e **J A D E**
electronic **Journal of Agricultural and Development Economics**

Agricultural and Development Economics Division (ESA) FAO
available online at www.fao.org/es/esa/eJADE

Vol. 1, No. 1, 2004, pp. 45-62

Assessing the Vulnerability of Agricultural Households to Macroeconomic Shocks: Evidence from Mexico

Gloria M. Rubio and Isidro Soloaga

Fundación Universidad de las Américas, Puebla, Departamento de Economia
Sta. Catarina Martir, Cholula, Puebla, 72820
gm_rubio@puebla.megared.net.mx

Abstract

This paper uses cross-sectional data from Mexico before and after the 1994 peso crisis to analyze rural household vulnerability to macroeconomic shocks. The study suggests that agricultural households are less vulnerable than non-agricultural households. The impacts vary depending on type of production and specialization level. Among agricultural households, those with a higher proportion of corn and bean production for self-consumption fared better than households which engaged in stronger market participation. Although the decline in their monetary income and consumption was more or less similar to that of the more market-oriented agricultural households, they were better able to shield their total income and consumption as well as their food expenditures.

Keywords: *economic shocks, household vulnerability, Mexico, rural poverty*

1. Introduction

Body text In recent years, researchers and policymaker have devoted increasing attention to understanding the vulnerability of the rural and urban poor to economic shocks. The traditional focus on static measurement of welfare levels has been broadened to include vulnerability as a key indicator for poverty (World Bank 2001). Research efforts have gradually moved from defining and measuring vulnerability to identifying vulnerable groups and the sources of their vulnerability. Moreover, major economic crises and adjustment programs during the last two decades have prompted interest in

The authors gratefully acknowledge research funding from the Government of Japan for the FAO Project, *Socio-Economic Analysis and Policy Implications of the Roles of Agriculture in Developing Countries the Roles of Agriculture* (GCP/INT/772/JPN ROA). We also gratefully acknowledge the useful comments and suggestions of ROA Central Team, the participants in Regional ROA Latin America Workshop May 2003, the Mexico Inception Workshop, the Mexico ROA National Workshop, the FAO International Conference on the Roles of Agriculture, 20-22 October, 2003, and Fabrizio Bresciani and Patricia Parera.

distinguishing vulnerability to aggregate shocks from idiosyncratic shocks and developing appropriate policy responses.

Panel data or, at the very least, two comparable cross-sectional household surveys taken before and after a given crisis or adjustment program are needed to carry out rigorous studies on vulnerability to macroeconomic shocks.[1] A number of macro vulnerability assessments have therefore focused on urban settings where panel datasets from employment and other related surveys exist (Glewwe and Hall 1998; Cunningham and Maloney 2000; Hernández Licona 2001; Schady 2001).[2] In countries such as Indonesia, Mexico and Zimbabwe, research on rural areas have used national level cross-section data (Frankenberg, Duncan and Beegle 1999; Ersado, Alderman and Alwang 2001; McKenzie 2003). In Mexico, McKenzie (2003) found evidence of a differential impact of the Tequila crisis on urban and rural populations. Rural households, and households with less formally-educated household heads or heads employed in the agriculture sector, suffered the smallest drops in income. The underlying factors explaining this difference, and in particular the role of the agricultural sector, have yet to be fully analyzed

This paper uses cross-sectional data from Mexico before and after the 1994 peso crisis to analyze rural household vulnerability to macroeconomic shocks. Section 1 presents an overview of the 1994 crisis in Mexico. Section 2 discusses the sources of risk and vulnerability among different groups. Section 3 analyzes the differential impact of the crisis on different types of households. Section 4 identifies time effects. Sections 5 and 6 provide a framework for examining household responses to the crisis with empirical results. Section 7 summarizes the findings.

2. The 1994 Mexican peso crisis

During the early 1980s, Mexico experienced stagnant economic activity and high inflation. A series of structural reforms, including financial market and trade liberalization, privatization of state-owned enterprises and tax and fiscal reforms, led to resumption of economic growth in the late 1980s. Economic growth averaged 3.1% per year between 1989 and 1994 and inflation gradually fell to single-digit levels. Prospects for prosperity ended abruptly in 1994, when a series of economic and political factors combined to lead the country into its most severe economic crisis since the 1930s.

The peso depreciated more than 50% causing a substantial increase in inflation and unfavourable inflation expectations. Capital inflows plunged leading to extremely high interest rates, both in nominal and real terms. As a consequence, aggregate demand contracted severely. As shown in Figures 1 and 2, real GDP in the second quarter of 1995 was 9.1% lower than a year earlier, while the inflation rate increased from single digit levels (before the crisis) to more than 50% in 1995. Weak economic activity also affected the labour market. Open unemployment rates in urban areas increased significantly. The average rate went from 3.7% in 1994 to 6.3% in 1995, reaching 7.4% in the third quarter of that year. The number of workers affiliated with the IMSS (Mexican Social Security Institute) – considered an indicator for formal sector employment – declined by 5.4% in 1995 and average earnings per worker registered a 12.5% decline in real terms.

All sectors in the economy were affected by the crisis, though in differing proportions. In 1995, production in the agriculture, forestry and fishing sectors fell by 3.8% and industrial production (manufacturing, construction, mining and electricity) fell by 8%. Service sector gross domestic product declined by 6.8%, showing a significant drop in the commerce, restaurants and hotels sectors (14.4%).

Subsector performance varied substantially. Those heavily dependent on the domestic market such as commerce, construction, freight transportation, restaurants, and professional services reported sharper declines in production. By contrast, subsectors directly or indirectly geared towards

[1] Vulnerability analysis for idiosyncratic shocks using only one cross-section of household data may also be possible provided that a detailed module on shocks and coping mechanisms is included in the survey (see Tesiluc and Lindert (2002)).

[2] Even though the dataset used for vulnerability studies in Peru did include rural households, researchers use the more reliable urban sample.

international markets, such as in-bond industries, mining firms, steel mills and some agricultural products, fared better.

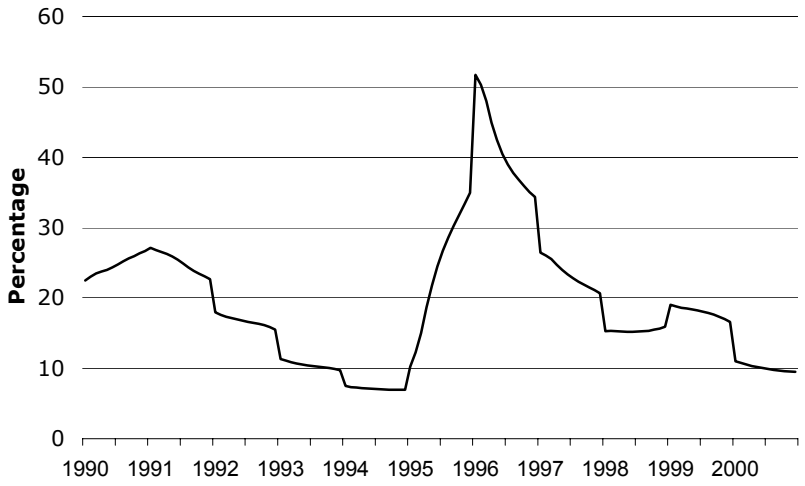
At the end of 1995, the economy began a slow recovery process. The renewed access to international capital markets just a few months after the start of the crisis and impressive export growth played a key role in the recovery of the Mexican economy. In addition, in 1996 exchange rate volatility gradually declined, inflation expectations subsided and, as a consequence, interest rates decreased. The latter contributed significantly to the rebound of private investment and consumption, another important factor in the recovery process.

Like the crisis, the 1996 economic recovery had uneven effect across economic sectors. Output rose by 1.2% in the agriculture, livestock, forestry and fisheries sectors, 3.1% in the service sector, and 10.4% in the industrial sector. The most dynamic gains were in construction, manufacturing industries, transportation and communications, and commerce, restaurant and hotel services.

Figure 1 Real GDP 1990-2000 (millions of 1993 pesos)

Source: Banco de Informacion Economica, INEGI

Figure 2 Inflation Rate 1990-2000

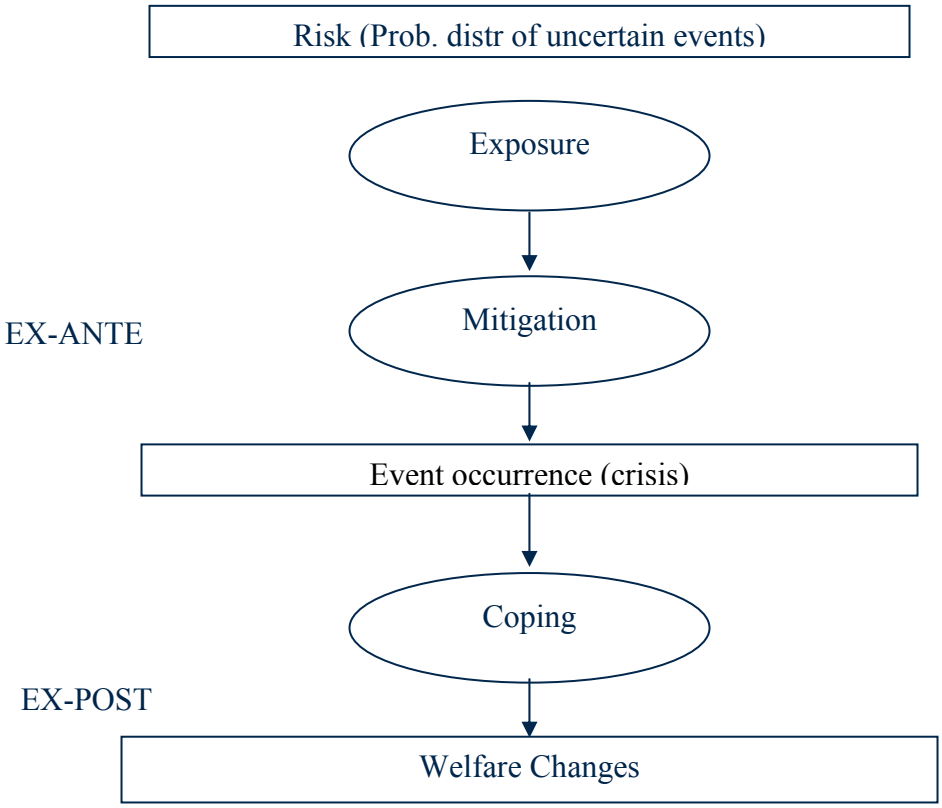


Source: Banco de Informacion Economica, INEGI

3. Sources of household vulnerability

In this paper, vulnerability represents household or individual exposure to a future loss due to a shock which causes wellbeing to fall below a given socially accepted level. Vulnerability is determined by the characteristics of the shock and a household's ability to respond to that shock. Following Heitzmann, Canagarajah and Siegel. (2002), vulnerability can be analyzed on the basis of a risk chain decomposed into several components (see Figure 3).

Figure 3 The risk chain



Source: Adapted from Heitzmann, et. al 2002

Households shocks can be caused by natural or man-made forces. This paper focuses on macroeconomic shocks. Depending on their exposure to shock transmission channels, households are more or less susceptible to macroeconomic shocks. Households isolated from markets are not as exposed to economic downturns as those more dependent on the economy. Likewise, net exporters and producers for the domestic market have a different exposure to the effects of a collapse in the national economy. Shocks vary in severity, duration and spread.

Households act in response to shocks before and after they occur. Ex-ante actions are aimed at reducing risk, lowering exposure and mitigating potential adverse effects. In the case of a macroeconomic crisis, household control over risk reduction is limited to its role in electing governments with sound economic agendas. Lowering risk exposure entails portfolio diversification, such as income source and investment diversification. Risk mitigation relates to compensation in case of loss. It includes both formal and informal arrangements such as the purchase of insurance, savings,

and risk sharing through family and community networks. Certain actions, such as migration of a household member, may lower exposure and mitigate risk, accomplishing more than one goal.

Ex-post actions attempt to manage realized losses. To cope with an income loss due to widespread unemployment, households may sell assets, switch to working in the informal sector, and alter consumption patterns. Coping alternatives depend in part on the government's supply of formal safety nets such as temporary employment programs. Access to and use of risk management instruments varies greatly across households. Household ability to manage risk efficiently can be constrained by limited assets, incomplete or missing financial and insurance markets, and exclusion from social networks

Different households experience more or less adverse outcomes from the same negative shock. Outcomes depend on a household's degree of risk exposure and the options available to manage it. Household characteristics including economic activities of its members, access to markets, and participation in informal networks, influence shock-related welfare changes. Households with closer links to more affected sectors and limited access to formal risk management mechanisms are more likely to find themselves disadvantaged by aggregate shocks.

4. Differential impact of the crisis

A number of studies indicate that some groups are more vulnerable to macroeconomic shocks than others. Lustig (1998) shows that while the agricultural sector in Mexico experienced some expansion in the first few years following the 1982 debt crisis, other sectors of the economy contracted. Glewwe and Hall (1998) found that among urban households, those with better educated heads and fewer children were less vulnerable to the adjustment program implemented in Peru in the late 1980s. In contrast, Mckenzie (2003) found that Mexican households with highly educated heads were among those which experienced the largest income drops after the crisis. Metropolitan area households and workers in financial services were among the most vulnerable to the crisis. Cunningham and Maloney (2000) found that without considering distributive weights, the least educated and the poor suffered slightly less during the crisis and were among the first to recuperate income losses during the recovery period.

Following McKenzie (2003), we classified households into groups and calculated the change in log mean per capita income and consumption before and after the crisis.[3] As shown in Table 1, total income fell 27% between 1994 and 1996. Total consumption decreased slightly less than income by 24%. Non-monetary consumption drop more than monetary consumption across all groups, whereas different groups adjusted their durable and nondurable consumption differently.

Crisis impact was widespread across locations and economic activities. Households living in metropolitan areas and headed by individuals working in the service sector suffered disproportionately more than the rest of the population. Rural households and households headed by individuals employed in the primary sector experienced a smaller income and consumption decline than the national average. Households headed by individuals whose main occupation is agriculture suffered slightly less from the crisis. Households not related to agriculture or households with agriculture as a secondary activity experienced similar declines in total income and consumption. However, the latter was better able to maintain food expenditures.

Differential impacts were registered within agricultural households. In terms of total income changes, agricultural households with more diversified economic activities fared better than non-agricultural households or households more specialized in agriculture. In terms of total consumption, agricultural households experienced a similar drop regardless of how much of their income derived from agriculture. However, agricultural households with more diversified economic activities had a sharper drop in durable goods consumption and a smaller decline in food expenditure compared to households more specialized in agriculture.

[3] Per capita variables are calculated using adult equivalents.

Table 1 Changes in log per capita income and consumption by group 1994-96

	Income		Consumption					
	Total	*Monetary*	*Total*	*Monetary*	*Non-monetary*	*Nondurable*	*Durable*	*Food Expenditure*
All heads 25-65	-0.31	-0.29	-0.27	-0.22	-0.36	-0.34	-0.30	-0.18
Location of Residence:								
Metropolitan Area	-0.47	-0.47	-0.43	-0.36	-0.44	-0.54	-0.52	-0.30
100000 + habs.	-0.16	-0.13	-0.14	-0.11	-0.25	-0.20	-0.18	-0.13
15,000 - 99,999 habs.	-0.29	-0.26	-0.28	-0.25	-0.38	-0.30	-0.09	-0.21
2,500 - 14,999 habs.	-0.22	-0.21	-0.15	-0.13	-0.24	-0.14	-0.44	-0.13
less than 2,500 habs.	-0.24	-0.20	-0.19	-0.10	-0.34	-0.21	-0.07	-0.11
Sector head works in:								
Primary	-0.27	-0.22	-0.23	-0.16	-0.36	-0.25	-0.44	-0.12
Industry	-0.26	-0.22	-0.21	-0.16	-0.35	-0.31	-0.18	-0.18
Services	-0.40	-0.40	-0.38	-0.31	-0.43	-0.42	-0.51	-0.25
Head's Relationship with Agriculture:								
None	-0.33	-0.31	-0.29	-0.24	-0.37	-0.37	-0.31	-0.21
Main Occupation	-0.30	-0.26	-0.26	-0.18	-0.33	-0.33	-0.57	-0.09
Secondary Occupation	-0.33	-0.31	-0.33	-0.14	-0.32	-0.12	-0.20	-0.11
Household Income Share from Agriculture:								
No income from agriculture	-0.34	-0.33	-0.30	-0.25	-0.39	-0.38	-0.32	-0.21
Less than 50%	-0.22	-0.18	-0.20	-0.12	-0.25	-0.24	-0.43	-0.07
More or equal to 50%	-0.32	-0.38	-0.19	-0.16	-0.29	-0.20	0.07	-0.14
Agricultural Households Market Participation:								
100%	-0.28	-0.21	-0.26	-0.16	-0.35	-0.24	-0.48	-0.10
Between 50 and 100%	-0.26	-0.26	-0.20	-0.15	-0.27	-0.33	0.12	-0.13
Less than 50%	-0.16	-0.20	-0.14	-0.13	-0.19	-0.26	-0.77	-0.05

Notes: Consumption and Income variables are calculated following INEGI criteria, except where otherwise noted. Source: Authors' calculations from 1994 and 1996 ENIGH. The 1996 figures are adjusted using the Consumer Price Index for September. Following Mackenzie 2003, non-durable consumption is calculated by subtracting the following expenditures from total recurrent (i.e. monetary and non-monetary) consumption: expenditures on furniture and household appliances, leisure, entertainment equipment, vehicles and therapeutic items. Food Expenditure excludes food for animals and tobacco products. Source: Authors' calculations from 1994 and 1996 ENIGH.

As discussed earlier, market participation is one of the determinants of risk exposure and therefore influences vulnerability to an economic crisis. Among agricultural households, those with a higher proportion of corn and bean production for self-consumption fared better than households with a stronger market participation. Although the decline in their monetary income and consumption was more or less similar to that of the more market-oriented agricultural households, they were better able to shield their total income and consumption as well as the level of their food expenditures.

As noted by McKenzie (2003), comparisons across geographic locations and based on other household characteristics implicitly assume these features remain constant over time. However, households may change their production patterns and members may change jobs or move to another city or country, especially in response to a shock. The next section presents a methodology for validating comparisons of different types of households before and after a shock.

5. Identification of time effects

Following McKenzie 2003, we model changes in variables at the household level through an additively separable model of age, birth cohort and time effects. Despite the exact linear relationship

between these effects, their second differences can be identified with no normalizing assumptions, enabling the identification of structural breaks.

Individuals are grouped into C birth cohorts observed for A age groups, $a_1,...,a_A$, and T time periods, $t_1,...,t_T$.[4] Thus, c_{j-k+1} is the cohort of individuals aged a_j in time period t_k, and n_{cj-k+1} is the number of individuals included in that cohort. Let $y_{i,cj-k+1,aj,tk}$ be the variable of interest for individual i in cohort c_{j-k+1} of age a_j in time period t_k, which is modeled as the sum of a cohort effect, an age effect, a time effect and an individual error term assumed to be the sum of an individual fixed effect and an i.i.d. component:

$$y_{i,cj-k+1,aj,tk} = \alpha_{cj-k+1} + \beta_{aj} + \gamma_{tk} + \varepsilon_{i,cj-k+1,aj,tk} \quad (1)$$

With repeated cross-sections, as in the case of the Encuesta Nacional de Ingreso y Gasto de los Hogares (National Household Income and Expenditure Survey - ENIGH) in Mexico, different individuals are observed in each time period, requiring the construction of a pseudo-panel. This is obtained by taking the mean of equation (1) by cohort at each time period:

$$y_{cj-k+1,aj,tk} = \alpha_{cj-k+1} + \beta_{aj} + \gamma_{tk} + \varepsilon_{cj-k+1,aj,tk} \quad (2)$$

Where $y_{cj-k+1,aj,tk}$ is the cohort sample mean of the variable of interest over individuals in cohort c_{j-k+1} of age a_j in time period t_k. The error term $\varepsilon_{cj-k+1,aj,tk}$ is the sample mean of individual errors. Equation (2) poses an identification problem that can be addressed through a double difference.

Consider equation (2) for cohort c_1 in time periods t_1 and t_2:

$$y_{c1,a1,t1} = \alpha_{c1} + \beta_{a1} + \gamma_{t1} + \varepsilon_{c1,a1,t1} \quad (3)$$
$$y_{c1,a2,t2} = \alpha_{c1} + \beta_{a2} + \gamma_{t2} + \varepsilon_{c1,a2,t2} \quad (4)$$

Subtracting (3) from (4) eliminates the cohort effect:

$$\Delta_t y_{c1,a2,t2} = (\beta_{a2} - \beta_{a1}) + (\gamma_{t2} - \gamma_{t1}) + \Delta_t \varepsilon_{c1,a2,t2} \quad (5)$$

where the first time difference of the outcome variable and the error term are denoted by $\Delta_t y_{c1,a2,t2} \equiv y_{c1,a2,t2} - y_{c1,a1,t1}$. and $\Delta_t \varepsilon_{c1,a2,t2} \equiv \varepsilon_{c1,a2,t2} - \varepsilon_{c1,a1,t1}$, respectively. Similarly, time differencing equation (2) for observations in cohort c_0 between time periods t_2 and t_3 gives:

$$\Delta_t y_{c0,a2,t3} = (\beta_{a2} - \beta_{a1}) + (\gamma_{t3} - \gamma_{t2}) + \Delta_t \varepsilon_{c0,a2,t3} \quad (6)$$

Subtracting equation (5) from (6) eliminates the age effects, yielding:

$$\Delta_{-c,t} \Delta_t y_{c0,a2,t3} = (\gamma_{t3} - \gamma_{t2}) - (\gamma_{t2} - \gamma_{t1}) + \Delta_{-c,t} \Delta_t \varepsilon_{c0,a2,t3} \quad (7)$$

More generally for cohort c_{j-k+1}, $j=2,...,A$ and time period t_k, $k= 3,..., T$:

$$\Delta_{-c,t} \Delta_t y_{cj-k+1,aj,tk} = (\gamma_{tk} - \gamma_{tk-1}) - (\gamma_{tk-1} - \gamma_{tk-2}) + \Delta_{-c,t} \Delta_t \varepsilon_{cj-k+1,aj,tk} \quad (8)$$

Defining $\tilde{I}_{tk} = (\gamma_{tk} - \gamma_{tk-1}) - (\gamma_{tk-1} - \gamma_{tk-2})$ in equation (8) gives the following regression

[4] For a comprehensive discussion of the model and assumptions about the error term see McKenzie (2002).

$$\Delta_{-c,t}\,\Delta_t y_{cj-k+1,aj,tk} = \tilde{I}_{tk} + \Delta_{-c,t}\,\Delta_t \varepsilon_{cj-k+1,aj,tk} \qquad (9)$$

Let $\hat{I}_{tk}$ denote the ordinary least squares estimator of $\tilde{I}_{tk}$ in equation (9). McKenzie 2002 shows the appropriate assumptions under which $\hat{I}_{tk}$ is consistent and has an asymptotically normal distribution as the number of individuals per cohort goes to infinity, that is $n_{cj-k+1} \rightarrow \infty$. The OLS standard errors, however, are not correct. The variance of $\hat{I}_{tk}$ can be estimated using the cross-sectional sample variance of $y_{cj-k+1,aj,tk}$ and the relative cohort sizes.

Thus, it is possible to identify structural breaks using a Wald test. For example, testing Ho: $\hat{I}_{tk} = 0$ enables the researcher to test whether $(\gamma_{tk} - \gamma_{tk-1}) = (\gamma_{tk-1} - \gamma_{tk-2})$ that is, whether there has been a change in the variable of interest beyond age effect and long-term trends. In the context of this study, we are interested in analyzing the effect of the peso crisis on a number of variables. Thus, we use the ENIGH surveys from 1992 to 1998 for analyzing changes in the pre-crisis, crisis and recovery periods.[5]

6. Changes in household characteristics

McKenzie (2003) examines the extent to which family structure in Mexico changed over the crisis period. He tests whether the change in the% age of household heads of a given age group between 1994 and 1996 is equal to the change over the pre-crisis and recovery periods. He also examines the determinants of household headship using a logit model. He concludes that household structure was stable over the crisis. We expand on McKenzie's earlier approach to investigate changes in household characteristics such as location, and occupation over the crisis period.

Table 2a presents a percentage breakdown by age of households in rural areas between 1992 and 1998. Age refers to the age of the head of the household. Between 20 and 29% of households of a given age group live in towns with fewer than 2,500 habitants. Younger and older households are more likely to be rural. No statistically significant changes in the percentage of rural household within a given age group is observed in the pre-crisis, crisis or recovery periods. Moreover, the difference-in-difference tests indicate that there is no evidence of a crisis effect on the percentage of rural households within a given age group. The test was rejected at the 10% level only for the youngest cohort indicating that they were slightly more likely to live in rural areas during the crisis period than before the crisis.

There is no strong evidence of changes in household head occupation either. As shown in Table 2b, the percentage of household heads of a given age group employed in agriculture remained fairly stable before, during and after the crisis. Only the youngest cohort experienced a decline (significant at the 10% level) in the percentage of individuals employed in agriculture between 1992 and 1994. However, as evidenced in the difference-in-differences test, this change is equal to the observed change between 1994 and 1996, and thus seems to be part of a long-term trend. There are slightly more changes in the percentage of household heads employed in the primary sector. There is some evidence that heads in the 50-54 cohort were less likely to be employed in the primary sector during the crisis than before the crisis.

The percentage of farmers of a given age group who report the production of corn and beans as their main occupation is used as a proxy to analyze changes in production patterns. Overall, there are no changes in the percentage of farmers employed primarily in the production of these staples, except in the youngest cohort. This group is more likely to produce corn and beans during the crisis than in the periods before or after it.[6]

Even though there is no convincing evidence of aggregate changes in household location and head occupation, there may be changes at a more disaggregated level which offset each other. Using logit

[5] Considering the limited degrees of freedom in estimating time effects, the analysis in this paper will rely on equality and double-difference tests.

[6] Although around five % of the observations in each survey year fall in the 20-24 cohort, one should be careful in interpreting results at a very disaggregated level. For example, sample size in 1998 is 10,952 households; 4.7% of them fall in the 20-24 cohort and only 19 observations reported corn and bean production as their main occupation.

regressions including year effects and its interaction with other variables, we analyze changes in household rural/urban location and head's main occupation between 1994 and 1996. Table 3a shows that larger households with less educated heads are more likely to live in localities with fewer than 2,500 habitants. State categorical variables (not reported) indicate a higher probability of being a rural household in Chiapas, Durango, Hidalgo, Oaxaca, Querétaro and Tabasco. Head age group variables lose significance when the regression allows for age and education interaction terms; households with older more educated heads are less likely to be rural.

Table 2a Changes in household location

Age	Percentage of Households in Head's Age Group Who Live in Rural Areas				Two-sided Test of Equality			Difference–in-differences p-values	
	1992	*1994*	*1996*	*1998*	*94=92*	*96=94*	*98=96*	*96-94=94-92*	*98-96=96-94*
20-24	26.0	19.9	25.9	25.9	-1.36	1.44	0.00	0.094*	0.444
25-29	25.5	24.3	22.2	21.1	-0.29	-0.56	-0.29	0.891	0.858
30-34	21.2	20.8	22.0	21.3	-0.11	0.35	-0.21	0.790	0.747
35-39	21.5	23.0	20.9	23.1	0.44	-0.69	0.78	0.524	0.389
40-44	25.4	22.7	23.0	22.8	-0.68	0.08	-0.06	0.634	0.934
45-49	23.3	25.0	22.8	23.8	0.47	-0.64	0.30	0.523	0.579
50-54	23.2	27.2	22.2	24.1	1.01	-1.40	0.53	0.172	0.249
55-59	28.3	24.9	28.3	25.2	-0.77	0.91	-0.79	0.315	0.334
60-64	29.3	27.3	29.5	27.3	-0.40	0.51	-0.52	0.595	0.554

Table 2b Changes in household heads' main occupation

	Percentage of Household Heads in Age Group Employed in the Primary Sector				Two-sided Test of Equality			Difference–in- differences p-values	
Age	*1992*	*1994*	*1996*	*1998*	*94=92*	*96=94*	*98=96*	*96-94=94-92*	*98-96=96-94*
20-24	16.0	12.4	13.5	20.6	-1.12	0.41	1.75*	0.347	0.289
25-29	17.3	15.3	13.8	13.3	-0.68	-0.62	-0.16	0.933	0.785
30-34	14.5	15.2	12.4	13.7	0.27	-1.16	0.65	0.442	0.263
35-39	20.2	16.5	13.6	14.9	-1.18	-1.31	0.62	0.844	0.258
40-44	22.0	18.3	16.2	15.5	-1.19	-0.77	-0.30	0.753	0.758
45-49	20.3	24.1	19.9	18.9	1.15	-1.39	-0.36	0.153	0.509
50-54	22.5	26.5	20.9	20.3	1.14	-1.82*	-0.17	0.093*	0.342
55-59	25.6	28.0	24.1	21.3	0.65	-1.12	-0.84	0.313	0.842
60-64	32.4	27.5	26.4	26.2	-1.06	-0.30	-0.04	0.610	0.878
	Percentage of Household Heads in Age Group Employed in the Agriculture				**Two-sided Test of Equality**			**Difference–in- differences p-values**	
Age	*1992*	*1994*	*1996*	*1998*	*94=92*	*96=94*	*98=96*	*96-94=94-92*	*98-96=96-94*
20-24	13.1	8.2	10.0	13.5	-1.65*	0.77	0.98	0.131	0.719
25-29	10.7	11.5	10.7	10.7	0.31	-0.35	0.00	0.710	0.841
30-34	9.7	12.4	10.1	10.0	1.12	-0.99	-0.10	0.251	0.537
35-39	13.0	10.8	11.4	10.5	-0.85	0.29	-0.43	0.455	0.681
40-44	15.0	12.9	12.8	10.7	-0.82	-0.04	-0.95	0.627	0.611
45-49	14.0	16.7	14.6	14.3	1.00	-0.87	-0.13	0.279	0.667
50-54	16.3	18.2	16.8	15.2	0.68	-0.54	-0.50	0.481	0.989
55-59	19.4	19.8	18.5	14.4	0.12	-0.42	-1.43	0.751	0.584
60-64	21.4	21.3	21.6	18.6	0.00	0.07	-0.88	0.968	0.591

Table 2c Changes in agricultural household heads' main occupation

	Percentage of Agricultural Household Heads in Age Group Employed in the production of corn and/or beans				Two-sided Test of Equality			Difference–in- differences p-values	
Age	*1992*	*1994*	*1996*	*1998*	*94=92*	*96=94*	*98=96*	*96-94=94-92*	*98-96=96-94*
20-24	42.2	22.5	39.3	20.8	-1.64	1.69*	-2.09**	0.047**	0.035**
25-29	43.3	45.0	52.6	40.9	0.17	0.86	-1.26	0.723	0.199
30-34	47.7	52.9	42.7	48.3	0.52	-1.12	0.68	0.374	0.259
35-39	35.8	48.6	49.6	54.2	1.40	0.14	0.58	0.405	0.785
40-44	57.1	50.0	47.5	41.5	-0.88	-0.33	-0.76	0.720	0.800
45-49	51.5	47.0	55.3	46.9	-0.51	1.28	-1.00	0.324	0.170
50-54	50.2	53.7	63.0	61.9	0.44	1.31	-0.12	0.649	0.442
55-59	63.2	60.9	68.1	54.5	-0.27	1.00	-1.65*	0.478	0.110
60-64	65.3	60.4	66.5	63.9	-0.48	0.77	-0.34	0.480	0.503

Analysis takes into account the survey design. * 10% significance level. ** 5% significance level. Source: Authors' calculations from 1992 - 1998 ENIGH.

Table 3a Logit estimation of probability of household living in rural area

	(1)	(2)	(3)	(4)	(5)
Constant	-0.285	-0.784	-0.465	-0.175	-0.754
	[0.392]	[0.573]	[0.409]	[0.402]	[0.599]
Household size	0.095	0.095	0.095	0.095	0.096
	[0.013]***	[0.013]***	[0.013]***	[0.013]***	[0.013]***
1996 year	0.114	0.114	0.473	-0.112	0.024
	[0.171]	[0.170]	[0.255]*	[0.231]	[0.338]
Education Level					
Incomplete Primary	-0.335	0.118	-0.330	-0.424	0.012
	[0.094]***	[0.474]	[0.094]***	[0.131]***	[0.480]
Complete Primary	-1.262	-0.527	-1.260	-1.404	-0.746
	[0.108]***	[0.474]	[0.108]***	[0.149]***	[0.476]
Junior High	-2.073	-1.623	-2.067	-2.368	-1.923
	[0.147]***	[0.463]***	[0.146]***	[0.187]***	[0.478]***
High School	-2.727	-2.186	-2.729	-2.786	-2.308
	[0.184]***	[0.528]***	[0.185]***	[0.272]***	[0.549]***
Higher Education	-3.170	-2.600	-3.164	-3.169	-2.677
	[0.189]***	[0.613]***	[0.189]***	[0.285]***	[0.651]***
Education*Year Interactions					
Incomplete Primary*year 96				0.208	0.248
				[0.182]	[0.189]
Complete Primary*year 96				0.308	0.423
				[0.198]	[0.225]*
Junior High*year 96				0.564	0.648
				[0.264]**	[0.304]**
High School*year 96				0.161	0.246
				[0.345]	[0.382]
Higher Education*year 96				0.037	0.200
				[0.370]	[0.398]
Age*Education	No	Yes	No	No	Yes
Age*year	No	No	Yes	No	Yes
Observations	22552	22552	22552	22552	22552

Table 3b Logit estimation of probability of household head employed in the primary sector

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-3.925	-4.044	-4.517	-4.569	-3.995	-4.523
	[0.387]***	[0.415]***	[1.546]***	[1.555]***	[0.469]***	[1.604]***
Household size	0.027	0.026	0.025	0.024	0.027	0.026
	[0.017]	[0.017]	[0.017]	[0.017]	[0.017]*	[0.017]
1996 year	-0.120	0.133	-0.124	0.042	-0.100	-0.213
	[0.096]	[0.251]	[0.097]	[0.265]	[0.521]	[0.532]
Female	-1.902	-1.906	-1.786	-1.823	-1.722	-1.816
	[0.136]***	[0.137]***	[0.864]**	[0.850]**	[0.179]***	[0.850]**
Female*Year 96					-0.383	
					[0.274]	
Education Level						
Incomplete Primary	-0.528	-0.528	-1.162	-1.182	-0.608	-1.226
	[0.092]***	[0.092]***	[0.687]*	[0.680]*	[0.131]***	[0.689]*
Complete Primary	-0.899	-0.900	-1.295	-1.332	-0.869	-1.287
	[0.107]***	[0.106]***	[0.812]	[0.804]*	[0.157]***	[0.792]
Junior High	-1.520	-1.523	-0.930	-0.938	-1.342	-0.822
	[0.142]***	[0.141]***	[0.786]	[0.777]	[0.194]***	[0.775]
High School	-1.988	-1.993	-1.128	-1.163	-2.116	-1.235
	[0.215]***	[0.214]***	[1.201]	[1.186]	[0.285]***	[1.141]
Higher Education	-2.606	-2.611	-4.431	-4.427	-2.335	-4.248
	[0.268]***	[0.269]***	[1.400]***	[1.397]***	[0.388]***	[1.412]***
Education*Year Interactions						
Incomplete Primary*year 96					0.172	0.204
					[0.183]	[0.179]
Complete Primary*year 96					-0.044	-0.015
					[0.215]	[0.216]
Junior High*year 96					-0.322	-0.241
					[0.277]	[0.268]
High School*year 96					0.221	0.247
					[0.418]	[0.408]
Higher Education*year 96					-0.583	-0.548
					[0.523]	[0.463]
Rural/Urban Location						
Locality of 100,000+	0.541	0.544	-0.774	-0.790	0.384	-0.882
	[0.301]*	[0.301]*	[1.584]	[1.583]	[0.406]	[1.641]
Locality of 15,000-99,999	1.931	1.934	3.299	3.280	1.951	3.370
	[0.269]***	[0.269]***	[1.444]**	[1.440]**	[0.362]***	[1.499]**
Locality of 2,500-14,999	3.154	3.159	3.405	3.434	2.997	3.317
	[0.248]***	[0.248]***	[1.425]**	[1.425]**	[0.327]***	[1.474]**
Locality of 2,500 or less	4.380	4.383	5.151	5.137	4.290	5.089
	[0.238]***	[0.238]***	[1.376]***	[1.372]***	[0.311]***	[1.426]***
Locality size*Year Interactions						
100,000+*year 96					0.411	0.386
					[0.532]	[0.525]
15,000-99,999*year 96					0.044	-0.001
					[0.488]	[0.498]
2,500-14,999*year 96					0.408	0.386
					[0.462]	[0.471]
2,500 or less*year 96					0.269	0.230
					[0.433]	[0.443]
Age*Year	No	Yes	No	Yes	Yes	Yes
Age*Education	No	No	Yes	Yes	No	Yes
Age* Locality Size	No	No	Yes	Yes	No	Yes
Age* Female	No	No	Yes	Yes	No	Yes
Locality size*Education	No	No	Yes	Yes	No	Yes
Observations	22552	22552	22552	22552	22552	22552
F test	29.48	26.55	14.00	13.50	24.43	-

Table 3c Logit estimation of probability of household head employed in agriculture

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-5.232	-5.333	-4.718	-4.755	-4.989	-4.479
	[0.453]***	[0.490]***	[1.641]***	[1.653]***	[0.551]***	[1.729]***
Household size	0.049	0.048	0.047	0.047	0.050	0.048
	[0.015]***	[0.015]***	[0.015]***	[0.015]***	[0.015]***	[0.015]***
1996 year	0.076	0.275	0.073	0.185	-0.711	-0.911
	[0.105]	[0.284]	[0.104]	[0.293]	[0.771]	[0.733]
Female	-1.906	-1.909	-1.163	-1.196	-1.763	-1.210
	[0.145]***	[0.145]***	[0.854]	[0.849]	[0.191]***	[0.854]
Female*Year 96					-0.292	
					[0.282]	
Education Level						
Incomplete Primary	-0.355	-0.356	-0.697	-0.717	-0.470	-0.645
	[0.088]***	[0.087]***	[0.703]	[0.700]	[0.118]***	[0.717]
Complete Primary	-0.765	-0.773	-1.064	-1.083	-0.824	-0.985
	[0.114]***	[0.113]***	[0.992]	[0.987]	[0.165]***	[0.948]
Junior High	-1.336	-1.337	-1.458	-1.475	-1.194	-1.301
	[0.159]***	[0.158]***	[0.957]	[0.947]	[0.227]***	[0.977]
High School	-1.890	-1.890	-1.570	-1.602	-2.075	-1.633
	[0.246]***	[0.246]***	[1.440]	[1.429]	[0.336]***	[1.357]
Higher Education	-2.725	-2.735	-33.496	-33.503	-2.540	-34.360
	[0.306]***	[0.308]***	[1.296]***	[1.288]***	[0.427]***	[1.369]***
Education*Year Interactions						
Incomplete Primary*year 96					0.253	0.259
					[0.173]	[0.166]
Complete Primary*year 96					0.135	0.156
					[0.228]	[0.225]
Junior High*year 96					-0.211	-0.141
					[0.311]	[0.295]
High School*year 96					0.347	0.526
					[0.486]	[0.516]
Higher Education*year 96					-0.372	-0.917
					[0.621]	[0.569]
Rural/Urban Location						
Locality of 100,000+	0.568	0.574	-2.027	-2.018	0.124	-2.352
	[0.415]	[0.416]	[1.948]	[1.948]	[0.555]	[2.064]
Locality of 15,000-99,999	2.181	2.182	2.752	2.732	1.932	2.569
	[0.351]***	[0.352]***	[1.636]*	[1.630]*	[0.426]***	[1.727]
Locality of 2,500-14,999	3.330	3.332	2.161	2.192	2.929	1.877
	[0.334]***	[0.335]***	[1.598]	[1.600]	[0.417]***	[1.683]
Locality of 2,500 or less	4.436	4.442	3.886	3.879	4.116	3.638
	[0.324]***	[0.325]***	[1.525]**	[1.520]**	[0.391]***	[1.609]**
Locality size*Year Interactions						
100,000+*year 96					1.110	1.283
					[0.830]	[0.815]
15,000-99,999*year 96					0.751	0.862
					[0.737]	[0.721]
2,500-14,999*year 96					1.038	1.161
					[0.724]	[0.702]*
2,500 or less*year 96					0.887	0.973
					[0.692]	[0.668]
Age*Year	No	Yes	No	Yes	Yes	Yes
Age*Education	No	No	Yes	Yes	No	Yes
Age* Locality Size	No	No	Yes	Yes	No	Yes
Age* Female	No	No	Yes	Yes	No	Yes
Locality size*Education	No	No	Yes	Yes	No	Yes
Observations	22552	22552	22097	22097	22552	22097
F test	21.93	19.36	-	-	-	-

Table 3d Logit estimation of probability of household head being a corn & beans producer

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-6.848	-7.217	-20.211	-20.599	-6.783	-18.497
	[0.519]***	[0.577]***	[1.837]***	[0.000]	[0.644]***	[0.000]
Household size	0.043	0.042	0.043	0.042	0.043	0.044
	[0.018]**	[0.018]**	[0.017]**	[0.017]**	[0.018]**	[0.017]**
1996 year	0.124	0.740	0.129	0.737	-0.591	-1.018
	[0.128]	[0.385]*	[0.127]	[0.410]*	[1.013]	[0.780]
Female	-1.807	-1.812	-1.132	-1.261	-1.660	-1.246
	[0.192]***	[0.193]***	[1.192]	[1.172]	[0.224]***	[1.165]
Female*Year 96					-0.285	
					[0.375]	
Education Level						
Incomplete Primary	-0.373	-0.373	-1.418	-1.524	-0.426	-1.323
	[0.094]***	[0.094]***	[1.035]	[1.029]	[0.126]***	[1.020]
Complete Primary	-0.551	-0.554	-2.035	-2.156	-0.498	-1.956
	[0.135]***	[0.134]***	[1.159]*	[1.156]*	[0.180]***	[1.158]*
Junior High	-1.071	-1.063	-15.517	-16.618	-0.975	-16.188
	[0.216]***	[0.216]***	[0.924]***	[1.341]***	[0.357]***	[1.347]***
High School	-1.894	-1.886	-16.243	-16.326	-2.151	-17.636
	[0.378]***	[0.380]***	[1.388]***	[1.279]***	[0.549]***	[1.420]***
Higher Education	-2.399	-2.400	-33.128	-34.063	-1.895	-35.538
	[0.420]***	[0.421]***	[2.374]***	[2.379]***	[0.555]***	[2.564]***
Education*Year Interactions						
Incomplete Primary*year 96					0.121	0.113
					[0.189]	[0.183]
Complete Primary*year 96					-0.073	-0.054
					[0.271]	[0.266]
Junior High*year 96					-0.121	-0.028
					[0.455]	[0.401]
High School*year 96					0.414	1.010
					[0.745]	[0.937]
Higher Education*year 96					-1.015	-1.957
					[0.846]	[1.120]*
Rural/Urban Location						
Locality of 100,000+	0.938	0.949	-2.563	-4.365	0.011	-5.784
	[0.554]*	[0.555]*	[1.475]*	[1.472]***	[0.892]	[1.462]***
Locality of 15,000-99,999	1.977	1.978	15.501	15.640	1.320	13.324
	[0.442]***	[0.441]***	[1.641]***	[1.217]***	[0.581]**	[1.271]***
Locality of 2,500-14,999	3.465	3.469	16.345	16.603	2.905	14.348
	[0.409]***	[0.409]***	[1.905]***	[0.759]***	[0.497]***	[0.772]***
Locality of 2,500 or less	4.453	4.461	18.023	18.124	4.028	16.037
	[0.400]***	[0.402]***	[1.788]***	[0.532]***	[0.469]***	[0.532]***
Locality size*Year Interactions						
100,000+*year 96					2.111	2.502
					[1.260]*	[1.022]**
15,000-99,999*year 96					1.675	2.033
					[1.005]*	[0.728]***
2,500-14,999*year 96					1.533	2.025
					[0.948]	[0.686]***
2,500 or less*year 96					1.283	1.691
					[0.915]	[0.651]***
Age*Year	No	Yes	No	Yes	Yes	Yes
Age*Education	No	No	Yes	Yes	No	Yes
Age* Locality Size	No	No	Yes	Yes	No	Yes
Age* Female	No	No	Yes	Yes	No	Yes
Locality size*Education	No	No	Yes	Yes	No	Yes
Observations	22143	22143	19797	19797	22143	19797
F test	19.91	17.68	-	-	15.78	-

Standard errors in brackets. *significant at 10%. ** significant at 5%. *** significant at 1%. Regressions are for households whose head is aged 20-64 (excludes absent heads) and are adjusted to reflect the sample design (weights, strata and clusters). All specifications include five-year age group and state categorical variables. Omitted variables are for unschooled individuals, age group 20-24 and Aguascalientes. Analysis takes into account the survey design. Source: Authors' estimation from 1994 and 1996 ENIGH

Overall, there is no strong indication of changes in rural/urban household location before and after the crisis; the 1996 year effect is only marginally significant in one specification and only a couple of age and year interaction terms are significant. Interestingly, however, households whose heads have secondary education are more likely to live in rural areas after the crisis than before it. It is important to note that despite the apparent overall stability of household location patterns, it is still possible that individual migration decisions change during the crisis period.

Tables 3b-d show logit estimates of changes in the probability of household heads having an agriculture-related occupation between 1994 and 1996. With the exception of the corn and beans producer equation, after controlling for age, education, household size, sex, and rural/urban location, 1996 year effects are mostly insignificant. Some of the year and age, and year and locality size interaction terms indicate changes in the probability of household heads' being staples producers over the crisis period. In particular, heads seem more likely to identify corn and beans production as their main occupation after the crisis in all localities except for metropolitan areas.

7. Household response to the crisis

As discussed earlier, the welfare change resulting from the crisis depends on a given household's exposure to the economic downturn, and its ex-ante and ex-post options for managing it. Measures to lower risk exposure and mitigate risks are difficult to analyze with the available data. However, it is possible to examine a number of household coping mechanisms using the ENIGH survey.

Labour supply response

Labour supply response to a crisis is an empirical matter that depends on the relative magnitude of income and substitution effects. McKenzie (2003) found that, in general, Mexican households did not respond to the crisis by increasing the number of working household members or total household labour hours. This was also true when considering rural and urban households separately. Table 4a shows our analysis of the labour force participation. Consistent with McKenzie, we find that increases over the 1992-1998 period were driven by higher female labour force participation. However, when we take the survey design into account, we do not find evidence of a slowdown of the increase in labour force participation during the crisis. Changes in labour force participation in rural and urban areas are also part of a long term trend.

Another possible household response to a shock is the withdrawal of children from school. Table 4b indicates that school attendance actually increased during the crisis period, especially for boys and in urban areas. School attendance in rural areas increased between 1992 and 1994 and then remained stable. In line with McKenzie's results, the difference-in-differences test show that there is no change in school attendance between the crisis and pre-crisis period, but the growth rate falls in the post-crisis period. This fall is more significant in urban areas.

Inter-household Transfers

McKenzie (2003) found that domestic inter-household transfers took on a reduced role in smoothing risk during the crisis, while foreign transfers increased (tables 5a and 5b). Household mean transfer to non-household members decreased by 25% and donations to charitable organizations by 35%. On the receiving side, they obtained, on average, 19% fewer gifts and donations from national sources. In contrast, mean foreign transfer almost doubled.

Table 4a Changes in household labor force participation

	Percentage of Individuals Employed				Two-sided Test of Equality			Difference–in-differences p-values	
	1992	*1994*	*1996*	*1998*	*94=92*	*96=94*	*98=96*	*96-94=94-92*	*98-96=96-94*
All 20-65	60.4	62.4	63.8	65.4	2.74**	2.08**	2.31**	0.68	0.94
Males	88.0	87.2	87.1	88.0	-0.86	-0.21	1.34	0.67	0.38
Females	35.0	39.4	43.0	44.9	3.56**	3.18**	1.71*	0.69	0.36
Urban	61.0	62.3	63.5	65.5	1.55	1.74*	2.75**	0.99	0.57
Rural	58.6	62.8	64.9	65.1	2.78**	1.17	0.13	0.48	0.53

Table 4b Changes in school attendance

	Percentage of Children Aged 5-16 Attending School				Two-sided Test of Equality			Difference–in-differences p-values	
	1992	*1994*	*1996*	*1998*	*94=92*	*96=94*	*98=96*	*96-94=94-92*	*98-96=96-94*
All 5-16	82.4	83.8	85.9	85.4	1.16	2.14**	-0.55	0.68	0.10*
Males	83.5	84.5	87.0	87.1	0.83	2.29**	0.15	0.49	0.18
Females	81.3	82.9	84.7	83.7	1.17	1.52	-0.99	0.93	0.13
Urban	86.8	87.1	89.2	88.2	0.22	1.93*	-1.29	0.40	0.04**
Rural	72.6	76.6	78.8	79.4	2.01**	1.26	0.37	0.55	0.59

Analysis takes into account the survey design. * 10% significance level. ** 5% significance level.
Source: Authors' calculations from 1992 and 1998 ENIGH.

Our analysis complements McKenzie's by showing that while the mean domestic transfer to rural households is lower compared to urban households, a higher proportion of them rely on them. They also receive more frequent and larger transfers from abroad. Moreover, while the percentage of rural households receiving both domestic and foreign transfers were constant for the 1992-1998 period, urban households seem to rely on transfers on a less regular basis. The percentage of urban households receiving transfers decreased from 1992 to 1994, then increased during the crisis period.

Table 5a Domestic transfers

	Percentage of Households Receiving Domestic Transfers				Two-sided Test of Equality			Difference–in-differences p-values	
	1992	*1994*	*1996*	*1998*	*94=92*	*96=94*	*98=96*	*96-94=94-92*	*98-96=96-94*
All	10.9	9.5	10.5	11.8	-1.73*	1.45	1.65*	0.06*	0.89
Urban	10.1	8.4	9.9	10.7	-1.87*	1.87*	1.08	0.03**	0.61
Rural	13.2	13.1	12.8	15.4	-0.12	-0.20	1.34	0.95	0.34

Table 5b Foreign transfers

	Percentage of Households Receiving Foreign Transfers				Two-sided Test of Equality			Difference–in-differences p-values	
	1992	*1994*	*1996*	*1998*	*94=92*	*96=94*	*98=96*	*96-94=94-92*	*98-96=96-94*
All	3.4	3.1	4.9	5.0	-0.58	2.83**	0.20	0.05**	0.12
Urban	2.8	1.8	3.4	3.6	-2.04**	3.16**	0.36	0.00**	0.12
Rural	5.3	7.0	9.7	9.6	0.94	1.36	-0.06	0.75	0.39

Analysis takes into account the survey design. Source: Authors' calculations from 1992 and 1998 ENIGH.

Other coping mechanisms

Few households reported selling assets between 1992 and 1998. Vehicles and second-hand electric appliance sales were more common than real estate and home business assets sales. The former was more frequent among urban households, whereas a higher proportion of rural households report home business asset sales. During the crisis, vehicle and second-hand electric appliance sales appear to have played a larger role as a coping mechanism, both in aggregate terms as well as in rural and urban areas. There is also some marginal evidence that rural households increased their real estate sales during the crisis as compared to the post-crisis period.

The percentage of households receiving a loan from non-household members or institutions decreased during the 92-94 period, increased during the crisis and decreased again afterwards.[7] This suggests that despite the credit crunch and extremely high interest rates observed during the crisis, households may have used emergency loans, most likely obtained informally from other individuals, as a coping mechanism. Both rural and urban households experienced a change in the percentage of loans received between 92-94 and 94-96, but the change between 94-96 and 96-98 is only significant for urban households.

8. Conclusion

The 1994 peso crisis had a widespread impact on household welfare. Certain groups of households, however, fared better than others. Agricultural households suffered slightly less from the crisis than non-agricultural households. They also experienced differential impacts. Agricultural households with more diversified economic activities fared better than non-agricultural households or households more specialized in agriculture.

Among agricultural households, those with a higher proportion of corn and bean production for self-consumption fared better than households which engaged in stronger market participation. Although the decline in their monetary income and consumption was more or less similar to that of the more market-oriented agricultural households, they were better able to shield their total income and consumption as well as their food expenditures.

The differential impact of the crisis may be due to a number of factors including options available for coping with welfare losses. Both rural and urban households appeared to have relied on inter-household transfers, assets sales and emergency loans to cope with the crisis, whereas labour supply responses were not observed. The main difference in the coping alternatives between rural and urban households seems to be a higher and more regular reliance on foreign and domestic transfers. It is also possible that the differential impact of the crisis is explained by a lower exposure of rural households to the crisis prompted by a highly polarized agricultural sector with a large group of subsistence producers and groups oriented to the export market.

[7] Excludes mortgage loans.

References

Cunningham, W. and W. Maloney. 2000. "Measuring Vulnerability: Who Suffered in the 1995 Mexican Crisis?" The World Bank: Washington, D.C. mimeo.

Ersado, L., H. Alderman and J. Alwang. 2001. "Changes in Consumption and Savings Behavior before and After Economic Shocks: Evidence from Zimbabwe." The World Bank: Washington, D.C. mimeo.

Frankenberg, E., T. Duncan and K. Beegle. 1999. "The Real Costs of Indonesia's Economic Crisis: Preliminary Findings from the Indonesia Family Life Surveys." Labour and Population Program Working Paper Series 99-04. Rand.

Glewwe, P. and G. Hall. 1998. "Are Some Groups More Vulnerable to Macroeconomic Shocks than Others? Hypothesis Test Based on Panel Data from Peru." *Journal of Development Economics*. 56, 181-206.

Heitzmann, K., R.S. Canagarajah and P. B. Siegel. 2002. "Guidelines for Assessing the Sources of Risk and Vulnerability." Social Protection Discussion Paper Series No. 218. Social Protection Unit, Human Development Network, The World Bank: Washington, D.C.

Hernández Licona, G. 2001. "Labour Market Transitions in Mexico: The Evolution of Household Businesses During Economic Crisis." Instituto Tecnológico Autónomo de México, México, mimeo.

Lustig, N. 1998. *Mexico: The Remaking of an Economy*, 2nd ed. Washington, DC.: The Brookings Institution.

McKenzie, D. J., 2002. "Disentangling Age, Cohort and Time Effects in the Additive Model." Department of Economics, Stanford University, mimeo.

McKenzie, D. J., 2003. "How Do Households Cope with Aggregate Shocks? Evidence from the Mexican Peso Crisis." *World Development*, 31(7): 1179-99.

Schady, N. R. "The (Positive) Effect of Macroeconomic Crisis on the Schooling and Employment Decisions Taken by Children in a Middle-Income Country." The World Bank: Washington, DC. Mimeo.