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Reading Notes on "Consumption and Habits"

Consumption models that assume intertemporal separable preferences have been commonly used by economists for decades. However, several empirical evidence has shown that the predictions of time-separable consumption models were inconsistent with the real-world data. Thus, consumption models with habit formation have been proposed. The new time non-separable model theoretically explained discrepancies between empirical evidence and the predictions of time-separable models. Also, several empirical papers supported the time non-separable model with macroeconomic data. But, due to the limited information on consumption and short consecutive quarters of most microeconomic data sets, there is a lack of empirical microeconomic evidence on the existence of habit formation in consumption models. Therefore, this paper fills in the lack of microeconomic evidence -- proving the existence of intertemporal non-separability in consumption decisions and addressing the importance of dealing with time-invariant unobserved heterogeneity across households while analyzing. This paper compares estimations of the MRS and the Euler equations with and without fixed effects to identify the habit formation in consumption models. Moreover, this paper calculates the implicit within period income and price elasticities, as well as the intertemporal elasticity of substitution and a measure of the degree of habit formation in the estimations.

The methodology in this paper is mostly based on the consumption model with borrowing restrictions proposed by Meghir and Weber (1996). The authors of this paper also introduce dynamic budget constraints and liquidity constraints while maximizing the present discounted value of a lifetime utility of consumers. Under those constraints, dependence on variables in the model based on several nondurable goods in the information set of the consumer comes from two sources: liquidity constraints and intertemporal non-separabilities. However, liquidity constraints are unobservable. It is hard to identify the source of such dependence. Therefore, the authors of this paper use modified MRS and Euler equations to identify the existence of habit formation. MRS is robust to the presence of liquidity constraints, while the Euler equation is not. So, the authors identify the existence of intertemporal non-separabilities along with the MRS. Also, the authors distinguish between liquidity constraints and intertemporal non-separabilities in preferences by comparing the MRS and the Euler equation. Also, to simplify the estimation, the authors of this paper describe the preferences for the goods in this model by a flexible direct trans-log utility function. This simplification makes estimations of parameters much easier without introducing a conditional variance like the log-linear approximation.

In empirical, the Spanish data set, the Continuous Family Survey (ECFP), used in this paper enables the performance of the estimations. ECFP interviews 3,200 households every quarter randomly rotating at 12.3 percent each quarter. There are two main advantages of this data set. First, there is plenty of information on consumption, income, demographic characteristics, and other variables. Second, the maximum of eight consecutive quarters. These two advantages enable the authors to use an adequate set of possible instruments variables with a long panel to consider fixed effects. In this paper, three kinds of nondurable goods are included: food at home, transport, and services. These three goods are generally consumed by all households and cannot be used to alleviate liquidity constraints. Also, demographic and labor supply variables are taken into consideration while modeling preferences, like age, education of the head of the household, family composition variables, and seasonal dummies. And households reporting full information for less than 5 consecutive quarters are excluded to consider habit formation in this paper. The authors then keep married couples whose head is aged 25-60. The households with extremely low income and missing the expenditure on the three goods chosen in this paper are excluded. Then, the final unbalanced panel data contains 2,606 observations (1,499 households) over the period 1985-95 used in all estimations.

For specific empirical strategies, this paper uses the generalized method of moments (GMM) to estimate the two models: the MRS and the Euler equation. In each model, the authors consider two equations: food versus services and transport versus services. And the estimators are defined by the orthogonality conditions derived from the error terms. As for error terms, this paper considers the presence of two sources of stochastic variability in the estimation of MRS and the Euler equation: expectational errors and the existence of preference shocks. To deal with the stochastic terms, this paper includes instrument variables. There are

two circumstances under different assumptions while choosing instrument variables. First, there is no autocorrelation in estimation. Then, the error terms at time *t* of estimations will be orthogonal to variables predetermined at time *t*, such as information known in period *t* and choice variables dated at *t-1* or earlier. So, such predetermined variables are valid instruments. In such estimation specification, without considering the effects of time-variant unobserved heterogeneity on preference shocks, the authors refer to these estimation equations as estimates in "levels". Second, autocorrelation exists in estimation. That is, the fixed effects will affect the preference specification and the estimated parameter will be inconsistent in levels. Then, those instrument variables in the first circumstance will be invalid. To drop the fixed effects in estimation, the authors use the differenced equation as the new preference specification. As estimated in "differences", the error terms now are orthogonal to the choice variables dated t-2 or earlier.

Before performing the estimation, this paper presents patterns of consumption. In Figure 3, the food and transport prices relative to services across periods vary and move differently over time, with the correlation between them being 0.64. This shows that it is possible to identify one MRS from another. Also, the results of the autoregressive model by OLS for the log of food, transports, and services which include seasonal dummies show the correlation of consumption over four consecutive (Table 2). And in the estimations, the authors provide more evidence on this autocorrelation. In the results of estimations, the authors report the estimates in levels and differences with the discount factor equal to 0.99. In the level estimations, the authors choose a set of instrument variables dated at t and t-1 which do not depend on the information at time t in both estimations of the MRS and the Euler equation. However, the Sargan test results show the invalidity of instruments in both MRS and the Euler equations and prove the existence of fixed effects (Tables A4 and A5). In Table 3, the authors also present that there is no evidence of first-order serial correlation by testing for the absence of serial correlation in the residuals of the equations in levels. Although with misspecification, the authors analyze the dynamic structure. From the relevant parameters of the MRS and the Euler equation in Table 4, the preferences are intertemporal separable in both MRS and the Euler equation. Also, these consistent results imply that no liquidity constraints in this preference specification. Using the MRS equations, the additive separability (only transport on service on good) and separable in goods are also cannot be rejected. Since these invalid instrument variables and wrong specification preferences in level estimation, the estimations are biased. Thus, the authors consider time-invariant unobserved heterogeneity and perform estimations in differences. The instrument variables include quantities, nominal expenditures, income, and prices in period t-2. From the results in Tables A8 and A9, the Sargan test results show that instrument variables in the MRS and the Euler equation are valid. These Sargan test results suggest that once control the unobserved heterogeneity with proper instrument variables, there is no evidence of misspecification. And intertemporal separability hypothesis is proved with the estimates of the relevant parameters in Table 5. MRS estimation shows the habit formation in foods and services, while the Euler equation estimation proves the habit formation in foods. Therefore, unobserved heterogeneity hides the true dependence. Also, comparing MRS and Euler estimations, there is no evidence of liquidity constraints (Table 7). Finally, the authors calculate the within period elasticities with models in levels and differences. In level estimation (Table 8), the income elasticity for food is very high, while the income elasticity for services is very low. In difference estimation (Table 9), most elasticities have expected signs and values. While elasticities for foods and services are small than 1, the transport is inelastic. Also, the authors try to calculate the intertemporal elasticity of substitution implicit in preferences. In Table 10, the upper bound for the RRA is around 1 for foods and transports, while the parameter is from 0.53 to 0.81 for services. These measure the sources of heterogeneity, which is services in this paper. And the authors measure the degree of habit formation by computing the fraction of past consumption that explains current consumption. The parameter is 0.72 for foods, 0.01 for transport, and 0.14 for services.

To summarize, this paper shows the importance of considering time-invariant unobserved heterogeneity when analyzing the existence of habit formation. The authors use the Spanish data set which overcomes the previous drawbacks in microeconomic analysis of consumption models. However, this paper has one limitation. Labor variables are only used as instrument variables in estimation, although labor choices do affect the consuming preferences.