Inside the boundary, trawl fishing is prohibited. |
| Individual tax increase per month (year) the next 10 years | (0), 50, 100, 200, 500 |
| Cost sharing principle to finance cod stock enhancement | Everybody pays the same amount, irrespective of income level |
| | Everybody pays the same percentage of their income; amount increases with income |

*****For most of the Swedish west coast, recreational fishing is allowed during April-December. A minor area has a ban on all recreational fishing for cod using gill net and other fixed gear, but allows the use of fishing rods from land.

[4] Cod of the age up to three years, originally from the North Sea, may spend time along the coast before migrating back out to high seas. Survival of eggs from older females is higher. Both factors imply that a sustainable coastal cod population should include older specimen, which we define as five years or older (Svedäng 2010).

**Figure 2. Example of a Choice Set**

| | **Alternative 1 (Situation today)** | **Alternative 2** | **Alternative 3** |
|---|---|---|---|
| Amount at least 5 year old cod caught per trawl hour | About 2 kg | About 50 kg | About 25 kg |
| Restrictions of when and where to fish | Like today | No fishing at all for cod inside the existing trawl boundary | The trawl boundary is moved 3.7 km farther out from the coast. Inside the boundary, trawl fishing is prohibited. |
| Your tax increase per month (year) the next 10 years | SEK 0 | SEK 200 (SEK 2400) | SEK 100 (SEK 1200) |
| Cost sharing principle to finance cod stock enhancement | | Everybody pays the same amount, irrespective of income level. | Everybody pays the same percentage of their income; amount increases with income |
| Mark the alternative that you prefer (X) | | | |

The choice sets were created using a cyclical design, a so-called fold-over strategy (e.g., Brownstone et al. 1996; Carlsson and Martinsson 2003). First, an orthogonal main effects design was generated, consisting of eleven attribute-level combinations (opt-out levels excluded). Each combination in the main-effects design is one alternative in one of the ten choice sets. The levels of the attributes of the second alternative in a choice set are obtained by adding one level to each attribute level of the first alternative; when the highest level is reached, one starts over from the lowest level. To these two alternatives, an opt-out alternative was added. The ten choice sets were then randomly blocked into two survey versions, meaning that each respondent answered five choice sets.

Remember that we also have two framing versions of the surveys. Depending on the version, some randomly chosen respondents were asked to choose the alternative "that best corresponds with your opinion" while others were asked to choose the alternative "that you as a civil servant would recommend as decisive for Swedish fishing policy". The latter framing is intended to induce a role and a feeling of responsibility beyond oneself and Homo Economicus. For simplicity, we will henceforth distinguish

these two samples by referring them as Homo Economicus and Homo Politicus.[5] We do not argue that asking respondents to choose the alternative that best corresponds with their opinion (i.e., the Homo Economics frame) excludes other-regarding preferences, while asking for policy recommendations (i.e., the Homo Politicus frame) excludes self-regarding preferences. But we do expect that these frames can empirically cause respondents to reveal different MWTP despite having identical preferences for own income and the public good (as outlined in the theoretical framework), because the different framings differ in how they induce a feeling of responsibility beyond oneself.

## 4. Administration of Surveys and Description of Samples

Samples were collected from three different populations: *1)* general public, *2)* bureaucrats at the Swedish Environmental Protection Agency (SEPA) and *3)* recreational anglers. Figure 3 summarizes the design and how the CE was framed for two different roles and populations.

**Figure 3. Summary of Design Where Respondents Were Asked to Choose the Alternative That:**

| | **Populations** | | |
|---|---|---|---|
| | **General Public** | **Bureaucrats** | **Anglers** |
| **Role 1 (Homo Ecn.)** | best corresponds with your opinion | best corresponds with your opinion | best corresponds with your opinion |
| **Role 2 (Homo Pol.)** | that you as a civil servant would recommend as decisive for Swedish fishing policy | that you as a civil servant would recommend as decisive for Swedish fishing policy | that you as a civil servant would recommend as decisive for Swedish fishing policy |

Again, in the Homo Politicus frame, all respondents were explicitly asked to take the role of civil servant and recommend a fishing policy decisive for Swedish policy, while in the Homo Economic frame all respondents were instead simply asked to choose the alternative that best corresponds with their opinion. One could argue that the framing for the administrators would be stronger if we were even more explicit in the Homo Economicus frame that we did not want the administrators to answer in the role of administrators. Because it is well-known that responses to valuation questions depend

[5] The conventional assumption in economics would be that people's choices are in line with the preference ordering of Homo Economicus.

crucially on the exact wording of the questionnaire (Mitchell and Carson 1989), we chose a conservative approach and kept the same wording across all populations.

The general public and recreational anglers were recruited based on the geographical limitation of the two adjacent Swedish counties, Västra Götaland and Halland, for which Skagerrak and Kattegat are the natural reference points for issues relating to the sea. The bureaucrats at SEPA are located mainly in Stockholm, the capital of Sweden, and in Östersund, a town located in the middle of Sweden. The general public were reached using a random regional sample from panel members of The Citizen Panel at the University of Gothenburg, which consists of about 16,000 active participants who regularly contribute to Swedish and international survey research by answering web questionnaires that they receive through e-mail invitations. The panel members do not get paid for their participation. The population of recreational fishermen included all registered members of the Swedish Anglers' Association within the region of concern. The population of SEPA bureaucrats included bureaucrats from SEPA. The general public and the bureaucrats at SEPA took the survey online, while the recreational fishermen got their surveys by regular mail.

The surveys to the different populations are identical with a few exceptions. The general public and recreational fisherman are randomly assigned to answer five choice sets of one of the two versions of the surveys. Due to the sample size limitations, the bureaucrats at the SEPA were asked to answer both versions of the surveys (i.e., ten choice sets and both as Homo Economicus and Homo Politicus). Order effects were controlled by letting half of the SEPA sample first answer the first survey version, while the other half of the sample first answered the second survey version. It should be noted that the web design did not allow respondents to return to their first five choices after completing them. Using the first five choices of each survey version, we can make a "clean" comparison between the two frames of the two survey versions. Hence, this allows us to test the multiple preference hypotheses free from confounded order-effects. Because it turned out that ordering had an effect on the responding bureaucrats, only

answers to the first five choice sets were used in the final analysis.[6] Hence, the results for the bureaucrats are based on the first five choices, where half of the sample was assigned to answer as Homo Economicus and the other half as Homo Politicus.

A second difference between the survey versions to different populations is how the cost attribute was framed. The general public and recreational anglers faced a tax to the citizens of western Sweden, while for the bureaucrats the cost was framed as a tax to the citizens of Sweden. As the SEPA bureaucrats do not live in western Sweden, we implemented this change to have the same monetary consequence in the CE for the decision-makers across all populations.

## 5. Hypothesis about Differences between Populations and Roles

### *5.1 Differences between the Two Roles (within Populations)*

Based on the literature of multiple preference orderings and the model in Section 2, we hypothesize that there will be a difference in MWTP between the Homo Economicus and the Homo Politicus version of the survey. Also note that, while Homo Economicus only cares about her own donation to the environmental good, Homo Politicus also cares about others' payments to the environmental good. To assess this, we build in a test (through the attribute "cost sharing principle to finance cod stock enhancement") on whether or not respondents will care about how much others in society pay for the environmental good and the strength of such preferences. Notably, the conventional assumption in economics would be that peoples' choices are in line with the preference ordering of Homo Economicus. Contrary to this, our research hypothesis is that the respondents will care about others' payments to the environmental good and how the burden of the costs is shared. To test this hypothesis, it is sufficient to find that the subjects have preferences on how the tax should be distributed to finance the cod stock

[6] We used a likelihood ratio test to test the hypothesis of equal preferences between SEPA bureaucrats who answered in a different order, i.e., we test whether we can pool the data. We did this for both roles, i.e., when a SEPA respondent answered as a Homo Economicus and when she/he answered as a Homo Politicus. The likelihood ratio test applies the grid search procedure suggested by Swait and Louviere (1993). The likelihood ratio test for equal scale parameters is rejected at the 1% level for the Homo Politicus experimental group. Although the likelihood ratio test for equal scale parameters was not rejected for the Homo Economicus experimental group, the comparison between MWTPs estimated from the first five and last five choice sets showed very large differences in both samples. Thus, both the data sets have a clear order effect and we will only use the first five choice sets per respondent in our analyses.

enhancement. If such preferences are found, it confirms that respondents act as Homo Politicus in this regard. Although we expect people to have such preferences, we do not have any well-formed expectations on which of the two cost-sharing principles our populations prefer.

### *5.2 Differences between Populations (in Identical Roles)*

Carlsson et al. (2011) found the MWTP of bureaucrats to be higher than of the general public. Because the SEPA bureaucrats have the professional goal of improving the environment and are likely more environmentally friendly than people in general, we hypothesize that they have higher MWTP than the general public for an increase of the cod stock. However, there are features of our design that could potentially work in the opposite direction. First, the bureaucrats live farther away from the Swedish west coast than our general public sample, which may result in a lower MWTP. This would be in line with the so called distance-decay relationship in the non-market valuation literature (see, e.g., Sutherland and Walsh 1985). Second, in the survey version to the bureaucrats, the cost was framed as a tax on the citizens of Sweden, while the general public faced a tax to the citizens of western Sweden. This could potentially reinforce the distance-decay relationship if bureaucrats take the welfare of people living farther away into account when deciding for the Swedish population. We also expect MWTP for cost sharing to be of less importance to the SEPA bureaucrats compared to the public, as we expect them to focus on reaching the environmental objectives while giving less attention to resulting distributional effects.

Turning to the comparison between recreational anglers and the general public, we expect recreational anglers, due their interest in fishing, to have higher MWTP for an increase of the cod stock. Further, recreational anglers are assumed to be more negative toward fishing restrictions that reduce their angling possibilities compared to an average respondent from the general public. Finally, when comparing the SEPA bureaucrats and recreational anglers, we conjecture that they may be similar in MWTP to increase the cod stock, while recreational anglers are expected to be more negative toward a fishing ban.

## 6. Results

### *6.1. Descriptive Statistics and Test of Difference between Survey Versions*

The results presented in this paper are based on data from surveys that were sent out between April and June 2014. For the general public, invitations were sent by email

to 4,199 men and women 18-80 years old. Two reminders were sent out, one and three weeks later. In total, 2,259 responded (54%). Some of the responses could not be used due to missing items and 2,141 responses were used in the final analysis. The mail survey to the Swedish Anglers' Association was sent to 2,466 members with no reminder. 791 responded (32%), but 11 were unavailable for analysis due to various missing responses. For the environmental bureaucrats at SEPA, an e-mail with a link to the web questionnaire was sent out to 244, of which 93 were used in the analysis (38%). Table 1 presents descriptive statistics of the three samples.

**Table 1. Descriptive Statistics (Standard Deviations in Parentheses)**

| Frame | Homo Economicus | | | Homo Politicus | | |
|---|---|---|---|---|---|---|
| Population | General Public | Recreational Anglers | SEPA Bureaucrats | General Public | Recreational Anglers | SEPA bureaucrats |
| Share of females | 0.440 | 0.041 | 0.545 | 0.459 | 0.021 | 0.646 |
| Share of respondents with university education > = 3 years | 0.494 | 0.265 | 0.955 | 0.477 | 0.260 | 1.0 |
| Mean age | 53.776 (13.981) | 58.755 (13.787) | 49.431 (9.968) | 54.028 (13.758) | 59.059 (14.388) | 49.688 (9.509) |
| Mean personal income in 1000SEK. | 30.163 (14.248) | 32.381 (13.421) | 37.670 (4.396) | 29.620 (13.783) | 31.351 (12.566 ) | 37.609 (5.591) |
| Number of respondents | 1071 | 392 | 44 | 1091 | 388 | 49 |

Using two-sample t-tests and Chi2 tests, we cannot reject the hypothesis of equal mean values of socio-economic variables for the two frames for each of the three populations, i.e., general public, SEPA bureaucrats, and recreational anglers. More specifically, we used a t-test to test difference in mean age and mean income, while difference in the share of females and university-educated respondents were tested using a chi-squared test of independence. The samples of Homo Economicus and Homo Politicus are well comparable within each group. However, our samples of the general public deviate from the general population living in western Sweden. More specifically, the share of males and university-educated, and the mean age and income, are

significantly higher compared to the general population.[7] Thus, later in MWTP calculations we will adjust the estimation by using the population means for the observable characteristics mentioned above instead of sample statistics.[8]

### *6.2. Choice Experiment Results*

A random parameter logit model using the simulated maximum likelihood method is used to analyze responses in the CE (for details, see Train, 2003.). All non-monetary attributes were estimated as random parameters and the parameters are assumed to be normally distributed and vary over decision-makers. We keep the price attribute fixed as the distributions of the MWTPs are then also normally distributed. Because we assume that utility is linear in the attributes, the MWTP is calculated as the ratio between the attribute parameter and the cost parameter. Tables 2 and 3 report the coefficients of the random parameter models, and the average MWTP estimates for the three populations. The results are also separated between the two frames: estimates of the Homo Economicus group are shown in Table 2 and estimates of Homo Politicus in Table 3.

[7] The share of females is 44% in the Homo Economicus sample and 46% in the Homo Politicus sample, while the corresponding population value is 49.5 % (Statistics Sweden 2015a). The shares of university educated are 49 % and 47% respectively, while the population value is 20% (Statistics Sweden 2015b). The mean age is 54 years in both samples, while the population mean value is 47 years (Statistics Sweden, 2015c). The mean income value in our sample is about 28,000 SEK per month, while the population mean income is 22,400 SEK (Statistics Sweden 2104). Sample representatives are assessed by bootstrapping the samples, which facilitates comparisons between sample and population means using percentile tests. The significance is calculated at the 5% level.

[8] The general public data is estimated with interaction terms between the attributes and socio-economic variables that are not representative (i.e., gender, age, university education, and income). The MWTPs are estimated by using the real population means.

**Table 2. Homo Economicus - Results of Random Parameter Logit Model and Corresponding MWTP Estimates.**

| Frame: Homo Economicus | | | | | | |
|---|---|---|---|---|---|---|
| | | General public | Recreational anglers | | SEPA | |
| | Coeff. | MWTP [95% C.I] | Coeff. | MWTP [95% C.I] | Coeff. | MWTP [95% C.I] |
| **Attributes** | | | | | | |
| Increase of Cod Stock | 0.015** | 0.25 [-0.29; 0.79] | 0.008*** | 2.00*** [1.10; 2.89] | 0.0180** | 3.04** [0.38; 6.04] |
| Fishing Restriction: Stop fishing policy | 0.216 | -111.79*** [-143.95; -79.63] | -1.256*** | -306.80*** [-387.44; -226.16] | -0.395 | -67.07 [-180.24; 46.10] |
| Cost Sharing: Percentage of income | 0.628** | 118.91*** [89.57; 148.24] | 0.459*** | 112.04*** [61.92; 162.16] | 0.422* | 71.56 [-270.22; 413.34] |
| Price | -0.006*** | | -0.004*** | | -0.006*** | |
| Intercept | -8.276*** | | -12.108*** | | -69.811 | |
| **Attributes x socioec. variables** | | | | | | |
| Cod*female | -0.009*** | | | | | |
| Cod*university | 0.004 | | | | | |
| Cod* Age | -0.0002** | | | | | |
| Cod*income | 0.000 | | | | | |
| Stop*female | -0.187 | | | | | |
| Stop*university | -0.165 | | | | | |
| Stop* Age | -0.018*** | | | | | |
| Stop*income | 0.001 | | | | | |
| Percentage*female | 0.273** | | | | | |
| Percentage *university | 0.155 | | | | | |
| Percentage * Age | 0.004 | | | | | |
| Percentage *income | -0.011** | | | | | |
| **St.dev** | | | | | | |
| Increase of Cod Stock | 0.022*** | | 0.018*** | | 0.028*** | |
| Fishing Restriction.Stop fishing policy | 1.633*** | | 1.836*** | | 0.812** | |
| Cost Sharing: Percentage of income | 1.189*** | | 0.840*** | | 0.104 | |
| | | | | | | |
| Pseudo R2 | 0.395 | | 0.433 | | 0.442 | |
| Observations | 5315 | | 1943 | | 259 | |

95% confidence intervals in parentheses. 1,000 Halton draws used to estimate RPL. Confidence intervals are calculated using Krinsky-Robb method with 2,000 draws.
*** = significant at 1% level, **= significant at 5% level, and *= significant at 10% level.

## Table 3. Homo Politicus, Results of Random Parameter Logit Model and Corresponding MWTP Estimates

| | Frame: Homo Politicus | | | | | |
|---|---|---|---|---|---|---|
| | General public | | Recreational anglers | | SEPA | |
| | Coeff. | MWTP [95% C.I] | Coeff. | MWTP [95% C.I] | Coeff. | MWTP [95% C.I] |
| **Attributes** | | | | | | |
| Increase of Cod Stock | 0.007 | 0.20 [-0.36; 0.77] | 0.009*** | 1.99*** [1.17; 2.81] | 0.034*** | 3.19*** [1.56; 4.81] |
| Fishing Restriction: Stop fishing policy | -0.183 | -140.76*** [-177.10; -104.42] | -0.994*** | -212.70*** [-275.25; -150.14] | -0.827* | -77.39** [-153.21; -1.57] |
| Cost Sharing: Percentage of income | 1.113*** | 155.88*** [122.80; 188.96] | 0.561*** | 120.06*** [72.95; 167.16] | 0.609* | 57.02 [-29.32; 143.36] |
| Price | -0.005*** | | -0.005*** | | -0.011*** | |
| Intercept | -10.771*** | | -9.903*** | | -27.192 | |
| **Attributes x socioec. variables** | | | | | | |
| Cod*female | -0.002 | | | | | |
| Cod*university | 0.006*** | | | | | |
| Cod* Age | -0.0001* | | | | | |
| Cod*income | 0.000 | | | | | |
| Stop*female | -0.104 | | | | | |
| Stop*university | -0.031 | | | | | |
| Stop* Age | -0.009** | | | | | |
| Stop*income | -0.0002 | | | | | |
| Percentage*female | -0.136 | | | | | |
| Percentage *university | 0.187* | | | | | |
| Percentage * Age | -0.003 | | | | | |
| Percentage *income | -0.009** | | | | | |
| **St.dev** | | | | | | |
| Increase of Cod Stock | 0.013*** | | 0.021*** | | 0.038*** | |
| Fishing Restriction.Stop fishing policy | 1.273*** | | 1.917*** | | 1.398*** | |
| Cost Sharing: Percentage of income | 0.923*** | | 1.128*** | | 0.600 | |
| Pseudo R2 | 0.399 | | 0.423 | | 0.492 | |
| Observations | 5394 | | 1912 | | 231 | |

95% confidence intervals in parentheses. 1,000 Halton draws used to estimate RPL. Confidence intervals are calculated using Krinsky-Robb method with 2,000 draws. ** = significant at 1% level, **= significant at 5% level, and *= significant at 10% level.

Overall, if we start by looking at the signs of the MWTP estimates in Tables 2 and 3, we see that for each attribute the sign is the same across the different populations as well as across the two frames.[9] There are, however considerable differences in the size of the MWTPs, especially between the populations. We will give some examples here and cover the details in subsequent sections where we also test whether the differences are statistically significant. Notably, the general public's MWTP for cod is insignificant, while the corresponding amounts by recreational anglers and SEPA bureaucrats are about 2 and 3 SEK per month.10 Considering the fishing policy, in the role of Homo Economicus, the general public is willing to pay on average 112 SEK/month to implement the trawl boundary policy instead of the fishing ban. Recreational anglers' average MWTP to implement the trawl boundary policy is three times larger, namely 307 SEK/month, while the MWTP for SEPA bureaucrats' is statistically insignificant (with a value of -67 SEK/month). Hence, we observe that restricting non-commercial fishing instead of commercial fishing has negative welfare implications for both the general public and the recreational anglers, while SEPA administrators do not seem to distinguish between whether the restriction affects commercial or non-commercial fishing.

Finally, how the costs will be shared is important for both the general public and recreational anglers. Both groups have WTP over 100 SEK/month for cost sharing based on percentage of income instead of based on absolute amount of income. These results provide support that the general public and the anglers are more accurately depicted as Homo Politicus compared to Homo Economicus. We also find support for our hypothesis that, in both roles, cost sharing is of less importance to the SEPA bureaucrats; their average MWTP for the cost sharing principle is not significantly different from zero. We also note that, for the general public, the interaction term income*cost sharing is negative and significant in both roles, showing that the higher their income, the less supportive people are of percentage cost sharing, compared to the alternative that everybody pays the same amount.

[9] The only exception is the positive sign of the coefficient of the "stop fishing policy" attribute in the general public sample in the role of Homo Economicus. This coefficient is, however, insignificant.

[10] When including only male respondents from the public sample, the mean MWTP for cod in the role of Homo Economicus is three times larger than the mean MWTP for cod of the whole Homo Economicus sample (MWTP of males is 0.64 and significant at the 10% level). See Table A1 in the appendix.

The standard deviations of the random parameters are highly significant, indicating that there is unobserved heterogeneity in preferences. If one expects that the SEPA bureaucrats who work with environmental problems are quite homogeneous in their preferences, one is in for a surprise. The results show that the standard deviations of the random parameter coefficients are sizable, indicating that their preferences are rather heterogeneous. This means that policy recommendations of the bureaucrats vary from bureaucrat to bureaucrat.

So far, we find considerable differences in MWTP across the samples. The preferences of SEPA bureaucrats concerning an increase of the cod stock seem closer to an interest group such as the recreational anglers than to the general public. However, we need to test whether differences in average MWTP are statistically significant between the populations and within each population between the two framings. Statistical significance is evaluated using the two-sided z-tests and the results are shown in Tables 4, 5 and 6 in the following sub-sections.

### *6.3. Differences between the Two Roles (within Populations)*

Table 4 shows the difference for each population with respect to framing, i.e., do respondents change preferences when they are asked to choose as Homo Politicus compared to when they are asked to choose as Homo Economicus?

**Table 4. Difference in MWTP Estimates between the Two Framings**

| Framing: Homo Politicus – Homo Economicus | Population | | |
|---|---|---|---|
| | **General Public** | **SEPA** | **Recreational anglers** |
| Increase of Cod stock | -0.05 | 0.15 | -0.01 |
| Fishing Restriction: Stop fishing policy | -28,97 | -10.32 | 94.11* |
| Cost sharing: Percentage of income | 36.97$^{+}$ | -14.54 | 8.02 |

*** = significant at 1% level, **= significant at 5% level, and *= significant at 10% level. + = borderline insignificance, the p-value is 0.101

For the SEPA bureaucrats, there are no significant changes at all. Remember that the population of SEPA bureaucrats was the only one that did not have a significant MWTP regarding how the costs of the public good should be shared. Hence, this could be an indication of that SEPA bureaucrats hold a single Homo Economicus preference ordering and focus mostly on reaching environmental goals, giving less attention to

possible distributional consequences of the improvements. This is also partly in line with the findings in Carlsson et al. (2011) that a majority of bureaucrats motivate their policy decisions on what is best for ecological sustainability and what would be appreciated by future generations, and that only a minority of bureaucrats are concerned with taking decisions that are in line with people living today.11

Regarding the harshest fishing restriction, the general public and SEPA bureaucrats do not differ significantly, while the recreational anglers do. In the role of Homo Economicus, they have on average a very high MWTP to implement the trawl boundary policy. However, when asked to answer as Homo Politicus, their MWTP decreases by one-third, i.e., as Homo Politicus, they are significantly less negative about a fishing ban. Looking at the general public, we also find one clear difference. When asked to answer as Homo Politicus, the general public has a 37 SEK higher MWTP for sharing the costs based on percentage of income, compared to the rule that everybody would pay an equal amount irrespective of income level. However, the difference is not significant but only close to significant (the p-value is 0.101). These two differences provide only weak evidence in favor of the multiple preference orderings hypothesis. However, it is worth noting that the decrease in MWTP among anglers for the attribute that captures fishing restrictions is substantial and occurs in an attribute where their self-interest is probably the largest.

### *6.4 Differences between Populations (in Identical Roles)*

Starting with the differences between SEPA and the two other populations, in Table 5 we see that, in the role as Homo Economicus, the SEPA bureaucrats have significantly higher MWTP for increasing the cod stock compared to the general public (the difference between the groups is 2.79 SEK/month, meaning 12 times higher MWTP) and are significantly more positive about a fishing ban compared to the recreational anglers (difference = 239.73SEK/month). We note that recreational anglers compared to the general public have significantly higher MWTP for an increase in cod stock and they are willing to pay significantly more to avoid a fishing ban.

11 An alternative explanation could be that we simply had too weak a framing to detect the multiple preference orderings.

**Table 5. MWTP Measures Given the Role of Homo Economicus**

| | Population | | |
|---|---|---|---|
| | **General Public – SEPA** | **General Public -- Recreational anglers** | **SEPA - Recreational anglers** |
| Increase of Cod stock | -2.79* | -1.75*** | 1.07 |
| Fishing Restriction: Stop fishing policy | -44.72 | 195.01*** | 239.73*** |
| Cost sharing: Percentage of income | 47.35 | 8.87 | -40.48 |

*** = significant at 1% level, **= significant at 5% level, and *= significant at 10% level.

Table 6 shows that most of the results remain the same when a respondent is asked to answer as a Homo Politicus. One exception is that the general public has significantly higher WTP for cost sharing based on percentage of income compared to the SEPA bureaucrats. As the recreational anglers are willing to pay less to avoid a fishing ban when they are in the role of Homo Politicus, we note a 63% reduction in the difference in MWTP of the general public and recreational anglers, from 195 to 72 SEK/month. Tables 5 and 6 confirm our hypothesis that SEPA bureaucrats have significantly higher MWTP for an increase of the cod stock; they clearly differ from the general public, while they are not significantly different from the special interest group of recreational anglers.

**Table 6. MWTP Measures Given the Role of Homo Politicus**

| | Population | | |
|---|---|---|---|
| | **General Public - SEPA** | **General Public - Recreational anglers** | **SEPA - Recreational anglers** |
| Increase of Cod stock | -2.99*** | -1.79*** | 1.20 |
| Fishing Restriction: Stop fishing policy | -63.37 | 71.94* | 135.31*** |
| Cost sharing: Percentage of income | 98.86** | 35.82 | -63.03 |

*** = significant at 1% level, **= significant at 5% level, and *= significant at 10% level.

### *6.5. Can Background Characteristics Explain Differences in MWTP between Populations?*

As shown in Tables 2 and 3, several socio-economic variables, such as age, education and gender, have significant impact on preferences in the general public sample. Do the significant differences between the three populations persist even if we control for differences in background characteristics? In this section, we explore whether

the differences in MWTP between the general public and SEPA bureaucrats as well as between the general public and recreational anglers can be explained by observable differences in socio-economic characteristics. We re-estimate MWTP for the general public, controlling for the same shares of females and university-educated respondents as well as the same mean age and mean income. Potential differences in MWTP between the populations are tested using two-sided z-tests. The results are shown in Table 7.

**Table 7. Comparisons of MWTP between General Public and SEPA Bureaucrats and General Public and Recreational Anglers Based on Sample Statistics of SEPA Bureaucrats/Recreational Anglers in Both Roles**

| | **General public-SEPA** | **General public-Recreational Anglers** |
|---|---|---|
| | Homo Economicus | Homo Economicus |
| Increase of Cod stock | -2.76* | -1.42*** |
| Fishing Restriction: Stop fishing policy | -96.60 | 175.82*** |
| Cost sharing: Percentage of income | 59.31 | -19.41 |
| | Homo Politicus | Homo Politicus |
| Increase of Cod stock | -2.71*** | -1.84*** |
| Fishing Restriction: Stop fishing policy | -64.20 | 60.41 |
| Cost sharing: Percentage of income | 64.21 | 34.29 |

*** = significant at 1% level, **= significant at 5% level, and *= significant at 10% level. 1,000 Halton draws used to estimate RPL.

The results in Table 7 confirm the findings reported in Tables 5 and 6. The MWTP of the SEPA sample are significantly larger for the cod attribute regardless of whether a respondent has answered as Homo Economicus or Homo Politicus. Thus, the fact that SEPA bureaucrats have a much higher MWTP for the cod attribute persist after controlling for differences in socio-economic characteristics. The only change between the MWTP with and without adjusting for differences in socio-economic characteristics is a difference in the cost sharing principle: the percentage of income in the Homo Politicus role becomes insignificant

Similarly, we also test whether the differences between the general public and the recreational anglers could be explained by differences in socio-economic characteristics. This is especially important for two reasons. First, almost all of the recreational anglers in

our sample are males. Second, male respondents from the public sample have three times higher mean MWTP for the cod attribute (MWTP is 0.64 SEK and becomes significant at the 10% level) in the role of Homo Economicus than the mean MWTP for the cod attribute of the whole Homo Economicus sample (See Appendix 1).12

The overall picture from the z-tests shows that the differences between the general public and recreational anglers persist. The recreational anglers still have significantly higher average MWTP for the cod attribute (actually three to thirteen times higher) and are willing to pay significantly more to avoid a fishing ban, compared to the general public. However, for the general public in the role of Homo Economicus, the preferences for the cod attribute are now clearly stronger than the corresponding results in Table 2. The MWTP for the cod attribute is now 0.582 SEK and significant at the 5% level; the results are available on request. This result is in line with the results from the model with a representative subsample of general public males. We therefore conclude that gender can partly, but not completely, explain the differences in preferences between respondents from the general public and recreational anglers.

## 6. Conclusion

The environmental problem we study in this paper is the abundance of coastal cod along the western Swedish coast. We use an identical choice experiment (CE) for Swedish EPA bureaucrats (SEPA), recreational anglers in western Sweden, and a random sample of the general public in western Sweden. Each group is split into two subsamples, where one part is asked to make choices in accordance with their opinion, i.e., as Homo Economicus, while the other half is asked to recommend a decisive fishing policy in the role of a civil servant, i.e., as Homo Politicus. The latter framing is intended to induce a feeling of responsibility beyond oneself and Homo Economicus.

[12] The share of university-educated males, and the mean age and mean income of male respondents, are all significantly higher in the general public sample compared to the public male population. Thus, the MWTP calculations are adjusted by using the population means for education level, income and age instead of sample statistics. The correct sample statistics are as follows: 17.2 % of males living in western Sweden have at least three years of university education (Statistics Sweden, 2015b), the mean age is 46.3 years (Statistics Sweden 2015c), and the mean income 25.700 SEK/ month (Statistics Sweden 2014).

We test whether we can confirm the previously found preference gap between the SEPA bureaucrats and the general public. In addition, our study is the first one to control for the potential existence of multiple preference orderings, which potentially could be important, as shown in the theoretical framework.

Our results indicate that we should not expect Swedish EPA bureaucrats to represent the general public when they design environmental policies. In line with the only previous study (Carlsson et al. 2011) that compares the preferences of environmental bureaucrats and the general public, we find that Swedish EPA bureaucrats have substantially higher MWTP for reaching the environmental objective of concern in our study. Most of the differences we found between the populations are robust, i.e., they exist independently of whether the Homo Economicus or the Homo Politicus frame was used. For example, we find that both SEPA bureaucrats and recreational anglers have substantially higher MWTP for improving the coastal cod stocks, compared to the general public. In fact, the MWTP of the SEPA bureaucrats is 12-16 times higher than that of the general public. In line with their self-interest, recreational anglers also have a higher MWTP to avoid a complete fishing ban along the coastline (which would affect recreational fishing) and instead move the trawl boundary farther out from the coast (which would affect commercial fishing), compared to both the general public and SEPA bureaucrats. SEPA bureaucrats in their turn do not seem to distinguish between whether the restriction affects commercial or non-commercial fishing. We also investigate whether the differences in MWTP between the three populations depend on differences in socio-economic characteristics and conclude that, in general, the differences persist and are large in magnitude when these factors are controlled. Thus, we conclude that the significantly stronger reported preferences for improvement of the cod stock and introduction of fishing restrictions are due to different actual preferences and not due to different levels of education, age or income level.

Do we find any evidence of multiple preference orderings, i.e., do we find observable differences in preferences between the two frames? The answer is yes, but to a very limited extent. The only significant and substantial result is that the recreational anglers in the role of Homo Economicus have on average a very high MWTP to implement a trawl boundary policy instead of a fishing ban, but, when asked to answer as Homo Politicus, they reduce their MWTP by one-third. Thus, they clearly act less in line with their self-interest and become significantly less negative toward a fishing ban when they step into the role of Homo Politicus.

A third lesson from our study is that the general public and the recreational angler respondents find it very important how the burden of the cost to finance the environmental good is shared. This is clearly not in line with Homo Economicus but more so with the Homo Politicus models (Nyborg 2000). On the contrary, we did not find significant preferences for different cost sharing principles among SEPA bureaucrats, who seem more focused on improving the environment than on how the burden of cost is shared. Notably, this is very much in line with what one would expect from Homo Economicus.

Our overall impression is that SEPA bureaucrats are foremost devoted to reaching Swedish environmental objectives for the marine environment. This devotion is expressed as a significantly higher MWTP for improved cod stocks, compared to the public, and in line with the special interest group recreational anglers. From a normative perspective, it is, of course, not necessarily bad that the preferences of SEPA bureaucrats are not in line with the preferences of the general public, as it is not self-evident that preference satisfaction ensures good environmental policies. However, it is worth noting that the preferences of the SEPA bureaucrats are heterogeneous, meaning that a policy recommendation may differ from one bureaucrat to another.

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## Appendix

**Table A 1. The MWTP Estimates of Male General Public Respondents in Both Roles. Comparisons with the Results of Anglers.**

| | MWTP male general public | MWTP male general public – recreational anglers |
|---|---|---|
| | **Homo Economicus** | |
| Increase of Cod stock | 0.64* [-0.11-1.39] | -1.356** |
| Stop fishing policy | -94.35*** [-135.84- -52.86] | 212.449*** |
| Cost sharing: Percentage of income | 96.68***[58.49-134.86] | -15.361 |
| Number of obs. | 2986 | |
| Number of respondents | 605 | |
| | **Homo Politicus** | |
| Increase of Cod stock | 0.41 [-0.41-1.22] | -1.583*** |
| Stop fishing policy | -137.47*** [-187.82- -87.11] | 75.231* |
| Cost sharing: Percentage of income | 162.95*** [118.70- 207.20] | 42.90 |
| Number of obs. | 2928 | |
| Number of respondents | 592 | |

95% confidence intervals in parentheses. *** = significant at 1% level, **= significant at 5% level, and *= significant at 10% level. 1,000 Halton draws used to estimate RPL.