Aggregate Shocks, Idiosyncratic Risk, and Durable Goods Purchases: Evidence from Turkey's 1994 Financial Crisis*

Burcu Duygan†

European University Institute

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Abstract

Durable goods spending is the most cyclically volatile component of household consumption, yet the micro-level dynamics of this variable remain largely unknown. This paper investigates the relationship between durables purchases and employment uncertainty using a unique household data set collected throughout Turkey's 1994 financial crisis. Results show that higher unemployment risk households are less likely to buy durables, even after controlling for differences in income and tastes. For households that do buy, the paper also analyzes risk versus purchase magnitude. The amount is positively correlated with uncertainty only for small durables and is otherwise statistically insignificant.

Keywords: uncertainty, durable goods spending, unemployment, financial crisis

JEL classification: D1, D8, D9, E2, E3

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†Department of Economics, Finance and Consumption Programme, Villa San Paolo, Via della Piazzuola 43, I-50133 Florence, Italy. E-mail: Burcu.Duygan@iue.it

1 Introduction

In general, aggregate data reveal that durable goods spending is the most cyclically volatile component of household consumption. Similarly, during many financial crises aggregate durables spending collapses, as shown in Romer (1990) and Duygan (2004a). As such, durable goods spending is often invoked to explain recessions. The micro-level dynamics of durable goods spending are therefore essential in understanding changes in consumption over the business cycle.

Furthermore, durable goods spending is also the component of household consumption that is most sensitive to uncertainty. With the growing literature of precautionary motives in saving[1] many authors have related increased uncertainty to declines in nondurable goods consumption, and to increased saving as consumers buffer themselves against rising labor income risk. However, as seen in Figures 1 and 2, and as the analysis below will show, household durables spending is much more sensitive to uncertainty than nondurables spending. Though this is an intuitive point, it has so far been examined in only a few papers.[2] It seems plausible that households would postpone expensive, long-term purchases when their jobs are at risk. Cars and refrigerators, for instance, are not usually subject to depletion or catastrophic, irreparable failure such that they would require immediate replacement. These goods are normally purchased on a much more flexible basis than nondurable goods—people still get hungry during crises, even if they buy less caviar.

Using a unique household level data collected throughout Turkey's 1994 financial crisis, this paper investigates consumer durable goods purchases against a background of employment uncertainty. The nature of this micro data set allows this paper to go further than previous studies in understanding the above two stylized facts. First, micro data make it possible to separate the level vs. uncertainty impact of the crisis on durables spending. Second, it allows one to study the distribution of the impact across socio-economic groups.

The financial crisis hit in early April 1994 as a currency and banking crisis, and spread quickly into the real sector. As GNP contracted by 6% compared to the previous year, value of the Turkish Lira fell by two thirds against the US Dollar. Money market overnight rates topped 1000%; employment volatility rose significantly following bankruptcies and layoffs. (Table 1) Within consumer expenditures, the impact was greatest in durable goods: in 1994, and in a similar crisis in 2001, the decline in durable goods spending was about three times more than that in food expenditures. (Figure 2).

This paper studies the relationship between consumers' durable goods purchases and the crisis-related nondiversifiable idiosyncratic employment and labor income risk, controlling for changes in expected income.[3] It looks at how changes in crisis-induced unemployment risk (measured by unemployment probability) affect a household's choice of whether to buy a durable good, and then, if the household does buy, how this same risk affects the magnitude of the purchase.

[1] Examples include the models of Carroll (1992, 1997), Deaton (1991), Hubbard et al. (1994), and Zeldes (1989).

[2] Romer (1990), Carroll and Dunn (1997), Dunn (1998), Bertola et al. (2003).

[3] Duygan (2004b) shows that households were not able to fully insure against the idiosyncratic income uncertainty caused by the financial crisis.

The majority of the work[4] on durable goods comprise of models without uncertainty, where the optimal consumption path for durables can be described as following an (S,s) rule: when the stock of a durable good falls below some lower bound s, a purchase is made and the stock is readjusted to a target size S. No action is taken when the stock of the durable good remains above the trigger point s.

This study follows and builds on three recent papers, which emphasize the importance of labor income uncertainty in describing durable goods purchases. Carroll and Dunn (1997), Dunn (1998), and Bertola et al. (2003). Carroll and Dunn (1997) derives a theoretical model of durable and nondurable goods consumption under uncertainty, and using aggregate data finds robust evidence that unemployment expectations are correlated with spending. Dunn (1998) then asks whether unemployment risk is an important determinant of the timing of durable goods purchases. Using household car and home purchase data from the Survey of Consumer Finances, she finds supportive evidence for the theoretical prediction that households with higher unemployment risk are less likely to have recently purchased a home, conditioning on other observable characteristics. The third paper, Bertola et al. (2003), derives a theoretical framework and shows how uncertainty affects the cross-sectional distribution of the durable stock to nondurables consumption ratio, the probability of costly adjustment, and the size of adjustment. Their model predicts that increases in uncertainty lead to more infrequent, but larger adjustments in the durable goods stock. Using household level data from Italy, they find evidence for these predictions, especially in vehicle purchases.[5]

At present, this study is the only one attempting to analyze the micro-dynamics of durable goods spending *throughout* a large actual macro shock—Turkey's 1994 crisis. Using the aforementioned fortuitously timed micro-level data, this paper analyzes how the idiosyncratic employment and income uncertainty caused by the crisis affected consumers' durable goods spending. Moreover, this paper differs from the studies mentioned above, by analyzing spending on not just vehicles or housing but other durable goods—furniture (as in Bertola et al. (2003)) and small durable goods, which includes clothing and shoes.[6] By looking at such "smaller" durable goods, this paper is able to capture further detail. Moreover, from a policy perspective the interesting question is what happens to the bottom end of the distribution, where people are not likely to buy homes even in good times.

To study the impact of increased unemployment risk on consumers' durable goods spending, this paper models households' consumption decision as a two-step separable choice. First, households decide whether or not to purchase a durable good based on a set of observable characteristics and unemployment expectations. Then, if they do decide to purchase a durable good, in the second step, they decide how much to spend. The theoretical predictions that have risen throughout the literature predict that increases in future labor

[4]Bertola and Caballero (1990), Bar-Ilan and Blinder (1992), Caballero (1993), Eberly (1994), Attanasio (2000), Hassler (2001).

[5]The paper by Foote et al.(2000) also studies the frequency of adjustment using data from the Consumer Expenditure Survey (CEX), though ignores the size of adjustment. They find that the frequency of adjustment is negatively correlated by the imputed variance of household income as estimated from PSID data.

[6]Jewelry is excluded because Turkish consumers treat it as an asset and not a consumable. This cultural difference prevents a comparison of the Turkish jewelry consumption pattern with that shown by Bertola et al. (2003) for Italians.

income uncertainty decrease the likelihood of durable goods purchases—step 1 in this study. However, these existing theories also predict that when households do buy, they choose to spend more, which is evaluated in step 2. To test these predictions empirically, this study utilizes the Heckman two-step model because of the possibility of correlation between unobserved heterogeneity affecting the first step decision and the unobserved heterogeneity affecting the second step.

The regression analysis shows that households facing higher unemployment risk were in fact less likely to have purchased furniture, small durable goods, or any durable good in general, even after controlling for other observables such as heterogeneity in tastes and differences in income processes. Moreover, the results show that the size of spending on durable goods is positively correlated with uncertainty only in the case of small durable goods and is otherwise statistically insignificant. Unfortunately, this paper cannot derive significant conclusions from the vehicle regressions because there are too few "successes" in the sample, i.e. too few households purchased a vehicle. However, this in itself may suggest that consumers in fact bought no cars, forcing factory closures, as described in an early crisis article in the Financial Times:

> Reduced shifts and layoffs at Tofas (a leading automobile maker) spotlight the problems of the industry. It was the only sign of life—a security guard in uniform and peaked hat, pedaling his bicycle around the factory floor, like a character out of a silence movie. Normally, the plant would have been drowned by the hum of machinery, but today Turkey's car industry is entombed in silence, at a virtual standstill, perhaps the most conspicuous casualty of the current economic crisis." *Financial Times, 5 May 1994.*

2 Theoretical Framework and Some Implications

Because the goal of this paper is not to re-derive a theoretical model of durable goods purchases but rather to test the theoretical implications that have been raised throughout the literature, this section presents the underlying theoretical framework and summarizes the theoretical predictions that have arisen from it. In other words, the model is presented to formalize the relationship between uncertainty and the durable goods purchase decisions.

2.1 A Canonical Model of Durable Goods Purchase Decisions

Consider a consumer who derives utility from consumption of nondurable goods, c, as well as from the flow of services from a stock of durable goods, z. The consumer's goal is then to maximize the expected utility subject to a standard dynamic budget constraint:

$$\underset{\{c_t, z_t\}}{Max} \sum_{t=0}^{T} E\beta^t u(c_t, z_t) \tag{2.1}$$

subject to a dynamic budget constraint

$$x_{t+1}^{NA} = E\{R[x_t - c_t - s_t] + y_{t+1}(A_{t+1}, J_{t+1})\} \tag{2.2}$$

if the consumer does not adjust the durables stock, or if they do adjust,

$$x_{t+1}^{A} = E\{R[x_t - c_t - s_t] + y_{t+1}(A_{t+1}, J_{t+1})\} + (1-\eta)z_t - s_{t+1}(1+\gamma) \tag{2.3}$$

where s_t is the spending on durable goods in period t,x_t is the level of cash-on-hand in period t, $R = 1 + r$ and r is the rate of return on assets held, $\beta = 1/(1+\rho)$ and ρ is the discount rate, y_t is the period-t labor income which in turns depend on the aggregate state of the economy in that period, A_t, and the consumer's current employment status in that period, J_t. η and γ represent the depreciation rate of the durable goods stock and the transaction cost associated with adjusting it, respectively.

Assume that the stock of durable goods evolves over time according to the following equations, depending on whether or not the consumer decides to adjust it:

$$z_{t+1}^{NA} = (1-\eta)z_t + s_{t+1} \tag{2.4}$$

or

$$z_{t+1}^{A} = s_{t+1} \tag{2.5}$$

The Bellman equation for this problem can then be written as:

$$v_t(x_t, z_{t-1}, A_t, J_t) = Max\{v_t^{NA}(x_t, z_{t-1}, A_t, J_t), v_t^{A}(x_t, z_{t-1}, A_t, J_t)\} \tag{2.6}$$

where,

$$v_t^{NA}(x_t, z_{t-1}, A_t, J_t) = \underset{\{c_t, z_t\}}{Max}[u(c_t, z_t) + \beta E_t v_{t+1}(x_{t+1}, z_t, A_{t+1}, J_{t+1})] \tag{2.7}$$

subject to

$$x_{t+1}^{NA} = E\{R[x_t - c_t - (z_t - (1-\eta)z_{t-1})] + y_{t+1}(A_{t+1}, J_{t+1})\} \tag{2.8}$$

and

$$v_t^{A}(x_t, z_{t-1}, A_t, J_t) = \underset{\{c_t, z_t\}}{Max}[u(c_t, z_t) + \beta E_t v_{t+1}(x_{t+1}, z_t, A_{t+1}, J_{t+1})] \tag{2.9}$$

subject to

$$x_{t+1}^{A} = E\{R[x_t - c_t - z_t] + y_{t+1}(A_{t+1}, J_{t+1})\} + (1-\eta)z_t - s_{t+1}(1+\gamma) \tag{2.10}$$

where z_t and c_t are the two control variables, and z_{t-1}, x_t, A_t, and J_t are the four state variables.

When both asset returns and labor income are random, such an optimization problem is analytically intractable and even numerical solutions have to rely on some simplifying assumptions. Next section summarizes the implications that have arisen throughout the literature based on various models that use different simplifications and approximations.[7]

2.2 Theoretical Implications

Many studies have modelled a consumer's optimal durable goods purchase decision and used different simplifications to solve a model that is similar to the one described in section 2.1. Despite differences in approaches, some common predictions have been raised. This section summarizes these common theoretical predictions that have been discussed throughout this literature, with a special focus on the models of Carroll and Dunn (1997), Dunn (1998), and Bertola et al. (2003) since they are the most relevant models from the perspective of this paper.

First main and common prediction is with regards to the role of uncertainty. Almost all of the models that have been used in this literature agree that greater uncertainty decreases the likelihood of a purchase conditioning on the initial information set, i.e. "inaction range becomes wider." In the framework of Carroll and Dunn (1997) and Dunn (1998) the intuition behind this prediction is one that is related to a precautionary motive. When households face increased unemployment risk, instead of buying a durable good they wait longer to accumulate more savings to use as a buffer against this increased risk. Furthermore, Bertola et al. (2003) shows that higher uncertainty makes adjustment less likely, but that "adjustment (in the stock of durable goods) is larger if it does occur." In this latter sense, there are not many other studies which also study the affect of uncertainty on the size of spending on durable goods. This aspect is a potentially interesting area for future research as discussed in the conclusion section.

Even though the optimization problem described above is one faced by an individual, the survey data are collected from a demographically heterogeneous cross-section of households. Another common prediction therefore concerns the heterogeneity and role of tastes. Most of these models show that stronger taste for durable goods implies a narrower inaction range and smaller purchase sizes because the cost of departure from the optimal consumption bundle is higher for households with stronger tastes for durable goods. In other words, it is very important to control for this heterogeneity in tastes in any regression analysis when testing the models' predictions. To do so, the below analysis includes a set of observable characteristics such as age, household size, dummies for education, region, gender, urban area, and marital status. The analysis also includes permanent income on the right-hand-side to control for differences in income processes that might also affect consumers' durable goods spending.

The models also show that when the period utility function is homothetic, the ratio of the stock of durable goods to the level of nondurable goods consumption will be a function of the user cost of the durable goods, the interest rate and the depreciation rate in this example. And if the user cost of durables is

[7] See Attanasio (2000) for a review.

constant, this ratio will be constant.[8] In other words, whenever the level of nondurable goods consumption changes, the level of the stock of durable goods will change by the same amount. A change in nondurable goods consumption spending will imply a large enough adjustment to the stock to achieve the new target level. In the early model of Mankiw (1982) with no transaction costs, this also implies that the spending on durable goods will be more variable than spending on nondurable goods, assuming that the durable goods depreciation rate is less than 1. And within durable goods, spending on durable goods with lower depreciation rates will be more volatile because the ratio of the *stock* of durable goods to income will be much higher than the average level of *spending* on durable goods to income ratio. Table 2 presents the over-time spending variability across consumption groups where the standard deviation is calculated only across non-zero observations. These numbers show that durables spending was indeed more variable than that on nondurable goods, and the degree of variability was higher for goods with lower depreciation rates, such as vehicles.

3 Data and Empirical Procedure

3.1 Data

To test the theoretical implications of the model, this paper uses data from the 1994 Household Consumption Expenditures Survey from Turkey. This survey is very useful because it provides detailed information on household expenditures before, during, and after Turkey's 1994 financial crisis. In other words, this study exploits a unique opportunity to test the response of durable goods spending to idiosyncratic employment and income uncertainty caused by a financial crisis. The 1994 survey is not a panel data set but is instead a repeated cross-section. Therefore the data allow one to study the impact distribution of the crisis across socio-economic groups but not across individual households. Even though this may be seen as a weakness, it is a step in the right direction for moving away from the representative agent models towards a more heterogeneous framework.

The 1994 survey provides detailed information on various categories of goods and therefore makes it possible to study the behavior of different kinds of durable goods. More specifically, this study focuses on three main categories of durable goods: i. means of transportation ("cars"), ii. furniture, furnishings, household appliances and sundry articles ("furniture"), and iii. small durable goods such as clothing and shoes. Jewelry is not included because it carries more of an asset value than consumption value in Turkey. Having defined durable goods this way, real durable goods spending is then computed by deflating the level expenditures with the relevant price index. The highly inflationary nature of the sample crisis year cause an obvious problem with this definition: During a period where beginning-to-end of year annual inflation rate was over 100% and households faced as high as 25% monthly inflation rates, using the monthly CPI measure to deflate nominal spending may not give a very accurate picture of changes in real spending. Furthermore,

[8] Mankiw (1982), Bertola et al. (2003).

while all prices rose, price of some commodities, such as oil and food, rose faster than others, such as durable goods as shown in Figure 3. This makes the measure of real spending growth very sensitive to the choice of base price to deflate nominal spending. Despite these shortcomings, however, this measure of real spending remains the best available option.

Unfortunately the data set does not provide information on consumers' durable goods stock. It only shows whether a household owns a vehicle or a house. This information, however, still proves useful in the regression analysis as discussed below.

Finally, the following sample restrictions are implemented as is typical in this literature. First, to reduce the unwanted influence of outliers, households with the highest and lowest 0.1% of income are dropped out. Second, households whose head are younger than 20 and older than 60 are excluded because they are not yet or no longer part of the labor force and therefore are not likely to be affected by changes in unemployment risk in their decision making. Observations with missing information on any of the independent variables or durables variables are also excluded. After all these exclusions, the final sample is comprised of 21617 valid observations across the entire sample year, with about 1800 observations in each month.

A table of summary statistics is given in Table 3. Some of the most interesting statistics worth mentioning here are the following: 26% of the household own a vehicle, and 62% of them own a house. On average (over time), about 1% of the household purchased a vehicle in 1994, 40% purchased furniture, 78% purchased small durable goods, and about 80% purchased some durable good. The ratio of durable goods spending to nondurable goods spending is on average 5% to 42% depending on the durable goods category and it decreases over time as the crisis hit and evolve, especially between the first two quarters.

3.2 Empirical Procedure

Because the 1994 survey is a repeated cross-section and not a panel, the data set allows one to study the behavior of groups of consumers over time. In other words, it allows one to construct a pseudo panel where the groups (cells) are determined by the repeated cross-section technique outlined in detail in Duygan(2001a). The underlying idea behind this technique is to construct socio-economic groups according to some demographic characteristics to get the necessary approximation to individual level data and hence to work in a more heterogeneous framework.

More specifically, the technique is composed of the following two steps. First the following expenditures function is estimated separately for each month:

$$s_{i(t)t} = X_{i(t)t}\beta_t + \epsilon_{i(t)t} \tag{3.1}$$

where $s_{i(t)t}$ denotes durable goods spending (on vehicles, furniture, small durable goods, or any durable good) of household i that was surveyed in month t, and X the vector of household characteristics, and ϵ a white-noise error term. Note that $i(t) = 1, \ldots, 1800$ and $t = 1, \ldots, 12$. The most important point in this step is to choose an X vector, which is composed of household characteristics that are time invariant and

exogenous. Because it is these variables that define the cells (socio-economic groups) that are studied over time, the cell composition should remain constant over time and so should, therefore, the variables that construct them.

Accordingly, in the analysis for this paper, the X vector is chosen to include the following independent variables: education, region, age, household size, area of residency, gender, and marital status. A summary of the results of the first set of regressions is presented in Tables 4.1—4.4. Household size, education, age, and urban dummies are almost always significant with at least 95% confidence. Also the p-value of the general F-statistics arising from these regressions is less than 1% supporting the overall statistical significance of the model.

The second step of this repeated cross-section technique is to compute the predicted durable goods spending, $\hat{s}_{jt}$ using the estimated coefficients, $\hat{\beta}_t$ for each month, for the entire sample. That is to compute,

$$\hat{s}_{jt} = X_{jt}\hat{\beta}_t \tag{3.2}$$

where $j = 1, \ldots, 21617$. These predicted durable goods expenditures are the figures used in the regression analysis below as the measure of real durable goods spending over time.

To be able to study the impact of uncertainty on durable goods spending in a regression analysis, also needed is a proxy for uncertainty. This proxy is constructed here as the probability of being unemployed using a procedure originally developed by Carroll et al. (2003) combined with the repeated cross-section method similar to the one just discussed.[9] The main idea is to first estimate the probability of being unemployed for groups of individuals in a given socio-economic group separately for each month, compute the "predicted" unemployment probability for each household over time, and use these "predicted" values as the uncertainty measure.

More specifically, the analysis starts with a logit regression for each month separately, where the dependent variable is the unemployment status (1-0 variable) in the corresponding month.[10] The independent variables are given by the same "limited X vector" used in the consumption regressions together with some industry and occupation dummy variables. More formally,

$$U^*_{i(t)t} = X'_{i(t)t}\delta_t + \upsilon_{i(t)t} \tag{3.3}$$

$$Ui(t)t = \begin{cases} 1, & \text{if } U^*_{i(t)t} \geq 0; \\ 0, & \text{otherwise.} \end{cases} \tag{3.4}$$

[9] Carroll et al. (2003) estimate this proxy using CPS data which have a panel component to it thereby allowing the authors to construct a measure of *becoming* unemployed instead of *being* unemployed for an individual. This paper uses the repeated cross-section dimension of the Turkish data and constructs a time-series of probability of being unemployed for a given socio-economic group. It then exploits the variation in this variable throughout the financial crisis.

[10] Recall that some employment related questions were included in the consumption survey which is collected monthly throughout the year.

where $U^*_{i(t)t}$ is a latent index, X a vector of household characteristics, and $\upsilon_{i(t)t}$ an error terms that follows the logistic distribution such that:

$$Prob(\upsilon < a) = \frac{e^a}{1+e^a} = F(a) \tag{3.5}$$

where F is the logistic cumulative density function.

Using the coefficient estimates, $\hat{\delta}_t$ from the above regression, the predicted unemployment probability are computed,

$$Prob(U_{jt} = 1) = Prob(\upsilon_{jt} > -X_{jt}\hat{\delta}_t) = F(X_{jt}\hat{\delta}_t) \tag{3.6}$$

for all $j = 1, \ldots, 21617$ households in the sample over time and use the corresponding month's predicted probability as the proxy of uncertainty.[11] Table 5 shows the results of this logit estimation. The corresponding mean predicted probability of unemployment and the actual observed mean proportion of unemployed people in the sample is given in Figure 5.

Finally, to control for differences in the income process, which might also affect the households' purchase decisions, the regression analysis includes permanent income for each of these groups of individuals. The permanent income variable is estimated by using a regression of log income on the same independent variables used to estimate the probability of unemployment and also the number of children under age 18 in the household, and the number of income earning members in the household. Table 6 presents the results from this regression.

Having constructed and defined the variables of interest, the next section presents the regression analysis used for testing the theoretical implications of the model.

4 Regression Analysis and Results

This section turns to the original question: How does the uncertainty created by the financial crisis affect a household's durable goods purchase decision. More specifically, this section tests the theoretical implication that conditional on the current state, increases in uncertainty leads to more infrequent and larger purchases of durable goods: higher levels of uncertainty implies lower probability of immediate purchase but that these purchases are larger if they do occur.

Figure 4 and Figure 6 show the patterns of unemployment risk and real durable spending over time by education level of the household head. The data pattern suggests that unemployment risk rose much more for the low-education groups than the high-education groups, and that real durable goods spending also decreased more for the low-education groups than high-education ones: unemployment risk of the less

[11] Note that the predicted employment status ($\hat{U}_{jt}$) cannot be used to construct the probability of becoming unemployed as in Carroll et al. (2003) because it would almost always be zero since most of the people in the sample is employed in each month.

educated groups increased steadily around the financial crisis, and their real durable spending decreased about 3 times more compared to the durables spending of college graduates, between the first two quarters of 1994. While this descriptive evidence agrees with an overall drop in durable goods purchases and that this drop was larger in groups who also faced larger increases in unemployment risk, a regression analysis is carried out in this section to study the impact of each parameter in isolation while controlling for all other characteristics such as heterogeneity in tastes and income processes.

To test both of these predictions, the decision faced by a household is modelled as a two step separable decision. First, a household decides whether or not to purchase a durable good based on a latent index, I_i^*. Second, they decide how much to spend on the particular durable good if they do decide to buy. More formally,

$$I_i^* = Z_i\delta + \nu_i I_i = \begin{cases} 1, & \text{if } I_i^* \geq 0; \\ 0, & \text{otherwise.} \end{cases} \tag{4.1}$$

$$S_i = X_i\beta + \epsilon_i \text{ observed if } I_i = 1 \tag{4.2}$$

where S is the log of spending on durable goods, Z is a vector of household characteristics that affect the decision to whether or not to buy, X is a vector of household characteristics that affect the decision of how much to spend, and ν_i and ϵ_i are error terms that are distributed bivariate normally with mean 0, variances 1 and σ^2, respectively, and are correlated by a correlation coefficient of ρ: $corr(\nu_i, \epsilon_i) = \rho$.

Section 4.1 presents the estimation of the first part of this model and section 4.2 presents the estimation of the second part.

4.1 Probability of purchase

To study how the decision of whether or not to purchase a durable good is affected by changes in unemployment risk, a model for the probability that a household does purchase a durable good is estimated, conditioning on observable characteristics. A household decides to purchase a durable good when a latent variable, I_i^* is larger than zero in a given period, Note that this index is a function of the observable household characteristics, Z as outlined in equation 4.1. Given that the error terms in this equation $\nu_i \sim N(0, 1)$, the decision model can be written down as a probit model:

$$Prob(I_i = 1) = Prob(I_i^* \geq 0) = Prob(\nu_i \geq -Z_i\delta) = F'(Z_i\delta) \tag{4.3}$$

where F' is the standard normal cumulative density function evaluated at $Z_i\delta$. Note that in the theoretical models used throughout the literature, such a latent variable can be interpreted as the distance between the action point and the current durable stock. In other words, households decide to purchase as they get closer to the lower bound of the desired durable good stock, s.

The results of this probit model estimation are presented in Table 7. Note that this paper estimates this model separately for all three categories of durable goods: vehicles, furniture, small durable goods, and also total durable goods spending. The analysis is carried out using pooled data (over 12 months) and exploits the cross-sectional variance.[12] Note also that the analysis includes, as an independent variable, a dummy variable indicating whether or not a household owns a vehicle or a house. Ideally one would use a variable indicating the beginning of period stock value of the durable goods but lack of data prohibits this exercise, as discussed below.

The results seem to provide considerable support for the hypothesis that increases in uncertainty make purchases less likely, except in the case of vehicles. The coefficient of the unemployment risk is of the expected negative sign for small durable goods, furniture, and total durable goods spending categories; and they are significant with 95% confidence in the case of small durable goods and with 90% in the case of all durable goods. The results from the vehicle probit regressions are most likely caused by the relatively few number of "successes": only 186 households purchased a car out of the 21617 households in the sample.

The permanent income variable is not statistically significant in all four sets of the regressions,[13] while some of the demographic variables seem to affect the likelihood of a durable goods purchase. For example, the results suggest that larger households are more likely to purchase a durable good, and especially small durable goods and furniture with at least 99% confidence. The number of income earning members in a household, being married and number of children also seem to be positively correlated with the likelihood of a purchase for these three categories of durable goods, though statistical significance of these coefficients vary across the three categories of durable goods. The coefficients on the number of income earning members and the dummy for being married are positive in all four sets of the regressions and are statistically significant with 95% confidence in all regressions but the first one. The coefficient on the number of children is also positive in all four regressions and is significant with at least 90% confidence in the vehicle and furniture regressions. Furthermore, the results show that households who own a house (or a vehicle) are more likely to purchase a durable good. The p-value of the Wald statistic from these estimations is below 1% in all four sets of the regressions suggesting that the model is significant on the overall.

4.2 Size of the Purchase

The other main implication of the theory of durable goods purchases, as discussed in Bertola et al. (2003) is that increases in uncertainty leads to larger adjustment conditional on the fact that a purchase does occur.

[12] The main findings remain the same when quarterly time dummies are included in the regression framework. Leaving out the dummy for the second quarter—the crisis period, the analysis shows that only the coefficient of the first quarter dummy is statistically significant and positive in the probit regressions.

[13] This insignificance might partly be caused by measurement error in the reported total income variable. Using the level of real nondurable spending instead yields positive and statistically significant but economically insignificant coefficients for this term in the probit regressions, though it is also economically significant for the second stage regressions except for the case of vehicle purchases.

This section tests this hypothesis using the Heckman two-step procedure. More formally, the following equation is estimated using only households who did decide to make a purchase:

$$E(S_i|I_i = 1) = X_i\beta + E(\epsilon_i|\nu_i \geq -Z_i\delta) = X_i\beta + \rho\sigma\lambda_i \tag{4.4}$$

where $\lambda_i = \frac{f'(-Z_i\delta)}{1-F'(-Z_i\delta)}$ is the inverse Mills' ratio or the non-selection hazard rate calculated from the selection equation of previous subsection, S is the log spending on durable goods, Z is a vector of explanatory variables that affect the decision whether or not to purchase as discussed in the previous subsection, and X is a vector of observable characteristics that affect the decision on how much to spend.

Note that a simple OLS regression will produce biased estimates because the error terms of the selection and size-of-purchase equations are correlated, i.e. $\rho \neq 0$ such that the last term in equation 4.4 is not zero. Note also that the Cragg (1971) model cannot be used because the error terms of the selection and size-of-purchase equations are correlated and the data have missing observations, not zeros. Consequently the analysis proceeds by using the Heckman's two-step procedure to correct this inherent bias in the regressions. The exclusion restrictions necessary for identification are provided by the theory: the decision to whether or not to buy does not depend on the same variables that affect the decision of how much to spend. In particular, the theory suggests that the beginning of the period stock of durable goods affects the probability of purchasing a durable good but not the size of the purchase. Ideally, one would use a variable indicating the value of the stock of durable goods. However, the data do not provide this information or information on any other variable that can plausibly affect the purchase decision but not the size of the purchase. The only variables that are available, though are clearly not the first-best options, are whether or not a household owns a house (or a vehicle). Therefore note that the results presented in this section are presented to provide *some* idea about the relationship between uncertainty and the size of durable goods purchases and they need to be interpreted cautiously.

The results of this second stage regressions are presented in Table 8. The first column reveals, just as in the case of the first stage probit regressions, that vehicle purchases regression do not yield any statistically significant coefficients, except for age, which is negatively correlated and is significant with 99% confidence. However, for this set of regressions, there is evidence for "self-selection" as in Bertola et al. (2003): the p-value for the Wald test for independent equations is less than 1% and the correlation coefficient ρ is negative. In other words the results reject the hypothesis that the error terms in the selection equation and the size-of-purchase equation are not correlated, i.e. $\rho = 0$. The results look a bit more interesting, for small durable goods, furniture, and total durable goods regressions.

For small durable goods, thee results show evidence that is supportive of the theory as presented in Bertola et al. (2003). Higher unemployment risk increases the size of purchases of small durable goods and this effect is statistically significant with 90% confidence. Permanent income, age, household size, and number of income earning members are also positively correlated and are statistically significant with at least 95% confidence. Moreover, there is again evidence for "self-selection" as suggested by a less than 1% p-value

for the Wald test for independent equations. The estimate of ρ is negative suggesting that there is negative correlation between the unobservables in the selection and the size-of-purchase equations. In other words, the unobserved heterogeneity that affects a household's decision to purchase a durable goods is negatively correlated with the unobserved heterogeneity that affects the size-of-purchase by that household.

For furniture and total durable goods in general, although the coefficients of the unemployment risk are of the expected positive sign, they are not statistically significant. The findings suggest "self-selection," and a negative and significant correlation between the two error terms. The results suggest that, of the other observable characteristics, permanent income, age, household size, and number of income earning members are positively correlated with the size of purchase and are statistically significant with at least 90% confidence.

In summary, the evidence from this regression analysis shows that uncertainty affects the decision to buy a durable good but not how much to spend on it once the household has decided to make a purchase, except for the case of small durable goods. This result is not surprising. Even a temporary shock may look permanent when compared to the life of a shirt. This depiction does not seem to explain the behavior of car or furniture adjustment, however. Households keep their cars or furniture at least for a while once they purchase them. Therefore, it does not seem plausible that a temporary increase in uncertainty should have an impact on the size of spending on these items. It is therefore the author's belief that a household considers the risk of unemployment only when they are deciding whether or not to buy a car or a fridge, and not when they are deciding on how much to spend on the particular good once they have decided to purchase it. The regression analysis provides evidence that supports this belief.

5 Conclusion

This paper studied the impact of the labor income uncertainty caused by the 1994 Turkish financial crisis on households' durable goods purchases. More specifically it analyzed how uncertainty, as measured by unemployment probability, affects a household's decision to purchase durable goods and also how much to spend on them if they do purchase.

The theoretical predictions regarding the role of uncertainty in buying a durable good typically suggest that increased labor income uncertainty decreases the purchasing probability. In other words, households postpone durable goods purchases when they face labor income uncertainty. Less clear are the theoretical predictions regarding how much households spend if they do decide to buy durables while facing uncertainty. The strongest indication so far is that increased uncertainty makes "immediate adjustment less likely, but that adjustment is larger if it does occur."

The empirical analysis supports the first prediction but not the latter, except in the case of small durable goods. In particular, this paper shows that if a household faces greater risk of unemployment, they are more likely to postpone their durable purchase. This evidence matches the findings of Dunn (1998) and Bertola

et al. (2003) and makes sense as durables tend to last a long time and can be repaired more cheaply than replaced. On the other hand, it seems less plausible that temporarily increased unemployment risk should cause people to substantially adjust the size of the car they buy, given that they are going to buy a car.

Small durable goods, as they have higher depreciation rates, require more frequent replacement. Furthermore, they have much shorter life-spans, compared to cars for example, such that even temporary changes in uncertainty look permanent. That is, they are durables with nearly the characteristics of nondurables. This is probably why this study finds supportive evidence in this particular range of durables, but not with large durables. In other words, while uncertainty affects the decision to buy a refrigerator, furniture, or a car, it does not influence the amount households are going to spend on these items once they do buy.

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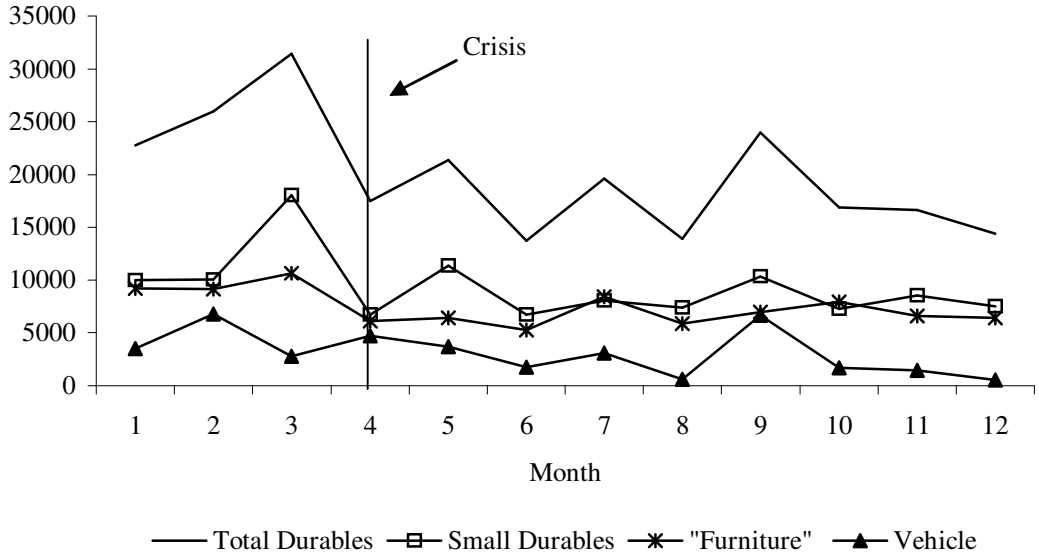
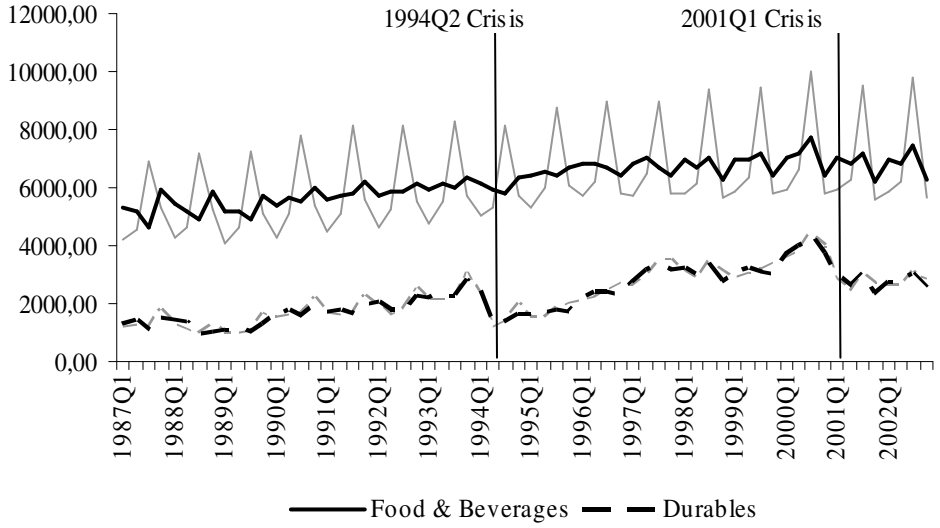
Figure 1: Average Real Durable Goods Expenditure, Monthly



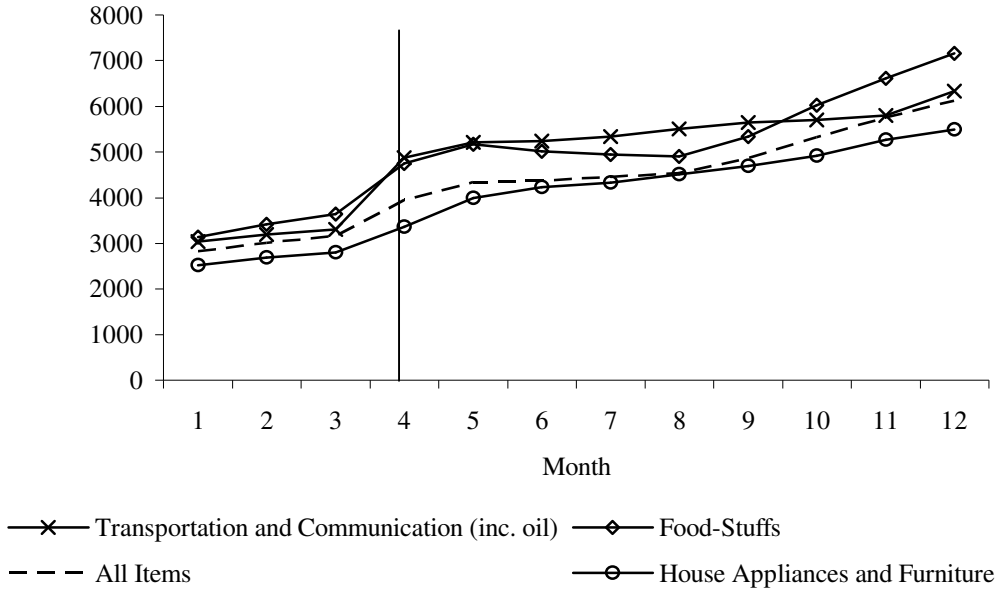
Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.

Figure 2: Aggregate Private Consumption Expenditures, Quarterly TL Billions (Fixed Prices)



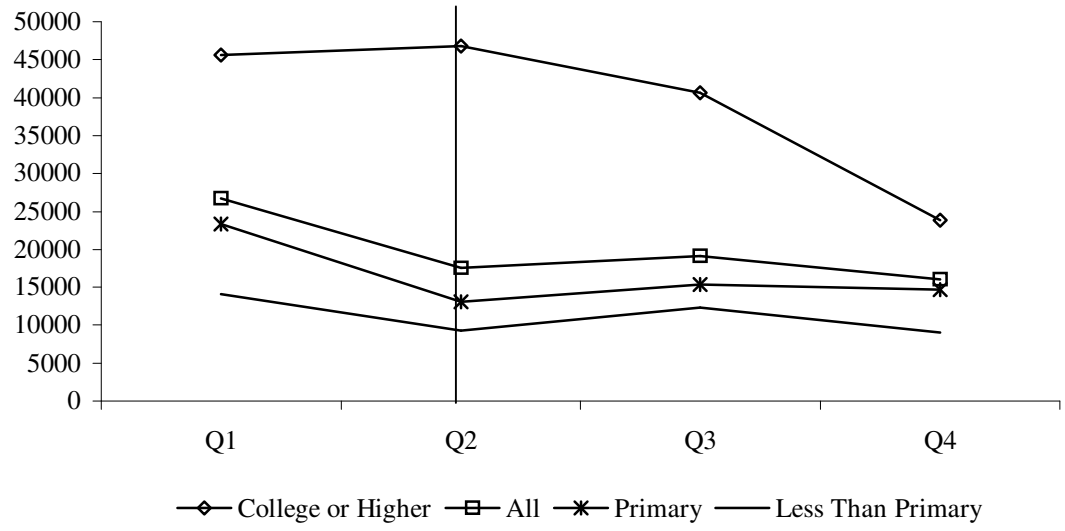
Source: Central Bank of the Republic of Turkey.
Notes: The dark lines represent the seasonally corrected time-series.

Figure 3: Consumer Price Index, monthly by consumption group



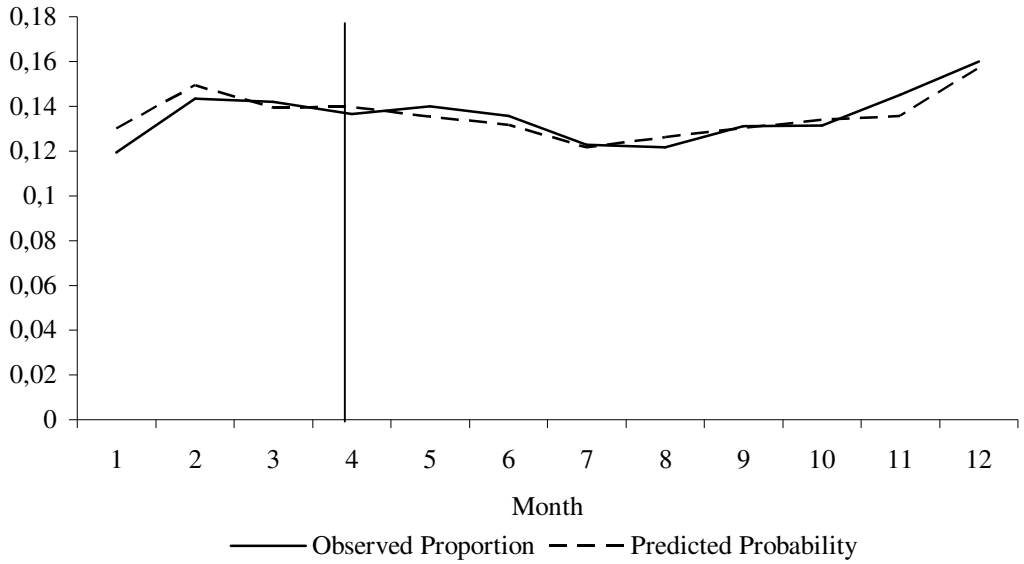
Source: Central Bank of the Republic of Turkey.

Figure 4: Mean Real Durable Goods Spending, by education groups



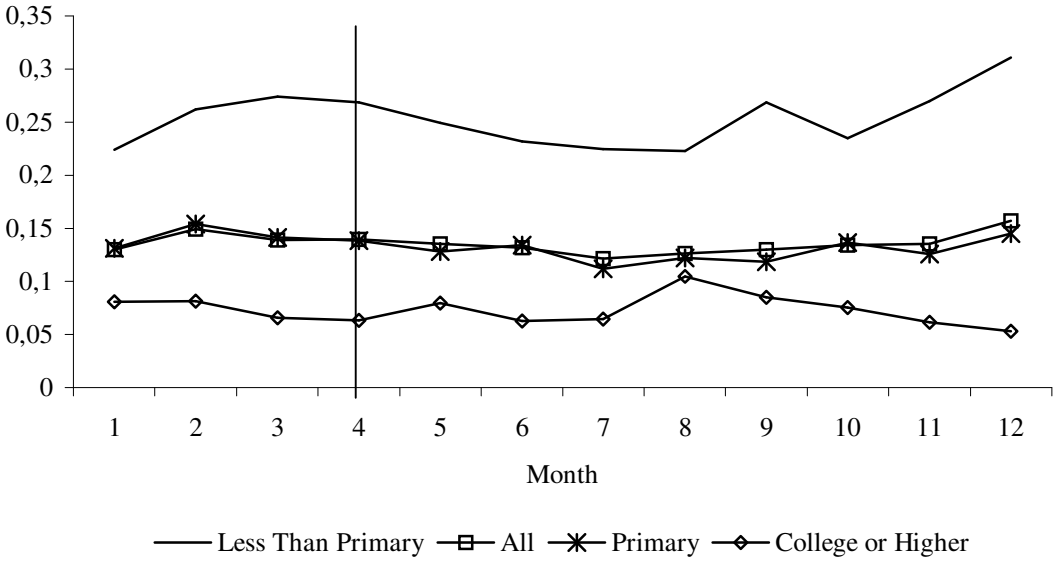
Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey

Figure 5: Predicted Mean Unemployment Risk vs. Observed Proportion of the Unemployed



Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.

Figure 6: Predicted Mean Unemployment Risk, by education groups



Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.

Table 1: Main Macroeconomic Indicators of the Turkish Economy around the 1994 Financial Crisis

	1991	1992	1993	1994	1995	1996	1997
GDP per capita	4,414	4,747	5,127	4,857	5,241	5,553	5,816
GDP growth (%)	0.9	6.0	8.0	-5.5	7.2	7.0	7.5
Interest rate (%)	72.7	65.4	62.8	136.5	72.3	76.2	70.3
Exchange rate	4171.8	6872.4	10984.6	29608.7	45845.1	81404.9	151865
Inflation (%)	66.0	70.1	66.1	106.3	88.1	80.3	85.7
Total debt service (% of GNI)	5.5	5.7	4.8	7.9	6.7	5.9	6.1
Unemployment (%)	7.9	8.1	7.7	8.1	6.9	6.1	6.4
Current account balance (% of GDP)	0.2	-0.6	-3.6	2.0	-1.4	-1.3	-1.4

Source: Word Development Indicators (2003) and International Financial Statistics (2003).
Notes: GDP per capita is measured in PPP, current international $. GDP growth and inflation rate are annual figures. Interest rates reflect period averages in money market interest rates. Exchange rate reflects period average for local currency units per US$.

Table 2: Over-time Variability of Spending on Durable Goods vs. Nondurable Goods

	Mean Standard Deviation of Expenditures, over time
Nondurable Goods (inc. Food)	3585.11
Small Durable Goods	3712.66
Furniture	4649.17
Vehicle	7893.55

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
Note: Standard deviation is taken across non-zero observations only.

Table 3: Summary Statistics

		Quarter 1	Quarter 2	Quarter 3	Quarter 4
Durables Spending (Real, in LCU)	Vehicles	4376.54	3366.12	3448.03	1211.16
		(94727.44)	(73151.07)	(97403.87)	(36164.28)
	Furniture	9662.98	5935.43	7087.29	6983.14
		(37992.72)	(31760.33)	(60942.37)	(29057.1)
	Small Durables	12690.71	8264.17	8616.27	7791.35
		(20042.83)	(14499.23)	(15675.64)	(13610.59)
	All Durable	26726.68	17556.07	19162.43	15981.75
		(105602.1)	(82282.11)	(118527.5)	(49928.61)
Durable Spen./Nondurable Spend.	Vehicles	0.09	0.05	0.05	0.02
		(1.70)	(1.14)	(1.18)	(0.63)
	Furniture	0.22	0.13	0.14	0.16
		(0.94)	(0.76)	(0.78)	(0.68)
	Small Durables	0.29	0.18	0.18	0.18
		(0.42)	(0.29)	(0.26)	(0.30)
	All Durable	0.59	0.36	0.37	0.36
		(2.02)	(1.41)	(1.46)	(1.01)
No. of People who Purchased	Vehicles	31	77	52	26
	Furniture	3206	2577	2659	2753
	Small Durables	4445	4143	4175	4129
	All Durable	4752	4456	45080	4473
Age		40.94	40.82	40.94	40.89
		(9.77)	(9.70)	(9.91)	(9.80)
Household Size		4.64	4.67	4.72	4.75
		(1.96)	(1.93)	(2.00)	(2.09)
Marital Status-Married		0.93	0.93	0.93	0.93
Urban		0.72	0.71	0.71	0.71
Own House		0.61	0.62	0.63	0.61
Own Vehicle		0.27	0.26	0.25	0.27
Female Head		0.06	0.06	0.06	0.06
Education					
	Less Than primary	0.14	0.13	0.14	0.14
	Primary school	0.55	0.54	0.55	0.55
	Middle school	0.10	0.10	0.10	0.10
	High School	0.14	0.15	0.14	0.14
	College or Higher	0.07	0.08	0.08	0.07
Number of observations		5327	5401	5431	5458

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
Notes: All entries except for the last six variables are the mean values with standard deviations in parentheses. The remaining figures represent the proportion of sample in each corresponding category.

Table 4.1: Estimation Results for Computing Real Vehicle Spending by socio-economic group over time

	Coef.	Std. Err.	t	P>|t|
Household Size2	3238.54**	1543.31	2.10	0.04
Household Size3	-304.01	1686.76	-0.18	0.86
Household Size4	1726.78	1653.33	1.04	0.30
Region 2	1000.25	2091.02	0.48	0.63
Region 3	-1223.01	1980.93	-0.62	0.54
Region 4	1227.01	1921.95	0.64	0.52
Region 5	748.10	1956.89	0.38	0.70
Region 6	-27.75	2058.68	-0.01	0.99
Region 7	-2426.48	2131.50	-1.14	0.26
Primary School	-68.82	1787.64	-0.04	0.97
Middle School	6672.11***	2443.67	2.73	0.01
High School	3850.99*	2271.39	1.70	0.09
College	8938.48***	2641.94	3.38	0.00
Urban	-695.56	1229.39	-0.57	0.57
Female	2339.57	3263.48	0.72	0.47
Age cat. 20-25	-1215.74	3326.28	-0.37	0.72
Age cat. 26-30	-187.49	2395.40	-0.08	0.94
Age cat. 31-35	1392.40	2298.94	0.61	0.55
Age cat. 36-40	-212.61	2289.10	-0.09	0.93
Age cat. 41-45	-1093.23	2322.97	-0.47	0.64
Age cat. 46-50	-2867.96	2416.30	-1.19	0.24
Age cat. 51-55	-432.84	2470.19	-0.18	0.86
Married	2108.27	3097.73	0.68	0.50
Constant	-1133.31	3934.55	-0.29	0.77
Number of obs.	21617			
F(23, 21593)	2.21			
Prob > F	0.00			
R-squared	0.00			
Adj R-squared	0.00			

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
*Significant at 10% or better. **Significant at 5% or better. ***Significant at 1% or better.
Notes: These are the results from the first step of the repeated cross-section method used to construct the predicted consumption levels over time by socio-economic group. Here, the dependent variable is the real vehicle expenditures. Independent variables are household size, region, education, area of residency, gender, age, and marital status. A constant term was also included.

Table 4.2: Estimation Results for Computing Real Furniture Spending by socio-economic group over time

	Coef.	Std. Err.	t	P>|t|
Household Size2	2300.54***	815.82	2.82	0.01
Household Size3	1165.54	891.65	1.31	0.19
Household Size4	2190.21***	873.98	2.51	0.01
Region 2	-733.84	1105.35	-0.66	0.50
Region 3	336.93	1047.16	0.32	0.75
Region 4	-803.79	1015.98	-0.79	0.43
Region 5	-648.96	1034.45	-0.63	0.53
Region 6	-1925.92*	1088.26	-1.77	0.08
Region 7	-3667.72***	1126.75	-3.26	0.00
Primary School	2769.42***	944.98	2.93	0.00
Middle School	3891.84***	1291.77	3.01	0.00
High School	5621.85***	1200.70	4.68	0.00
College	9494.23***	1396.58	6.80	0.00
Urban	2135.97***	649.88	3.29	0.00
Female	2124.78	1725.14	1.23	0.22
Age cat. 20-25	-1531.80	1758.34	-0.87	0.38
Age cat. 26-30	-4093.71***	1266.25	-3.23	0.00
Age cat. 31-35	-4373.93***	1215.26	-3.60	0.00
Age cat. 36-40	-4091.63*	1210.06	-3.38	0.00
Age cat. 41-45	-2180.30	1227.97	-1.78	0.08
Age cat. 46-50	-1960.18	1277.31	-1.54	0.13
Age cat. 51-55	-1062.41	1305.79	-0.81	0.42
Married	2299.18	1637.52	1.40	0.16
Constant	2554.17	2079.88	1.23	0.22
Number of obs.	21167			
F(23, 21593)	5.24			
Prob > F	0.00			
R-squared	0.01			
Adj R-squared	0.00			

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
*Significant at 10% or better. **Significant at 5% or better. ***Significant at 1% or better.
Notes: These are the results from the first step of the repeated cross-section method used to construct the predicted consumption levels over time by socio-economic group. Here, the dependent variable is the real furniture expenditures. Independent variables are household size, region, education, area of residency, gender, age, and marital status. A constant term was also included.

Table 4.3: Estimation Results for Computing Real Small Durable Goods Spending by socio-economic group over time

	Coef.	Std. Err.	t	P>|t|
Household Size2	1784.79***	311.13	5.74	0.00
Household Size3	2500.78***	340.04	7.35	0.00
Household Size4	3287.82***	333.31	9.86	0.00
Region 2	565.37	421.54	1.34	0.18
Region 3	-1228.76***	399.35	-3.08	0.00
Region 4	-529.20	387.46	-1.37	0.17
Region 5	-317.70	394.50	-0.81	0.42
Region 6	247.85	415.02	0.60	0.55
Region 7	-2556.61***	429.70	-5.95	0.00
Primary School	2552.41***	360.38	7.08	0.00
Middle School	3793.81***	492.64	7.70	0.00
High School	5748.17***	457.91	12.55	0.00
College	9679.35***	532.61	18.17	0.00
Urban	1979.72***	247.84	7.99	0.00
Female	543.28	657.91	0.83	0.41
Age cat. 20-25	-1199.89*	670.57	-1.79	0.07
Age cat. 26-30	-2285.99***	482.91	-4.73	0.00
Age cat. 31-35	-1869.99***	463.46	-4.04	0.00
Age cat. 36-40	-462.24	461.47	-1.00	0.32
Age cat. 41-45	475.80	468.30	1.02	0.31
Age cat. 46-50	1196.23***	487.12	2.46	0.01
Age cat. 51-55	685.19	497.98	1.38	0.17
Married	7.10	624.49	0.01	0.99
Constant	3704.26	793.19	4.67	0.00
Number of obs.	21167			
F(23, 21593)	36.47			
Prob > F	0.00			
R-squared	0.04			
Adj R-squared	0.04			

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
*Significant at 10% or better. **Significant at 5% or better. ***Significant at 1% or better.
Notes: These are the results from the first step of the repeated cross-section method used to construct the predicted consumption levels over time by socio-economic group. Here, the dependent variable is the real small durable goods expenditures. Independent variables are household size, region, education, area of residency, gender, age, and marital status. A constant term was also included.

Table 4.4: Estimation Results for Computing Real Total Durable Goods Spending by socio-economic group over time

	Coef.	Std. Err.	t	P>|t|
Household Size2	7319.21***	1804.17	4.06	0.00
Household Size3	3361.56*	1971.87	1.71	0.09
Household Size4	7199.81***	1932.79	3.73	0.00
Region 2	827.84	2444.47	0.34	0.74
Region 3	-2108.09	2315.77	-0.91	0.36
Region 4	-108.14	2246.82	-0.05	0.96
Region 5	-221.09	2287.66	-0.10	0.92
Region 6	-1714.12	2406.66	-0.71	0.48
Region 7	-8651.22***	2491.79	-3.47	0.00
Primary School	5247.97***	2089.80	2.51	0.01
Middle School	14352.03***	2856.72	5.02	0.00
High School	15214.36***	2655.33	5.73	0.00
College	28094.10***	3088.50	9.10	0.00
Urban	3421.16**	1437.19	2.38	0.02
Female	5005.25	3815.11	1.31	0.19
Age cat. 20-25	-3961.50	3888.52	-1.02	0.31
Age cat. 26-30	-6566.86**	2800.29	-2.35	0.02
Age cat. 31-35	-4852.41*	2687.53	-1.81	0.07
Age cat. 36-40	-4766.07*	2676.02	-1.78	0.08
Age cat. 41-45	-2804.22	2715.62	-1.03	0.30
Age cat. 46-50	-3625.07	2824.73	-1.28	0.20
Age cat. 51-55	-804.61	2887.73	-0.28	0.78
Married	4421.38	3621.34	1.22	0.22
Constant	5126.62	4599.61	1.12	0.27
Number of obs.	21167			
F(23, 21593)	8.34			
Prob > F	0.00			
R-squared	0.01			
Adj R-squared	0.01			

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
*Significant at 10% or better. **Significant at 5% or better. ***Significant at 1% or better.
Notes: These are the results from the first step of the repeated cross-section method used to construct the predicted consumption levels over time by socio-economic group. Here, the dependent variable is the real total durable goods expenditures. Independent variables are household size, region, education, area of residency, gender, age, and marital status. A constant term was also included.

Table 5: Estimation Results for Computing Unemployment Probability by socio-economic group over time

	Coef.	Std. Err.	t	P>|t|
Household Size2	-0.24***	0.08	-3.12	0.00
Household Size3	-0.19**	0.08	-2.31	0.02
Household Size4	-0.26***	0.08	-3.36	0.00
Region 2	-0.28***	0.11	-2.61	0.01
Region 3	0.05	0.10	0.48	0.63
Region 4	0.28***	0.09	3.16	0.00
Region 5	-0.07	0.09	-0.75	0.45
Region 6	-0.01	0.10	-0.05	0.96
Region 7	-0.12	0.11	-1.11	0.27
Primary School	0.14*	0.08	1.87	0.06
Middle School	0.33***	0.12	2.73	0.01
High School	0.59***	0.11	5.17	0.00
College	1.23***	0.18	6.90	0.00
Urban	0.92***	0.07	13.44	0.00
Female	1.61***	0.13	12.42	0.00
Age cat. 20-25	-1.34***	0.16	-8.62	0.00
Age cat. 26-30	-1.71***	0.12	-14.42	0.00
Age cat. 31-35	-1.45***	0.11	-13.39	0.00
Age cat. 36-40	-1.51***	0.11	-14.11	0.00
Age cat. 41-45	-1.08***	0.10	-10.78	0.00
Age cat. 46-50	-0.40***	0.10	-4.22	0.00
Age cat. 51-55	-0.21**	0.09	-2.32	0.02
Married	0.00	0.13	-0.02	0.98
Industry	-0.03***	0.00	-23.87	0.00
Occupation	0.52***	0.02	33.77	0.00
Constant	-4.90	0.20	-24.84	0.00
Number of obs.	21617			
LR chi2(25)	7355.06			
Prob > chi2	0.00			
Pseudo R-sq	0.43			

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
*Significant at 10% or better. **Significant at 5% or better. ***Significant at 1% or better.
Notes: These are the results from the first step of the repeated cross-section method used to construct the predicted unemployment probabilities over time by socio-economic group. Here, the dependent variable is a dummy variable for unemployment status. Independent variables are household size, region, education, area of residency, gender, age, marital status, industry, and occupation. A constant term was also included.

Table 6: Estimation Results for Permanent Income

	Coef.	Std. Err.	t	P>|t|
Occupation	-0.05***	0.00	-24.49	0.00
Age cat. 20-25	-0.29***	0.03	-11.28	0.00
Age cat. 26-30	-0.21***	0.02	-11.52	0.00
Age cat. 31-35	-0.09***	0.02	-5.27	0.00
Age cat. 36-40	0.00	0.02	-0.14	0.89
Age cat. 41-45	0.06***	0.02	3.30	0.00
Age cat. 46-50	0.07***	0.02	4.07	0.00
Age cat. 51-55	0.05***	0.02	2.82	0.01
Industry	0.00***	0.00	-5.35	0.00
Region 2	-0.09***	0.02	-5.93	0.00
Region 3	-0.08***	0.02	-5.54	0.00
Region 4	-0.10***	0.01	-6.97	0.00
Region 5	-0.02	0.01	-1.60	0.11
Region 6	0.00	0.02	0.15	0.88
Region 7	-0.22***	0.02	-13.50	0.00
Primary School	0.31***	0.01	22.31	0.00
Middle School	0.42***	0.02	22.47	0.00
High School	0.54***	0.02	30.71	0.00
College	0.69***	0.02	31.77	0.00
Urban	0.13***	0.01	12.46	0.00
Female	-0.07*	0.04	-1.75	0.08
Married	0.20***	0.02	8.50	0.00
No. Children	0.00	0.01	-0.25	0.80
No. Income Earners	0.03***	0.00	7.05	0.00
Constant	18.33	0.03	675.27	0.00
Number of obs.	21617			
F(24, 21592)	228.00			
Prob > F	0.00			
R-square	0.20			
Adjusted R-sq	0.20			

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
*Significant at 10% or better. **Significant at 5% or better. ***Significant at 1% or better.
Notes: These are the results from the regressions used for imputing permanent income. Here, the dependent variable is the log of total income. Independent variables are region, education, area of residency, gender, age, marital status, industry, occupation, number of children and income earning members in the household. A constant term was also included.

Table 7: Probit Model Estimation Results for Durable Goods Purchase Decision

	Vehicles	Small Durables	Furniture	Total Durables
LogYhat	0.135	0.074	-0.031	0.019
	(0.285)	(0.086)	(0.084)	(0.097)
Pr(u)	0.051	-0.134**	-0.070	-0.131*
	(0.230)	(0.063)	(0.061)	(0.071)
Age	-0.017***	-0.002	0.001	-0.003
	(0.005)	(0.002)	(0.001)	(0.002)
Household size	0.027	0.050***	0.040***	0.055***
	(0.016)	(0.005)	(0.005)	(0.006)
Female	-0.11	0.196**	0.036	0.101
	(0.208)	(0.085)	(0.08)	(0.093)
No. Children	0.096***	0.014	0.032*	0.04
	(0.027)	(0.018)	(0.017)	(0.020)
No. Income Earners	0.02	0.024**	0.022**	0.028**
	(0.031)	(0.010)	(0.010)	(0.012)
Married	0.329	0.119**	0.132**	0.118**
	(0.210)	(0.054)	(0.053)	(0.061)
Own house		0.098***	0.013	0.093**
		(0.016)	(0.021)	(0.021)
Own vehicle	0.468***			
	(0.521)			
Number of obs.	21617	21617	21617	21617
Wald chi2(20)	130.9	622.38	839.60	660.30
Prob > chi2	0.00	0.00	0.00	0.00
Pseudo R2	0.0612	0.03	0.03	0.04

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
*Significant at 10% or better. **Significant at 5% or better. ***Significant at 1% or better.
Notes: The dependent variables equals one if a purchase of the durable good in question was made. Standard errors are reported in parentheses below coefficient estimates and are calculated using the Huber/White/sandwich robust estimator of variance. The following independent variables were also included in the regressions but are not reported: urban dummy, region dummies, education dummies and a constant term.

Table 8: Size-of-Spending on Durable Goods Estimation Results (Heckman two-step model)

	Vehicles	Small Durables	Furniture	Total Durables
LogYhat	-2.696	0.367***	0.371**	0.478***
	(1.910)	(0.120)	(0.174)	(0.121)
Pr(u)	-0.647	0.170*	0.043	0.132
	(1.405)	(0.091)	(0.129)	(0.091)
Age	0.119***	0.006***	0.006*	0.004*
	(0.037)	(0.002)	(0.003)	(0.002)
Household size	-0.097	0.016**	-0.008	0.029***
	(0.117)	(0.007)	(0.010)	(0.007)
Female	1.241	-0.233*	-0.090	-0.107
	(4.8226)	(0.125)	(0.183)	(0.125)
No. Children	-0.284	0.026	0.106***	0.044*
	(1.149)	(0.026)	(0.040)	(0.027)
No. Income Earners	0.008	0.03**	0.085***	0.055***
	(0.260)	(0.014)	(0.020)	(0.014)
Married	-1.681	-0.262***	-0.112	-0.118
	(1.431)	(0.081)	(0.120)	(0.083)
ρ	-0.872	-0.921	-0.104	-0.768
	(0.059)	(0.005)	(0.027)	(0.015)
Wald-test (p-value for ρ=0)	0.0000	0.0000	0.0001	0.0000
Number of obs.	21617	21617	21617	21617
No. uncensored obs.	186	16892	11195	18189
Wald chi2(19)	41.18	257.18	225.01	414.93
Prob > chi2	0.0023	0.0000	0.0000	0.0000

Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.
Significant at 10% or better. **Significant at 5% or better. ***Significant at 1% or better.
Notes: The dependent variable is the log of spending on the durable good in question. Standard errors are reported in parentheses below coefficient estimates and are calculated using the Huber/White/ sandwich robust estimator of variance. The following independent variables were also included but are not reported: urban dummy, region dummies, education dummies, and a constant term.