Analyzing Durable Goods Purchases and Idiosyncratic Income Uncertainty

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29 March 2003

Abstract

Using a uniquely timed household survey of consumption expenditures that was collected throughout Turkey's 1994 Financial Crisis, this paper analyzes the relationship between durable goods purchases and employment uncertainty. While aggregate data, in general and in the case of Turkey, show that durable goods spending is the most cyclically volatile component of household consumption, there are very few studies that investigate the micro-level dynamics of this variable. Here, using micro-level data that were collected against the backdrop of a large aggregate shock and Heckman's two-step procedure, we show how changes in unemployment risk affect a household's choice of whether to buy a durable good. Then, if the household does buy, we show how this same risk affects the magnitude of the purchase. We find that households facing higher unemployment risk were 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. Our finding on the impact of uncertainty on the size of spending on durable goods, however, is less conclusive: amount of durables goods spending is positively correlated with uncertainty only in the case of small durable goods and is otherwise statistically insignificant.

1 Introduction

What happens to durable goods consumption during financial shocks? Analyzing data from Turkey's 1994 financial crisis, this paper investigates consumer

*I would like to thank Christopher Carroll and Bruce Hamilton for their continuous support, helpful comments, and suggestions.

durable goods purchases against a background of fiscal volatility and employment uncertainty. The financial crisis began in 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, the US Dolllar to the Turkish Lira exchange rate depreciated by about 170%. Money market overnight rates topped 1000%; employment volatility rose significantly following bankruptcies and layoffs.[1] Within consumer spending, the impact was greatest in durable goods. Even after controlling for seasonal effects, durable goods spending dropped by 40% in the first months of the crisis (Figures 1 and 2).

In general, aggregate data, reveal that durable goods spending is the most cyclically volatile component of household consumption.[2] 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. In this paper we present Turkey's case as evidence that durable goods purchases are at least very sensitive to economic uncertainty. In the 1994 crisis, and in a similar one in 2001, durable goods were the most affected component of consumer spending. Figure 2 shows the quarterly aggregate private consumption numbers for food and durable goods. These numbers show that the decline in durable goods spending was about three times more than that in food expenditures.

This paper is further motivated by the growing literature of precautionary motives in saving.[3] 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 our analysis will show below, 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.[4] 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

[1] Duygan (2001b).

[2] Attanasio (2000), Dunn (1998).

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

[4] Carroll and Dunn (1997), Dunn (1998), Bertola et al. (2002).

flexible basis than nondurable goods—people still get hungry during crises, even if they buy less caviar. Since the bulk of work in this area is theoretical, this paper has the further advantage of unique household level data collected before, during, and after an actual financial crisis.

In this paper we study the relationship between consumers durable goods purchases and the crisis-related nondiversifiable idiosyncratic employment and labor income risk.[5] In particular, we look 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. The "old literature," such as Caballero (1993), Bertola and Caballero (1990), Eberly (1994), Bar-Ilan and Blinder (1992), has argued that 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 in the "new literature," which emphasize the importance of labor income uncertainty in describing durable goods purchases.

Carroll and Dunn (1997) study the relationship between unemployment expectations, household balance sheets, and consumer purchases of durable goods. From this, they derive a theoretical model of durable and nondurable goods consumption under uncertainty. Using aggregate data, they find robust evidence that unemployment expectations are correlated with spending, though the link is less clear between the household balance sheet (household debt) and spending.

Dunn (1998) then asks whether unemployment risk is an important determinant of the timing of durable goods purchases. Her theoretical model builds on Carroll and Dunn (1997), and tests the earlier predictions using household car and home purchase data from the Survey of Consumer Finances. Her uncertainty proxy is the probability of unemployment, which she constructs using data from the Current Population Survey. Her regression analyses find 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. Though her results are useful, because she studies

[5]Duygan (2001a) shows that households were not able to fully insure against the idiosyncratic income uncertainty caused by the financial crisis.

home purchases, which are high in value, more interesting details behind the uncertainty impact get lost. In this paper, to capture these details, we study the behavior of smaller durable goods purchases such as clothing and refrigerators. After all, from a policy perspective we are interested in what happens to the bottom end of the distribution, where people are not likely to buy homes even in good times.

The third paper whose work we build on, Bertola et al. (2002) derive a theoretical framework and show 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 their model's predictions, especially in vehicle purchases. Their data also allow them to study adjustment of other categories of durable goods. In addition to vehicles they focus on two main durable goods: furniture (includes houseware and appliances), and jewelry. Their survey data offer an uncertainty measure based on households' own information and expectations about future income uncertainty.

As in Bertola et al. (2002), our work differs from the studies by Carroll and Dunn (1997) and Dunn (1998) in that we analyze not only how the timing of durable goods purchases are affected by uncertainty, but also how the magnitude of purchase is affected. This paper differs from Bertola et al., however, with respect to the data used, the uncertainty measure, and the durable goods categories studied. We use unemployment risk (probability) as our proxy for uncertainty to study the behavior of vehicle, furniture, and small durable goods which includes clothing and shoes. Jewelry is excluded because Turkish consumers treat it as an asset and not a consumable. This cultural difference prevents us from comparing the Turkish jewelry consumption pattern with that shown by Bertola et al. for Italians.

A recent 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. As in both Dunn (1998) and Bertola et al. (2002), our work differs from that of Eberly (1994) or Hassler (2001) by allowing for nondiversifiable

idiosyncratic labor income risk. Attanasio (2000) derives a model of automobile purchases and estimates directly the parameters of an (S,s) rule that have been shown to be optimal in many of the papers just discussed. Therefore, he focuses on estimation of trigger and return points, and not the role of structural variables, such as uncertainty.

Our most important contribution relates to our unique data set. At present, this study is the only one attempting to analyze durable goods spending *throughout* a large actual macro shock—Turkey's 1994 financial crisis. We exploit a unique opportunity provided by our fortuitously timed data set to analyze how the idiosyncratic employment and income uncertainty caused by the crisis affected consumers' durable goods spending decisions. A second major contribution, as we discuss below, is that our results shed some light on the need for improving the current models to better capture the impact of uncertainty on the size of durable goods expenditures.

To study the impact of increased unemployment risk on consumers' durable goods spending, we model 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 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 what we evaluate in step 2.

To test these predictions empirically, we follow 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. In other words, since we believe that the error terms of the "selection" equation and the "size-of-purchase" equation are correlated, we correct the bias that would result from a regular OLS estimation by the Heckman two-step procedure.

Our regression analyses show that households facing higher unemployment risk were 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, we show that the size of spending on durable goods is positively correlated with un-

certainty only in the case of small durable goods and is otherwise statistically insignificant. We believe that this latter result is not surprising despite the predictions of the model presented in Bertola et al. (2002), which we feel is more appropriate for small durable goods, but which may not apply as well to large durables. Unfortunately, we cannot derive significant conclusions from our 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 Turkeys 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.*

The Heckman two-step procedure requires an exclusion restriction for identification of our model. Ideally, we would use the value of the beginning of period stock of the durable good since it affects the probability of purchasing a durable good but not the size of spending on it.[6] However, we do not have the necessary information on the value of the stock of durable goods or any other variable that can plausibly affect the purchase decision but not the size of the purchase. Instead, we use a dummy variable indicating whether or not a household owns a vehicle or a house as a proxy. Because of the weakness of our instrument, our findings from this second stage are presented only to provide *some* idea about the relationship between uncertainty and the size of durable goods purchases and they need to be interpreted cautiously.

Our results show that households who own a vehicle were more likely to have purchased a vehicle, and also households who own a house were more likely to have purchased small durable goods, furniture, or any durable good in general. Finally, our estimates show that unobserved heterogeneity that affects the likelihood of a purchase and one that affects the size of spending on it are negatively correlated, and that this effect is statistically significant. In other words we find significant evidence to support our use of the Heckman two-step correction procedure. This result is identical to the one found in Bertola et al.

[6]See Bertola et al. (2002) for a discussion of how this necessary identifying restriction is implied by the theory.

(2002).

The remainder of the paper is organized as follows. Section 2 presents a theoretical model of durable goods purchase decisions and summarizes the testable implications based on this theoretical framework. Data and the empirical procedure used for our analysis is then introduced in section 3 followed by the regression analysis and results in section 4. Section 5 concludes by summarizing our results and outlines directions for future research.

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, in this section we present the underlying theoretical framework and summarize 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 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 consumers goal is then to maximize the expected present discounted 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

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

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 consumers current employment status in that period, J_t.

We assume that the stock of durable goods depreciates at the rate η , and evolves over time according to the following equation:

$$z_{t+1} = (1-\eta)z_t + s_{t+1} \tag{2.3}$$

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

$$v_t(x_t, z_{t-1}, A_t, J_t) = \underset{\{c_t, z_t\}}{Max}[u(c_t, z_t) + \beta E_t v_{t+1}(x_{t+1}, z_t, A_{t+1}, J_{t+1})] \tag{2.4}$$

subject to

$$x_{t+1} = E\{R[x_t - c_t - (z_t - (1-\eta)z_{t-1})] + y_{t+1}(A_{t+1}, J_{t+1})\} \tag{2.5}$$

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. In the next section, we summarize 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 modeled 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. In this section we summarize 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. (2002) 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

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

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. (2002) 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, to our knowledge, 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 is 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. We do so below by including a set of observable characteristics such as age, household size, dummies for education, region, gender, urban area, marital status, and permanent income. This last one helps us 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 our example. And if the user cost of durables is 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

[8]Mankiw (1982), Bertola et al. (2002).

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 1 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, we use 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, we are presented with 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 us 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/aggregate data models towards a more heterogeneous framework.

The 1994 survey provides us with detailed information on various categories of goods and therefore makes it possible to study the behavior of different kinds of durable goods. More specifically we focus 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. We do not include jewelry 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, 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 4. This makes our measure of real spending growth very sensitive to the choice of base price to deflate nominal spending. Despite these shortcomings, however, our measure of real spending remains the best available option.

Unfortunately the data does not provide us much information on consumers durable goods stock. We are only able to observe whether a household owns a vehicle or a house. This information, however, still proves useful in our regression analysis as we discuss below.

To measure uncertainty we follow a methodology originally developed by Carroll et al. (1999) and that is used in Dunn (1998). The idea behind this technique is to construct estimates of the probability of being unemployed over time. This methodology is discussed in detail in the next subsection.

Finally, we implement the following restrictions on the sample included in our regression analyses.[9] 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, we have 21617 valid observations across the entire sample year, with about 1800 observations in each month.

A table of summary statistics is given in Table 2. 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.

[9]These sample restrictions follow Dunn (1998) closely for comparability of results.

3.2 Empirical Procedure

Because the 1994 survey is a repeated cross-section and not a panel, the data set allows us to study the behavior of groups of consumers over time. In other words, it allows us 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, we follow a two-step technique. First we estimate the following expenditures function 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 we study over time, the cell composition should remain constant over time and so should, therefore, the variables that construct them.

Accordingly, in our 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 3.1—3.4. 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.

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 we use in our 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, we also need a proxy for uncertainty. We construct this proxy as the probability of being unemployed using a procedure originally developed by Carroll et al.(1999) combined with the repeated cross-section method similar to the one just discussed.[10] 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" unemployed probability for each household over time, and use these "predicted" values as our uncertainty measure.

More specifically, we first run a logit regression for each month separately, where the dependent variable is the unemployment status (1-0 variable) in the corresponding month.[11] 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,

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

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

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:

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

[10] Carroll et al. estimate this proxy using CPS data which has a panel component to it thereby allowing the authors to construct a measure of *becoming* unemployed instead of *being* unemployed for an individual. In this paper, we exploit the repeated cross-section dimension of our data and construct a time-series of probability of being unemployed for a given socio-economic group and exploit the variation in this variable throughout the financial crisis.

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

where F is the logistic cumulative density function.

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

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

for all $j = 1, \ldots, 21617$ households in our sample over time and use the corresponding months predicted probability as our proxy of uncertainty.[12] Table 4 shows the results of this probit estimation. The corresponding mean predicted probability of unemployment and the actual observed mean proportion of unemployed people in our sample is given in Figure 5.

Finally, to control for differences in the income process, which might also affect the households purchase decisions, in our regression analysis we include 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 5 presents the results from this regression.

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

4 Regression Analysis and Results

In this section, we turn to our original question: How does the uncertainty created by the financial crisis affect a household's durable goods purchase decision. More specifically, we want to test 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 3 and Figure 6 show the patterns of unemployment risk and real durable spending over time by education level of the household head. The data

[12] Note that we cannot use the predicted employment status ($\hat{U}_{jt}$) to construct the probability of becoming unemployed as in Carroll et al. (1999) because it would almost always be zero since most of the people in our sample is employed in each month.

pattern suggest 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 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 we model the decision faced by a household 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,

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

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

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, we estimate a model for the probability that a household does purchase a durable good, 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:

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

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 6. Note that we estimate 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.[13] Note also that we include, as an independent variable, a dummy variable indicating whether or not a household owns a vehicle or a house. Ideally we would have liked to use a variable indicating the beginning of period stock value of the durable goods but lack of data prohibits this exercise, as we discuss 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. We believe that the results from the vehicle probit regressions are caused by the relatively few number of "successes": only 186 households purchased a car out of the 21617 households in our sample.

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

The permanent income variable is not statistically significant in all four sets of the regressions,[14] while some of the demographic variables seem to affect the likelihood of a durable goods purchase. For example, our 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. 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, we find 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 our 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. (2002) is that increases in uncertainty leads to larger adjustment conditional on the fact that a purchase does occur. In this section, we test this hypothesis using the Heckman two-step procedure. More formally, we estimate the following equation 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

[14] 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.

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 we cannot use the Cragg (1971) model because the error terms of the selection and size-of-purchase equations are correlated and we have missing observations, not zeros. Consequently we proceed by using the Heckmans two-step procedure to correct this inherent bias in our 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, we would use a variable indicating the value of the stock of durable goods. However, the data does 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). Consequently, we would like to 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 7. In the first column, we can again see, just as 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, we do find evidence for "self-selection" as in Bertola et al. (2002): the p-value for the Wald test for independent equations is less than 1% and the correlation coefficient ρ is negative. In other words we can reject the hypothesis that the error terms in the selection equation and the size-of-purchase equation are not correlated, i.e. $\rho = 0$. Our results look a bit more interesting, for small durable goods, furniture, and total durable goods regressions.

For small durable goods, we find evidence that is supportive of the theory as presented in Bertola et al. (2002). 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, we find 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 households 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. We again find evidence for "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 our regression analyses shows that uncertainty affects only the decision to whether or not 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. We believe that this result is not surprising since the model that is used to derive this prediction in Bertola et al. (2002) seems more appropriate for small durable goods. Small durable goods are closer to the view of durable goods in their model: they are continuous variables whose stock a household "adjusts" by purchasing (and selling). This depiction of a durable good 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, and not really "adjust" their stock. It is therefore our 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. Our regression analyses provide evidence that supports this belief.

5 Conclusion

In this paper, we studied the impact of the labor income uncertainty caused by the 1994 Turkish financial crisis on households' durable goods purchases. More specifically we 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 indications so far are derived in Bertola et al. (2002)—increased uncertainty makes "immediate adjustment less likely, but that adjustment is larger if it does occur."

Our empirical analysis supports the first prediction but not the latter, except in the case of small durable goods. We believe that this latter result is not fully upheld due to the assumptions about durable goods made in the Bertola et al. (2002) model. Their model, we believe, is better at capturing the behavior of small durables but breaks down for most durables. In particular, they assume that agents can "adjust" their durables stocks by buying and selling their durables. However, the goods specifically mentioned—furniture, refrigerators, and even cars—are not typically bought and sold with the frequency suggested by this model. If a household faces greater risk of unemployment, we think (and show) that they are more likely to postpone their durable purchase. This evidence matches the findings of Dunn (1998) and Bertola et al. (2002) 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, and have relatively little value. That is, they are durables with nearly the characteristics of nondurables. Accordingly, and as expected, small durables fit best in the assumptions of the Bertola et al. (2002) model. This is probably why we find 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.

Given these results, the main direction for future research might lie in reassessing the current theoretical framework used in studying durable goods purchasing such that they better reflect the available data. In particular, much remains to be done in modeling the effect of uncertainty on purchase size.

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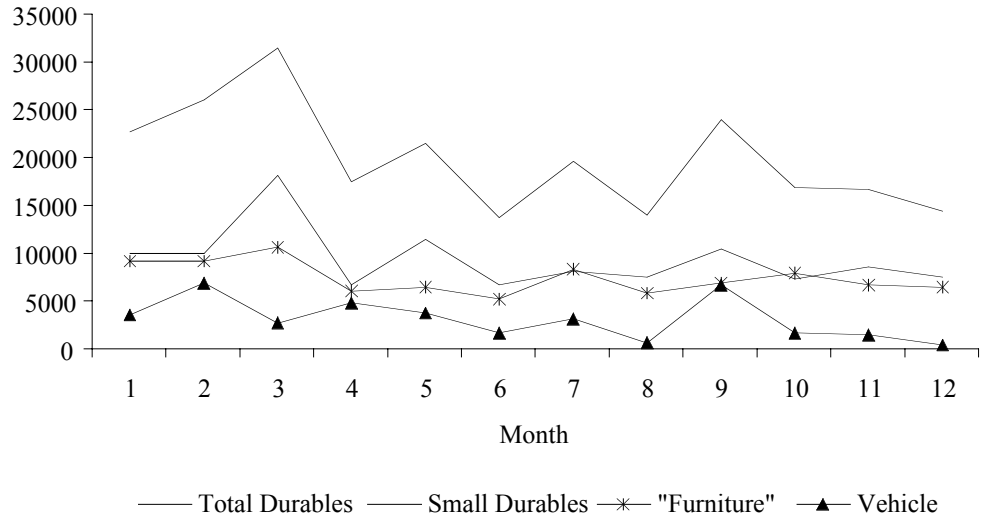
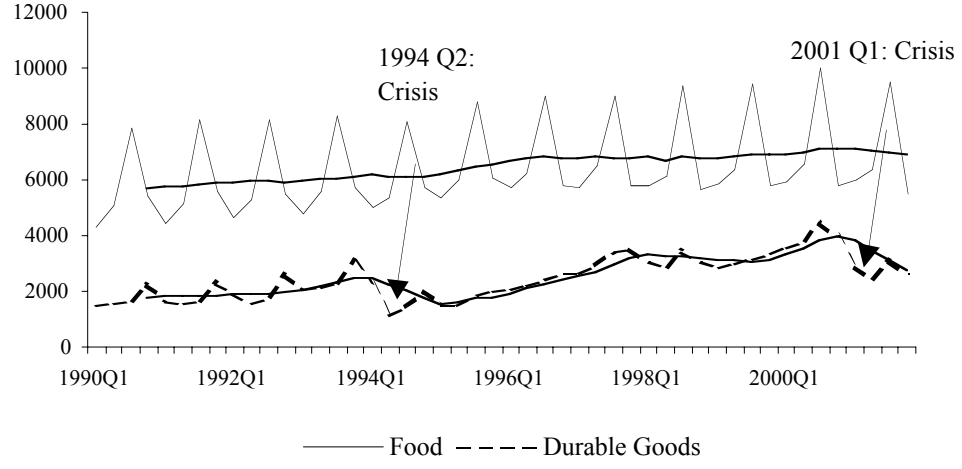
Appendix

Figure 1: Average Real Durable Goods Expenditure, Monthly



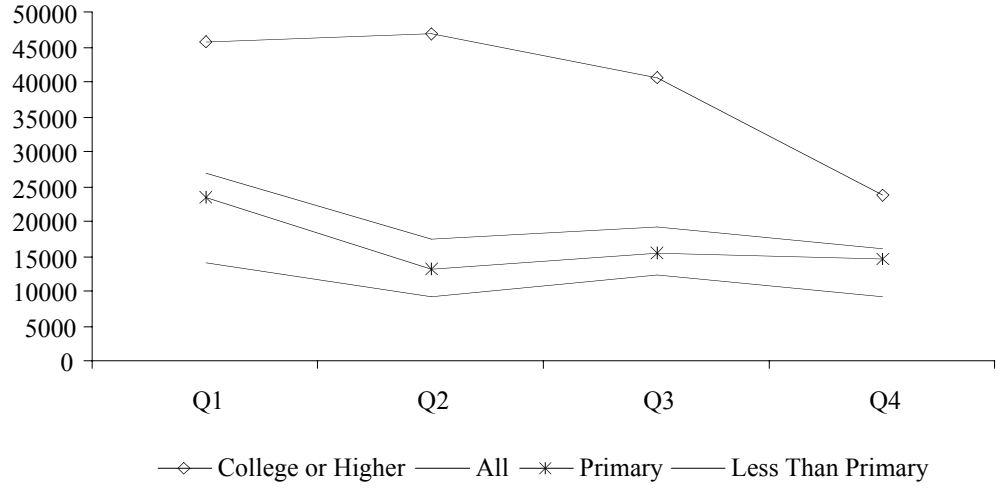
Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey.

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



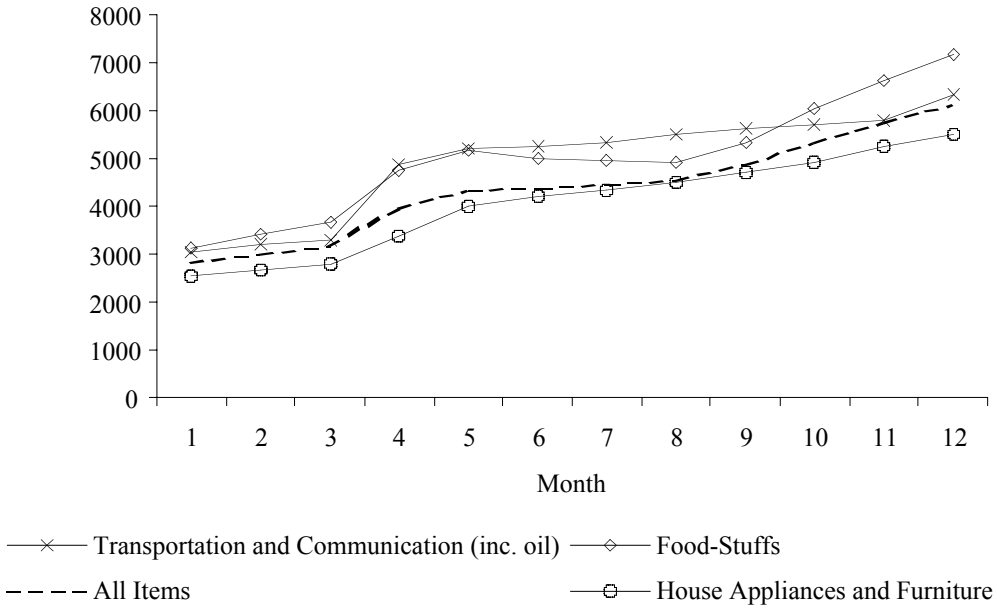
Source: Central Bank of the Republic of Turkey.
Notes: The dark solid line represents a 4-period moving average, and hence the seasonally corrected time-series.

Figure 3: Mean Real Durable Goods Spending, by education groups



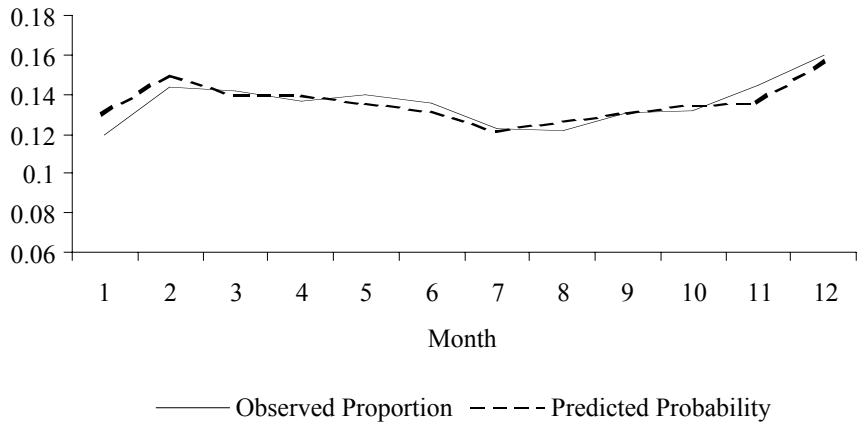
Source: 1994 Household Survey of Consumer Expenditures, State Institute of Statistics, Turkey

Figure 4: Consumer Price Index, monthly by consumption group



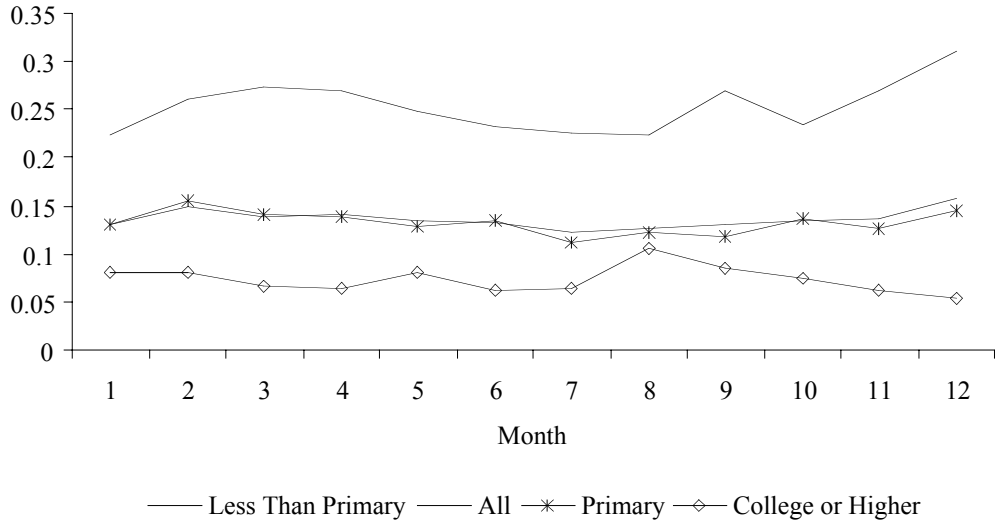
Source: Central Bank of the Republic of Turkey.

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: 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 2: 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 3.1: 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 3.2: 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 3.3: 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 3.4: 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 4: 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 5: 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 6: 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 7: 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.