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Maximizing and satisficing in a choice model based on time allocation

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Abstract. It has been suggested in the literature of social psychology that consumers that search exhaustively for the best option of a product in the market -called maximizers- eventually feel worse than those that just look for something good enough -in turn, satisficers-. We address this striking phenomenon using a formal framework for consumer rational choice relaying on time allocation which accounts both for maximizers and satisficers. By means of a numerical analysis of the model for a case study with real market prices, we show that satisficers that do not check all available options typically are better off than maximizers exploring all market alternatives, despite maximizers get a better deal in the market.

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1. The model

We assume that the consumer behavior in the market is implicitly determined by her management of time subject to some natural constraints. This is the framework that was adopted in the model introduced in [1] and that we also consider here. The basics of the model are explained next. A consumer decides about how to spend her total available time (T) in three different rival uses of time, so she must fulfill the time constraint

$$T_s + T_f + T_w = T, \quad T_s, T_f, T_w \geq 0, \tag{1}$$

where T_s is shopping time, T_w is working time, and T_f is non-working time, or free time.

The consumer typically finds a large number of market options for every product. We focus on her decision about acquiring a single product among N alternatives offered in the market. A maximizer –looking for the best option– will check the total number of N product alternatives. A satisficer, however, will check a smaller number of alternatives to make her buying decision. Let a denote the fraction of the total set of options which a consumer decides to check *ex-ante*, so that $n = aN$ is the number of options actually checked by the consumer. We may think of $0 \leq a \leq 1$ as the strategy adopted by the consumer to address the purchase problem, so that $a = 1$ corresponds to a maximizer and $0 < a < 1$ refers to a satisficer. Notice that there is a whole class of satisificers. An optimal choice of a will be implicitly obtained by comparing the welfare status of different satisficers after solving their time allocation problem.

The consumer's total expenditure is bounded from below by some quantity G which is clearly a function of the number of checked options n, $G = G(n)$. The consumer problem is thus subject to the budget constraint

$$G(n) \leq wT_w + V, \tag{2}$$

where w is the wage rate per unit of working time (T_w), and V is non-working income or savings. Since $G(n)$ represents the best deal for the searched product, it depends in a non-increasing fashion on n.

There is incentive to look for more options and consequently to spend more time searching in the market because the best price decreases as the number of seen options increases. On the other hand, searching for more options is time consuming. Let $\tau = \tau(n)$ denote the minimum shopping time that is necessary to find and evaluate n options of the product. The consumer problem must fulfill the time constraint

$$T_s \geq \tau(n). \tag{3}$$

Notice that the shopping time floor defined by $\tau(n)$ may depend on the search efficiency of the consumer, and also on the organization of the market of the product. In general, it may be assumed that $\tau(n)$ is a non-decreasing function of n.

Since consumer's welfare eventually depends on the way she decides to use her time, her welfare can be written as a function

$$U\left(T_s, T_f, T_w\right). \tag{4}$$

Under standard rational behavior, the consumer seeks to maximize her welfare. Therefore, the consumer solves an optimization problem in which she determines the time distribution (T_s, T_f, T_w) that maximizes her welfare function (4) subject to constraints (1), (2), and (3).

2. Data and methods

Given N different versions of the product –the market size–, we solve numerically the time allocation problem above as a function of the number n of checked alternatives. We consider a consumer with balanced preferences about time uses, specifically we take utility defined by $U(T_s, T_f, T_w) = a_1 \log(T_s) + a_2 \log(T_f) + a_3 \log(T_w)$, with $a_1 = 0.25$, $a_2 = 0.50$, $a_3 = 0.25$. Regarding search behavior, we assume that the individual spends a time inspecting each option which is independent of the number of options previously checked and uniformly distributed on the time interval $[0, 2]$, which amounts to spend one hour on average exploring each alternative. This assumption implies that the shape of the search cost function $\tau(n)$ in (3) is linear. This setting corresponds to the case of a typical consumer profile considered in [1] (see the case #1 therein).

Our numerical analysis here makes use of the algorithm in [1] and follows similar lines. In order to compare the satisficer and maximizer responses with respect to different market sizes of the product market, we solve five different problems using the same price data. Price data correspond to tours around Europe that can be obtained on the internet at some popular travel website. We use the same dataset obtained in [1] by processing raw data from a very popular US travel website. Our numerical experiments are defined from five random samples of the total number of original data prices, which is 319. These samples may be thought of as five possible scenarios or market sizes that a consumer may face when searching for the product (trips around Europe). The five cases that we consider correspond with the percentiles 10, 20, 40, 80 and 100 of the total number of 319 prices. The length of each price sample plays the role of N in the model explained in section 2., so that the total number of options in the five exercises are $N = 32, 64, 128, 256, 319$. The variable n of the model runs from 1 to N in each case.

3. Results

Figure 1 shows how welfare changes with n for each case of market size. In each scenario, it is observed that welfare decreases beyond a certain number of options n^* which depends on N. The precise output values of the analysis are gathered in table 1. A maximizer's strategy ($a = 1$) produces optimal welfare only for the minimal market size ($N = 32$). For a larger market size –the other four cases– it is a satisficer's strategy (checking a certain fraction

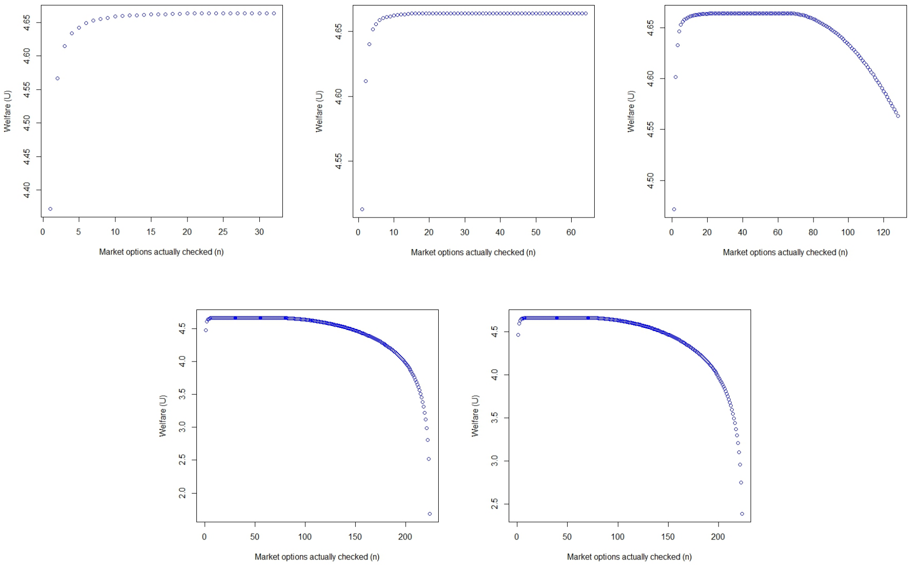

Figure 1: Welfare (U) vs. the number of options checked by the consumer (n) when $N = 32$ (percentile 10, top-left), when $N = 64$ (percentile 20, top-centered), when $N = 128$ (percentile 40, top-right), when $N = 256$ (case percentile 80, bottom-left), and when $N = 319$ (case percentile 100, bottom-right).

$0 < a* < 1$ of all options) what gives the best welfare status. It is worth noticing that, when a satisficer is better off (in all cases but $N = 32$), he is so despite he gets a worse deal for the product in the market (see table 1). A formal mathematical model thus provides evidence to support the striking fact that ‘maximizers do better but feel worse”, which has been claimed in the literature of social psychology [2]. Notice that this phenomenon takes place for choice sets that are relatively small.

It is also apparent from table 1 that the optimal number of checked options does not necessarily increase as the number of total options increases. This pattern can be seen in figure 2. In turn, the optimal fraction of seen options is strictly decreasing beyond some number of options, as it is shown in figure 2.

N	n^*	a^*	$G(n^*)$	$G(N)$
32	32	1.00	1799.00	1799.00
64	57	0.89	1650.19	1629.00
128	58	0.45	1708.35	1629.00
256	56	0.22	1730.70	1632.62
319	56	0.18	1730.99	1638.03

Table 1: Numerical results

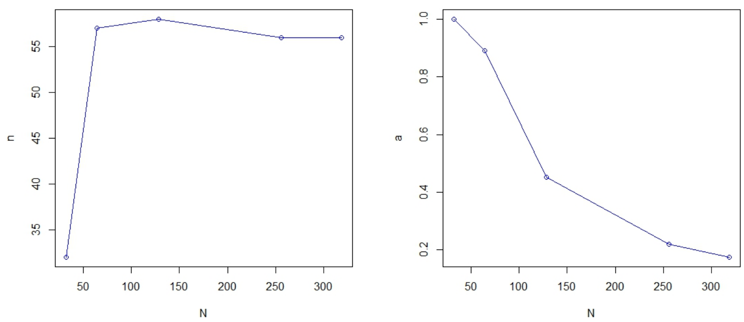

Figure 2: Optimal number of options actually checked n^* vs. number of given options N (left) and optimal fraction a^* vs. number of given options N (right) for $N = 32, 64, 128, 256, 319$.

4. Conclusions

The numerical analysis of a choice model based on rational time allocation indicates that, when facing a large choice set, a typical consumer with balanced preferences on time uses and with linear search cost will be better off when satisficing -by looking over a smaller subset of options- rather than when maximizing -searching over the whole choice set. Specifically, for choice sets sufficiently large satisficers are better off than maximizers, whereas for smaller choice sets maximizers feel better. Also, the optimal number of options that the satisficer looks does not necessarily increase -but typically stabilizes- as the size of the choice set increases. The analysis implies that, for large choice sets, satisficers are better off despite of the fact that they are paying a higher price for the product. The model in this paper thus provides a formal framework for the so-called paradox of choice in social psychology, namely that maximizers do better but feel worse.

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