DETERMINING FACTORS IN FOOD AWAY FROM HOME EXPENDITURE OF TURKISH HOUSEHOLDS

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Abstract. The aim of this study was to determine the effects of socio-demographic and economic factors of households and household heads on monthly expenditures of food away from home (FAFH) in Turkey. The sample size was determined as 11290 households. The data were analyzed by generalized Heckman type sample selection models. The results showed that both the probability and monthly spending levels of household FAFH increased with male household heads, household income, whilst the married household heads, the households that receive cash income aids from the government and private sector, decreased both the probability and spending levels of FAFH in Turkey. The findings in the study may provide useful information for more effective identification and implementation of the marketing strategies of the stakeholders operating in the sector and also help the relevant public and private institutions determine more effective nutritional policies towards families with a certain profile.
Keywords: *eating out, consumption, expenditure patterns, Heckman Sample Selection Model, Turkey*

Introduction

Many countries have experienced changes in eating habits over the last decades in terms of individual consumers and households. These changes generally were from home consumption towards food away from home (Stewart et al., 2004; Akbay and Boz, 2005; Gül et al., 2007; Drescher and Roosen, 2013; Bozoglu et al., 2013; Niyonzima et al., 2017; Mottaleb et al., 2017). Changes were generally derived from convenience and increasing food availability, but demographic changes such as a higher share of working women and an increasing number of single households contributed as well (Nayga and Capps, 1992; Robson et al., 2016). One of the discouraging factors on the preparing the meal at home was reported to be working longer hours (Blick et al., 2017). In many studies, it was stated that globalization, urbanization, income, education, marketing, religion, culture, tourism women's participation in the labor force and consumer attitudes increases in FAFH consumption (Nayga, 1995; Ma et al., 2006; Bozoglu et al., 2013; Liu and Niyongira, 2017).

Worldwide, food consumption trends have been moving towards FAFH in many countries (Mancino et al., 2009; Bozoglu et al., 2013; Liu et al., 2013). For instance, the ratio of FAFH in household food expenditure of the United States of America (USA) increased twofold from 25% in 1954 to 50% in 2014 (USDA, 2018). This rate rose to 32% in 1992 in Canada (Jensen and Yen, 1996). FAFH ratio in 2002 was 24% reaching to 31% in 2008 in Brazil (Bezerra et al., 2013). In the last two decades, the percentage of FAFH rose to 25% in 1996 and 30% in 2006 in Spain (Mutlu and Gracia, 2006; Angulo et al., 2007). Again, the period of 2004-2010 experienced an increase from 20% to 25% FAFH consumption in Slovakia (Cupak et al., 2016), while in the 1987-1999 period FAFH consumption rate rose from 13% to 23% in Ireland (Keelan et al., 2009).

Turkey has also experienced similar changes in the pattern of food consumption expenditures mainly due to changes in the socio-economic structure of Turkish

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population in the last two decades. Composition and size of households, consumer lifestyles, per capita income, age distribution of the population and urbanization had a significant effect in FAFH. Thus, more efficient marketing strategies are required in the sector. Money spent of food, including non-alcoholic beverages as a share of total household spending continued to shrink, from 26.7% in 2002 to 19.5% in 2016, while expenditures on hotels, restaurants, and pastry shops (FAFH) as a share of total household spending increased from 4.4% in 2002 to 6.4% in 2016 (TURKSTAT, 2018).

The current work has identified the effects of socio-demographic and economic factors of households and household heads on their FAFH consumption expenditures using a Double Hurdle (DH), Heckman Sample Selection (HSS) and Log-Heckman Sample Selection (LHSS) models. The study, which is rich in terms of household socio-demographic and economic profiles, also presented marginal impacts of exogenous variables on spending of FAFH. The presentation of such marginal effects may provide useful information for more effective identification and implementation of the marketing strategies of the stakeholders operating in the industry. This study will also help the relevant public and private institutions determine more effective nutritional policies towards families with a certain profile.

Materials and methods

Turkish Statistics Institute (TSI)' Household Budget Surveys data of 2015 was used as main material of this study. These data are regularly collected by TSI on the annual basis so as to cover the period between January 1 and December 31 and cover 10 thousand households on average across the country. The sample size was determined as 11290 family observations after deleting incomplete data and outliers.

Table 1 shows the descriptive statistics for sample. The results of this study showed that 77.3% of households had monthly expenditures on food away from home. In some studies conducted in different parts of Turkey, this ratio was reported as 55.4% (Gül et al., 2007), 83.6% (Uzunöz et al., 2011), 74.5% (Bozoglu et al., 2013) and 68.4% (Traş and Şengül, 2017). The reported figures for some countries, were as follows: Slovakia, 62.0% (Cupak et al., 2016), Brazil, 40.0% (Bezerra et al., 2013), China, 83.0% (Liu et al., 2015), Egypt, 38% (Fabiosa, 2008) and Malaysia, 71.9% (Heng and Guan, 2007). Monthly average FAFH consumption expenditures of households were found to be 180.14 Turkish Liras (TL). These figures were as follows for different parts of Turkey: 137.66 TL (Bozoglu et al., 2013), 371.00 TL (Onurlubaş et al., 2015) and 131.82 TL (Traş and Şengül, 2017).

Three censored models competing with one another and at the same time compatible with the maximization of the utility function of consumers were considered. The mathematical representation of each econometric model were made here while referring to the textbooks on how these models are derived from the utility function under the good in question (e.g., food away from home). Before moving on to the presentation of each econometric model, it is worth mentioning a very important point here. Some families may not be able to consume FAFH and such observations are often reported as zero. Food away from home may not have been consumed, either because its current price is too high or because the family income is not affordable for the consumption or because of some health concerns and psychological factors. The Heckman sample selection (HSS) model is characterized by a selection equation (d_i) (e.g., the decision on

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the expenditure of the food away from home) and level equation (y_i) (e.g., monthly expenditure level for the food away from home) as follows (*Eq. 1*):

$$\begin{aligned} d_i &= 1 \quad if \quad z_i'\alpha + u_{1i} > 0 \\ &= 0 \quad if \quad z_i'\alpha + u_{1i} \le 0 \\ y_i &= x_i'\beta + u_{2i} \quad if \quad z_i'\alpha + u_{1i} > 0 \\ &= 0 \quad if \quad z_i'\alpha + u_{1i} \le 0 \\ &(can\ be = unobserved)\ if \quad z_i'\alpha + u_{1i} \le 0 \end{aligned} \tag{Eq.1}$$

where z and x are sets of exogenous factors affecting the household decision and expenditure levels on food away from home, respectively whilst α and β are vectors of associative parameters to be estimated for each equation, respectively. u_1 and u_2 are error terms unknown to researchers. The error terms (u_1, u_2) are distributed as truncated bivariate normal with zero means, standard deviations (1, σ), correlation ρ, and covariance ρσ, all indicating:

$$\begin{bmatrix} u_{1i} \\ u_{2i} \end{bmatrix} \square\ N\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho\sigma \\ \rho\sigma & \sigma^2 \end{bmatrix} \right)$$

The corresponding sample likelihood function is (*Eq. 2*)

$$L = \prod_{d_i=0} \left\{ 1 - \Phi\left(z_i'\alpha \right) \right\} \prod_{d_i=1} \left\{ \frac{1}{\sigma} \phi\left(\frac{y_i - x_i'\beta}{\sigma} \right) \Phi\left(\frac{z_i'\alpha + \frac{\rho}{\sigma}\left(y_i - x_i'\beta \right)}{\left(1 - \rho^2 \right)^{1/2}} \right)^{-1} \right\} \tag{Eq.2}$$

where Φ and ϕ are the univariate standard normal cumulative and probability distribution functions, respectively. The log-transformed Heckman SSM (LHSS) is characterized by replacing y_i with log y_i in *Equation 2* with its corresponding likelihood function as (*Eq. 3*):

$$L = \prod_{d_i=0} \left\{ 1 - \Phi\left(z_i'\alpha \right) \right\} \prod_{d_i=1} \left\{ y_i^{-1} \frac{1}{\sigma} \phi\left(\frac{\log y_i - x_i'\beta}{\sigma} \right) \Phi\left(\frac{z_i'\alpha + \frac{\rho}{\sigma}\left(\log y_i - x_i'\beta \right)}{\left(1 - \rho^2 \right)^{1/2}} \right)^{-1} \right\} \tag{Eq.3}$$

The same distributional assumption for error terms (u_1, u_2) as in Heckman-SSM are maintained and y_i^{-1} is the Jacobian of transformation from log y_i to y_i. Now, augmenting the binary decision $z_i'\alpha + u_{1i}$ with an additional mechanism $x_i'\alpha + u_{2i}$ the double-hurdle (DH) model can be stated as follows (*Eq. 4*):

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$$\begin{aligned} y_i &= x_i'\beta + u_{2i} \quad if \quad z_i'\alpha + u_{1i} > 0 \text{ and } x_i'\beta + u_{2i} > 0 \\ &= 0 \qquad\quad if \quad z_i'\alpha + u_{1i} \le 0 \text{ and } x_i'\beta + u_{2i} \le 0 \end{aligned} \tag{Eq.4}$$

The error terms (u_1, u_2) in the double-hurdle model are distributed as the bivariate normal as in Heckman's (1979) sample selection model (HSS) without truncation. The sample likelihood function is (*Eq. 5*):

$$L = \prod_{d_i=0}\left\{1-\Phi_2\left(z_i'\alpha, \frac{x_i'\beta}{\sigma}, \rho\right)\right\}\prod_{d_i=1}\left\{\frac{1}{\sigma}\phi\left(\frac{y_i - x_i'\beta}{\sigma}\right)\Phi\left(\frac{z_i'\alpha + \frac{\rho}{\sigma}(y_i - x_i'\beta)}{\left(1-\rho^2\right)^{1/2}}\right)\right\} \tag{Eq.5}$$

where Φ2 is the standard bivariate cumulative distribution function. By imposing parametric restriction ρ = 0 in model, The HSS, LHSS and DH models reduce to their two-part models. This can be done via the conventional tests such as Wald, Likelihood Ratio, or Lagrangian Multiplier (LM). On the other hand, the choice between the three competing models can be done by a non-nested Vuong's specification test.

While the probability of both the HSS and LHSS models are the same, their conditional and unconditional, expenditure level equations vary greatly (*Eq. 6*):

$$\Pr\left(y_i > 0\right) = \Phi\left(z_i'\alpha\right) \tag{Eq.6}$$

Conditional and unconditional means of y_i of the HSS model are respectively (*Eq. 7*):

$$E\left(y_i \mid d_i = 1\right) = x_i'\beta + \rho\sigma\frac{\phi\left(z_i'\alpha\right)}{\Phi\left(z_i'\alpha\right)} \text{ and } E\left(y_i \mid d_i = 1\right) = \Phi\left(z_i'\alpha\right)x_i'\beta + \rho\sigma\phi\left(z_i'\alpha\right) \tag{Eq.7}$$

While the conditional and unconditional mean levels for the LHSS model is respectively (*Eq. 8*):

$$E\left(y_i \mid d_i = 1\right) = \exp\left(x_i'\beta + \sigma^2/2\right)\frac{\Phi\left(z_i'\alpha + \rho\sigma\right)}{\Phi\left(z_i'\alpha\right)} \text{ and } E\left(y_i \mid d_i = 1\right) = \exp\left(x_i'\beta + \sigma^2/2\right)\Phi\left(z_i'\alpha + \rho\sigma\right) \tag{Eq.8}$$

However, the probability, conditional and unconditional mean levels of monthly household food away from home product in DH is, respectively (*Eq. 9*):

$$\begin{aligned} &\Pr\left(y_i > 0\right) = \Phi_2\left(z_i'\alpha, \frac{x_i'\beta}{\sigma}; \rho\right) \\ &E\left(y_i \mid y_i > 0\right) = x_i'\beta + \sigma\Phi_2\left(z_i'\alpha, \frac{x_i'\beta}{\sigma}; \rho\right)^{-1}\left\{\phi\left(\frac{x_i'\beta}{\sigma}\right)\Phi\left[\frac{z_i'\alpha - \rho x_i'\beta/\sigma}{\sqrt{1-\rho^2}}\right] + \rho\phi\left(z_i'\alpha\right)\Phi\left[\frac{x_i'\beta/\sigma - \rho z_i'\alpha}{\sqrt{1-\rho^2}}\right]\right\} \\ &E\left(y_i\right) = \Pr\left(y_i > 0\right)E\left(y_i \mid y_i > 0\right) \end{aligned} \tag{Eq.9}$$

Marginal effects can be obtained by differentiation each equation with respect to z and x variables. Delta method is used to construct the variance-covariance of marginal impact estimates.

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Table 1. *Variable definition and sample means*

Variables	Definition	Mean	VIF
	Dependent variables		
Food away from home	Expenses per month (TL)	180.14 (235.58)	-
	% consuming	77.3%	-
	Independent variables		
	Continuous explanatory variables		
Children 0-5	Number of kids aged 0-5	0.316 (0.637)	-
Children 6-14	Number of kids aged 6-14	0.569 (0.917)	-
Children 15-18	Number of kids aged 15-18	0.215 (0.481)	-
Adult 19 +	Number of adults aged over 18 years	2.476 (1.085)	-
Total expenditure	Household total expenditure (1000 TL/month)	2.782 (2.047)	-
Household size	Household size	3.576 (1.900)	1.758
Education	Household head education in years	7.392 (4.801)	1.913
House feature index	Index created by house characteristics	7.270 (2.236)	2.499
Number of autos	Number of automobiles owned	0.449 (0.497)	1.272
Number of properties	Number of properties owned	1.025 (1.156)	-
	Binary explanatory variables: Household head and household characteristics		
Male	Gender is male	0.862 (0.345)	2.223
Age < 30	Age < 30 (Reference)	0.076 (0.265)	-
Age 30-50	30 < Age ≤ 50	0.457 (0.498)	4.213
Age > 50	Age > 50	0.467 (0.499)	5.399
No diploma	No diploma (Reference)	0.128 (0.330)	-
Primary school	Primary school education	0.445 (0.497)	-
Secondary school	Secondary school education	0.122 (0.328)	-
High school	High school education	0.163 (0.370)	-
College school	College school education	0.142 (0.349)	-
Compulsory insurance	Has compulsory health insurance	0.840 (0.367)	1.517
Married	Married	0.835 (0.371)	2.298
Employed	Employed	0.666 (0.472)	1.926
Manager	Manager	0.047 (0.211)	1.110
Retired	Retired	0.320 (0.467)	2.072
Entrepreneurial income	Families with entrepreneurial income	0.339 (0.473)	1.432
State cash aids	Receives cash income from government	0.304 (0.460)	1.484
State in-kind aids	Receives in-kind type help income from state	0.105 (0.307)	1.306
Private cash aids	Receives cash income from private	0.131 (0.337)	1.185
Private in-kind aids	Receives in-kind type income from private	0.096 (0.295)	1.170
Foreign income	Has abroad retired, scholarship or in-kind aid	0.024 (0.152)	1.033
Apartment	Resides in an apartment	0.493 (0.500)	2.096
Renter	Resides in rental house	0.230 (0.421)	2.187
Homeowner	Resides in own house	0.632 (0.482)	2.248
Combi	Resides in a house warmed up with a combi	0.321 (0.467)	2.435
Stove	Resides in a house warmed up with a stove	0.547 (0.498)	3.736
Income 1	Monthly income < 2000 TL (Reference)	0.374 (0.484)	-
Income 2	Monthly income 2000 – 5000 TL	0.494 (0.500)	1.725
Income 3	Monthly income > 5000 TL	0.132 (0.338)	2.019
Internet	Has home internet access	0.350 (0.477)	1.442
One child	Family with only one children	0.195 (0.396)	1.358
Two child	Family with only two children	0.197 (0.398)	1.529
Three and more child	Family with three and more children	0.141 (0.348)	1.611
Sample size		11290	

Standard deviations are in parentheses

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Results and discussion

Specification tests and maximum-likelihood estimates

Before discussing the marginal impacts of the preferred model, some specifications applied to the data and models were taken into consideration. First, in each model under consideration, the two-part models were rejected using Wald statistic (W = $\frac{\rho^2}{Var(\rho)}$, df = 1, where Var (ρ) is the estimated variance of the correlation coefficient, ρ, between the decision to participate at food-away from home and its expenditure level). Therefore, the error terms generating the relationship between the decision to spend and the spending levels on FAFH are statistically interrelated, affecting one to other equations. In addition, Vuong non-nested tests discriminating competed models were used (see *Table 2*). In all pair comparison, the error-dependent log-Heckman sample selection (LHSS) model outperforms over its competitors (e.g., the double-hurdle and conventional error-dependent Heckman models). Most likely, the logarithmic nature of the model correcting outliers and minimizing the persistent heteroscedasticity in the data gives an advantage to the LHSS model to outperform the other two competing models (e.g., HSS and DH). In this case, all correlation coefficients are statistically significant, indicating after controlling exogenous variables in models, uncontrollable factors that affect the decision to spend also significantly affect the spending level on FAFH. The correlation coefficient in the LHSS model is negative, indicating that the uncontrollable factors that boost the likelihood to spend also reduce expenditure level or vice-versa. Also sings of most of the estimated parameters echoed with the economic theory. Since these parameters do not indicate the direct marginal effects of regressors on both the probability and the spending level, the marginal impacts derived from *Equations 6–9* were discussed in subsequent section.

Table 2. *Some specification tests comparing independence and used models*

Specification tests	Test-statistic
Independence	
Heckman SS	Wald 491.3661, df = 1, p < 0.0001
Log-Heckman SS	Wald 1009.967, df = 1, p < 0.0001
Double- hurdle	Wald 196.0345, df = 1, p < 0.0001
Vuong's non-nested test	
Double-hurdle versus Heckman SS	*z* = 54.3073, p < 0.0001
Double-hurdle versus Log-Heckman SS	*z* = -14.0318, p < 0.0001
Heckman SS versus Log-Heckman SS	*z* = -30.2837, p < 0.0001

Note: The null hypothesis under Vuong's test for non-nested models is that the expected value of competing log-likelihood ratios equals zero, indicating the competing pair models are equally away from the data being modelled. Under this test, if z > 1.96 the first listed model is preferred, while if z < -1.96 the second listed model is chosen. However, if |z| < 1.96 then no decision is made among the competing pairs

Marginal effects

Marginal effects of explanatory variables on the probabilities, conditional level, and unconditional level of FAFH households are presented at *Table 3*. According to these results, it was observed that various socio-demographic and economic factors of

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households and heads of households had significant effects on FAFH expenditures. The subsequent discussion will continue only on statistically significant variables for the preferred LHSS model.

Table 3. *The error-dependent Log-Heckman sample selection (LHSS) model both with maximum likelihood (MLE) and marginal impact estimates*

Variables	MLE estimates				Marginal effects					
	Probability		Level		Probability		Conditional		Unconditional	
	Parameter	t-value	Parameter	t-value	Parameter	t-value	Parameter	t-value	Parameter	t-value
Constant	-0.164	-1.337	4.837***	34.399						
Male	0.280***	5.099	-0.092	-1.392	8.321***	4.750	25.179***	3.002	34.390***	4.792
Age 30-50	-0.019	-0.279	-0.163**	-2.373	-0.512	-0.278	-33.116***	-2.623	-27.676**	-2.324
Age > 50	-0.309***	-4.303	-0.060	-0.798	-8.495***	-4.275	-27.042***	-4.255	-61.628***	-4.919
Married	-0.199***	-3.723	-0.249***	-4.036	-5.124***	-3.967	-87.301***	-7.193	-83.125***	-7.658
Employed	0.218***	5.769	0.345***	7.728	6.164***	5.649	90.769***	13.853	83.169***	14.237
Manager	-0.121	-1.643	0.018	0.223	-3.476	-1.574	-14.686	-1.091	-17912	-1.456
Compulsory insurance	0.131***	3.271	0.203***	4.207	3.712***	3.160	-52.520***	-8.458	48.052***	8.864
Retired	0.090**	2.262	-0.346***	-7.359	2.437**	2.290	-49.084***	-6.922	-35.426***	-5.575
Entrepreneurial income	-0.132***	-3.809	-0.473***	-11.867	-3.680***	-3.769	-100.33***	-16.24	-86.892***	-15.64
State cash aids	-0.120***	-3.670	-0.258***	-6.586	-3.358***	-3.604	-62.514***	-11.27	-55.990***	-11.44
State in-kind aids	-0.029	-0.671	-0.003	-0.052	-0.789	-0.665	-4.781	-0.609	-5.309	-0.784
Private cash aids	0.064	1.479	-0166***	3.342	1.724	1.511	-20.759***	-2.858	-13.780**	-2.102
Private in-kind aids	0.012	0.249	-0.024	-0.431	0.322	0.250	-2.700	-0.315	-15.582	-0.207
Foreign income	0.042	0.523	-0.166*	-1.709	1.121	0.532	-23.497*	-1.762	-17.111	-1.456
Apartment	-0.064	-1.553	-0.064	-1.425	-1.762	1.553	-21.647***	-2.840	-20.775***	-2.948
Renter	0.109**	2.089	0.053	0.943	2.926**	2.144	27.248***	2.602	27.914***	2.860
Homeowner	-0.110**	-2.338	0.014	0.280	-2.969**	-2.370	-13.912	-1.608	-16.905**	-2.096
Combi	-0.033	-0.646	0.038	0.689	-0.898	-0.643	2.210	0.225	0.091	0.010
Stove	0.048	0.888	-0.045	-0.752	1.322	0.887	-1.231	0.124	1.488	0.163
Internet	0.107***	2.787	0.094**	2.328	2.897***	2.839	34.529***	4.345	33.612***	4.478
One child	0.222***	5.279	0.093**	2.017	5.719***	5.657	54.084***	5.791	56.268***	6.452
Two child	0.167***	3.785	0.018	0.371	4.370***	3.968	29.211***	3.271	32.543***	3.928
Three and more child	0.057	1.207	-0.016	-0.302	1.538	1.229	5.511	0.600	7.396	0.886
House feature index	-0.012	-1.254	0.003	0.283	-0.331	1.254	-1.227	-0.649	-1.611	-0.939
Number of autos	0.041	1.331	-0.085**	-2.401	1.116	1.333	-9.708*	-1.709	-5.751	-1.122
Primary school	0.198***	5.719			5.360***	5.743	29.807***	5.632	34.272***	5.653
Secondary school	0.206***	4.190			5.249***	4.499	31.791***	4.052	36.759***	4.045
High school	0.306***	5.391			7.625***	5.969	47.668***	5.144	55.183***	5.143
College school	0.209***	3.027			5.357***	3.262	32.333***	2.933	37.377***	2.925
Number of properties	-0.041***	-3.217			-1.112***	-3.215	-6.100***	-3.202	-7.009***	-3.206
Children 0-5	-0.105***	-5.135			-2.882***	-5.119	-15.813***	-5.107	-18.170***	-5.117
Children 6-14	-0.077***	-5.132			-2.094***	-5.133	-11.492***	-5.097	-13.205***	-5.103
Children 15-18	0.029	1.200			0.797	1.199	4.374	1.199	5.026	1.200
Adult 19 +	0.088***	7.304			2.400***	7.243	13.169***	7.228	15.132***	7.257
Total expenditures	0.221***	27.238			6.038***	26.295	33.137***	20.347	38.076***	21.590
Education			-0.025***	-5.404			-4.657***	-5.323	-3.758***	-5.321
Household size			0.103***	11.157			19.391***	10.821	15.650***	10.762
Income 2			0.477***	14.476			90.648***	13.336	73.161***	13.238
Income 3			0.062***	14.056			233.042***	9.705	188.085***	9.655
σ			1.532***	105.393						
ρ			-0.982***	-96.855						
Log-likelihood value		-60266.65								

Statistical significance *** at the 1% level; ** at the 5% level; * at the 10% level

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Because of culinary skills, households under the supervision of the male are reported to have higher FAFH expenditures (Byrne et al., 1996). Our results confirmed that hypothesis. Households with a male headed were 8.32% more likely to consume FAFH and spend 25.18 TL more per month than households with a female headed Bozoglu et al. (2013) found that male household heads tended to 13.84% more likely to consume FAFH and spend 51.05 TL more per month than their female peers. Previous findings is consistent with our findings (Byrne et al., 1996; Ham et al., 2004; Binkley, 2006; Angulo et al., 2007; Keelan et al., 2009; Fanning et al., 2010; Liu et al., 2013; Blick et al., 2017).

Heng and Guan (2007) reported that the young differed from the old as regards tastes, food preferences, lifestyle, eating habits and opportunities to socialize. In the study, there was a negative relationship between the age of the head of household and the monthly average expenditure on FAFH. Household with households heads whose ages between 30-50 and over 50 years tended 0.51% and 8.50% points less likely to consume FAFH and they spent 33.12 TL and 27.04 TL less than households whose heads aged below 30 years. These negative effects of ages were also reported in previous studies conducted in Turkey (Akbay et al., 2007; Gül et al., 2007), in South Africa (Blick et al., 2017), in China (Min et al., 2004; Ma et al., 2006), in USA (Stewart and Yen, 2004; Binkley, 2006), in Ireland (Keelan et al., 2009), in Slovakia (Cupak et al., 2016), in Egypt (Fabiosa, 2008), in Brazil (Rezende and Avelar, 2012), and in Spain (Mutlu and Gracia, 2006; Angulo et al., 2007).

Households with a married head were 5.12% points less likely to consume FAFH and spent 87.30 TL less per month than single headed households. The results indicated that married households were less likely to consume FAFH and spent less than single headed households. Bozoglu et al. (2013) found that married household heads tended to 4.14% points less likely to consume FAFH and spent 18.60 TL less per month than that of unmarried peers. Our results were consistent with the earlier findings (Ham et al., 2004; Keelan et al., 2009; Drescher and Roosen, 2013; Piekut, 2016; Traş and Şengül, 2017).

Compulsory health insurance played a positive role in the probability of consume FAFH, but negatively affected the expenditure levels. Households whose heads had a compulsory health insurance were 3.71% points more likely to consume FAFH but spent 52.52 TL less per month than those without insurance. Employment played a role on FAFH, households with an employed head were 6.16% points more likely to consume FAFH and spent 90.77 TL more per month than their unemployed counterparts. The findings showed that households with employed head in Turkey had significantly higher probability of entering the FAFH market and they spent more on FAFH. Bozoglu et al. (2013) and Traş and Şengül (2017) reported a positive employment effect on FAFH in Turkey. These positive effects of employment were also reported for USA (Jensen and Yen, 1996; Stewart and Yen, 2004), for Spain (Angulo et al., 2007), for Mexico (Langellier, 2015) and for Slovakia (Cupak et al., 2016).

Households with a retired head were 2.43% points more likely to consume FAFH but spent 49.08 TL less per month than their not retired counterparts. Retired played a positive role in the probability of consume on FAFH, but negatively affected expenditure levels. These results were in line with the expectations because retired household head, on average might be older than those not retired and similar health and/or financial reasons in the retired group might result in less consumption of FAFH. Piekut (2016) found that in Poland, households with a retired head were less likely to

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consume FAFH and spent 15.96 PLN per month than those not retired households head. Negative effects of retired household head on FAFH were also reported in earlier studies (Jang et al., 2007; Drescher and Roosen, 2013).

In the study, the households receiving financial aid from the state resources had lower probability of consumption and related expenditure levels by 3.39% points and 62.51 TL, respectively, in comparison to those who were not receiving financial aid from public resources. This finding was in line with findings of Binkley (2006). The finding was in accordance of expectations. The major reason could be income levels and high quality life due to financial support provided by the government. Therefore, it is expected that the expenditures on such households on FAHF would be lower.

Households residing in rental house were 2.93% more likely to consume FAFH and spent 27.25 TL more per month than those residing state apartments. This result was consistent with Bozoglu et al. (2013), who reported a positive relationship between households residing in rental house and FAFH expenditures. Home ownerships had a higher income compared to no home ownership due to high income and low cash flow effects, which is contradictory, the effects of homeowner status on FAFH is reported to be unclear (Yen, 1993). This means that homeowner would show a less probability of FAFH and less expenditure on FAFH in comparison of hypothesized a lack of homeowner. Homeowners were 2.97% points less likely to consume FAFH and spent 16.91 TL less per month than those residing state apartments, similar to findings by Ham et al. (2004), but contradicts to those by Jensen and Yen (1996), Mutlu and Gracia (2006), Jang et al. (2007) and Keelan et al. (2009).

Having an internet connection at home increased the probability of consuming FAFH (2.90%) and it also had a significant and positive effect on FAFH expenditures for households (34.53 TL). This result was consistent with Bozoglu et al. (2013) who reported a positive relationship between having an Internet connection at home and FAFH expenditures.

Households with only one and two children were 5.72% and 4.37% points more likely to consume FAFH and spend 54.08 TL and 29.21 TL more per month than households without children, respectively. These results agreed with the expectations. Piekut (2016) found that in Poland, households with a children are more likely to consume FAFH and spent 16.49 PLN per month than childless households. Similar findings were also reported by Stewart and Yen (2004) and Bozoglu et al. (2013).

Education level increases the probability of the FAFH decision and also increases expenditures on FAFH. Households with a primary, secondary, high and college school head were 5.36%, 5.25%, 7.63% and 5.36% points more likely to consume FAFH, and spent 29.81 TL, 31.79 TL, 47.67 TL and 32.33 TL more per month than their illiterate counterparts, respectively. The findings were consistent with the previous findings (Jensen and Yen, 1996; Mihalopoulos and Demoussis, 2001; Stewart and Yen, 2004; Angulo et al., 2007; Zan and Fan, 2010; Langellier, 2015; Cupak et al., 2016; Piekut, 2016; Traş and Şengül, 2017).

Households who had pre-school children is reported to have spent less FAFH expenditures compared to other families mainly because of difficulties feeding children in public places (Heng and Guan, 2007). Our results confirmed this expectation. In the study, households with a young children aged 0–5 and aged 6-14 were 2.88% and 2.09% less likely to consume FAFH and they spent 15.81 TL and 11.49 TL less than their counterparts without such young children, respectively. Presence of children (aged 0–5 and aged 6–14) decreased FAFH expenditure of households. Negative effects of

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pre-school (aged 0-5) and school children (aged 6-14) on FAFH were also reported in the earlier studies (Mihalopoulos and Demoussis, 2001; Keelan et al., 2009; Chang and Yen, 2010; Drescher and Roosen, 2013; Leschewski et al., 2018; Rezende and Avelar, 2012).

As the total expenditure of households increased, the probability of consuming FAFH increased by 6.04% points and spending increased by 33.14 TL per month. These positive effects of total expenditure might be related to the increased income because household's total expenditures are generally viewed as proxy for income. The positive effects of total expenditure of households on FAFH expenditures were consistent with the earlier studies (Mihalopoulos and Demoussis, 2001; Fabiosa, 2008; Traş and Şengül, 2017).

Level of FAFH expenditure and the probability of consumption in the FAFH market were affected positively from household size. Each additional household member increased the probability of consuming FAFH by 0.10% point, the conditional expenditure by 19.39 TL per month. While these positive effects of household size on FAFH was in consistent with the findings of some earlier studies (Mihalopoulos and Demoussis, 2001; Ham et al., 2004; Chang and Yen, 2010; Cupak et al., 2016), it contradicted with some other findings of Stewart and Yen (2004), Heng and Guan (2007), Akbay et al. (2007), Drescher and Roosen (2013) and Mottaleb et al. (2017).

Households with an average monthly income between 2000 and 5000 TL and over 5000 TL spent 90.65 TL on FAFH and 233.04 TL more than households with an average monthly income below 2000 TL. This was consistent with the applied theoretical framework and other empirical studies investigating the link between income and FAFH spending (Byrne et al., 1996; Min et al., 2004; Ma et al., 2006; Zan and Fan, 2010; Liu et al., 2013; Cupak et al., 20016; Piekut, 2016; Blick et al., 2017; Traş and Şengül, 2017). The results were as it is expected. The major reasons could be households with relatively high income would tend to have more expenditure on products and services including dinning (Bozoglu et al., 2013).

Conclusions

In the study, the characteristics of households and the heads of households had a significant effect on determining the probability of consuming FAFH and the related expenditure. The findings were supported by analyses. Results showed that 77.3% of Turkish households participated in the FAFH market.

The results also showed that both the probability and monthly spending levels of household FAFH increased with male household heads, decreasing in age of household heads, educational levels of household heads, working household heads, household size, household income, reside in rental house, use of internet and the number of adults in a family, whilst the female headed households, married household heads, the households receiving cash income aids from the government and private sector, homeowner, the number of properties in family and families with children 0-5 and 6-14 years old, decreased both the likelihood and spending levels of food away from home in Turkey.

These findings are very important especially for the companies and enterprises operating in the non-home food industry. Because knowing the factors that increase and decrease the food consumption expenditures of households FAFH will provide important clues to the companies and enterprises operating in this sector for what kind of services they will develop for households. For example, children's play areas for

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households with children, car parking for car-owners, low-income households and large households multiple alternative options will have a positive impact on household consumption expenditures. Increasing demand for FAFH will probably ensure further growth in industry. In these days, industry provides employment for many people and creates demand for other food chains from farmers to retailers.

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APPENDIX

Table A1. *Heckman sample selection model both with maximum likelihood (MLE) and marginal impact estimates*

Variables	MLE estimates				Marginal effects					
	Probability		Level		Probability		Conditional		Unconditional	
	Parameter	t-value	Parameter	t-value	Parameter	t-value	Parameter	t-value	Parameter	t-value
Constant	-0.221*	-1.661	215.201***	9.450						
Male	0.346***	5.476	-2.965	-0.267	9.790***	4.980	15.371	1.479	32.973***	3.737
Age 30-50	-0.067	-0.954	-27.485***	-2.905	-1.696	-0.952	-30.720***	-3.304	-29.141***	-3.218
Age > 50	-0.392***	-5.164	-11.463	-1.037	-10.049***	-5.104	-30.606***	-2.838	-46.905***	-4.607
Married	-0.199***	-3.295	-26.184***	-2.592	-4.733***	-3.532	-35.336***	-3.669	-40.740***	-4.648
Employed	0.341***	8.230	55.888***	7.308	9.096***	7.912	73.090***	10.117	78.014***	12.713
Manager	-0.183**	-2.387	9.372	0.987	-5.00**	-2.229	-0.043	-0.005	-10.944	-1.134
Compulsory insurance	0.202***	4.529	29.880***	3.291	5.443***	4.273	40.150***	4.678	43.671***	6.180
Retired	0.051	1.159	-54.394***	-7.033	1.277	1.168	-51.953***	-6.907	-40.556***	-6.014
Entrepreneurial income	-0.261***	-6.884	-86.305***	-14.198	-6.875***	-6.697	-99.334***	-17.242	-95.024***	-18.881
State cash aids	-0.144***	-3.954	-39.807***	-5.610	-3.733***	-3.857	-46.896***	-6.923	-46.343***	-8.015
State in-kind aids	-0.050	-1.071	7.799	0.765	-1.301	-1.051	5.324	0.550	1.523	0.187
Private cash aids	0.060	1.248	-24.532***	-2.776	1.497	1.276	-21.662**	-2.534	-14.945**	-1.971
Private in-kind aids	0.007	0.135	-5.876	-0.569	0.181	0.135	-5.531	-.0559	-4.203	-0.490
Foreign income	0.010	0.118	-17.252	-1.072	0.260	0.119	-16.755	-1.089	-13.377	-0.999
Apartment	-0.111**	-2.463	-13.794**	-2.052	-2.803**	-2.462	-19.142***	-2.969	-21.982***	-3.666
Renter	0.095*	1.680	19.611**	2.231	2.350*	1.721	24.118***	2.839	25.439***	3.210
Homeowner	-0.137***	-2.657	4.682	0.577	-3.400***	-2.708	-1.829***	-0.234	-8.948	-1.244
Combi	0.012	0.233	2.819	0.390	0.313	0.234	3.416	0.486	3.521	0.516
Stove	0.071	1.213	-0.845	-0.101	1.794	1.209	2.577	0.324	6.047	0.815
Internet	0.219***	5.509	20.924***	3.560	5.366***	5.718	31.230***	5.589	38.072***	7.218
One child	0.254***	5.615	8.590	1.203	5.954***	6.116	20.127***	2.914	30.386***	4.713
Two child	0.175***	3.712	-4.280	-0.595	4.211***	3.917	3.840	0.557	12.466*	1.956
Three and more child	0.049	0.954	-16.169*	-1.921	1.225	0.970	-13.823*	-1.720	-8.919	-1.237
House feature index	-0.018*	-1.697	0.118	0.0733	-0.446*	-1.693	-0.733	-0.466	-1.581	-1.031

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Number of autos	0.019	0.555	-15.215***	-2.793	0.469	0.555	-14.320***	-2.745	-10.866**	-2.302
Primary school	0.185***	4.115			4.638***	4.135	8.868***	4.020	17.506***	4.112
Secondary school	0.131**	2.178			3.152**	2.285	6.074**	2.240	12.059**	2.246
High school	0.289***	4.534			6.643***	5.025	12.925***	4.753	25.764***	4.855
College school	0.228***	3.112			5.329***	3.397	10.336***	3.280	20.583***	3.300
Number of properties	-0.046***	-3.181			-1.155***	-3.176	-2.205***	-3.154	-4.350***	3.009
Children 0-5	-0.110***	-4504			-2.790***	-4.492	-5.324***	-4.415	-10.505***	-4.399
Children 6-14	-0.088***	-5.022			-2.235***	-5.019	-4.266***	-4.948	-8.417***	-4.852
Children 15-18	0.013	0.443			0.332	0.443	0.633	0.442	1.249	0.436
Adult 19 +	0.081***	6.102			2.059**	6.057	3.929***	5.685	7.752***	5.839
Total expenditures	0.273***	34.493			6.908***	30.998	13.183***	17.034	26.009***	23.503
Education			-4.686***	-6.835			-4.686***	-4.903	-3.888***	3.762
Household size			14.972***	9.799			14.972***	9.577	12.423***	9.391
Income 2			74.116***	10.226			74.116***	10.226	61.497***	10.210
Income 3			202.437***	20.766			202.420***	20.765	167.956***	20.614
σ			228.437***	104.540						
ρ			-0.551***	-22.167						
Log-likelihood value		-64110.05								

Statistical significance *** at the 1% level; ** at the 5% level; * at the 10% level

Table A2. *Double hurdle model both with maximum likelihood estimates (MLE) and marginal impact estimates*

Variables	MLE estimates				Marginal effects					
	Probability		Level		Probability		Conditional		Unconditional	
	Parameter	t-value	Parameter	t-value	Parameter	t-value	Parameter	t-value	Parameter	t-value
Constant	-0.374	-0.782	48.099**	2.027						
Male	0.566***	3.950	28.305**	2.355	3.884**	2.303	14.693**	2.437	20.699**	2.422
Age 30-50	-0.130	-0.562	-29.081***	-2.795	-3.891***	2.787	-15.315***	-2.808	-21.539***	-2.806
Age > 50	-0.549**	-2.163	-42.829***	-3.599	-5.734***	-3.590	-22.581***	-3.624	-31.736***	-3.622
Married	-0.216	-1.487	-40.553***	-3.643	-5.205***	-3.788	-22.064***	-3.543	-30.819***	-3.568
Employed	0.011	0.088	84.973***	10.857	11.712***	10.470	43.494***	11.211	61.352***	11.210
Manager	0.327	0.317	-5.029	-0.484	-0.674	-0.480	-2.630	-0.484	-3.706	-0.484
Compulsory insurance	-0.029	-0.218	55.831***	5.811	7.800***	5.562	28.250***	6.078	39.962***	6.052
Retired	-0.241*	-1.741	-34.611***	-4.268	-4.692***	-4.199	-18.037***	-4.340	-25.410***	-4.329
Entrepreneurial income	0.217	1.618	-108.756***	-17.095	-15.077***	-16.361	-55.261***	-17.603	-77.935***	-17.678
State cash aids	0.211*	1.811	-58.331***	-7.814	-8.000***	-7.570	-30.014***	-8.026	-42.352***	-8.010
State in-kind aids	0.129	0.935	-6.801	-0.637	-0.913	-0.632	-3.562	-0.640	-5.017	-0.639
Private cash aids	-0.114	-0.842	-6.223	-0.651	-0.836	-0.648	-3.276	-0.657	-4.608	-0.656
Private in-kind aids	0.311**	2.059	-9.562	-0.856	-1.287	-0.847	-4.992	-0.862	-7.036	-0.861
Foreign income	11.503***	3.169	-40.803**	-2.434	-5.709**	-2.332	-20.606**	-2.542	-29.174**	-2.530
Apartment	0.098	0.723	-22.648***	-3.119	-3.021***	-3.114	-11.944***	-3.123	-16.797***	-3.123
Renter	0.349**	2.048	19.427**	2.004	2.555**	2.033	10.389**	1.986	14.568**	1.990
Homeowner	0.254*	1.689	-21.971**	-2.471	-2.905**	-2.492	-11.654**	-2.453	-16.372**	-2.457
Combi	-0.576***	-2.852	16.769**	2.145	2.212**	2.162	8.850***	2.122	12.450**	2.128
Stove	-0.302	-1.411	18.962**	2.078	2.53**	2.074	9.971**	2.080	14.032**	2.080
Internet	-0.444***	-3.067	50.534***	8.105	6.590***	8.230	27.091***	7.973	37.953***	8.015
One child	-0.133	-0.939	36.789***	4.773	4.753***	4.924	19.895***	4.664	27.829***	4.692
Two child	-0.179	-1.056	20.551***	2.667	2.693***	2.715	10.984***	2.632	15.407***	2.640

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Three and more child	0.115	0.597	-6.870	-0.775	-0.922	-0.770	-3.600	-0.779	-5.070	-0.778
House feature index	-0.105***	-3.346	1.226	0.695	0.163	0.340	0.641	0.590	0.904	0.690
Number of autos	-0.022	-0.192	-7.504	-1.285	-1.002	-1.285	-3.959	1.287	-5.567	1.286
Primary school	0.253**	2.436			0.001	0.925	0.015	0.994	0.015	0.974
Secondary school	0.373**	2.085			0.001	0.953	0.014	1.025	0.014	1.004
High school	0.225	1.035			0.001	0.796	0.010	0.836	0.010	0.825
College school	-0.012	-0.045			0.000	0.044	-0.001	-0.044	-0.001	-0.044
Number of properties	-0.146***	-2.650			-0.001	-0.044	-0.009	-0.009	-0.009	-0.012
Children 0-5	-0.079	-0.799			0.000	0.003	-0.005	-0.006	-0.005	-0.006
Children 6-14	-0.197***	-3.198			-0.001	-0.008	-0.012	-0.020	-0.012	-0.016
Children 15-18	0.097	0.768			0.001	0.004	0.006	0.018	-0.006	-0.007
Adult 19 +	0.175***	2.805			0.001	0.008	0.010	0.008	0.010	0.009
Total expenditures	1.852***	13.728			0.011	0.058	0.110	0.166	0.110	0.120
Education			-3.598***	-4.853	-0.480*	-1.672	-1.899	-1.579	-2.761***	-2.896
Household size			9.178***	5.476	1.224***	2.994	4.845***	4.723	6.812***	4.704
Income 2			102.321***	14.305	13.567***	13.897	54.127***	14.480	75.862***	14.549
Income 3			247.599***	24.818	24.101***	31.178	157.816***	21.519	207.372***	23.213
σ			242.332***	165.359						
ρ			-0.868***	-37.169						
Log-likelihood value	-61885.49									

Statistical significance *** at the 1% level; ** at the 5% level; * at the 10% level

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