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Nudging parental health behavior with and without children's pestering power: Fat tax, subsidy or both?

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NUDGING PARENTAL HEALTH BEHAVIOUR WITH AND WITHOUT CHILDREN'S PESTERING POWER: FAT TAX, SUBSIDY OR BOTH?

Abstract: We study the effect of several food fiscal policies as a way of nudging consumers towards a healthier way of eating. Our experimental design varies prices of healthier and unhealthier alternatives of food products for children. We also examine the interplay of children's pestering power. Results from our lab experiment suggest that (a) implementing a fat tax and a subsidy simultaneously can nudge parents to choose healthier products, (b) providing information regarding the fiscal policies in place can further increase the impact of the intervention, and (c) kid's pestering power is one of the causes of the policies' moderate effectiveness.

Keywords: Choice experiment; Fiscal policies; Information; Pester

1 Introduction

Overconsumption and excessive intake of sugar and fats along with sedentary lifestyles have been partly blamed for the worldwide obesity prevalence trend. Individual food choices are influenced by a wide variety of biological and environmental variables. Biological variables include hunger, taste, appetite; while environmental variables include economic determinants (cost, availability, income, access, and time), social determinants (socio-cultural status, meal patterns, peer and social networks), psychological determinants (mood, stress, guilt) and perceived nutrition determinants (knowledge about food, beliefs, attitudes) (The European Food Information Council (EUFIC), 2005). Individuals place different levels of importance on each of these evaluative dimensions.

However, when transferring this framework from adults to children, an additional dimension must be taken into account. The food environment created by parents for children likely plays a more important role. Although adults have the freedom to make their own choices over energy intake and expenditure, the child's choice set is limited by the environment created by their parents (Barlow and Dietz, 1998). In this respect, Cawley (2006) stresses that parental control and bounded rationality are of great importance for childhood obesity. Thus, nudging healthy behaviours at home could play an important role in helping children develop healthy eating habits at a young age and adopt them throughout their adulthood. Evidence shows that habits are formed early on in life and are then kept into adulthood (Kelder et al., 1994; Singer et al., 1995). Therefore, interventions that focus on nudging parental food choice behaviour may help in this direction.

Due to the substantial negative externalities for society involved with increasing obesity rates, several governments worldwide have intervened with various policies with the goal of influencing dietary habits. These include fiscal (OECD, 2012), marketing/informational (Beaudoin et al., 2007; Maes et al., 2012), and educational policies (Cross-Government Obesity Unit, 2008; New York City Department of Health and Mental Hygiene, 2008) that aim to nudge people to make healthier food choices. In the literature, fiscal policies (i.e., those that limit access and provide price incentives and disincentives) have received great attention with respect to their effectiveness in improving dietary patterns (Thow et al., 2010). Generally, three types of price strategies have been applied: increasing unhealthy food prices (fat tax), decreasing healthy food prices (often called a thin subsidy) and a combination of both (Waterlander et al., 2012).

Among the three fiscal policies mentioned above, great political as well as scientific attention has been given to examining the effect of price increases of unhealthy products. This price increase can be levied either by increasing the value added tax (VAT) or by imposing an

additional (fat) tax. Leicester and Windmeijer (2004) note that this policy can be implemented in two ways. One way is by taxing certain types of products of low nutritional value such as soft drinks and snacks (Bowman, 1999). Another way is by taxing a variety of products based on their nutritional composition, i.e. percentage of fat, salt, calories, etc. The first way of taxation has been applied to alcohol and tobacco (“sin taxes”) which are taxed based on their effects on human health. The second fiscal policy, i.e. reducing the price of products considered healthy, can be applied in a similar manner. This would be possible either by reducing the prices of specific product categories that are considered healthy (such as salads, fruits, etc.) or by reducing the prices of products which have lower amounts of certain nutrients such as fat and sugar. These reductions can be made directly on product’s price or through discount coupons.

Given the pros and cons of the two policy options discussed above, a third policy that combines these two policies could be considered. This policy can be designed to be revenue neutral so that the subsidy exactly offsets the revenue from the fat tax (Salois and Tiffin, 2011). Furthermore, this policy seems to combine the benefits of the two previous policies (i.e., reduction of sales of unhealthy products and increased sales of healthy products) and overcomes the negative side effects (purchase of more calories, use of the saved money to purchase unhealthier products and being regressive to the poor) (Powell and Chaloupka, 2009; Waterlander et al., 2012).

All the above evidence on the effectiveness of health related food price incentives and disincentives comes from three sources: natural experiments, controlled trials of price changes in closed environments, and modelling studies (Mytton et al., 2012). To our knowledge, there are only a handful of studies that performed controlled experiments over food purchases under different fiscal policies and these studies come with some caveats. For example, two such studies (Epstein et al., 2010; Nederkoorn et al., 2011) lack enforcement of real incentives since both the purchases and the budget for the purchases were hypothetical. Another set of studies (Epstein et al., 2006; Epstein et al., 2007) lacks sufficient statistical power since they employed small sample sizes (10 and 47 couples of mother-child, respectively). Our emphasis on experimental research is based on our belief that this kind of research can further enhance the contribution of economics on evaluating public interventions and hence improving public health.

Our aim in this study is to identify some factors either inside or outside the home environment that can either weaken or enhance the expected outcomes of fiscal policies on food choices, through a controlled laboratory experiment. We focus on how parents choose between healthier and unhealthier food items for their child under different fiscal pricing policies. Furthermore, we evaluate how factors like the provision of information on fiscal policies and child’s pestering power, may influence parental food choices. Our experiment further contributes to the literature by providing an empirical examination of parents’ choices between healthier and unhealthier alternatives when it comes to children’s food products. To our knowledge, this is the first time a study has examined children’s pestering power on parents’ choices in the context of a lab experiment on food choices. This allows us to examine how fiscal pricing policies and external influences can affect food choice behaviour.

The question we ask in this paper is whether incentives can affect parental food choice behaviour. We examined these effects through the recruitment of 189 parent-child pairs in a controlled laboratory choice experiment where we created an experimental market with real food products where parents actually had to purchase products presented under different pricing schemes. Our sample consisted of four within subject treatments and four between subject treatments. In the within subjects treatments, each participant faced 12 food choice tasks. In each choice task, we displayed two food-for-kids products with different levels of healthiness and a no-buy option. The participants chose their preferred alternative in each

choice task. Between choice tasks, the prices varied according to a base (market price) level and three different fiscal policies levels (i.e., fat tax, subsidy, fat tax and subsidy at the same time). To induce real economic incentives, one of the choice tasks was randomly drawn as binding at the end of the experiment and the participant had to buy the food product chosen in the binding task. In addition to the within subjects treatments, there were four *between subjects* treatments. The control treatment was as described above. The second treatment (the information treatment) was similar to the control treatment but with the addition of information regarding the food fiscal policies. The third treatment (the pestering power treatment) was similar to the control treatment but now the parent chose *together* with their child in each choice task while the final treatment was like the pestering power treatment but we also added information to the participants about the food fiscal policies (pestering power + information treatment).

Our results make three substantive contributions to the literature. We found that the intervention by itself has a moderate effect on parent’s food choices. In particular, a fat tax or a subsidy can increase healthier choices but the simultaneous implementation of both fat tax and subsidy can further improve healthier choices among parents. Our second result is that when information regarding the applied food fiscal policies is available, healthier choices can increase the impact of the intervention even further. Therefore, it appears that the lack of proper provision of information is one of the causes of the policy’s moderate effectiveness. Third, we find that kid’s pestering power strongly affects parents in making unhealthier choices.

The rest of article proceeds as follows: first, we present the design of the experiment and the experimental procedures as well as information about our sample and products used in the study (section 2). Section 3 illustrates the results drawn from the descriptive and econometric analysis, and we conclude with the importance and the implications of the findings in the last section (section 4).

2 Experiment

2.1 Experimental Design

Table 1 exhibits the four within and four between subjects treatments used in the study, along with the number of parent-child pairs that participated in each treatment. Each cell in the table represents a between-subject treatment. Within each cell, the four within subjects treatments are listed which correspond to the price variations caused by the four fiscal policies: (1) a baseline scenario of market prices, (2) a fat tax, (3) a subsidy, and (4) a fat tax and subsidy applied simultaneously (the both treatment). The between subjects treatments vary the decision environment (parent goes through the choice tasks with or without the presence of the child which corresponds to the with and without pestering power treatments) and information provision (where the parent is provided with information about the fiscal policies or not, hereafter referred to as the info and no info treatments). All sessions were conducted by a single experimenter i.e., one of the authors and the experiment was conducted using the z-Tree software (Fischbacher, 2007).

Table 1. Experimental design

	No information for fiscal policy	Information for fiscal policy
Without pestering power	47	47
	Market price, Fat tax, Subsidy, Both	Market price, Fat tax, Subsidy, Both
With pestering power	47	48
	Market price, Fat tax, Subsidy, Both	Market price, Fat tax, Subsidy, Both

The role of food fiscal policies

Our experiment allows us to study the role of food fiscal policies as a tool that can influence healthier food purchasing behaviour. We varied within subjects the posted prices of the products according to four within-subjects treatments. The market price (MP) treatment was always displayed first in order to create a common reference point to all subjects. In this treatment, the healthier and unhealthier versions of a product on any given choice task were set to the same level. The price level was set to the average value of market prices we found in major supermarket chains prior to the experiment. After the MP treatment, the three food fiscal policies (three treatments) followed in random order to avoid order effects. The only thing that was varied in these treatments was prices for the products (see Table 2). One of the treatments imposed a fat tax on the price of the unhealthier product (as judged by the fat or sugar content) while keeping the price of the healthier product constant at market price (FT treatment). Another treatment imposed a subsidy on the price of the healthier product keeping the price of the unhealthier product constant at market price (SB treatment). The third treatment combined a fat tax on the price of the unhealthier product with a subsidy on the healthier product (BO treatment).

Table 2. Overview of the within subjects treatments

Treatment	Description
Control Treatment	Prices are set to the average value of market prices we found in major supermarket chains prior to the experiment. Prices are equal between the healthier and unhealthier alternative.
Fat tax Treatment (FT)	Fat tax on the unhealthier alternative (25% increase on the market price)
Subsidy Treatment (SB)	Subsidy on the healthier alternative (25% decrease on the market price)
Both Treatment (BO)	Fat tax on the unhealthier alternative and subsidy on the healthier alternative at the same time (25% increase on the market price of the unhealthier product & 25% decrease on the market price of the healthier product)

The role of provision of information

Our rationale for including a (between-subjects) provision of information treatment is that information regarding the relation of a price change and the healthiness of a product can potentially alter purchase behaviour. Such information provision can be enacted using several methods, including mass media, governmental/community-level agents' announcements and informative labels on the shelves next to the price. In the context of our laboratory experiment a labeling scheme was more realistic. Therefore, in the information treatment, subjects were informed on the actual reason on why a price change occurred (e.g., implementation of a fat tax or a subsidy or both) using a descriptive label on the top of the screen. In the no-information treatment, subjects remained unaware of the actual reason of the price increases/decreases.

The role of kid's pestering power

Our second between-subjects treatment examined the role of making food purchasing decisions together with the child. While a parent may rationally choose to purchase a healthier product for their child, the mere presence of a child could adversely affect purchase decisions if the parent decides to give in to the child's demands (which may be motivated by factors other than nutrition). To vary the child's ability to potentially pester the parents on their choices (i.e., hereon referred to as child's pestering power), we allowed children in half of the sessions to seat next to their parent while the parent was going through the choice tasks. The

child and the parent could freely communicate and discuss about the choice options¹. In the no pestering power treatments, the parent decided on their own without any external influence from the child. Hence, in these treatments, the child did not participate in the choice tasks and was kept engaged in the lab's lobby where he/she could watch cartoons or draw using paper and pencils.

2.2 Participants

A random sample of families (one adult who is the primary grocery shopper and makes the household meal decisions and one child) from the general population of Athens, Greece, was recruited by a market recruitment research company based on random digit dialing. The research company ensured that the interested families met the following study criteria: (1) the child in the family was between the ages of 6 and 10² (if there was more than 1 child in the family in this particular age range, the company randomly picked one child) and (2) the family consumed the products used in the study moderately or more often (parents were screened for consumption patterns from a large list of food and stationery products, which included the products used in our study, so that we would avoid any prior associations with the aims of the study. Subjects were offered a fixed fee of 30€ per family to participate in a “children's snack and stationery preference study”, conducted in the experimental economics laboratory of the Agricultural University of Athens. A total of 189 families participated in the experiment. Subjects participated in one of the 4 between subject treatments and they were randomly assigned to a time slot between July 2012 and September 2012. Experimental sessions were split between morning (97 sessions) and afternoon (92 sessions) snack time hours, i.e., from 9.00-13.00 o'clock and 16.00-20.00 o'clock each day of the week except Sundays³. All subjects were given a short orientation and training before the experiment began.

2.3 Experimental procedures

Each experimental session consisted of four tasks. It included a real choice experiment (RCE), a manipulation check questionnaire, a socio-demographic questionnaire and anthropometric measurements. Each session lasted approximately 40 minutes. In each session a single parent-child pair participated. Depending on the treatment, the child could have an active role in the choice experiment or not.

In the RCE task, participants faced different choice tasks where they had to choose between two similar products of the same brand (e.g., cheese) differentiated by their healthiness status (healthier vs. unhealthier alternative) and price (three levels). The healthiness or unhealthiness status was not explicitly labeled as such. Choices also included a no-buy option in the event that subjects did not prefer any of the products⁴.

The experiment was conducted as follows: first, each parent was assigned a unique ID number to guarantee his/her anonymity and s/he was informed that their fixed participation fee of 30€ would be given to them at the end of the experiment. In addition, subjects could examine the products offered for sale in a display section in the lab. They were given enough time to see and inspect all products. Subjects were then seated in front of a computer and they were informed that they will go through 20 choice tasks showing various combinations of the food and non-food products on display in the lab. They were also informed that when they

¹ We observed that in the pestering power treatment all children interacted with their parent.

² We chose this specific age range because, on the one hand, children of this age range have almost no pocket money and are totally dependent on what their parents purchase for them while, on the other hand, they are old enough to accompany parents at the supermarket.

³ Lunch and dinner time in Greece are usually later than other parts of Europe or North America. Lunch is usually served between 13.30 and 15.00 o'clock while dinner between 20.00 and 21.30. Two parent-child pairs participated in the experiment at 14.00 and 14.45 o'clock because they were late and early, respectively.

⁴ According to Louviere and Street (2000) it is not realistic to force participants to choose one of the available options and therefore including a no-buy option is to be preferred.

complete all choice tasks, one of these would be chosen as binding and they would have to purchase the product of their choice at the indicated price. The price of the product would be deducted from their participation fee. To determine the binding round, subjects had to draw a number from a jar with folded papers listing numbers from one to twenty (as many as the choice tasks). To make sure parents were choosing products for their child, they were told that the product would be given to their child right away to consume while s/he would be filling out the socio-demographic questionnaire. We emphasized to subjects that actual payment would occur for the binding choice task and that they should evaluate each choice task carefully, since all tasks were equally likely to become binding. Subjects were also told that choosing the “none of these” option (i.e., the no-buy option) is an acceptable choice and that if they had chosen the no-buy option in a binding task, no purchase would be made and they would keep their full endowment.

In order to confirm that our experiment worked well, that there was no experimenter demand effect and participants adhered to the experimental instructions, we incorporated a manipulation check questionnaire right after the choice experiment was finished⁵.

The socio-demographic questionnaire, which elicited parental perceptions about their child’s weight status, family’s dietary habits, and family’s socio-demographics, were addressed to parents.

Each session concluded with anthropometric measurements of the parent and the child. Physical measurements of body weight and height were obtained from all children and their parents (light summer clothing, no shoes). Body weight was measured on a levelled platform scale with a beam, movable weights and body height on a wall-mounted stadiometer, to the nearest 0.5 kg and 0.5 cm, respectively. Body Mass Index (BMI) was computed as weight (in kilograms) divided by height (in meters squared) and it was used for participants’ classification as normal-weight, overweight or obese (Cole et al., 2000; Cole et al., 2007; WHO, 1995).

2.4 Products and choice tasks

The food products chosen were products commonly purchased by Greek families as snacks for children. In each product category (choco milk beverage, cheese, and yogurt) there were two products of the same size and weight that differed only on the basis of percentage of calories, fat and sugar and so it was easy for parents to distinguish between the healthier and the unhealthier alternative (for example all healthier products carried nutritional claims such as “free”, “2%”, “light”). We did not explicitly mention, however, if a product would be considered more or less healthy. We also did not label any of the products as such. Each choice task depicted the alternative products using photo stimuli. To mute any brand effects, we chose products of the same brand in each product category, that is, each pair of healthier and unhealthier products were of the same brand⁶. One week before the official start of the experiment, the experimenter visited supermarkets of the four largest chain stores in the city and collected prices for the products of the experiment. The average of these prices was used in the baseline control (market price) treatment and prices for the other within-subjects treatments varied accordingly.

To cover up the aim of the study and preclude subjects from potentially succumbing to experimenter demand effects, two additional non-food categories were added to the list of choice tasks. We used stationery products (colored markers, pens/pencils) as a decoy. The prices of the decoy products in the market price treatment were the average of prices observed

⁵ The results of the manipulation check questionnaire reinforce the validity of our experimental results. All subjects in the information treatment responded that their responses were based on the information given at the beginning of the session along with what s/he and/or their child wanted; not based on what they thought the experimenter wanted from them. All subjects in the no-information treatment responded that the purpose of the study was to examine consumption patterns on food and/or stationery products for kids.

⁶ The products were: milko vs. milko free, babybel vs. babybel light, delta yogurt vs. delta yogurt 2%.

in the same four supermarkets as the food items. Decoy products were selected so that their price range lied between the lowest and the highest price of the market prices of food products, in order to avoid exposing subjects to any irrelevant price anchors. Prices did not change for the decoy products under the fat tax, subsidy and both treatments since the fiscal policies were irrelevant for stationery products.

In all, the real choice experiment incorporated 20 different choice tasks [4 within subject treatments (MP, FT, SB and BO) \times 5 product categories (3 food and 2 non-food)]. The 8 choice tasks pertaining to the stationery products will not be further analyzed and the results will be based on the 12 food choice tasks.

3 Results

To check whether the insights gained from the descriptive analysis hold under the scrutiny of conditional analysis, we estimated a mixed logit model [also referred to as the “random parameter logit model” or “mixed multinomial logit model” (Hensher et al., 2005)]. The mixed logit model solves three primary limitations of the standard logit model. It allows for random taste variation, unrestricted substitution pattern and correlation in unobserved factors over time (Train, 2003). McFadden and Train (2000) showed that under mild regularity conditions, a mixed logit model can calculate to any degree of accuracy any random utility model of discrete choice.

We assume that a sampled individual ($n = 1, \dots, N$) faces a choice among i alternatives in each of s choice tasks. The utility associated with each alternative i , as evaluated by each individual n in choice task s , is represented by the following model:

$$U_{nis} = \beta'_n x_{nis} + \varepsilon_{nis} \quad (1)$$

where x_{nis} is the full vector of explanatory variables that are observed by the analyst; β'_n is a vector of fixed and random coefficients across individuals parameters; and ε_{nis} is an i.i.d. extreme value error term.

In our experiment, the participants were asked to make 12 choices between dairy products offered at various pricing levels. The choices can be analyzed using the following mixed logit model:

$$U_{nis} = \beta_{0ni} + \beta_1 ChocoMilk + \beta_2 Cheese + \beta_{3i} Price + \beta_{4ni} Info + \beta_{5ni} Pester + \varepsilon_{nis} \quad (2)$$

where β_{0ni} is the alternative specific constant (ASC) for alternative i ; *ChocoMilk* and *Cheese* are product dummies (*Yoghurt* is the excluded category); *Price* is the price of the products; *Info* is a dummy variable for when information about the fiscal policies are provided to subjects; and *Pester* is a dummy variable indicating the treatment where the parent-child pair choose together (allowing the child to exercise pestering power).

The coefficient β_{0ni} captures parents’ sensitivity to the health attribute and we model this as a random parameter that is triangularly distributed⁷. The coefficients of *Info* and *Pester*, which capture consumers’ sensitivity to information provision and child’s pestering power, are modelled as random and triangularly distributed as well. The parameters $\beta_1, \beta_2, \beta_3$ are non-random and capture consumer sensitivity towards product category and price changes. Finally, the alternative-specific constant for the “none-of-these” alternative is normalized to zero.

⁷ We tried several other distributions for the random coefficients of our model like the normal and the uniform distribution. Differences between models with different distributions for the random coefficients are negligible. We only report results from the models with triangular distribution because it is a limited distribution and therefore it does not imply that anyone has an unlimited high willingness to pay for snacks (Alfnes et al., 2006). See Hensher and Greene (2003) for a discussion on the various distributions in mixed logit models.

Table 3. Estimated parameters for the multinomial logit and mixed logit models

Multinomial logit			Mixed logit (1)			Mixed logit (2)		
Variable	Coefficient	S.E.	Variable	Coefficient	S.E.	Variable	Coefficient	S.E.
ASC _U	8.251***	1.056	ASC _{U (R)}	10.388***	1.120	ASC _{U (R)}	10.434***	1.121
ASC _H	7.040***	1.054	ASC _{H (R)}	8.197***	1.121	ASC _{H (R)}	8.196***	1.125
ChocoMilk	-1.621	1.052	ChocoMilk	-1.235	1.060	ChocoMilk	-1.237	1.060
Cheese	0.121	1.074	Cheese	1.566	1.099	Cheese	1.562	1.099
Price _U	-2.178***	0.179	Price _U	-3.505***	0.249	Price _U	-3.504***	0.249
Price _H	-2.348***	0.217	Price _H	-3.756***	0.294	Price _H	-3.755***	0.294
Info _U	0.970	0.631	Info _{U (R)}	0.662	0.703	Info _U	0.606	0.694
Info _H	2.683***	0.632	Info _{H (R)}	3.803***	0.742	Info _H	3.781***	0.743
Pester _U	0.061	0.456	Pester _{U (R)}	0.210	0.540	Pester _U	0.201	0.540
Pester _H	-0.673	0.459	Pester _{H (R)}	-1.239**	0.603	Pester _H	-1.238**	0.593
Log likelihood	-1394.050					-1126.947		
AIC	2808.100					2277.894		
N	2268							

Note: ***, **, * denotes statistical significance at the 1%, 5% and 10% level, respectively.

(R): Denotes random coefficient for the respective variable.

Table 3 shows the estimated coefficients of the parameters and respective standard errors from the estimated model of equation (2) (mixed logit (1) columns). For comparison, a multinomial logit model is also displayed as well as a mixed logit model for which only the alternative specific constants are modeled as random (mixed logit (2) columns). We can see that both the mixed logit models (LL= -1127.017 and LL= -1126.947) are an improvement to the more restrictive multinomial logit model (LL=-1394.050). Likelihood ratio tests indicate the mixed logit model (1) is to be preferred than the multinomial logit model ($\chi^2=534.07$, p-value<0.001). A similar result is obtained when we compare the mixed logit model (2) with the multinomial logit model ($\chi^2=534.21$, p-value<0.001). On the other hand, the two mixed logit models do equally well ($\chi^2=0.14$, p-value=0.998). AIC values support these conclusions. Note that the two mixed models are qualitatively and quantitatively indistinguishable in terms of the estimated coefficients⁸.

The alternative specific constants represent the utility of the alternatives (unhealthier-healthier) at base level and the alternative with the highest utility on the base level is the healthier alternative, namely ASC_H, which is significantly higher than the healthier alternative (Wald test-statistic: $\chi^2=46.69$, p-value<0.001). The product dummies have no effect on the utilities of the alternatives. Furthermore, the coefficient of the *Price* variable for both the healthier and healthier alternatives is negative, as one would normally expect.

The coefficient of the information variable for the healthier alternative is positive and statistically significant at the 1% level, while for the healthier alternative, it is not statistically significant and of small magnitude. This means that providing information about fiscal policies affects the utility of the healthier alternative much more than the utility of the healthier alternative. A similar pattern in terms of statistical significance is observed for the child's pestering power coefficients. The pestering power dummy has a negative statistically significant effect for the healthier alternative but is not significant and is of small magnitude for the healthier alternative.

Given that the estimates of the coefficients from the mixed logit model are meaningless for quantitative interpretations, we also calculated the effect of changes in prices on the choice probabilities for each of the alternatives (see Table 4). Since market prices between the three products differ, we simulated the fiscal policy changes separately for each product. Results show that changing the food fiscal policy for the choco milk beverage from a basic level of market prices to imposing a 15% fat tax, increases choices of the healthier alternative by 6.8% and decreases choices of the healthier alternative by 7.07%. The effect is proportional to a 25% fat tax and results in a 11.25% increase in healthier choices and a 11.8% decrease in healthier choices. The results from a corresponding subsidy of the healthier alternative show that the effect is even stronger in increasing the incidence of healthier choices. For example, a 25% subsidization of the price of the healthier cheese alternative results in a 19.6% increase in the healthier choice share while the equivalent fat tax imposed on the healthier alternative results in a 15.6% increase in the healthier choice share. This indicates that the implementation of a subsidy is more effective than the implementation of a fat tax in increasing healthier choices, at least in the context of our experiment. The combined effect of a fat tax and a subsidy is even more robust. The most prominent case is for the cheese product where a 25% fat tax on the healthier alternative and a 25% subsidy on the healthier alternative increase (decrease) the choice share of the healthier (unhealthier) alternative by 36% (38.5%).

⁸ We also estimated models that included a time of the session dummy (morning vs. afternoon sessions) to control for time of the day differences. The dummy was never statistically significant and of small magnitude. In addition, likelihood ratio tests indicate that the model with the time of the day dummy does not significantly improve the fit of the model ($\chi^2=0.928$, p-value=0.629).

Table 4. Two scenarios of fiscal policies and their effects on choice probabilities (%)

		Choco Milk			Cheese			Yogurt		
		FT	SB	BO	FT	SB	BO	FT	SB	BO
<i>25%</i>	U	-11.79	-12.16	-24.57	-21.41	-18.14	-38.52	-9.09	-9.65	-19.03
	H	11.25	12.25	24.29	15.61	19.62	35.97	8.96	9.68	18.95
	N	0.54	-0.09	.028	5.80	-1.48	2.55	0.13	-0.3	0.08
<i>15%</i>	U	-7.07	-7.35	-14.65	-12.49	-10.51	-23.09	-5.36	-5.68	-11.31
	H	6.81	7.42	14.48	9.36	11.39	21.77	5.29	5.70	11.28
	N	0.26	-0.07	0.17	3.13	-0.88	1.32	0.07	-0.02	0.03

Note: H: Healthier alternative, U: Unhealthier alternative, N: Non of these

FT: Change price from market price to fat tax, SB: Change price from market price to subsidy, BO: Change price from market price to both policies.

4 Conclusion

Given the rapid rise in obesity especially among children, policymakers and academics have proposed a large number of policy measures to halt or reverse this trend. Some of the most well known mechanisms are food fiscal policies which may be used to nudge consumers towards a healthier way of eating. In this paper, we studied the effects of such policies within the family environment which is extremely important given that adult eating habits are acquired during childhood (Birch, 1988; Kelder et al., 1994). Thus, children are more apt to adopt healthier eating behaviour while they grow up under a healthy parental food “umbrella”. We focus on parental food choices since young children’s choices are normally constrained by what their parents provide them. In this study, we perceive food fiscal policies as a promising incentive mechanism that could create a parental environment that supports healthy eating in the family. However, specific factors that influence the effectiveness of food fiscal policies have to be taken into account.

From an economics perspective, this study tries to simulate the choices parents face in real world using real choice experiments, which is an incentive-compatible method that is easy for consumers to understand. In our experiment, subjects were tested in a “closed environment” as they could choose between three alternatives: a healthier and an unhealthier product of the same product category, brand and size, or the no-buy option. Although in real life, far more many options (brands, sizes, substitutes) are available in a grocery store that can create more complex substitution patterns resulting from fiscal policies, our small scale choice environment provides a clean illustration of the effects of these policies.

In terms of policy making, our study also illustrates that the magnitude of the effect of any fiscal policy can be weakened or enhanced by several other factors. For example, our study shows the significant (negative) influence that kids could exert on parental choice decisions (i.e., with their pestering power) when it comes to healthier foods. On the other hand, our findings suggest that if proper provision of information regarding the cause of the price increase/decrease is provided (e.g., on the shelf close to the price), the effect of a food fiscal policy can be enhanced. This finding implies that food fiscal policies should be accompanied by information campaigns to become more effective. More importantly, our results indicate that although there is an impact on healthier choices after the implementation

of a fat tax or a subsidy, the simultaneous implementation of fat tax and subsidy can further improve healthier choices.

Overall, one of the ways for a fiscal policy that increases the price of some products to gain public acceptance is to convince consumers that the revenues from the difference in the payable price will be returned to them. This could be done with the implementation of subsidies to products considered healthier ensuring that food taxes are not more regressive to poor consumers; through educational programs related to healthy eating behaviour among adults and children; through public information campaigns and fitness equipments/parks available to public; as well as through funding of the public health system. For example, Reger et al. (1999) reported that after a six-week mass media campaign and implementation of media public relation strategies in east Virginia to encourage consumers to switch from whole-fat milk (2%) to low-fat milk (1%), there was a 17% rise in low fat milk purchases. This effect lasted at least six months after the intervention ended.

Given the context upon which this study was conducted (i.e., in Greece), future research should test the robustness of our findings in other places where parenting styles, family structures, and eating culture could be different.

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