The Impact of Minimum Wage on Food Away from Home Expenditure Using Structural Equation Model

Jun Ho Seok

University of Kentucky

junhoseok@uky.edu

GwanSeon Kim

University of Kentucky

tate.kim@uky.edu

Tyler Mark

University of Kentucky

tyler.mark@uky.edu

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Jun Ho Seok, GwanSeon Kim, and Tyler Mark
Department of Agricultural Economics, University of Kentucky

UNIVERSITY OF KENTUCKY
College of Agriculture, Food and Environment
Department of Agricultural Economics

Abstract

The purposes and contributions of this paper are two-folds. First, this paper develops the proxy variable for food away from home (FAFH) price to solve the omitted variable problem in FAFH expenditure. Second, this paper incorporates two equations for FAFH price and demand to capture the minimum wage shock on FAFH expenditure. Decomposing FAFH expenditures to demand and price, this study figures out the path of minimum wage shock on FAFH expenditures. This study utilizes a structural equation model (SEM) framework with data from Bureau of Labor Statistics (BLS) for periods through 2005 to 2010. This paper finds that the minimum wage has a positive relationship with the price level of FAFH, but a price does not have a significant effect on FAFH demand. This finding implies that the increase of minimum wage protects the low-income people without reducing restaurant owners' sales. It infers that the employment in restaurant industries may not be reduced by an increase of minimum wage. This study also shows that the standard errors in SEM are smaller than OLS, which implies that estimators of SEM is more efficient than OLS estimators.

Objectives

- estimates the linear recursive model to identify the effect of minimum wage on restaurant expenditures using a structural equation model using a recursive relationship
- The structural equation model, which utilizes the recursive model, allows for an estimate of the minimum wage effect on restaurant expenditures through the price path.
- Moreover, this recursive form with structural equations allows for assumptions to maintain the low unemployment rate since restaurant expenditures are used to determine the impact of minimum wage on restaurant expenditures needed to maintain this low unemployment rate

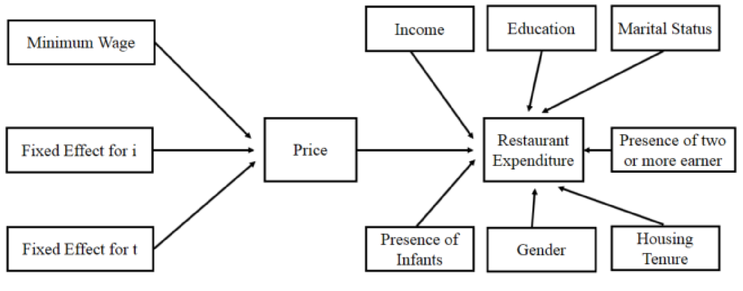

Figure 1. Structural Equation Model for Restaurant Expenditure

Data and Methodology

- The main source of data used in this study is Consumer Expenditure (CE) Survey data from 2005 to 2010 provided by the U.S. Department of Labor, Bureau of Labor Statistics.
- The sample has 6,873 after controlling for respondents who never spent money on food away from home during the study period.
- This study follows the model specification of Basker and Khan (2016) which define the determinants for prices of a fast-food restaurant

$$Ln(Price_{it}) = \beta_0 + \beta_1 Ln(minimum\ wage) + u_i + v_t + \varepsilon_{it}$$

where, i is household, t is the year, *Price* is a consumer price index, u_i is household fixed effect, v_t is year fixed effect, *minimum wage* is state minimum wage, and ε_{it} is and *i.i.d.* disturbance term. This study does not specify the food expenditures between fast food and full-service restaurants due to data limitations.

- The expenditure function is utilized to determine the model specification of the restaurant expenditure as following:

$$Expenditure = Price \times Quantity$$

$$ln(Expenditure) = ln(Price) \times ln(Quantity)$$

- The equilibrium quantity of restaurant food is defined as a quantity demanded of restaurant food. Following Ham, et al. (2004) for the restaurant demand determinants. The following function indicates the determinants for restaurant food demand:

$$\begin{aligned} &Ln(Demand) \\ &= \beta_0 + \beta_1 Ln(Price) + \beta_2 Ln(Habit\ Formation) + \beta_3 Income \\ &+ \beta_4 Race + \beta_5 (Marital\ Status) + \beta_5 Education \\ &+ \beta_6 (Child\ Number) + \beta_7 (Presence\ of\ Infants) \\ &+ \beta_8 (Housing\ Tenure) + \beta_9 (Number\ of\ Earners) + u_i + v_t + \varepsilon_{it} \end{aligned}$$

Table 1. Descriptive Summary Statistics (N=6,873)

Variable	Type	Description	Mean	Std. Dev	Exp. Sign
Wage	Continuous	Annual minimum wage rate in log	1.860	0.182	
Price	Continuous	Average annual Consumer Price Index (CPI) in log	5.311	0.148	+/-
Demand	Continuous	Demand for Food Away from Home in current year in log	-1.731	1.132	
Habit	Continuous	Demand for Food Away from Home in previous year in log	-1.730	1.132	+
Income 1	Binary	1 if income category is less than $5,000 and 0 otherwise	0.023	0.149	+
Income 2	Binary	1 if income category is between $5,000 and $9,999 and 0 otherwise	0.025	0.157	+
Income 3	Binary	1 if income category is between $10,000 and $14,999 and 0 otherwise	0.048	0.214	+
Income 4	Binary	1 if income category is between $15,000 and $19,999 and 0 otherwise	0.042	0.201	+
Income 5	Binary	1 if income category is between $20,000 and $29,999 and 0 otherwise	0.105	0.306	+
Income 6	Binary	1 if income category is between $30,000 and $39,999 and 0 otherwise	0.110	0.313	+
Income 7	Binary	1 if income category is between $40,000 and $49,999 and 0 otherwise	0.098	0.298	+
Income 8	Binary	1 if income category is between $50,000 and $69,999 and 0 otherwise	0.171	0.377	+
Income 9	Binary	I if income category is over $70,000 and 0 otherwise	0.377	0.485	+
White	Binary	1 if household is white and 0 otherwise	0.828	0.377	+
Married	Binary	1 if household is married and 0 otherwise	0.570	0.495	+
College	Binary	1 if household's education level is some college, less than college graduate , Associate's degree, or Bachelor's degree	0.540	0.498	+
Graduate	Binary	1 if household's education level is Master's or Professional/Doctorate degree	0.120	0.326	+
Age_6	Binary	1 if all age of children is less than 6 and 0 otherwise	0.071	0.258	-
Owned	Binary	1 if household owned house and 0 otherwise	0.678	0.467	+
Age	Continuous	Age of household	47.572	16.180	-
Child	Binary	Number of children	0.731	1.109	+
Earner	Continuous	Number of earner	1.422	0.910	+

Note: We calculate demand as total expenditure of food away from home divided by mean price

Results and Discussions

Table2. The Structural Equation Model with Price and Demand (N=6,873)

Variables	Price Equation (SEM)				Price Equation (OLS)			
	(1)		(2)		(3)		(4)	
Minimum Wage	0.026***	(0.001)	0.026***	(0.001)	0.026***	(0.001)	0.026***	(0.001)
	Demand Equation (SEM)				**Demand Equation (OLS)**			
	(1)		(2)		(3)		(4)	
Price	1.665	(1.264)	1.668	(1.264)	1.665	(1.267)	1.668	(1.267)
$5,000-$9,999	0.033	(0.115)	0.040	(0.115)	0.033	(0.116)	0.040	(0.116)
$10,000-$14,999	-0.035	(0.102)	-0.027	(0.102)	-0.035	(0.102)	-0.027	(0.102)
$15,000-$19,999	-0.012	(0.105)	0.005	(0.105)	-0.012	(0.105)	0.005	(0.105)
$20,000-$29,000	0.089	(0.093)	0.103	(0.093)	0.089	(0.093)	0.103	(0.093)
$30,000-$39,999	0.251***	(0.093)	0.266***	(0.093)	0.251***	(0.093)	0.266***	(0.093)
$40,000-$49,000	0.334***	(0.095)	0.348***	(0.094)	0.334***	(0.095)	0.348***	(0.095)
$50,000-$69,999	0.448***	(0.092)	0.461***	(0.092)	0.448***	(0.092)	0.461***	(0.092)
>$70,000	0.653***	(0.092)	0.666***	(0.092)	0.653***	(0.092)	0.666***	(0.092)
Married	0.110***	(0.030)	0.129***	(0.030)	0.110***	(0.030)	0.129***	(0.030)
College	0.152***	(0.030)	0.146***	(0.029)	0.152***	(0.029)	0.146***	(0.029)
Graduate	0.189***	(0.046)	0.178***	(0.046)	0.189***	(0.046)	0.178***	(0.046)
Age	-0.006***	(0.001)	-0.007***	(0.001)	-0.006***	(0.001)	-0.007***	(0.001)
Own House	0.150***	(0.032)	0.162***	(0.032)	0.150***	(0.032)	0.162***	(0.032)
Number of Earner	0.058***	(0.018)	0.057***	(0.018)	0.058***	(0.018)	0.057***	(0.018)
Habit Formation	0.006	(0.011)			0.006	(0.011)		
White	0.128***	(0.035)			0.128***	(0.035)		
Number of Child	0.027**	(0.013)			0.027**	(0.013)		
Log Likelihood	12040.4		12030.7					
R-Squared					0.151		0.151	

Note: *, **, * Significant 1%, 5%, and 10%, respectively. () is standard error. Regression models include year and state fixed effects.**

- Based on price equation in column 1, this study finds that the price is positively and significantly affected by minimum wage rate.
- In the demand equation in column 1, the minimum wage rate through price equation, however, has no significant impact on demand for FAFH. This finding indicates that the supply shock from the minimum wage change has an impact on total annual FAFH expenditure only through the price path.
- Total FAFH demand and expenditure are positively associated with the minimum annual income level more than $30,000. It also suggests that people tend to consume more in FAFH compared to food at home as the household income increases with a minimum annual earnings level more than $30,000.
- This study also finds that standard errors in SEM are smaller than OLS, which implies that estimators of SEM are more efficient than OLS

Conclusions

- This paper has several contributions and implications to existing literature for FAFH expenditure.
- The first contribution of this study is to develop the proxy variable for FAFH price using the FAFH price index in BLS.
- Second, decomposing expenditure into demand and price, this study captures not only the price effect but also demand effect on FAFH from a price change.
- Third, the government policy for increasing minimum wage results in mixed policy implications for the restaurant industry.