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Buying Less but Shopping More: The Use of Nonmarket Labor during a Crisis

Camine, señora, camine! (Walk, lady, walk!)

—Lita de Lazzari,
President of the Argentine Association of Housewives

The current global financial crisis has caused output to drop in many developing countries, with the World Bank estimating that 55 million more people will live on less than $1.25 a day than expected precrisis.[1] The extent to which the crisis will have long-term impacts depends on how poor people respond to the income declines. In this paper we use data from a previous economic crisis in Argentina to show the importance of a little-studied mechanism that households can use to partly mitigate aggregate shocks, through changes in shopping behavior—in particular, in the amount of time devoted to shopping search.

Despite missing markets and widespread market imperfections, development economists have found that households are able to use a variety of

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1. World Bank (2009).

coping measures to smooth a large amount of idiosyncratic risks.[2] These mechanisms include, among others, income smoothing, the use of durable assets as buffer stocks, and informal credit arrangements.[3] However, economic crises affecting most households simultaneously 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.[4] 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.[5] A general economic slowdown and rising unemployment can also stymie households' efforts to increase their labor supply. As a consequence, household consumption expenditure often falls by as much as income.[6]

Although households may not be able to prevent a decrease in total expenditure, they do adjust the basket of goods purchased in order to mitigate reductions in food expenditures. The expenditure share on food increases, and consumers further reallocate across food products, devoting a larger share of food expenditure to basic staples.[7] Nevertheless, despite this shift in consumption from clothing and other semidurables toward food, expenditure on food may fall in real terms during a crisis.

The contribution of this paper is to show that in addition to reallocating consumption shares to protect the level of food expenditure, households can adjust to shocks by taking actions that affect how much food a given level of expenditure can buy. In particular, households may change the frequency of their purchases, the stores at which these purchases are made, and the quality of items purchased in order to make a given amount of expenditure cover a larger quantity of food. This insight dates back to Becker's theory of the allocation of time, in which he notes that "the poor . . . the unemployed . . . would be more willing to spend their time in a queue or otherwise ferreting out rationed goods than would high-earning males."[8] This pattern is also seen upon retirement in rich countries; studies have shown an increase in time spent shop-

2. Townsend (1994, 1995).
3. See, respectively, Morduch (1995), Rosenzweig and Wolpin (1993), and Udry (1994).
4. Lustig (2000).
5. Dercon (2002).
6. See, for example, Thomas and others (1999) and Strauss and others (2004) on Indonesia, Skoufias (2003) on Russia, Paxson, and Schady (2005) on Peru, and McKenzie (2006) on Mexico.
7. Frankenberg, Smith, and Thomas (2003); McKenzie (2006).
8. Becker (1965, p. 516).

ping and in home food preparation when people in the United States and Germany retire.[9]

While the theory is straightforward, we are unaware of any existing empirical evidence in developing countries that examines shopping time in the cross-section, nor evidence in any country that examines the use of this mechanism for crisis mitigation. One reason is that standard expenditure surveys (such as the Living Standards Measurement Study or national household expenditure surveys) typically collect data on items purchased and prices paid but not on the frequency of purchases, quality of goods, or locations where these purchases are made.

This paper allows us for the first time to explore how households change their shopping behavior to mitigate a crisis. It does so by exploiting high-frequency household expenditure data registering the purchase activity of a panel of Argentine households in order 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 7 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 is 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 drop in income experienced during the crisis, consumers used this adjustment mechanism to save, on average, almost 2 percent of the cost of their food, beauty, and cleaning product expenditures, thereby mitigating about 17 percent of the decline in real expenditure in these products.

In addition to its importance as a crisis mitigation mechanism, the increase in shopping frequency could partly explain the puzzle of why inflation is

9. See Aguiar and Hurst (2005) and Schwerdt (2005), respectively.

surprisingly low after large devaluations.[10] Burstein, Eichenbaum, and Rebelo argue that the nontradable component of distribution costs and the substitution of low-quality local goods for high-quality imports explain this low pass-through.[11] Our results confirm the presence of quality substitution and also add that the increase in shopping frequency may reduce the ability of sellers to pass cost increases through prices.

In this paper we first provide a theoretical benchmark for our discussion of household time allocation. This is followed by a section describing the household expenditure data obtained from LatinPanel, a market research firm, followed by a discussion on the cross-sectional relationship between shopping frequency and income. The fourth section provides a general overview of the macroeconomic conditions before and during the Argentine crisis, followed by a description of consumer responses to the crisis in terms of changes in expenditure, quality, and shopping behavior. Next we examine several explanations for the changes in shopping activity and then calculate the gains from increased shopping frequency. The next-to-last section compares the prevalence of increased shopping relative to other crisis mitigation strategies, which is followed by a summation in the concluding section.

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.[12] Substituting for O and C, the individual's problem is:

10. Obstfeld and Rogoff (2000).
11. Burstein, Eichenbaum, and Rebelo (2005).
12. 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.

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

The first-order conditions are

$$U_c wLf'\left(S\right) = U_o \text{ and} \tag{2}$$

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

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:

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

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

—The marginal utility of consumption U_c. The gain mentioned with the preceding factor is higher in quantity terms when individuals are consuming more but may be worth less in utility terms due to diminishing marginal utility.

Differentiating equations 2 and 3 with respect to wages, w, then allows one to see how shopping time is expected to change when wages change:

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

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 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 expenditure level and marginal utility of consumption weigh against one another. Holding shopping constant, a decrease in wages lowers consumption, which reduces the benefit from shopping (smaller basket to shop for), but it 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.[13]

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

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 3,000 Argentine households: 1,500 from the Buenos Aires metropolitan area, and the other half from the rest of the country (excluding Patagonia). In each area, the families are selected through stratified randomization (accord-

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

14. See "Prevalence of Increased Shopping" in this paper and McKenzie (2004a) for evidence supporting the inability of households to increase labor hours during the Argentine crisis.

ing to the 1991 Argentine census socioeconomic characteristics of the whole population).[15]

The families that participate in the sample report regularly all their purchase decisions for thirty-seven products by filling a "purchase diary." LatinPanel then collects the diaries and reports this expenditure thrice monthly for each month for days 1–10, 11–20, and 21 through the end of the month. The articles include twenty food products (cooking oil, cocoa powder, coffee, yerba mate and tea, dressings and sauces, biscuits, breakfast cereals, pasta and noodles, soups, canned food, milks, carbonated drinks, bottled water, beers, fruit juice, frozen food, ice creams, yogurt, 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 care 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, yogurt, ice cream, and butter. Meals out are also excluded. In terms of total LatinPanel consumption, the mean share of food expenditure is 76 percent, with cleaning products averaging 13 percent and personal care 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 precrisis expenditure survey, performed in 1996–97 by the Instituto Nacional de Estadística y Censos (INDEC), allows us to calculate the share of total food expenditure and total expenditure that the items in our LatinPanel data cover.[16] Overall, LatinPanel food, personal care, 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

15. The households in the sample are randomly replaced when they interrupt participation, do not provide the information correctly and on time, or reach four years of participation in the sample. The sample rotation rates have remained very stable during the period of analysis: 27.6 percent of the sample was rotated during 2000, 25.8 percent during 2001, and 28.3 percent during 2002, representing an average annual attrition rate of approximately 3 percent. Households receive small durable-good prizes from LatinPanel as compensation for their participation in the sample through a sort of "mileage" loyalty program that limits attrition. For more description of the panel rotation and attrition, see McKenzie and Schargrodsky (2005).

16. See *Encuesta Nacional de Gastos de los Hogares* (INDEC 1998).

by LatinPanel constituted between 68 and 70 percent of all supermarket sales (which also included fresh fruit, vegetables, meat, and bread) during the 2000–02 period.[17] As a further test of the quality and representativeness of our data, we also show later that monthly food inflation for the LatinPanel basket of goods closely follows the overall consumer price index (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, they provide information on three aspects of consumer purchase behavior that are not covered in standard household expenditure surveys. First, 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 5 percent of the value of purchases; thus we concentrate on comparing premium, high-quality to priced, low-quality products.[18] Second, 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.[19] Third, beginning in January 2001, LatinPanel has collected information on the particular day within each ten-day period when each purchase was made. This enables calculation of the number of days within each ten-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 rather aggregated at the pseudo-household (also referred to as "pseudo") level. Households are classified according to five demographic categories (location, socioeconomic level, household size, housewife's age, and age of the youngest child).[20] Each

17. See INDEC's Encuesta de Supermercados for 2000–02 (www.indec.mecon.ar).

18. The classification between premium and priced brands is done at the manufacturer level, that is, all the versions of the product made by the same manufacturer are classified under the same quality category.

19. We exclude items received through welfare transfers in our calculations, as these are not purchased.

20. Location: Buenos Aires metropolitan area, the interior region; socioeconomic level: high income, middle income, upper low income, low income; 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+ years; and age of the youngest

pseudo includes all the households that share the same demographic characteristics. There are in principle 640 pseudos (2 regions × 4 socioeconomic levels × 4 household sizes × 4 housewife's age categories × 5 youngest child's age categories). However, several pseudohouseholds are empty because no families satisfy all the characteristics. The final sample is then an unbalanced panel that includes between 360 and 400 pseudohouseholds 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 weigh 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.[21]

The LatinPanel database does not contain information on income. We therefore construct mean labor income for each pseudohousehold by using data from the 2000–02 waves of the *Encuesta Permanente de Hogares* (EPH), an urban household labor force survey performed by INDEC in May and October of each year. Approximately 21,000 households and 80,000 individuals are surveyed each period. Income data are collected for the month before the survey, giving measures of monthly income for April and September.[22] From the EPH, we use data on location, socioeconomic level, household size, housewife's age, and youngest child's age to construct the same pseudohouseholds as used in the LatinPanel data and obtain a measure of mean labor income for each pseudohousehold. The mean number of households in the EPH within a pseudo is 43.[23] These data are then used to examine the effect

child: less than 6 years, 6–12 years, 13–18 years, 19–25 years, without children or 25+ years. For socioeconomic levels, LatinPanel follows the standard methodology of the Argentine Marketing Association (1998) and classifies households in four categories (ABC1, high income; C2C3, middle income; D1, upper low income; D2E, low income) based on maximum educational attainment, profession and occupational status of the household head, and possession of cars, home appliances, and use of services (personal computers, credit cards, washing machine, dishwashing machine, telephone, color TV, video, and freezer).

21. For the households included in the LatinPanel sample throughout the period of analysis, 5.8 percent of the households changed socioeconomic level between 2000 and 2001 and 7.2 percent between 2001 and 2002. These small rates of change are explained by the broadness of the categories and the fact that the categories are based on several characteristics not immediately affected by the crisis.

22. More details of this survey are provided in McKenzie (2004a).

23. Note that we have a large number of pseudos and a reasonable number of households within each pseudo. Pseudohousehold panel estimation is consistent under these conditions and general assumptions. See McKenzie (2004b) for details.

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 pseudohousehold mean incomes and thus construct a labor income variable that is available for every month and pseudohousehold.[24]

Shopping Frequency

One form of nonmarket labor is spending more time shopping 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 where purchases are made. 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 ten-day period.

We also 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 ten-day period in 2001.

This composite measure expands on the number of days shopped by capturing within-day shopping. One limitation is that LatinPanel only registers the days and channels when 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 at which store within a channel a consumer shops. 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 be

24. Source: data series "Remuneración bruta promedio mensual y trimestral con SAC devengado de los puestos de trabajo declarados al SIJP por período devengado" from the Dirección Nacional de Programación Macroeconómica, Secretaría de Política Económica, sobre la base de información del Sistema Integrado de Jubilaciones y Pensiones (no online link available).

TABLE 1. Shopping Frequency and Income in the Cross-Section, 2001

		Households by income quartile			
Measures of shopping frequency	*All households*	*Lowest*	*Second*	*Third*	*Highest*
Shopping days per 10-day period	5.02	5.03	5.31	4.87	4.63
Channels shopped per 10-day period	2.39	2.26	2.38	2.42	2.49
Channel-days shopped 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

measured as two channel-days. While these caveats should be borne in mind, the measure captures rich detail on consumer behavior that is unavailable in standard expenditure surveys.

Table 1 also reports mean shopping frequency by household real labor income quartile in 2001. Following Becker, 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 nonmarket labor, shopping more in order to search for better prices and quality.[25] 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 follow the same pattern as shopping days.

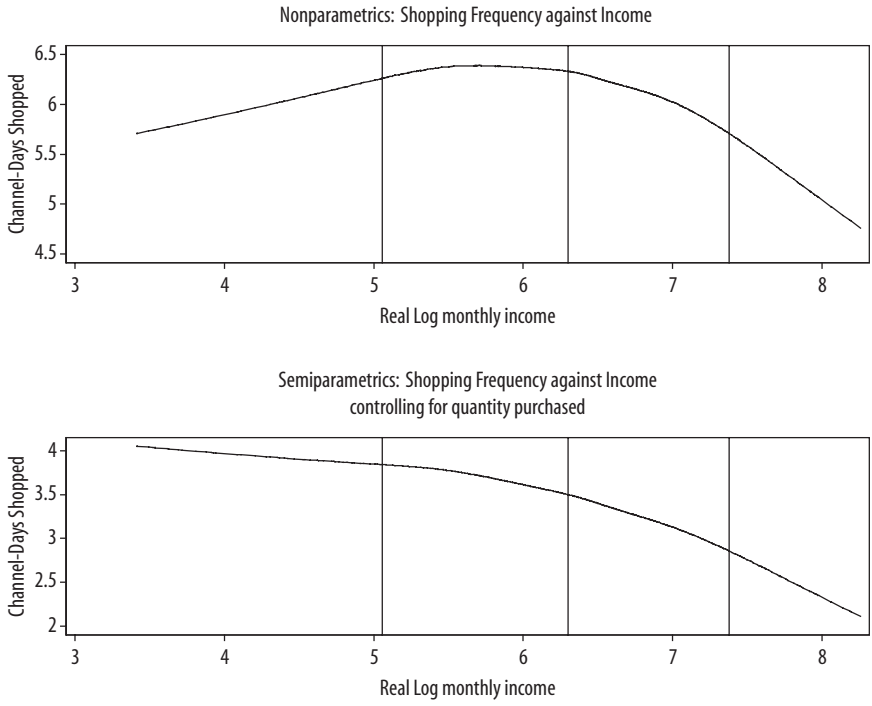
Nonparametric estimation via the local linear regression of Fan and Gijbels confirms this nonlinear relationship between shopping frequency and income in 2001.[26] The top plot of figure 1 graphs the estimated cross-sectional relationship, indicating with vertical lines the 10th, median, and 90th percentiles of the income distribution. The number of channel-days spent shopping is seen to first increase and then decrease with growing income.

The reasons 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

25. Becker (1965).

26. Fan and Gijbels (1996). The Epanechnikov kernel was used with a bandwidth of approximately one-half of the observations.

FIGURE 1. Shopping Frequency and Income[a]



a. Cross-sectional analysis for 2001. Vertical lines indicate 10th, 50th, and 90th percentiles of income distribution.

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.[27] 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 it on the quantity of goods purchased rather than on the amount spent. Semiparametric estimation allows us to do this. We use Yatchew's higher-order

27. This variable is constructed by dividing channel-days by real expenditure, where the overall CPI is used to deflate nominal expenditures.

differencing method for two-step estimation of the following partial linear model:

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

where $q_{j,h}$ is the quantity of product j purchased by pseudo h.[28] 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 ten-day period) is strictly decreasing in log labor income and close to linear. As predicted by theory, a poorer household spends more days shopping or goes to more channels, or both, than a richer household in order to purchase the same quantity of products.

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, cross-sectional estimation will always face the concern that there are unobserved characteristics of households that 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.[29] Or, affecting results in the opposite direction, middle- and upper-class families might shop more, for example, because they live closer to shops than low-income households. 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.

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 that had pegged the peso at unity to

28. See Yatchew (1997). We use a differencing order of five.
29. Blaylock (1989).

TABLE 2. Macroeconomic Summary, 1999–2003
Percent, except as indicated

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-U.S. dollar exchange rate (annual average)	d	1.00	1.00	1.00	3.06	2.90
CPI 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

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, various years (www.indec.mecon.ar).
d. International Monetary Fund, International Financial Statistics, online, various years (www.imfstatistics.org/imf).
e. INDEC, Annual inflation for Greater Buenos Aires (GBA), December to December, various years (www.indec.mecon.ar).
f. Ministerio de Economía y Finanzas Públicas, Nominal average wage for employees contributing to the social security system, various years (www.mecon.gov.ar).

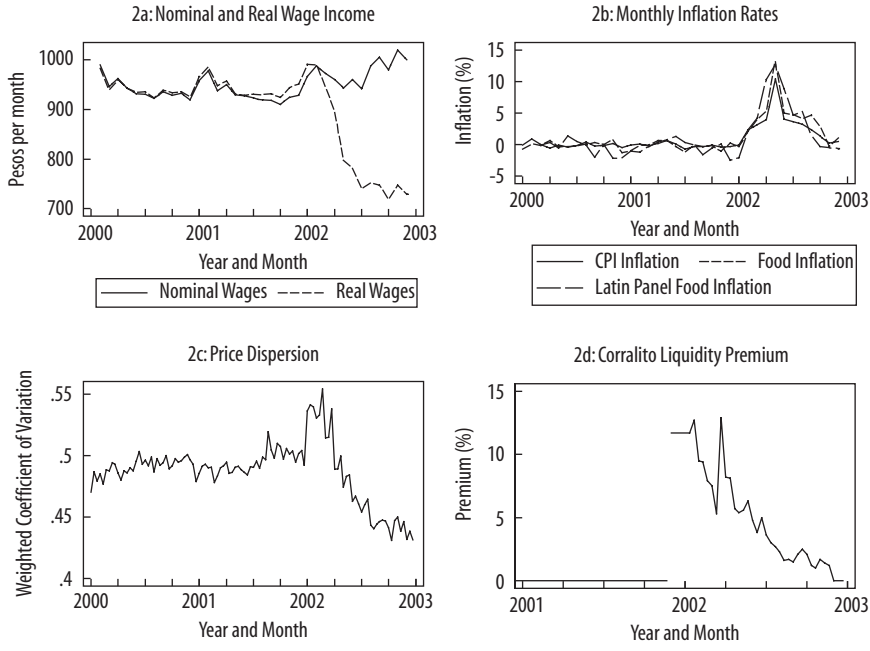
the U.S. dollar.[30] Argentina's real GDP fell 10.9 percent in 2002, the largest fall since records began in 1900. This aggregate decline followed on top of three years of recession. Table 2 details the evolution of key macroeconomic variables from 1999 to 2003. While the earlier years of recession had 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 monthly wages were sticky, growing only 8.9 percent by the end of the year, despite the price inflation.[31] 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 rising inflation on sticky nominal wages, unemployment increased by five points, from the already high

30. See Economist Intelligence Unit (2002) for an excellent account of the events 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); Galiani, Heymann, and Tommasi (2003); and Hausmann and Velasco (2003), among others.

31. Wages for workers in the formal economy contributing to the social security system.

FIGURE 2. Macrovariables



Sources: Wages are from *Ministerio de Economia;* inflation rates are from INDEC and calculated from LatinPanel; data price dispersion is calculated from LatinPanel data; corralito data are from Allaria and Ledesma.

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 finds that 78 percent of households experienced a decrease in real income, and 63 percent of households suffered a decline in real income of 20 percent or more between September 2001 and September 2002.[32] The percentage of households below the poverty line grew from 23.5 in 2001 to 37.7 in 2002.

The large shock to income was, obviously, not the only consequence of the crisis, and so in our analysis we control for other impacts of the crisis that

32. McKenzie (2004a).

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 as measured by a fixed-basket price index constructed from the LatinPanel data (figure 2b). 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 1 percent a month or less from October through 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.[33] We follow Van Hoomissen in measuring price dispersion as the interstore price variability from month to month.[34] Price dispersion rises during the first part of 2002 following the devaluation, and falls later in the year (figure 2c).

The third variable measures liquidity constraints, which are common during crises and can affect shopping frequency. We measure the degree of liquidity by exploiting a special feature of the Argentine crisis called the *corralito* (the "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 (one dollar = one peso at that time) a week. Deposits could be freely used inside the banking system but could not leave it.[35] As these two monetary systems (inside and outside the *corralito*) coexisted, a market developed for exchanging money from one to the other at a discount. Figure 2d shows the evolution of the trimonthly average discount for these

33. Van Hoomissen (1988); Lach and Tsiddon (1992).

34. See Van Hoomissen (1988). 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.

35. 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.

transactions from the main domestic Buenos Aires stock exchange house.[36] The daily average discount reached as high as 21 percent 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 withdrawal limits were gradually increased, allowing the *corralito* to become progressively less binding until all restrictions were finally lifted on December 2, 2002.

Buying Less and Shopping More during the Crisis

This section studies how consumers adjusted their shopping behavior during this crisis period, beginning with the amount purchased and then examining the amount of shopping required to purchase these amounts.

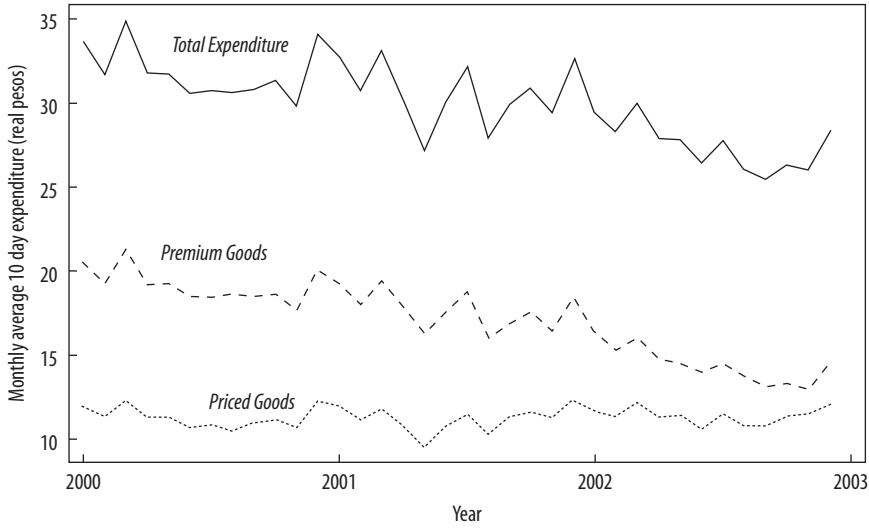
Buying Less

Figure 3 shows the evolution of real expenditure for LatinPanel households. To obtain real expenditure, we deflate 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, decline in real expenditure is observed if the CPI 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 decrease in household real income between September 2001 and September 2002, the estimated drop in real expenditure represents substantial smoothing of the income shock. Nevertheless, household expenditure still fell by a substantial amount, especially as this followed smaller declines during the recession that 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.

36. 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 2d assumes the premium during this period to be that prevailing on the first day of operations (11.7 percent). Our results are robust to excluding the observations over this period.

FIGURE 3. LatinPanel Real Expenditure, 2000–02



Source: Authors' calculation from LatinPanel data.

Burstein, Eichenbaum, and Rebelo also report this quality substitution during the Argentine crisis.[37] 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 surveyed 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.[38] Households reduced the quantity of all cleaning and personal care purchases, with eleven of the seventeen products showing declines of over 10 percent.

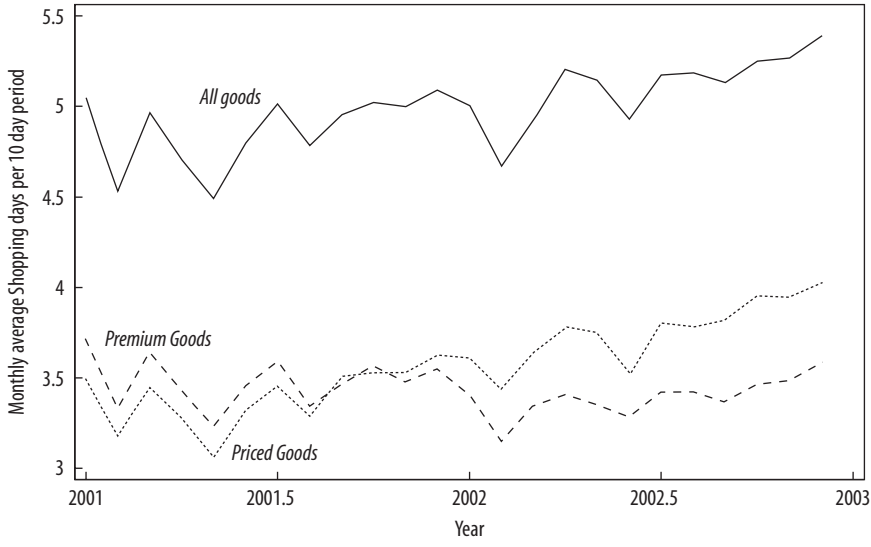
Shopping More

Although households bought less in 2002, shopping frequency increased. Figure 4 plots the monthly means of the number of days each household spent

37. Burstein, Eichenbaum, and Rebelo (2005).

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

FIGURE 4. Mean Days Each Household Shopped per Ten-Day Period



Source: Authors' calculation from LatinPanel data.

shopping over each ten-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 per household within each ten-day period. Total channels shopped remained fairly stable between 2000 and 2001, then increased dramatically starting the last few months of 2001. The mean number of channels shopped within a ten-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 60 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, for which people reduced expenditure, show a small increase in the number of channels used for shopping.

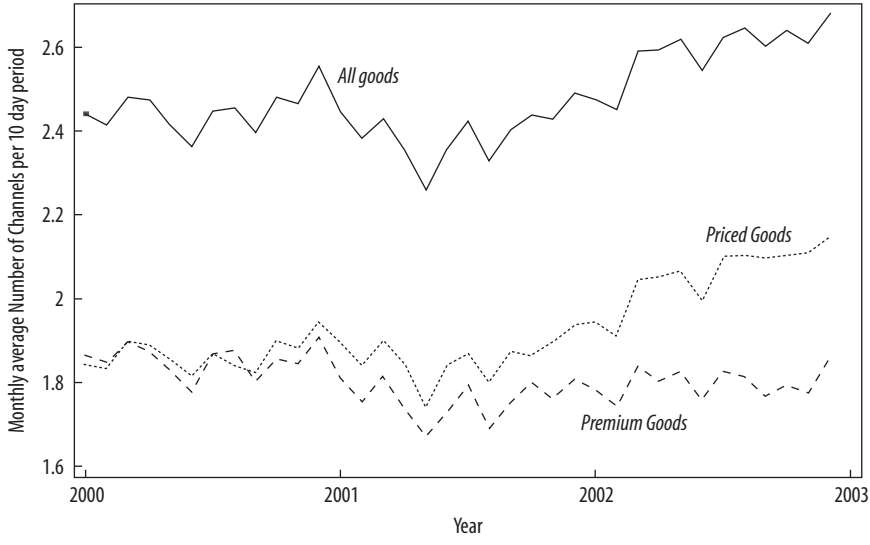
The increase in both days and channels translates into an increase in channel-days. Mean channel-days increased from 6.28 per ten-day period in

TABLE 3. Changes in Shopping Frequency, 2001–02

Measures of shopping frequency	*Year*	*All households*	*Households by income quartile*			
			Lowest	*Second*	*Third*	*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 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 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**

Source: Authors' calculation from LatinPanel data.
**2002 mean is significantly different from the 2001 mean at the 1 percent level.

FIGURE 5. Mean Number of Channels Shopped per Household per Ten-Day Period



Source: Authors' calculation from LatinPanel data.

2001 to 6.71 per ten-day period in 2002, a statistically significant increase of 7 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 17 percent increase for this variable.

This growth in shopping days and the number of channels shopped cannot be explained by an increase in the number of suppliers. On the contrary, ACNielsen reports a reduction in the total number of stores in Argentina of 9.5 percent between 2001 and 2002.[39] It also cannot be explained by an increase in the variety of products. The market research firm CCR reports a reduction of 14.3 percent in the number of stock-keeping units offered in supermarkets between 2001 and 2002.[40] 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 among channels in the value of expenditure.

The increase in shopping activity, including the expansion in the number of channels used, is seen to arise from a significant increase in the use of down-trade channels such as self-service stores (*autoservicios*), grocery stores (*almacenes*), candy stores (*kioscos*), and discount stores. These channels are generally used more often by lower socioeconomic classes. There is also an increase in the use of barter clubs (*trueque*) and in the residual category of other channels, which includes community markets. In contrast, the up-trade channels of hypermarkets and supermarkets actually see some significant declines in usage. These channels were most often used by the upper socioeconomic classes before the crisis. Interestingly, the migration from up-trade to down-trade channels occurs throughout every socioeconomic level, not just among the poor.

Effect of Income on Shopping Frequency

We now investigate empirically what the impact of changes in income is on shopping frequency, relying on our rich data and the income shock provided by the crisis to identify this impact.

39. ACNielsen (2003).

40. CCR International Research (2003). 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.

Basic Specification

The cross-sectional analysis shows 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 to divide their allocation of nonleisure time between shopping and labor. The macroeconomic crisis provides an exogenous source of income change that can be used to identify the effect of income on shopping frequency. Moreover, the use of pseudohousehold fixed effects in a panel dataset controls for preferences, location, demographics, and other time-invariant, household-specific determinants of shopping frequency that potentially bias the cross-sectional estimates. McKenzie 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.[41]

For pseudohousehold h in time period t, we specify:

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

where $shopping\ freq_{h,t}$ is the number of channel-days shopped (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, $q_{j,h,t}$ is the quantity of product j purchased by pseudo h at time t, and μ_h are pseudohousehold fixed effects. Standard errors are clustered to allow for arbitrary correlation of the error terms $\varepsilon_{h,t}$ at the pseudohousehold level.

As explained earlier, 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 EPH household survey, where income is available, and LatinPanel, and then calculating mean income for each pseudohousehold. Recall that the former household survey only collects income information for April and September of each year. We then obtain our first income measure for every month and pseudohousehold by extrapolating for each pseudohousehold the EPH observations for the interim months using the evolution of nominal average wage for employees in the formal economy.

41. McKenzie (2004a).

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 pseudohousehold 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 using a panel data structure for this exercise. Based on column 3 and in agreement with the theoretical prediction, an income drop 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 crises. In the Argentine case, liquidity restrictions took the form of weekly restrictions on cash withdrawals (the *corralito*) that the government imposed in order to stop a bank run. 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 obtain all the money 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. Because 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.[42] The sign of the effect of inflation on shopping frequency

42. Casella and Feinstein (1990) and Tommasi (1999).

TABLE 4. Determinants of Shopping Frequency, 2001–02[a]

	Channel-days per 10-day period				*Days*	*Channels*
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Fitted EPH log real labor income	0.026	−0.110	−0.730	−0.586	−0.236	−0.200
	(0.29)	(1.56)	(12.53)**	(9.18)**	(6.43)**	(9.70)**
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	−0.00417	0.00512
				(1.14)	(2.22)*	(5.10)**
Food CPI inflation				0.043	0.0258	0.0137
				(9.52)**	(10.28)**	(9.42)**
Aggregate price dispersion across channels				−1.099	0.0494	−0.372
				(2.55)*	(0.17)	(2.76)**
Constant	4.586	4.731	8.370	7.454	4.954	3.145
	(6.97)**	(9.13)**	(24.66)**	(19.83)**	(23.01)**	(26.19)**
Product quantity effects	no	yes	yes	yes	yes	yes
Pseudohousehold fixed effects	no	no	yes	yes	yes	yes
Summary statistic						
No. observations	21,060	21,060	21,060	21,060	21,042	21,060
R squared	0.27	0.48	0.71	0.72	0.71	0.53

Sources: Ministerio de Economia, EPH (INDEC), LatinPanel, and Allaria and Ledesma.

*Statistically significant at the 5 percent level.

**Statistically significant at the 1 percent level.

a. The dependent variable is shopping frequency. Robust *t* statistics are in parentheses with standard errors clustered at the pseudohousehold level.

should also depend, however, on the frequency that consumers receive their cash. 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). But 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, since a significant portion of Argentine consumers worked in the informal economy, which is subject to irregular payments, and since 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 inflation level 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. 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 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.[43]

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 still 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, 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 coefficient on price dispersion is negative and significant. Using the same specification, columns 5 and 6 of table 4 confirm that the augment in shopping frequency operates through increases in both days and channels.

43. Van Hoomissen (1988).

Based on column 4, one estimates that the 0.34 decrease in mean log wages is associated with consumers shopping 0.2 more channel-days per ten-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.

Robustness Analysis

In table 5 we perform a battery of robustness analyses using as a baseline our last regression from table 4, which we repeat in the first column. We start by introducing two alternative income measures. We had extrapolated the April and September EPH pseudohousehold 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, as well as the potential presence of interaction effects among these variables. Therefore, in column 4 of table 5, we introduce time effects, which 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 decreases after the introduction of time effects but still significantly shows that households whose incomes declined 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 pseudohousehold-

TABLE 5. Robustness of Shopping Frequency Regressions[a]

Explanatory variable	*(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 September 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)		
Pseudohousehold-level inflation					0.035		
					(1.16)		
Pseudohousehold-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)**
Pseudohousehold 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
Summary statistic							
No. observations	21,060	21,060	3,808	21,060	21,060	21,060	21,042
R squared	0.72	0.72	0.77	0.77	0.77	0.72	0.45

Sources: Ministerio de Economia, EPH (INDEC), LatinPanel, and Allaria and Ledesma.

*Statistically significant at the 5 percent level.

**Statistically significant at the 1 percent level.

a. Dependent variables are channel-days shopped per ten-day period (columns 1–6) and channel-days per real peso per ten-day period (column 7). Robust t statistics are in parentheses with standard errors clustered at the pseudohousehold level.

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 before the crisis (provided by LatinPanel) with the *corralito* premium in order to allow the liquidity restrictions to differ across households. Pseudohousehold-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 that tended to consume more of a particular product precrisis to be affected more by price increases in that product. Similarly, we use the year 2000 expenditure shares of different pseudos on each product and quality (instead of the mean shares across all pseudos) as weights on our Van Hoomissen measures of interstore price variability in calculating a pseudohousehold-specific price dispersion variable.[44]

The coefficient on the change in log income proves extremely robust to the inclusion of all of these pseudohousehold-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 pseudohousehold-level measures do not suffer from this problem under the assumption that each individual pseudo 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 finds that mean household labor hours actually fell by an average of five hours a week during the crisis and that more than one quarter of all workers reported wishing to work more hours than they currently did.[45] As a result, households unable to take their labor to the market may have substituted toward nonmarket uses of time, such as home production and increased shopping time. Thus unemployment and

44. Van Hoomissen (1988).
45. McKenzie (2004a).

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.[46] 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.

In column 7 of table 5, instead of defining our shopping frequency variable as channel-days and conditioning on quantities purchased, 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. Income again shows a negative and significant effect on shopping frequency. Now the 0.34 decrease in mean (log) income is estimated to induce an increase of 0.102 on channel-days per real peso of expenditure, which amounts to more than one quarter of the observed increase in that variable between 2001 and 2002.

Finally, we explore heterogeneous effects in table 6 by interacting income and household characteristics. The results are in accordance with theoretical predictions. Larger households, which have more potential members to do the shopping, respond more. The response is also significantly larger for households with a lower opportunity cost of time (less education and younger housewives). Although the interaction term is not significant, the results also suggest larger effects for the Buenos Aires metropolitan area, where there is a greater variety of shops than in the rest of the country.

What Are the Benefits of Shopping More?

For the increase in shopping frequency observed during the crisis to be useful as a response to the decline in income, more frequent shopping must confer benefits upon households. Viewing the frequency of shopping as an indicator of search suggests at least two possible gains 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

46. 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.

TABLE 6. Which Households Change Shopping Behavior More When Income Declines?[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*
Fitted EPH log real labor income	−0.0723	−0.906**	−1.398**	−0.451**
	(0.546)	(6.102)	(6.020)	(3.934)
Log real income*household size	−0.128**			
	(3.736)			
Log real income*years of schooling of head		0.0316*		
		(2.386)		
Log real income*age of housewife			0.0159**	
			(3.684)	
Log real income*lives in Greater Buenos Aires				−0.183
				(1.444)
Product quantity effects	yes	yes	yes	yes
Pseudo-household fixed effects	yes	yes	yes	yes
Summary statistic				
No. observations	21,060	21,060	21,060	21,060
R squared	0.717	0.716	0.717	0.716

Sources: Ministerio de Economia, EPH (INDEC), and LatinPanel.
*Statistically significant at the 5 percent level.
**Statistically significant at the 1 percent level.
a. The dependent variable is channel-days shopped per ten-day period. Robust *t* statistics are shown in parentheses with standard errors clustered at the pseudohousehold level.

each of these explanations but also note that there may be other benefits to consumers from more frequent shopping that our data do 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 to more frequent trips by foot to nearby local stores.[47]

An alternative explanation is that the increase in shopping frequency is a result of liquidity constraints that 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 that 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

47. Gasoline prices increased 82 percent during the study period, whereas public transport prices remained fixed in nominal terms. So as real wages fell, 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.

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 since consumers' alternatives get reduced. Thus the relationship between income, shopping frequency, and prices also provides indirect evidence on the reasons driving the observed increase in shopping.

To estimate the change in prices associated with a change in income, we use the following reduced-form equation for good i of quality q purchased at time t by pseudohousehold h:

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

The fixed-effects term $\gamma_{i,q,t}$ captures 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 pseudohousehold on average and its income. In carrying out this estimation, we weigh equation 7 by the average share of consumer expenditure on the product in 2000 so that price gains on items that constitute a larger share of household budgets are given more weight. We cluster the standard errors at the pseudohousehold level.

Table 7 then presents the resulting estimates of β in equation 7. The first column contains quality*time*product effects $\gamma_{i,q,t}$ and thereby isolates the impact of income on prices for the same products and qualities. Income reductions, which earlier in the paper were shown to be associated with higher shopping

TABLE 7. Are Declines in Income Associated with Paying Lower Prices?[a]

Explanatory variable	*(1)*	*(2)*
EPH log real labor income (April and September only)	0.046**	0.052**
	(11.81)	(12.44)
Quality*time*product effects	Yes	No
Product*time effects	No	Yes
Controls for location, household size, age of mother and child	Yes	Yes
Summary statistic		
No. observations	128,470	128,470
No. clusters	400	400

Sources: Ministerio de Economia, EPH (INDEC), and LatinPanel.
*Statistically significant at the 5 percent level.
**Statistically significant at the 1 percent level.
a. Robust *t* statistics are in parentheses with standard errors clustered at the pseudohousehold level.

frequency, show a negative effect on prices. A 10 percent decrease in income is associated with people paying 0.46 percent less for the same quality goods.

Column 2 replaces $\gamma_{i,q,t}$ 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 that 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 toward priced goods in order to maintain the quantity of food and other items consumed as their incomes fall. The coefficient is larger in magnitude than its counterpart in column 1, suggesting that consumers achieve additional savings by sacrificing quality. The change in log labor income between 2001 and 2002 was 0.34, so the associated change in prices paid is 0.34 * 0.052 = 0.0177 log points, that is, a reduction of 1.77 percent in prices.[48]

Therefore the estimated average savings to consumers from the drop in income is a 1.77 percent saving in the price of food, personal care, and cleaning products. These savings in price allow a given level of expenditure to buy more and thereby mitigate approximately 17 percent of the 10.6 percent decline in real expenditure by LatinPanel households (see "Buying Less").

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 8 we calculate the percentage of pseudohouseholds that increased their shopping days, shopping channels, and channel-days in total in 2002 compared to 2001. Over 61 percent of households are found to have increased their shopping days,

48. The identification strategy in equation 7 exploits the sudden decrease in income between 2001 and 2002. Alternatively, we can also estimate the structural effect of shopping frequency on prices by using equation 6 to instrument channel-days in an instrumental variable regression of prices on shopping frequency. Through this exercise, we also find an association between lower income, higher shopping frequency, and lower prices, with one more channel-day of shopping resulting in an 18.8 percent saving in prices after controlling for household characteristics. However, the exclusion restriction could be questioned since the drop in income can affect prices through channels different from the increase in shopping frequency.

TABLE 8. Prevalence of Use of Different Adjustment Mechanisms
Percentage of households using

		Income Quintile				
Adjustment mechanism	*All*	*Lowest*	*Second*	*Third*	*Fourth*	*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 nonfood items	81.0	90.5	87.7	81.5	76.8	68.3
Substituted nonfood 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: Authors' calculations from LatinPanel data at pseudohousehold level for shopping frequency; Fiszbein, Giovagnoli, and Aduriz (2003) from World Bank Survey at household level for crisis coping strategies.

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 during the Argentine crisis. The survey directly asked households whether or not they had used a variety of strategies to cope with the crisis. Table 8 summarizes results from this survey presented in Fiszbein, Giovagnoli, and Aduriz.[49] Regarding consumption adjustment, this survey finds that a large percentage of households reduced the consumption of food and nonfood items, substituted toward cheaper food and nonfood items, and engaged in more home production. The prevalence of

49. Fiszbein, Giovagnoli, and Aduriz (2003).

these consumption adjustments in the World Bank survey is comparable to our findings based on the LatinPanel database.[50]

The prevalence of labor and financial market 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 14 percent of households said that as a response to the crisis they had worked more hours, and 13 percent sent more members to the labor market.[51] 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 percent used store credit. Table 8 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.

Conclusions

When income decreases, consumers are expected to substitute for goods with 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 and to gauge its relevance as a crisis mitigation strategy. Standard expenditure surveys generally provide little information on consumer shopping 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.

50. 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. See Fiszbein, Giovagnoli, and Aduriz (2003).

51. 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 pseudohouseholds 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 (2004a) 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.

We use 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 effected 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 drop 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 almost 2 percent of the cost of their food, personal care, and cleaning products by increasing shopping frequency, allowing them to mitigate about 17 percent of the reduction in food expenditure. These savings, of course, come at the cost of additional search effort.

The efficacy of this coping mechanism could be fostered by some public policies, such as the free dissemination of price information, subsidies to public transportation, impeding anticompetitive practices that could block the development of distributor brands, and ensuring that zoning restrictions do not prevent large and cheaper retailers from setting up shop in central areas. A further policy implication is that collection of CPI data during a crisis should account for these changes in channels, quality, and basket composition, and be designed to cover a wide range of outlets.

Finally, increased shopping search activity is found to be a more prevalent mechanism used by consumers to cope with an aggregate shock than household adjustments through the labor and credit markets, even though the latter mechanisms have received more attention in the literature.