Evaluation of Intertemporal Welfare Indices for Two Mexican Regions

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Abstract

This paper evaluates welfare indices for two Mexican regions from1992-2000. A methodology is proposed based on implicit true standard of living indices, built from a recovered household expenditure function. Household preferences are estimated from a full-demand system that uses the QUAIDS specification of Banks, Blundell and Lewbel (1997). The model is extended to account for sociodemographic characteristics (complying with integrability restrictions), and the presence of censoring in the data. Indices are presented for the complete populations of each region. Afterwards the calculations are repeated to consider urban versus rural households and three additional variables: household size, home ownership and income deciles. Results show that welfare dynamics differed between regions and varied considerably compared to GDP per capita measures for the same period, thereby posing the question of how well aggregated income measures (and national accounts) reflect welfare. Once the analysis is focused in particular subgroups, the differences appear even more substantial.

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I. Introduction

In the last decade Mexico has experienced deep structural changes in its economy and political system. First, the country switched from a relatively closed economy to a more open one by becoming one of the world's principal exporters/importers due in part to the implementation of the North American Free Trade Agreement (NAFTA) in 1994. Secondly, in 1995 the country had one of its worst economic crises in modern history, with its GDP losing several percentage points. Thirdly, as a result of the crisis, the financial system collapsed. The government was obliged to take on part of the banks' liabilities[1], and in the second half of the 90s many private banks were sold to foreign financial institutions. Fourth, some brief, albeit significant, social disruptions occurred in the southern part of the country[2]. A fifth event occurred in 1997 when the PRI (Partido Revolucionario Institucional), which had dominated the political life of the country since the 1930s, lost control of Congress, and then lost the presidency in 2000. Furthermore, new programs aimed at combating poverty were developed during this time while some older ones were replaced or cancelled.[3] Finally, reforms in the fiscal coordination between the federation and the states occurred, which nowadays means that a large percentage of public expenditures are given directly to the state governments.

Given the magnitude and nature of these events, it is very important to understand the implications for households' welfare. The term "welfare" in this study will be used to refer to material well being as opposed to happiness, which should be understood as a much broader term. More specifically, the focus of this methodology is on private consumption, where household welfare is assumed to be generated by the commodities consumed.

Despite the frequent use of income variables as welfare measures, the advantages of using consumption expenditures for measuring welfare have long been recognized (Deaton (1997), Slesnick (2001)). Income levels are of limited usefulness as measures of household welfare if the prices that households face, their preferences, and their sociodemographic characteristics are not taken into consideration. Among the advantages of the expenditure approach is the ability to capture the smoothness of consumption (income is more volatile due to transitory effects), and the presence of non-monetary consumption (e.g., imputed rents).

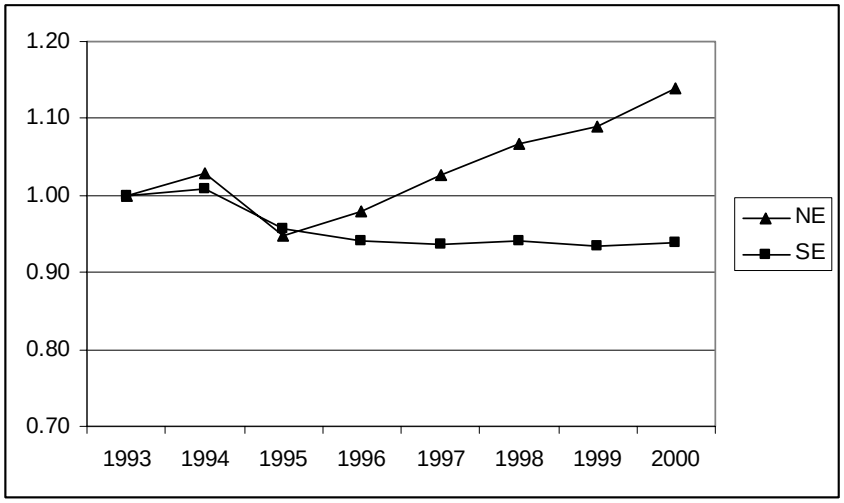
During the last twenty-five years, a literature has emerged in response to the use of income levels and the shortcomings[4] of consumer surplus (i.e., the difference between willingness to pay and price paid for the commodities consumed) as a welfare measure. The unifying characteristic of this literature is that the proposed methods involve estimating demand functions that are used to recover the underlying utility and expenditure structures. This study continues in that tradition.

This research is different from previous studies about societal welfare in Mexico. Many of these earlier studies focused more on inequality issues or measuring poverty lines, rather than on household welfare (e.g. Szekely 1998, Cortes 2001, Hernadez 2001). Camberos and Huesca (2001) analyze the welfare of selected income groups in northern Mexico, but focus on simulations about income changes. Rubalcava (2001) also studies Mexican households' welfare from an expenditure perspective. However, his methodology is based on estimating how consumption levels vary without recovering household preferences, and his study period is different: 1984-1994. Ianchovichina et al. (2002) study welfare consequences for Mexican households due to trade reform. They do it by simulating price changes under a CGE (computational general equilibrium) framework without estimating household preferences. Finally, Urzua (2001) estimates a demand system for Mexico and recovers household preferences. However, his main purpose was to evaluate impacts of a possible tax reform, rather than considering actual welfare changes within a time framework.

Instead of considering the entire country, this study will focus on two Mexican regions. The first region includes four states in the northeast: Chihuahua, Coahuila, Nuevo Leon and Tamaulipas (NE). The second region includes four states located in the southeastern part of the country: Chiapas, Guerrero, Oaxaca, and Tabasco (SE). The reason for this choice is to test differences between the two regions: each one has a very different development level in terms of income, education levels, life expectancy, etc. Yet despite these differences, both regions have populations of a similar size[5] and experienced comparable population growth from 1990-2000[6].

Figure 1 provides a description of the contrasting situation between the two regions. While the 1995 crisis affected both regions in terms of GDP per capita, NER had a quick recovery (by year 2000 its GDP per capita was 15% above the level of 1993). In contrast,

SER underperformed. Its GDP per capita fell in 1995 and subsequently stayed at that level for the next five years.



Graph 1 GDP per capita index for the Northeastern region (NE) and Southeastern region (SE) at constant prices (1993=1). Source: INEGI, constructed by author.

II. The Model

The model used in this paper is based on the evaluation of an implicit standard of living index that uses a true cost of living index as a building block. The general characterization of cost of living indices stems from equation (1), i.e., the ratio of two expenditure functions[7], where the denominator is used as base, and the numerator takes into account the variation due to prices, demographic characteristics, etc. such that:

$$TCLI(p^1, p^0; d^1, d^0; u^*) = \frac{m^*(u^*, p^1, d^1)}{m^*(u^*, p^0, d^0)} \qquad (1)$$

where TCLI is the true cost of living index, u^* is the label of the indifference curve taken as reference (which will be discussed in section IV), p^0 and p^1 are two price vectors, d^0 and d^1 are two vectors of socio-demographic variables, and m^* is the consumer cost function (also called the expenditure function). It should be noticed that (1) is a "true" cost of living index since it is calculated using as a base a recovered expenditure function rather than employing approximations. As Banks et al. (1996) point out, such approximations may be misleading when doing welfare analysis. Therefore, in this paper, an index is constructed to reflect an adjustment in household expenditures using (1). The ISLI (Implicit Standard of Living Index) is defined as:

$$ISLI(p^0, p^1, g^0, g^1, u^*, d) = \left[\frac{\frac{p^1 g^1}{p^0 g^0}}{\frac{m(u^*, p^1, d^1)}{m(u^*, p^0, d^0)}} \right] \quad (2)$$

whereISLI is an implicit standard of living index,

g^0 is a vector of observable Marshallian demands for the base period, and

g^1 is a vector of observable Marshallian demands for the comparison period.

Notice that the ratio $\frac{p^1 g^1}{p^0 g^0}$ can be interpreted as a change in income between periods that gives flexibility to the ISLI, because it is not necessary to know the specific consumption bundles if total expenditures (treated as income) are known.

A crucial assumption throughout this work is that demand behavior, represented by Marshallian demands, is driven by the maximization of household preferences. That is, a well-behaved household utility function exists. In fact, by assuming the presence of a Household Welfare Function (HWF) that reflects the utility levels of all household members, it is implied that all the resources of the household are pooled and that there is a common set of preferences across household members. Demand models that utilize this framework are usually referred as "unitary" models, since the household is acting as a single unit (Alderman et. al 1995).

Since the welfare estimates calculated from (2) rely on a household welfare function recovered from an estimated demand system, refining the estimation of the system was very important. The model employed in this paper follows Villarreal (2003b), from who three aspects will be brought: the discussion of rank within a demand system and the employment of the QUAIDS specification of Banks et al. (1997), the inclusion of socio-demographic characteristics via cost modifying functions (Lewbel 1985), and finally the importance of disaggregated commodities and the censoring problem associated with zero consumption of some goods.

A rank 3 demand system specification

Demand systems specifications having expenditure shares linear in logarithmic total expenditure[8] have been called Price-Independent Generalized Logarithmic (PIGLOG) by Muellbauer (1976) and arise from indirect utility functions that are themselves linear in

total expenditures. Both the AIDS (Deaton and Muellbauer 1980) and Translog (Christensen et al. 1976) models are examples of PIGLOG demands. These models are frequently used because they have flexible specifications (they only present the standard restrictions of consumer theory), and can be integrated (passing from the indirect utility function to the implied cost function) with relative ease. However, a series of empirical Engel curve studies (for example Atkinson et al. (1990), Lewbel (1991), Hildebrand (1994), Hausman et al. (1995), Villarreal (2003), etc.) suggest that further terms in income may be required to achieve reliable estimations. In other words linearity in log-income is often not enough to provide an accurate representation of consumer behavior.

Banks et al. (1997) present a more general specification that nests the PIGLOG preferences. They begin by defining budget shares in the following form:

$$w_i = A_i(p) + B_i(p)\ln x + C_i(p) f(x) \tag{3}$$

for goods i =1 ,..., m , where p is the m-vector of prices and A, B, C, and *f* are differentiable functions. Equation (3) states that expenditures shares are linear in the natural logarithm of income and in another function *f*(x).

Lewbel (1991) defines the rank of any demand system as the dimension of the space spanned by its Engel curves. The three terms in the equation system (for all the equation shares using (1)) can be thought as three columns of a matrix with N rows. Since the maximum possible rank of a matrix with j columns and k rows, is Min (j , k). So the maximum possible rank of the matrix with N columns and 3 rows formed from the equation system (1) will have a maximum possible rank of 3 (assuming N> 3). Gorman (1981) proved that the maximum possible rank of any exactly aggregable demand system[9] is 3. Consequently, the theory shows that there will be little gain in adding additional terms to the system of equations (1).

In addition, Banks et al. (1997) prove that if demand systems are exactly aggregable, consistent with utility maximization and have a rank of 3, then their indirect utility functions will be of the form:

$$\ln V = \left\{ \left[\frac{\ln m - \ln a(p)}{b(p)} \right]^{-1} + \lambda(p) \right\}^{-1} \tag{4}$$

where the first term within the brackets is the indirect utility function of a PIGLOG demand system and the extra term (λ) is a differentiable, homogeneous function of degree zero in prices p.

In order to nest the AIDS model a(p) and b(p) are defined as:

$$\ln a(p) = \alpha_0 + \sum_{i=1}^{m} \alpha_i \ln p_i + \frac{1}{2} \sum_{i=1}^{m} \sum_{j=1}^{m} \gamma_{ij} \ln p_i \ln p_j \tag{5}$$

and

$$b(p) = \prod_{i}^{m} p_i^{\beta_i} \tag{6}$$

to complete the specification:

$$\lambda(p) = \sum_{i=1}^{m} \lambda_i \ln p_i \quad \text{where} \sum_{i=1}^{m} \lambda_i = 0 . \tag{7}$$

Plugging equations (5-7) into the indirect utility function (3), the following indirect utility function is obtained:

$$\ln V = \left\{ \left[\frac{\ln m - (\alpha_0 + \sum_{i=1}^{m} \alpha_i \ln p_i + \frac{1}{2} \sum_{i=1}^{m} \sum_{j=1}^{m} \gamma_{ij} \ln p_i \ln p_j)}{\prod_{i}^{n} p_i^{\beta_i}} \right]^{-1} + \sum_{i=1}^{m} \lambda_i \ln p_i \right\}^{-1} . \tag{8}$$

Applying Roy's Identity to equation (8) completes the Quadratic Almost Ideal Demand System specification (QUAIDS) proposed by Banks et al. (1997).

$$w_i = \alpha_i + \sum_{j=i}^{m} \gamma_{ij} \ln p_j + \beta_i \ln \left[\frac{m}{a(p)} \right] + \frac{\lambda_i}{b(p)} \left\{ \ln \left[\frac{m}{a(p)} \right] \right\}^2 \tag{9}$$

The presence of the quadratic term does not imply that the model is better per se with respect to more parsimonious specifications, (i.e. the classical AIDS). Compared with simpler models, its main advantage is that it permits a broader estimation and is able to test the shape of the Engel curves while maintaining consistency with consumer theory. Given that the purpose in this paper is to use the estimated parameters to recover the expenditure functions in order to build welfare indices, this will provide a refined basis for estimating consumer behavior and evaluating consumer welfare. From (3) it is possible to invert the indirect utility function to obtain the algebraic specification of the cost function:

$$\ln m^* = \ln a(p) + b(p)\left[\frac{1}{(\ln u^*)^{-1} - \lambda(p)}\right] \quad (10)$$

where m^*, a(p), b(p) and λ(p) are used as defined previously, and u^* is a representative[10] utility level. When the function λ(p) is zero, (10) becomes the expenditure specification of the AIDS model.

A very important feature of the expenditure function is that once a reference utility level has been selected, it is possible to "tag" each household, and afterwards evaluate the function to obtain the corresponding minimum expenditure needed to obtain that utility. The expenditure function is able to map between an ordinal variable (utility) and a cardinal value (money). As such, it provides a very useful approach for applied welfare analysis.

The Inclusion of Sociodemographic Characteristics

Sociodemographic variables are very important in determining the households' demand patterns and ultimately their welfare. In this study in order to preserve the theoretical restrictions imposed by consumer theory, Lewbel (1985) will be followed[11]. Thus modifying cost functions are defined as:

$$m^* = C(u, p, d) = f[C^*(u, h(p, d)), p, d] \quad (11)$$

where C^* is a well-behaved expenditure function, d a vector of sociodemographic characteristics (with S elements), h and f are continuous functions that have first and second derivatives and exist everywhere (except possibly in a set of measure zero). The function h will generate non-negative modified prices for every commodity and a positive modified price for at least one.

Following Pollak and Wales (1981), the technique of "translating"[12] will be applied and the following cost function is derived assuming $m^*=C=f$ and that $m=C^*$:

$$m^* = C(u, p, d) = f[m^*, p, d] = m \ * P^f \ , \quad (12)$$

where:

$$P^f = \prod_{i=1}^{m} (p_i)^{t_i(d)} \ . \quad (13)$$

A possible interpretation for t_i is that of a commodity specific translating sociodemographic function. Following Perali (1993) for ease of estimation the translating functions will be specified as:

$$t_i(d) = \sum_{s=1}^{S} k_{is} \ln(d_s) \tag{14}$$

where k_{is} is the translating sociodemographic parameter for the i[th] commodity and the s[th] sociodemographic variable.

Modifying the embedded cost function in (9) and applying theorem 4 from Lewbel (1985), the resulting modified quadratic budget shares will be:

$$w_i = \alpha_i + t_i(d) + \sum_{j=i}^{m} \gamma_{ij} \ln p_j + \beta_i \ln\left[\frac{m^*}{a(p)}\right] + \frac{\lambda_i}{b(p)}\left\{\ln\left[\frac{m^*}{a(p)}\right]\right\}^2 \tag{15}$$

where $\ln(m^*)=\ln(m)-\ln(P^f)$.

Estimation of budget shares implies the adding-up condition of $\sum_{i=1}^{n} w_i = 1$, thus homogeneity of degree one for the cost function implies that $\sum_{i=1}^{n} t_i(d_i) = 0$. With respect to the budget shares, the standard QUAIDS restrictions will apply, and given the translating specification, the following extra restrictions on the sociodemographic characteristics are needed[13]:

$$\sum_{i=1}^{m} k_{is} = 0 \tag{16}$$

The Censoring Problem

When a demand system is estimated empirically, one of the main concerns for the researcher is to decide how many commodities or equations to investigate. Two main factors influence the number of commodities: the purpose for which the system is estimated and the characteristics of the available data set (sample size, data quality, etc).

In this study consumer behavior is specified and estimated in order to evaluate household welfare. Therefore, the model specification involves the following trade-off: a large number of equations/commodities will give a more detailed welfare function/index but is harder to estimate, while a small number of commodities makes the system simpler, but less realistic. For example, when just three or four categories are used and

the prices of a subcategory change, thereby altering relative prices in the whole system, the interpretation of the results becomes difficult.

As the number of equations increases, the main problem from an econometric point of view is the censoring issue. Censoring is defined when a household/individual does not consume a good or service in a given period. The cause for non-consumption may be related to prices, preferences, budget constraints or inventory holding. No matter the cause for censoring, the problem is that econometric estimates that neglect censoring will be biased and inconsistent.[14] In this study the censoring problem is solved by employing the consistent two-step estimator proposed by Shonkwiler and Yen (1999).

Consider the system of equations with limited dependent variables:

$$y_{it}^{*} = f(x_{it}, \beta_i) + \varepsilon_{it} \quad , \quad d_{it}^{*} = z_{it}^{'}\alpha_i + v_{it} \tag{17}$$

$$d_{it} = \{1 \text{ if } d_{it}^{*} > 0 \text{ , } 0 \text{ if } d_{it}^{*} \leq 0 \} \tag{18}$$

and

$$y_{it} = d_{it} y_{it}^{*} \tag{19}$$

where:

i=1,2,...,m (for m commoditties),

t=1,2, ..., T (for T households),

y_{it} and d_{it} are the observed dependent variables,

y_{it}^{*} and d_{it}^{*} are the corresponding latent variables,

both x and z are vectors of exogenous variables,

and β and α are vectors of parameters.

Assume $[\varepsilon_{it}, v_{it}]$' are distributed bivariate normal with $\text{cov}(\varepsilon_{it}, v_{it}) = \delta_i$, with var ($\varepsilon_{it}$)=$\sigma_i$, and var($v_{it}$)=1. The conditional mean for the non-censored observations is:

$$E(y_{it} \mid x_{it}, z_{it}; v_{it} > -z_{it}^{'}\alpha_i) = f(x_{it}, B_i) + \delta_i \frac{\phi(z_{it}^{'}\alpha_i)}{\Phi(z_{it}^{'}\alpha_i)} \tag{20}$$

where $\phi(.), \Phi(.)$ are the univariate standard normal probability density function and the cumulative distribution function respectively.

The unconditional mean (using the complete set of observations) will be:

$$E(y_{it} \mid x_{it}, z_{it}) = \Phi(z_{it}^{'}\alpha_i)\, f(x_{it}, \beta_i) + \delta_i \phi(z_{it}^{'}\alpha_i) \,.$$

(21)

From (x) the system of equations can be presented as:

$$y_{it} = \Phi(z_{it}^{'}\hat{\alpha}_i)\, f(x_{it}, \beta_i) + \delta_i \phi(z_{it}^{'}\hat{\alpha}_i) + \xi_{it} \tag{22}$$

with

$$\xi_{it} = (y_{it} - E(y_{it})) + [\Phi(z_{it}^{'}\alpha_i) - \Phi(z_{it}^{'}\hat{\alpha}_i)]\, f(x_{it}, \beta_i) + \delta_i [\phi(z_{it}^{'}\alpha_i) - \phi(z_{it}^{'}\hat{\alpha}_i)] \tag{23}$$

with $E(\xi_{it}) = 0$ and

$$Var(\xi_{it}) = \sigma_i^2 \Phi(z_{it}^{'}\alpha_i) + [1 - \Phi(z_{it}^{'}\alpha_i)] * \{[f(x_{it}, \beta_i)]^2 \Phi(z_{it}^{'}\alpha_i) + 2 f(x_{it}, \beta_i)\phi(z_{it}^{'}\alpha_i)\}$$
$$- \delta_i^2 \{z_{it}^{'}\alpha_i \phi(z_{it}^{'}\alpha_i) + [\phi(z_{it}^{'}\alpha_i)]^2\} \,. \tag{24}$$

The system of equations based on (22) can be estimated in two steps: first, use Maximum Likelihood Probit to estimate $\Phi(\,)$ and $\phi(\,)$; second, use SUR or ML to estimate β in (22).

III. The Data

The study covers six subpopulations, equally divided between the Northeastern and Southeastern regions of Mexico, over three different years (1992, 1996, and 2000). Consequently, six *master data sets* were produced, each containing the consumption, income, sociodemographic variables, sample weights, and a household identificator.

The main source of data for this paper comes from INEGI (Instituto Nacional de Estadistica Geografia e Informatica), who collects a household income-expenditure survey called ENIGH (Encuesta Nacional de Ingreso y Gasto de los Hogares). These surveys include a set of disaggregated consumption data, and other variables such as income and socio-demographic characteristics. All the information was collected using a combination of the "booklet method" and daily interviews. The booklet method uses recall interviews in which households are asked to report their expenditures (or other relevant variable) during a particular time period (e.g. clothing expenditures in the last six months). Daily interviews focused on recording common transactions (e.g. food purchases). As pointed out by Perali and Cox (1995) this mixture of methods allows a researcher to distinguish between frequent expenditures and less frequent expenditures.

Different time units are assumed depending on the related category, for example while food expenditures are recorded as weekly purchases, tuition and education expenditures are considered on a quarterly basis, health expenditures on a bi-annual basis, etc.[15]

Consumption in all the categories comes from monetary consumption and nonmonetary consumption in ENIGH. Categories are restricted to market goods, thus commodities/inputs like household labor used for cooking, cleaning, etc. will not be considered. The main difference between the two categories is that monetary consumption refers to all transactions for which the household pays. Nonmonetary consumption is composed of equivalent commodities but received as gifts, transfers, non-financial benefits, or household production (e.g. in farms). This is important given that without the nonmonetary information, consumption will be highly underestimated.

Consumption Variables

Given that this investigation focuses on demand behavior, it was crucial to obtain high quality consumption measurements. As discussed in section II, a decision that must be made is the number of consumer goods that will be analyzed. When the number of commodities is small the estimation of the system simplifies, however an aggregation problem may arise, thereby making the interpretation of the recovered parameters difficult. On the other hand, when the number of commodities is large (it can be as large as 500 in the ENIGHs), the estimation of the system becomes harder and censoring issues make the estimation difficult.

In order to maintain some system complexity and detail while allowing for tractable estimation twelve commodity categories were employed for this study, six non-food categories and six food categories. The non-food categories are almost identical to the classification presented in Perali and Cox (1995), corresponding to a very broad classification system that has been used in related studies. This choice was made in order to allow for future comparisons between studies. In contrast to the one or two food categories commonly used in demand systems for welfare evaluations, the six categories give a much richer representation. These six food categories are similar to the ones used by Sabates et al. (2001). As will be discussed later in the paper, this classification was important in terms of substitution effects.

The measurement of prices for each household's consumption profile can be divided into two general procedures, when the household consumes a particular category and when it does not (censoring). By definition when a household does not consume a certain good, the household purchases zero units. However, when a household does not purchase a commodity, it still faces a positive price for that good. Yet, a selectivity bias (Heckman 1979, Yen et. al 2002) may be embedded in the preference structure. If a selectivity bias exists and is not taken into consideration, estimated prices (for censored households) will be inconsistent. In order to test and correct for a possible selectivity bias in the non-participating households, this study will apply the Heckman correction factor for selectivity bias as presented in Davidson and McKinnon (1993).

The consumption categories for this study are:

Basics.-This category is constituted by pure and processed products from grains (flour, bread, tortillas, pastas, etc.), legumes, and potatoes. The economic intuition behind the category is that it is integrated by the elements that constitute the core of the diet; they can be classified as low price/high energy foods.

Meats.-this category includes beef, pork, poultry, seafood and all kinds of meats, both cut and processed.

Dairy.-fluid milk and every product derived from milk are included in this category; substitutes products like margarine are not included.

Fandv (fruits and vegetables).-this category includes processed as well as natural fruits and vegetables.

Outside.-this category considers meals consumed outside the household, the variable basically captures "formal" meals, i.e. if someone buys a fruit, snack, etc., and eats it outside the household, it will not be considered.

Other.-the category that includes all the rest of the food components not included in the previous categories; it includes elements such as soft drinks, powder to prepare soft drinks, spices, sugar, sweetening products and non-dairy oils.

House.-the purpose in this category is to capture the expenditures of households on their homes: rent[16], services, home improvement and some of the furniture and hardware[17].

Edu.-the expenditures in the category will include tuition, education services, books, school articles, CDs, cinemas, concerts, and related activities as in Perali and Cox (1995).

Trans (transportation).-This category includes the expenses for public transportation (fees of buses, taxis, etc.) and private transportation (gasoline, diesel, and replacement parts).

Health.-this variable covers expenditures for a big set of commodities/services related to health care; medicines, medical analysis and services, minor and major operations, insurance fees, etc. (Category J at ENIGH).

Cloth.-this variable considers expenditures for clothing (including shoes) for any member of the family. Jewelry, watches and accessories in general are also considered (Category H at ENIGH).

Aother.-this category includes expenditures for commodities and services in the survey that do not appear in the previous eleven categories.

Sociodemographic Varables

Four sociodemographic variables are employed in the analysis:

hhsize.-Total number of members in the household.

kids.-Number of household members whose age is less than 15.

h_own.-Dummy with value of 1 if the household owns the place where they live, and 0 otherwise.

rural.-Dummy with a value of 1 if the household lives in a rural area (population < 2500), and 0 otherwise.

Income Variables

The model presented in section II requires an income specification. There are two general ways to proceed, one is to estimate some form of total income and treat savings (positive or negative) as another consumption category. The alternative is to use total expenditures as a proxy for total income. In this study the latter approach will be taken. The rationale for the expenditure approach (following Slesnick (2001) and Perali and Cox (1995) is three-fold. In the first place, total expenditures are smoother than income, so they are more stable with respect to transitory income (Deaton 1997). The second reason refers to the nonmonetary components of consumption (e.g. self production, imputed rents), which are difficult to incorporate when total expenditures are not used as total income. Finally, since expenditures in ENIGH used both the booklet method and interviews for goods that

are less frequently purchased, the risk of underestimating expenditures because of purchasing frequency is highly reduced. Table 1 gives a general description of the data.

IV. Econometric Results

The model developed in section II is estimated in two stages. In the first stage, probit estimates of the probabilities of consuming at particular commodities were obtained for the nine categories that had a censoring problem[18]. These were: meats, dairy, fruit and vegetables, outside, other, education, health, clothing and transportation, as defined in section III. The nine equations were estimated independently using Maximum Likelihood. The vector of independent variables of each equation (z) was composed by the natural logarithm of the prices of the twelve categories, the natural logarithm of income, and household size. Many of the variables were highly significant for most equations, which mean that they play a role in the household decision to participate in consuming a particular category.

With the correction factors calculated, the system of equations based on (22) was non-linearly SUR estimated using NLS (non linear least squares) in GAUSSX. All the theoretical restrictions (with the exception of adding-up) were imposed in the programs as shown in section II (discussed in Villarreal 2003b). The estimations were performed dropping one equation (transportation as defined in section III), whose parameters were recovered by the theoretical restrictions, completing the system. Estimation was repeated using weighted NLS to solve for heteroscedasticity.

A series of tests were performed to evaluate the adequacy of the modelthe. Among these, a Wald test was employed to see if there is statistical improvement of using a quadratic rank 3 model versus the conventional rank 2 AIDS. The resulting Wald test will be a χ^2 statistic. The critical value for a χ^2 statistic with 173 degrees of freedom at a 95% confidence level is 204.7. The calculated values of the Wald were 4,090 and 3,669 for the NE and SE regions respectively: they are much larger than the critical value, so the hypothesis of AIDS is rejected in favor of the QUAIDS specification. The improvement in specification due to the incorporation of sociodemographic variables was also tested. The plain specification (with no sociodemographic variables) was soundly rejected in

favor of the one employed. This result may be hinted from the parameters in tables 5 and 6.

The results of the estimation for both regions are summarized below. Tables 2-4 present the income (budget) elasticities, and uncompensated price elasticities. Tables 5 and 6 present the estimated parameters, the parameters' corrected standard errors, R^2's, and the evaluation of the adding-up condition for each model. Given the number of parameters in these models, the elasticities are a good way of summarizing information, and permit the evaluation of the models.

The food categories' elasticities have important differences between regions. In general, the budget elasticities for food categories are smaller in the Northeastern region (NER) than in the Southeastern region (SER). The result is not surprising considering that (as shown in table 1), the SER has higher budget shares for the food categories (this results can be catalogued within Engel classic results). Also as predicted by theory, within the food categories "basics" has the smallest budget elasticities.

The "housing" category has values, ranging from 0.65 to 0.78, between regions. It was expected that budget elasticities lower than 1 would be found, since changes in income have to be considered together with transaction costs (moving to another house, etc.). "Edu" (education) and "health" (health services) both have high budget elasticities. Now, both of these categories have possible substitutes in the public sector (highly subsidized). However, it appears that high-income groups used private educational and health services, thus the elasticities found.

Tables 3 and 4 provide average uncompensated price elasticities for both regions. A general pattern is that own-price effects tend to be statistically significant for almost all of the categories, yet in many cases the cross-price effects are much smaller in magnitude and not statistically significant.

Tables 5 and 6 include parameter estimates and the corrected standard errors. This is because least square estimates of (22) would generate standard errors that are incorrect (since it would neglect the fact that the α 's were estimated in the first step). In order to obtain the correct standard errors for the estimates, a variation of Amemiya's (1985) quadratic will be employed, discussed in Villarreal (2003b).

As anticipated, the own-price effect was highly significant in determining the magnitude of the shares. The result coupled with the elasticities point out that relative prices matter and that substitution effects can be important when prices or taxes change. If the categories were more "aggregated", i.e. having five or six categories, instead of twelve, many of these effects will not show up, since sometimes effects with different signs will be averaged.

Cross-price effects have more ambiguous values for all categories. As expected, some subsets were significant, for example when comparisons were made between food categories. For others, the values do not appear to be economically or statistically significant. As suggested by the estimated elasticities, the cross price effects are larger in the SER. In general, this generates more substitution between food categories. Again, this effect would be difficult to capture if food were aggregated into a single category. The cross-price effects for non-food categories are less consistent, nonetheless considerable for some categories/years.

The income effect is important for some categories, but not all. The interpretation of this result does not mean that income is not important for the quantities demanded, it means that for some categories the direct income effect is not statistically significant in explaining the relative shares of that category with respect to others. The distinction between a direct and an indirect effect is important, because if the income effect is significant for some of the categories, indirectly it affects all the others. This is a result of a model specification that works with budget shares. Thus when income directly affects the demand of one category, indirectly it shifts the shares in all the other equations.

The Quadratic Effect seems to be important for some categories but not all, similar but not identical to the results in Banks et al. (1997). One of the differences is that Banks et al. (1997) find that the quadratic term is not important for food in general. As mentioned in section II the problem of over-aggregation may be considerable. Given that Banks et al (1997) pool all of the food elements into a single category, they may be losing important effects, this will be true when doing welfare analysis, causing the estimated expenditure functions to be biased.

This section shows that sociodemographic variables were statistically and economically significant in many of the equations. Many of these results were expected:

owning a refrigerator will influence the demand for certain kinds of food (e.g. dairy), the number of children is very significant in determining the budget share of education, household size has a negative effect in the share of outside, etc.

A brief comment about the specification: as explained in section II, the model employed in this study uses translating modifying cost functions. Translating sociodemographic effects are of an income nature since they translate the intercepts of the budget shares and income terms. This in contrast with scaling effects, which influence prices, i.e. rotating the budget shares. Given the important differences in income levels between the two regions, translating effects appear more suitable to describe the differences between them.

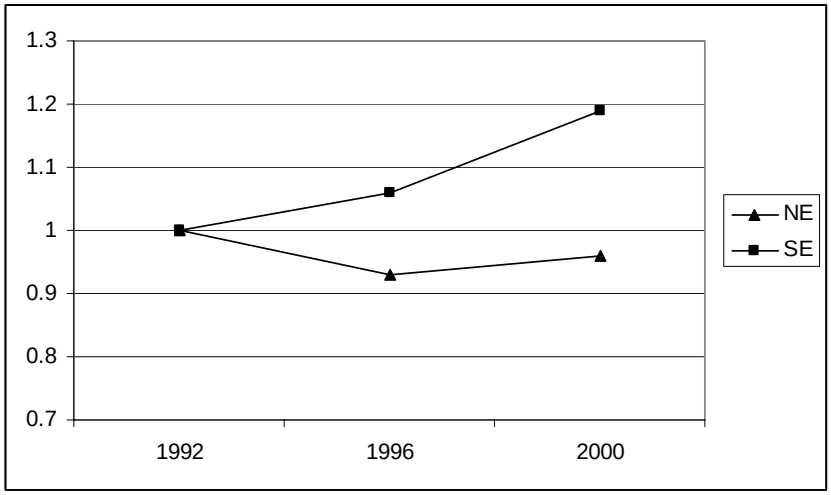
V. The Evolution of Welfare Over Time

Since the household records at ENIGHs come from stratified sampling, in order to reproduce the populations of each region, the ISLI needs to be weighted with the expansion factors (described in section III) provided by INEGI. A possible source of problems is that while the expansion factor is for the national population, this study is concerned with regional populations (a subsample of the whole survey). The basic assumption behind this procedure is that since the subsamples (the regions covered) are a big part of the whole survey, the expansion factors will still represent their population. The alternative of ignoring the expansion factors is not possible since stratified sampling was employed, i.e. it will be equivalent to utilizing a uniform weight. (Deaton 1997). Table 7 and Graphs 2-10 present the results.

The exclusive presentation of a general index where all households were aggregated (Graph 2), will limit the appreciation of the welfare dynamics of particular subgroups. Therefore, in order to complement the general index, eight pairs of alternative indices will be presented. In the first one, indices used to compare the performance of rural households in the two regions (Graph 3) are built. In the second, urban households are compared (Graph 4). The third pair is evaluated from households that own their home (Graph 5). The fourth comparison is between households that do not own their home (predominantly renters, Graph 6). The fifth represents households with three or more members (Graph 7). Households with less than three members are considered in Graph 8.

Finally, Graph 9 takes in to account households in the bottom half of the income distribution, while Graph 10 considers households in the upper half of it. The distribution of welfare is not evaluated; the evaluation is about the dynamics of welfare for two income groups.

It should be noticed that indices are relative measures with respect to their own base periods. While comparisons can be made horizontally they cannot be performed vertically (by columns in Table 7). In other words the "1" used as a base for 1992 corresponds to a different welfare level for each row of the table, and the comparisons between rows **do not** have any interpretation since they are using a different base and different expenditure functions between regions.[19] In table 7 indices were normalized using 1992 as a base in order to make comparisons more intuitive. So the numbers presented below are used in the graphs are the ISLI indices using year 2000 as a base (in terms of the expenditure functions and average prices), and then normalized by the 1992 results.



Graph 2 General ISLI for the Northeastern Region (NE) and Southeastern Region (SE).

The general index (Graph 2) shows that from 1992-2000 the two regions display contrasting changes in standards of living. The NE region experiences a decline that starts in 1994, deepens in 1996, and begins to improve afterwards. The ISLI in 2000 appears slightly above 1994, but remains below the 1992 level. On the other hand, the SE region has a completely different experience: its ISLI shows a small decline between 1992 and 1994, which may be caused by the social disruptions (i.e. guerrilla warfare and civil

unrest) that happened that year. Afterwards the improvements in the standards of living are constant and substantial. It should be noted that these results differ drastically from the suggestions of Graph 1. The region that had a strong (relative) increase in its GDP per capita cannot recover its standard of living previous to the crisis, while the region that performed weakly in terms of GDP has a large increase in standard of living. A clue to this apparent paradox can be found in GDP's composition. While the NE GDP was increasing, those increments do not reflect themselves in households' consumption. The SE region experienced modest increases in GDP (decreasing in per capita terms); however household expenditures were more stable than in the NE region, and it benefited from a strong decline in the prices of food and in some services (e.g. rent, health).

Moreover, the structural differences that are present in both regions should be considered. The information available points out that both private investment and exports grew more than GDP in the NER, implying a reduction in total private consumption as a percentage of GDP. The expansion of house construction, which is a component of total private consumption but not of total households' expenditures, has two effects. It increases the region's GDP (but not the household expenditures), and if the supply of houses increases faster than demand it pulls the rental prices down. The latter implies smaller household expenditures, but not necessarily lower household welfare.

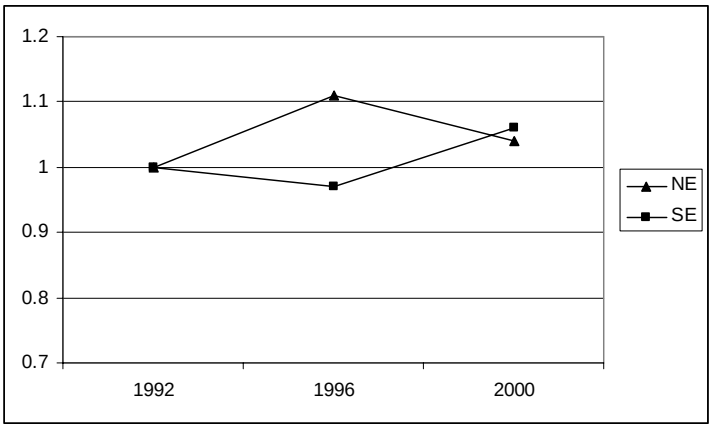
Two more differences between the regions can explain the results in Graph2. The NE region is more industrialized and employs more financial services than the SE region. During the 1994-1995 economic crisis, many financial services collapsed (shown in the appendix). It is possible that debts and the lack of financial services affected households' consumption patterns. Since financial services did not play an important role in the more economically isolated SE region their collapse did not affect household consumption. Another possible explanation can be found in the government's actions. The fiscal coordination between states in Mexico (administered by the federal government) redistributes resources from "rich" to "poor" regions. This can be reflected in subsidized public services (e.g. education and health), and in the expenditures of poor people who received direct cash transfers from some federal programs.

Another explanation may be found in the nature of the CPI (consumer's price index) that is used to put GDP in real terms. Between December 1992 and December 2000

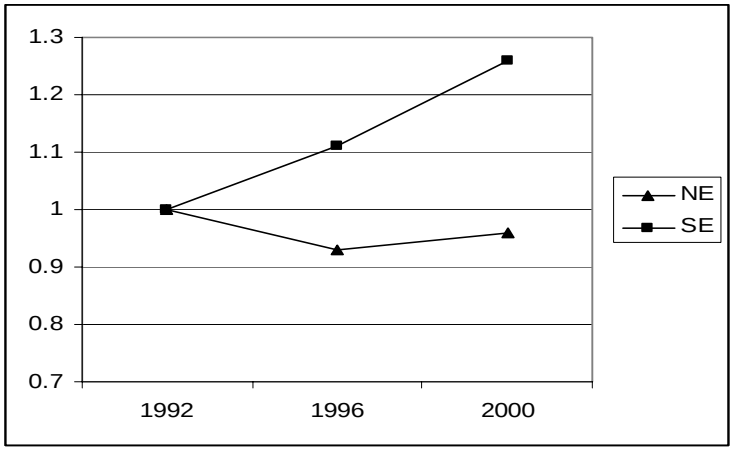
Mexico experienced an inflation of about 300%. So using the CPI to calculate real income measures may give highly biased results (with possible important differences between regions). Notice that the index (2) presented in section II will be free of this bias, since price level effects will be canceled.

The indices' graphs for particular population groups will help to shed some light on these results and to expand the analysis.

Graph 3 Rural ISLI for both regions



Graph 4 Urban ISLI for Both Regions

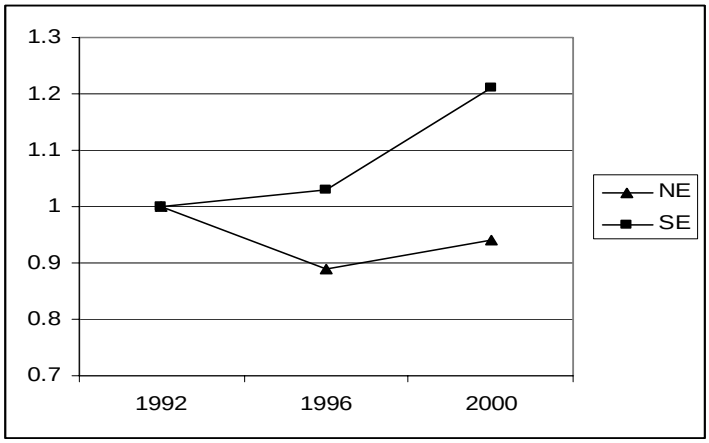


When rural (Graph 3) and urban households (Graph 4) are compared, the indices present important differences between regions. The index for rural households shows that while households in the SE under-perform the average households in their region, the standard of living of rural households in the NE performed better than their urban counterparts. A possible explanation for the results is that the social disruptions in the

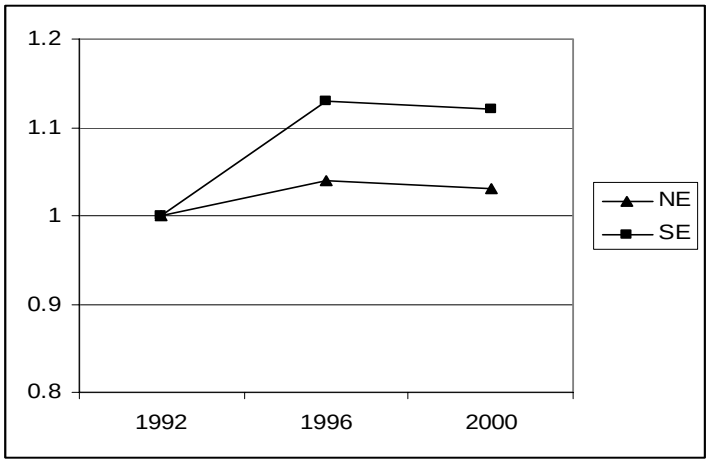
south of the country were highly concentrated in rural areas. By 1996, the improvements in the standards of living of urban households in SE are large enough to dominate the below 1992 ISLI of the rural households, producing a positive net change in the general index.

The results in the NE regions seem very different. Here rural households have a higher ISLI in 2000 compared to 1992. They reach their peak value index in 1996. Possible reasons for this include less dependence on financial services, and benefits from the relative prices. It seems that the period 1992-2000 was better for the rural households in the NE region compared to the rural households in the SE region. Some explanations may include the previously mentioned social conflicts that were not present in the NE and NAFTA. It is possible, that the trade agreement was better utilized by farmers in the northeast part of the country because they are geographically closer to the border with the US and possess better infrastructure. It might also be plausible that the lack of investment, infrastructure, and a production more oriented to self-consumption in the south caused this result. The ISLI for urban households in the NE region closely resembles the general index for the region.

Graph 5 Home owners ISLI for Both Regions

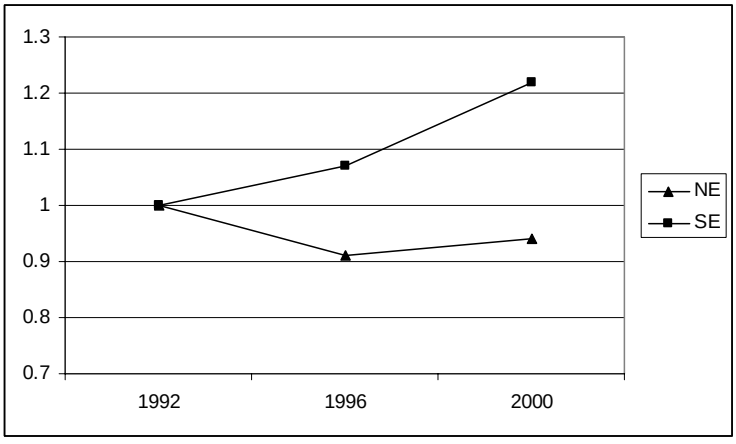


Graph 6 Non-home owners ISLI for Both Regions



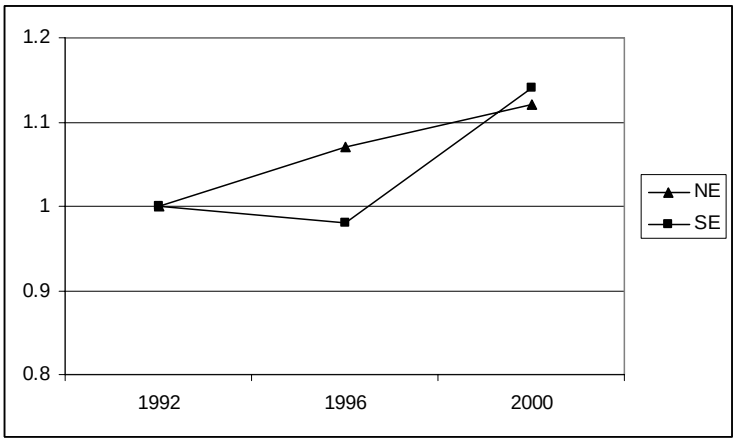
When the variable home ownership is used as a base for the comparisons, the results differ drastically conditioned on home ownership status. This is not surprising: rental prices declined drastically between 1992 and 1996. Given that expenditures in housing represent a big percentage of the total for most households, the effect of this decline should appear in the ISLI. Home-owning households (Graph 5) have similar changes in standard of living (both in magnitude and timing) to the average of the regions (the general index). One small difference is that for the NE region, the drop in the ISLI is slightly larger than for the overall population. In comparison (Graph 6), it appears that households that do not own their homes have a very different dynamic in the ISLI with respect to the homeowners. The result is very similar for both regions. Moreover, the decline in the ISLI for non-home owners from 1996 to 2000 coincides with the recovery in the rental prices.[20]

Graph 7 Household size greater or equal than three ISLI for Both Regions

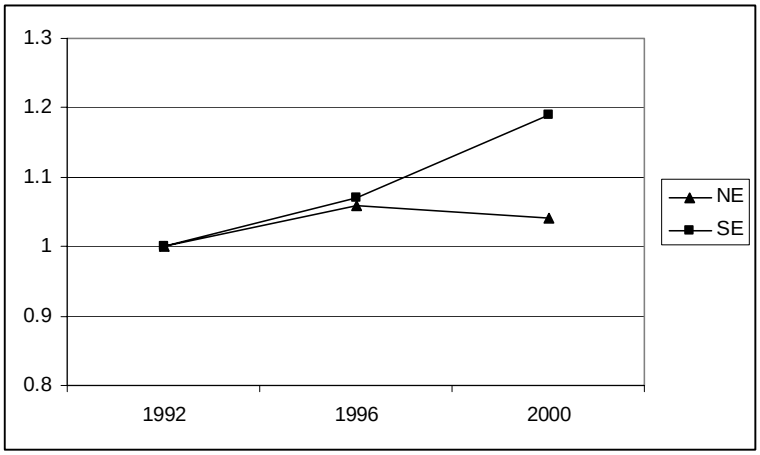


When household size is taken into consideration, results take another twist. The indices built using households with three or more members (Graph 7) closely resemble the general indices, but those evaluated from households with less than three members (Graph 8) differ markedly in their dynamics, both, between the two regions and in comparison with the general indices of the regions. Households in the NE with less than three members experience a considerable increase in their standards of living, which contrasts with the performance of the general ISLI for the region. To understand the behavior of these indices, it should be noted that most two-members households are young couples. It is possible that the labor market for young couples, especially for more educated ones, is better for them than for older cohorts[21]. Also, if many of these young couples live in rented houses, the change in prices described above will play a role in their improved standards of living. In the SE region, households with less than three members under-perform in terms of ISLI the general index of their region, contrasting with the results in the NE. Under the assumption that many of these households correspond to young couples, the findings can have severe policy implications. While young couples in the "rich" region are doing well, young couples in the "poor" region are not catching up with their population means increments in ISLI. Given the life expectancy of young people, the result can be very important in terms of convergence between the living standards of different regions in Mexico.

Graph 8 Household size less than three ISLI for Both Regions

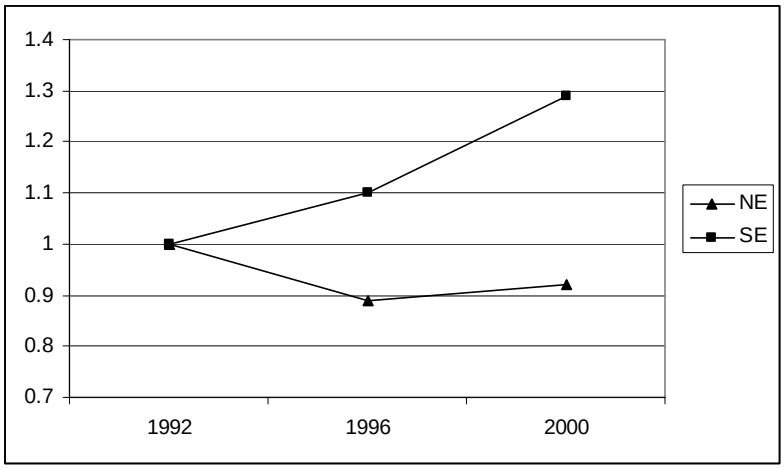


Graph 9 Income distribution lower five deciles ISLI for Both Regions



Finally, graphs (9) and (10) show the evolution of ISLI for the two regions conditional on income levels. The first graph represents the five lower deciles of the income distribution, while the second graph, represents the five upper deciles. For the SE region both indices have a similar "shape" to the general index for their region. The main difference is that the upper income group had bigger increments in their ISLI. The result is of particular significance: despite a favorable change in prices and "stable" total expenditures, it seems that benefits are concentrating in "richer" people. This is consistent with the other ISLI evaluated for the region (e.g. the underperformance of rural households, which are among the poorest members of society).

Graph 10 Income distribution upper five deciles ISLI for Both Regions



For the NE region the changes in ISLI between income groups is very different. The lower income group ends the period with a higher ISLI compared to the starting point in 1992. Their peak occurs in 1996 (however very similar in level to 2000), which may be partially influenced by the rural population. The upper income group in the NE region had a big decrease in their ISLI between 1992 and 1996, even though a small recovery takes place between 1996 and 2000, the ISLI remains below the 1992 level by several percent points. So when the "pictures" are put together, it seems that big losers from the mid 1990s crisis are "richer" households in the Northeastern region. The GDP in the NE grew faster than in the country (on average), but total expenditures of the rich households decreased significantly. Also, while poorer households may have benefited highly from the extension of public services (health, education), it may be the case that "richer" households employ private services, thus the potential benefit will vanish.

VI. Conclusions

This paper began with the question of how welfare dynamics in two regions of Mexico evolved during the period from 1992-2000. The first results show (unexpectedly) that despite the evolution of regional GDPs, the average standards of living in the SE region improved while the average standards of living for the NE region remained below their 1992 level. Plausible explanations include: the evolution of relative prices, a SE that was more isolated from the economic crisis during the mid 1990s, provision of public goods by the federation and the states, transfers of economic resources from the richer to the poorer regions, the effects of NAFTA, and the absence of financial services during the second part of the 90s. In fact, despite considerable GDP growth rates in the NE region, this growth **is not** reflected in the households' total expenditures (consumption), which instead decrease significantly between 1992 and 1996.

When particular subpopulations are taken into consideration, the results become more complicated. In fact, it seems that the results are far from uniform across these subpopulations. In the SE region the welfare improvements are concentrated in the urban population, with more emphasis on richer, more numerous, and possibly older households. Although positive, the improvements in standard of living for rural and

poorer households are smaller. When the price changes are included in the analysis, a possible hypothesis that emerges is that households that are more "well-off" than others may be taking advantage of cheaper public services such as education and health.

In the NE region a general decrease in the standards of living between 1992 and 2000 was found. However, there are some groups that are "better-off" at the end of the period compared to their initial situation. Among the beneficiaries are renters, small (possibly younger) households and rural households. There were also some improvements in the ISLI of the population in the lower income deciles.

It can be said that results are mixed, while poorer people in the richer region (NE) had improvements in their standards of living, the increases in the ISLI of the poorer region (SE) appeared concentrated in richer and urban households. In terms of who "faced" the costs of the mid 1990s crisis, it seems that the NE households bore a larger burden. Possible explanations include a higher dependence on a financial system that collapsed, transfers (via the federal government of subsidies to poorer regions), and high investment rates that do not show in current consumption.

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[1]This happened through FOBAPROA (Fondo Bancario de Protección al Ahorro), which eventually became IPAB (Instituto para la proteccion del ahorro bancario).
[2]The "Ejercito Zapatista" (guerrilla movement) appeared in January of 1994. While they were active for just a few days, together with other guerilla organizations, they have remained as a latent source of conflict in rural areas in the southeastern part of Mexico.
[3] An example is the implementation of PROCAMPO, which gives cash transfers to the farmers based on the amount of land they plant, and the disappearance of CONASUPO (a government intermediary that bought agricultural products guaranteeing minimal prices).
[4] The problem was presented by Hicks (1942), Samuelson (1947) and Hausman (1981).
[5] The population for NER was 12 million, and for SER 12.8 million in December 2000. Source: INEGI (Instituto Nacional de Estadistica Geografia e Informatica).
[6] NER had a net population growth of approx. 22.9% and SER had a net population growth of approx. 23.2% in the period 1990-2000. Source: INEGI.
[7] A true standard of living index can be defined analogously to the true cost of living index, based on the Distance Function. The employment of a TCLI in this study was preferred since the emphasis is done on the evolution of prices through time.
[8] From now on I will use logarithmic income and logarithmic total expenditure indistinctly.
[9] Exact Aggregation means that aggregated demands generated from individual observed behavior will have closed forms.
[10] A particular indifference curve in the dense space.
[11] If sociodemographic variables were included in the right-hand side of the demand equations without further structure, it will not be possible to recover the household cost function.
[12]Pollak and Wales (1981) present two ways of incorporating sociodemographic characteristics into demand systems: scaling and translating. In this study just translating is included. Perali (1993) uses both techniques and compares their performance. Phipps (1996) employs exclusively scaling. It should be notices that in principle the modification of cost functions (Lewbel 1985) is more general that both techniques.
[13] Described in Perali (1993) and employed for identification.
[14] A detailed description of the problem and its consequences can be found in Maddala (1983).
[15] When correcting for censoring it is very important to distinguish between a nonconsumption decision of the household and infrequent purchases (e.g. clothing) and model the problem accordingly. In the case of this study, the datasets employed take into consideration infrequent purchases.
[16] ENIGH's provide a value for imputed rent for that households that are owners of the place they live, this information extremely simplifies the construction of the variable.
[17] Categories G, I, and K in ENIGH.
[18] The other three categories (basics, housing, and another) present a very small number of non-participating households.
[19] As explained in section IV, it was assumed that the preference structure was different between regions. Hence the regional demand systems were estimated independently.
[20] This does not imply that the movements in the home rental prices are the only variable causing variations in the ISLI for this group.
[21] Mehta and Villarreal (2003) found that young adults in the Northern states in Mexico had a higher average of education years, and were receiving a higher return (measured as income) per education year, compared to young adults in the Southern states.

Tables

	Northeastern Region			Southeastern Region		
	1992	1996	2000	1992	1996	2000
	Consumption Categories					
Basics	3.14	5.65	4.10	8.97	10.76	8.12
Meats	3.31	4.01	3.50	8.07	7.44	6.60
Fandv	1.43	1.58	1.50	4.11	3.24	3.13
Dairy	1.59	2.55	2.50	2.12	2.23	2.13
Other	1.82	2.88	3.14	2.38	3.31	3.06
Outside	8.19	7.22	9.24	5.63	7.76	11.28
House	51.40	41.58	39.12	47.18	37.82	30.79
Edu	5.37	7.21	7.15	4.04	5.19	6.10
Health	5.28	4.20	4.74	2.12	3.52	4.08
Cloth	4.32	4.33	5.30	4.17	4.23	5.41
Trans	5.21	7.64	7.43	3.90	5.36	6.57
Aother	8.95	11.15	12.26	7.33	9.14	12.74
	Sociodemographic Variables					
Hhsize	4.22	4.15	4.01	5.17	4.86	4.3
Kids	1.42	1.39	1.32	2.22	2.07	1.58
h_own	0.69	0.66	0.65	0.82	0.8	0.77
Rural	0.12	0.13	0.12	0.46	0.47	0.46

Table 1. The consumption categories appear as percentages of total expenditures for the respective year and region. All the values are weighted averages.

	NE		**SE**	
	Val.	s.e.	Val.	s.e.
Basics	**0.51**	(0.053)	**0.52**	(0.046)
Meats	**0.83**	(0.081)	**0.92**	(0.096)
Dairy	**0.64**	(0.146)	**1.16**	(0.475)
Fandv	**0.79**	(0.124)	**0.89**	(0.103)
Outside	**1.23**	(0.157)	**1.52**	(0.122)
Other	**0.67**	(0.086)	**1.00**	(0.090)
Housing	**0.72**	(0.024)	**0.75**	(0.028)
Edu	**2.72**	(0.131)	**2.19**	(0.170)
Health	**1.65**	(0.234)	**1.38**	(0.193)
Cloth	**0.96**	(0.075)	**0.77**	(0.102)
Aother	**0.90**	(0.036)	**0.91**	(0.044)
Trans	**0.63**	(0.200)	0.31	(0.307)

Table 2. Budget Elasticities. Values in bold are significant at a 95% level.

	Basics		Meats		Dairy		Fandv		Outside		Other	
	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.
Basics	**-0.84**	(0.054)	**0.15**	(0.073)	0.23	(0.122)	0.08	(0.141)	0.27	(0.081)	-0.09	(0.056)
Meats	**0.10**	(0.044)	**-0.76**	(0.093)	0.13	(0.117)	-0.11	(0.089)	-0.02	(0.054)	-0.09	(0.057)
Dairy	0.09	(0.048)	0.07	(0.076)	**-0.54**	(0.184)	0.04	(0.115)	-0.07	(0.067)	0.03	(0.065)
Fandv	0.03	(0.040)	0.00	(0.047)	0.04	(0.090)	**-1.11**	(0.106)	0.06	(0.045)	0.01	(0.039)
Outside	**0.46**	(0.080)	-0.01	(0.132)	-0.08	(0.239)	0.33	(0.219)	**1.46**	(0.522)	**0.47**	(0.118)
Other	-0.05	(0.027)	-0.03	(0.043)	0.00	(0.081)	-0.07	(0.063)	0.04	(0.049)	**-1.08**	(0.064)
Housing	**-0.09**	(0.041)	-0.11	(0.075)	-0.13	(0.113)	-0.11	(0.127)	-0.12	(0.114)	0.01	(0.077)
Edu	**-0.10**	(0.050)	-0.03	(0.054)	0.00	(0.105)	-0.07	(0.055)	0.07	(0.067)	-0.07	(0.053)
Health	0.02	(0.038)	-0.01	(0.039)	0.02	(0.069)	-0.05	(0.084)	-0.05	(0.068)	-0.02	(0.058)
Cloth	-0.03	(0.028)	0.03	(0.039)	0.02	(0.054)	0.01	(0.049)	-0.07	(0.042)	0.00	(0.032)
Aother	**-0.08**	(0.036)	-0.12	(0.072)	-0.10	(0.103)	-0.02	(0.093)	**-0.58**	(0.072)	0.05	(0.048)
Trans	-0.03	(0.077)	-0.03	(0.089)	-0.04	(0.249)	-0.06	(0.198)	-0.08	(0.118)	-0.03	(0.109)
	Housing		Edu		Health		Cloth		Aother		Trans	
	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.
Basics	**-0.04**	(0.011)	**-0.30**	(0.113)	-0.10	(0.142)	**-0.08**	(0.039)	**-0.11**	(0.021)	-0.03	(0.122)
Meats	-0.02	(0.013)	-0.07	(0.061)	-0.03	(0.053)	0.03	(0.039)	**-0.06**	(0.024)	-0.08	(0.059)
Dairy	-0.02	(0.012)	-0.02	(0.076)	-0.01	(0.047)	-0.01	(0.036)	-0.04	(0.022)	-0.01	(0.100)
Fandv	-0.01	(0.009)	-0.07	(0.056)	-0.04	(0.050)	0.01	(0.024)	-0.02	(0.015)	0.00	(0.066)
Outside	**0.08**	(0.029)	-0.23	(0.198)	-0.23	(0.214)	**-0.25**	(0.078)	**-0.26**	(0.045)	-0.02	(0.201)
Other	-0.01	(0.010)	-0.11	(0.067)	-0.07	(0.066)	0.00	(0.027)	-0.01	(0.016)	-0.03	(0.068)
Housing	**-0.67**	(0.021)	**-0.68**	(0.180)	-0.17	(0.252)	-0.04	(0.045)	**-0.16**	(0.025)	-0.02	(0.201)
Edu	-0.02	(0.021)	**-0.63**	(0.135)	-0.14	(0.136)	-0.06	(0.033)	**-0.05**	(0.022)	0.06	(0.116)
Health	0.03	(0.018)	-0.25	(0.169)	**-0.60**	(0.229)	-0.05	(0.034)	-0.02	(0.020)	0.03	(0.127)
Cloth	0.01	(0.009)	**-0.17**	(0.041)	**-0.11**	(0.040)	**-0.41**	(0.067)	**-0.03**	(0.017)	-0.02	(0.037)
Aother	-0.02	(0.013)	**-0.65**	(0.072)	**-0.28**	(0.089)	**-0.08**	(0.041)	**-0.13**	(0.025)	0.12	(0.070)
Trans	-0.03	(0.032)	-0.02	(0.264)	-0.04	(0.227)	-0.04	(0.054)	0.00	(0.032)	**-0.64**	(0.295)

Table 3 Average Uncompensated Price Elasticities for the Northeastern Region . Values in bold are significant at a 95% level. The table should be read column-wise.

	Basics		Meats		Dairy		Fandv		Outside		Other	
	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.
Basics	**-1.09**	(0.044)	0.11	(0.075)	**0.76**	(0.320)	**0.17**	(0.071)	0.15	(0.113)	0.13	(0.069)
Meats	0.05	(0.039)	**-0.88**	(0.070)	**0.48**	(0.245)	**0.19**	(0.084)	0.01	(0.050)	-0.03	(0.051)
Dairy	**0.15**	(0.049)	0.04	(0.059)	-1.07	(0.662)	0.01	(0.067)	0.03	(0.050)	0.08	(0.057)
Fandv	**0.05**	(0.020)	**0.13**	(0.038)	0.02	(0.068)	**-0.85**	(0.064)	-0.03	(0.023)	0.05	(0.031)
Outside	**0.27**	(0.070)	0.10	(0.081)	0.05	(0.177)	-0.02	(0.083)	**-1.04**	(0.076)	0.08	(0.063)
Other	**0.05**	(0.019)	0.01	(0.024)	0.09	(0.086)	0.05	(0.031)	0.01	(0.019)	**-0.95**	(0.029)
Housing	0.01	(0.036)	**-0.16**	(0.069)	-0.24	(0.254)	-0.08	(0.080)	**-0.23**	(0.093)	-0.07	(0.054)
Edu	-0.06	(0.039)	-0.05	(0.047)	0.00	(0.115)	-0.04	(0.040)	0.00	(0.039)	**-0.07**	(0.030)
Health	0.03	(0.029)	-0.07	(0.052)	0.00	(0.215)	-0.02	(0.050)	0.00	(0.078)	-0.06	(0.052)
Cloth	0.00	(0.030)	-0.06	(0.041)	-0.10	(0.088)	-0.03	(0.049)	**-0.07**	(0.028)	-0.02	(0.033)
Aother	-0.03	(0.027)	-0.08	(0.058)	-0.25	(0.148)	**-0.23**	(0.068)	**-0.21**	(0.050)	-0.06	(0.043)
Trans	0.03	(0.090)	0.03	(0.092)	-0.23	(0.509)	-0.07	(0.088)	-0.13	(0.089)	-0.04	(0.080)
	Housing		Edu		Health		Cloth		Aother		Trans	
	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.	Val.	s.e.
Basics	**-0.05**	(0.015)	-0.25	(0.170)	-0.03	(0.140)	-0.05	(0.079)	**-0.12**	(0.028)	-0.05	(0.254)
Meats	**-0.08**	(0.019)	-0.04	(0.096)	0.00	(0.089)	0.00	(0.065)	**-0.10**	(0.034)	0.02	(0.102)
Dairy	-0.01	(0.028)	-0.05	(0.165)	0.03	(0.132)	**-0.16**	(0.057)	-0.04	(0.029)	-0.11	(0.210)
Fandv	**-0.02**	(0.010)	-0.03	(0.034)	-0.03	(0.040)	-0.03	(0.035)	**-0.09**	(0.020)	-0.05	(0.040)
Outside	0.01	(0.041)	-0.32	(0.233)	-0.14	(0.194)	-0.09	(0.067)	**-0.11**	(0.045)	-0.01	(0.137)
Other	-0.01	(0.009)	-0.06	(0.044)	-0.06	(0.042)	0.01	(0.023)	**-0.03**	(0.014)	-0.04	(0.042)
Housing	**-0.54**	(0.023)	**-0.56**	(0.141)	-0.20	(0.127)	-0.08	(0.065)	**-0.19**	(0.031)	-0.12	(0.197)
Edu	-0.01	(0.023)	**-0.57**	(0.157)	-0.12	(0.125)	-0.01	(0.041)	**-0.07**	(0.024)	0.08	(0.102)
Health	0.02	(0.017)	-0.13	(0.143)	**-0.42**	(0.178)	-0.06	(0.062)	**-0.05**	(0.022)	0.01	(0.199)
Cloth	0.00	(0.015)	-0.08	(0.080)	-0.10	(0.061)	**-0.36**	(0.059)	-0.03	(0.022)	-0.03	(0.062)
Aother	**-0.05**	(0.014)	**-0.54**	(0.072)	**-0.35**	(0.072)	**-0.09**	(0.047)	**-0.05**	(0.025)	0.01	(0.081)
Trans	-0.02	(0.053)	-0.10	(0.339)	-0.06	(0.286)	-0.09	(0.093)	-0.02	(0.046)	-0.59	(0.367)

Table 4 Average Uncompensated Price Elasticities for the Southeastern Region . Values in bold are significant at a 95% level. The table should be read column-wise.

2000 Northeastern Region (obs=1181)												
	Basics		Meats		Dairy		Fandv		Outside		Other	
Cons.	0.573	(0.065)	0.181	(0.099)	0.078	(0.108)	0.187	(0.072)	-1.087	(0.222)	0.298	(0.073)
Pbasics	-0.017	(0.010)	-0.001	(0.007)	0.004	(0.009)	-0.007	(0.006)	0.105	(0.020)	-0.020	(0.006)
Pmeats	-0.001	(0.007)	0.013	(0.008)	0.004	(0.007)	-0.003	(0.005)	0.019	(0.020)	-0.006	(0.005)
Pdairy	0.004	(0.009)	0.004	(0.007)	0.007	(0.011)	0.001	(0.006)	0.002	(0.022)	-0.004	(0.006)
Pfandv	-0.007	(0.006)	-0.003	(0.005)	0.001	(0.006)	-0.003	(0.005)	0.034	(0.014)	-0.005	(0.003)
Pout.	0.105	(0.020)	0.019	(0.020)	0.002	(0.022)	0.034	(0.014)	-0.189	(0.067)	0.055	(0.016)
Pother	-0.020	(0.006)	-0.006	(0.005)	-0.004	(0.006)	-0.005	(0.003)	0.055	(0.016)	0.000	(0.005)
Phouse	-0.056	(0.007)	-0.019	(0.009)	-0.011	(0.009)	-0.018	(0.005)	0.105	(0.024)	-0.025	(0.006)
Pedu	-0.010	(0.009)	-0.004	(0.009)	0.003	(0.010)	-0.002	(0.005)	0.029	(0.025)	-0.003	(0.006)
Phealth	0.053	(0.010)	0.015	(0.011)	0.005	(0.012)	0.015	(0.007)	-0.150	(0.025)	0.025	(0.008)
Pcloth	-0.005	(0.006)	0.001	(0.003)	0.000	(0.003)	0.001	(0.003)	-0.016	(0.014)	0.001	(0.004)
Paother	-0.014	(0.006)	-0.008	(0.004)	-0.005	(0.004)	-0.003	(0.003)	-0.045	(0.016)	-0.001	(0.004)
ln m	-0.062	(0.012)	-0.019	(0.015)	-0.005	(0.017)	-0.018	(0.010)	0.173	(0.038)	-0.030	(0.012)
(ln m)^2	0.001	(0.001)	0.000	(0.001)	0.000	(0.001)	0.000	(0.000)	-0.005	(0.002)	0.000	(0.001)
c.factor	n.a.	n.a.	0.058	(0.027)	0.058	(0.031)	-0.004	(0.021)	0.062	(0.017)	-0.021	(0.026)
Hhsize	0.008	(0.002)	0.004	(0.002)	0.001	(0.002)	0.000	(0.001)	-0.006	(0.005)	0.004	(0.002)
Kids	0.004	(0.002)	-0.003	(0.002)	0.003	(0.002)	0.000	(0.001)	-0.003	(0.007)	-0.001	(0.002)
H_own	0.010	(0.005)	-0.001	(0.004)	0.000	(0.004)	0.001	(0.002)	-0.051	(0.011)	-0.002	(0.003)
Rural	0.014	(0.005)	-0.008	(0.004)	-0.010	(0.003)	0.008	(0.002)	-0.001	(0.013)	0.006	(0.003)
Elec	-0.040	(0.008)	-0.014	(0.013)	-0.004	(0.009)	-0.013	(0.006)	0.058	(0.040)	0.002	(0.007)
Refrig	-0.010	(0.005)	0.015	(0.005)	0.008	(0.004)	0.004	(0.003)	-0.064	(0.014)	-0.004	(0.003)
R^2	0.382		0.067		0.073		0.120		0.162		0.151	
Expec.		0.085		0.052		0.034		0.026		0.097		0.051
Pred.		0.070		0.051		0.031		0.021		0.115		0.048
	Housing		Edu		Health		Cloth		Aother		Trans	
Cons.	1.003	(0.092)	-0.201	(0.136)	-0.838	(0.114)	0.061	(0.083)	0.179	(0.075)		
Pbasics	-0.056	(0.007)	-0.010	(0.009)	0.053	(0.010)	-0.005	(0.006)	-0.014	(0.006)		
Pmeats	-0.019	(0.009)	-0.004	(0.009)	0.015	(0.011)	0.001	(0.003)	-0.008	(0.004)		
Pdairy	-0.011	(0.009)	0.003	(0.010)	0.005	(0.012)	0.000	(0.003)	-0.005	(0.004)		
Pfandv	-0.018	(0.005)	-0.002	(0.005)	0.015	(0.007)	0.001	(0.003)	-0.003	(0.003)		
Pout.	0.105	(0.024)	0.029	(0.025)	-0.150	(0.025)	-0.016	(0.014)	-0.045	(0.016)		
Pother	-0.025	(0.006)	-0.003	(0.006)	0.025	(0.008)	0.001	(0.004)	-0.001	(0.004)		
Phouse	0.018	(0.014)	0.017	(0.010)	0.069	(0.013)	-0.002	(0.006)	-0.025	(0.007)		
Pedu	0.017	(0.010)	-0.086	(0.009)	0.033	(0.014)	-0.003	(0.007)	0.009	(0.008)		
Phealth	0.069	(0.013)	0.033	(0.014)	-0.093	(0.019)	-0.005	(0.010)	-0.012	(0.011)		
Pcloth	-0.002	(0.006)	-0.003	(0.007)	-0.005	(0.010)	0.037	(0.005)	-0.005	(0.003)		
Paother	-0.025	(0.007)	0.009	(0.008)	-0.012	(0.011)	-0.005	(0.003)	0.110	(0.004)		
ln m	-0.066	(0.015)	-0.090	(0.017)	0.147	(0.017)	0.002	(0.014)	0.016	(0.014)		
(ln m)^2	-0.001	(0.001)	0.011	(0.001)	-0.006	(0.001)	0.000	(0.001)	-0.002	(0.001)		
c.factor	n.a.	n.a.	0.172	(0.019)	0.080	(0.019)	0.046	(0.023)	n.a.	n.a.		
Hhsize	-0.003	(0.003)	-0.001	(0.003)	-0.005	(0.003)	0.001	(0.001)	-0.009	(0.002)		
Kids	-0.005	(0.004)	0.014	(0.003)	0.001	(0.004)	0.001	(0.002)	0.000	(0.002)		
h_own	0.040	(0.007)	-0.002	(0.007)	0.004	(0.007)	-0.002	(0.004)	-0.007	(0.004)		
Rural	-0.016	(0.007)	-0.002	(0.007)	-0.007	(0.009)	0.002	(0.004)	0.003	(0.005)		
Elec	0.009	(0.026)	0.018	(0.038)	-0.013	(0.028)	-0.003	(0.010)	-0.023	(0.012)		
Refrig	0.036	(0.009)	-0.002	(0.008)	-0.004	(0.010)	-0.007	(0.005)	-0.004	(0.006)		
R^2	0.328		0.430		0.133		0.231		0.526			
Expec.		0.292		0.044		0.043		0.061		0.132		0.082
Pred.		0.314		0.054		0.052		0.068		0.125		0.096

Table 5 (Adding-up: 1.05) *The first column represents the parameters names, and the first row the categories. Parameters that begin with p stand for price parameters, (ln m) and $(\ln m)^2$ are logarithm of income and the quadratic logarithm of income respectively. C. Factor is the censoring parameter in the model of Chapter 2. Three categories: basics, house and aother, did not need the censoring correction. Hhsize, kids, h_own and rural, elc, refrig are the parameters for the equation specific translating specifications. Expec is the current budget share, while pred .is the budget share obtained with the model.*

2000 Southeastern Region (obs=1094)												
	Basics		Meats		Dairy		Fandv		Outside		Other	
Cons.	0.754	(0.082)	0.259	(0.154)	-0.154	(0.164)	0.012	(0.076)	0.019	(0.272)	0.066	(0.066)
Pbasics	-0.066	(0.015)	-0.011	(0.011)	0.033	(0.010)	0.007	(0.006)	0.035	(0.019)	0.003	(0.005)
Pmeats	-0.011	(0.011)	0.010	(0.011)	0.014	(0.009)	0.009	(0.005)	0.009	(0.013)	-0.002	(0.004)
Pdairy	0.033	(0.010)	0.014	(0.009)	-0.024	(0.026)	0.001	(0.004)	0.002	(0.011)	0.005	(0.004)
Pfandv	0.007	(0.006)	0.009	(0.005)	0.001	(0.004)	0.006	(0.004)	-0.001	(0.005)	0.002	(0.002)
Pout.	0.035	(0.019)	0.009	(0.013)	0.002	(0.011)	-0.001	(0.005)	-0.001	(0.017)	0.004	(0.004)
Pother	0.003	(0.005)	-0.002	(0.004)	0.005	(0.004)	0.002	(0.002)	0.004	(0.004)	0.002	(0.002)
Phouse	-0.027	(0.008)	-0.027	(0.006)	-0.002	(0.006)	-0.007	(0.003)	0.001	(0.008)	-0.006	(0.002)
Pedu	-0.021	(0.011)	-0.004	(0.013)	0.008	(0.011)	0.004	(0.006)	-0.020	(0.015)	0.001	(0.005)
Phealth	0.069	(0.012)	0.019	(0.017)	-0.019	(0.013)	-0.004	(0.009)	-0.008	(0.025)	0.000	(0.007)
Pcloth	0.002	(0.008)	-0.002	(0.006)	-0.005	(0.005)	-0.001	(0.003)	-0.005	(0.006)	0.001	(0.002)
Paother	-0.009	(0.007)	-0.010	(0.006)	-0.007	(0.005)	-0.011	(0.003)	-0.014	(0.007)	-0.004	(0.002)
Ln m	-0.081	(0.016)	-0.026	(0.026)	0.025	(0.023)	0.006	(0.013)	0.004	(0.041)	0.000	(0.011)
(ln m)^2	0.001	(0.001)	0.000	(0.001)	-0.001	(0.001)	-0.001	(0.001)	0.002	(0.002)	0.000	(0.000)
c.factor	n.a.	n.a.	0.014	(0.036)	0.049	(0.058)	0.030	(0.027)	0.034	(0.044)	0.002	(0.025)
Hhsize	0.015	(0.002)	0.007	(0.002)	0.001	(0.003)	0.003	(0.001)	-0.008	(0.006)	0.002	(0.001)
Kids	0.003	(0.003)	-0.002	(0.003)	-0.001	(0.002)	0.000	(0.002)	-0.009	(0.006)	0.001	(0.001)
h_own	0.001	(0.007)	0.003	(0.007)	0.004	(0.004)	0.003	(0.004)	-0.038	(0.012)	-0.003	(0.004)
Rural	0.037	(0.007)	0.003	(0.006)	-0.004	(0.004)	0.008	(0.004)	-0.063	(0.014)	0.014	(0.003)
Elec	-0.012	(0.008)	0.045	(0.014)	-0.011	(0.008)	0.012	(0.006)	0.026	(0.025)	0.006	(0.005)
Refrig	-0.030	(0.007)	0.032	(0.006)	0.012	(0.005)	0.002	(0.004)	-0.070	(0.013)	-0.008	(0.003)
R^2	0.532		0.159		0.068		0.146		0.164		0.180	
Expec.		0.130		0.081		0.025		0.040		0.111		0.042
Pred.		0.121		0.079		0.029		0.041		0.117		0.041
	Housing		Edu		Health		Cloth		Aother		Trans	
Cons.	0.482	(0.087)	0.035	(0.126)	-0.830	(0.103)	-0.024	(0.106)	0.079	(0.078)		
Pbasics	-0.027	(0.008)	-0.021	(0.011)	0.069	(0.012)	0.002	(0.008)	-0.009	(0.007)		
Pmeats	-0.027	(0.006)	-0.004	(0.013)	0.019	(0.017)	-0.002	(0.006)	-0.010	(0.006)		
Pdairy	-0.002	(0.006)	0.008	(0.011)	-0.019	(0.013)	-0.005	(0.005)	-0.007	(0.005)		
Pfandv	-0.007	(0.003)	0.004	(0.006)	-0.004	(0.009)	-0.001	(0.003)	-0.011	(0.003)		
Pout.	0.001	(0.008)	-0.020	(0.015)	-0.008	(0.025)	-0.005	(0.006)	-0.014	(0.007)		
Pother	-0.006	(0.002)	0.001	(0.005)	0.000	(0.007)	0.001	(0.002)	-0.004	(0.002)		
Phouse	0.077	(0.005)	0.040	(0.009)	0.002	(0.012)	0.000	(0.004)	-0.029	(0.004)		
Pedu	0.040	(0.009)	-0.076	(0.010)	0.048	(0.012)	-0.002	(0.007)	0.009	(0.009)		
Phealth	0.002	(0.012)	0.048	(0.012)	-0.087	(0.020)	-0.011	(0.009)	-0.020	(0.011)		
Pcloth	0.000	(0.004)	-0.002	(0.007)	-0.011	(0.009)	0.031	(0.006)	-0.004	(0.003)		
Paother	-0.029	(0.004)	0.009	(0.009)	-0.020	(0.011)	-0.004	(0.003)	0.102	(0.004)		
ln m^{21}	0.020	(0.017)	-0.110	(0.018)	0.141	(0.016)	0.005	(0.015)	0.023	(0.015)		
(ln m)^2	-0.004	(0.001)	0.011	(0.001)	-0.005	(0.001)	0.000	(0.001)	-0.002	(0.001)		
c.factor	n.a.	n.a.	0.149	(0.019)	0.112	(0.021)	0.133	(0.030)	n.a.	n.a.		
Hhsize	-0.003	(0.002)	0.003	(0.003)	-0.003	(0.003)	0.001	(0.002)	-0.014	(0.002)		
Kids	-0.005	(0.003)	0.008	(0.005)	0.000	(0.003)	0.003	(0.002)	0.006	(0.003)		
h_own	0.032	(0.007)	-0.003	(0.007)	-0.002	(0.006)	-0.002	(0.004)	0.003	(0.005)		
Rural	-0.014	(0.008)	-0.002	(0.007)	0.020	(0.007)	0.008	(0.004)	-0.010	(0.007)		
Elec	-0.044	(0.015)	0.011	(0.016)	-0.018	(0.010)	-0.003	(0.008)	0.011	(0.011)		
Refrig	0.030	(0.008)	-0.001	(0.008)	0.013	(0.007)	-0.005	(0.004)	-0.002	(0.007)		
R^2	0.381		0.446		0.204		0.219		0.562			
Expec.		0.251		0.043		0.039		0.048		0.112		0.068
Pred.		0.249		0.059		0.048		0.058		0.090		0.116

Table 6 (Adding-up: 1.05) *The first column represents the parameters names, and the first row the categories. Parameters that begin with p stand for price parameters, (ln m) and (ln m)^2 are logarithm of income and the quadratic logarithm of income respectively. C. Factor is the censoring parameter in the model of Chapter 2. Three categories: basics, house and aother, did not need the censoring correction. Hhsize, kids, h_own and rural, elc, refrig are the parameters for the equation specific translating specifications. Expec is the current budget share, while pred .is the budget share obtained with the model.*

		1992	1996	2000	
General	NE	1.00	0.93	0.96	Graph 2
	SE	1.00	1.06	1.19	
Rural	NE	1.00	1.11	1.04	Graph 3
	SE	1.00	0.97	1.06	
Urban	NE	1.00	0.93	0.96	Graph 4
	SE	1.00	1.11	1.26	
Home owners	NE	1.00	0.89	0.94	Graph 5
	SE	1.00	1.03	1.21	
Non-home owners	NE	1.00	1.04	1.03	Graph 6
	SE	1.00	1.13	1.12	
Hhsize>=3	NE	1.00	0.91	0.94	Graph 7
	SE	1.00	1.07	1.22	
Hhsize<3	NE	1.00	1.07	1.12	Graph 8
	SE	1.00	0.98	1.14	
Low Income	NE	1.00	1.06	1.04	Graph 9
	SE	1.00	1.07	1.19	
High Income	NE	1.00	0.89	0.92	Graph 10
	SE	1.00	1.10	1.29	

Table 7 Weighted implicit standard of living indices (average) for the Northeastern Region (NE) and Southeastern Region (SE) in Mexico from 1992 to 2000.