FOOD CHOICES FUEL FEMALE LABOR FORCE: THE EFFECTS OF PURCHASED FOODS ON FEMALE LABOR FORCE PARTICIPATION IN THAILAND*

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September, 2005

* Preliminary and incomplete. Comments welcome.

♦ The author is grateful to Robert Moffitt and Burt Barnow for comments and guidance and to Kaspar Richter, Andy Healy, and Thai NSO for data. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author. They do not necessarily represent the view of the Johns Hopkins University or the World Bank.

1. Overview

The past 50 years has seen women joining the labor force in greater numbers, in both developed and developing countries. In the United States, the labor force participation rate of women 16 and older has jumped to almost 60 percent in 2000 from 34 percent in 1950. In middle-income developing countries, the percentage of women ages 20-49 has risen to almost 50 percent in 1990 from 37 percent in 1970 (BLS, 2000). Some of the biggest gains for women in the workforce have occurred in Asia, Latin America, and the Caribbean (Clark et al., 2003).

The influence of time spent in food preparation could have contributed to women's gains in the workforce, since women tend to spend more time in household production. Such use of time then determines labor force participation, particularly that of female. In the United States, households' food consumption behavior has changed considerably as more women entered the work force (Bowers, 2000).

1.1 Main Hypothesis

The use of *purchased foods*—food eaten in restaurants and prepared food eaten at home—affects labor market outcomes. A household that relies upon a higher percentage of purchased foods should experience a higher level of labor market activities, such as labor force participation and labor supply. Specifically, this study poses the hypothetical question that if a household increases the proportion that it spends on purchased foods while keeping the food expenditure constant, how such adjustment would increase the chance that the wife works outside home. Additionally, are such effects on labor market

outcomes between male and female spouses asymmetric because of the gendered structure of household production?

The hypothesis looks at two broad types of *purchased foods*: food eaten in restaurants and market-place prepared food eaten at home. Both categories can influence labor market outcomes differently and, at the same time, are diversely affected by surrounding factors. A household's preference for cooking and eating habit could react to prepared food and restaurant meals in a different way, making the labor response to one category of food more pronounced than the other. Restaurant meals imply less housework, but also increase travel time. Restaurant meals, however, can be viewed as luxury goods, which are effects not causes of female labor force participation.

The substitution of time use between household labor and market labor provides the theoretical support for this hypothesis. The direct effect of purchased food is seen in reduced household chores. One can allocate this saved time to leisure or labor. Many studies from developing countries document the link between wife's employment status and the use of household services, such as childcare and household chores. These services are outsourced, so to speak, in the same manner as home cooked meals and purchased meals. Cerrutti (2003) shows that flexibility in domestic work is key in promoting female labor force participation in Argentina. Middle-class married women who have a stable participation in the labor market can do so because "…they made satisfactory domestic arrangements and could count on the support of other people to take care of domestic responsibilities (their mothers or trustful maids)." Participation of low-income women, however, are less stable, partly due to their restricted domestic work arrangement. Numbers of female relatives and older adult women in the household—

who usually assist with household chores—improve labor force participation of wives in urban Brazil (Conelly, DeGraff, and Levinson, 2001). In another study on female labor force participation in Pakistan, Hafeez and Ahmad (2002) argue that an extended family can provide support in terms of household chores, and allows educated women to earn monetary income outside homes.

To understand how time use in household production can interact with women's labor supply, one can look at research on time used by husband and wife. The studies on Ecuador by Newman (2002) and on the United States by Colthrane (2000) find that women work longer hours than their husband. They also find that time use in household tasks also vary by a variety of household characteristics; however, women's employment is the strongest predictor of household work (Colthrane, 2000).

1.2 The simultaneous relationship between women's work and household production

One cannot deny that *purchased food* expenditures are not exogenous; female labor force participation and households' food choices both actually influence one another. Time saved from household chores, such as cooking, allows women to enter the labor market. At the same time, women who work outside the home earn more income and can afford to buy household services from the market. Both income effects (higher income of wife or of household) and substitution effect (relative price between housework and wife's marketable work) influence food choice. A consensus from numerous empirical studies from the United States (Byrne, Capps, and Saha, 1998; Stewart et al.,2004; Nayga, 1996; Nayga, 1998) is that female labor force participation affects expenditures on purchased foods.

Ideally we want our variable of interest—proportion of food expenditure spent on *purchased food*—to be exogenously determined. In the observed data, however, both purchased food and female labor force participation are jointly decided by the household. To explore this reciprocal relationship, one must control for household characteristics in the right hand side of the model. Differences in taste can be filtered out by using multivariate regressions. The instrumental variable method will also be used to overcome this endogeneity. I use information on local demand and neighborhood food service providers as instrumental variables. These variables capture the availability of purchased foods around the households.

1.3 Why Thailand?

Thailand offers a good case in studying the effects of intra-household behavior—such as decisions to use purchased foods—on female labor market outcomes. The factors that make Thailand a suitable case to test the proposed hypothesis are: high female labor force participation rate, interesting labor dynamic, flexible social structure, possibility of intra-household bargaining, and a wide availability of prepared food and restaurants.

Thailand has a higher female labor force participation rate than other developing countries. Table 1 shows female activity rates[1] in a variety of developing countries in East Asia and Latin America. The female activity rate in Thailand is higher than in other countries with comparable characteristics. Social norms on work, household chores, and cooking are not rigid. Households offer an array of arrangements in allocating their production. The possibility of intra-household bargaining comes from the fact that the contribution of the wife in total household expenditure is quite large. In 40 percent of

[1] Female activity rate is the percentage of economically active females to total female population.

urban households in Thailand, wife's income share is between 40 percent to 60 percent.[2] The ratio of female wage to male wage in the non-agricultural sector rose from 64 percent in 1990to 72 percent in 2000[3]. Those factors encourage intra-household bargaining and substitution between purchased food and household produced food, provides a basis for the proposed hypothesis. The nature of Thai food and the availability of purchased food also fit well with the hypothesis. The following section on "Purchased foods in Thai context" makes a case for this feature.[4]

In conclusion, this study focuses on the relationship between household food consumption behavior and family labor market behavior, especially how changes in the share of prepared food in households' food expenditure affect female labor force participation. An instrumental variable method will be used to deal with the potential endogeneity. Further comparison of the effects of purchased foods and labor market outcomes between male and female will be conducted. The analysis will allow us to understand the nature and extent of the difference in male and female economic behavior, in terms of labor supply and household production. Impact among the poor is also interesting since this group tends to suffer from economic crunch and is more likely to face food insecurity.

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[2] SES 2000, own compilation. See Section 5 on data for more detail about the data set.
[3] Gender Statistics, National Statistical Office.
[4] Experience from this study on Thailand can also be applied beyond its boundary. Fass (1995) discovers that food sectors in urban areas of developing countries operate very much like their richer and more developed counterparts. The author explores Port-au-Prince's fast food industry, both the demand and supply sides. He discovers similar factors influencing demand for meals in Port-au-Prince, Haiti and in the United States. The expenditure shares for food purchased outside the home are higher in the United States, which is not surprising given that United States's households have higher levels of income. The patterns of food spending across income quintiles, however, are similar. The shares rise among the middle income brackets and then fall among the richest households. On the supply side, firms in developing countries may be smaller and look shabbier, but operate under the same structures as firms in richer countries. Labor productivity is also the same as in the United States restaurants. The difference is that entrepreneurs in richer countries can "alter their milieu" while their counterparts in poorer places do not enjoy such opportunity.

This chapter is organized as follows. Definition and features of purchased food in Thailand are described in Section 2. Section 3 sets up theoretical model. Section 4 looks at the data and Section 5 outlines estimation techniques. The regression results are presented in Section 6, while the last section offers conclusion the analyses.

2. Purchased Foods in the Thai Context

This section describes the characteristics of purchased foods in Thailand, which can be different from those of purchased foods in other parts of the world. We first start with the way that purchased foods fit into a typical Thai meal. The emphasis of this section is in prepared food eaten at home, because its feature differs from other countries.' Then we examine the issue of time used in food preparation. The last subsection explains the exact definition of purchased foods in our data set.

2.1 Significance of purchased foods in Thailand

A typical Thai meal comprises many dishes. Each dish has different flavor and texture. Many meals are eaten with white rice. A salient feature of Thai meals is the additivity of dishes. Since family members and guests share all dishes during a meal, another dish or an additional guest can be added to the dining table without disrupting the meal plan. Commercially bought prepared meals can be added to the meal without replacing it. This additive characteristic allows incremental use of commercially bought prepared food.

Prepared meals can be bought easily in urban Thailand. The locales of stalls that sell prepared, Thai food are prevalent: sidewalks in business districts, public markets, bus stops, and metro stations. Thus one can purchase an entire home-made meal on their commute home. Food stalls that specialize in prepared foods are usually small,

comprising only one to two vendors. Typically each stall offers about 10 to 20 varieties of food such as curry dishes, stir fried dishes, soups, etc[5]. (See Figure 1 for pictures of food stalls.) Customers pick the dishes and the vendor put a ladle or two of such food in containers. Because of the wide selections of food from each stall and the presence of numerous food stalls in a venue, one can rely on prepared food as a home-cooked meal substitute for an extended period of time without growing weary of it.

2.2 Varying degree of prepared food and food away from home.

Thailand's National Statistical Office (NSO) collects expenditure data on both types of purchased foods. *Prepared food eaten at home* can be broken down as: curry, noodles, fried rice, instant noodles, canned prepared food, and other prepared food. For *meals eaten away from home*, sub-categories include: breakfast, lunch, dinner, and snacks. Table 2 shows expenditures on each category of purchased food as percentages of total household food expenditure.

Curry is eaten with rice as part of meals and households usually prepare white rice—which takes very little time to prepare—to eat with curry which is usually shared among a few members of households. *Noodle and rice dishes* such as fried rice and pad thai, are one-dish meals.

3. Theoretical Model

The theoretical model starts with a utility maximization problem under the family labor supply model with intra-household bargaining similar to that of Browning and Chiappori (1998). The household utility is a weighted sum of the utility functions of the

[5] Prepared food stalls are usually arranged in the same way as cafeterias in the United States, however, the food are not heated.

husband and wife.[6] The weight $\lambda(M)$, or woman's bargaining power, is a function of marriage characteristic *M*. Household allocation might not only depend on comparative wage alone, but also upon bargaining power.

The household's problem can be stated as:

$$\begin{aligned}&\max \lambda(M)(U_w(C^{rm}, C^{pm}, C^{ot}, Z, \ell_w)) \\ &+(1-\lambda(M))(U_h(C^{rm}, C^{pm}, C^{ot}, Z, \ell_h))\end{aligned} \quad (1)$$

s.t.

$$H_j = T - TZ_j - \ell_j;\ j \in \{w, h\}, \text{ and} \quad (2)$$

$$\omega_h H_h + \omega_w H_w + W_h + W_w = \sum_k p^k C^k \quad (3)$$

where

$\lambda(M)$: woman's bargaining power, $0 \le \lambda \le 1$

M : factors that contribute to bargaining power within the household

C^{rm}: consumption of food away from home

C^{pm} consumption of prepared food

C^{ot}: consumption of other foods

k: $k \in K$; *K* is the set of goods consumed by the household

w,h: wife and husband

Z : household production, such as home cooked meals, where $Z = Z(TZ_h, TZ_w)$

TZ_j : time use in household production; $j \in \{w, h\}$

ℓ_j : leisure; $j \in \{w, h\}$

H_j : labor supply; $j \in \{w, h\}$

ω_j : wage rate; $j \in \{w, h\}$

W_j : non-earned income; $j \in \{w, h\}$

p_k : price of good *k*

T: total time available

[6] This class of household utility function is easy to solve, but allows bargaining within households.

Note that C^k denotes consumptions of goods that are bought from markets while Z indicates consumption of home produced goods such as home cooked meals. To solve the maximization problem, we set up the Lagrange as

$$\begin{aligned}\mathcal{L} &= \lambda(M)(U_w(C^{rm}, C^{pm}, C^{ot}, Z(TZ_h, TZ_w), \ell_w)) \\ &+(1-\lambda(M))(U_h(C^{rm}, C^{pm}, C^{ot}, Z(TZ_h, TZ_w), \ell_h)) \\ &+\theta[\omega_h H_h + \omega_w H_w + W_h + W_w - \sum_k p^k C^k]\end{aligned} \qquad (4)$$

where θ is the Lagrange multiplier. We then take derivative and then solve the first order conditions to get the solutions,

$$C^{pm}* = C^{pm}(\mathbf{p}, \boldsymbol{\omega}, \mathbf{W}, \lambda(M)) \qquad (5A)$$

$$C^{rm}* = C^{rm}(\mathbf{p}, \boldsymbol{\omega}, \mathbf{W}, \lambda(M)) \qquad (5B)$$

$$C^{ot}* = C^{ot}(\mathbf{p}, \boldsymbol{\omega}, \mathbf{W}, \lambda(M)) \qquad (5C)$$

$$TZ_w^* = TZ_w(\mathbf{p}, \boldsymbol{\omega}, \mathbf{W}, \lambda(M)) \qquad (5D)$$

$$TZ_h^* = TZ_h(\mathbf{p}, \boldsymbol{\omega}, \mathbf{W}, \lambda(M)) \qquad (5E)$$

where $\mathbf{p}$ is the vector of prices, $\boldsymbol{\omega}$ is the vector of wage rates, and $\mathbf{W}$ is the vector of non-earned incomes. $C^{food}*$, the total food consumption is the sum of $C^{rm}*, C^{pm}*$, and $C^{ot}*$. Dividing prepared food consumption and food away from home consumption with the total food consumption to get

$$\frac{C^{pm}*}{C^{food}*} = g^{pm}(\mathbf{p}, \boldsymbol{\omega}, \mathbf{W}, \lambda(M)) = E^{pm} \qquad (6A)$$

$$\frac{C^{rm}*}{C^{food}*} = g^{rm}(\mathbf{p}, \boldsymbol{\omega}, \mathbf{W}, \lambda(M)) = E^{rm} \qquad (6B)$$

where E^{pm} is the proportion of prepared food expenditure to total food expenditure and E^{rm} is the proportion of food away from home to total food expenditure. At the same

time, one can derive the first order condition of the wife's labor supply and substitute ℓ_w with $T - TZ_w - H_w$ to get

$$\frac{d\mathcal{L}}{dH_w} = \lambda(M)\frac{\partial U_w}{\partial H_w}(C^{rm}, C^{pm}, C^{ot}, Z(TZ_h, TZ_w), T - TZ_w - H_w)[\frac{\partial \ell_w}{\partial H_w}] + \theta\omega_w = 0 \qquad (7)$$

Rearrange (7) to get

$$\lambda(M)\frac{\partial U_w}{\partial H_w}(C^{rm}*, C^{pm}*, C^{ot}*, Z(TZ_h*, TZ_w*), T - TZ_w* - H_w*) = \theta\omega_w \qquad (8)$$

Note that choice variables with asterisk, *, denote value of the choice variables at the optimum level—the solution of the maximization problem. Substitute TZ_w^* and TZ_h^* from (5D) and (5E), and replace C^k* with E^{pm} and E^{rm} from (6A) and (6B) to get the labor supply equation

$$H_w* = H_w(\mathbf{p}, \boldsymbol{\omega}, \mathbf{W}, \lambda(M); E^{pm}, E^{rm}) \qquad (9)$$

And the labor force participation equation is

$$LFP_w = 1 \text{ if } H_w* > 0 \qquad (10)$$

$$= 0 \text{ if } H_w* = 0$$

Equation (6A), (6B), (9), and (10) will be used in the estimations. To deal with the fact that price data does not exist in the data set, I assume that consumers face uniform price of food. Expenditures, consequently, become weighted values of quantity. Studies on demand for food away from home such as Byrne, Capps, and Saha (1998) and Stewart et al. (2004) also use this assumption[7].

[7] This assumption is very sensible in Thai context. Prepared foods are provided by small establishments that tend to cluster together. They often provide the same type of food, and with competition, offer uniform price.

4. Data

4.1 Overview

This research draws on various data sources. The main source of data is the Thai Socio-Economic Survey (SES). The SES is a household survey that focuses on household's income and expenditure—a stripped down version of the Living Standard Measurement Survey (LSMS) (see Grosh and Muños, 1996 for details). The National Statistical Office of Thailand (NSO) conducts the survey every even year. The 2000 data set is used this study[8]. The SES collects information on household characteristics and individual characteristics such as education, age, marital status, relationship to head of household, occupation, and employment status, as well as incomes (both earned and non-earned). This data set, though, does include information on labor supply, wages, or prices associated with consumption expenditures. In terms of expenditure, it has detailed information on expenditures in household services that are relevant such as domestic helps, prepared food, and restaurant food.

The concept of this essay fits well with the nature of urban institutions, such as the well-functioned markets for purchased foods and formal labor market for both male and female. The sample is, therefore, restricted to only households in urban[9] areas and to married households where both husband and wife are present; there are 5568 households

[8] The latest SES is 2002. In this survey, the prepared meals and food away from home expenditures are broken down to about 5 sub-categories each. Despite the much more detailed data availability, this study does not use the 2002 SES because it cannot be merged with the 2000 population and housing census.
[9] Urban areas refer to municipal areas as defined in 2000.

in this sample. All expenditure and income are deflated spatially with the 1996 spatial price structure.[10]

Table 3 shows characteristics of wives and husbands in the sample of married households in urban Thailand. On average, wives in urban Thailand are slightly younger than their husbands and their earned income lower, as well as their level of education. The variable "work for pay" under the *work status* section is the dependent variable of this study, namely the labor force participation. Thai NSO collects data on work status[11] and occupation of both primary and secondary occupations of respondents age 15 or older. Only those who identify themselves as employers, own account workers, government employees, state enterprise employees, or members of a cooperative group in either primary or secondary occupation are classified as "work for pay" in this research. This definition of "work for pay" includes the gender aspect of work, fitting well with this study.[12] This definition, however, might vary from the official labor force participation statistics.

This data set is then combined with the location variables. Most of these variables are obtained directly from the 2000 Population and Housing Census, while the sub-district's average consumption expenditure variable is from the Poverty Map of Thailand.[13] These variables are shown in Table 4. The local labor market information

[10] These prices and incomes may not need to be inflated since these numbers are used as proportion not level.
[11] Categories for work status are: employer, own account worker, unpaid family worker, government employee, state enterprise employee, member of cooperative group, economically inactive, and no occupation.
[12] The SES dataset does not have information on hours of work per week; therefore, this definition of labor force participation does not differentiate between full-time and part-time works.
[13] A poverty map is a small-area estimation of welfare indicators such as mean income, average consumption, poverty headcount, and Gini coefficient, etc. In the case of Thailand, these indicators are

from the population census is merged to the SES 2000, matching the primary sampling units (PSU) of the SES with their corresponding sub-districts (and districts) in the Census. Not all of the urban households in the sample of married urban couples can be merged with the location variables. However, the number of observations that can be matched stands at 4913; it is still sufficient to perform substantive econometric analyses. This *final* sample is the data set used in the estimation phase.

4.2 Instrumental variables

The location variables serve as instrumental variables and as covariates in the labor force participation equation. Conceptually, good instrumental variables should be correlated with the household's demand for prepared food and restaurant meals, but not correlated with women's decisions to enter the labor force. Availability and access of purchased foods fit well with this concept. Households located in a neighborhood that is plentiful with purchased food establishments—such as restaurants and stalls that sell prepared food—may consume more of these foods given the same level of income and household conditions. To determine availability of purchased foods, I use characteristics of the area surrounding the subject's house as candidates for instrumental variables.[14] The information on local areas' proportion and number of workers in occupations related to purchased food represents the supply side of the local purchased food market. These occupations are food stall workers, cooks, servers, and stall market vendors; they are classified according to the International Standard Classification of Occupations (ISCO-

available at the sub-district level (Healy et al., 2003). For general discussion on the method of poverty mapping, please see Elbers, Lanjouw, and Lanjouw (2003).

[14] In section 5, we will select the eventual instrumental variables from this list of candidates.

88).[15] The sums and means of the number of workers are summarized from the 2000 Population and Housing Census at the sub-district level and at the district level.[16] Both levels are used because workers may travel from one part of town to work in another part. Population characteristics from both levels of aggregation might affect the consumption behavior of households differently.[17]

To complement the supply side picture of the local purchased food markets, the local consumption expenditure from the Poverty Map of Thailand offers the demand side's. I use the per capita consumption at the sub-district level as another instrumental variable. This level of aggregation is preferred since we want to capture the availability of purchased foods that help households save time not the ones that provide luxury. Households tend to buy food from establishments close by because of convenience, but may travel further to acquire food for luxurious qualities.

Given the context of Thailand, the local area per capita consumption expenditure is an appropriate instrumental variables; it is not correlated with the wife's working status. One might be concerned that a household where a woman works outside the home would have higher income and therefore located in a high income neighborhood. This logic is unlikely in the context of Thailand. Households in urban Thailand are spatially immobile; families rarely move out of a place in which they have settled, even if they become more prosperous or vice versa. Two factors contribute to this phenomenon. Firstly, a school district system does not exist. Most public schools do not have strict

[15] International standard classification of occupations: ISCO-88. International Labour Office Geneva: ILO, 1990.
[16] The hierarchy of administrative division in Thailand descends from Province (Changwat)—the highest level of administration—to District (Amphoe), Sub-district (Tambon), and Village, the lowest level of administration.
[17] Most municipal (urban) areas—cities or towns—lie within only a single district but an urban area might spread over several sub-districts.

rules, or enforce any rules, that require students to live in the district surrounding the school. Moreover, school budgets come from the central government, not from locally raised taxes. The other factor is homogeneity. Thai demographic profile is extremely homogenous; most people share the same belief, religion, and appearance. There is no motive to move to live with others of similar background.

4.3 Covariates

Covariates[18] control the intervening effects. Table 5 lists all the variables used as covariates in the estimations, together with their weighted means and standard errors. To control for regional variation, I use dummy variables for the Northern, Northeastern, Southern regions and Bangkok metropolitan, leaving out the Central region. Note that wages of men and women appear in the theoretical model. Since the data set does not contain wage information, I use educational attainments and ages to proxy their wage rates. For the education attainment variables, I use dummy variables for educational attainment at lower secondary, upper secondary, tertiary, and vocational.[19] Non-earned income is a vital part of the theoretical model. In this data set, it is defined as the sum of transfer income, property income and other incomes.

Household demographic characteristics can also influence the decision making process of households. The following variables are included in the covariates: household size, number of children younger than a year, number of children age between 1 and 6 years, and number of children age between 7 and 15 years. Literature of family labor supply in developing countries demonstrates that extended family structure is crucial. I

[18] $\mathbf{X}_i$ in equation (7) to (12).
[19] Post-graduate education is dropped due to its limited size.

use the number of other relatives and of older women to encapsulate this feature. Characteristics of married couples also enter the equations as determinants of bargaining power. To show this effect, I use the interaction between unearned incomes of couples (husband's non-earned income * wife's non-earned income) and the ratio of the wife's age to the husband's age.

To discover the non-linearity in the model, I use the squared of the following variables: number of other relatives, number of older women, household size[20], number of children younger than a year, number of children age between 1 and 6 years, and number of children age between 7 and 15 years, non-earned incomes and ages of husband and wife.

Table 5 also compares characteristics of households by the wives' working statuses. Households where wives work differ from those where they do not work in a number of dimensions. In households where wives work, both partners tend to have college degrees. Moreover, they tend to be in areas where there are many working married women. For households where wives do not work outside the home, their non-earned incomes tend to be larger, husbands tend to have higher earnings, their family sizes are larger, and they often have more children under the age of six.

Note that the means of most variables from the *married urban household* data set (before merging with the location variables) and from the final data set (after merging) are very similar. The differences are within the ranges of the confidence intervals. The only exception is the regional component—there are fewer Bangkok households in the

[20] Stewarts et al. (2004) contend that there is non-linearity in household size and the economy of scale from cooking contributes to this relationship.

final data set than in the original *married urban households*. In general, we can conclude that restricting to the merged sample does not change the characteristic of the data set.

5. Econometric Model

The main objective of the estimations is to examine the extent to which purchased foods affect labor market outcomes of women.[21] To proceed, one can write econometric model of the linear approximation of equation (6A), (6B), (9), and (10) as:

$$Y_i^* = \mathbf{X}_i\beta + \alpha_1 E_{1i} + \alpha_2 E_{2i} + u_i \quad (11)$$

$$Y_i = 1 \text{ if } Y_i^* \geq 0; Y_i = 0 \text{ if } Y_i^* < 0 \quad (12)$$

$$E_{1i}^* = \mathbf{X}_i\delta_{11} + Z_i\delta_{12} + \varepsilon_{1i} \quad (13)$$

$$E_{1i} = \max(0, E_{1i}^*) \quad (14)$$

$$E_{2i}^* = \mathbf{X}_i\delta_{21} + Z_i\delta_{22} + \varepsilon_{2i} \quad (15)$$

$$E_{2i} = \max(0, E_{2i}^*) \quad (16)$$

where Y_i : Labor force participation

$\mathbf{X}_i$: Vector of covariates

E_{1i} : Proportion of prepared food expenditure to total food expenditures

E_{2i} : Proportion of restaurant food expenditure to total food expenditures

Z_i : Instrumental variables

The econometric model in equation (11) to equation (16) has two econometric issues in which we need to address: the zero censoring in the food expenditures and the endogeneity of the food expenditures.

[21] For simplicity, only women labor force participation is considered here. Results on male labor force participation, which are equally important, can be use to compare gender differences.

5.1 Censored explanatory variables

The first econometric problem that we encounter in our data set is the zero censoring of food expenditure. Studies on the purchased food demand recognize the importance of this issue (Byrne, Capps, and Saha, 1998; Stewart et al., 2004; Nayga, 1996; and Nayga, 1998). Table 6 shows the proportions of households that spend positive amounts on prepared meals and on food away from home. In our final data set, 13 percent of households do not use prepared meals. The same figure stands at 17 percent for food away from home. The proportions of zero censored households are not negligible, thus we need to address this problem. Tobit-styled correction is used in equations (13) to (16) to deal with the biases from the problem of censored data.

We only apply left-censored Tobit estimation; we focus solely on the zero censoring problem. The proportions of food expenditures are, by their construction, bounded on both sides at zero and one. The maximums of both proportions are at one in Table 3. However, if we look at Table 5, the mean of the proportion of prepared food expenditure is only 0.13 while the mean of the proportion of food away from home is 0.19; it is not likely that censoring at one will be an issue.[22]

5.2 Endogeneity

The second econometric issue considered before estimating the model is the endogeneity of the food expenditures in the labor force participation equation. The endogeneity problem often arises in this type of study. We have addressed this issue in Section 1.2. Econometrically, the endogeneity occur because the random process in the

[22] Histograms of both expenditures show that the right tails of the distributions taper off around 0.8.

labor force participation equation is determined jointly with the decisions to buy prepared foods and foods away from home. Such endogeneity leads to biased estimations.

One can detect the endogeneity before taking on a full-scale estimation by using a simple two-step procedure proposed by Wooldridge (2002: pp. 474). The procedure is as follows. First, we run Ordinary Least Squares (OLS) of equations (13) to (16) and keep the predicted residuals, and then run the Probit of equation (11) and (12) together with the OLS residuals from the first step. We can ascertain whether the endogeneity exists from the t-test of the residual's coefficients. Noted that the t-test of the residual's coefficient is valid under the null hypothesis that purchased foods expenditure is exogenous; it is valid without assuming normality or homoskedasticity. In our application, OLS regression is replaced by Tobit regression. To deal with endogenous food expenditures, I use the instrumental variable technique. Details about the source and selection of instrumental variables will be discussed extensively in the next section.

5.3 Estimation techniques

To estimate the coefficients of the food expenditures in the labor force participation equation while recognizing the two econometric issues discussed earlier, the two-step method is used in this essay. For this method, we begin by estimating equations (13) to (16) with Tobit regressions. Then we substitute the predicted values of food expenditures, $\hat{E}_{1i}$ and $\hat{E}_{2i}$ in equations (11) and (12), the labor force participation equation. The labor force participation equation is then estimated by using the Probit regression. The inference of the estimation results are from bootstrapping.[23] The coefficients

[23] Standard errors of the Probit step (the second step) reported by statistical packages are incorrect.

obtained from this method are consistent but are less efficient than the maximum likelihood estimation's (MLE).

6. Regression Results

This section presents the estimation results of the impact of purchased foods expenditures on labor force participation of married women in urban Thailand. The regression results presented below begin with intermediate estimations, such as instrumental variables selection, quality of instrumental variables, and endogeneity tests. We then show the regression results of the labor force participation equations and perform sensitivity analysis. Subsequently, we explore the effects of purchased foods on labor supply decisions of married women in low-income households—how and why the effects differ from those of the general population. Finally, we compare the earlier results with the impact of purchased foods on married males.

6.1 Expenditure equations and instrumental variables

The proposed econometric model in Section 5 uses the instrumental variable technique to deal with the endogeneity in food expenditures. To estimate the system of equations as proposed in equation (7) to equation (12), one must decide which instrumental variables (IV) to use in the first stage equations, equation (9) to equation (12). These first stage equations are estimated by Tobit regressions. The predicted values of both food expenditures will then be inserted into the labor force participation equation, equations (7) and (8).

As described earlier in Section 4.2, candidates for instrumental variables are proportions and numbers of workers in food service occupations, both at district and sub-district levels. The sub-district level per capita consumption is also included in the list of

candidates. The descriptive statistics of these variables are presented in Table 4. As explained in the data section, these candidates are theoretically relevant and suitable as instrumental variables. Hahn and Hausman (2002) contend that the two Stage Least Squares (2SLS) bias increases with the number of instrumental variables. To increase the quality of instrumental variables and bolster the fit of the first stage equations, only some of the candidates are selected into the final model specification. Including fewer instruments also reduces the concern that employing a large number of instrumental variables will add irrelevant variables, thus increasing the variances of the predicted endogenous variables.

The IV candidates are selected by using stepwise process on Tobit regressions. Results for both prepared food (PREP) and food eaten away from home (FAFH) are presented in Table 7. The first specification, IV-A, includes all covariates (from Section 4.3) and the instrumental variables candidates that are selected by the stepwise process. The selection criterion is that the coefficients pass t-test at 5 percent level. In column (3) and (4), IV-B specification, we combine the list of instrumental variables to include instrumental variables that are selected in either (1) or (2). In the IV-B specification, the same set of instrumental variables is used for both of the food expenditure equations. In the process of combining the two sets of IVs, some variables from PREP are not included to reduce the number of irrelevant IVs in the IV-B specification. The quality of IV, which will be addressed subsequently, is also improved by this process. On the whole, we also observe that the coefficients of covariates in the IV-A and IV-B models are very similar.

In terms of the coefficients of family's characteristics, most of the results have the expected signs. Husband's education levels are found to increase the demand for purchased foods; the impact is larger in food away from home. This result is consistent with the findings by Nayga (1996). Non-earned income of both husband and wife do not significantly influence both food expenditures. Regional variation affects demand for food away from home but not for market-prepared eaten at food. Contrary to food demand studies in the United States (Stewart et al., 2004), neither the age of wife nor husband affects expenditures on both foods. The results for the family size variable are consistent with the literature on food demand. The coefficient family size on prepared food is negative because it exhibits economy of scales (Stewart et al., 2004).

Let us shift to results of the instrumental variable candidates. Local demand, represented by per capita consumption, is significant in both food expenditures. The profile of local food service workers affects the demand of prepared food and food away from home, generally speaking. However, it is complicated to interpret each coefficient separately because we use both the number of workers as well as the proportion of workers to population in local areas. Moreover, the exact label of food service occupations could be difficult to classify in an informal setting. The person who sells prepared food tends to create the food by herself; she is, thus, also a cook. In a small, family-run food stall, the cook and the server could be the same person.

The quality of instrumental variables is crucial, and can be measured with test statistics. Test statistics that gauge various dimensions of the instrumental variables' quality are presented at the bottom of Table 7. First, we consider the F-test of the likelihood ratio which checks the first stage model as a whole. This test confirms that all

models, from (1) to (4), are meaningful because their p-values are equal to zero (the last row). Second, examining the relevance of instrumental variables can help us avoid the Weak Instrument problem[24]. The F-test cannot only be significant, but the F-statistic must also be high enough, preferably higher than 10 (Stock, Wright, and Yogo, 2002). The F-statistics of the instrumental variables (the third row from the bottom) of model (1) to (3) are sufficiently high. Model (4) has F-stat of 8.36, which is slightly low given the number of instrumental variables used (6 variables are used as IV in this model); this may be a sign of a weak instrument problem.

Overall, the choice of instrumental variables is appropriate. To make the model consistent, we use IV-B in all of the second stage estimations.[25] The coefficients of the entire models do not change much either as we move from model (1) to (3) and from (2) to (4). We do not sacrifice much to have a consistent model of both foods. Modeling issue aside, it is more reasonable to use the same IV for both foods considering the difficulties in classifying food service occupations.

6.2 Endogeneity Tests

Before embarking on the main regression results of the labor force participation equation, we examine the existence of the endogeneity problem. The econometric model in this essay is constructed based the notion that the unobservables in the labor force participation equation are correlated with the unobservables in the purchased food expenditure decisions. Such correlations can cause a well-known endogeneity problem, which leads to the bias in coefficient estimates. To detect the problem, we use the

[24] Stock, Wright, and Yogo (2002) and Baum, Schaffer, and Stillman (2003) provide overviews of the weak instrument problem and its diagnosis.
[25] We also compare the IV-B results with those from IV-A specification to examine the robustness of the estimates.

procedure outlined in Section 5.2, the method adapted from the procedure proposed by Wooldridge (2002). In essence, we run Probit regression of the labor force participation equation with the predicted error terms from the food expenditure equations. If the coefficients of the predicted errors are significant, then, we may conclude that the purchased food expenditures—food away from home or prepared food—are endogenous.

Results of the endogeneity tests are shown in Table 8; each column presents test result from each model specification of the female labor force participation equation. The IV-B specification is used in models (1), (2), and (3). The coefficients for the estimated error term of food away from home are significant (models (1) and (3)), but the coefficients for prepared foods' are not. This test suggests that there is an endogeneity problem in the food away from home expenditure.

6.3 Regression results

Table 9 presents the instrumental variable Probit regression results of the female labor force participation equation. We use the two-step method, with the IV-B specification for the first stage Tobit. The proportions of both purchased food expenditures are included in this model. Standard errors of coefficients shown are from bootstrapping. Because of the two-step and nonlinear nature of the labor force participation model, it is cumbersome to calculate the correct estimates of standard errors analytically. Bootstrapping is, therefore, a superior alternative.[26] Bootstrap biases[27] of the two food expenditures variables, and of most covariates, are lower than 25% of the standard errors; therefore, this bias is not a serious problem (Efron, 1982).

[26] This paper uses 1,000 replications for all bootstrap results. At this order of replication, it is believed to produce reliable estimates (STATA, 2003).
[27] Results are not shown here.

The Probit-IV estimation shows that the coefficient of the proportion of food away from home is significant, but the coefficient of prepared food is not. Coefficients of other independent variables have the expected values. In terms of women's characteristics, older women and women with better education—particularly those who have college degree—tend to work outside home. A husband's higher non-earned income reduces the likelihood that his wife joins the labor force. Larger family size is another factor that encourages married women to stay at home. Analogous to the studies in other developing countries, the support from relatives and older women proves to be essential. The numbers of children are not significant, as we control for family size.

In Table 10 we compare the coefficients of purchased foods from Probit and two-step (Probit-IV) estimations. We also examine the sensitivity with respect to IV choice by comparing regression results from different first-stage specifications. In models (1), (2) and (3) we include only food away from home in the right-hand side, while prepared food is the only food expenditure in models (4) to (6). In models (7) to (9), the last three columns, both food expenditures are used in the estimations. Note that model (9) in this table also appears in Table 9. This table also contrasts estimates from regular Probit estimation (models (1), (4), and (7)) with estimates using the instrumental variable method.

In all specifications of the female labor force participation model, coefficients of the covariates do not change much after applying the instrumental variable method. The coefficients of prepared food remain near zero in all models while food away from home's coefficients increase after applying IV. This result is consistent with the earlier endogeneity test. As expected, the standard errors from the IV estimations are higher

than standard errors from the regular Probit estimations. The coefficients of food away from home increase as we switch from IV-A to IV-B. At the same time, the biases from bootstrap estimation are much higher in IV-B models, which may be a result of weak instrumental problem in the IV-B specification. This problem may cast doubt on the results in models (6) and (9). However, the coefficients are significantly greater than zero in all models. In all, we can conclude that food away from home has a significant impact on women's labor force participation, and the direction of this impact is not sensitive with the choice of instrumental variables.

The increase in the coefficient after applying IV exhibits the negative bias of the Probit regression. That is the unobservables in the purchased food decision are negatively correlated with the unobservables in the labor force participation decision. One may explain this correlation by arguing that high potential women tend to be hard working in many aspects; women who are likely to join the labor force and be employed also enjoy preparing food. Therefore, these women have tendency to cook from scratch and do not rely on purchased food. When we use access variables as instruments, we find that these diligent women can channel their energy to marketable works if they spend less time cooking. To explain the difference between the coefficients of both foods, we contend that high potential women prefer substituting restaurant meals to their home cooked meals. Prepared food found in street stalls may be deemed inferior by women who also enjoy cooking and appreciate good food. Food from restaurants may also resemble the food that these women would cook at home.

We can determine the robustness of this result by changing the covariates on the right-hand side. The results from this sensitivity analysis are shown in Table 11. Since

we focus on the robustness of the purchased food coefficients, only these two coefficients are presented. We start with the full model, which is model (9) in Table 10. Then we remove some control variables, both in the first stage and Probit equations, as we progress to the far-right column.[28] The control variables used are displayed on the top part of the table. We observe that the direction of the results do not change with respect to model specification; the coefficients of prepared foods' expenditure are around zero while the coefficients of restaurant food's expenditure are positive and significant through out. However, the coefficients of expenditure on food away from home fall sharply after removing regional and locational variables.

To conclude, the regression results in this section show that an upward adjustment in the proportion of food away from home expenditure can significantly increase the likelihood that the woman works outside the home. An adjustment in prepared food expenditure, conversely, does not have any impact on the labor force participation of married women in urban Thailand.

6.4 Labor force participation of low-income women

Labor market behavior of a low-income population is particularly interesting, both as an academic question and as a policy concern. One can expect nonlinearity in the interaction between household income and the hypothesized effect on female labor force participation. Moreover, low income households might face a higher level of economic crunch, forcing household decisions to be more responsive to economic factors. Singling out only low-income households to conduct analysis can reveal more underlying relationship between the use of purchased foods and the labor force participation of women.

[28] The instrumental variables are the same for all models.

We identify a household as low-income, if its per capita income falls in the first and second quintiles. That is, we restrict the sample to all households that are below the 40^{th} national percentile. The quintiles are weighted and calculated based on all households in the *final* sample (the married urban households that can be merged with location variables). Because of weight system of the SES data set, the low-income sample contains a large number of observations. In the first and second quintiles, there are 2,421 observations.

The analyses in this section follow the steps we take in Sections 6.1 to 6.3. The first stage estimation results are reported in Table 12. Note that the F-statistics of instrumental variables of prepared food expenditure are just below 10, but F-stats of food away from home expenditures are much lower than the desired level. Parallel to Section 6.3, we use the IV-B specification in the second stage to maintain consistency among all equations in the system.

The instrumental variable Probit regression results are presented in Table 13; the IV-B first stage specification is used. Similar to Section 6.3, standard errors and confidence intervals are obtained from bootstrapping at 1,000 repetitions. Since we already restrict the sample based on a household's income, variables on couple's non-earned income and education are not significant. Only a husband's tertiary education is shown to discourage the wife's labor force participation. Analogous to the regression results in Table 9, the household size and number of older relatives significantly impact women's decisions to work.

Looking at the coefficients on the food expenditures, we find that the regression results are the reverse of the results from the full sample. Among low-income

households, prepared food has a significant impact on female labor force participation. The expenditure on food away from home (FAFH), conversely, is not significant with respect to the standard error, but it is somewhat significant to the confidence interval. The level of bias is unusually high, around 15 percent of standard error. We will analyze the extent of this result further in Table 14.

Table 14 presents the estimates of the coefficients of both purchased foods using Probit and two-step (Probit-IV) estimations. As in Section 6.3, we also examine the sensitivity with respect to IV choice by comparing regression results from different first-stage specifications. In models (1), (2) and (3), we include only food away from home in the right-hand side, while prepared food is the only food expenditure in models (4) to (6). In models (7) to (9), the last three columns, both food expenditures are used in the estimations. Note that model (9) in this table also appears in Table 13. This table also contrasts estimates from regular Probit estimation (models (1), (4), and (7)) with estimates using instrumental variable method.

The regression results change considerably after applying instrumental variables. Overall, FAFH becomes insignificant after applying the instrumental variable method (models (5), (6), (8) and (9)[29]), but coefficients of prepared food are significantly greater than zero in the Probit-IV models. The results from model (9) seem unreliable considering it deviates greatly from other estimates in models (5) to (8); the bootstrap bias is also high. A weak instrument problem, shown by low F-stat of IV of only 3.41 for FAFH, could contribute to this result. However, regression results in other models are

[29] The significance of FAFH in model (9) is discussed earlier.

stable. The Probit-IV coefficients of prepared food stay around 3.7 to 3.9 in models (5), (6), and (8).

These results are consistent with the endogeneity test.[30] The jump after applying IV estimation underlines the strong negative correlation between the unobservables in labor force participation and the unobservables in the decision to use prepared food among low-income households. This large correlation contributes to the large gaps between the Probit and the IV results.

An explanation for this correlation centers on the modes of transportation among the urban poor. Low-income populations in urban Thailand are more likely to walk and use public transportation. At the same time, prepared foods are often sold along sidewalks and in major bus stops. Those who have better access to such transportation are more likely to work outside the home and are to encounter food sold by venders. The variables on access to public transportation are absent from the data set and, therefore, are not included in the econometric model. Another explanation is similar to the one given in section 3.7.3. Highly productive women may also be proficient in cooking. They possess both the (unobservable) ability to work outside home and distaste for commercially prepared food. Therefore, the unobservable in labor force participation is negatively correlated with the purchased food expenditures.

We can use this theory to explain the difference between the results of low-income women and the overall results from all observations. In general, high potential women prefer substituting restaurant meals to home-cooked meals. Prepared food found

[30] The coefficient of predicted error term in prepared food expenditure are at -4 in the IV-A specification and at -4.7 in the IV-B, and all are significant; while the FAFH's is not significant.

in street stalls may be considered inferior by women who also enjoy cooking and fine food. Food from restaurants may resemble the food that these women would have cooked themselves. This theory might vary slightly among low-income households. Restaurant meals might be beyond their means to be used as substitutes for home-cooked meals. High-potential, low-income women, even though they enjoy cooking and high-quality food, may be less selective. The quality of prepared food might be the same as the food they would have cooked at home. The combined effects of unobservables in transportation and cooking contribute to the large negative bias in the Probit estimation of prepared food coefficient.

6.5 Husband's Labor Force Participation

To expand our understanding about the role of purchased foods on household allocation and its gender economics implication, we shift our analysis to the impacts on the husbands' labor force participation. In this section, we run two-step Probit regressions as in Section 6.3, but the dependent variable is now working status of husbands. In terms of the first stage estimations, the same IV specification as in the female labor analyses—Section 6.1 for the full sample and Section 6.4 for the low income sample—are used.

Comparing regression results between that of husband and wife allows us to discern the structure of intra-household allocation, both in terms of household chores and labor supply. Table 15 presents the labor force participation regression results of married men using all households; only the coefficients of food expenditures are shown. Using Probit regression in models (1) and (5), the coefficients of prepared food are significantly negative. The coefficients of food away from home, conversely, are significantly

positive in models (3) and (5). The results clearly suffer from an endogeneity problem: households in which husbands work have more income, therefore, consume more food away from home, which is luxury goods, and less prepared food. Moreover, the husband's contribution to household income is large, since men tend to earn more than women of the same qualifications. The results change dramatically after we apply the two-step estimation. Both coefficients become insignificant in models (2), (4) and (6). The results from two-step estimation are consistent with the theoretical prediction. Since husbands rarely help with cooking, any changes in the households' food consumption patterns—and therefore the amount of time required to carry out the chores—do not affect the husbands' labor supply nor labor force participation. This exercise also assures us that the instrumental variables remove the income effects from labor force participation.

Similar results appear when we analyze labor force participation of married men in low-income households. Regression results are shown in Table 16. We also consider the Probit-IV results using IV-A specification in the first stage, as IV-B in FAFH is deemed unreliable in Section 6.4. Overall, neither food expenditure affects the husband's labor force participation. All coefficients from Probit-IV models are insignificant, except of FAFH in IV-B, models (6) and (9). Due to the weak instrument problem, we have less confidence in these results. Further, we may draw a conclusion that prepared food is not a luxury good for the poor. The coefficients of prepared food in the regular Probit regressions, models (1) and (7), are negative in the same way as the full sample results in Table 15.

Another contribution of this section is the awareness on behaviors of male partners or husbands. Looking at the married men's labor force participation, we gain insights that can be brought back to the analysis and the interpretation of the main results. Studies on gender issues, like this one, cannot ignore the male and only focus on women. With the limited effort that we use to studying male outcomes, we benefit immensely.

In conclusion, substituting home cooked food with purchased foods can increase women's labor supply and labor force participation. Overall, an upward adjustment in the proportion of food away from home to total food expenditure can increase the wife's labor force participation. Focusing on low-income households, we find that the use of prepared food can encourage married women to work outside the home. We also find that adjustments in either purchased food do not affect male labor market outcomes in any cases.

7. Summary and Discussion

Changes in household production help explain the increase of married women in the labor forces. Meal preparation, a component of household production, is substitutable with purchased foods. These purchased foods include both prepared food, meals that are bought and eaten at home, such as take out meals and food away from home, food eaten in establishments outside home, such as restaurants and street-side stalls. Purchased food in Thailand is prevalent, and it accounts for 40 percent of food expenditures among households with married couples in urban Thailand.

The study explores the relationship between the use of purchased foods and its impact on female labor force participation. For a household that spends more of its food budget on prepared foods and restaurant meals, is it more likely that the woman will be a

member of the community workforce? Specifically, this study answers the hypothetical question that if a household increases the proportion that it spends on purchased foods while keeping the food expenditure constant, how such adjustment would increase the chance that the wife works outside home. This study looks at a cross-cutting topic, and it can help promote gender equality through involvement and the voice of women in the economy. Current literature on purchased foods mainly concentrates on food demand but never touches on the impact of its use on other issues. This knowledge gap is even wider in a developing country setting. In the same direction, this study also fills in the gap in family labor supply literature where numerous determinants of female labor force participation have been explored but not on prepared food and food away from home.

To test the hypothesis, this study employs the 2000 Socio-Economic Survey, a nationally representative household survey of Thailand, and restricts the observations to married urban families. It uses information on local area food service workers from the population census as instrumental variables and uses the Tobit model to resolve biases from zero censoring of purchased food expenditures.

Accounting for the endogeneity, the estimation results confirm the hypothesis that purchased foods affect female labor force participation. Overall, wife's labor force participation increases if the household allocates more of its food budget to food away from home. This study, however, does not discover a significant change in labor force participation from an adjustment in prepared food expenditure. The results change dramatically when focusing only on low-income households; prepared food expenditure has a large and significant impact on labor force participation of wives while food away from home's impact is not significant. This reversal of estimates hinges on the strong

and negative correlation between the unobservables of female labor force participation and of prepared food decisions among low-income populations. Though higher consumption of purchased foods significantly affects the wife's participation in the labor force, it does not impact the husband's. An explanation of this outcome centers on the gendered structure of housework in Thailand: women are the main provider of food services inside households.

The findings shed more light on the intra-household allocation and negotiation between husband and wife, as well as the consequences on labor market outcomes. Implication from this study is multifold. First, the findings emphasize the importance of food preparation and its efficiency. Food consumption pattern and cooking practice can be changed to save time, which, in turn, can immensely affect the labor markets. Moreover, the impact of prepared food among low income households has policy implications regarding poverty alleviation. It also signifies linkage between gender and poverty reduction. At a micro-level, the well-being of poor people, particularly among women, can be improved through participation in the formal labor market. Higher female labor force participation also improves the gender equality.

Second, this study offers a new way to examine time use or household production when such data are not available. We use the access to purchased foods to perturb food expenditure, which consequently affects time use in food preparation. The set up may seem circuitous, but it works well and produces sensible results. It should be noted that access to purchased food is not the only factor, and one may look more broadly at other factors that can change time use directly. Changes in men's attitude and new technology can all influence time use in cooking. However, the method proposed in this chapter is

proven to be feasible with the household data that are available in most developing countries.

Table 1Female activity rates in selected developing countries

Country	Female-Activity rates (all age groups combined)
Thailand	*55.99*
Philippines	32.13
Malaysia	31.62
Korea, Rep.	42.68
Vietnam	49.79
Colombia	33.54
Ecuador	22.04
Chile	27.18

Source: ILO, 2000.

Table 2 Relative use of each type of prepared food[1]

Types of purchased meals	% of food expenditure
Prepared meal taken home	16.50
Prepared curry and other dishes	9.18
Prepared noodle	2.34
Prepared rice dishes	1.12
PinToe food[2]	0.09
Instant Noodle	0.25
Prepared canned food	0.21
Snacks and other prepared food	1.42
Meals eaten away from home	21.73
Food outside home: breakfast	1.81
Food outside home: lunch, western styled	1.47
Food outside home: lunch, others	8.07
Food outside home: dinner, western styled	0.51
Food outside home: dinner, others	1.59
Food outside home: snack	0.31

Source: SES 2002, all married urban households

Note: 1) The breakdown figures do not add up to the total expenditures of prepared food eaten at home and of meals eaten away from home. A conjecture for this discrepancy is that some households only answer the total expenditures, namely total prepared food eaten at home and total meals eaten away from home, but do not answer the breakdown categories. Therefore, breakdown expenditures are coded zero. 2) *Pin Toe* food is a subscription service in which *Pin Toe* business delivers 2-4 dishes to member households every day.

Table 3 Characteristics of husbands and wives in urban Thailand

	Husband					Wife				
Variable	Mean	Obs	Std. Dev.	Min	Max	Mean	Obs	Std. Dev.	Min	Max
Age	44	5568	13	18	93	41	5568	13	16	96
Wages and Salary	12441	2839	12848	22	125969	8374	1829	8523	36	70623
Profit from non-farm business	15519	1750	27829	0	402108	8195	1003	22255	0	301560
Profit from farm	3854	319	15962	0	241218	4576	46	8152	0	25534
Transfer income	6168	858	9682	7	260502	3821	582	9255	3	96687
Property income	1312	1055	4435	2	116090	1433	646	4344	3	89690
Other income	1250	467	2963	5	50551	786	423	1427	10	16533
Total monthly income	13637	5151	19526	0	402108	8021	3440	13718	0	301560
Monthly income from primary activity	13490	4657	19403	0	402108	8413	2777	13572	0	301560
Education attainment (proportion)										
Lower secondary	0.145	5568	0.352	0	1	0.127	5568	0.333	0	1
Upper secondary	0.088	5568	0.283	0	1	0.066	5568	0.249	0	1
Collage	0.131	5568	0.337	0	1	0.118	5568	0.322	0	1
Vocational	0.108	5568	0.310	0	1	0.090	5568	0.286	0	1
Graduate degree	0.026	5568	0.160	0	1	0.010	5568	0.100	0	1
Work status (proportion)										
Work for pay	0.838	5568	0.368	0	1	0.527	5568	0.499	0	1
Unpaid family workers in primary activity	0.021	5568	0.144	0	1	0.123	5568	0.328	0	1
Unpaid family workers in secondary activity	0.005	5568	0.074	0	1	0.005	5568	0.067	0	1

Source: SES 2000.

Table 4 Descriptive statistics of local economic condition variables

	Sub-district level		District-level	
	Mean	Std. Dev.	Mean	Std. Dev.
Proportion of:				
Street food vendors	0.006	0.0042	0.0058	0.0034
Cooks	0.003	0.0027	0.0029	0.0024
Servers	0.0046	0.0052	0.0044	0.0042
Stall and market vendors	0.0194	0.0113	0.0186	0.008
Number of:				
Street food vendors	232	203	587	417
Cooks	133	149	319	254
Servers	199	270	482	483
Stall and market vendors	747	574	1949	1328
Per capita consumption	4619	1260		

Table 5 Descriptive statistics of variables used in the estimations

Label	Variable	Not Working		Working		Final		All Marr. Urban	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Dependent variables and independent variables of interest									
Wife work outside home	*WORKF*	0	0	1	0	0.52	0.01	0.53	0.01
Husband work outside home	*WORKM*	0.79	0.02	0.87	0.01	0.83	0.01	0.84	0.01
Proportion of food away from home to food expenditure	*P_FDOUT*	0.20	0.01	0.26	0.01	0.23	0.00	0.25	0.00
Proportion of prepared food to food expenditure	*P_FDPREP*	0.14	0.01	0.15	0.01	0.15	0.01	0.15	0.00
Regional dummies									
Bangkok	*BKK*	0.38	0.03	0.38	0.03	0.38	0.03	0.58	0.01
North	*NORTH*	0.08	0.01	0.09	0.01	0.09	0.01	0.06	0.00
Northeast	*NORTHEAST*	0.15	0.01	0.13	0.01	0.14	0.01	0.10	0.01
South	*SOUTH*	0.13	0.01	0.13	0.01	0.13	0.01	0.09	0.00
Wife's characteristics									
Age	*AGEF*	45.26	0.61	38.09	0.43	41.56	0.44	40.88	0.40
Non-earned income (1,000 Baht)	*NEARNEDF*	0.67	0.14	0.24	0.03	0.45	0.07	0.48	0.07
Dummy: Lower secondary edu.	*EDULSF*	0.11	0.01	0.13	0.01	0.12	0.01	0.13	0.01
Dummy: Upper secondary edu.	*EDUUSF*	0.06	0.01	0.06	0.01	0.06	0.01	0.07	0.01
Dummy: Tertiary education	*EDUTEF*	0.07	0.01	0.18	0.01	0.12	0.01	0.12	0.01
Dummy: Vocational education	*EDUVOF*	0.08	0.01	0.10	0.01	0.09	0.01	0.09	0.01
Age squared	*AGEF_2*	2244	59	1560	34	1891	40	1833	35
Non-earned income squared (1,000 Baht)	*NEARNEDF_2*	10.7	3.3	1.9	0.6	6.2	1.6	10.1	4.2
Husband's characteristics									
Age	*AGEM*	49.27	0.63	41.31	0.45	45.17	0.46	44.40	0.42
Dummy: Lower secondary edu.	*EDULSM*	0.13	0.01	0.16	0.01	0.15	0.01	0.14	0.01
Dummy: Upper secondary edu.	*EDUUSM*	0.08	0.01	0.09	0.01	0.09	0.01	0.09	0.01
Dummy: Tertiary education	*EDUTEM*	0.10	0.01	0.15	0.01	0.13	0.01	0.13	0.01
Dummy: Vocational education	*EDUVOM*	0.09	0.01	0.12	0.01	0.10	0.01	0.11	0.01
Age squared	*AGEM_2*	2634	67	1834	39	2221	45	2153	40
Earned income squared (1,000 Baht)	*EARNEDM_2*	545	90	225	29	380	47	481	127
Non-earned income squared (1,000 Baht)	*NEARNEDM_2*	34.1	9.6	7.2	3.0	20.2	6.0	20.9	4.8

Source: SES 2000

Table 5 Continued

Label	Variable	Not Working		Working		Final		All Marr. Urban	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Household characteristics									
Family size	*FSIZE*	4.21	0.09	3.52	0.06	3.85	0.05	3.80	0.05
Number of other relatives	*OTHER_REL*	0.81	0.06	0.41	0.03	0.61	0.03	0.56	0.03
Number of older women in HH	*OLDER_F*	0.09	0.01	0.08	0.01	0.09	0.01	0.08	0.01
Number of children: 7 to 15 y.o.	*KID_7_15*	0.56	0.04	0.53	0.03	0.54	0.03	0.51	0.02
Number of children: 1 to 6 y.o.	*KID_1_6*	0.32	0.02	0.26	0.02	0.29	0.02	0.28	0.01
number of children: < 1 y.o.	*KID_1*	0.11	0.01	0.06	0.01	0.09	0.01	0.09	0.01
Family size squared	*FSIZE_2*	21.02	1.00	14.56	0.50	17.69	0.56	17.18	0.48
Number of other relatives squared	*OTHER_REL_2*	3.03	0.34	1.13	0.16	2.05	0.19	1.87	0.15
Number of older women in HH squared	*OLDER_F_2*	0.11	0.02	0.08	0.01	0.10	0.01	0.10	0.01
Number of children: 7 to 15 y.o. squared	*KID_7_15_2*	1.09	0.17	0.87	0.06	0.98	0.09	0.92	0.07
Number of children: 1 to 6 y.o. squared	*KID_1_6_2*	0.45	0.04	0.33	0.03	0.39	0.03	0.37	0.02
Number of children: < 1 y.o. squared	*KID_1_2*	0.12	0.01	0.06	0.01	0.09	0.01	0.09	0.01
Ratio of female to male age	*AGE_V*	0.92	0.00	0.93	0.00	0.92	0.00	0.93	0.00
NEARNEDF*NEARNEDM	*NEARNED_X*	4.13	1.20	0.29	0.06	2.15	0.58	2.21	0.48
Location characteristic									
Number of working married women in sub-district	*SUM_WORKING_MAR_FEM*	4.70	0.21	4.92	0.22	4.81	0.20	4.81	0.20

Source: SES 2000

Table 6 Zero censoring

Variable	**Proportion of purchasing households**	**Std. Dev.**	**Min**	**Max**
Prepared meal taken home	0.868	0.339	0	1
Meals eaten away from home	0.835	0.372	0	1

Source: SES 2000, 4913 observations

Table 7Instrumental variable specifications

Variable	(1)	(2)	(3)	(4)
	IV-A		IV-B	
	PREP	FAFH	PREP	FAFH
Bangkok	0.015	0.054	0.014	0.053
	-1.59	(5.54)**	-1.44	(5.34)**
North	-0.016	-0.028	-0.005	-0.025
	(2.26)*	(3.98)**	-0.78	(3.53)**
Northeast	0.003	-0.036	0.01	-0.031
	-0.35	(5.27)**	-1.41	(4.31)**
South	-0.01	-0.009	-0.009	-0.004
	-1.38	-1.2	-1.25	-0.56
Wife's age	0	-0.002	0	-0.002
	-0.02	-0.37	-0.07	-0.39
Wife's non-earned income (1,000 Baht)	0	-0.001	0	-0.001
	-0.19	-0.95	-0.22	-0.99
Dummy: Wife has lower secondary edu.	0.019	0.024	0.019	0.024
	(2.60)**	(3.07)**	(2.60)**	(3.11)**
Dummy: Wife has upper secondary edu.	-0.004	0.039	-0.005	0.039
	-0.43	(3.83)**	-0.48	(3.86)**
Dummy: Wife has tertiary education	0.006	0.074	0.005	0.074
	-0.76	(8.67)**	-0.63	(8.63)**
Dummy: Wife has vocational education	-0.003	0.058	-0.004	0.058
	-0.41	(6.57)**	-0.48	(6.60)**
Wife's age squared	0	0	0	0
	-0.25	-0.06	-0.3	-0.08
Wife's non-earned income squared (1,000 Baht)	0	0	0	0
	-0.23	-1.8	-0.25	-1.83
Husband's age	-0.005	-0.001	-0.004	0
	-0.99	-0.11	-0.89	-0.07
Husband's non-earned income (1,000 Baht)	-0.001	-0.001	-0.001	-0.001
	-1.05	-1.08	-0.87	-1.07
Dummy: Husband has lower secondary edu.	0.019	0.009	0.019	0.008
	(2.93)**	-1.24	(2.95)**	-1.17
Dummy: Husband has upper secondary edu.	0.012	0.007	0.013	0.006
	-1.44	-0.76	-1.51	-0.69
Dummy: Husband has tertiary education	-0.003	0.029	-0.002	0.029
	-0.31	(3.42)**	-0.24	(3.38)**
Dummy: Husband has vocational education	-0.008	0.019	-0.007	0.018
	-1	(2.31)*	-0.91	(2.26)*
Husband's age squared	0	0	0	0
	-1.14	-0.17	-1.02	-0.2
Husband's non-earned income squared (1,000 Baht)	0	0	0	0
	-0.13	-1.06	0	-1.05

Table 7 Instrumental variable specifications (Continued)

Variable	(1)	(2)	(3)	(4)
	IV-A		IV-B	
	PREP	FAFH	PREP	FAFH
Family size	-0.028	0.072	-0.03	0.072
	(3.93)**	(9.52)**	(4.09)**	(9.50)**
Number of other relatives	0.005	-0.005	0.004	-0.005
	-0.95	-0.97	-0.9	-0.99
Number of older women in HH	0.012	-0.09	0.015	-0.089
	-0.6	(4.46)**	-0.75	(4.45)**
Number of children: 7 to 15 y.o.	-0.015	0.006	-0.014	0.006
	(2.13)*	-0.83	(2.01)*	-0.86
Number of children: 1 to 6 y.o.	-0.008	-0.072	-0.008	-0.073
	-0.82	(7.14)**	-0.77	(7.15)**
Number of children: < 1 y.o.	-0.01	-0.095	-0.009	-0.095
	-1.3	(11.56)**	-1.19	(11.53)**
Family size squared	0.002	-0.004	0.002	-0.004
	(2.47)*	(4.85)**	(2.64)**	(4.83)**
Number of other relatives squared	-0.001	0.002	-0.001	0.002
	-0.97	-1.73	-1.06	-1.73
Number of older women in HH squared	-0.014	0.031	-0.016	0.032
	-1.07	(2.31)*	-1.21	(2.32)*
Number of children: 7 to 15 y.o. squared	0.002	-0.005	0.002	-0.006
	-0.96	(2.11)*	-0.95	(2.13)*
Number of children: 1 to 6 y.o. squared	0	0.012	0	0.013
	-0.05	(2.31)*	-0.02	(2.33)*
Ratio of female to male age	-0.089	0.018	-0.081	0.02
	-0.77	-0.15	-0.7	-0.16
NEARNEDF*NEARNEDM	0	0	0	0
	-0.57	-0.04	-0.57	-0.1
Number of working married women in subdistrict	-0.005	0.001	-0.004	0.002
	(5.60)**	-1.62	(4.42)**	-1.71

Table 7 Instrumental variable specifications (Continued)

	(1)	(2)	(3)	(4)
Variable	**IV-A**		**IV-B**	
	PREP	**FAFH**	**PREP**	**FAFH**
Subdistrict level per capita consumption	0	0	0	0
	(4.00)**	(5.79)**	(4.17)**	(6.06)**
Street food vendors, subdistrict mean		-1.855	1.085	-1.893
		(3.32)**	(2.03)*	(3.37)**
Cooks, subdistrict mean				
Servers, subdistrict mean	3.225		-0.826	-1.23
	(2.60)**		-1.24	-1.75
Stall and market vendors, subdistrict mean				
Street food vendors, subdistrict sum	0.102			
	(4.60)**			
Cooks, subdistrict sum				
Servers, subdistrict sum	-0.099			
	(3.87)**			
Stall and market vendors, subdistrict sum				
Street food vendors, district mean				
Cooks, district mean	-7.991		-11.374	2.118
	(3.17)**		(6.73)**	-1.2
Servers, district mean	-4.941			
	(2.77)**			
Stall and market vendors, district mean				
Street food vendors, district sum	-0.047	0.037	-0.018	0.041
	(3.36)**	(2.96)**	-1.46	(3.23)**
Cooks, district sum	0.174		0.23	-0.023
	(3.65)**		(9.54)**	-0.89
Servers, district sum	0.052			
	(2.26)*			
Stall and market vendors, district sum	0.012			
	(3.04)**			
Constant	0.397	0.012	0.385	0.002
	(3.47)**	-0.1	(3.35)**	-0.02
Observations	4913	4913	4913	4913
F-stat of IV	15.17	15.18	18.81	8.36
LR chi square	419.16	1147.58	381.34	1152.2
p-value of LR chi squared	0	0	0	0

Note: Absolute value of t statistics in parentheses. * significant at 5%; ** significant at 1%

Table 8 Endogeneity tests

	(1)	(2)	(3)
		IV-B	
Model	Food away from home only	Prepared food only	Both foods
Proportion of food away from home to food expenditure	3.85 (3.20)**		4.055 (3.33)**
Predicted error term of FAFH	-2.506 (2.07)*		-2.678 (2.19)*
Proportion of prepared meals to food expenditure		-0.522 -0.63	-0.892 -1.05
Predicted error term of prepared meals		0.399 -0.48	1.052 -1.23

Note: Dependent variable is female labor force participation. Other control variables are *BKK NORTH NORTHEAST SOUTH AGEF NEARNEDF EDULSF EDUUSF EDUTEF EDUVOF AGEF_2 NEARNEDF_2 AGEM NEARNEDM EDULSM EDUUSM EDUTEM EDUVOM AGEM_2 NEARNEDM_2 FSIZE OTHER_REL OLDER_F KID_7_15 KID_1_6 KID_1 FSIZE_2 OTHER_REL_2 OLDER_F_2 KID_7_15_2 KID_1_6_2 KID_1_2 AGE_V NEARNED_X SUM_WORKING_MAR_FEM*. The instrumental variables used are: Subdistrict level per capita consumption; Street food vendors, subdistrict mean; Servers, subdistrict mean; Cooks, district mean; Street food vendors, district sum; Cooks, district sum.

Table 9 Two-step Probit regression result of female labor force participation equation

Dependent Variable: Female labor force participation

Variable	Coefficient	Bias	Std. Err.	95% Conf.	Interval
Proportion of prepared food to food expenditure	-0.912	0.030	0.912	-2.647	0.827
Proportion of food away from home to food expenditure	3.735	-0.089	1.359	1.374	6.722
Bangkok	-0.303	0.006	0.120	-0.575	-0.099
North	0.191	-0.001	0.074	0.056	0.352
Northeast	0.057	-0.001	0.074	-0.087	0.217
South	-0.068	0.002	0.061	-0.182	0.053
Wife's age	0.115	-0.003	0.056	-0.007	0.216
Wife's non-earned income (1,000 Baht)	-0.001	-0.002	0.020	-0.034	0.041
Dummy: Wife has lower secondary edu.	-0.021	0.000	0.075	-0.172	0.118
Dummy: Wife has upper secondary edu.	0.015	0.005	0.111	-0.230	0.211
Dummy: Wife has tertiary education	0.839	0.014	0.138	0.549	1.083
Dummy: Wife has vocational education	0.210	0.002	0.118	-0.047	0.414
Wife's age squared	-0.001	0.000	0.000	-0.002	-0.001
Wife's non-earned income squared (1,000 Baht)	0.000	0.000	0.001	-0.005	0.000
Husband's age	-0.058	0.003	0.051	-0.148	0.052
Husband's non-earned income (1,000 Baht)	-0.036	0.000	0.009	-0.054	-0.018
Dummy: Husband has lower secondary edu.	0.067	0.003	0.064	-0.070	0.176
Dummy: Husband has upper secondary edu.	-0.182	0.002	0.083	-0.344	-0.022
Dummy: Husband has tertiary education	-0.157	0.005	0.091	-0.342	0.019
Dummy: Husband has vocational education	-0.134	0.004	0.081	-0.321	0.014
Husband's age squared	0.001	0.000	0.000	0.000	0.001
Husband's non-earned income squared (1,000 Baht)	0.000	0.000	0.000	0.000	0.001
Family size	-0.456	0.006	0.131	-0.749	-0.227
Number of other relatives	0.154	0.002	0.045	0.063	0.242
Number of older women in HH	0.597	-0.006	0.222	0.167	1.029
Number of children: 7 to 15 y.o.	0.113	0.000	0.068	-0.021	0.245
Number of children: 1 to 6 y.o.	0.055	-0.009	0.137	-0.189	0.339
Number of children: < 1 y.o.	-0.011	-0.014	0.148	-0.281	0.315
Family size squared	0.027	0.000	0.010	0.009	0.049
Number of other relatives squared	-0.023	0.000	0.010	-0.044	-0.004
Number of older women in HH squared	-0.303	0.003	0.133	-0.580	-0.041
Number of children: 7 to 15 y.o. squared	-0.018	-0.001	0.026	-0.066	0.038
Number of children: 1 to 6 y.o. squared	-0.047	0.003	0.052	-0.149	0.065
Ratio of female to male age	-0.075	0.079	1.219	-2.129	2.757
NEARNEDF*NEARNEDM	-0.003	0.000	0.001	-0.006	0.000
Number of working married women in subdistrict	-0.009	0.001	0.006	-0.022	0.000
Pseudo R-squared	0.135				

Note: Confidence interval of IV regression refers to Bias Corrected confidence interval. Standard errors and all other inferences are from bootstrapping at 1,000 repetitions. Constant term is included in the right hand side. The instrumental variables used are: Subdistrict level per capita consumption; Street food vendors, subdistrict mean; Servers, subdistrict mean; Cooks, district mean; Street food vendors, district sum; Cooks, district sum.

Table 10 Comparison of food expenditure coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Prepared food only			Food away from home only			Both foods		
Model	Probit	Probit-IV-A	Probit-IV-B	Probit	Probit-IV-A	Probit-IV-B	Probit	Probit-IV-A	Probit-IV-B
Prepared Food									
Coefficient	-0.13	0.08	-0.51				0.15	-0.31	-0.91
S.E.	0.14	0.76	0.91				0.14	0.79	0.92
Lower CI	-0.42	-1.45	-2.28				-0.14	-1.92	-2.83
Upper CI	0.15	1.62	1.30				0.44	1.12	0.80
Food Away From Home									
Coefficient				1.37	2.65	3.53	1.40	2.78	3.73
S.E.				0.15	1.32	1.31	0.15	1.45	1.42
Lower CI				1.08	0.51	1.32	1.11	0.30	1.13
Upper CI				1.66	5.67	7.08	1.70	6.51	6.91
Observations	4913	4913	4913	4913	4913	4913	4913	4913	4913
Pseudo R-squared	0.15	0.13	0.13	0.13	0.13	0.13	0.15	0.13	0.13

Note: Confidence interval of IV regression refers to Bias Corrected confidence interval. Standard errors and all other inferences are from bootstrapping at 1,000 repetitions. Constant term is included in the right hand side.

Covariates are *BKK, NORTH, NORTHEAST, SOUTH, AGEF, NEARNEDF, EDULSF, EDUUSF, EDUTEF, EDUVOF, AGEF_2, NEARNEDF_2, AGEM, NEARNEDM, EDULSM, EDUUSM, EDUTEM, EDUVOM, AGEM_2, NEARNEDM_2, FSIZE, OTHER_REL, OLDER_F, KID_7_15, KID_1_6, KID_1, FSIZE_2, OTHER_REL_2, OLDER_F_2, KID_7_15_2, KID_1_6_2, AGE_V, NEARNED_X, SUM_WORKING_MAR_FEM*. See Table 7 for the instrumental variables used.

Table 11 Sensitivity analysis

	(Full)	(1)	(2)	(3)	(4)
Covariates	Household characteristics Husband's characteristics Wife's characteristics Regional dummies Location variable Squared terms Interaction terms	Household characteristics Husband's characteristics Wife's characteristics Regional dummies Location variable Squared terms	Household characteristics Husband's characteristics Wife's characteristics Regional dummies Location variable	Household characteristics Husband's characteristics Wife's characteristics Regional dummies	Household characteristics Husband's characteristics Wife's characteristics
Prepared Food					
Coefficient	-0.91	-0.914	-0.996	-0.630	-1.346
S.E.	0.92	0.895	0.923	1.050	1.046
Lower CI	-2.83	-2.834	-3.048	-2.883	-3.756
Upper CI					
Food Away From Home		0.80	0.765	0.612	1.357
Coefficient	3.73	3.749	3.680	1.837	1.469
S.E.	1.42	1.380	1.432	0.854	0.633
Lower CI	1.13	1.175	1.362	0.167	0.325
Upper CI					

Note: Bias corrected confidence intervals are used. The instrumental variables used are: Subdistrict level per capita consumption; Street food vendors, subdistrict mean; Servers, subdistrict mean; Cooks, district mean; Street food vendors, district sum; Cooks, district sum.

Table 12 Instrumental variable specifications: Low income households

Variable	(1)	(2)	(3)	(4)
	IV-A		IV-B	
	PREP	FAFH	PREP	FAFH
Bangkok	0.027	0.054	0.031	0.05
	-1.79	(3.77)**	(2.09)*	(3.48)**
North	-0.007	-0.041	-0.004	-0.041
	-0.76	(4.60)**	-0.42	(4.40)**
Northeast	0.008	-0.042	0.015	-0.043
	-0.94	(5.04)**	-1.61	(4.77)**
South	-0.018	-0.006	-0.014	-0.002
	-1.85	-0.63	-1.44	-0.2
Wife's age	0.004	-0.013	0.004	-0.014
	-0.61	(2.16)*	-0.59	(2.24)*
Wife's non-earned income (1,000 Baht)	-0.006	0.007	-0.007	0.008
	-0.9	-1.1	-0.93	-1.15
Dummy: Wife has lower secondary edu.	0.021	0.004	0.021	0.004
	(2.02)*	-0.39	(2.04)*	-0.41
Dummy: Wife has upper secondary edu.	0.021	-0.01	0.022	-0.01
	-1.46	-0.7	-1.47	-0.71
Dummy: Wife has tertiary education	0.035	0.031	0.034	0.031
	-1.44	-1.29	-1.38	-1.3
Dummy: Wife has vocational education	0.025	0.027	0.024	0.027
	-1.74	-1.95	-1.71	(2.00)*
Wife's age squared	0	0	0	0
	-0.1	-1.72	-0.06	-1.8
Wife's non-earned income squared (1,000 Baht)	0	-0.001	0	-0.001
	-0.46	-1.09	-0.48	-1.13
Husband's age	-0.009	0.01	-0.009	0.01
	-1.58	-1.66	-1.56	-1.72
Husband's non-earned income (1,000 Baht)	-0.004	-0.012	-0.004	-0.011
	-1.13	(3.19)**	-1.15	(3.09)**
Dummy: Husband has lower secondary edu.	0.015	0.021	0.015	0.02
	-1.63	(2.39)*	-1.69	(2.28)*
Dummy: Husband has upper secondary edu.	0.01	0.003	0.012	0.003
	-0.84	-0.25	-0.95	-0.21
Dummy: Husband has tertiary education	0.009	0.003	0.01	0.002
	-0.48	-0.16	-0.53	-0.11
Dummy: Husband has vocational education	0.004	0.01	0.004	0.009
	-0.31	-0.82	-0.33	-0.75
Husband's age squared	0	0	0	0
	-1.62	-1.56	-1.59	-1.64
Husband's non-earned income squared (1,000 Baht)	0	0	0	0
	(2.14)*	-1.15	(2.16)*	-1.05

Table 12 Instrumental variable specifications: Low income households (Continued)

Variable	(1)	(2)	(3)	(4)
	IV-A		IV-B	
	PREP	FAFH	PREP	FAFH
Family size	-0.029	0.087	-0.029	0.087
	(2.81)**	(8.45)**	(2.81)**	(8.53)**
Number of other relatives	0	-0.014	0.001	-0.014
	-0.06	(2.29)*	-0.09	(2.38)*
Number of older women in HH	0.038	-0.1	0.036	-0.1
	-1.11	(3.09)**	-1.06	(3.07)**
Number of children: 7 to 15 y.o.	-0.017	0.025	-0.018	0.024
	-1.96	(2.94)**	(2.00)*	(2.86)**
Number of children: 1 to 6 y.o.	-0.008	-0.064	-0.009	-0.064
	-0.65	(5.28)**	-0.68	(5.35)**
Number of children: < 1 y.o.	-0.007	-0.074	-0.007	-0.074
	-0.73	(8.02)**	-0.77	(8.02)**
Family size squared	0.002	-0.005	0.002	-0.005
	-1.93	(5.09)**	-1.92	(5.17)**
Number of other relatives squared	0	0.003	0	0.003
	-0.17	(2.51)*	-0.19	(2.60)**
Number of older women in HH squared	-0.033	0.056	-0.032	0.056
	-1.24	(2.26)*	-1.21	(2.23)*
Number of children: 7 to 15 y.o. squared	0.003	-0.008	0.003	-0.008
	-1.01	(2.93)**	-1.06	(2.87)**
Number of children: 1 to 6 y.o. squared	0.003	0.012	0.003	0.013
	-0.5	(2.00)*	-0.52	(2.08)*
Ratio of female to male age	-0.223	0.272	-0.223	0.277
	-1.53	-1.91	-1.54	-1.95
NEARNEDF*NEARNEDM	-0.003	0.003	-0.003	0.003
	-1.13	-1.22	-1.14	-1.21
Number of working married women in subdistrict	-0.001	0.001	-0.001	0.002
	-1.13	-0.71	-0.48	-1.3

Table 12 Instrumental variable specifications: Low income households (Continued)

	(1)	(2)	(3)	(4)
Variable	**IV-A**		**IV-B**	
	PREP	**FAFH**	**PREP**	**FAFH**
Subdistrict level per capita consumption	0	0	0	0
	-1.79	(2.41)*	-1.96	(2.60)**
Street food vendors, subdistrict mean		-1.73	1.595	-1.877
		(2.59)**	(2.19)*	(2.63)**
Cooks, subdistrict mean				
Servers, subdistrict mean				
Stall and market vendors, subdistrict mean				
Street food vendors, subdistrict sum	0.05		0.036	-0.002
	(2.68)**		-1.8	-0.09
Cooks, subdistrict sum				
Servers, subdistrict sum				
Stall and market vendors, subdistrict sum				
Street food vendors, district mean				
Cooks, district mean				
Servers, district mean				
Stall and market vendors, district mean				
Street food vendors, district sum	-0.042	0.047	-0.056	0.054
	(2.55)*	(2.90)**	(3.18)**	(3.15)**
Cooks, district sum	0.051		0.057	-0.045
	(2.50)*		(2.77)**	(2.24)*
Servers, district sum				
Stall and market vendors, district sum	0.02		0.021	0
	(3.89)**		(4.07)**	-0.03
Constant	0.516	-0.252	0.5	-0.26
	(3.55)**	-1.77	(3.44)**	-1.83
Observations	2421	2421	2421	2421
F-stat of IV	8.82	5.04	8.17	3.41
LR chi square	221.44	648.38	226.24	653.73
p-value of LR chi squared	0	0	0	0

Note: Absolute value of t statistics in parentheses. * significant at 5%; ** significant at 1%

Table 13Two-step Probit regression result of female labor force participation equation: Low income households

Variable	Coefficient	Bias	Std. Err.	95% Conf. Interval	
Proportion of prepared food to food expenditure	4.771	-0.310	1.710	2.235	9.385
Proportion of food away from home to food expenditure	5.005	-0.689	2.831	0.486	12.008
Bangkok	-0.562	0.044	0.244	-1.261	-0.182
North	0.294	-0.032	0.152	0.049	0.638
Northeast	0.006	-0.025	0.138	-0.247	0.312
South	-0.054	-0.009	0.104	-0.239	0.169
Wife's age	0.101	-0.010	0.088	-0.050	0.299
Wife's non-earned income (1,000 Baht)	0.031	0.022	0.094	-0.170	0.199
Dummy: Wife has lower secondary edu.	-0.188	0.016	0.118	-0.484	0.018
Dummy: Wife has upper secondary edu.	-0.081	-0.008	0.180	-0.438	0.265
Dummy: Wife has tertiary education	-0.291	0.030	0.286	-0.979	0.155
Dummy: Wife has vocational education	-0.233	0.032	0.185	-0.715	0.063
Wife's age squared	-0.001	0.000	0.001	-0.002	0.000
Wife's non-earned income squared (1,000 Baht)	-0.005	-0.005	0.019	-0.041	0.025
Husband's age	-0.014	0.006	0.081	-0.183	0.143
Husband's non-earned income (1,000 Baht)	-0.137	-0.007	0.072	-0.258	0.032
Dummy: Husband has lower secondary edu.	0.029	0.018	0.124	-0.293	0.230
Dummy: Husband has upper secondary edu.	-0.214	0.001	0.145	-0.519	0.067
Dummy: Husband has tertiary education	-0.363	0.001	0.214	-0.847	-0.002
Dummy: Husband has vocational education	-0.138	0.005	0.136	-0.425	0.117
Husband's age squared	0.000	0.000	0.000	-0.001	0.001
Husband's non-earned income squared (1,000 Baht)	0.003	-0.001	0.007	-0.010	0.016
Family size	-0.499	0.048	0.261	-1.118	-0.053
Number of other relatives	0.167	-0.008	0.077	0.034	0.341
Number of older women in HH	0.683	-0.056	0.653	-0.270	1.973
Number of children: 7 to 15 y.o.	0.237	0.016	0.116	-0.030	0.436
Number of children: 1 to 6 y.o.	0.293	-0.044	0.228	-0.063	0.868
Number of children: < 1 y.o.	0.145	-0.059	0.236	-0.235	0.766
Family size squared	0.032	-0.003	0.018	0.002	0.074
Number of other relatives squared	-0.034	0.002	0.016	-0.072	-0.006
Number of older women in HH squared	-0.231	0.037	0.547	-1.109	0.451
Number of children: 7 to 15 y.o. squared	-0.042	-0.005	0.040	-0.110	0.054
Number of children: 1 to 6 y.o. squared	-0.103	0.008	0.082	-0.290	0.039
Ratio of female to male age	0.972	0.216	1.969	-3.034	4.726
NEARNEDF*NEARNEDM	-0.228	-0.115	0.255	-0.858	-0.056
Number of working married women in subdistrict	-0.026	0.003	0.013	-0.061	-0.006
Pseudo R-squared	0.092				

Note: Confidence interval of IV regression refers to Bias Corrected confidence interval. Standard errors and all other inferences are from bootstrapping at 1,000 repetitions. Instrumental variables used are: Subdistrict level per capita consumption; street food vendors, subdistrict mean; Street food vendors, subdistrict sum; Street food vendors, district sum; Cooks, district sum; Stall and market vendors, district sum.

Table 14 Comparison of food expenditure coefficients: Low income households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Prepared food only			Food away from home only			Both foods		
Model	Probit	Probit-IV-A	Probit-IV-B	Probit	Probit-IV-A	Probit-IV-B	Probit	Probit-IV-A	Probit-IV-B
Prepared Food									
Coefficient	-0.04	3.94	3.86				0.21	3.70	4.77
S.E.	0.21	1.74	1.65				0.21	1.70	1.69
Lower CI	-0.46	1.20	1.34				-0.22	1.04	2.18
Upper CI	0.38	8.00	8.26				0.64	8.18	9.11
Food Away From Home									
Coefficient				1.36	3.43	2.84	1.41	2.13	5.00
S.E.				0.23	3.89	2.68	0.23	3.56	2.81
Lower CI				0.91	-3.22	-1.76	0.94	-5.25	0.40
Upper CI				1.82	12.07	8.92	1.87	9.31	11.96
Observations	2421	2421	2421	2421	2421	2421	2421	2421	2421
Pseudo R-squared	0.10	0.09	0.09	0.09	0.09	0.09	0.10	0.09	0.09

Note: Confidence interval of IV regression refers to Bias Corrected confidence interval. Standard errors and all other inferences are from bootstrapping at 1,000 repetitions. Constant term is included in the right hand side.

Covariates are *BKK, NORTH, NORTHEAST, SOUTH, AGEF, NEARNEDF, EDULSF, EDUUSF, EDUTEF, EDUVOF, AGEF_2, NEARNEDF_2, AGEM, NEARNEDM, EDULSM, EDUUSM, EDUTEM, EDUVOM, AGEM_2, NEARNEDM_2, FSIZE, OTHER_REL, OLDER_F, KID_7_15, KID_1_6, KID_1, FSIZE_2, OTHER_REL_2, OLDER_F_2, KID_7_15_2, KID_1_6_2, AGE_V, NEARNED_X, SUM_WORKING_MAR_FEM*. See Table 12 for the instrumental variables used.

Table 15 Comparison of food expenditure coefficients in male labor force participation

Model	(1)	(2)	(3)	(4)	(5)	(6)
	Prepared food only		Food away from home only		Both foods	
	Probit	Probit-IV-B	Probit	Probit-IV-B	Probit	Probit-IV-B
Prepared Food						
Coefficient	-0.771	-0.059			-0.68	0.361
S.E.	0.19	1.140			0.20	1.267
Lower CI	-1.16	-2.326			-1.07	-1.933
Upper CI	-0.39	2.356			-0.29	2.991
Food Away From Home						
Coefficient			0.641	-2.828	0.503	-2.922
S.E.			0.21	1.736	0.22	1.746
Lower CI			0.22	-6.791	0.07	-6.813
Upper CI			1.07	0.521	0.94	0.050
Observations	4913	4913	4913	4913	4913	4913
Pseudo R-squared	0.39	0.39	0.39	0.39	0.39	0.39

Note: Confidence interval of IV regression refers to Bias Corrected confidence interval. Standard errors and all other inferences are from bootstrapping at 1,000 repetitions. Constant term is included in the right hand side.

Covariates are *BKK, NORTH, NORTHEAST, SOUTH, AGEF, NEARNEDF, EDULSF, EDUUSF, EDUTEF, EDUVOF, AGEF_2, NEARNEDF_2, AGEM, NEARNEDM, EDULSM, EDUUSM, EDUTEM, EDUVOM, AGEM_2, NEARNEDM_2, FSIZE, OTHER_REL, OLDER_F, KID_7_15, KID_1_6, KID_1, FSIZE_2, OTHER_REL_2, OLDER_F_2, KID_7_15_2, KID_1_6_2, AGE_V, NEARNED_X, SUM_WORKING_MAR_FEM*. The instrumental variables used are: Subdistrict level per capita consumption; Street food vendors, subdistrict mean; Servers, subdistrict mean; Cooks, district mean; Street food vendors, district sum; Cooks, district sum.

Table 16 Comparison of food expenditure coefficients in male labor force participation

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Prepared food only			Food away from home only			Both foods		
	Probit	Probit-IV-A	Probit-IV-B	Probit	Probit-IV-A	Probit-IV-B	Probit	Probit-IV-A	Probit-IV-B
Prepared Food									
Coefficient	-0.59	-0.80	0.24				-0.70	-0.20	-0.85
S.E.	0.29	2.07	2.00				0.29	2.13	2.27
Lower CI	-1.17	-4.63	-3.56				-1.28	-4.53	-5.89
Upper CI	-0.02	3.50	4.03				-0.11	3.98	3.27
Food Away From Home									
Coefficient				-0.43	-4.92	-6.63	-0.57	-4.84	-6.98
S.E.				0.31	4.08	3.33	0.32	4.06	3.51
Lower CI				-1.05	-15.17	-16.23	-1.21	-15.03	-18.69
Upper CI				0.19	1.80	-1.77	0.06	1.56	-2.27
Observations	2421	2421	2421	2421	2421	2421	2421	2421	2421
Pseudo R-squared	0.37	0.38	0.38	0.37	0.37	0.37	0.38	0.38	0.38

Note: Confidence interval of IV regression refers to Bias Corrected confidence interval. Standard errors and all other inferences are from bootstrapping at 1,000 repetitions. Constant term is included in the right hand side.

Covariates are *BKK, NORTH, NORTHEAST, SOUTH, AGEF, NEARNEDF, EDULSF, EDUUSF, EDUTEF, EDUVOF, AGEF_2, NEARNEDF_2, AGEM, NEARNEDM, EDULSM, EDUUSM, EDUTEM, EDUVOM, AGEM_2, NEARNEDM_2, FSIZE, OTHER_REL, OLDER_F, KID_7_15, KID_1_6, KID_1, FSIZE_2, OTHER_REL_2, OLDER_F_2, KID_7_15_2, KID_1_6_2, AGE_V, NEARNED_X, SUM_WORKING_MAR_FEM*. Instrumental variables used are: Subdistrict level per capita consumption; street food vendors, subdistrict mean; Street food vendors, subdistrict sum; Street food vendors, district sum; Cooks, district sum; Stall and market vendors, district sum.

Figure 1 Prepared food stalls in urban Thailand

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