Experimental Method For Studying Habitual Behavior In Food Consumption

Naziha Kasraoui

Abstract: To investigate the process of habit formation in everyday life, a sample of 126 participants (students) chooses an eating and drinking for three periods (weeks). They completed the self-report habit each period and we have recorded their choices. All participants provided sufficient data for analysis and collected experimental data were examined over the study periods (3 weeks). Experimental analysis was used to examine the persistence of habit formation process in the behavior of participants. The game is carried out with 126 students and repeated for three periods. Using experimental laboratory data approach and economic analysis (elasticity), results show that into the presence of labor income and for 126 students, of whom approximately 70% showed that habit formation process is persist in their behaviors along the three periods. The rest (30% of them) who don't present habit formation in their behavior for the three periods did not materially affect our conclusion about the assumption of habit formation process. Participants to the game persistently spend too much in early periods, they learn rapidly from their own experience to consume the same choice of meals and drinks. Their spending is closely linked to optimal consumption (non conditional on earlier spending) and they choose the same basket of goods in the future horizon, which shows that there's a habit formation in the behaviors of participants.

Keywords: Habit formation process, Consumption, Experimental method, Statistics analysis, Economic analysis, Tunisia.

————————————————————◆————————————————————

1 INTRODUCTION

At the beginning, the literature on the theory of consumption reviewed with an insistence on several assumptions. Samuelson & Paul (1969) and Breeden (1979) suppose that the consumer's choices are separable [1], [2]. They show using the economic models certain stability in the series of consumption. The report of a smooth consumption in time calls into question this first assumption and supposes that the preferences in the behavior of the consumer are no separable. Ferson & Constandides (1991), Deaton & Muellbauer (1992) and Carroll & Kimball (1994) using an econometric approach, found contradictory results [3], [4], [5]. Thus, they could not check the assumption of the habit formation. In the field of consumption and insurance, the preferences are no separable [6]. To check this assumption, the latter introduced in an explicit way the formation of the habit formation into the model of optimization. However, the work of Ben-Arab et al. (1997) remained limited in so far as they do not have to validate the found theoretical results. From the literature quoted previously, one noted two major problems: the first feature with consumption and the second feature with the combined effect of consumption and the insurance. Thus, the problem of our paper relate to the training of the habit formation in the behavior of the consumer. Then, the first object of our paper is to check the assumption of the habit formation in the behavior of the consumer on a side in the field of consumption and other side in the field of consumption and insurance. The second object of this paper is to demonstrate how the experimental method can be used to describe habitual behavior in food consumption [7].

————————————————————

- *Dr. Naziha Kasraoui, Associate professor in Management*
- *E-mail: kasraouiisg12@yahoo.fr Laboratory of International Finance Group Code: UR 13ES221, Tunisia*

This paper is structured as follows. Section 2 compares between the three approaches which we shall use in the study. Section 3 describes the used statistical methods in this paper. Statistical analysis and results are presented in section 4. Different types of results are given in this section to confirm our reports on the existence of habit formation in the consumer's behavior. Section 5 gives an economic analysis to understand the habit formation in the behavior of the subjects. Conclusion and discussion are presented in the last section.

2 VARIOUS APPROACHES OF HABIT FORMATION MEASUREMENTS

Admittedly, the review of literature quoted previously carries out us to propose a tabular of classification of the various approaches used to study the habit formation in the behavior of the consumer. For that, we propose a detailed table in which one classifies the various approaches which were used to measure the habit formation as well as the limits and the differences on the level of the results which can exist between these approaches.

TABLE 1: COMPARING BETWEEN THREE APPROACHES

Economic approach	Econometric approach	Experimental approach
Economic Model	Econometric model	Model of optimization
Separable preferences	No separable preferences	No separable preferences
Failed of economic model	Failed of econometric model	Success of method

Table 1 show that neither the economic approach, nor the econometric approach could show the persistence of the habit formation in the behavior of the consumer. All the studies which were carried out the assistance of these two approaches led either to weak results on the level of interpretation, or with contradictory results on the level of the assumption of the habit formation. This shows that, using these two approaches, the authors could not affirm the assumption of the habit formation in the behavior of the consumer. Conversely, Ben-Arab et *al.* (1997) used an experimental approach based on a model of optimization

50

through which they showed and affirmed within a theoretical framework the assumption of the habit formation. However, the work of Ben-Arab et al. (1997) remains limited and was never validated empirically.

3 MATERIALS AND METHODS

3.1 Study area and sample
Our study is based on three experiences which took place in three different laboratories for experimental economics for three different periods at the high institute of Tunis, Sousse and Jendouba. The laboratories are equipped with computers linked to a central network on which we have planned the game. Following an announcement inside the department of management, in three institutes, a sample of 126 students participated in the game. Thus, a sample of 35 students from the University of Tunis, a sample of 60 students from the University of Sousse and a sample of 31 students from the University of Jendouba participate in the game. Since we are interested to identify the habit formation at the behavior of consumers, the experiment game was repeated for three times.

3.2 Experiment procedure and data collection
For each experiment, each student has 3 dinars as a budget. For the three experiences, we have spent more than 1134 dinars. Each of the three experiences took place at lunch time, and the students were asked to make their choice from menu. At the end of the game, they are assumed to consume the menu of the first period. Those relative to the second and third period one are served respectively the same day of the successive two weeks. Each of the three experiments that lasted 45 minutes took place at mind time of the day. The choice of the time is not arbitrary as explained above; it is related to the nature of game.

TABLE 2: MEALS AND DRINKS WHICH PRICES VARY ACROSS THE THRRE EXPERIMENTS

Meals & Drinks	Experiment 1	Experiment 2	Experiment 3
Tuna& French Fries	1.600	1.900	2.100
Escallop	2.400	2.100	1.800
Cheese French Fries	1.500	1.700	1.900
Coca/ Boga	0.700	1.000	1.200
Water	0.500	0.700	0.900

To capture the habit formation form, each of the three experiences was repeated after which the game is reinitiated. Then to achieve conditions close to real allocation budget, at the beginning of each experiment we grant for every student 3 dinars per period and propose to them a basket of consumption goods made of meals and drinks. According to their relative prices allowed to vary across the period for each experiment to detect the persistence of habit formation for each subject [8], (see table 2). In order to help the subject not to waste anything of his budget, additional information appeared on the screen, showing the meals and the drinks. This information clearly helped the subject avoid an annoying trial-and error mechanism. Subjects could spend as much time as they like on their decisions and were free to compare, reconsider and correct choices already made.

4 STATISTICAL ANALYSIS
A data base was conceived with SPSS (version 8.0) using the individual and the subject responses as statistical unit. Data were entered and checked. The distribution of data response was performed in order to study the presence of habit formation in the behavior of consumer. The results obtained starting from this play is in a number of two: The first is concern habit formation in food consumption for each of the three experiences. The second is related to the change in the behavior of the consumer with varying price of foods.

4.1 Experiment 1
To exhibit habit formation in the behavior consumption, having a fixed income, even if the prices vary across the period, we should observe almost the same choice of basket of goods. For the first experience, among three varieties of meals and two varieties of drinks, table 3 shows that 67 students choose Tuna & French Fries which correspond to 53.17% of choices.

TABLE 3: FREQUENCY OF MEALS AND DRINKS CHOICES FOR 126 STUDENTS STUDIED IN THE FIRST PERIOD

Maels & Drinks	Number of choice	Frequency (%)
Tuna & French Fries	67	53 .17
Escallop	28	22.23
Cheese & french Fries	31	24.60
Total	126	100
Coca/ Boga	102	80.95
Water	24	19.04
Total	126	100

For the drinks, we observe that 102 students choose Coca or Boga and 24 students choose water which corresponds to 80.95% and 19.04% respectively. This means that most of students whose participate to the game prefer Tuna & French Fries as meals and Coca or Boga as drinks.

4.2 Experiment 2
Note that students whose participate to the game divided in three experiments are the same and are identified with their code in order to control their choices along the three periods.

TABLE 4: FREQUENCY OF MEALS AND DRINKS CHOICES FOR 126 STUDENTS STUDIED IN THE SECOND PERIOD

Meals & Drinks	Number of choice	Frequency (%)
Tuna & French Fries	71	56.34
Escallop	34	26.98
Cheese & French Fries	21	16.66
Total	126	100
Coca/ Boga	96	76.19
Water	30	23.80
Total	126	100

The number 71 in table 4 is in reality a sum of 67 in table 1 plus 4 new students who choose Tuna 1 French Fries in the

51

second period. We adopt this method in order to compare choices in period 2 with choices in period 1. Then, we aimed to know if students who choose Tuna & French Fries in period 1 for example are the same or no in period 2. Then, from table 4 we can see along the two period that the percentage of choose the same basket of meals is augmented from 53% to 56%. This means that students choices are not depend on prices of meals but it depend on their preferences.

4.3 Experiment 3

To confirm the results found in the first and second experiment, a third experiment was carried out with the same subjects (126 students). As it is already previously mentioned, the prices of meals and drinks vary across periods. The goal of this second experiment is on the one hand to identify the phenomenon of habit formation in the behavior of consumption of the subjects with respect to the variation of prices of meals across the periods. Results of the third experiment where the price varies across the periods are reported in table 5. We can see along the three experiments that only three subjects change their choices between the second and the third period.

TABLE 5: FREQUENCY OF MEALS AND DRINKS CHOICES FOR 126 STUDENTS STUDIED IN THE THIRD PERIOD

Meals & Drinks	Number of choice	Frequency (%)
Tuna & French Fries	69	54.76
Escallop	29	23.01
Cheese & French Fries	28	22.22
Total	126	100
Coca/ Boga	81	62.79
Water	45	35.71
Total	126	100

We remark from table 5 that from period 1 to period three the number of subjects whose choose the same basket of meals is the same. This leads to the assumption that subjects (students) have a priori presence of habit formation in their behaviors. For the drinks, we make approximately the same conclusion.

5   ECONOMIC ANALYSIS

To understand the habit formation in the behavior of subjects, one must introduce the concept of elasticity price. Table 6 shows the calculate elasticity meal/price and drink/price for the three meals and two drinks relatively to each experiment. An elasticity meal/price or drink/price in the interval [0, 1] means that the request for this meal or this drink is inelastic and the subject chooses the same meal or same drink (habit formation) independely of the variation in meal or drink price. However, when elasticity is superior to the unit this means that the request is elastic. The subject in this case is sensitive to the variation of price of the meals or drinks and i twill choose a different meal or drink during the next period (no habit formation). Table 6 reports the calculated elasticity for the three meals and two drinks. Based on this table, we distinguish between 2 types of elasticity. When the Elasticity is in the interval [0, 1] for the three meals and two drinks in experiment 1 and 2, this means that the request does not vary when the price varies

which explain the persistence of habit formation in the behavior of the subjects in the case of experiment 1 and 2. The request of meals and drinks is not sensitive to the price and is maintained because subjects prefer to consume the same meal and drink in experiment 1 and 2. The result was changed in experiment 3 for Cheese & French Fries, Coca/Boga and water. The elasticity is superior to the unit. This means that a small change in the price of meals and drinks involves a great change of request.

TABLE 6: ELASTICITY ON THE DEMAND OF THREE MEALS AND TWO DRINKS OFFERED TO THE SUBJECTS FOR THE THRRE PERIODS

	Experiment 1	Experiment 2	Experiment 3
Tuna& French Fries	0.723	0.654	0.808
Escallop	0.503	0.237	0.123
Cheese& French Fries	0.078	0.521	1.045
Coca/ Boga	0.897	0.435	2.310
Water	0.034	0.145	1.312

The variation in the price of these meals and drinks changes decisions choices and the structure of consumption in the behavior of the subjects. The request in this case is elastic which means that few of the subjects change their choices in the future. Based on these results of elasticity, we conclude that in general the subjects present a habit formation in their behavior and their request is not sensitive to the variety of prices of meals which cannot redirect their choices in the future.

6   DISCUSSION AND CONCLUSION

From this paper, we can provide three types of results: The first result is based on descriptive statistics (frequency) and it concerns the experimental results. The number of subjects who choose the same meal or drink for the three experiments is in general the same. This means that most subjects' consumers present a habit formation in their behaviors. The second result is based on economic analysis (elasticity) and it concerns the economic results. From table 6, we see that most values of elasticity are in [0, 1] which means that the request of subjects is maintained across the three periods. The two types of results cited previously show the presence of habit formation in the behaviors of retained subjects and the assumption of dependence between choices carried out by the participants is quite visible. A glance over the three experiments reveals that there were a certain persistence of choice of meals and drinks. This study is not without limitations, the first is related to the number of experiments. Even if we think that our results are not skewed too much, it would have been more interesting if the number of experiments is longer. We had a financial constraint. The second, with whom we reflected too much, it is the periodicity day laborer, weekly etc. Future experimental research could attempt to consider these limitations in order to determine how habit formation effects unfold in more complicated settings. Dynamic programming method can be a candidate to resolve problem of habit formation with Intertemporally Dependent Preferences [9].

52

References

[1] A. Samuelson and S. Paul, "Lifetime Portfolio Selection by Dynamic Stochastic Programming," Review of Economics and Statistics, vol. 51, pp. 239–46, 1969.

[2] D.T. Breeden, "An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities," Journal of Financial Economics, vol. 7, pp. 265-296, 1779.

[3] W.E. Ferson and G.M. Constantinides, "Habit persistence and durability in aggregate consumption: Empirical tests," Journal of Financial Economics, vol. 29, pp. 199-240, 1991.

[4] A. Deaton and J. Muellbauer, "Economics and Consumer Behavior", Cambridge University Press, Cambridge.

[5] C. Carrol and M. Kimball, "Notes and comments on the concavity of the consumption function," Econometrica, vol. 64, pp. 981-992, 1994.

[6] M. Ben-Arab, E. Briys and H. Schlesinger, "Habit Persistence and the Demand for Insurance," The Journal of Risk and Insurance, vol. 63, pp.111-119, 1997.

[7] V.L. Smith, "Microeconomic Systems as an Experimental Science," American Economic Review, vol. 72, pp. 923-955, 1982.

[8] J.B. Detempie and F. Zapatero, "Asset Price in an Exchange Economy with Habit Formation," Econometrica, vol. 59, pp. 1633-1657, 1981.

[9] H.E. Ryder and G.M. Heal, G.M, "Optimum Growth with Intertemporally Dependent Preferences," Review of Economic Studies vol. 40, pp. 1-33, 1973.