BUYING LESS, BUT SHOPPING MORE: THE USE OF NON-MARKET LABOR DURING A CRISIS*

David McKenzie#
The World Bank

Ernesto Schargrodsky##
Universidad Torcuato Di Tella

Abstract

Households allocating time between market and non-market uses should respond to income variations by adjusting the time devoted to shopping search and other home production activities. In this paper, we exploit high-frequency household expenditure data to examine the use of changes in shopping intensity as a method of mitigating the effects of the 2002 Argentine economic crisis. Although the total quantity and real value of goods purchased fell during the crisis, consumers are found to be doing more shopping search. This increase in shopping is shown to enable households to seek out lower prices and locate substitutes, allowing a given level of expenditure to buy more goods. The magnitude and prevalence of these effects suggest that this non-market use of labor can be an important coping strategy for households during a recession.

Keywords: *time allocation; non-market labor; crisis mitigation; aggregate shocks*

JEL classification codes: D12, J22, O12.

* Thanks to Sebastian Gimenez of LatinPanel for help with the market research data used in this study, to Nestor De Cesare for *corralito* expertise, to Graciela Bevacqua and Cecilia Pazo for their help with INDEC's price information, to Matias Cattaneo, Sebastian Calonico and Florencia Borrescio Higa for extremely valuable research assistance, and seminar participants at the Bay Area Development Day, BREAD, Di Tella, NEUDC, Stanford SITE, UCLA, Virginia, LACEA, and Virginia Tech. Financial support was provided by a SIEPR seed grant.

Development Research Group, The World Bank, MSN MC3-300, 1818 H Street N.W., Washington, D.C. 20433. E-mail: dmckenzie@worldbank.org.

Universidad Torcuato Di Tella, Saenz Valiente 1010, (C1428BIJ) Buenos Aires, Argentina; E-mail: eschargr@utdt.edu.

1. Introduction

In his seminal theory of the allocation of time, Becker (1965) analyzed how households optimally distribute their members' time between market and non-market activities, introducing the idea that consumption results from the combination of market goods and time spent in home production. An important implication of this theory is that "women, the poor, children, the unemployed, etc. would be more willing to spend their time in a queue or otherwise ferreting out rationed goods than would high-earning males" (Becker 1965, p. 516). Thus, when their income falls, consumers are expected to substitute goods for time in the production of consumption by increasing the time devoted to shopping search and other home production activities. It has proven difficult, however, to test this implication. Standard expenditure surveys generally provide little information on shopping consumer behavior, and as a consequence, the use of this mechanism in response to income variations has been largely unstudied. When expenditure surveys including detailed shopping data exist, they usually have a cross-sectional structure with no exogenous source of income variation that could allow the identification of the causal effect of income on shopping activity.

In this paper, we exploit high-frequency household expenditure data registering the purchase activity of a panel of Argentine households to study changes in shopping activity in response to the 2002 financial crisis. Despite real expenditure falling 10.6 percent during the crisis, we find a seven percent increase in shopping frequency, with consumers shopping more days a week and at a wider variety of stores. We examine whether the observed change in shopping frequency represents an adjustment to falling income, or the result of changes in inflation, price dispersion, and liquidity during the crisis. Although these other factors may play a role, we find evidence for a large income effect on shopping frequency, whereby poorer consumers shop more often to buy a given quantity of products.

In the face of a deep recession, this increase in shopping search activity is found to be one of the most prevalent adjustment mechanisms used by consumers to cope with the crisis. Such search behavior is found to be associated with consumers paying lower prices for

the same products, and shifting their expenditure from high to low-quality brands. As a result, a given level of expenditure is able to purchase a larger quantity of goods. Our calculations suggest that in response to the fall in income experienced during the crisis, consumers used this adjustment mechanism to save, on average, approximately four percent of the cost of their food, beauty, and cleaning product expenditure, thereby mitigating up to forty percent of the fall in real expenditure in these products.

Our findings contribute to several branches of the economic literature. Development economists have shown a variety of responses utilized by households in developing countries to smooth idiosyncratic risks (Townsend, 1994, 1995). These mechanisms include, among others, income smoothing (Morduch, 1995), the use of durable assets as buffer stocks (Rosenzweig and Wolpin, 1993) and informal credit arrangements (Udry, 1994). Economic crises affecting most households simultaneously, however, greatly reduce the set of available risk-coping strategies. Access to formal credit is scarce during recessions. Group-based informal insurance arrangements are ineffective, as the incomes of a household's risk-pooling partners also fall (Lustig, 2000). Self-insurance is also less useful during an aggregate shock, as rising inflation erodes the purchasing power of financial savings, and a common desire to sell reduces the relative price of other assets (Dercon, 2002). A general economic slowdown and rising unemployment can also stymie the efforts of households to increase their labor supply. As a consequence, household consumption expenditure often falls by as much as income.[1]

Although households may not be able to prevent a fall in total expenditure, they do adjust the basket of goods purchased in order to reduce the fall in food expenditure. The expenditure share on food increases, and consumers further reallocate across food products devoting a larger share of food expenditure to basic staples (Frankenberg, Smith and Thomas, 2003; McKenzie, 2006). We add to these crisis mitigation consumption strategies the use of households' time to increase shopping search intensity. This

[1] See, for example, Thomas et al. (1999) and Strauss et al. (2004) on Indonesia, Skoufias (2003) on Russia, Paxson and Schady (2005) on Peru, and McKenzie (2006) on Mexico.

additional adjustment mechanism is shown to have a sizeable crisis mitigation impact, allowing a given level of expenditure to buy more goods.

Our findings also contribute to a recent empirical literature on the response of home production to income variation.[2] Hamermesh (2006) compares two cross-sections of U.S. time-use and expenditure data for 1985 and 2003, and finds a decline in time spent in food shopping, cooking and cleaning up, and relatively more time spent directly eating, over this period of rising incomes. Aguiar and Hurst (2005a) find a large rise in time spent on home food preparation and increased time spent shopping upon retirement in the U.S. (for evidence from Germany, see Schwerdt, 2005). Lach (2007) finds a negative relationship between the shares of Former-Soviet-Union immigrants in Israeli city populations and prices, and argues that the negative immigration effect can be explained by these new (and poor) immigrants searching more intensively for lower prices than the native population. In contrast to these studies, our data contain detailed high-frequency information on shopping behavior; have a panel household structure which allows us to use fixed effects to control for unobserved household characteristics affecting both income and shopping; and are situated during a crisis period which provides an exogenous income shock.

Our price results on the association between reduced opportunity cost of search and consumers paying lower prices for the same products are consistent with recent contributions on returns to search by (Sorensen (2000), Brown and Goolsbee (2002), and Aguiar and Hurst (2005b)) and on the relative evolution of prices faced by rich and poor (Broda and Romalis, 2008). We also aim to contribute to the literature on price setting over cycles initiated by Rotemberg and Saloner (1986). To the potential pro-cyclicality of demand elasticities due to economies of scale in search by Warner and Barsky (1995) (see, also, the discussion in Chevalier et al., 2003), we contrast their possible counter-cyclicality due to variations in consumers' income. The increase in shopping frequency could also contribute towards explaining the puzzle of why inflation is surprisingly low

[2] After Becker (1965), previous work on home production includes Ghez and Becker (1975), Gronau (1977, 1980), Benhabib, Rogerson and Wright (1991), Greenwood and Hercowitz (1991), Baxter and Jermann (1999), Parente, Rogerson and Wright (2000), inter alia.

after large devaluations (Obstfeld and Rogoff, 2000). Burstein, Eichenbaum, and Rebelo (2005) argue that the non-tradable component of distribution costs and the substitution from high-quality imports to low-quality local goods explain this low pass-through. Our results confirm the presence of quality substitution, and add that the increase in shopping frequency may reduce the ability of sellers to pass cost increases through prices.

The remainder of this paper is structured as follows. Section 2 provides a theoretical benchmark to our discussion of household time allocation. Section 3 describes the household expenditure data obtained from LatinPanel, a market research firm. Section 4 discusses the cross-sectional relationship between shopping frequency and income. Section 5 provides a general overview of the macroeconomic conditions before and during the Argentine crisis. Section 6 then describes the consumer responses to the crisis in terms of changes in expenditure, quality and shopping behavior, Section 7 examines several explanations for the changes in shopping activity, and Section 8 calculates the gains from increased shopping frequency. Section 9 compares the prevalence of increased shopping relative to other crisis mitigation strategies, while Section 10 concludes.

2. A Simple Model of Time Allocation

We use a simple model of time allocation to analyze the effect of income changes on shopping time. Consider an individual who optimally distributes her total time T between leisure O, labor L and shopping S in order to maximize utility $U(C,O)$. We assume that consumption C results from the combination of labor and shopping. In particular, $C = wLf(S)$, where w is the wage, wL is the monetary expenditure, and $f(S)$ is a function of shopping time, which represents the lower prices (and better product quality) obtained from the same expenditure level by spending more search time. We assume $f'(S) > 0$ and $f''(S) < 0$ so that there is a positive marginal benefit from the shopping technology, with decreasing returns. We also assume that $U_c>0$, $U_o>0$, $U_{cc}<0$, $U_{oo}<0$, and, for

simplicity, that utility is separable in consumption and leisure.[3] Substituting for *O* and *C*, the individual's problem is:

$$\max_{\{L,S\}} U\left(wLf(S), T - L - S\right) \tag{1}$$

The first-order conditions are:

$$U_c wLf'(S) = U_o \tag{2}$$

$$U_c wf(S) = U_o \tag{3}$$

The optimal levels of shopping and labor then set their marginal benefits equal to their marginal cost, which is the loss in utility from less leisure. In particular, the marginal benefit from shopping more depends on three factors:

(a) The reduction in prices obtained from more search $f'(S) > 0$.

(b) The expenditure level *wL*. A given price gain from shopping has higher benefit when it is applied to a larger basket of consumption.

(c) The marginal utility of consumption U_c. The gain mentioned in (b) is higher in quantity terms when individuals are consuming more, but may be worth less in utility terms due to diminishing marginal utility.

Differentiating both equations in (2) with respect to wages, *w*, then allows us to see how shopping time is expected to change when wages change:

$$\frac{dS}{dw} = \frac{\left[U_c + U_{cc}C\right]U_c wf(S)f'(S)}{SOC} \tag{4}$$

where *SOC* is the determinant of the second order condition Hessian matrix, which is positive for regular preferences. Note first that if $f'(S) = 0$ then shopping will be

[3] We also assume for simplicity that shopping is the only home production activity. Other domestic chores (and savings) could also be incorporated into the model.

unresponsive to wages. That is, if there are no price gains to be had at the margin from changing shopping behavior, individuals will not adjust along this margin. Under our assumptions, expression (4) cannot be signed. This shows that whether or not shopping will increase as wages fall depends on how the two effects described as (b) and (c) above weigh against one another. Holding shopping constant, a fall in wages lowers consumption, which reduces the benefit from shopping (smaller basket to shop for), but also increases the marginal utility of consumption (thereby increasing the value of each unit of price saving). Depending on the curvature of the utility function (the sign of $U_c + U_{cc}C$), shopping time may increase or decrease in response to wage changes.[4]

The effect of income on the time spent to shop for a *given* consumption basket, however, can be signed. If we hold the consumption basket fixed in equation (2) and, therefore, an increase in income does not induce more shopping from price gains being applied to a larger basket, then the partial derivative $\left.\frac{\partial S}{\partial w}\right|_{wL=\bar{K}}$ becomes negative. Alternatively, the same result can be obtained with a consumption function separable in *wL* and *S*. For example, if $C = wL + f(S)$ or $C = \log(wLf(S))$, where the shopping gains are not proportional to the consumption basket, then $\frac{dS}{dw}$ becomes negative.

In this simple model, households can also respond to income changes by increasing labor hours. Increasing labor hours, however, may have not been an option for Argentine households during the crisis, when unemployment was drastically increasing.[5] Nonetheless, the above results continue to hold if we assume that households are constrained in the choice of the number of hours they work and, therefore, the choice of shopping time just involves a trade-off of the gain in prices from shopping more against the loss in leisure time. That is, the sign of the response of shopping time to wages is, in

[4] For example, with log utility, the two effects counterbalance one another, and so a fall in wages will have no effect on shopping time.

[5] See section 9 and McKenzie (2004b) for evidence supporting the inability of households to increase labor hours during the Argentine crisis.

general, undetermined, but is negative when the shopping gains only apply to a fixed consumption basket, or when the consumption function is separable in *wL* and *S*.

3. LatinPanel Data

Detailed expenditure data covering the period January 1, 2000 through December 31, 2002 were obtained from the marketing company LatinPanel, a subsidiary of TNS Gallup. LatinPanel follows the purchase decisions of a panel of 3000 Argentine households: 1500 from the Buenos Aires metropolitan area, and the other half from the rest of the country (excluding Patagonia).[6] In each area, the families are selected through stratified randomization (according to the 1991 Census socio-economic characteristics of the whole population). The families that participate in the sample report regularly all their purchase decisions for a sample of products. LatinPanel reports this expenditure thrice-monthly for each month for the days 1 to 10, 11 to 20, and 21 through the end of the month.

The households report all the purchases of thirty-seven products by filling daily a "purchase diary" and sending it periodically to LatinPanel. The articles include twenty food products (cooking oil, cocoa powder, coffee, yerba mate & tea, dressings sauce, biscuits, breakfast cereals, pasta & noodles, soups, canned food, milks, carbonated drinks, bottled water, beers, fruit juice, frozen food, ice creams, yoghurt, butter, and margarine); ten cleaning products (dishwashing detergent, bleach, home cleaners, floor waxes, air care products, kitchen rolls, napkins, toilet paper, laundry soap, and fabric softeners); and seven personal cleaning and beauty articles (toilet soap, deodorants, toothpaste, shampoo, hair conditioners, hair coloring, and feminine protection). Fresh fruit, vegetables, meat, and bread, which are largely unbranded in Argentina, are not included because LatinPanel would have no corporate clients to sell these data to. However, the sample does include other fresh and perishable products such as milk, yoghurt, ice cream, and butter. Meals out are also excluded. In terms of total LatinPanel consumption, the mean

[6] See the Appendix for more description of the panel rotation and attrition, and also McKenzie and Schargrodsky (2005).

share of food expenditure is 76 percent, with cleaning products averaging 13 percent and beauty products 11 percent of total expenditure.

An important question is what share of household expenditures is captured by LatinPanel. Matching the expenditure categories collected by LatinPanel with those in the last official expenditure survey, the 1996/97 *Encuesta Nacional de Gastos de los Hogares,* allows us to calculate the share of total food expenditure and total expenditure that the items in our LatinPanel data cover. Overall, LatinPanel food, beauty and cleaning products account for 16.7 percent of total expenditure, and the LatinPanel basket of food items accounts for 44.5 percent of total food consumed at home. More recent data show that the food products covered by LatinPanel comprised between 68 and 70 percent of all supermarket sales (which also include fresh fruit, vegetables, meat, and bread) during the 2000-02 period.[7] As a further test of the quality and representativeness of our data, we will also show later that monthly food inflation for the LatinPanel basket of goods closely follows the overall CPI and food CPI official inflation rates.

The key advantage of the LatinPanel data for our study is that, in addition to price, quantity, and expenditure data, it provides information on three aspects of consumer purchase behavior which are not covered in standard household expenditure surveys. Firstly, each product item is classified by LatinPanel into three quality levels: premium brands, distributor brands, and priced brands. The distributor brands are private, retailer labels that account for only five percent of the value of purchases, so we will concentrate on comparing premium, high-quality to priced, low-quality products.[8] Secondly, households report the distribution channel where they obtained each product. Eleven distribution channels are considered: hypermarkets, supermarkets, discount stores, self-service stores (*autoservicios*), grocery stores (*almacenes*), wholesalers, candy stores (*kioscos*), drugstores, welfare programs, bartering clubs (*trueque*), and a residual category for other channels such as community markets. Thirdly, beginning in January 2001, LatinPanel has collected information on the particular day within each 10-day period

[7] Source: Encuesta de Supermercados de INDEC, www.indec.mecon.ar.
[8] The classification between premium and priced brands is done at the manufacturer level, i.e. all the versions of the product made by the same manufacturer are classified under the same quality category.

when each purchase was made. This enables calculation of the number of days within each 10-day period that each household went shopping. This will be used along with information on the number of types of channels a household shopped at in order to obtain a measure of shopping frequency.

Due to confidentiality restrictions, LatinPanel does not provide the expenditure data at the household level, but at the pseudo-household level. Households are classified according to five demographic categories (location, socioeconomic level, household size, housewife's age, and age of the youngest child).[9] Each pseudo includes all the households that share the same demographic characteristics. There are in principle 640 pseudos (2 regions × 4 socio-economic levels × 4 household sizes × 4 housewife's age categories × 5 youngest child's age categories). However, several pseudo-households are empty because no families satisfy all the characteristics. The final sample is then an unbalanced panel that includes between 360 and 400 pseudo-households at any point in time. The data also indicate the total number of families included in each pseudo for each period. The mean number of households within a pseudo is 8, with the range being between 1 and 62. We weight each pseudo by the number of households within the pseudo in our calculations. Households are surveyed at the end of each year to register changes in their characteristics. When a household reports a change, it is moved to its new pseudo as of December 31.

The LatinPanel database does not contain information on income. We therefore construct mean income for each pseudo-household by using data from the 2000-2002 waves of the *Encuesta Permanente de Hogares* (EPH), an urban household labor force survey taken by INDEC in May and October each year. Approximately 21,000 households and 80,000 individuals are surveyed each period. Income is collected for the month prior to the

[9] The categories are as follows: Location (Buenos Aires metropolitan area, the Interior region); Socioeconomic Level (high income, middle income, upper-low income, low income – See Appendix); Household Size (1 or 2 members, 3 members, 4 members, 5+ members); Housewife's age or the age of male household head if there is no housewife (less than 35 years, 35-49 years, 50-64 years, 65+); Age of the youngest child (less than 6 years, 6-12 years, 13-18 years, 19-25 years, without children or older than 25 years).

survey, giving measures of monthly income for April and September.[10] Within the EPH, we use location, socioeconomic level (see Appendix), household size, housewife's age and youngest child's age to construct the same pseudo-households as in LatinPanel, and obtain a measure of mean income for each pseudo-household. The mean number of households in the EPH within a pseudo is 43.[11] These data will then be used to examine the effect of changes in income on LatinPanel consumption outcomes. We also use the evolution of the nominal average wage for employees contributing to the social security system provided by the Ministry of Finance, which is available for every month, to extrapolate the April and September EPH pseudo-household mean incomes and thus construct an income variable that is available for every month and pseudo-household.

4. Shopping Frequency

One form of non-market labor is to spend more time shopping in order to search for better prices and quality, thereby allowing a household to extract more consumption from a given level of expenditure. The LatinPanel data enable us to measure two aspects of shopping frequency: the number of days a household makes a purchase (*shopping days*) and the *number of channels* purchases are made at.[12] The first column of Table 1 shows that, before the 2002 macroeconomic crisis, Argentine households spent on average 5.02 days shopping and made purchases at 2.39 different channels per 10-day period.

We combine these two measures into an overall measure of shopping frequency, called *channel-days*. For each household the number of channel-days is the sum over the ten different channels of the days spent shopping at each channel. Both more days spent shopping at the same channel, and more channels shopped at on the same day will increase this measure. On average households shopped 6.28 channel-days per 10-day period in 2001.

[10] More details of this survey are provided in McKenzie (2004b).
[11] Note that we have a large number of pseudos and a reasonable number of households within each pseudo. Pseudo-panel estimation is consistent under these conditions and general assumptions (see McKenzie, 2004a, for details).
[12] We exclude items received through welfare transfers in our calculations, as these are not purchased.

This composite measure expands on the number of days shopped at by capturing within-day shopping. One limitation is that LatinPanel only registers the days and channels at which consumers actually purchase at least one item. If consumers search, but do not buy anything, then this is not measured. Note also that we do not observe which store within a channel a consumer shops at. Hence, if a consumer shops at two supermarkets on the same day, this would only be measured as one channel-day. However, if this occurs on different days, or if the consumer shops at one supermarket and one grocery store on the same day, it will be captured as two separate transactions and hence measured as two channel-days. While these caveats should be borne in mind, the measure captures rich detail on consumer behavior which is unavailable in standard expenditure surveys.

Table 1 also reports mean shopping frequency by household real labor income quartile in 2001. Following Becker (1965), one would expect poorer households to have a higher marginal utility of consumption (and a lower opportunity cost of time) and therefore engage in more non-market labor, shopping more in order to search for better prices and quality. However, at lower consumption levels, the gains from shopping are smaller as they apply to a reduced consumption basket, lowering the incentives to increase shopping search. Table 1 shows a nonlinear relationship between shopping days and income: the second quartile shops the most often. The number of channels shopped at varies little across income quartiles, and as a result, channel-days follows the same pattern as shopping days.

Non-parametric estimation via the local linear regression of Fan and Gijbels (1996) confirms this nonlinear relationship between shopping frequency and income in 2001.[13] The top plot of Figure 1 graphs the estimated cross-sectional relationship, indicating with vertical lines the 10^{th}, median, and 90^{th} percentiles of the income distribution. The number of channel-days spent shopping is seen to first increase, and then decrease with growing income.

[13] The Epanechnikov kernel was used with a bandwidth of approximately one-half of the observations.

The reason for this pattern are the two counteracting effects of income on shopping frequency discussed in the theory section. On the one hand, higher income increases the opportunity cost of time and reduces the marginal utility of consumption, leading to less shopping frequency. On the other hand, more income leads to higher expenditure within a given period of time, which will tend to increase shopping frequency as consumers shop for more goods. For the top half of the income distribution the first effect dominates, so shopping frequency declines with income.

In order to separate these two effects, the last row of Table 1 examines the number of channel-days shopped per real peso spent.[14] This descriptive evidence shows quite clearly that poorer households use more shopping time to spend a given amount of money. Alternatively, we isolate the effect of income on the time spent to purchase a certain consumption basket by conditioning on the quantity of goods purchased rather than on the amount spent. Semi-parametric estimation allows us to do this. We use Yatchew's (1997) higher-order differencing[15] method for two-step estimation of the following partial linear model:

$$Shopping\ Freq_h = g(\log income_h) + \sum_{j=1}^{37} \beta_j q_{j,h} + \varepsilon_h \qquad (5)$$

where $q_{j,h}$ is the quantity of product j purchased by pseudo h. Local linear regression is then used in the second step to estimate the function $g(.)$, which is plotted in the lower half of Figure 1. One sees that after controlling for the quantity of products purchased, shopping frequency (the number of channel-days shopped per 10-day period) is strictly decreasing in log labor income, and close to linear. As predicted by theory, a poorer household spends more days shopping and/or goes to more channels than a richer household in order to purchase the same quantity of products.

[14] This variable is constructed by dividing channel-days by real expenditure, where the overall CPI is used to deflate nominal expenditures.
[15] We use a differencing order of five.

The cross-sectional evidence therefore suggests that poorer consumers spend more time to purchase a certain amount of goods. However, these results may reflect other determinants of shopping frequency that are correlated with income in the cross-section. Even if observable household characteristics are included as controls as in Blaylock (1989), cross-sectional estimation will always face the concern that there are unobserved characteristics of households which may affect both labor time and shopping frequency, which are jointly determined in our model. For example, individuals who dislike shopping may choose to work more and earn more income, in order to be able to spend less time searching for bargains. We therefore turn to panel estimation, which allows us to control for household invariant characteristics through fixed effects, in a circumstance where households suffered a large exogenous income shock.

5. A Large Income Shock: The Argentine Financial Crisis

On January 6, 2002, the Argentine Congress voted to devalue the peso and ended eleven years of a currency board which had pegged the peso at unity to the U.S. dollar.[16] Argentina's real GDP fell 10.9 percent in 2002, the largest fall since records began in 1900. This aggregate decline followed on top of three years of recession. Table 2 details the evolution of key macroeconomic variables from 1999-2003. While the earlier years of recession had been accompanied by deflation, the devaluation resulted in a significant increase of 41 percent in the overall Consumer Price Index. Real private consumption fell 14.4 percent in 2002.

Nominal hourly wages were sticky, growing only 8.9 percent by the end of the year, despite the price inflation.[17] As a result, real wages fell 32.1 percent. Figure 2a shows the evolution of nominal average wages for employees in the formal economy, and the dramatic fall in real wages between 2001 and 2002. Deepening the reduction in real wages generated by raising inflation on sticky nominal wages, unemployment increased

[16] See EIU (2002) for an excellent account of the events taking place during this period. Debate exists over how much of the causes of this crisis can be attributed to excess government spending, to real exchange overvaluation and financial dollarization under the convertibility system, or to an unfortunate sequence of external shocks, including the appreciation of the U.S. dollar during the 1990s, the Russian crisis, and the collapse of the Brazilian real. See Mussa (2002), Feldstein (2002), Calvo, Izquierdo and Talvi (2003), De la Torre, Levy Yeyati and Schmukler (2003), and Hausmann and Velasco (2003), inter alia.

[17] Wages for workers in the formal economy contributing to the social security system.

by five points, from the already high level of 16.4 percent in 2001 to 21.5 percent in 2002. Using the total household income from the EPH, which considers both formal and informal economy workers and the effect of unemployment, we calculate that mean total household real income for LatinPanel households fell 32.4 percent between September 2001 and September 2002. This large income shock was experienced by most households and workers. McKenzie (2004b) finds that 78 percent of households experienced a fall in real income and 63 percent of households suffered a fall in real income of 20 percent or more between September 2001 and September 2002. The percentage of households below the poverty line grew from 23.5 in 2001 to 37.7 in 2002.

This large aggregate shock to real income was largely unexpected. Most forecasts in November 2001 or earlier predicted that 2002 would be another year of deflation with zero growth or a small contraction.[18] Although experts questioned the sustainability of the convertibility plan after the failure of a last IMF-supported program in the third quarter of 2001, the crisis still took the general population by surprise. Halac and Schmukler (2003) provide evidence that large and foreign depositors managed to withdraw much of their deposits in the run-up to the crisis, whereas the general public that held small deposits did not.

The large shock to income was not the only effect of the crisis and so in our analysis we will control for other impacts of the crisis that are also likely to affect shopping frequency. The last three panels of Figure 2 display the evolution of these other key macroeconomic variables. *Inflation* took off at the beginning of 2002, peaking in April, when food inflation was 13.2 percent using the official food price index, and 12.7 percent measured by a fixed-basket price index constructed from the LatinPanel data. The two inflation indices track one another closely, providing further proof of the coverage and quality of our expenditure data. Food inflation then averaged 4-5 percent a month between May and August, and was one percent a month or less from October through

[18] For example, LatinFocus (2002) reports that a consensus private sector forecast of growth for 2002, obtained from banks and consulting agencies, fell from -0.2% in December 2001 to -5.3% in January 2002. See McKenzie (2004b) for further evidence that the magnitude of the shock was unexpected.

December 2002, totalizing 57.9 percent throughout the year. The overall CPI inflation was somewhat lower, amounting to 41 percent at the end of the year.

In addition to the direct effect of the level of inflation on search activity, inflation is generally accompanied by increasing *price dispersion* (Van Hoomissen, 1988, Lach and Tsiddon, 1992. See also Kashyap, 1995). We follow Van Hoomissen (1988) in measuring price dispersion as the interstore price variability from month to month.[19] Price dispersion rises during the first part of 2002 following the devaluation, and falls later in the year.

The third variable measures liquidity constraints, which are common during crises and can affect shopping frequency. We measure the degree of *liquidity* exploiting a special feature of the Argentine crisis, called the *corralito* (little fence). After an accelerating loss in banking deposits in the second half of 2001, the government imposed a partial freeze on deposits on December 3, 2001, in order to stop the bank run. Cash withdrawals were restricted to 250 pesos (dollars at that time) per week. Deposits could be freely used inside the banking system but could not leave it.[20] As these two monetary systems (inside and outside the *corralito*) co-existed, a market developed for exchanging money from one to the other at a discount. Figure 2d shows the evolution of the tri-monthly average discount for these transactions from the main domestic Buenos Aires stock exchange house.[21] The daily average discount reached as high as 21% on March 26, 2002, when depositors would sacrifice a check for $100 in order to receive $79 in cash. In our analysis, this discount will proxy for the stringency of liquidity constraints. The

[19] This is obtained by first calculating the monthly LatinPanel inflation rate for a given product and quality purchased in a given channel. We then take the standard deviation of this rate across channels to obtain a measure of price variability for each product, quality and month. The aggregate share of expenditure on each product in 2000 is then used to weigh the individual product-quality variabilities in order to obtain an aggregate measure of price dispersion.

[20] Thus, money within the financial system could be used to buy items from stores accepting checks or credit cards, or to pay formal wages and mortgage payments. However, depositors could not use funds for cash transactions, such as purchasing at small stores, paying informal employees, buying foreign currency, or carrying out cash transactions such as paying for buses and taxis.

[21] No transactions occurred between the start of the *corralito* on December 3, 2001, and January 15, 2002, due to time taken for the market to develop and the lack of transactions during banking holidays. The flat portion in Figure 2.d assumes the premium during this period to be that prevailing on the first day of operations (11.7%). Our results are robust to dropping the observations over this period.

withdrawal limits were gradually increased allowing the *corralito* to become progressively less binding until all restrictions were finally lifted on December 2, 2002.

6. Buying Less and Shopping More during the Crisis

6.1. Buying Less

Figure 3 shows the evolution of real expenditure for LatinPanel households. We obtain real expenditure by deflating nominal expenditure by a fixed basket price index constructed from the prices in the LatinPanel dataset. Real expenditure by LatinPanel households is then estimated to have fallen 10.6 percent in 2002. Similar results are obtained using the official food price index as a deflator: real expenditure falls 9.3 percent in 2002. A still large, but smaller, fall in real expenditure is observed if the Consumer Price Index is used as a deflator, because food prices increased by much more than the overall index in 2002 (see Table 2). Given the 32.4 percent fall in household real income between September 2001 and September 2002, the estimated fall in real expenditure represents substantial smoothing of the income shock. Nevertheless, household expenditure still fell by a substantial amount, especially as this followed smaller falls in the recession which preceded the devaluation.

Using the quality information provided by LatinPanel, Figure 3 also shows that this decline in expenditure is the result of a reduction in expenditure on premium products. Expenditure on (low-quality) priced products actually rose 2 percent, whereas expenditure on premium products fell 17.6 percent. Burstein et al. (2005) also report this quality substitution during the Argentine crisis. The quality substitution affected consumers across all the income distribution.

The change in consumption during the crisis period can also be observed by examining changes in the physical quantities of goods obtained by consumers as a result of their purchases. Eleven of the twenty food products collected by LatinPanel show a 15 percent or larger decline in the mean quantity purchased in between 2001 and 2002, while only yerba mate (a local tea) and pasta show significant increases.[22] Households reduced the

[22] Yerba mate is a traditional tea beverage known to reduce hunger, which may explain its increased use.

quantity of all cleaning and beauty products, with 11 of the 17 products showing declines of over 10 percent.

6.2. Shopping More

Although household bought less in 2002, shopping frequency increased. Figure 4 plots the monthly means of the number of days each household spent shopping over each 10-day period in 2001 and 2002. Mean shopping days increased from 5.02 in 2001 to 5.21 in 2002. Table 3 shows that this increase is statistically significant and occurs across all quartiles of the income distribution. This increase translates into almost two-thirds of households shopping an extra day each month, and comes entirely through additional days spent shopping for priced products, with shopping days actually falling for premium products.

Figure 5 plots the monthly mean number of channels shopped at per household within each 10-day period. Total channels shopped at remained fairly stable between 2000 and 2001, increasing dramatically from the last few months of 2001. The mean number of channels shopped at within a 10-day period rose from 2.39 in 2001 to 2.58 in 2002. Table 3 shows that this increase is statistically significant and occurs for all income levels. This translates into sixty percent of households shopping at an additional channel each month. The largest increase in channels occurs for purchases of priced products, but even premium products, which people reduced expenditure on, show a small increase in the number of channels used for shopping.

The increase in both days and channels translates into an increase in channel-days. Mean channel-days increased from 6.28 per 10-day period in 2001 to 6.71 per 10-day period in 2002, a statistically significant increase of seven percent. This overall increase reflects an increase in channel-days shopping for priced goods and a decrease in channel-days shopping for premium products. As real expenditure fell significantly during the crisis, the increase is even larger in the channel-days used per each real peso spent. The last row of Table 3 shows a seventeen percent increase for this variable.

This growth in shopping days and the number of channels shopped at cannot be explained by an increase in the number of suppliers. On the contrary, ACNielsen (2003) reports a reduction in the total number of stores in Argentina of 9.5% between 2001 and 2002. It cannot either be explained by an increase in the variety of products. CCR (2003) reports a reduction in the number of SKUs offered in supermarkets of 14.3% between 2001 and 2002.[23]

Moreover, the measured increase in the number of stores is not induced by tiny purchases at new channels. Herfindahl indexes of expenditure shares across channels show a significant reduction from 2001 to 2002, indicating less concentration amongst channels in the value of expenditure. The increase in the number of channels used is seen to arise from an increase in use of down-the-trade channels such as self-services (*autoservicios*), grocery stores (*almacenes*), candy stores (*kioscos*), and discount stores. These channels are generally used more often by lower socioeconomic classes, but all socioeconomic levels increased their use of these channels during the crisis. There is also an increase in the use of barter clubs (*trueque*) and the residual category of other channels, which includes community markets. In contrast, the up-the-trade channels of hypermarkets and supermarkets actually see some falls in usage. These channels were most often used by the upper socioeconomic classes before the crisis, who are now seen to be switching to alternative channels.

7. The Effect of Income on Shopping Frequency

7.1 Basic Specification

We have seen in the cross-sectional analysis that poor households shop more often than rich households per unit of product purchased. The concern with cross-sectional estimation is that households may simultaneously decide their allocation of non-leisure time between shopping and labor. The crisis provides an exogenous source of income change which can be used with the panel data on pseudo-households to identify the effect of income on shopping frequency. Moreover, the use of pseudo-household fixed effects

[23] Shortages cannot explain these findings either. The products that disappeared from the market were high-quality, premium goods (mainly imports), whereas shopping days and the number of channels increased for priced goods.

controls for preferences, location, demographics and other time-invariant household-specific determinants of shopping frequency which potentially bias the cross-sectional estimates. McKenzie (2004b) shows that there was little change in household size or structure during the crisis, so the use of fixed effects will also control for these factors.

For pseudo-household h in time period t, we specify:

$$Shopping\ Freq_{h,t} = \alpha \log income_{h,t} + \gamma Z_t + \delta X_{h,t} + \sum_{j=1}^{37} \beta_j q_{j,h} + \mu_h + \varepsilon_{h,t} \qquad (6)$$

where $Shopping\ Freq_{h,t}$ is the number of channel-days shopped at (divided by the number of households in the pseudo), log $income_{h,t}$ are alternative income measures, Z_t alternatively represents aggregate controls that only vary by time or time effects, $X_{h,t}$ are controls that vary by time and pseudo, $q_{j,h}$ is the quantity of product j purchased by pseudo h, and μ_h are pseudo-household fixed effects. Standard errors are clustered to allow for arbitrary correlation of the error terms $\varepsilon_{h,t}$ at the pseudo-household level.

As explained in Section 3, as LatinPanel does not collect income data, we measure income by matching location, socioeconomic level, household size, housewife's age and youngest child's age between the official household survey, where income is available, and LatinPanel, and then calculating mean income for each pseudo-household. This household survey only collects income information for April and September of each year. We then obtained our first income measure for every month and pseudo-household by extrapolating for each pseudo-household the EPH observations for the interim months using the evolution of nominal average wage for employees in the formal economy.

In column 1 of Table 4, we only introduce some basic controls for household size, age of the housewife, age of the youngest child, education of the household head, ownership of a refrigerator, and geographic location, but we do not control for the quantities purchased. As suggested by the first panel of Figure 1, we find a small positive and insignificant effect of income. The signs of the coefficients on the control variables tend to be in

accordance with the theoretical prediction that households with a higher opportunity cost of time will shop less frequently. Shopping frequency is higher in larger households, which have more potential members to do the shopping, and lower in more educated households.

In the second column, we control for the quantity of each product purchased in order to identify the effect of income on the time spent to acquire a certain amount of goods. As suggested by the second panel of Figure 1, the income coefficient becomes negative (and is close to significant). We then replace the household characteristics with pseudo-household fixed effects in Column 3. In this specification, the income coefficient increases significantly in both absolute value and statistical significance. This large change suggests the presence of unobservable time-invariant characteristics correlated with income and shopping and, therefore, the relevance of exploiting a panel data structure for this exercise. Based on Column 3 and in agreement with the theoretical prediction, an income fall induces an increase in the time spent to purchase a given consumption basket.

However, the large income shock was not the only feature of the crisis that could have affected shopping frequency. As shown in Figure 2, the crisis also triggered liquidity restrictions, inflation, and price dispersion. Liquidity constraints are usual during macroeconomic crisis. In the Argentine case, liquidity restrictions took the form of a partial freeze on deposits (the *corralito*) that the government imposed in order to stop a bank run. Cash withdrawals were restricted to $250 per week. In order to withdraw, for example, the $967 of the December 2001 average monthly wage in the formal economy, consumers had to do four weekly withdrawals instead of being able to spend the money all at once. Thus, we would expect the *corralito* to cause liquidity-constrained consumers to have less cash on hand, and be forced to shop more frequently for a smaller number of items each time.

The devaluation also brought a significant increase in inflation. As inflation depreciates the real value of nominal monetary holdings, traders should spend less time searching for

the best price, and increase the speed of their expenditure (Casella and Feinstein (1990) and Tommasi (1999)). The sign of the effect of inflation on shopping frequency should also depend, however, on the frequency of cash receptions obtained by consumers. Assume, for example, a consumer whose optimal purchasing frequency without inflation was shopping twice a month. If this consumer receives cash once a month, an increase in inflation may lead her to spend all her money as soon as it is received, reducing shopping frequency (from two to one). Instead, if this consumer receives money four times a month, her shopping frequency may increase with inflation (from two to four). In principle, the expected sign is ambiguous. However, as a significant portion of Argentine consumers work in the informal economy, which is subject to irregular payments, and as the *corralito* imposed a fractionalization in payments in the formal economy, the rise in inflation may have increased shopping frequency.

In addition to a potential direct effect of the level of inflation on shopping activity, inflation is generally accompanied by increasing *price dispersion*. In particular, inflation results in the ranking of prices across stores changing from period to period.[24] A consequence of the increase in price dispersion is that the stock of knowledge that consumers have about where to find the best prices depreciates more quickly with higher inflation. As a result, consumers engaged in search will find it optimal to hold a lower *stock* of knowledge about prices when search is costly. Van Hoomissen (1988) makes clear that this does not necessarily mean that consumers will choose to search less during inflation as more search may be necessary to hold a smaller stock of information.

Adding controls for illiquidity, inflation and price dispersion in Column 4 of Table 4 induces a small reduction in the income coefficient, but income still shows a large and significant negative effect on shopping frequency. Thus, shopping frequency is still found to have increased as aggregate income fell, controlling for the presence of these other macroeconomic factors. This result should not be surprising after looking at Figures 2, 4

[24] This timing could occur if sticker prices are costly to adjust as in Diamond (1993). A depreciation will increase the price of replacement products, leading to increased price dispersion as stores adjust prices at different times. As explained before, we followed Van Hoomissen (1988) in measuring price dispersion as the interstore price variability from month to month.

and 5, which showed that the reduction in real income and the increase in shopping days and channels continued throughout 2002, whereas the rises in inflation, liquidity constraints, and price dispersion had mainly dissipated after the first half of the year. The *corralito* premium is found to have a small positive impact on shopping frequency, so that consumers shop more often when there is less liquidity, but the effect is not statistically significant. The inflation coefficient shows a significant increase in the frequency of purchases accompanying inflation. The coefficients on price dispersion is negative and significant. Based on Column 4, one estimates that the 0.34 fall in mean log wages is associated with consumers shopping 0.20 more channel-days per 10-day period. Comparing this to the 0.43 increase in channel-days between 2001 and 2002, we see that the fall in income accounts for almost one-half of the increase in shopping frequency during the crisis.

7.2. Robustness Analysis

We perform in Table 5 a battery of robustness analysis using as baseline our last regression from Table 4, that we repeat in the first column. We start by introducing two alternative income measures. We had extrapolated the April and September EPH pseudo-household income observations for the interim months using the evolution of nominal average wage for formal employees contributing to the social security system. This income measure used for the extrapolation does not capture labor income changes outside of formal employment. Column 2, instead, uses for each period the six-month average of EPH log labor income, whereas Column 3 uses the log household labor income only for the months of the EPH labor force survey, thereby restricting our analysis to the months of April and September of each year. The estimated coefficient on income is robust across these different specifications, although the coefficients on the macroeconomic controls are somewhat unstable.

Although we have controlled directly for what we consider to be the three most important concomitant macroeconomic events, the instability of these coefficients across specifications suggests that there may be other aggregate shocks in the economy arising from the crisis. Therefore, in Column 4 of Table 5 we introduce time effects, which will

capture the impact of the liquidity constraints, inflation, price dispersion, and any other aggregate effects. This specification poses an important challenge to the data, as the impact of changes in labor income is then only identified from relative differences across households in the amount of income changes, removing the effect of the large aggregate income shock. The estimated coefficient falls after introducing time effects, but still significantly shows that households whose incomes fell by more differentially increased their shopping frequency.

Although the addition of time effects captures any aggregate influence on shopping frequency, it may still be the case that the liquidity constraints, inflation, and price dispersion had different impacts on different households. We therefore examine the robustness of our results to adding pseudo-household specific measures of these controls. Since money within the *corralito* could be used to buy items from stores that accepted credit cards, we interact the percentage of households in a pseudo owning a credit card prior to the crisis (provided by LatinPanel) with the *corralito* premium in order to allow the liquidity restrictions to differ across households. Pseudo-household specific inflation rates are calculated by using the relevant expenditure shares in the year 2000 for each pseudo to weigh the inflation rates of each individual product in the official consumer price index. This allows households which tended to consume more of a particular product pre-crisis to be affected more by price increases in that product. Similarly, we use the expenditure shares in the year 2000 of different pseudos on each product and quality (instead of the mean shares across all pseudos) as weights on our Van Hoomissen (1988) measures of interstore price variability in calculating a pseudo-specific price dispersion variable.

The coefficient on the change in log income proves extremely robust to the inclusion of all of these pseudo-specific controls in Column 5 of Table 5. None of the coefficients on the control variables are statistically significant, and the income coefficient shows basically no change relative to the previous column. Note that, although the *aggregate* inflation and price dispersion considered before could be endogenous to shopping frequency if shopping affects the prices set by retailers, after controlling for aggregate

time effects these pseudo-level measures will not suffer from this problem under the assumption that each individual pseudo-household has a negligible effect on the price of each product. This assumption appears reasonable given the large number of pseudos and the fact that no single pseudo makes up a substantial part of the market for any one product.

The crisis was also accompanied by the forced availability of extra-time generated by unemployment. Although a common response to an idiosyncratic shock is to send another household member to work or to increase own labor hours, rising unemployment and low labor demand make this more difficult to achieve during covariate shocks. McKenzie (2004b) finds that mean household labor hours actually fell by an average of 5 hours per week during the crisis and that more than one quarter of all workers reported wishing to work more hours than they currently did. As a result, households unable to take their labor to the market may have substituted towards non-market uses of time, such as home production and increased shopping time. Thus, unemployment and underemployment could have affected the availability of shopping time, in addition to their income effect. We therefore control in Column 6 of Table 5 for changes in total household labor hours, which renders no change in our income estimated effects.[25] This suggests that once one accounts for the effects of unemployment and changes in labor hours on labor income, there is no additional effect of the changes in total labor hours on shopping frequency.

Finally, instead of defining our shopping frequency variable as channel-days and conditioning on quantities purchased, in Column 7 of Table 5 we remove the quantities purchased from the right-hand-side of our regressions and redefine the dependent variable as channel-days per real peso expenditure. Note that the interpretation of the coefficient would now be the effect of (log) income on channel-days per real peso of expenditure, instead of being the effect of income on channel-days per unit of product. Income shows again a negative and significant effect on shopping frequency.

[25] Similar results are obtained using household labor hours per adult, the proportion of male adults unemployed, or the proportion of female adults unemployed, instead of total household labor hours.

8. What Are the Benefits of Shopping More?

In order for the increase in shopping frequency observed during the crisis to be useful as an adjustment mechanism, more frequent shopping must confer benefits upon households. Viewing the frequency of shopping as an indicator of search suggests at least two possible gains to be made from more shopping. The most obvious is that by going to more stores consumers are able to find lower prices for the same products. A second potential advantage is that more search allows consumers to identify other brands and, in particular, to be able to substitute less known and less expensive brands for premium quality items. We examine each of these explanations in detail, but also note that there may be other benefits to consumers from more frequent shopping which our data does not allow us to measure. For example, consumers may save on gasoline and other transportation costs by switching from a once-a-week shopping trip by car to the supermarket towards more frequent trips by foot to nearby local stores.[26]

An alternative explanation is that the increase in shopping frequency is a result of liquidity constraints which prevent consumers from buying many items at the same time. In addition to the direct effect of the *corralito* on liquidity, it may be that households which suffered a fall in income also became more liquidity constrained, so that some of the income effect on shopping frequency also reflects liquidity. If this is the case, in contrast to the search rationale for shopping more, we would expect to find that shopping more due to liquidity constraints results in consumers paying higher prices. Similarly, if the rush to avoid the inflationary erosion of money holdings or the increase in transportation costs drives the rise in shopping frequency, we should expect an association between increased shopping and higher prices, as consumers' alternatives get reduced. Thus, the relationship between shopping frequency and prices also provides indirect evidence on the reasons driving the observed increase in shopping.

[26] Petrol prices increased 82 percent while public transport prices remained fixed in nominal terms and real wages fell, so shopping by car became relatively more expensive compared to more time-consuming methods of transport or to walking. To the extent that consumers reduced expenses by switching from driving to supermarkets to going to stores by public transport or walking, we will underestimate the savings from the change in shopping patterns.

To estimate the change in prices associated with a change in shopping frequency we estimate the following equation for good i of quality q purchased at time t by pseudo-household h:

$$\ln\left(price_{i,q,t,h}\right) = \gamma_{i,q,t} + \beta\, ChannelDays_{t,h} + \lambda X_h + \varepsilon_{i,q,t,h} \qquad (7)$$

The fixed effects $\gamma_{i,q,t}$ capture the effect of inflation, allowing this to differ by product and quality. The term X_h captures household characteristics such as location of residence, household size, and demographic variables, which may be related to both the price paid by a pseudo-household on average and its shopping frequency. In carrying out this estimation, we weight equation (7) by the average expenditure share on the product by consumers in 2000, so that price gains on items which comprise a larger share of household budgets are given more weight. Since there are multiple observations per pseudo-household in each period (one observation on each product and quality combination) we cluster the standard errors to allow for arbitrary correlation of the error terms within a time period for each pseudo-household.

As discussed in the previous section, there are a number of reasons for the increase in channel-days observed during the crisis, with only part of the effect due to the fall in income. Inflation and price dispersion could also have an effect on shopping frequency. As a result, shopping frequency is likely to be endogenous to prices in equation (7). We therefore isolate the effect of the increase in shopping frequency due to lower income on the prices paid for a given quantity of goods by using equation (6) to instrument channel-days.[27]

Table 6 then presents the resulting estimates of β in equation (7) under several different specifications of controls. Since the dependent variable is log prices, 100*β can be interpreted as giving the change in prices associated with one more channel-day shopping. The first three columns contain quality*time*product effects $\gamma_{i,q,t}$ and thereby

[27] We restrict this estimation to the EPH months of April and September in order to use only actual and not fitted income variation across pseudos to instrument changes in shopping behavior.

isolate the impact of shopping more for the same products and qualities on prices. As assumed by our shopping technology function in the theory section, the results show a negative effect of shopping frequency on prices, which becomes large in magnitude once one controls for household characteristics in Columns 2 and 3. One more channel-day of shopping is estimated to result in a 17-18 percent saving in prices after controlling for household characteristics.

Columns 4 through 6 replace $\gamma_{i,q,t}$ with product*time effects. This allows us to also capture any reduction in prices resulting from switching to lower-quality goods when consumers shop more often. Shopping at a wider variety of stores may provide consumers with more choice over brands, and allow them to substitute priced brands for premium quality items. Priced goods have a price which is on average only 83 percent of the price of premium goods in our data. Although this price differential may reflect actual or perceived quality differences, consumers may be willing to substitute towards priced goods in order to maintain the quantity of food and other items consumed as their incomes fall. The coefficients are always larger in magnitude than their counterparts in Columns 1-3, and comparing the coefficients suggests that consumers save an additional 1.6-2.0 percent in prices by sacrificing quality.

An alternative method of determining whether consumers switch to lower quality items by shopping more can be obtained by regressing the percentage share of priced goods for product i purchased at time t by pseudo-household h on shopping frequency and household fixed effects:

$$PricedShare_{i,t,h} = \theta\, ChannelDays_{t,h} + \pi_h + \nu_{i,t,h} \qquad (8)$$

To estimate equation (8), we again instrument channel-days with EPH income holding quantity fixed. We obtain an estimate of θ of 11.5 with a highly significant t-statistic of 7.52. That is, shopping one more channel-day is estimated to increase the share of priced goods by 11.5 percentage points. If consumers save 17 percent of the price by doing so, then one more channel-day saves consumers an additional 1.96 percent as a result of

switching qualities. This is almost exactly the estimate obtained by comparing the coefficients in Columns 3 and 6 of Table 6.

Combining the above results, we have that shopping one more channel-day is associated with a 17-18 percent fall in the price paid for the same products, along with a 2 percent saving from switching to cheaper brands. Recall that the crisis resulted in a 0.34 fall in log household labor income, which based on the coefficient on log labor income in column 4 of Table 4 is estimated to have increased channel-days by 0.20 channel-days per 10-day period. Therefore the estimated average savings to consumers from the increase in shopping frequency during the crisis in response to falling income is a 4 percent saving in the price of food, beauty and cleaning products. These savings in price allow a given level of expenditure to buy more, and thereby mitigate approximately 40 percent of the 10.6 percent fall in real expenditure by LatinPanel households shown in Section 6.1.

9. The Prevalence of Increased Shopping

Increasing shopping frequency is an adjustment mechanism that can be employed by a large number of households during an aggregate shock, in contrast to many other adjustment mechanisms. In Table 7 we calculate the percentage of pseudo-households that increased their shopping days, shopping channels, and channel-days in total in 2002 compared to in 2001. Over 61 percent of households are found to have increased their shopping days, 76 percent increased the number of channels used, and 66 percent increased their channel-days. Moreover, when we look at the use of this mechanism across 2001 income quintiles, we see that the increase in shopping frequency applied across the income distribution.

Our results can be compared with independent evidence on household crisis mitigation strategies collected by the World Bank's Socioeconomic Impact of the Argentine Crisis survey (*Impacto Social de la Crisis en la Argentina –ISCA–*).[28] The survey directly asked

[28] Data available online at the World Bank's Argentina website: www.bancomundial.org.ar. See Fiszbein et al. (2003) for details.

households whether they had used or not a variety of strategies to cope with the crisis. Table 7 summarizes results from this survey presented in Fiszbein et al. (2003). Regarding consumption adjustment, this survey finds that a large percentage of households reduced the consumption of food and non-food items, substituted towards cheaper food and non-food items, and carried out more home production. The prevalence of these consumption adjustments in the World Bank survey is comparable to our findings based on the LatinPanel database.[29]

The prevalence of other crisis adjustment mechanisms is much smaller, although they have received more attention in the literature than the changes in home production and consumption behavior. Regarding labor market adjustments, only 13 percent of households said that as a response to the crisis they had worked more hours, and 14 percent sent more members to the labor market.[30] With respect to financial strategies, 3 percent sold assets, 5 percent used their savings, 11 percent used loans from family members and friends, less than 2 percent used bank loans, and 8 percents used store credit. Table 7 suggests that, in terms of prevalence, increases in shopping frequency and the associated changes in consumption patterns are one of the most used crisis mitigation strategies.

10. Conclusions

When income falls, consumers are expected to substitute goods for time in the home production of consumption by increasing the time devoted to shopping search (and other home production activities). It has proven difficult, however, to test this implication.

[29] Moreover, the World Bank survey coincides with our results in showing that these consumption adjustments not only took place during the most tumultuous phase of the crisis in the first part of 2002, but also continued throughout the rest of the year. Two different waves of the World Bank survey show that approximately the same percentage of households made these changes between October 2001 and June 2002 than between June 2002 and November 2002.

[30] The World Bank survey specifically asked whether households increased labor hours to ameliorate the effect of the crisis. Using the EPH to calculate the percentage of pseudo-households changing (for any reason) their household total labor hours over this same period shows that 36 percent of households increased labor hours, whereas 64 percent reduced labor hours. Moreover, McKenzie (2004b) shows that the proportion of households increasing their labor hours was actually lower in 2002 than in the previous years, so that much of the increase in labor hours can be seen as standard labor market churn, rather than a specific response to the crisis. He also shows that average total EPH household labor hours per week fell from 59.4 in 2001 to 54.1 in 2002.

Standard expenditure surveys generally provide little information on shopping consumer behavior, and when expenditure surveys including detailed shopping data exist, they usually have a cross-sectional structure with no exogenous source of income variation that could allow the identification of the causal effect of income on shopping activity.

We exploit high-frequency household expenditure data to study changes in shopping activity in response to the 2002 Argentine financial crisis. Argentine consumers reacted in part to the crisis by changing their shopping behavior. Although consumers bought less after the devaluation, they shopped more. This increase in shopping frequency occurred over a wider variety of channels, and was almost entirely through increased shopping for lower-quality products. Although inflation, price dispersion, and illiquidity effects could have played a role in accounting for the changes observed in shopping behavior, our analysis suggests that the fall in income experienced by consumers during the crisis was the prime determinant of the increase in shopping frequency.

More frequent shopping is found to be associated with consumers paying lower prices for the same products, and shifting a portion of their expenditure from high to low quality goods. Our calculations suggest that on average consumers were able to save 4 percent of the cost of their food, beauty and cleaning products by increasing shopping frequency, allowing them to mitigate up to 40 percent of the fall in food expenditure. This increase in shopping search activity is found to be a more prevalent mechanism used by consumers to cope with an aggregate shock than adjustments in the labor and credit markets that have received more attention in the literature.

Appendix: Further Details on the LatinPanel Data

Classification of Household Socioeconomic Levels

Following the methodology of the Argentine Marketing Association (1998), LatinPanel classifies households by socioeconomic level in the following way. First, households are assigned index points according to the maximum educational attainment of the household head (up to 32 points), the profession and occupational status (employee, employer, self-employed, unemployed, or retired) of the household head (up to 40 points), the possession of home appliances and use of services such as personal computers, credit cards, washing machine, dishwashing machine, telephone, color TV, video, and freezer (up to 14 points), and the quality and age of the car/s owned (up to 14 points).[31] For each household, the index takes values between 4 and 100 points. Households are then classified into four socioeconomic levels according to the following table:

SOCIO-ECONOMIC LEVEL	POINTS
ABC1 - High income	64-100
C2C3 - Middle income	35-63
D1 - Upper-low income	27-34
D2E - Low income	4-26

For the households included in the LatinPanel sample throughout the period of analysis, 5.8% of the households changed SEL between 2000 and 2001 and 7.2% between 2001 and 2002. These small rates of SEL change are explained by the broadness of the categories and the fact that the index awards points to several characteristics not immediately affected by the crisis.

Rotation and Attrition

The households in the sample are randomly replaced when they interrupt participation, do not provide the information correctly and on time, or reach 4 years of participation in the sample. The sample rotation rates have remained very stable during the period of analysis: 27.6% of the sample was rotated during 2000, 25.8% during 2001, and 28.3% during 2002, representing an average annual attrition rate of approximately 3%. The relative importance of each of these three reasons for replacement has also been stable. New families that decline the invitation to be included in the sample are also randomly replaced with households of similar characteristics.[32] Households receive small durable-good prizes from LatinPanel as compensation for their participation in the sample, which acts to limit attrition.[33]

[31] For the assignment of points for each concept and further details, see Argentine Marketing Association (1998).

[32] LatinPanel reports an acceptance rate above 50% for new invitations during the period of analysis, which is lower for the households in the higher socioeconomic levels. The acceptance rate shows a minor decrease from 53% in 2001 to 50% in 2002, which LatinPanel attributes to the growing reluctance in the population to receive strangers at home at a time of large increases in crime throughout the country.

[33] Households accumulate points analogous to a "mileage" loyalty program. In just under a year a household would have accumulated enough points for a scientific calculator, and in approximately two years would have enough points for a baby stroller or a discman.

References

ACNielsen (2003) “Fin del 2003: Un Nuevo Escenario”, Buenos Aires, November.

Aguiar, Mark and Erik Hurst (2005a) “Consumption vs. Expenditure”, *Journal of Political Economy* 113(5): 919-948.

Aguiar, Mark and Erik Hurst (2005b) “Lifecycle Prices and Production”, mimeo, University of Chicago.

Argentine Marketing Association (1998), “Indice de Nivel Socio Económico Argentino”.

Baxter, Marianne and Urban J. Jermann (1999) “Household Production and the Excess Sensitivity of Consumption to Current Income”, *American Economic Review* 89(4): 902-920.

Becker, Gary S. (1965) “A Theory of the Allocation of Time”, *The Economic Journal* 75(299): 493-517.

Benhabib, Jess, Richard Rogerson and Randall Wright (1991) “Homework in Macroeconomics: Household Production and Aggregate Fluctuations”, *Journal of Political Economy* 99(6): 1166-1187.

Blaylock, James R. (1989) “An Economic Model of Grocery Shopping Frequency”, *Applied Economics* 21: 843-852.

Broda, Christian and John Romalis (2008) "Inequality and Prices: Does China Benefit the Poor in America?", mimeo, University of Chicago.

Brown, Jeffrey R. and Austan Golsbee (2002) “Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry”, *Journal of Political Economy* 110(3): 481-507.

Burstein, Ariel, Martin Eichenbaum, and Sergio Rebelo (2005) “Large Devaluations and the Real Exchange Rate”, *Journal of Political Economy* 113(4): 742-784.

Calvo, Guillermo, Alejandro Izquierdo, and Ernesto Talvi (2003) “Sudden Stops, the Real Exchange Rate and Fiscal Sustainability: Argentina’s Lessons.”, NBER Working Paper No. w9828.

Casella, Alessandra and Jonathan S. Feinstein (1990) “Economic Exchange During Hyperinflation”, *Journal of Political Economy* 98(1): 1-27.

CCR (2003) “Evolución de la Cantidad de SKUs Vendidos Antes y Después de la Devaluación en las Cadenas de Hipermercados, Supermercados y Hard Discounts en la Argentina”.

Chevalier, Judith, Anil Kashyap and Peter Rossi (2003) “Why Don’t Prices Rise During Periods of Peak Demand? Evidence from Scanner Data”, *American Economic Review* 93(1): 15-37.

De la Torre, Augusto, Eduardo Levy Yeyati and Sergio L. Schmukler (2003) “Living and Dying with Hard Pegs: The Rise and Fall of Argentina´s Currency Board.”, *Economía* 3(2): 43-107.

Dercon, Stefan (2002) “Income Risk, Coping Strategies and Safety Nets”, *World Bank Research Observer* 17(2): 141-66

Diamond, Peter A. (1993) “Search, Sticky prices, and Inflation”, *Review of Economic Studies* 60(1): 53-68.

Economist Intelligence Unit (2002) *Country Report: Argentina*, March 2002, Economist Intelligence Unit: London.

Feldstein, Martin (2002) “Argentina’s Fall: Lessons from the Latest Financial Crisis.”, *Foreign Affairs* 81(2): 7-14.

Fan, Jianqing and Irene Gijbels (1996) *Local Polynomial Modeling and Its Applications*, Monographs on Statistics and Applied Probability 66, Chapman & Hall: New York.

Fiszbein, Ariel, Paula Ines Giovagnoli and Isidro Aduriz (2003) “El Impacto de la Crisis Argentina en el Bienestar de los Hogares”, *Revista de la Cepal* 79: 151-167.

Frankenberg, Elizabeth, James P. Smith and Duncan Thomas (2003) “Economic Shocks, Wealth and Welfare”, *Journal of Human Resources* 38(2): 280-321.

Ghez, Gilbert and Gary Becker (1975) *The Allocation of Time and Goods over the Life Cycle*, Columbia University Press, New York.

Greenwood, Jeremy and Zvi Hercowitz (1991) "The Allocation of Capital and Time Over the Business Cycle", *Journal of Political Economy* 99(6): 1188–1214.
Gronau, Reuben (1980) "Home Production: A Forgotten Industry", *Review of Economics and Statistics* 62(3): 408-416.
Gronau, Reuben (1977) "Leisure, Home Production and Work – The Theory of the Allocation of Time Revisited", *Journal of Political Economy* 85(6): 1099-1124.
Halac, Marina and Sergio L. Schmukler (2003) "Distributional Effects of Crises: the Role of Financial Transfers", mimeo, The World Bank.
Hamermesh, Daniel (2006) "Time to Eat: Household Production Under Increasing Income Inequality", IZA Discussion Paper No. 1965.
Hausmann, Ricardo, and Andrés Velasco (2003) "Hard Money's Soft Underbelly: Understanding the Argentine Crisis." In *Brookings Trade Forum: 2002*, edited by Susan M. Collins and Dani Rodrik. Washington: Brookings.
Kashyap, Anil (1995) "Sticky Prices: New Evidence from Retail Catalogs", *Quarterly Journal of Economics* 110(1): 245-274.
Lach, Saul (2007) "Immigration and Prices", *Journal of Political Economy*, 115 (4).
Lach, Saul and Daniel Tsiddon (1992) "The Behavior of Prices and Inflation: An Empirical Analysis of Disaggregated Price Data", *Journal of Political Economy* 100(2): 349-389.
LatinFocus (2002) "LatinFocus Consensus Forecast: January 2002". Barcelona: LatinFocus; available at http://www.latin-focus.com (accessed March 28, 2003).
Lustig, Nora L. (2000) "Crises and the Poor: Socially Responsible Macroeconomics", *Economia* 1(1): 1-30.
McKenzie, David J. (2004a) "Asymptotic Theory for Heterogeneous Dynamic Pseudo-panels", *Journal of Econometrics,* 120(2): 235-262.
McKenzie, David J. (2004b) "Aggregate Shocks and Labor Market Responses: Evidence from Argentina's Financial Crisis", *Economic Development and Cultural Change* 52(4): 719-758.
McKenzie, David J. (2006) "The Consumer Response to the Mexican Peso Crisis", *Economic Development and Cultural Change* 55(1): 139-172
McKenzie, David J. and Ernesto Schargrodsky (2005) "Buying Less But Shopping More: Changes in Consumption Patterns During a Crisis", BREAD Working Paper No. 92, February.
Morduch, Jonathan (1995) "Income Smoothing and Consumption Smoothing", *Journal of Economic Perspectives* 9(3): 103-114.
Mussa, Michael (2002) *Argentina and the Fund: From Triumph to Tragedy*. Institute of International Economics: Washington, D.C.
Obstfeld, Maurice and Kenneth Rogoff (2000) "The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?", NBER Working Paper No. w7777.
Parente, Stephen, Richard Rogerson and Randall Wright (2000) "Homework in Development Economics: Household Production and the Wealth of Nations", *Journal of Political Economy*, 108(4): 680-87.
Paxson, Christina and Norbert Schady (2005) "Child Health and Economic Crisis in Peru", *World Bank Economic Review* 19(2): 203-223.
Rosenzweig, Mark R. and Kenneth Wolpin (1993) "Credit Market Constraints, Consumption Smoothing and the Accumulation of Durable Production Assets in Low Income Countries: Investments in Bullocks in India", *Journal of Political Economy* 101(2): 223-44.
Rotemberg, Julio and Garth Saloner (1986) "A Supergame-Theoretic Model of Price Wars During Booms", *American Economic Review* 76(3): 390-407.
Schwerdt, Guido (2005) "Why does Consumption Fall at Retirement? Evidence from Germany", *Economic Letters* 89(3): 300-305.
Skoufias, Emmanuel (2003) "Consumption Smoothing in Russia: Evidence from the RLMS", *Economics of Transition* 11(1): 67-91.

Sorensen, Alan (2000) “Equilibrium Price Dispersion in Retail Markets for Prescription Drugs”, *Journal of Political Economy* 108(4): 833-862.

Strauss, John, Kathleen Beegle, Yulia Herawati, Agus Dwiyanto, Daan Pattinasarany, Elan Satriawan, Bondan Sikoki, Sukamdi, Firman Witoelar (2004) *Indonesian Living Standards Before and After the Financial Crisis: Evidence from the Indonesia Family Life Survey*. RAND: Santa Monica.

Thomas, Duncan, Elizabeth Frankenberg, Kathleen Beegle and Graciela Teruel (1999) “Household Budgets, Household Composition and the Crisis in Indonesia: Evidence from Longitudinal Household Survey Data”, mimeo, UCLA Department of Economics.

Tommasi, Mariano (1999) “On High Inflation and the Allocation of Resources”, *Journal of Monetary Economics* 44: 401-421.

Townsend, Robert M. (1994) “Risk and Insurance in Village India”, *Econometrica* 62: 539-91.

Townsend, Robert M. (1995) “Consumption Insurance: An evaluation of Risk-bearing Systems in Low-income Countries”, *Journal of Economic Perspectives* 9(3): 83-102.

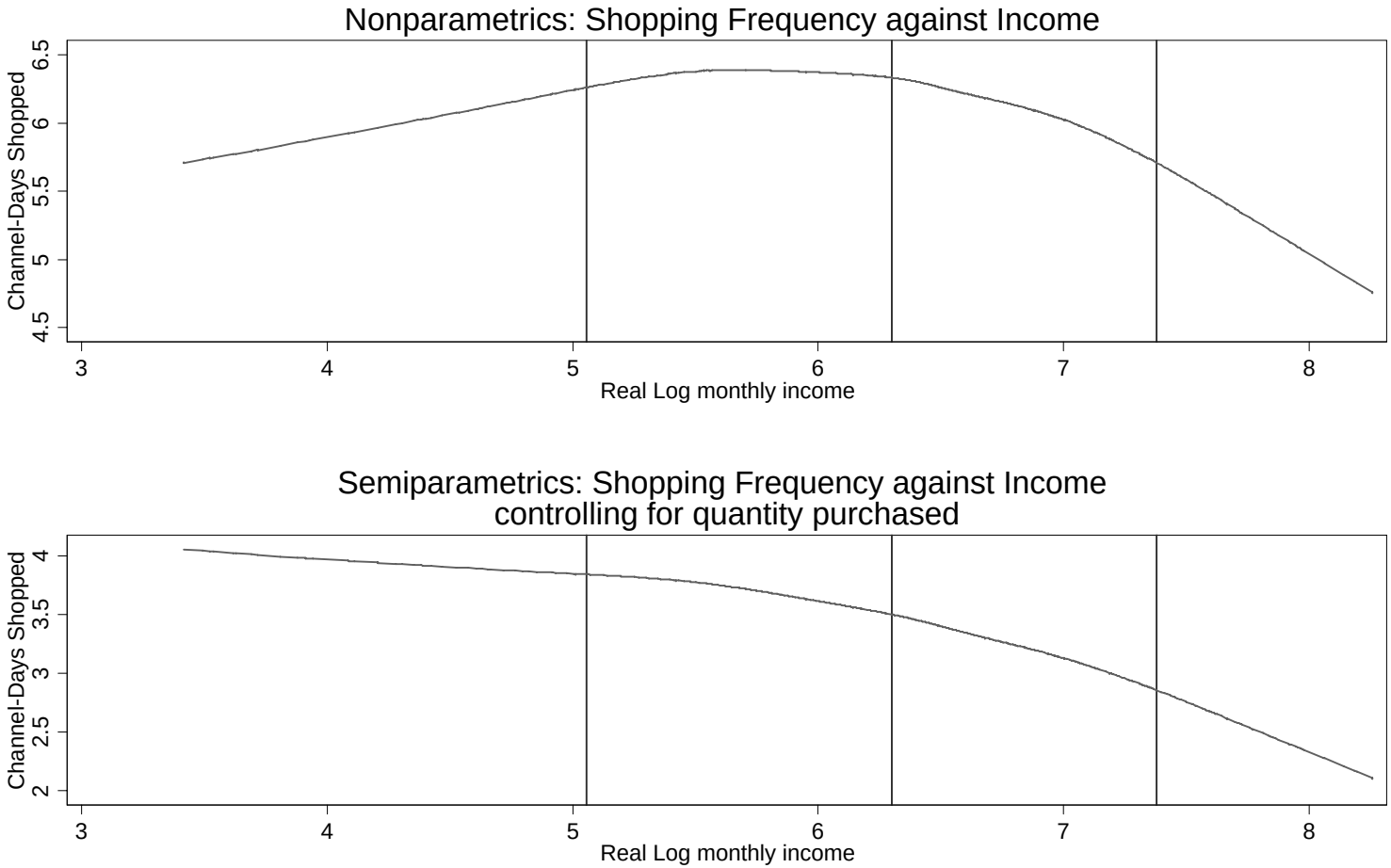
Udry, Christopher (1994) “Risk and Insurance in a Rural Credit Market: An Empirical Investigation”, *Review of Economic Studies* 61(3): 495-526.

Van Hoomissen, Theresa (1988) “Price Dispersion and Inflation: Evidence from Israel”, *Journal of Political Economy* 96(6): 1303-1314.

Warner, Elizabeth and Robert Barsky (1995) “The Timing and Magnitude of Retail Store Markdowns: Evidence from Weekends and Holidays”, *Quarterly Journal of Economics* 110(2): 321-352.

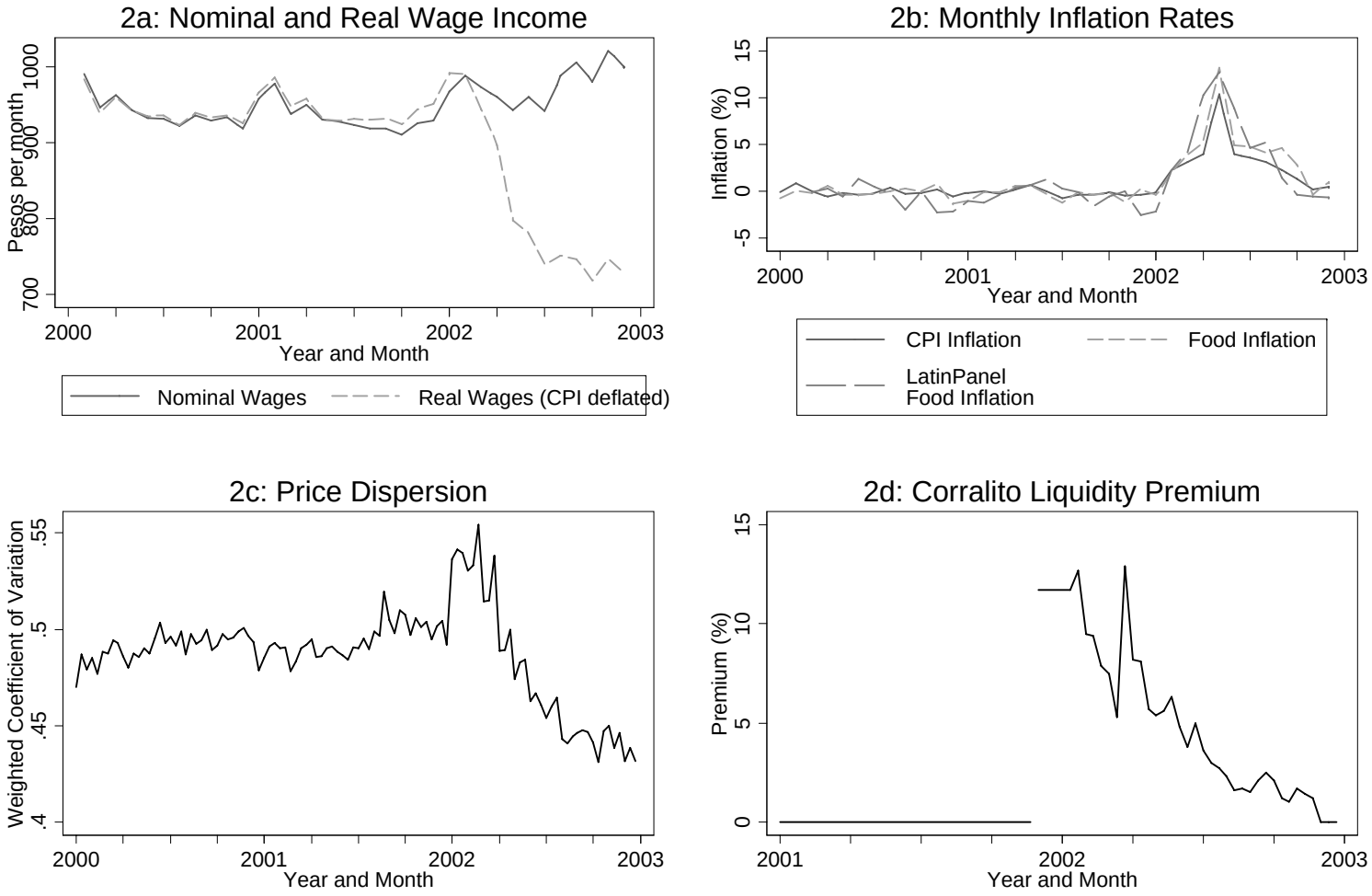
Yatchew, Adonis (1997) “An Elementary Estimator of the Partial Linear Model”, *Economics Letters* 57: 135-143.

Figure 1: Shopping Frequency and Income



Note: Cross-sectional analysis for 2001. Vertical lines indicate 10th, 50th, and 90th income percentiles

Figure 2: Macro variables



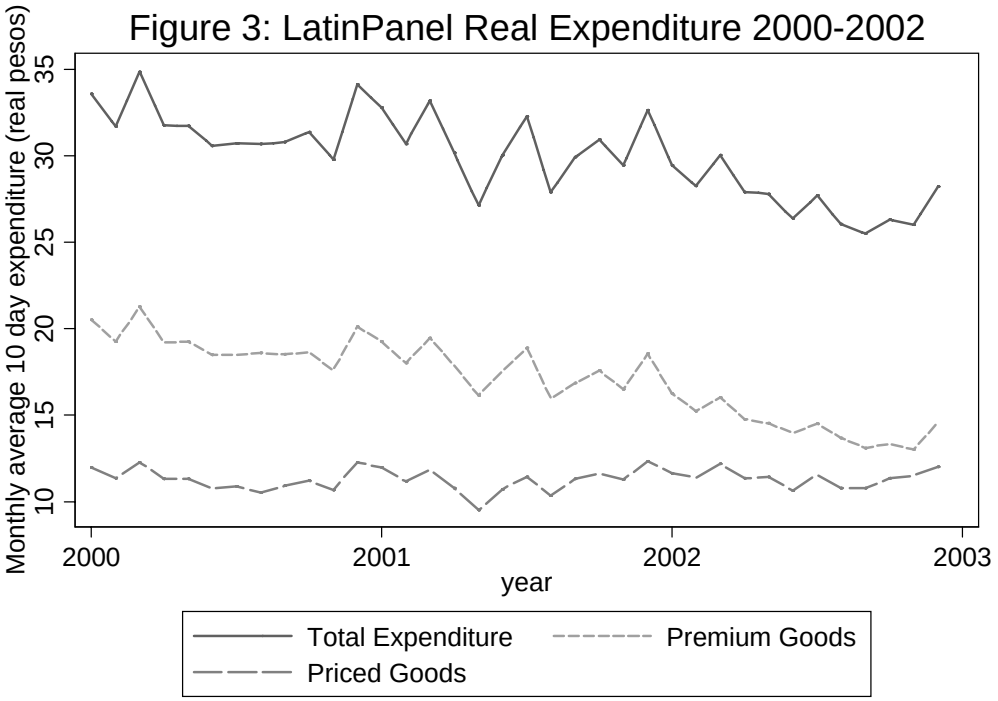


Figure 3: LatinPanel Real Expenditure 2000-2002
Monthly average 10 day expenditure (real pesos)
10
15
20
25
30
35
2000
2001
2002
2003
year
Total Expenditure
Premium Goods
Priced Goods

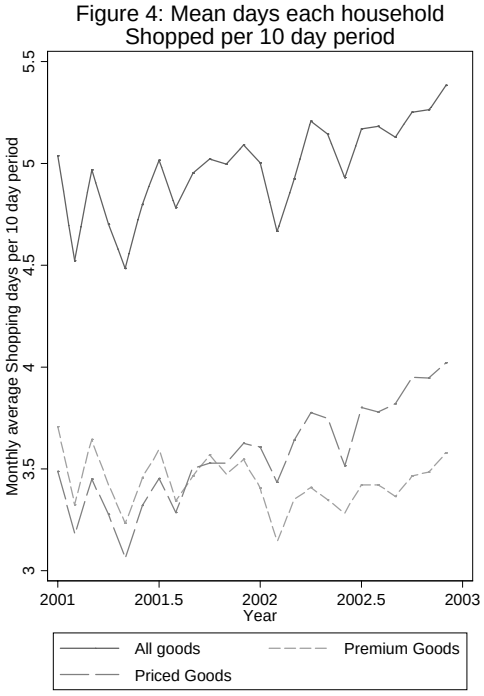


Figure 4: Mean days each household Shopped per 10 day period
Monthly average Shopping days per 10 day period
3
3.5
4
4.5
5
5.5
2001
2001.5
2002
2002.5
2003
Year
All goods
Premium Goods
Priced Goods

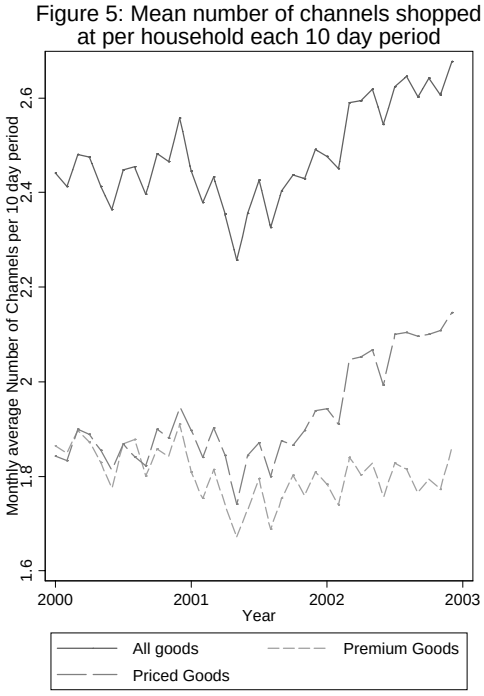


Figure 5: Mean number of channels shopped at per household each 10 day period
Monthly average Number of Channels per 10 day period
1.6
1.8
2
2.2
2.4
2.6
2000
2001
2002
2003
Year
All goods
Premium Goods
Priced Goods

TABLE 1: SHOPPING FREQUENCY AND INCOME IN THE CROSS-SECTION IN 2001

	All	Households by Income Quartile			
	Households	Lowest	2nd	3rd	Highest
Shopping Days per 10-day period	5.02	5.03	5.31	4.87	4.63
Channels Shopped at per 10-day period	2.39	2.26	2.38	2.42	2.49
Channel-Days Shopped at per 10-day period	6.28	6.04	6.56	6.14	5.97
Channel-Days Shopped per Real Peso Spent	0.24	0.29	0.26	0.21	0.16

TABLE 2: MACROECONOMIC SUMMARY

Indicator	**Source**	**1999**	**2000**	**2001**	**2002**	**2003**
Real GDP growth (%)	a	-3.4	-0.8	-4.4	-10.9	8.8
Real private consumption growth (%)	a	-2.0	-0.7	-5.7	-14.4	8.2
Urban unemployment rate (May) (%)	b	14.5	15.4	16.4	21.5	15.6
Households below the poverty line (May) (%)	c	19.1	21.1	23.5	37.7	39.4
Peso/USD Exchange rate (annual average)	d	1.00	1.00	1.00	3.06	2.90
Consumer Price Index Inflation (%)	e	-1.8	-0.7	-1.5	41.0	3.7
Food and Beverages Price Inflation (%)	e	-5.1	-1.5	-2.1	57.9	4.7
Nominal monthly wage growth (%)	f	-0.3	-1.0	0.9	8.9	11.0

Sources:
a: INDEC, Quarterly GDP at constant prices series, www.indec.mecon.ar
b: INDEC, Total urban employment and unemployment from 1974 to present, www.indec.mecon.ar
c: INDEC, Living Conditions, Poverty Lines and Basic Living Basket, www.indec.mecon.ar
d: IMF, International Financial Statistics Online
e: INDEC, Annual inflation for Greater Buenos Aires (GBA), December to December, www.indec.mecon.ar
f. Ministerio de Economia, Nominal average wage for employees contributing to the Social Security System, www.mecon.gov.ar
Websites accessed on Feb 16, 2004

TABLE 3: CHANGES IN SHOPPING FREQUENCY 2001-2002

		All	Households by Income Quartile			
		Households	Lowest	2nd	3rd	Highest
Shopping Days per 10-day period	2001	5.02	5.03	5.31	4.87	4.63
	2002	5.21**	5.36**	5.52**	5.12**	5.03**
Channels Shopped at per 10-day period	2001	2.39	2.26	2.38	2.42	2.49
	2002	2.58**	2.49**	2.58**	2.60**	2.72**
Channel-Days Shopped at per 10-day period	2001	6.28	6.04	6.56	6.14	5.97
	2002	6.71**	6.68**	7.07**	6.64**	6.66**
Channel-Days Shopped for premium goods	2001	3.95	3.56	4.07	4.00	4.10
	2002	3.83**	3.45	3.90**	3.88	4.16
Channel-Days Shopped for priced goods	2001	4.06	4.08	4.28	3.86	3.66
	2002	4.54**	4.73**	4.84**	4.41**	4.25**
Channel-Days Shopped per Real Peso Spent	2001	0.24	0.29	0.26	0.21	0.16
	2002	0.28**	0.35**	0.31**	0.26**	0.20**

Note: ** indicates that the 2002 mean is significantly different from the 2001 mean at the 1% level.

TABLE 4: DETERMINANTS OF SHOPPING FREQUENCY 2001-02
Dependent Variable: Shopping Frequency (Channel-days shopped at per 10 day period)

	(1)	(2)	(3)	(4)
Fitted EPH log real labor income	0.026	-0.110	-0.730	-0.586
	(0.29)	(1.56)	(12.53)**	(9.18)**
Household Size	0.481	0.231		
	(8.87)**	(4.94)**		
Ownership of a refrigerator dummy	0.090	-0.491		
	(0.23)	(1.52)		
Years of Schooling of Household Head	-0.068	-0.043		
	(2.10)*	(1.61)		
Age of Housewife	0.008	-0.004		
	(1.09)	(0.64)		
Greater Buenos Aires dummy	-0.071	-0.228		
	(0.56)	(1.87)		
Youngest child is aged under 6 dummy	-0.038	-0.210		
	(0.14)	(0.92)		
Youngest child is aged 6 to 12 dummy	0.155	-0.080		
	(0.61)	(0.41)		
Youngest child is aged 13 to 18 dummy	0.285	-0.033		
	(1.27)	(0.19)		
Youngest child is aged 19 to 25 dummy	0.116	-0.189		
	(0.50)	(1.05)		
Corralito premium				0.004
				(1.14)
Food CPI inflation				0.043
				(9.52)**
Aggregate price dispersion across channels				-1.099
				(2.55)*
Constant	4.586	4.731	8.370	7.454
	(6.97)**	(9.13)**	(24.66)**	(19.83)**
Product quantity effects	no	yes	yes	yes
Pseudo-household fixed effects	no	no	yes	yes
Observations	21060	21060	21060	21060
R-squared	0.27	0.48	0.71	0.72

Notes:
Robust t statistics in parentheses with standard errors clustered at the pseudo-household level.
* Significant at 5%; ** significant at 1%

TABLE 5: ROBUSTNESS OF SHOPPING FREQUENCY REGRESSIONS

Dependent Variables: Channel-days shopped at per 10 day period (Columns 1-6),
Channel-days per real peso per 10 day period (Column 7)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fitted EPH log real labor income	-0.586			-0.237	-0.238	-0.558	-0.030
	(9.18)**			(2.83)**	(2.84)**	(8.67)**	(9.46)**
Six month average of EPH log real labor income		-0.797					
		(10.79)**					
EPH log real labor income (April and Sept only)			-0.560				
			(6.54)**				
Corralito premium	0.004	-0.013	0.284			0.002	-0.001
	(1.14)	(4.10)**	(12.16)**			(0.56)	(6.48)**
Food CPI inflation	0.043	0.046	-0.113			0.043	0.004
	(9.52)**	(10.60)**	(8.15)**			(9.30)**	(20.43)**
Aggregate price dispersion across channels	-1.099	-3.260	-1.415			-1.328	0.005
	(2.55)*	(7.31)**	(0.58)			(3.03)**	(0.22)
Corralito premium*credit card ownership					0.009		
					(0.84)		
Pseudo-level inflation					0.035		
					(1.16)		
Pseudo-level price dispersion					0.477		
					(0.32)		
Total household labor hours worked						-0.005	
						(1.54)	
Constant	7.454	8.868	7.568	6.132	4.379	7.554	0.392
	(19.83)**	(19.88)**	(13.72)**	(12.28)**	(8.56)**	(19.87)**	(20.92)**
Pseudo-household fixed effects	yes	yes	yes	yes	yes	yes	yes
Time effects	no	no	no	yes	yes	no	no
Product quantity effects	yes	yes	yes	yes	yes	yes	no
Observations	21060	21060	3808	21060	21060	21060	21042
R-squared	0.72	0.72	0.77	0.77	0.77	0.72	0.45

Notes:
Robust t statistics in parentheses with standard errors clustered at the pseudo-household level.
* Significant at 5%; ** significant at 1%.

TABLE 6: ESTIMATING PRICE GAINS FROM SHOPPING MORE OFTEN FOR THE SAME QUANTITY
Dependent Variable: log price

	(1)	(2)	(3)	(4)	(5)	(6)
Instrumented channel-days shopped per 10-day period	-0.039	-0.169	-0.184	-0.055	-0.188	-0.205
	(2.77)**	(11.99)**	(13.09)**	(3.57)**	(12.20)**	(13.40)**
Quality*Time*Product effects	Yes	Yes	Yes	No	No	No
Product*Time effects	No	No	No	Yes	Yes	Yes
Controls for location, household size, age of mother and child	No	Yes	No	No	Yes	No
Pseudo-household fixed effects	No	No	Yes	No	No	Yes
Number of Observations	128,470	128,470	128,470	128,470	128,470	128,470
Number of Clusters	1368	1368	1368	1368	1368	1368

Notes:
Robust t-statistics in parentheses with standard errors clustered at the pseudo-household*time period level.
Channel-days are instrumented using pseudo-level real labor income from the EPH, holding quantities fixed (see text).
Pseudo-household fixed effects include the complete interaction of location, household size, age of mother, and age of youngest child variables.
** Significant at 1%.

TABLE 7: PREVALENCE OF USE OF DIFFERENT ADJUSTMENT MECHANISMS

Adjustment Mechanism	All	Percentage of Households using: Income Quintile				
		Lowest	2nd	3rd	4th	Highest
Shopping Frequency from LatinPanel database						
Increase in days	61.6	60.3	56.3	61.3	61.6	66.2
Increase in channels	75.8	72.6	71.8	80.0	79.5	74.3
Increase in channel-days	66.0	61.6	63.4	65.3	65.8	71.6
World Bank Survey on Crisis Coping Strategies:						
Consumption Strategies						
Reduced quantity of food	74.9	90.4	83.1	73.2	69.0	59.1
Substituted for cheaper food	92.3	97.6	95.4	92.5	91.5	84.8
Reduced consumption of non-food items	81.0	90.5	87.7	81.5	76.8	68.3
Substituted non-food items for cheaper items	83.2	89.5	89.3	80.4	80.2	76.6
Increased home production	61.1	64.4	73.0	62.6	52.5	43.2
Labor Market Strategies						
Adding new workers to labor market	12.9	28.0	16.8	12.2	6.2	1.4
Working more hours	13.7	11.4	15.6	16.3	11.5	13.4
Financial Strategies						
Selling assets	3.3	5.9	3.7	3.3	2.7	1.1
Using savings	4.8	2.8	3.5	4.0	8.0	5.6
Borrowing from banks	1.8	0.9	3.6	1.8	0.6	2.0
Borrowing from friends and family	11.3	21.2	15.7	10.6	5.8	3.0
Purchase with delayed payment	8.0	14.6	13.1	9.5	2.3	0.7

Sources:
Own calculations from LatinPanel data at pseudo-household level for Shopping Frequency.
Fiszbein et al (2003) from World Bank Survey at household level for Crisis Coping Strategies.