POVERTY ESTIMATES AND TRENDS IN IRAQ: 2007-2012

Acknowledgements

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All the results and analysis presented in this note reflect a series of discussions and deliberations with the technical team from the Central Organization for Statistics and the Kurdistan Region Statistics Office led by the Ministry of Planning and International Cooperation under the able leadership of Dr. Mehdi al-Alaak.

Most importantly, we thank the multitude of field staff, enumerators, data entry operators, data analysts and all others associated with the IHSES surveys, led by Qusay Raoof.

The time from survey implementation to the presentation of poverty estimates comprised only 18 months. These surveys are a massive undertaking, under some difficult circumstances, and the high quality of the data is a testament to the commitment and hard work of the entire team. The culmination of these efforts, described in this note, was only possible because of the seamless collaboration across the Iraqi and World Bank teams.

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1. Introduction and context

The Iraq Household Socio-Economic Survey conducted in 2006-07 (IHSES 2007), was Iraq's first nationwide income and expenditure survey since 1988. Based on the model of the Living Standards Measurement Surveys, it covered more than 18,000 households, collected detailed data on all aspects of household income and expenditure and generated information on a wide variety of socio-economic indicators. It also formed the basis for updating the Consumer Price Index (CPI), from an outdated index based in 1990 to a revised index with the base year of 2007.

Detailed analysis of poverty, its incidence, characteristics, determinants and consequences, was undertaken using this comprehensive survey. Under the overall guidance of the Poverty Reduction Strategy High Committee (PRSHC) and a technical sub-committee, a poverty line was defined and adopted by the Council of Ministers. Detailed analysis of IHSES data is documented in the World Bank's poverty assessment for Iraq, *Confronting poverty in Iraq,* and informed the new National Strategy for Poverty Reduction, which was adopted by the Council of Ministers in late 2009.

Six years later, in 2012, the second round of the IHSES surveys was completed. Learning from past and international experience on survey design, implementation and sampling, IHSES 2012 also incorporated additional modules on areas of evolving interest. It is the most comprehensive socio-economic survey as yet undertaken in Iraq (Box 1).

Field work began January 2012 and was completed by February 2013. This was followed by an intensive process of data verification and cleaning, and data was ready to use for analysis by the middle of March. Building on enhanced capacity, experience and with the support of the World Bank, methodological improvements were implemented and poverty estimates were discussed with the core technical team from the Central Organization for Statistics (COS) and the Kurdistan Region Statistics Office (KRSO) within three short months. The high quality of the data in both 2007 and 2012 are a testament to the hard work and commitment of these agencies.

BOX 1: IRAQ HOUSEHOLD AND SOCIO-ECONOMIC SURVEYS

	IHSES 2007	IHSES 2012
Sample size	> 18,000 households	> 25,000 households
Survey months	November 2006-October 2007	February 2012-January 2013
Core information	Household roster, composition and demographics; Consumption and receipts of rations; Housing; Health; Education; Job Search, past and current Employment; Wages, earnings and income; Loans and Assistance; Activities; Consumption of food and non-food items; Time Use; Durable goods (limited information)	
Additional information		Anthropometrics; Access to Justice; Household Shocks and Coping Strategies; Durable goods (extended); Migration; Life Satisfaction; Recall food consumption (sub-sample)

This note was prepared as a complement to the presentation of the poverty estimates to PRSHC on June 30, 2013 in Erbil, Iraq. The objectives of this note are to:

(a) Describe the methodology and the improvements underlying the poverty line and estimates for 2012
(b) Present estimates of poverty for 2012
(c) Present comparable poverty trends for the period 2007-2012

The most significant innovation in methodology is to allow for region specific variation in non-food consumption items. World over, urban residents need a different set of non-food items- such as clothing, shelter, commuting and transportation-to satisfy a minimum standard of living, relative to their rural counterparts. Especially in growing and urbanizing economies, these differences become increasingly relevant over time. Due to these evolving conditions, many countries in the world are explicitly incorporating these features into their poverty line calculations. In the case of Iraq, urban areas demonstrate distinctly different patterns of consumption relative to rural areas. With this innovation incorporated into the revised methodology, Iraq is also joining this practice.

2. Poverty estimation methodology: Broad principles

Absolute poverty line

There are two broad classes of methodologies for estimating a poverty line: a "relative" and "absolute" approach. The "relative" poverty line is defined in terms of some percentage cut-off point in a welfare distribution, such as the bottom three deciles of the distribution of per capita total consumption expenditure. The "absolute" poverty line is explicitly fixed at a specific welfare level. In comparison to the "absolute" poverty line, the "relative" poverty line is appealing in that it is both simple and transparent; however, it provides little on poverty profiles over time and across regions because there is always a bottom 30 percent of the population irrespective of changes in living standards.

Based on the discussions following IHSES 2007, Iraq has chosen the "absolute" poverty line approach, as is the practice adopted in most developing countries, so that changes in poverty over time or across regions can be easily checked with reference to this same fixed poverty line. The absolute poverty line for Iraq is based on the Cost of Basic Needs approach (CBN).

Cost of Basic Needs approach

The CBN approach as applied in Iraq defines the poverty line as the level of expenditure that allows the households to spend just enough on food to meet a certain caloric threshold, and just enough to meet basic nonfood needs. The total poverty line is therefore calculated by adding up a food poverty line and a non-food poverty line.

How are these lines determined? The food poverty line in Iraq was fixed at a level equivalent to the expenditures needed to meet a minimal nutritional intake of 2337 calories per person per day (a threshold agreed upon in 2009).

In Iraq, the method outlined above is implemented to derive the food poverty line in the following way:

i. the households in the 2nd and 3rd deciles ranked by real per-capita total consumption expenditure are chosen as the reference group;
ii. all food items for which information on expenditure, quantity and estimated calorie value are available are selected;
iii. the aggregates of food expenditures and calorie intakes in the reference group are calculated;
iv. and the cost per calorie is derived by dividing the total expenditures divided by the associated calories, for the reference group.

The national food poverty line is defined at ID 50,473.26 per person per month in 2012, based on the approach described above.

This food poverty line obtained has to be translated into a poverty line that also incorporates the expenditure required to attain basic non-food needs.

Deriving the non-food component of the poverty line is less straightforward than deriving the food poverty line, since it is not clear what level of non-food expenditures should be defined as basic needs. The accepted best practice methodology under the CBN methodology is to anchor the relevant nonfood expenditures that constitute basic needs to the food poverty line.

The "lower bound" of the non-food poverty line is therefore defined as the *average per capita non-food expenditure of households whose per capita total expenditure is close to the food poverty line*. The logic behind this definition is as follows. Such households' non-food expenditure should be considered as absolutely necessary for sustaining the minimum living standards, simply because any amount of spending on non-food items for such households necessarily reduces their food expenditure below what is required to attain the minimum calorie requirement.

The "upper bound" is defined as the *average per-capita non-food expenditure of households whose per-capita food expenditure is close to the food poverty line*. The rationale for such an "upper bound" is as follows. The average non-food expenditures among households whose food expenditure is around the food poverty line is applicable to households that no longer need to sacrifice food expenditures necessary to meet the minimum calorie requirement in order to consume nonfood items. As long as the non-food poverty line is chosen from the range between the above lower and upper bounds, such an approach is justifiable. In the case of Iraq, the average of the lower and upper bounds was used to set the non-food allowance.

Thus, the total poverty line for Iraq is the sum of the food poverty line and the corresponding non-food allowance. The latter varies by region, and the methodology is described in more detail in the following section.

3. Methodological improvements for poverty measurement

There are three main ingredients of poverty measurement, listed below. Improvements and methodology and measurement were implemented in 2012 and made consistent with 2007 data. These are described in this section.

(i) An appropriately defined consumption expenditure or welfare aggregate

The consumption aggregate used as the basis for measuring poverty in Iraq consists of the following elements (these same elements were included for 2007 data): Food (including rations) ; Liquor and tobacco; Rents and housing expenditures; Durables; Education; Transport; Recreation; Communication; Utilities; Clothing; Household goods; and Other.

All these elements were valued according to the same methodology applied in 2007 with the exceptions of two elements – estimating the consumption flow from durable goods, and the valuation of rations. In these two cases, improvements in survey design or in methodology necessitated the adoption of a different, improved strategy for estimating expenditures.

(ii) Adjustments for price differences across space and time

Prices vary across space and time, and it is important to adjust consumption accordingly to ensure comparability. These temporal price adjustments take two forms: (a) adjusting for differences in prices in survey months within a particular year, to make consumption expenditures measured in May comparable with expenditures measured in December for instance; (b) adjusting for differences in prices across survey years, to make 2012 consumption expenditures comparable to those measured in 2007, for instance. Spatial price adjustment is critical especially where there are important differences in prices for food and non-food items across urban and rural areas and in different governorates.

The previous methodology adopted a Fisher price index formula based on survey-based prices or unit values. As described below, one significant improvement that is now possible with the new survey in 2012 is the use of the CPI for temporal adjustments (as is common practice across the world) because of significant improvements in CPI methodology in Iraq. Another enhancement is the use of the Paasche price index for spatial adjustment of prices to address what is an increasing reality in Iraq- significant differences in prices faced by households across different parts of the country.

(iii) Being sensitive to differences in consumption patterns across space

Even after addressing spatial differences induced by prices, there may be patterns of consumption that vary depending on where households live. For instance, in urban areas, households typically spend a larger share of their budgets on clothing, rents, and transportation, especially as the basic elements of non-food needs change.

The methodological innovation that has now been introduced is to allow for these variations to be reflected in region-specific non-food allowances. This essentially implies that the poverty line is sensitive to the varying definition of what constitutes basic needs in each region.

In what follows, each of these elements will be elaborated in more detail. This will be followed by construction of a revised poverty line, incorporating these methodological changes, and subsequently, a description of key results.

(i) Constructing the welfare aggregate

As mentioned above, the components of the consumption expenditure aggregate are identical to what was agreed upon for IHSES 2007. However, deliberate improvements in survey design were implemented in 2012 for capturing the flow of services from durables which induces the adoption of a better methodology for calculation of consumption flows. A second change is in the way in which subsidized and almost universally provided food items are measured and valued. Each of these is described in turn below.

Durables

One important characteristic about durable goods is that they last for several years and therefore, it is the *value of the service* that the household receives from these goods which must be included in the welfare aggregate. Since the value of the service or use is rarely observed, it needs to be estimated. Typically, it is assumed to be proportional to the *stock* of the good held by the household. In other words, this is the *annual cost* of holding the stock of each durable and it is approximated by the addition of three main components: the loss in real value of the money invested in the good over the reference period (i.e. inflation); the opportunity cost of the money (i.e. interest rate); and the erosion of the value of the good over the reference period (i.e. depreciation).[1]

Empirically, this is approximated by:

$$V_d^h = \sum_{d=1}^{D} v_t^d \left(r_t - \pi_t + \delta^d\right)$$

where v_t^d = current value of the durable good; r_t = nominal interest rate at time t; π_t = inflation rate for each durable good at time t and δ^d = depreciation rate for the durable and D is the total quantity of durables.

To implement this estimation methodology, significant improvements were made in the questionnaire in 2012 to be able to estimate the flow of consumption from durable goods. This was not possible in 2007 as the survey did not collect information to be able to estimate depreciation rates.

Based on analysis of IHSES 2007, eight important durable goods were identified as being the most important. For this set of goods, additional information was collected on date of manufacture, date of purchase and purchase prices. This information enables the application of best practice methods to estimate depreciation rates and therefore, the flow of services from these durable goods (see annex for

[1] This cost is estimated from a conceptual experiment in which the household buys the durable good at the beginning of the period and sells it again at the end. For further discussion see Deaton and Zaidi (2001) or Deaton and Mullebauer (1980)

details). Depreciation rates were allowed to vary by governorates and to some extent, by the age of the durable good. These direct estimates of depreciation rates where then incorporated into a revised measure of flow of services from durable goods in 2007; and this improved methodology was applied in a comparable manner to the extent possible.

Rations

In the case of Iraq, an important element of food consumption comes in the form of rations, or food items distributed through the Public Distribution System. These food items are universally distributed, consumed by the vast majority of the Iraqi population, and are an important source of calories, especially for the poor.

The IHSES surveys collect information about the quantity of ration items received, consumed and purchased. The previous methodology used a notion of 'net quantity received' and purchases of ration items recorded in the diary on a monthly basis (very few transactions) to measure the quantity of rations consumed. The former is the quantity of ration items received, net of amounts bartered, sold, or given away. However, this measure has no clearly defined recall period, such as the last week or the last month. Moreover, since receipts are not consumption, they may not reflect utility. Two households who receive the same amount of rations, but consume very different amounts, derive different utility from rations.

The IHSES surveys also include a direct question on consumption of ration items within the last 30 days. This is a more accurate measure of consumption, with a clear recall period, and equal consumption implies equal utility derived for households. This is the primary measure of consumption of ration items in the revised methodology. Purchases of ration items in the diary (over the last week) are converted into monthly equivalents, and also included, as households who purchase additional rations on the market must be assigned higher consumption and thereby utility.

How is this important component of food consumption to be valued? In principle, goods and services ought to be valued equal to their infra-marginal benefit; i.e.; the market price faced for the marginal unit consumed. In the case of Iraq, ration items are rarely traded and in this sense, a market-equivalent price does not exist. A few transactions are recorded in the diary but these are insufficient to calculate unit values, and moreover, are associated with a select few households who are quantity constrained (see annex for more details). So these unit values cannot be used to value all ration consumption.

Another possibility is to use official prices for ration items, which are very low, nominal prices paid by consumers. Using these heavily subsidized prices would artificially suppress the value of food expenditures stemming from rations. Moreover, rations should be valued at a price close to one at which we expect these items to be traded; and official prices are not the prices at which households can procure unlimited quantities.

Is there a close substitute to ration items that are traded in the market? In the case of Iraq, unit values for these substitutes are significantly higher for some items, especially rice, suggesting important quality

differences. This implies that market prices for commercially available items cannot be used because they are not perfect substitutes.

The only remaining candidate to value rations is a question that asks households their opinion on how much they would pay for ration-equivalent items in the market. In practice, few households expressed an opinion, and enumerators approached the local ration agent in the cluster, in a manner akin to a price survey. However, there were variations in these prices that may reflect uncertainty, noise and local variations in supply, demand and quality. In order to ensure that all those who consume exactly the same amount of a ration item are assigned the same expenditure; and that this expenditure increases with higher consumption; it was decided to use the national median values of prices reported by ration agents to value ration items.

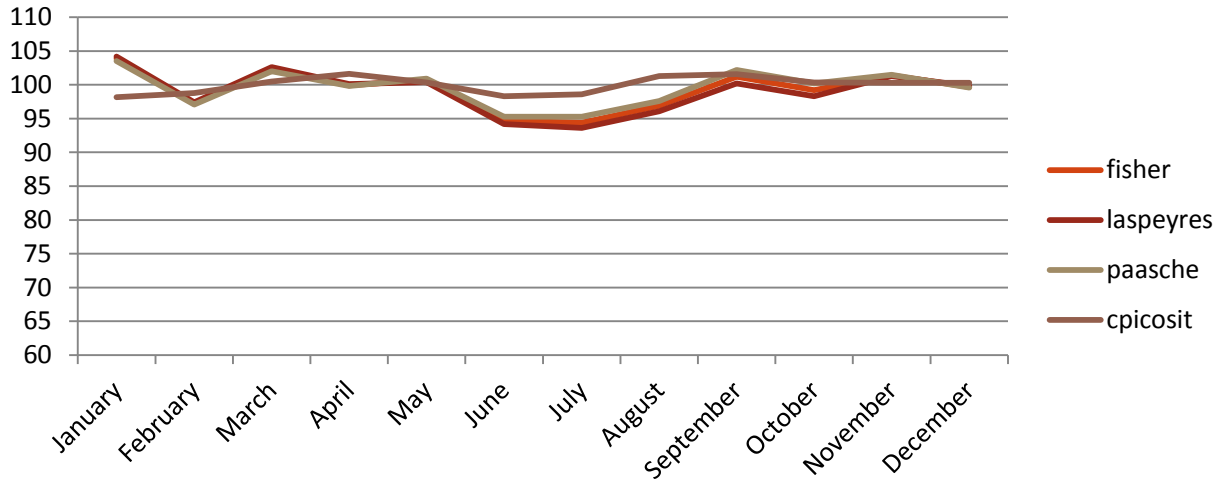
(ii) Price adjustments for time and space

Many countries depend on their CPIs for temporal price adjustments. In the case of Iraq, the 2007 consumption aggregates relied exclusively on survey based price indices for price adjustments. The use of the CPI for month-to-month price adjustments was not possible for IHSES 2007. At that time, the CPI in use was significantly outdated, and the base year was 1990. Moreover, unit value based price indices calculated on the basis of IHSES 2007 indicated important differences in trends and magnitude across survey months when compared to the old CPI. Therefore, a decision was rightly made to use survey based Fisher price indices to adjust for month-to-month inflation.

In IHSES 2012, however, unit value or survey based price indices were found to be very consistent with the CPI series (revised on the basis on IHSES 2007, with base year 2007) in levels and in trends. This consistency indicates substantial improvements in the CPI methodology and also allows for greater transparency in the calculation of real consumption. Therefore, it was decided to use the official CPI for converting nominal consumption expenditures across different months within the survey year into real consumption expenditures.

The improvements in methodology in the new CPI also imply that they can be used to reliably adjust nominal expenditures over survey years (such as 2007 and 2012), so that poverty lines and consumption expenditures are expressed in comparable terms. Figure 1 below shows the consistency between the CPI and survey based price indices.

FIGURE 1: CONSUMER PRICE INDEX AND SURVEY (UNIT-VALUE) BASED PRICE INDICES: A COMPARISON USING IHSES 2012



Early analysis of IHSES 2012 suggests that there are important differences in prices across Iraq. In this context, the choice of the price index formula can be important in how well it accounts for spatial price variations. The Paasche and Laspeyres indices vary in how the relative prices of a good faced by a household are weighted. In the case of the former, these relative prices are weighted by the budget share of the item for the household itself, i.e., if a household spends a large share of its total budget on a certain item, it receives a higher weight. In contrast, the Laspeyres formulation weights the relative prices according to the budget share of that item for a hypothetical reference household. In this case, all prices faced by households, irrespective of their consumption of an item, receive the same weight as that of the reference household. These formulations are shown below, as well as the formula for the Fisher index, which is the geometric mean of the two indices (Box 2).

BOX 2: PRICE INDICES

Paasche index: $P_P = \left(\sum_{k=1}^{K} w_{hk} * \frac{P_{Rk}}{P_{hk}}\right)^{-1}$

Laspeyres index: $P_L = \sum_{k=1}^{K} w_{Rk} * \frac{P_{hk}}{P_{Rk}}$

Where w_{hk} refers to budget share of item k for household h; R refers to reference

Fischer index: $P_F = \sqrt{P_P * P_L}$

The implications of the choice of price index are therefore non-trivial if there are significant differences in relative prices faced within a country and if the hypothetical reference household is not representative of significant parts of the country, but is nevertheless an *average* of the nation. If this is the case, Paasche allows the most flexibility to incorporate these differences in relative prices and budget shares.

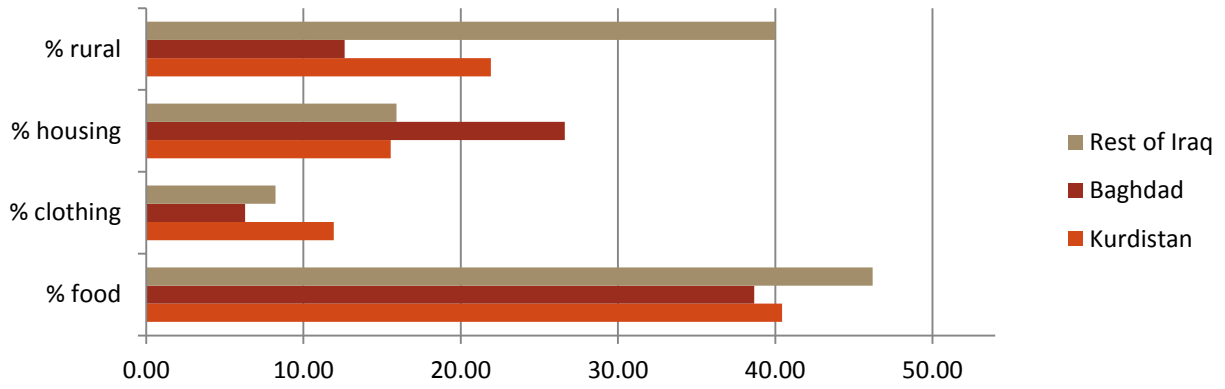
To this end, it was agreed to use the Paasche formula for the spatial price index. Unlike other candidate measures, Paasche incorporates the quantities of each item consumed by the household and weights them accordingly. As with other indices, Paasche can be constructed at the national, regional or governorate level. The most flexible form of the index is when it allows each household's consumption to vary in its formulation. Indeed, Deaton and Zaidi (2002) recommend the use of the Paasche price index constructed at the household level, and this is the approach implemented for Iraq.

(iii) Accounting for regional differences in non-food consumption patterns

One important trend that has become increasingly important in Iraq over the last six years is the significant differences in consumption patterns, in particular non-food consumption, across different regions of Iraq. Spatial price adjustments can only take into account the effect of differing prices faced by households who live in different regions. This still leaves the issue of differences in the pattern of consumption itself, i.e., the items that are typically consumed by households.

Figure 2 plots the variation in the expenditure shares of basic needs- food, housing, and clothing- as well as the degree of urbanization, across Iraq, after taking into account spatial price differences. Thus, in the case of Iraq, this implies that in setting the poverty line, the non-food allowance needs to be sensitive to regional differences.

FIGURE 2: SPATIAL VARIATIONS IN CONSUMPTION ACROSS IRAQ



Ravallion and Bidani (1994) highlight the approach to be followed to allow for differences in the basic non-food goods needed to achieve the same standard of living in the various sectors or regions. The non-food allowance, i.e., the identification of the upper and lower bounds used to define the magnitude of the non-food allowance be calculated separately by each region.

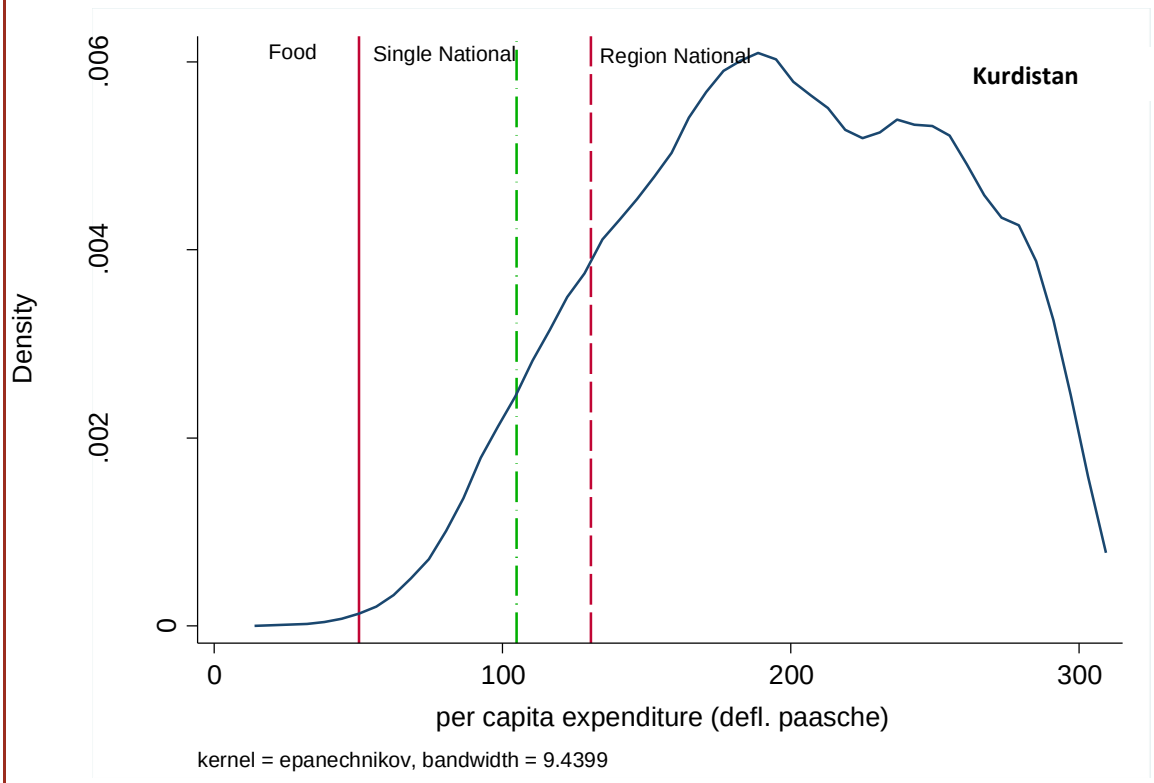
Many countries currently implement this strategy to better account for spatial differences: countries that allow the non-food allowance to vary spatially include Indonesia, Egypt, Argentina, Bolivia, Afghanistan, Colombia, Costa Rica, Mexico, Paraguay, Tanzania, Peru and Uruguay.

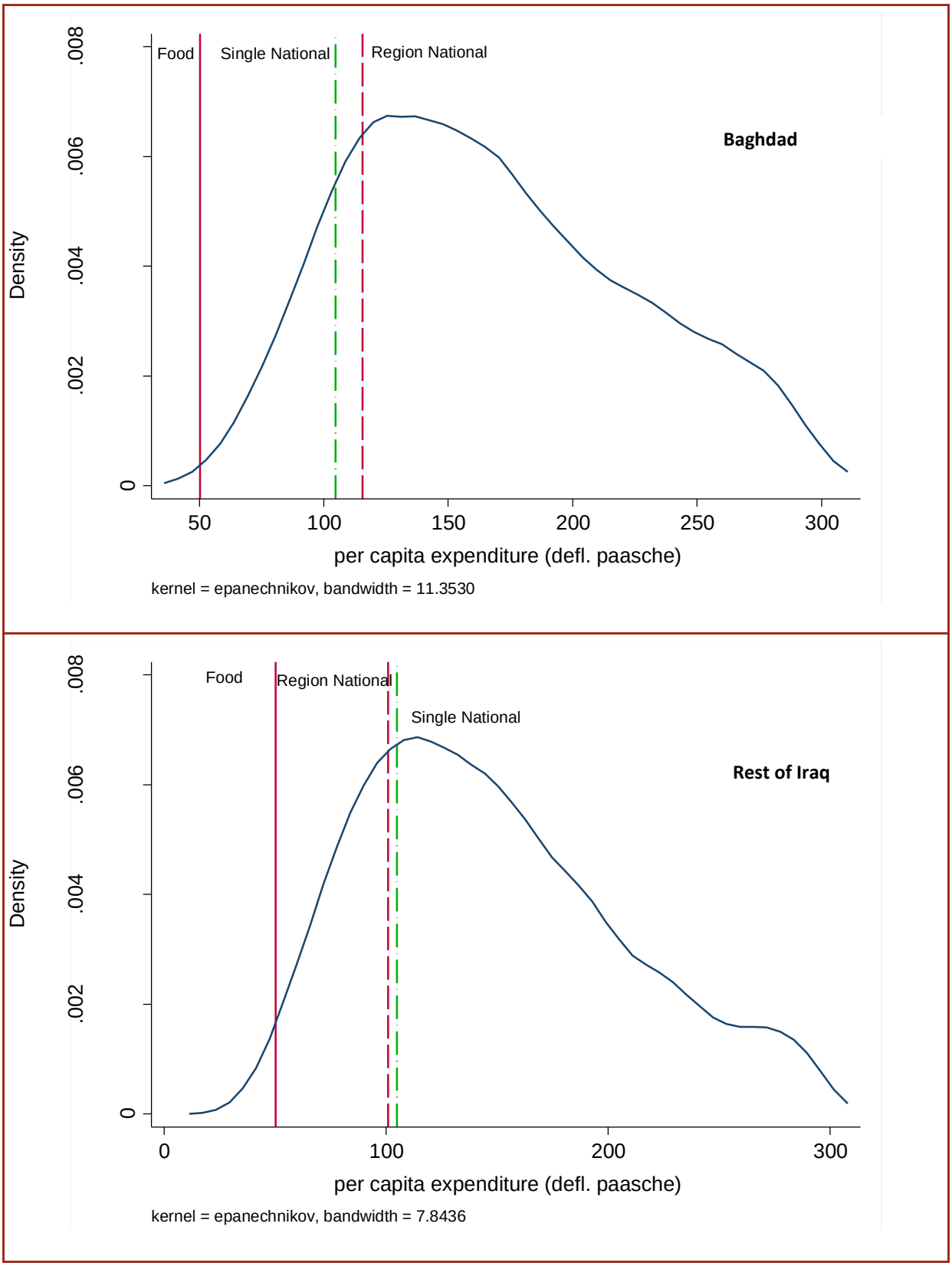
To account for these increasingly important differences in consumption expenditure across space in terms of non-food items- for instance, clothing and shelter – we allow the regional non-food allowances to vary by region in the case of Iraq. This implies that for a given national food poverty line, the corresponding non-food allowances are defined according to the distribution of consumption within that particular region.

In contrast to using a single national non-food allowance, this approach takes into account that in certain regions in Iraq, households spend more on certain basic non-food needs, such as clothing, housing costs (rents), transportation, etc.

In more urbanized regions, such as Kurdistan and Baghdad, the implied non-food allowance calculated at a regional level is higher than what would have been obtained at a national level (Figure 3). This implies that the cost of basic non-food items, such as clothing and shelter, which are faced by the reference food-poor household in these regions, is higher than the national average.

FIGURE 3: REGIONAL NON-FOOD ALLOWANCES INCORPORATE DIFFERENCES IN CONSUMPTION ACROSS REGIONS




Food
Single National
Region National
Baghdad
Density
0
.002
.004
.006
.008
50
100
150
200
250
300
per capita expenditure (defl. paasche)
kernel = epanechnikov, bandwidth = 11.3530
Food
Region National
Single National
Rest of Iraq
Density
0
.002
.004
.006
.008
0
100
200
300
per capita expenditure (defl. paasche)
kernel = epanechnikov, bandwidth = 7.8436

This approach, which was presented and discussed in detail in May with the core technical team, is the most significant innovation in methodology that has applied in this round. It was universally accepted as the most appropriate methodology to reflect the diversity in basic needs across Iraq as well as the evolving realities on the ground. These spatial differences in consumption patterns will also become increasingly important as Iraq transitions onto a stable development path.

4. Comparability with 2007

In order to assess trends in poverty, we first need to ensure comparability between the two survey years of 2007 and 2012. This implies that the significant advances in methodology and measurement that were implemented with IHSES 2012 data are also taken back to 2007 data so that the consumption expenditure aggregate was consistent and comparable. Price adjustments were also implemented in accordance with the revised methodology as far as possible.

First, the consumption aggregate for 2007 was re-estimated to take into account the measurement changes for rations and for a better estimate of the flow of services from durable goods. In the case of rations, all the data necessary to implement the improved measurement was available in 2007 and it was straightforward to re-estimate expenditures on rations, based on quantity consumed in the last month, and monthly diary purchase quantities, valued at the ration agent's cluster median price (at the national level). For durable goods, depreciation rates were estimated (varying by good, governorate and a proxy for age) based on 2012 data. These depreciation rates were then applied to the same set of 8 durable goods using 2007 data, and consumption flows were re-estimated.

Second, Paasche price indices were used for construction of spatial and temporal price deflators in 2007. Unlike in 2012, temporal price adjustments were not possible using the new CPI as 2007 was the base year for the CPI. However, the demonstrated equivalence between survey based price indices and CPI in 2012, serves as a key indicator that the use of survey based prices for temporal price adjustments in 2007 would have yielded very similar results as the use of CPI, had it been usable.

Finally, the CPI was used to make consumption expenditures and poverty lines comparable across survey years, as is described in more detail below.

5. Poverty lines for 2007 and 2012

The implementation of this improved methodology, i.e., a single food poverty line for Iraq as a whole, with regionally varying non-food allowances, yields three regional poverty lines in 2012. Poverty lines for 2007 are calculated by deflating these 2012 poverty lines by the cumulative rate of inflation over the period 2007-2012, i.e., by dividing the poverty lines for 2012 by 1.41. These are shown below.

TABLE 1: POVERTY LINES (ID PER PERSON PER MONTH)	2007	2012
Food poverty line	35796.64	50473.26
Kurdistan poverty line	101000.5	142410.7
Baghdad poverty line	82223.19	115934.7
Rest of Iraq poverty line	72110.57	101675.9

Consistency with a single national poverty line

The methodology of applying region-specific non-food allowances does not necessarily imply that Iraq adopts three regional poverty lines. The latter is equivalent to using a single total national poverty line, with appropriately adjusted regional real per capita consumption expenditures.

To implement this approach, we first calculate the weighted average of the three regional poverty lines (Z_r , r = Kurdistan; Baghdad; Rest of Iraq), called Z_w . Then, a regional adjustment factor is defined that is equal to the regional poverty line divided by the national poverty line. For a region r, the adjustment factor is given by: $A_r = Z_r / Z_w$

Finally, real per capita consumption expenditures in a particular region are divided or adjusted by the corresponding adjustment factor. This approach adjusts consumption expenditures in different regions so that a single national poverty line yields the same poverty rates as with regional non-food allowances. In effect, this affords the Government of Iraq flexibility in terms of representation, i.e., a single national poverty line with regionally adjusted consumption; or, three regional poverty lines. In turn, regional policies can be anchored to the regional poverty line, to effectively identify the poor within their regions. This approach is demonstrated in the table below.

TABLE 2: CONSISTENCY WITH A SINGLE NATIONAL POVERTY LINE

	Real per capita expenditure	Total poverty line (regional non-food allowances)	Real per capita consumption (adjusted)	Adjustment factor	Single national poverty line
Kurdistan	317.89	142.41	246.34	1.29	110.36
Baghdad	236.02	115.93	224.67	1.05	110.36
Rest of Iraq	191.85	101.68	208.24	0.92	110.36
Note: Real consumption and poverty lines are expressed in '000s ID per month					

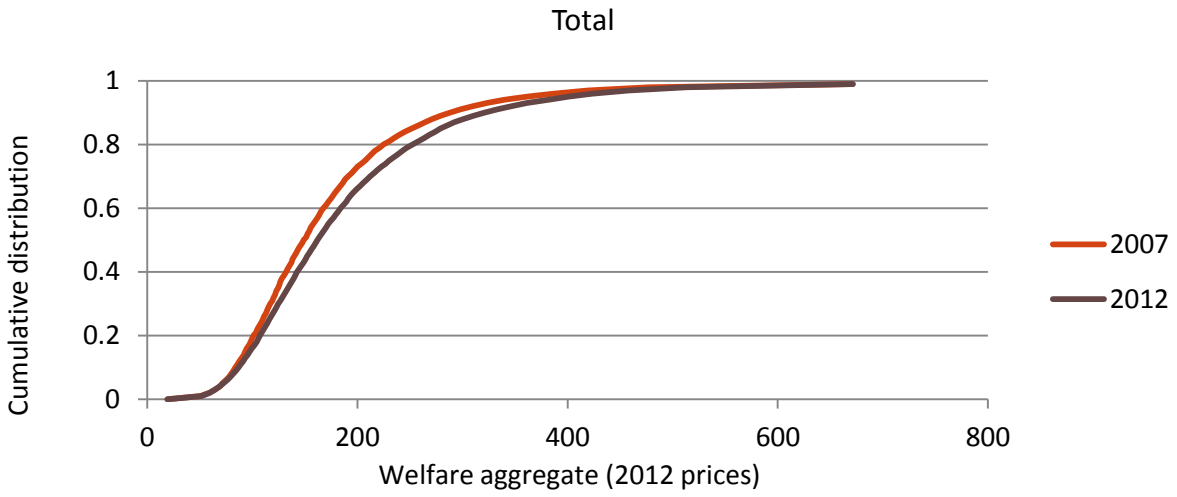
6. Main Results

A secular improvement in consumption expenditures between 2007 and 2012

The period between 2007 and 2012 has been marked by a significant increase in consumption expenditures. The consumption distribution in 2012 stochastically dominates that in 2007 (Figure 4).

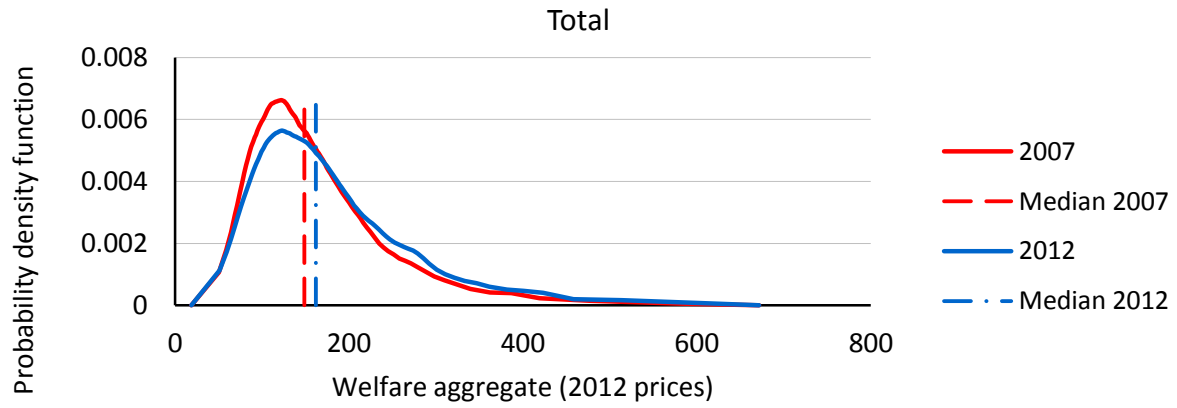
This implies that irrespective of where the poverty line is set (barring an extreme shift in the poverty line), the proportion of people below that line in 2012 is lower than 2007.

FIGURE 4: CUMULATIVE DENSITY OF CONSUMPTION EXPENDITURES: 2007-2012



These improvements in welfare, especially for those with lower consumption expenditures is also evident in the probability density functions (figures below), which clearly show the increase in median consumption expenditures over this six year period. These improvements in welfare were widespread and evident in rural as well as urban areas.

FIGURE 5: PROBABILITY DENSITY FUNCTION OF CONSUMPTION: 2007 AND 2012



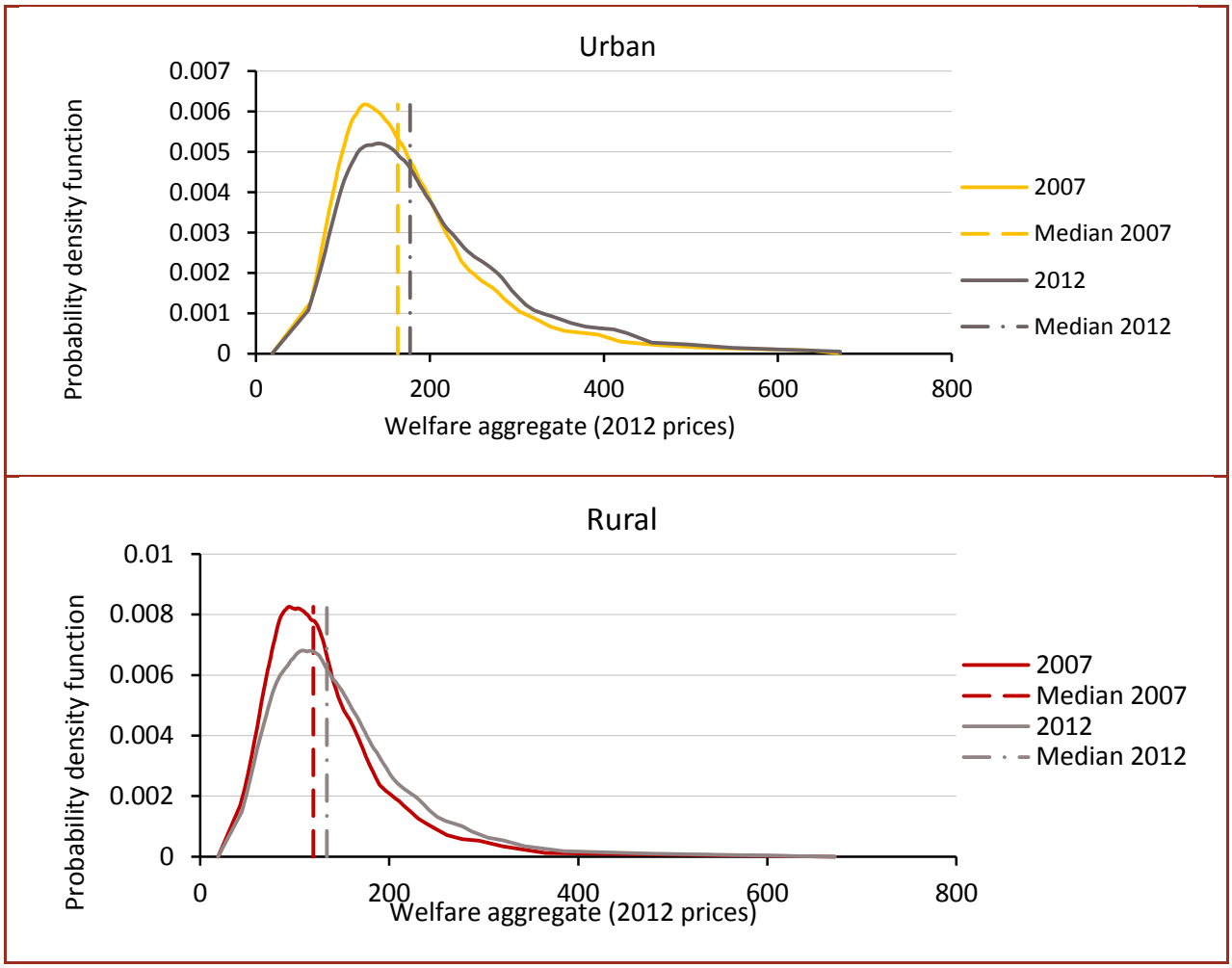


Table 3 provides more details on average and median per capita consumption expenditure (expressed in 2012 terms) in 2007 and 2012, its growth, and consumption inequality as measured by the Gini coefficient. Inequality in consumption in Iraq was low in 2007 and has not significantly increased over time. Consumption per capita particularly increased in rural Iraq over 2007-2012, and this is good news as poverty rates in 2007 were higher in rural areas.

TABLE 3: MEAN AND MEDIAN PER CAPITA CONSUMPTION EXPENDITURE ('000S ID PER PERSON PER MONTH), GROWTH, AND THE GINI COEFFICIENT

	Mean	Median	Gini Coefficient
2007			
Urban	191.1	163.1	28.0
Rural	133.7	119.8	25.5
Total	174.6	148.9	28.6

2012			
Urban	207.7	177.1	28.9
Rural	152.9	133.9	27.8
Total	190.4	161.9	29.5
Percentage change			
Urban	8.6	8.6	
Rural	14.4	11.8	
Total	9.0	8.8	
Change			
Urban			0.9
Rural			2.3
Total			0.9
Note: Changes shown between years 2007 and 2012			

These patterns and trends are also mirrored at the sub-national or regional level, although average and median consumption in the Kurdistan region did not change much over the six year period spanning 2007 and 2012. The latter is consistent with any region in the world where poverty rates are low to begin with and improving welfare becomes more difficult at the margin. The ongoing work on poverty mapping will be particularly relevant in similar parts of Iraq to identify pockets of poverty.

The largest increases in average consumption happened in governorates other than Baghdad and those in the Kurdistan region (Table 4). This is also an encouraging trend as these governorates are also those which had higher rates of poverty in 2007.

TABLE 4: MEAN AND MEDIAN PER CAPITA CONSUMPTION EXPENDITURE, GROWTH, AND THE GINI COEFFICIENT ACROSS SUBNATIONAL REGIONS

	Mean	Median	Gini Coefficient
2007			
Region			
Kurdistan	277.9	236.2	29.1
Baghdad	184.0	162.5	24.7
Rest of Iraq	150.2	132.1	25.7
Total	174.6	148.9	28.6
2012			

Region			
Kurdistan	279.0	243.0	27.5
Baghdad	201.4	171.6	27.4
Rest of Iraq	167.8	146.4	27.9
Total	190.4	161.9	29.5
Percentage change			
Region			
Kurdistan	0.4	2.9	
Baghdad	9.5	5.6	
Rest of Iraq	11.7	10.8	
Total	9.0	8.8	
Change			
Region			
Kurdistan			-1.6
Baghdad			2.7
Rest of Iraq			2.2
Total			0.9
Note: Changes shown between years 2007 and 2012			

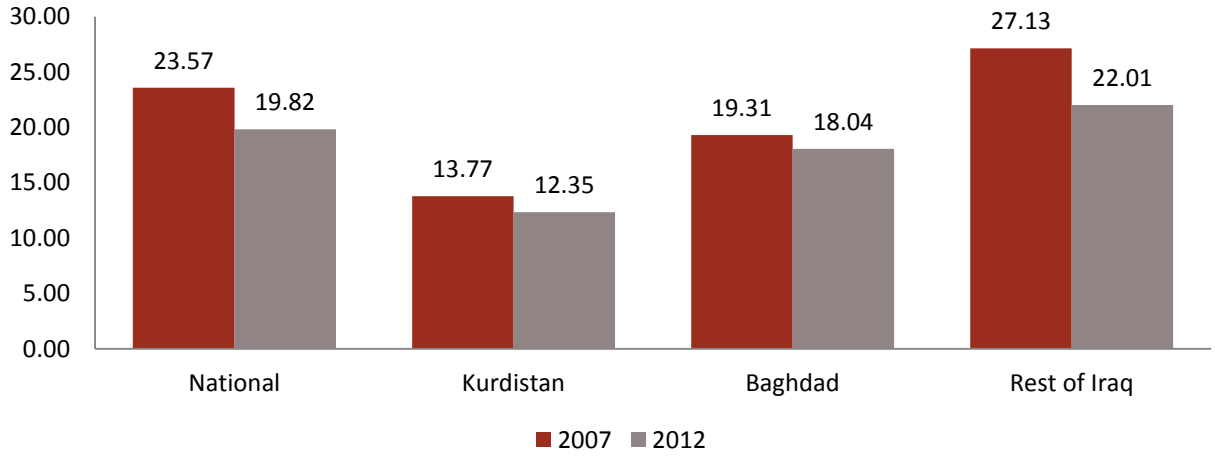
Poverty estimates for 2012 and Trends in poverty between 2007 and 2012

The table below shows poverty headcount rates for 2012, incorporating all the methodological improvements documented above, and applying the regional poverty lines that account for varying non-food consumption patterns. As expected, poverty rates are lower in Kurdistan region relative to Baghdad and other governorates.

TABLE 5: POVERTY HEADCOUNT RATES (PERCENT)	**2012**
National	19.82
Kurdistan	12.35
Baghdad	18.04
Rest of Iraq	22.01

Table 6 shows comparable trends in poverty over the six year period spanning 2007 and 2012. Over this time, poverty in Iraq as a whole declined by 3.75 percentage points. Poverty fell in all three regions, although the largest decline of 5 percentage points came from outside the Kurdistan region and Baghdad.

TABLE 6: TRENDS IN POVERTY HEADCOUNT RATES (PERCENT)	2007	2012
National	23.57	19.82
Kurdistan	13.77	12.35
Baghdad	19.31	18.04
Rest of Iraq	27.13	22.01



Over and above the improvement in headcount rates, the intensity of poverty has also declined over time in rural and urban parts of Iraq. The poverty gap measures the amount of resources (as a percent of the poverty line) it would take on average to lift all poor people up to the poverty line. Compared to 2007, this gap declined by 1.7 percent in rural areas in 2012. In general, where poverty rates were the highest, the resources needed to pull people up to the poverty line have declined over time.

TABLE 7: FGT INDICES: HEADCOUNT, POVERTY GAP AND SQUARED POVERTY GAP

	Poverty Headcount Rate			Poverty Gap			Squared Poverty Gap		
	2007	**2012**	**Change**	**2007**	**2012**	**Change**	**2007**	**2012**	**Change**
Total poverty line									
Urban	17.4	14.8	-2.5	3.0	2.7	-0.2	0.8	0.8	0.0
Rural	38.9	30.6	-8.3	9.1	7.4	-1.7	3.1	2.6	-0.6
Total	23.6	19.8	-3.7	4.7	4.2	-0.5	1.5	1.3	-0.1
Food poverty line									

Urban	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rural	2.9	2.2	-0.6	0.4	0.3	-0.1	0.1	0.1	0.0
Total	1.0	0.9	-0.1	0.1	0.1	0.0	0.0	0.0	0.0
Note: Changes shown between years 2007 and 2012									

Turning to regional trends in the distribution of the poor, overall, there has been little change. 72 percent of Iraq's poor and almost all of Iraq's food poor live in governorates outside of the Kurdistan region and Baghdad.

TABLE 8: HEADCOUNT RATIO BY SUBNATIONAL REGIONS

	Poverty Headcount Rate			**Distribution of the Poor**			**Distribution of Population**		
	2007	**2012**	**Change**	**2007**	**2012**	**Change**	**2007**	**2012**	**Change**
Total poverty line									
Region									
Kurdistan	13.8	12.3	-1.4	7.5	8.7	1.1	12.9	13.9	1.0
Baghdad	19.3	18.0	-1.3	19.2	19.3	0.1	23.4	21.2	-2.2
Rest of Iraq	27.1	22.0	-5.1	73.3	72.1	-1.2	63.7	64.9	1.2
Total	23.6	19.8	-3.7	100.0	100.0	0.0	100.0	100.0	0.0
Food poverty line									
Region									
Kurdistan	0.1	0.1	0.0	1.4	0.9	-0.5	12.9	13.9	1.0
Baghdad	0.1	0.0	-0.1	2.6	0.4	-2.2	23.4	21.2	-2.2
Rest of Iraq	1.5	1.4	-0.1	96.0	98.7	2.7	63.7	64.9	1.2
Total	1.0	0.9	-0.1	100.0	100.0	0.0	100.0	100.0	0.0
Note: Changes shown between years 2007 and 2012									

Many Iraqi governorates have witnessed significant declines in poverty of more than 10 percentage points between 2007 and 2013: these include Salahuddin, Kerbala, Babil, Diala, Basrah, and Al-Anbar. Wasit, Al-Najaf, Duhouk, Karkouk and Baghdad saw smaller declines in poverty, and Suleimaniya and Erbil saw little change. Poverty rates over the period 2007-2012 increased in only five governorates – Al-Muthanna, Thi-Qar, Al-Qadisiya, Nineveh and Missan.

In conclusion, the policies adopted under the Poverty Reduction Strategy, with their focus on rural areas, appear to have paid off. However, it would be instructive to undertake more detailed analysis of the determinants of poverty and poverty reduction based on new IHSES data. A critical area for policy reform which is under consideration by the Government of Iraq is the Public Distribution System (PDS). As has been amply demonstrated, there is much to be gained from reforming the PDS to make it more efficient and effective. One of the elements of this reform that has been under consideration is moving to a targeted system. This will imply that the poor who rely on the PDS as a source of calories would be protected while at the same time, resources would be freed to design programs that address other constraints. For example, Kurdistan, which accounts for the smallest share of Iraq's poor population, will have much to gain from a broader package of policies that target other dimensions of poverty such as unemployment, housing and education. Similarly, rapidly growing Baghdad would benefit from diversifying the programs that cater to its vulnerable and poor population. At the same time, it will be important to further the momentum of poverty reduction among Iraq's rural poor.

7. Annexes

A.1: Price adjustments

Comparisons of nominal consumption expenditures between households may be misleading when there are price differences between geographical divisions or periods of time. For instance, two households (H1 and H2) may expend exactly the same amount of money (E1 = E2) making them equally well off. [2] However, the first one lives in an area where prices of goods are lower than that of the other area (P1 < P2), H1 could purchase more quantities of goods than H2 (Q1 >Q2). Alternatively, H1 could use the savings from lower prices towards other consumption. In this case, equal expenditures will not reflect the difference in utility levels that each household achieves through its maximization problem. In other words, the utility rank order among households has been distorted in this particular case by spatial price differences.[3] In general, when consumption expenditure is no longer utility consistent, price adjustments must be made i.e. *spatial* and/or *temporal* adjustment.

The usual approach to control for these price differences is implementing a price index. These indices tend to look quite similar when neither relative prices nor consumption patterns change very much over time or across space; making the specific choice less relevant. However, this is not the case in Iraq. The table below shows the 251 food and 63 non-food items that account for more than 1% of average household expenditure when focusing only on *consumption patterns* across space (i.e. by governorate and area). For instance, for food items: commercial imported rice accounts in most governorates for around 3% of average household expenditure but more than 5% in Kurdistan region with a maximum of

[2] Both households are exactly the same except that H1 lives in area A and H2 lives in area B and the only difference between them are reflected on prices of goods. Preferences and composition of both households are the same.
[3] It is also likely to find a similar case when comparing prices across time. Therefore, temporal price adjustment is needed.

13% of average household expenditure in rural Sulaimaniya. Frozen mutton account for more than 11% of average household expenditure in governorates of Kurdistan region while dried fish and animal fat account for similar budget share in Nainawa, Kerbela, Diyala, among others. However, fresh water fish is consumed equally across space.

Items per governorate and rural/urban	Food	Non food
Number of items that account for more than 1% of average household expenditure	251	63
Number of items that account for more than 5% of average household expenditure	119	8
Number of items that account for more than 10% of average household expenditure	57	1

Source: Own estimations based on HSES II

As in many other countries, Iraq also shows larger divergences among consumption patterns of non-food items across space relative to food items. While automobiles and television sets are relatively more important in Kurdistan region; refrigerators and costs of LPG are in Anbar, Wasit, Maysan, among others.[4] Similarly, as the survey spans several months, temporal price differences are also evident in the data, and must be similarly accounted for.

There are different price indexes such as Laspeyres and Paasche as well as superlative index such as Fisher. The Laspeyres index calculates the relative cost in each region (period) of buying the base region (period) basket of goods. It uses the same weights for all households

$$P_L = \sum_{k=1}^{K} w_{Rk} * \frac{P_{hk}}{P_{Rk}}$$

Where $w_{Rk} = \frac{q_k^R p_k^R}{\sum_{k=1}^{K} q_k^R p_k^R}$ refers to the budget share of good k for the reference household R, P are unit values or prices and Q are quantities.

The Paasche index calculates the weighted average of relative prices. Formally;

$$P_P = \left(\sum_{k=1}^{K} w_{hk} * \frac{P_{Rk}}{P_{hk}} \right)^{-1}$$

This index comprises not only prices faced by household *h* in relation to the reference prices but also household *h*'s expenditure pattern; something that is not true of a Laspeyres index. This distinction is

[4] Notice that some items are bulky expenditures such as automobiles and naturally account for a large share of total non-food expenditure but not in all governorates. This may reflect different preferences across space.

important when adjusting total expenditure consistently with money metric utility ranking. The Paasche index considers household's own demand pattern which varies with household's expenditure, demographic composition, location and other characteristics. These are the conceptual reasons why this index was preferred over the Laspeyres or Fisher[5].

Building the price index: different components

There are three major components of these price indexes: the prices or unit values, reference price vector and budget shares. Each of them involves judgments that the researcher must make based on empirical appropriateness and data constraints before calculating the index.

1- Unit values

Price indexes are used to aggregate a large number of individual prices into a single number, so that individual prices are one of the main components for these indexes. There are different possible sources for prices being the survey itself one of them.[6] Households report both quantities and expenditures for most food and some non-food items purchased. Dividing expenditures by quantities gives "unit values" which are used as proxies for market prices. This approach has both advantages and disadvantages.

In addition to their availability, there are three potential advantages of using them. First, it is their *representativeness* across space and time. Unit values can be a rich source of data because there are typically far more observations than are available from traditional price surveys. In consequence, it is possible to construct, not only price indexes that track inflation over time, but also price indexes that compare price levels across space for instance governorates. Secondly, they are related to *actual transactions*; and thirdly, to *people who made them* that allows creating price indexes where both "prices" and weights are tailored to specific groups in the population.

There are three potential disadvantages which could offset previous advantages and prevent them from being used as proxies for prices. Firstly, unit values are subject to *quality* effects, especially for non-food items. Many goods are not perfectly homogeneous, so that any given unit value will reflect not only price but a mix of varieties within the category.[7] Consequently, unit values may differ from one purchaser to another in a way that is not caused necessarily by differences in prices. Secondly, unit values may reflect *measurement errors* in quantities, expenditures, or both. Perfect accuracy in recalling value and quantities of household expenditures over the last week, month or year is not very likely. These errors induce a variation in unit values that might be mistaken for genuine variation in prices.

[5] The Fisher is defined as the geometric mean of the Paasche and Laspeyres:

$$P_F = \sqrt{P_P * P_L}$$

[6] There are different methods for obtaining local price information: community market prices surveys, unit values, price opinions and using prices collected for on-going surveys like the CPI. Further discussions on each method see Gibson (2007).

[7] As Prais and Houthakker (1955) pointed out: "An item of expenditure in a family-budget schedule is to be regarded as the sum of a number of varieties of the commodity each of different quality and sold at a different price".

Lastly, unit values are available only for purchasers. A *sample selection* problem may result in the imputation process when no households within the cluster survey reports expenditures.

Dealing with unit values in IHSES II

IHSES II is unique in that unit values can be calculated for food and non-food items, at a detailed level of disaggregation.[8] However, especially for non-food items, the challenge is distinguishing quality from price.

The literature recommends certain rules of thumb to address measurement error. These include inspecting if the data presents "*reasonable*" dispersion; checking if the magnitude of the change imposed by the correction method is not significant; and using more than one method to corroborate the rationale of the correction such as graphs and automatic rules for example boxplots and elimination of the top and bottom 1 percent.[9] Nevertheless, all these methods are arbitrary and depend on the analyst's judgments of what it is in or out of a reasonable range.

The procedure implemented for detecting outliers in IHSES II is part graphical and part automatic. For each item, a boxplot is graphed to detect the presence of gross outliers for further investigation. The automatic process defines an outlier when the unit value of a particular item is greater or lower than 2.5 standard deviations of the mean of the logarithm of the original variable.[10] This procedure is similar to the method applied in IHSES I. However, it diverges from it because it is done at the governorate level rather than the national level. The rationale behind is that defining outliers for an item at the national level could eliminate values of certain governorates facing relatively high or relatively low unit values. In other words, it ensures that the genuine geographical variation in unit values is captured and preserved in the data.

The difficulty arises when positive quantities are consumed but expenditures are not available. In this case, unit values need to be imputed in order to have a complete dataset to calculate price indexes. The method implemented in IHSES II tries to capture the closest approximation to the amount actually paid by households. To do that, a sequential procedure is used starting with households of the same cluster, following by strata, governorates, areas (urban/rural) and finishing at the national level. Missing unit values are replaced by the median unit value of the lowest level of aggregation available.[11] Note that unit values are replaced by the cluster median when the number of observations is more than 5 but no restrictions are imposed for the other levels. In practice, the number of imputations by item is small in number and most of them take values at the cluster or stratum level with few occasional items at the governorate level. This is a significant improvement from the previously imputation method deployed in 2007 that used national values to impute.

[8] The Diary records up to 257 plus rations food items and a maximum of 261 non-food items for twelve months recall period.

[9] Deaton, Friedman and Alatas (2004)

[10] This is consistent as previous round IHSES I (2007) and it follows Deaton and Tarozzi (2009) method. However, there are many others such as the previously mentioned from Deaton, Friedman and Alatas (2004) or elimination of those values more than 5 standard deviation above or below the mean of the original variable applied by Cox and Wohlgenant (1986) or Gibson and Roselle (2004).

[11] The median as well as the mode are more robust or less sensitive to outliers.

It is important to mention that in this process, some food and non-food items were eliminated when households reported zero quantity consumed over the reference period or refused to answer (i.e. missing data). Other non-food items such as some furniture, camera, cinema, and data processing equipment were also not included in the analysis to maintain consistency with IHSES I.

2- Price of reference

The reference price vector considered was the national median prices for all observed items when making the spatial adjustment. For the temporal adjustment in 2012, CPI was used as is explained in the note. However, the temporal adjustment for 2007 followed the same reference as the spatial adjustment. This choice is based on the fact that when using the unit values from individual records, some outliers may remain. Use of medians rather than means reduces sensitivity misreporting units.

3- Budget shares

For each household in the survey, we calculated the share in the budget of each commodity as the ratio between the total value of expenditures divided by household total expenditure on all goods and services. These budget shares were then averaged over all households generating "democratic" price indexes rather than "plutocratic" price indexes that are generally produced by national statistical offices.[12]

A.2: Rations

Limited purchases of ration items in the market

	% of households reporting diary purchases (2012)
Rice	0.027
Brown wheat	0.007
Sugar	0.009
Vegetable oil	0.011
Vegetable fat	0.002
Children's food	0.000
Lentils	0.002
White wheat	0.013

[12] The plutocratic approach is generally used to construct official CPI. This method weights each commodity by adding up expenditure on a particular item across all households and then calculating the ratio of the total expenditure on the item to the total expenditure on all items. This gives more weight to the wealthier households who have more total spending. Gibson(2007)

A.3: Durables

The IHSES II allows for several improvements in measuring the monetary flow of services that households receive from durable goods in comparison with the previous round. This is based on major changes incorporated in the durable module which collects complete information on the stock of 8 important items of durables goods currently owned by the household. Before presenting the empirical implementation of these methodological improvements, we briefly discuss the conceptual framework that supports this estimation strategy.

Conceptual framework

In measuring poverty, it can be argued that only the food component should be considered. However, there are households that cannot afford adequate quantities of food and devote some expenditure to non-food items such as clothes and shelter in order to function in a society. It is reasonable to assume that these items must represent very basic needs and should be included in the poverty line. This argument applies to durables which may represent a significant part of the total expenditure in middle income countries.

One important characteristic of these goods is that they last for several years and it is the *value of the service* that the household receives from all of them which must be included in the welfare aggregate. The principle is not to modify the welfare ranking of individuals. This may happen if the value of durable goods were not included when using expenditure as the yardstick of welfare. Assume two households which are equal except that one of them rents a bicycle and the other owns it. Not including the *use* or *service* of the bicycle as part of the owner's expenditure but considering the rent in the renter's will make the latter better off than the first one when in fact both households are equally well off.

Since the value of the service or use is rarely observed, it needs to be estimated and it is assumed to be proportional to the *stock* of the good held by the household. This is the *annual cost* of holding the stock of each durable and it is approximated by the addition of three main components: the loss in real value of the money invested in the good over the reference period (i.e. inflation); the opportunity cost of the money (i.e. interest rate); and the erosion of the value of the good over the reference period (i.e. depreciation).[13] Formally:

$$Cost_d^h = \left(v_t^d - v_{t+1}^d\right) + \left(v_t^d * r_t\right) + \left(v_t^d * \delta^d\right) \qquad (1)$$

Where $\left(v_t^d - v_{t+1}^d\right)$= loss in real value of money (v_t^d = the value of the good at the beginning of the period, v_{t+1}^d = the value of the good at the end of the period); $\left(v_t^d * r_t\right)$ = opportunity cost of buying at the beginning of the period (r_t = the interest rate); and $\left(v_t^d * \delta^d\right)$ = erosion of the value of the good over the period (δ^d= the depreciation rate). So the cost of maintaining the stock –which is what we need to add to the total expenditure – could be approximated by:

[13] This cost is estimated from a conceptual experiment in which the household buys the durable good at the beginning of the period and sells it again at the end. For further discussion see Deaton and Zaidi (2001) or Deaton and Mullebauer (1980)

$$V_d^h = \sum_{d=1}^{D} v_t^d \left(r_t - \pi_t + \delta^d\right) \quad (2)$$

where v_t^d = current value of the durable good; r_t = nominal interest rate at time *t*; π_t = inflation rate for each durable good at time *t* and δ^d = depreciation rate for the durable and *D* is the total quantity of durables. In practice, it is best to collapse the nominal and inflation rates into a single real rate of interest, taken as an average over several years, and use that for all durable goods.

Methodological implementation

The empirical implementation of this conceptual framework implies the estimation of each of the following elements of equation (2):

1. Real interest rate ($r_t - \pi_t$);
2. Depreciation rate (δ^d); and
3. Current value of the durable good (v_t^d).

The calculation of the real interest rate requires information provided from other sources (CSO) than the household survey. It is a constant for all durables and it is defined as the difference between the *nominal interest rate* (r_t) which is calculated as the average between saving and deposit rates over the last year[14]; and the *inflation rate* (π_t) based on Consumption Price (CPI) over the same period[15].

On the other hand, the depreciation rate for each durable good is estimated using the information from IHSES II. As mentioned, the survey collects complete data on the stock of 8 important items of durables goods currently owned by the household: price paid at the time of acquisition, year of acquisition, and value today (if sold) (v_t^d).[16] Formally;

$$\delta^d = \pi + 1 - \left(\frac{v_t^d}{v_{t-T}^d}\right)^{1/T} \quad (3)$$

where v_t^d = current value of the durable good; v_{t-T}^d = value of the item when purchased; π = inflation rate and T age of the item in years which is estimated as the difference between the year of acquisition and the year of the interview.[17]

In order to capture variation in the quality of durable goods across space; to allow for different rates of depreciation for older goods; and to minimize the influence of any outliers in the data; we estimate different depreciation rates for each durable goods as the median value by governorate and vintage. The vintage is defined as a categorical variable which takes the value of 1 if $T \leq 1$ year old; 2 if

[14] $r_t = \frac{savings(0.07) + deposit(0.09)}{2}$

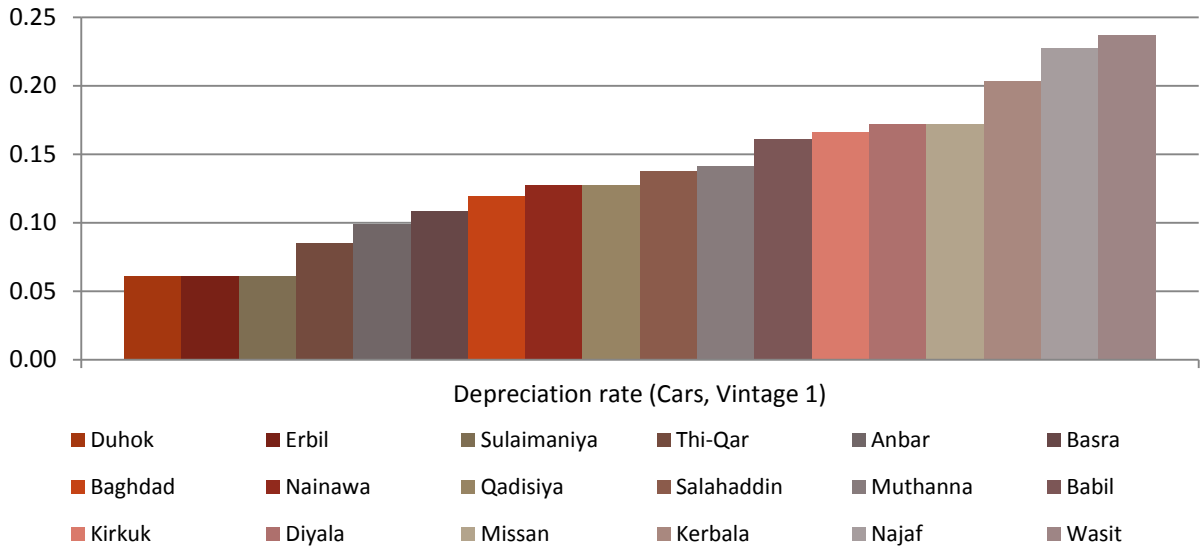
[15] $\pi_t = \frac{140.1}{132.1} - 1$

[16] For all other durable goods, IHSES II only collects the total number currently owned by the household.

[17] We calculate the nominal depreciation rate because we could not deflate the values when purchased at present value given that the series of CPI begins in 2007. Therefore, all items with year of acquisition before 2007 could not be reasonable deflated.

$2 \leq T \leq 3$; and 3 if $T \geq 4$ years old.[18] This division is empirically driven and conditioned by negative values for some items and governorates. The graph below presents the average depreciation rate for cars of vintage 1 (i.e., one year or less of age) by governorate and shows the heterogeneity across space. For example, Erbil's depreciation rates are half of Najaf's for all considered items.

Graph A.1: Average depreciation rates by governorate
(Cars, vintage 1)



Source: Own estimations based on IHSES II

The last element of equation (2) is the current value of the durable good (v_t^d) which is part of the information collected by IHSES II. Once all components of equation (2) are calculated or available then the estimation of the *value of the service* that a household receives from all durable items is straightforward.

[18] In the case of taxis the vintage is defined as a binary variable: 1 if $T \leq 1$ year old; 2 if $T \geq 2$ years old; given the low number of observations by governorates.