Poverty in Haiti: Methodological Note on the aggregate of consumption using ECVMAS 2012

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I. Introduction

In 2012, Haiti conducted a national household survey on living conditions, the first in over a decade. The survey has two main objectives: to provide data to assess poverty and living conditions in the country and to analyze the impact of the January 2010 earthquake on the living conditions of Haitian households. The survey covers a sample of nearly 4951 households, 4930 subject to the analysis of poverty work[2]. The survey was designed and executed by the Haitian Institute of Statistics and Informatics (IHSI, by its acronyms in French), with technical and financial assistance from the World Bank and DIAL (French research center). This technical note presents the methodology used for the construction of the consumption aggregate.

II. Methodological considerations

2.1.Indicator of well -being

The analysis of poverty requires at least three indicators: i) one basic indicator for measuring household welfare –usually a monetary measure based on consumption or income; ii) a poverty line, i.e. a threshold indicator of welfare below which a household is considered poor (not able to satisfy basic needs); and iii) the indicators of poverty.

[1] The World Bank. Natalia Garbiras provided excellent assistance in the drafting of this paper.
[2] We excluded from the poverty analyses households with zero consumption and others presenting inconsistencies.

Welfare indicators allow households to be classified from poorest to richest. In practice, this indicator is constructed either from consumption or from income. Either choice presents some advantages or some disadvantages (see e.g. Deaton, 2002).

For the Poverty Assessment work, the choice was made to use consumption as a welfare indicator, as it is considered more appropriate in the case of Haiti[3].

2.2. Steps to calculate the consumption aggregate for poverty measurement

This aggregate consists on a four stage annual per capita consumption measure.

1. The **first step** is to calculate total annual household consumption.
2. The **second step** is to remove the effect of inflation from household's consumption. Households were surveyed between August and December 2012, and during this period the consumer prices (CPI) rose by an average of 2% nationally, with food prices rising by 3%. This type of deflation is not done for non-food consumption as its reference period is annual and its prices generally don't change significantly from one month to the next, unlike for food.
3. **Third**, the household's total consumption is normalized - accounting for differences in household composition - dividing it by its size.
4. **Finally,** we divide per capita consumption by a spatial deflator which takes into account differences in the cost of living between regions and, when possible, areas of residence (urban versus rural) – differences related to different supply sources, transportation costs and other transaction costs[4].

2.3. Composition of the Consumption aggregate

Total consumption is the sum of four components: food consumption, non-food consumption of non-durables, the (imputed) rent for (homeowner) tenant households and the use value of durable goods.

[3] For a summary of advantages and disadvantages, as well as the motivations for our choice, see the Haiti Poverty Work Concept Note, Page 13.

[4]Due to logistical constraints, the data collection did not start in all departments of the country at the same time. The work was completed in some parts of the country before even starting in others. Under these conditions, consumption may have been affected not only by price but also by seasonal factors (school holidays, weather events like Hurricane Sandy, holiday season, etc.). This seasonality problem will be addressed later on, thanks to the new round of ECVMAS (2013).

2.3.1. Food consumption

Food consumption is in the Q section of the household questionnaire. Questions Q1 to Q11 concern food and questions Q11 to Q13 meals taken outside the household. To estimate annual consumption, the survey includes standard variables on the consumption of a certain food item *in the last 7 days*. Food consumption is disaggregated into i) the quantity and value of the consumption of each good purchased on the market; and ii) the quantity (not the value!) of the consumption of *non-monetary* food consumption, i.e. each food item coming from household's production, food aid and other donations. The survey provides additional information on: iii) the quantity and amount paid for *regular* purchases of all food items consumed in the last 7 days, and iv) the *frequency* of these purchases.

In light of this, the analyst can choose between two approaches to calculate annual food consumption: i) to use the complete information on consumption during the last 7 days and extrapolate this for annual consumption or ii) to use information on regular consumption and the frequency of purchases. To decide, one needs to answer the following critical question: which of the two approaches would give us a better estimation of *annual* food consumption? While approach ii) is tempting since, by its nature, it is not affected by any seasonality (unlike the last seven days approach), it also presents one insurmountable difficulty due to the structure of the questionnaire: regular consumption is limited to *purchases*; non-monetary consumption is hence not covered. As a result, if we used regular consumption we would most probably end up underestimating food consumption, especially for rural areas where self-production is prevalent. Therefore, consumption over *the last seven days* is chosen as a basis to calculate the food component of the consumption aggregate of consumption. To validate the choice of using the consumption of the *last seven days* to extrapolate annual consumption (by dividing it by 7 and multiplying it by 366), we tabulated the frequencies declared by the households for the purchases of food items. As we found that the mean/mode/median frequency is the *week* we consider that our method provides a credible approximation of annual consumption (see Table 1).

Table 1 How often does the household buy the declared quantity in Q2 of (PRODUCT)?

	Freq.	*Percent*	*Cum.*
Doesn't answer	3	0.01	0.01
Doesn't know	4	0.01	0.02
Daily	4,757	12.61	12.63
Every two days	3,059	8.11	20.74
Every three or four days	4,350	11.53	32.27
Weekly	**19,566**	**51.86**	**84.13**
Every two weeks	3,318	8.79	92.92
Monthly	2,248	5.96	98.88
Every two months	296	0.78	99.66
Quarterly	101	0.27	99.93
Biannually	19	0.05	99.98
Annually	7	0.02	100
Total	37,726	100	

Non-monetary food consumption: It is necessary to impute a monetary value for non-monetary consumption (home-production or gifts) in order to be able to estimate annual consumption. To do this, we calculate the average price per product and per unit. The price is calculated at different geographical levels: district, department and national levels. Using this information, we multiply the quantity consumed by the household by the average price at the district level to obtain the value consumed. If the price for this product and this unit does not exist at the district level, we use the one at the department level; and if the price does not exist at the department level, the price is used at national level. Values (purchased and non-monetary consumption) are then divided by 7 and multiplied by 366 to obtain the value of annual consumption.

Meals taken outside, tobacco and alcoholic beverages: Meals taken outside are in a separate section of the questionnaire but they are to be included in the food consumption aggregate (although they can be removed if necessary). Households declared the overall amount of all meals taken outside over the last seven days. In order to annualize it, we multiplied by 366 and divided by 7. For alcoholic-beverages and tobacco, which are in the same section of the

questionnaire as food consumption, we apply the same technique used to estimate the annual food consumption though these two products are listed later in the non-food consumption.

When deciding whether to include meals taken outside in the aggregate we conducted few tests to check if this type of consumption could bias the overall consumption aggregate in anyways. Results, illustrated in Annex 1, suggest that the answer is no. Firstly, the percent increase of food consumption due to the inclusion of meals taken outside is randomly distributed across percentiles. Besides, the coefficient of variation of food consumption without meals taken outside is even higher than with them (≈0.82 versus ≈0.87). This indicates that meals taken outside are not generating much noise in the aggregate of food consumption. Finally, around one-third of the households of the survey did take meals outside. Therefore, by eliminating this type of consumption, we would be removing an important source of consumption for an important part of the population[5].

2.3.2. Non- food consumption of non-durable goods

The calculation of the annual consumption of non-durable goods takes into account the reference period used in the questionnaire.

Non-food products (current expenditures): For those products (questions Q15 to Q17 of the questionnaire) we need the following information: i) purchases made by the household, ii) the amount per period, iii) the frequency being reported by the household and iv) the value of gifts received from other households in the past 12 months as these are an important component of the Haitian's regular consumption. With regard to purchases we simply annualize them using their declared frequency. If the purchase is daily, the reported amount is multiplied by 366; if weekly we multiply by 52; if it is annual, by 12, and so on. Gifts are reported in annual values[6]. We then proceed to sum these two components to obtain the value of annual consumption.

Non-food products (occasional expenses): Information for these goods is in questions Q18 and Q19 of the questionnaire. The reference period is annual and the corresponding value is captured

[5] For further information on the inclusion of meals taken outside, see Guidelines for constructing consumption aggregate for welfare analysis (Deaton & Zaidi, 2003).
[6] Gifts are reported and included exclusively for food consumption and non-food recurrent consumption.

in the questionnaire. Therefore we only need to sum them to get to annual consumption for these items category.

Expenses on education during the year 2011-2012: Education expenditures are recorded in questions Q21 to Q24. The interviewers had the option to report information by children or for all children attending school in the household (code 88). When distinctions among children were hard to make, interviewers chose the latter. As with food consumption, we deal with two types of information: i) expenditures in education over a period declared by the household (from daily to annual) and ii) expenditure during the school year 2011-2012. It is interesting to compare the two variables since neither choice is perfect. The expenditure for the school year 2011-12 has the advantage of covering a full school year and, therefore, is not affected by seasonality. The only downside is that the period does not cover exactly the last 12 months before the survey, especially for households whose questionnaires were administered from the *rentrée* (i.e. school year 2012-13), between October and December 2012. However, since the question is clearly referring to school year 2011-2012, the expenses declared by the households shouldn't include those related to the new school year, even if it has already started, avoiding double counting. On the other hand, the declared expenditure in question Q23a, which is relative to the frequency chosen by the household, is deeply affected by seasonality, does not necessarily cover the school year[7] and we therefore consider this a worse option. The other key aspect to take into account is that the variable Q24a (school expenditure in school year 2011-12) has 17,599 observations versus 2438 observations for variable Q32a (for periodic expenditure). Finally, the annualized amounts declared in question Q23a have a higher mean and standard deviation than answers in question Q24a: the former is approximately 4 times the latter. This seems to confirm that the use of Q24a would bring to an overestimation of annual school expenditures. For these reasons, we preferred using expenses for the school year 2011-12.

Consumption and expenditure on services: Water, electricity, telephone. Variables Q25 to Q27 cover expenses for water, electricity and telephone. In this case, we also have two types of expenses: expenses per period and annual expenditure. Before choosing the right candidate for the estimation, we proceed to compare these two variables. The downside of the expenditure of

[7] As an example, we know that most of the expenditure on education is effectuated at the beginning of the school year; it would be inappropriate to multiply for instance the expenditure incurred during the three months from October to December by four to annualize it.

the last 12 months is that it can be affected by the memory of the respondent who might forget certain expenses. As for the expenditure per period, it can be affected by seasonality (e.g. people can consume more electricity and water during the dry season). The Q27b variable (annual expenditure) has nearly 7,500 observations against 6,500 observations for periodic expenditure question. So we have 959 cases where an annual expenditure is declared but not the expenditure per period, and only 23 cases for the opposite case. The periodic expenditure variable has a slightly higher mean and greater variance compared to annual expenditure, tending to show either that the former is affected by seasonality or that the second measure is affected by memory; certainly a bit of both. Accordingly, we use the annual expenditure which seems smoother. For the 23 cases where we do not have with the information, we impute it annualizing the reported amount in Q27a.

Out of the 37% and 18.3% of households who declare having access to public electricity and water services (ED'H and DINEPA), only 21% and 12.6% declare to spend money in electricity and water bills respectively. In order to include expenses of those who have access to the services but don't pay for it (because they get it for free or because of illicit access[8]), we run hedonic regressions based on the observations of households who pay the electricity and water bill and we estimated an imputed electricity and water bill for those who declare nothing.

Health expenses: Health expenses are indicated in questions Q28 to Q30 for recurrent expenses, and Q31 to Q32 for less frequent ones. A decision was made not to include only part of the latter[9] ("medical exams and care") in the consumption aggregate since they do not necessarily represent the level of wellbeing of a household. On the other hand, we include recurrent/common expenses. For recurrent expenses (consultations and medicines), we consider the expenditure incurred during the last episode of illness (Q29) and the frequency of this expenditure in the last 12 months (Q30b). We then proceed to annualize that amount multiplying the former information by the latter. For the selected medical expenses (medical exams and care), we take the value declared in Q32, as it is already annualized.

[8] We refer here to households who reply 01= Robinet prive'/DINEPA to C10a and C10b (Quel est le principal mode d'approvisionnement du ménage en eau?) , but don't declare any expense for water, and those who declare 1= Electricite'/compteur individual ED'H; 2= electricite'/Compteur Collectif ED'H or 3= Electricite'/Prise sans compteur at C9a (quel est le principal type d'eclairage dans le logement?)

[9] They include hospitalization, exams, glasses, prostheses, among others.

Extraordinary expenses. These are consigned in questions Q33 and Q34, and cover the last 12 months. However, these expenses are not included in the consumption aggregate, due to their exceptionality.

2.3.3. Imputed rent of house owner households and for rent-free tenants.

Housing is an investment good for the households and they consume the service it provides them. Households which own their dwelling consume the service provided by it, as rent-free tenants do (i.e. all those who stay for free). We impute the rent for these cases and also for renting households which did not declare how much they paid (5 households out of 936), through a hedonic linear regression run for households who pay rent. The dependent variable of the model we used is the logarithm of the amount paid for rent, and the dwelling characteristics[10] as independent variables (we also controlled with dummies for the department and area of residence). Given the existing differences in housing between urban and rural areas, it would have been appropriate to estimate the model separately, so that all the estimated parameters would have been different; but, due to the small number of renting households in the rural areas (138) we could not do it. Yet, the existence of dichotomous variables for the place of residence and for the departments partially accounts for these differences. The dataset also includes a variable corresponding to the self-declared use-value of the dwelling (Q C8[11]). After comparing the characteristics and correlation between the two measures (imputed rent and self-declarations) we decided to use the imputed rent, as the self-declaration seem to over-estimate the use-value of the dwelling (see annex 5).

2.3.4. Use-value of durable goods

As in the case of dwellings, for the estimation of households' welfare it is important to consider that households also consume services provided by their durable goods. A use-value (which is equivalent to consumption) is estimated from the stock of goods listed by the household, their acquisition and actual values. However, we do not include in the consumption aggregate the

[10] Type of building, number of rooms, type of roof, type of walls, soil type, electricity, water, sanitation , etc.

[11] The survey includes question Q.C8 which asks owners to provide an approximate value for their dwelling in the case they had to pay for a rent. Nevertheless, due to the fact the absence of a rental market in rural areas (incapability of house owner to estimate the rental value of their dwelling) and the tendency for this variable to be over-estimated, it was decided to impute rent using the linear regression method as discussed above.

purchase cost of the durables acquired during the year (vehicle, household appliances, and furniture).

The value of use is estimated using the economic depreciation of the asset over its life time. In other words, if we consider a durable good bought for 1000 gourdes with a life expectancy of 5 years, we can assume, as a first approximation, that the household consumes 200 gourdes of the value of this good each year. This being said, we must take into account also other factors. First, due to inflation the new value of the good will tend to be higher. Second, the good deteriorates (depreciates) as time goes by, and therefore does not provide the same service across the years.

Therefore, the value of use is equal to the purchase price multiplied by the depreciation rate of the asset plus the real interest rate (nominal interest rates minus inflation). If δ is the depreciation rate, PA the acquisition price (Q37), PR the value of the property at the time of the survey (current value or Q.38), Age is the age of the good (2012 – the year the good was purchased), the depreciation rate is estimated by the following formula (Deaton , 2002):

$$\delta = 1 - ({}^{PR}/_{PA})^{\frac{1}{Age}}$$

Then, the value of use (VU) is equal to the acquisition value multiplied by the depreciation rate plus the real interest rates (r the nominal interest rate, π the inflation rate)[12].

$$VU = \big(\delta + (r - \pi)\big) * (PA)$$

For each good, we calculated and used *the median rate of depreciation*. This approach has several advantages. First, even for households that are not able to estimate the current value of a good, the use-value is calculated with the information on the purchase price (easier to obtain) and the age of the good. Additionally, using the median depreciation rate instead of the value declared in question Q38 (replacement value of the durable item) by each household limits outliers. It should also be noted that for this exercise, we calculated the rate just for the goods where the replacement value was less than the value of acquisition (which makes sense since the

[12] In our calculation, we use a 2% average real interest rate, as real interest rates are negative (-1.5%) on average between 2000 and 2012.

observed value of the good decreases with time)[13]. In Annex 2 we show results using an alternative methodology to estimate use-value. [14]

2.3.5. Outliers

After the estimations of each subsection or section, we identify outliers and treat them. For each good, values greater than the mean value plus three times its standard deviation are considered inconsistent values. These are replaced by the maximum value of the consumption of this item (below the outlier value for that item). Nevertheless, we checked the percentage of these cases to avoid creating artificial data that would reduce the tails of the distribution which are, in fact, a reality. In annex n.5, we detail the tests and simulations conducted to validate this choice.

Table 2 presents the percentage of outliers identified in each section and, therefore, the number of households whose corresponding variable was imputed.

Table 2 Percentage of outlier observations per section

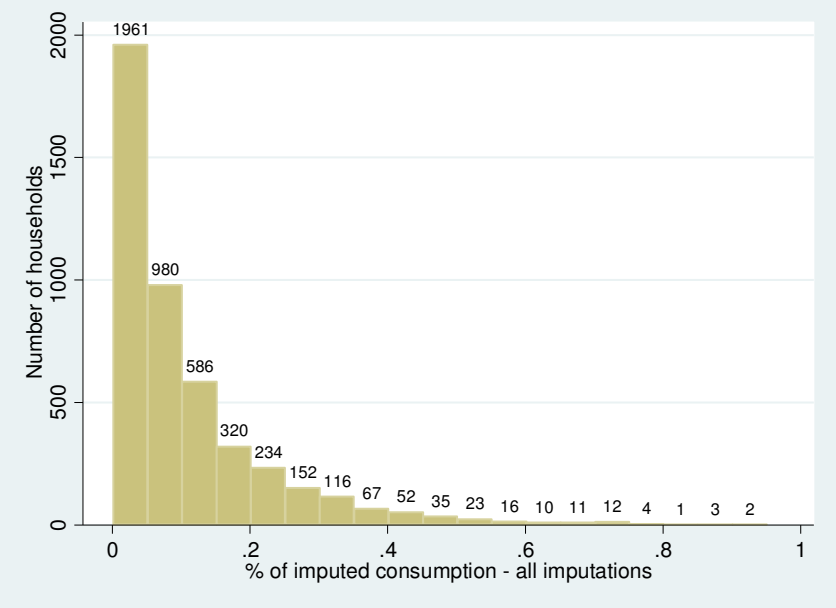
Section	Subsection	% of outlier observations
Food consumption	Food consumption	1.4%
Non-food consumption	Current expenses	0.98%
	Occasional expenses	1.23%
	Educational expenditures	1.40%
	Water, electricity and telephone	1.32%
	Health regular expenses	1.36%
Rent	Tenants	0.04%
Durables	Durables	1.3 %

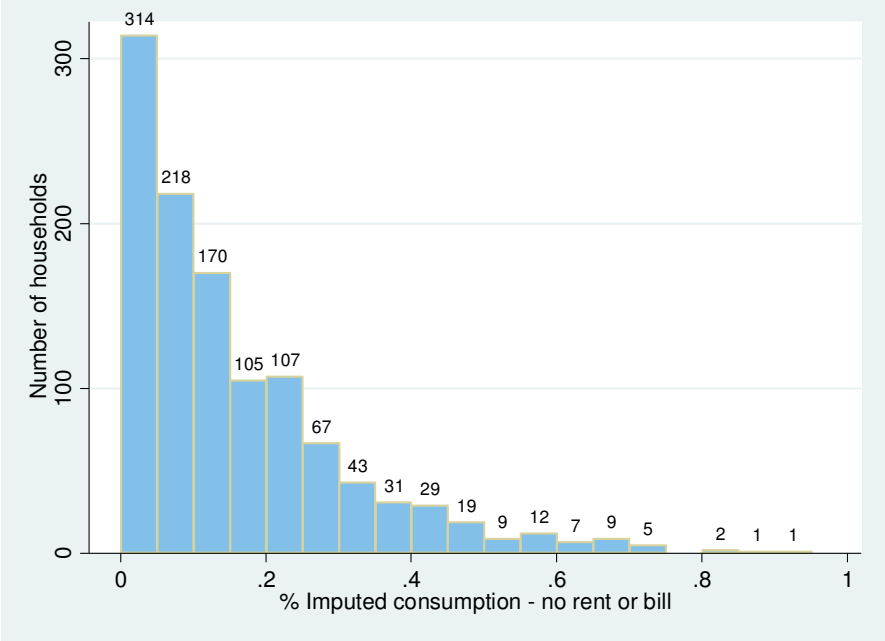
We also examine the overall percentage of the household consumption that was imputed in this process. There were 4,585 (unweighted) households, almost 94% of the total, with one or more imputed values—although this number is fairly high, it is important to notice that imputations are per item. When we restrict to only imputations due to outliers (i.e., we exclude rent and bill

[13] We also tested an alternative methodology to estimate the use-value and compared results: the difference in the consumption aggregate and households ranking was not statistically significant. See Annex 2 for more details.
[14] See annex 6, point 5 for more information on the imputation process while calculating the use-value.

imputations), this number is reduced to 1149, with less than 100 households having more than 40% of their total consumption imputed. Graph 1 shows the distribution of these percentages.

Graph 1 Distribution of the percentage of imputed values of the total household consumption





2.3.6. Aggregate welfare

At this stage, we summed up the four components described above to produce a measure of households' annual consumption, which in turn is used as an indicator of welfare. It is important to emphasize once again that extraordinary expenses (including extraordinary health expenses) are not part of the aggregate. To complete the process and obtain the final aggregate of welfare we do three *normalizations*.

Temporal deflator – October CPI: As noted before, data was collected from August to December 2012. During this period prices have increased by more than 2%. Therefore, we inflate/deflate all prices to October 2012 prices, as it is the median month of the survey fieldwork and also has the advantage of not being affected by any seasonal phenomenon. We can use either a food deflator or a deflator for total consumption. In general, non-food expenditures are not subject to the same seasonal variations as food expenses are, as illustrated by the difference in monthly inflation between food and non-food (Table 3 below, and Annex 6 for more details). Moreover, non-food expenditure has longer reference periods, usually the last year (last 12 months). Consequently, deflation will only concern food expenditures.

Besides this, we also need to choose whether to calculate an index for each region or to use a national index. Since the collection took place in one region after the other (and not simultaneously in all regions), the national index seems more reliable. The *temporal* deflator is calculated using the CPI reported by the IHSI (Haiti's National Statistical Office, 2004 base year), and takes the value of 1 in October 2012. The CPI for each month (August to December) is divided by the month of October. The total household consumption is divided by this index.

Table 3 Monthly Haiti's CPI (August 2004 = 100)

Year	Month	General Index	Monthly inflation general index	Food, beverages, and tobacco	Monthly inflation food index
2012	Jan	190.85	0.61%	197.87	0.95%
	Feb	191.4	0.29%	198.58	0.36%
	Mar	192.06	0.34%	199.48	0.45%
	Apr	193.44	0.72%	200.92	0.72%
	May	194.3	0.44%	201.63	0.35%
	Jun	195.92	0.83%	203.39	0.87%
	Jul	196.69	0.39%	203.84	0.22%
	Aug	198.42	0.88%	206.5	1.30%
	Sep	200.35	0.97%	208.58	1.01%
	Oct	201.7	0.67%	209.5	0.44%

	Nov	203.33	0.81%	212.35	1.36%
	Dec	204.09	0.37%	213.27	0.43%

Per capita consumption: The next step is to consider the size and composition of households. In fact, households' needs differ depending on the number of its members, their age and their gender. In consequence, we can calculate the annual consumption either *per capita* or *per adult equivalent* –which takes into account differences in needs among members of the household depending on their age and sex. Literature has widely studied the pros and cons of choosing either one of these two alternatives.

Most recent studies have advocated for the benefits of taking into account household's composition and its characteristics. Including consumption heterogeneity among the different members of the same household can shift the distribution of consumption, leading to lower estimates of poverty (see for example Agüero and Gould, 2003). The main argument for the use of *adult equivalent* is that a child may consume less than an adult. Therefore, the *adult equivalence* allows avoiding the (sometimes wrong) assumption of negative correlation between household size and per capita consumption (Ravallion and Lanjouw, 1994)[15].

Authors who prefer the use of *per capita* consumption (and income) state that it has long been used as a measure of welfare for poverty analyses and should never been omitted (Deaton and Zaidi, 2003). As it is the most commonly chosen measure, it is also broadly comparable both between and within countries. Additionally, if it is certainly true that a child consumes less food than an adult, this is not always the case in terms of non-food consumption. For this and other reasons the choice of the scale is controversial and often considered arbitrary.[16]

In order to allow for easier international and national comparisons while avoiding getting involved in the complicated issue of choosing the right scale, we decided to use *per capita annual consumption* in the analysis of poverty in Haiti, leaving to future research the task of elucidating further this question. In particular, the *Conseil National pour la Securite' Alimentaire*

[15] Another interesting consideration refers to economies of scale, which is related to the household size and the principle that fact of sharing certain goods in the household allow to safe resources. However, in this case there is no consensus on how to capture or measure the economies of scale within a household (Haughton and Khandker, 2009)
[16] "The determination of the values for the parameters of the equivalence scales is still an area of debate. The equivalence scales currently in use are more a product of consensus rather than an accurate representation of the living cost differences among different family types" (Expert group on poverty statistics, 2006).

(CNSA) d'Haiti monitoring food insecurity uses a food basket calculated using per capita measures, and in Latin America the majority of the countries adopted per capita measures.. Nevertheless, for the sake of transparency and peace of mind we computed both measures (taking the Adult Equivalence Scale used in Jamaica and inspired by FAO) and compared welfare distributions and basic poverty profiles, to check to which extent the change in scale affects both dimensions. Not surprisingly, results show that the choice of the scale significantly affects the distribution of individuals' consumption, shifting to the right. In fact, *adult equivalent* consumption is higher and individuals generally richer. However, while probably reducing the headcount, this methodological choice doesn't seem to significantly affect the *profiles* of the poor. This finding makes the trade-off between the two methodologies easier, and comforts us in our choice of adopting the per capita scale. Annex 3 contains the results of these tests.

Regional deflator - regional CPI: The final normalization involves dividing the annual *per capita* consumption by a spatial deflator, which takes into account the differences among regions in terms of the costs of living. There are two alternative ways to estimate this deflator. In the first case, we can obtain it as the ratio of the poverty lines of each of the four regions and a chosen base (which could be either Port-au-Prince or national); in the second way, we can use the CPI of 2012 for each region. Since this former limits the analysis to a reference group and ties it to specific poverty lines (that in the case of Haiti have been defined at a later stage, using the consumption aggregate as welfare indicator), we chose to estimate the spatial deflator using the latter, that is to say the CPI of 2012 for each region. The deflator will then correspond to the ratio of each region's CPI to the National CPI (of October 2012). At the end, household consumption is expressed in terms of cost of living at the national level, which is convenient for international comparisons. Although the CPI presents an advantage over using the Poverty lines as a deflator, we cannot differentiate geographically between rural and urban areas. This obstacle is not really worrying though, as the CPI within region does not vary substantially between rural and urban areas. In order to validate our choices, we have compared the consequences of using alternative deflators (poverty lines, CPI with Port-au-Prince as reference, CPI with national index as reference) on the distribution and ranking of the households and found no significant differences. Results are showed in Annex 4.

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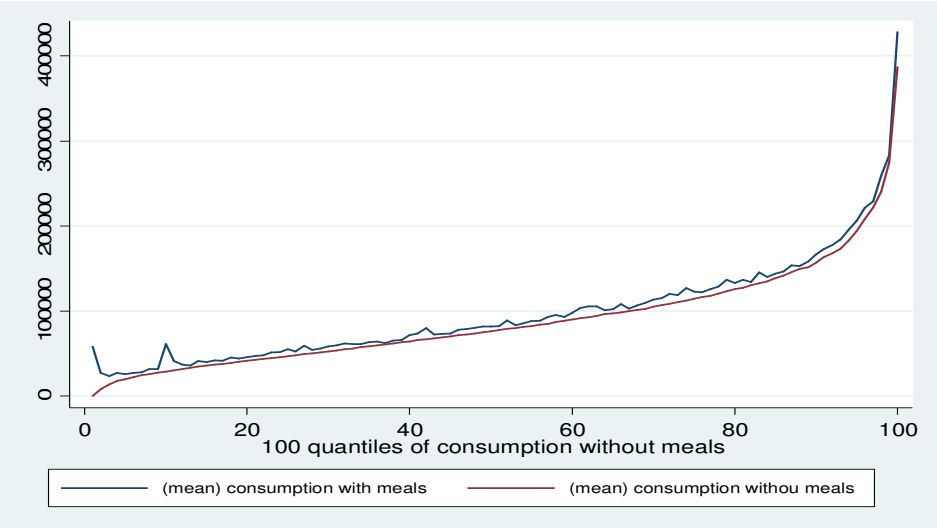
Annex 1. Testing the inclusion/exclusion of the value of meals taken outside the household in the overall food consumption aggregate.

Traditional literature on the construction of consumption aggregates tends to favor the inclusion of meals outside the households in food consumption, as it may be an essential component of a household's overall usual consumption (e.g. in Latin America, Guatemala did it for 2000, 2006 and 2011). Since in Haiti around one third of the total surveyed households declared having taken at least one meal outside during the last 7 days, representing almost 11 percent of total consumption, its exclusion from the aggregate would definitely underestimate the country's average consumption.

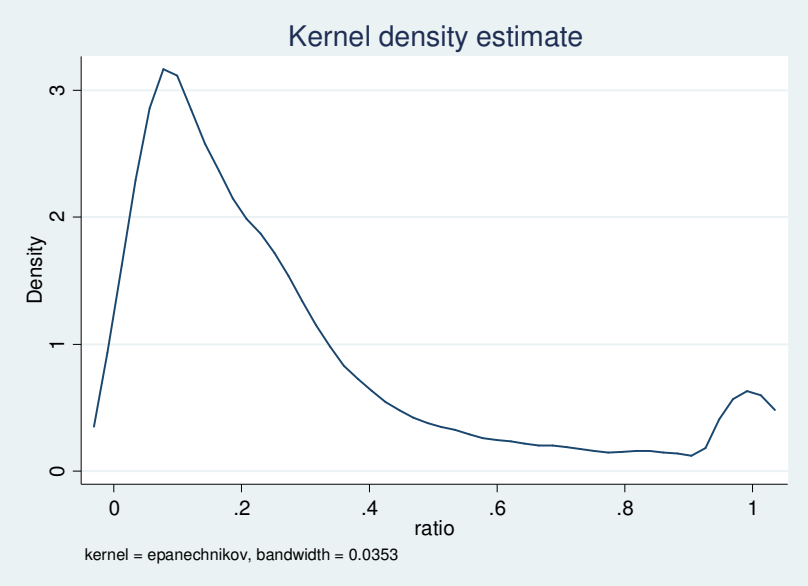
In order to test the implications of including or not the variable *meals taken outside* in the overall food consumption, we first identify the mean percent increase per percentile (including those households who don't consume meals outside). This is done to assess the distribution of this increase across the total population and, therefore, verify if it does not benefit a specific segment of the population. Graph 2 shows that the increase is randomly distributed along the different percentiles, and that the distribution does not change abruptly when including meals in the food consumption aggregate. . This implies that the coefficient of variation of food consumption should not vary substantially when including meals taken outside. This is indeed true as the coefficient is ≈0.82 with meals taken outside and is ≈0.87 when excluding them.

Graph 4 Distribution of food consumption with and without meals per percentile of food consumption without meals



Additionally, we identified the percentage that *meals taken outside* represent in total food consumption, conditional on *meals taken outside* being greater than 0 (considering only households who consume meals outside). According to Graph 5, in most of the cases, meals taken outside represent 26% of the overall food consumption of these households. In other words, 1 out of 5 individuals within a household takes meals outside. This number seems quite reasonable.

Graph 5 Distribution of the percent of food consumption that is attributed to meals taken outside



Although the increase is random, it is also true that it leads to non-despicable implications over the final consumption aggregate. In fact, as shown in Tables 4 and 5, quintile's composition of food consumption and overall consumption (respectively) change when including meals: the latter implies individuals moving to higher quintiles.

Table 4 Comparing quintiles' distribution of <u>food</u> consumption including/excluding meals taken outside (using food consumption excluding meals as quintile thresholds)

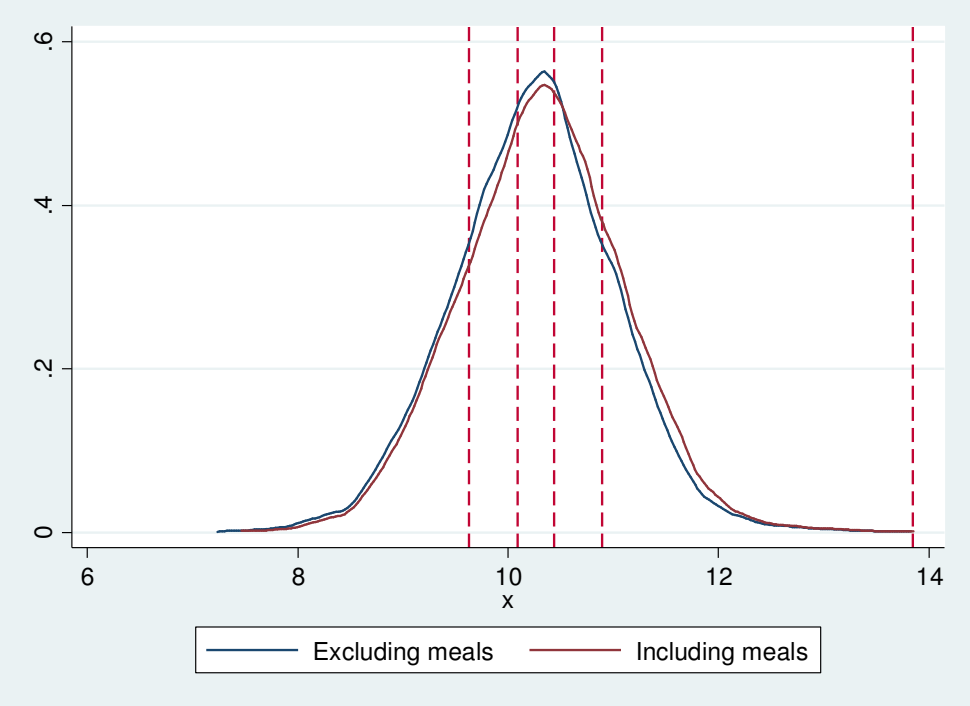
		Excluding meals				
Including	**Quintiles**	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5
	Q. 1	15.04 %	0	0	0	0
	Q. 2	1.77%	16.17%	0	0	0

	Q. 3	0.68%	2.95%	16.15 %	0	0
	Q. 4	0.78%	0.61%	3.10 %	16.69%	0
	Q. 5	1.74%	0.28%	0.73%	3.30%	20.00%

Table 5 Comparing quintiles' distribution of <u>overall</u> consumption including/excluding meals taken outside (using consumption excluding meals as quintile thresholds)

	Excluding meals					
Including meals	**Quintiles**	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5
	Q. 1	18.19%	0.02%	0	0	0
	Q. 2	1.23%	17.34%	0.11%	0	0
	Q. 3	0.29%	2.01%	16.95%	0	0
	Q. 4	0.24%	0.41%	2.54%	17.90%	0.27%
	Q. 5	0.09%	0.19%	0.44%	2.05%	19.72%

Graph 6 Distribution of the percent of overall consumption (logarithm) that is attributed to meals taken outside



There might be certainly some caveats when including meals taken outside in the total food consumption, we opt to include them in the final aggregate as we consider them an important fraction of the regular Haitians food consumption habits.

Annex 2. Technical note on the comparison of two different estimation methods of the use-value

In order to test the robustness of our estimation method for the use-value of durable goods, we have compared it to an alternative method, used in the calculation of the consumption aggregate for Guatemala (2006)[17].

In this alternative method, three data points are needed to estimate the use-value of the household durables (i) the age of the durable; (ii) the remaining life of the durable good; and (iii) the current value of the durable good.

To obtain the remaining life of durable goods, we need to know the average lifetime of each good or, as commonly referred to, its use life or expected lifetime. If the use life of the durable good is known, we will only need to subtract its age to obtain the remaining lifetime. Assuming that in one year a similar percentage of the population buys a durable good (say a television), it is likely that some individuals will have a new television, some will have televisions that are one-year old, others two-years old, etc. As such, calculating the average age of all televisions sets yields the mean life or average age of all televisions. By multiplying the mean life by two, the result would be the expected lifetime of a television set in years. If the reported age is subtracted from the expected lifetime of a television set, the remaining life of each television set is obtained. Finally, dividing the current value of a television set by the remaining use life yields the annual use value of the television set.

Applying this procedure for all durable goods and adding the values of each item yields the annual value of the consumption of household durable goods.

The comparison of the two methods showed that both means were not statistically different[18]. Additionally, there were not serious implications on overall household consumption when choosing one or another method (see Graph 2 and Table 4). Given the difficulties to accurately obtain the life expectancy of durable goods (as there is a large variety of goods (in terms of brands and models), we preferred adopting the *discount rate* methodology.

[17] Technical note "Measuring consumption using the ENCOVI 2006" LCSPP 2006.

[18] In particular, the difference between the mean consumption using the first methodology and the mean consumption using Guatemala's methodology is 197.2606 with confidence intervals of -39.43711 and 433.9575.

Graph 7 Distribution of household consumption (logarithm) using two different discount rates

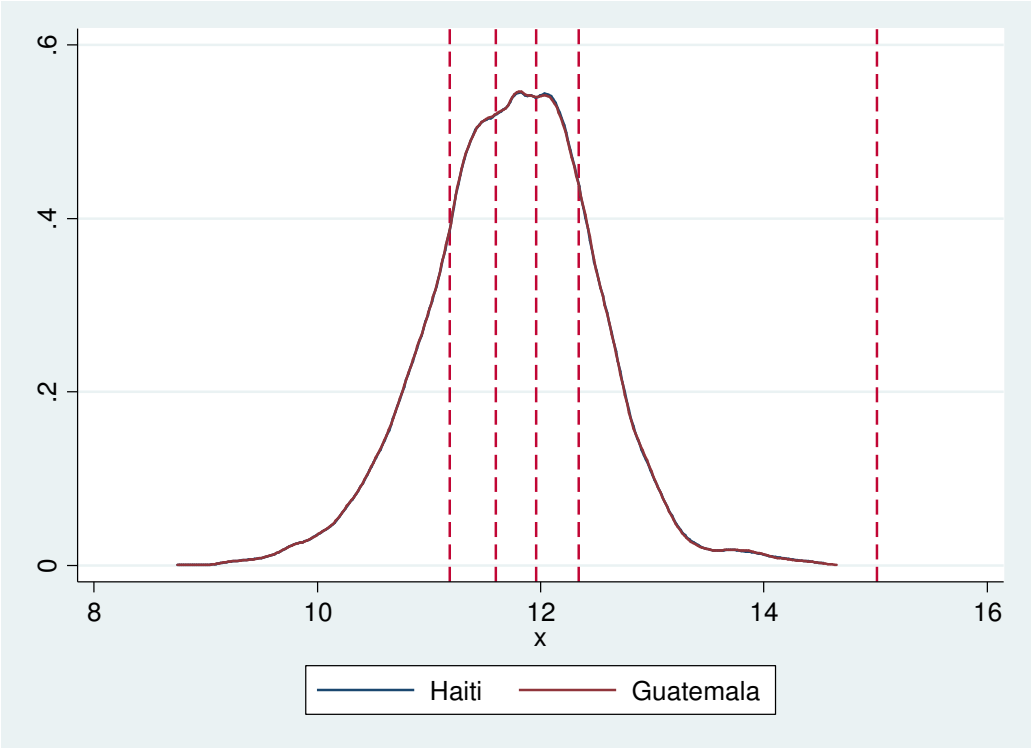


Table 6 Comparing quintiles' distribution using two discount rates (using Haiti quintile thresholds)

		Guatemala's discount rate				
Haiti's discount rate	**Quintiles**	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5
	Q. 1	19.98	0.02%	0	0	0
	Q. 2	0.35	19.63	0.05	0	0
	Q. 3	0	0.43	19.52	0.01	0.00
	Q. 4	0	0	0.59	19.34	0.08
	Q. 5	0	0	0	0.24	19.75

Annex 3. Comparing profiles using per capita versus adult equivalent consumption

In this annex we are going to compare the impact of choosing per capita versus adult equivalent scales on the distribution of welfare, the ranking of individuals and on the profiles of the poor. For the sake of illustration, we used Jamaica's adult equivalence scales[19], another island of the Caribbean quite close to Haiti. Our results show that while when using *adult equivalent* scale there is a clear shift of the distribution of consumption towards the right and, consequently, a re-ranking of individuals towards higher quintiles suggesting lower poverty rates, the profiles of the poor (bottom 40 and 20 percent) don't change significantly. These results make the trade-off between choosing one method or the other less controversial and comfort us in our choice of the per capita scale.

Graph 14 shows how the distribution of individuals' consumption increases, moving to the right, when using the *adult equivalence*. Table 7 presents the quintile classification of the individuals according to their consumption level, comparing it between *per capita* versus *adult equivalent* alternatives. These results all suggest that numbers change when using the two different approximations. As preempted by the shift in the distribution, in most cases the change in ranking went in the direction of an increase, with 53.6% of individuals becoming richer and 46.4% remaining in the same quintile. Therefore, using adult equivalent consumption improves individuals' ranking (all movements are done to higher quintiles), which, in turn, must logically have implications on the overall poverty headcount.

Graph 14 Distribution of consumption (logarithm) using per capita versus adult equivalent

[19] Which are also quite similar to the ones suggested by the FAO.

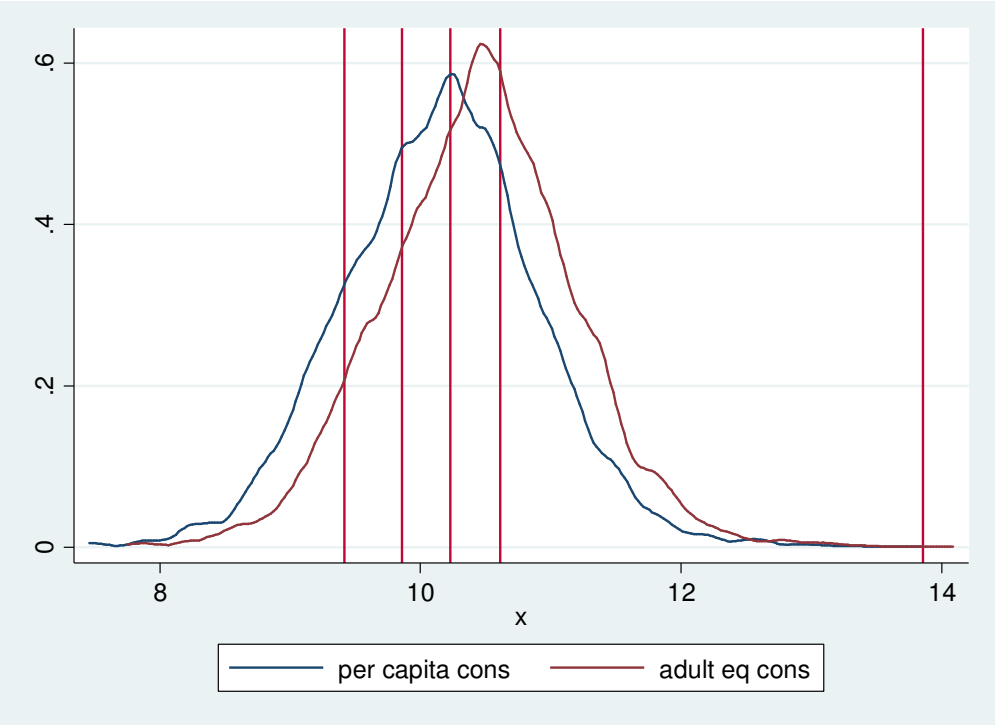


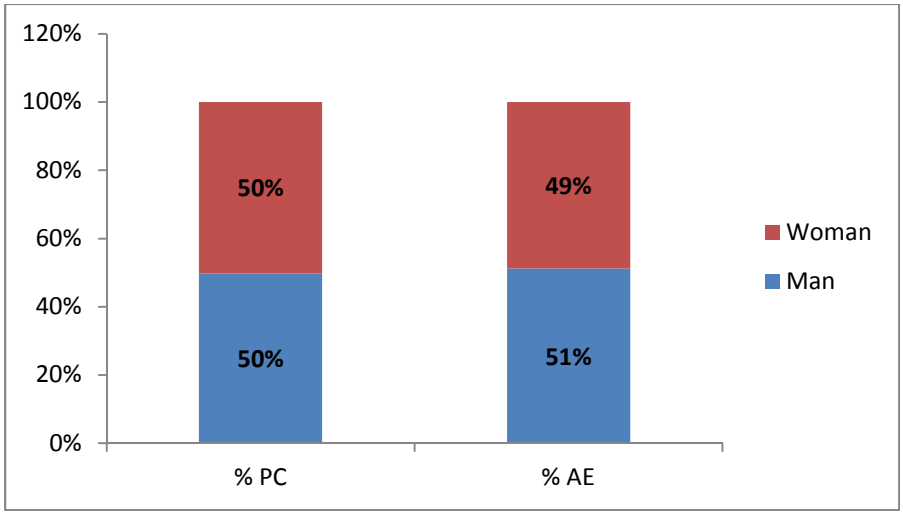
Table 7 Comparing quintiles' distribution using per capita and adult equivalent scales

	Using *adult equivalent* consumption					
Using *per capita* consumption	Quintiles	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5
	Q. 1	7.84	10.84	1.34	0	0
	Q. 2	0	2.01	14.12	3.86	0
	Q. 3	0	0	0.94	16.90	2.16
	Q. 4	0	0	0	1.88	18.22
	Q. 5	0	0	0	0	19.89

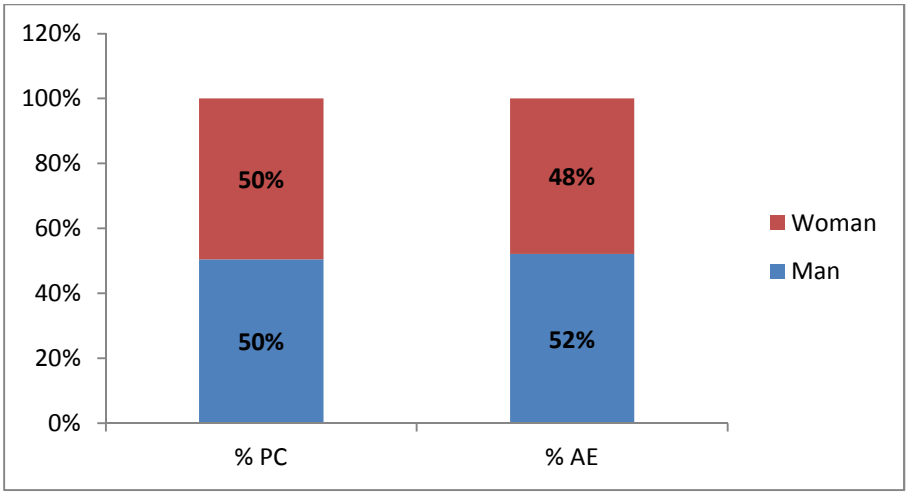
On the other hand, the following graphs compare the profiles of the individuals belonging to the bottom 40 and 20 percent when using *per capita* consumption versus *adult equivalent* consumption. Numbers do not vary dramatically (within a range of 0 to 2 percent points).

1. By sex

Graph 8 Composition of the bottom 40% by sex

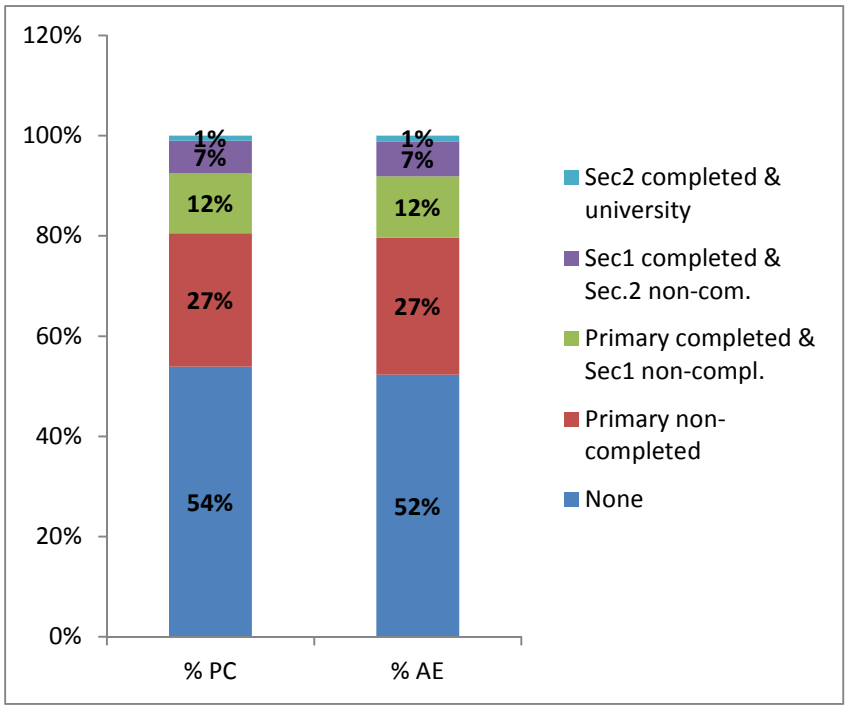


Graph 9 Composition of the bottom 20% by sex

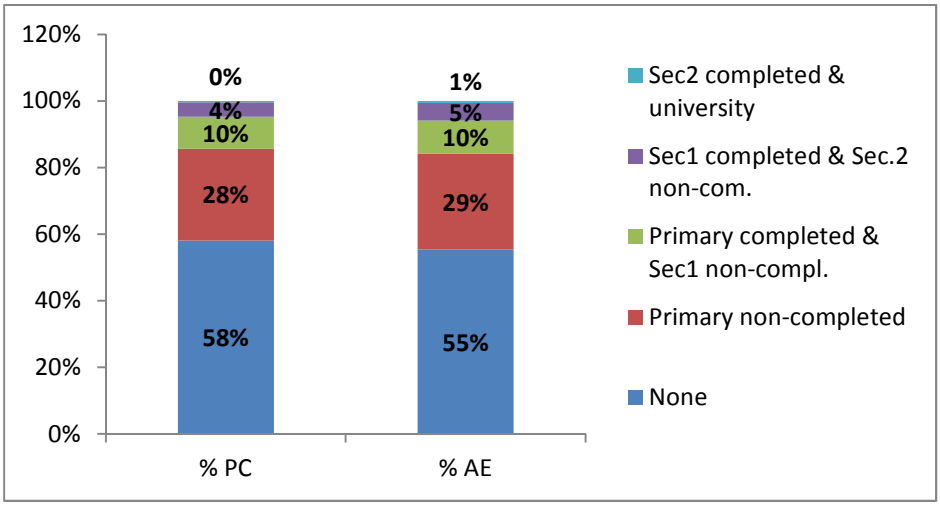


1. By education level

Graph 10 Composition of the bottom 40% by level of education

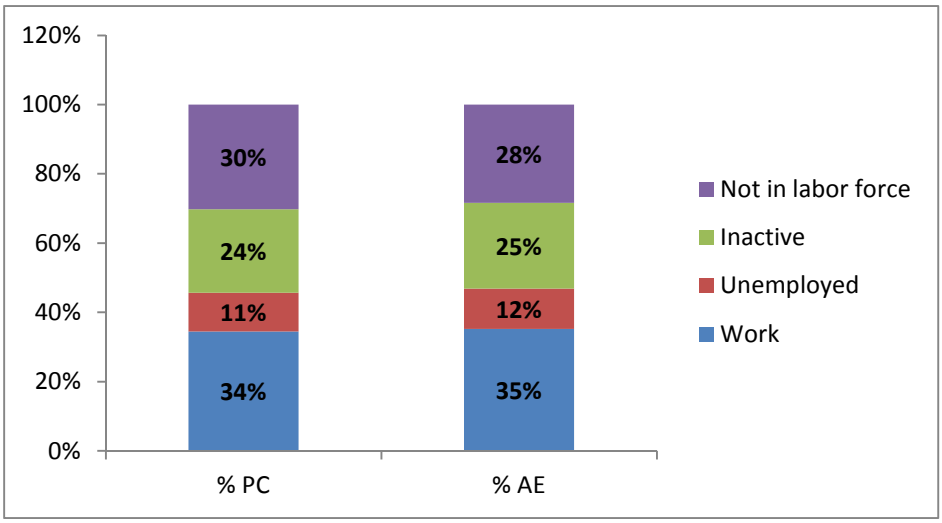


Graph 11 Composition of the bottom 20% by level of education

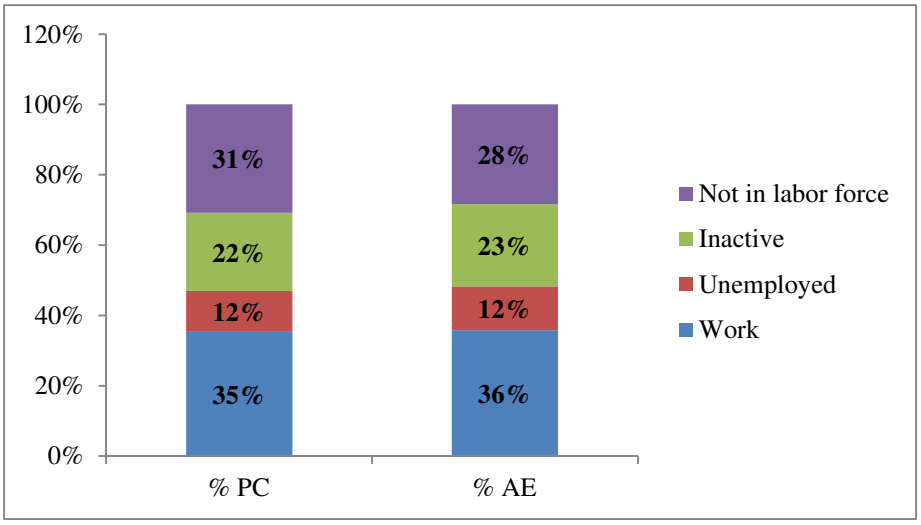


2. By economic status

Graph 12 Composition of the bottom 40% by economic status

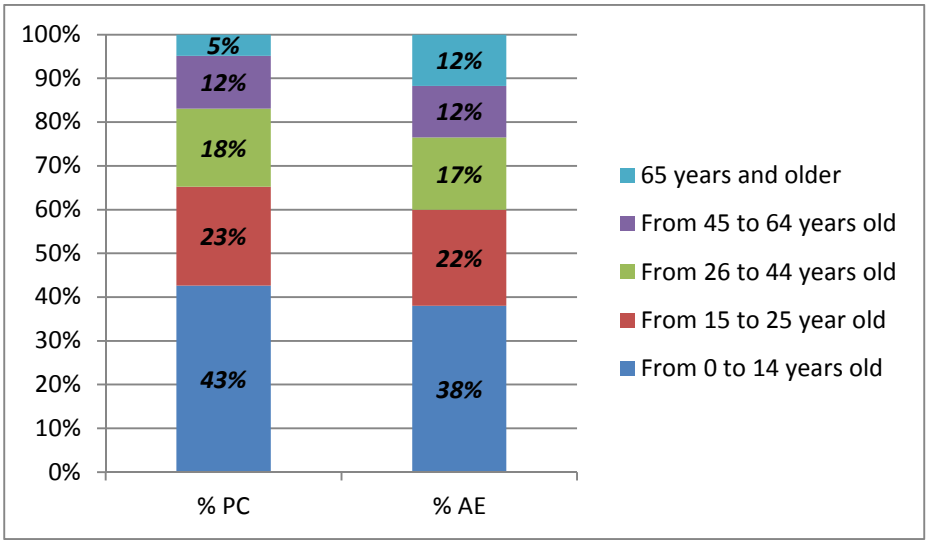


Graph 13 Composition of the bottom 20% by economic status

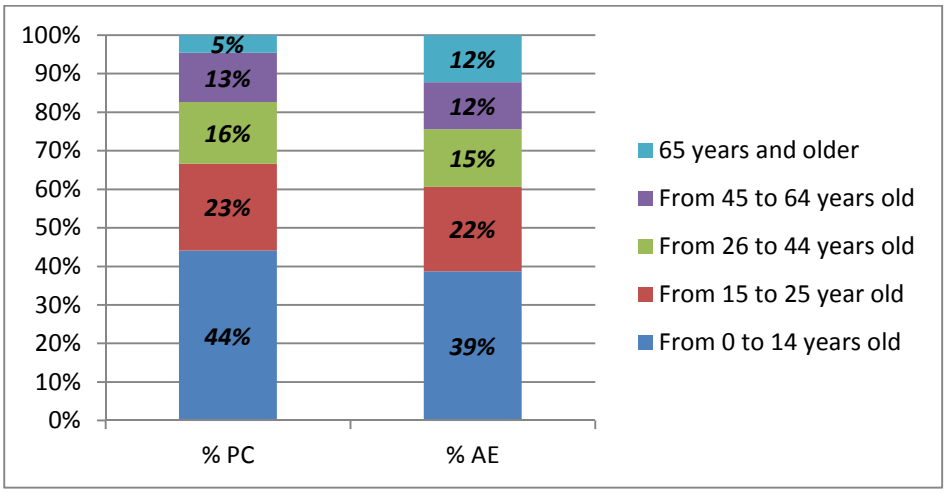


3. By groups of age

Graph 14 Composition of the bottom 40% by groups of age



Graph 15 Composition of the bottom 20% by groups of age



Annex 4. Technical note on the comparison of two different estimation methodologies for the spatial deflator

We test how sensible is the consumption aggregate to the choice of the spatial deflator. Table 4 presents the results of this comparison. As it shows, in .3196 cases the consumption aggregate is greater when deflated using the poverty lines ratio as spatial deflator rather than when using CPI as a deflator. In 1734 cases the opposite happens. Nevertheless, these two methodologies result in an average difference in monthly per capita consumption of only approximately 4 PPP dollars, in the first case, and 2.8 PPP dollars, in the second case. Notably, both are fairly small numbers, suggesting that consumption is not substantially sensible to the choice of these two spatial deflators.

Table 8 Comparison of the consumption aggregate using two spatial deflators

	Difference			
	Number of observations	Minimum	Average	Maximum
ipcf_ppp < ipcf_ppp2	2501	-131.9893	-5.782498	-.047142
ipcf_ppp > ipcf_ppp2	2429	.1947112	6.838847	172.7847
Jointly defined	4930	-131.9893	.4360102	172.7847
Total	4930			

Note: variable ipcf_ppp corresponds to the per capita monthly consumption aggregate using the poverty lines as the especial deflator and variable ipcf_ppp2 corresponds to the per capita monthly consumption aggregate using CPI as spatial deflator. Both variables are in 2011 PPP dollars.

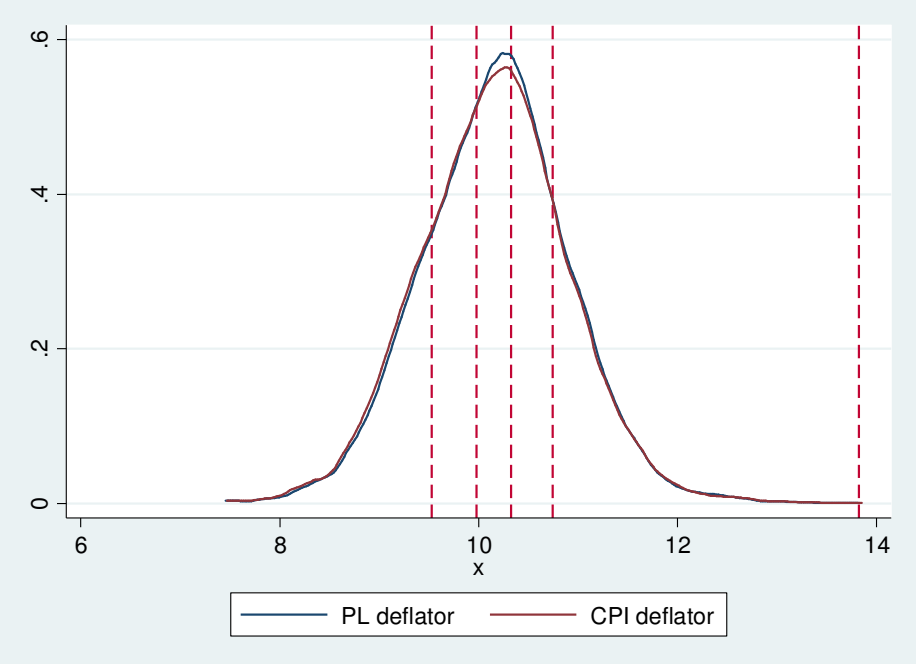
Furthermore, we also verify the implications of using one or the other deflator on the ranking of households by looking at the composition of consumption quintiles. We identify the cases where a household changes quintile as the spatial deflator changes. Table 5 presents the results of this comparison. As shown, in most of the cases households stay in the same quintile.

In light of these results, we privilege the use of a deflator that gives us more flexibility (in terms of the reference group, i.e. the CPI) instead to the one linked to the estimated (yet unofficial) poverty line.

Table 9 Comparing quintiles' distribution using two spatial deflators (using PL quintile thresholds)

		Using CPI as deflator				
Using Poverty lines as deflator	**Quintiles**	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5
	Q. 1	19.34	0.67	0	0	0
	Q. 2	0.60	18.49	0.95	0	0
	Q. 3	0	0.92	17.75	1.33	0
	Q. 4	0	0	0.63	18.54	0.79
	Q. 5	0	0	0	0.70	19.29

Graph 15 Distribution of the per capita consumption (logarithm) using two deflators



We also examine the implications of choosing the national rate as the reference CPI for the spatial deflator instead of Port-au-Prince. The deflator is marginally higher when we use the latter as reference. This difference is, on average, 0.034, with a quite small range (from 0.033 to 0.036). We also observe that the change in the index reference does not result in significant movements between quintiles (see Table 6). Accordingly, we opt to use Haiti as the reference

CPI since it allows more intuitive international comparisons using PPP dollars and international poverty lines.

Table 10 Comparing quintiles' distribution using two spatial deflators (using Haiti base as quintile thresholds)

	Using CPI as deflator and PaP as reference					
Using CPI as deflator and Haiti as reference	**Quintiles**	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5
	Q. 1	19.99	0	0	0	0
	Q. 2	1.41	18.55	0	0	0
	Q. 3	0	1.47	18.54	0	0
	Q. 4	0	0	2.03	18.00	0
	Q. 5	0	0	0	1.45	18.56

Graph 16 Distribution of the per capita consumption (logarithm) using two deflators

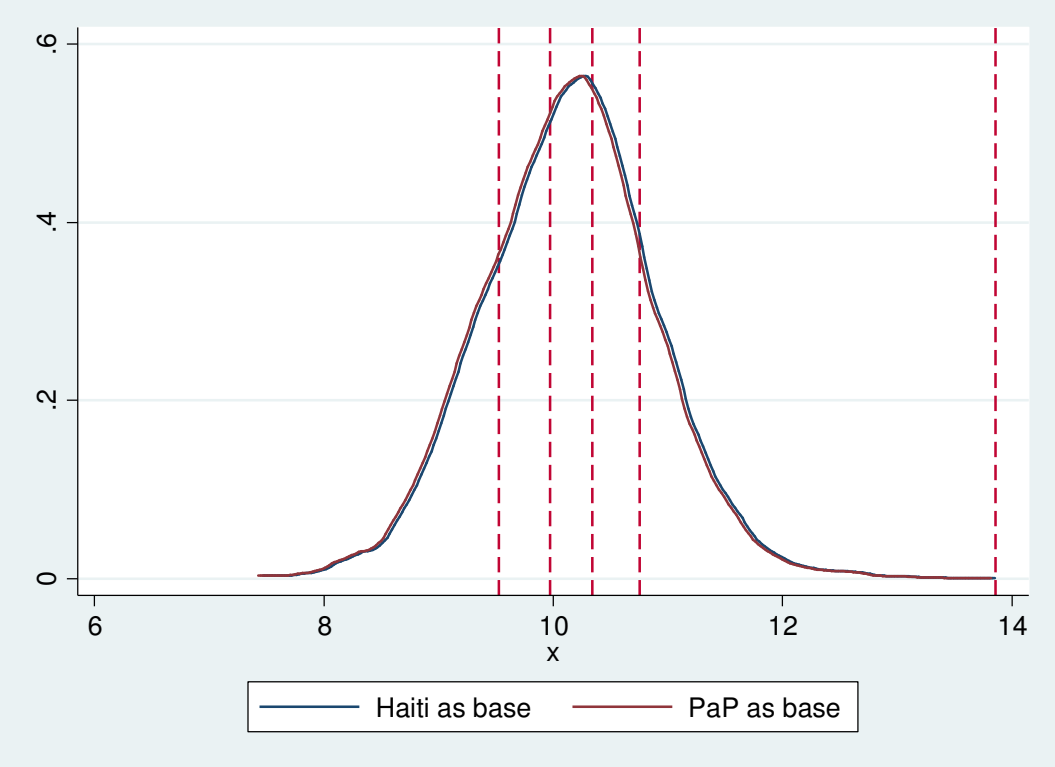


Table 11 Geographical deflators using different approaches

Region	CPI (Haiti base)	CPI (PaP base)	Poverty lines (PAP base)
Nord urban	1.055	1.09	0.984573
Nord rural			1.005295
Sud urban	1.085	1.12	1.076143
Sud rural			1.05584
Transvers urban	0.993	1.03	1.031423
Transvers rural			1.029291
Ouest urban	1.028	1.06	0.997003
Ouest rural			1.047506
Metropolitaine	0.967	1	1

Source: CPI – IHSI (Oct -2012). ECVMAS I. Authors' calculations

Annex 5. Testing the consistency of the imputed value for rent.

As mentioned above, the dwellings and their characteristics contributes to increase households' utility. While the monetary value of this contribution is easy to capture in the case of tenants (using the rent they are paying to use the dwelling), in the case of homeowners this value is *implicit*, as they own the dwelling and don't pay any rent to occupy it. There are two alternatives to capture such value. The first one is based on one of the questions included in ECVMAS I, as households are asked to estimate the rent they would have to pay if they were renters[20]. The second option is to impute the value of the rent for homeowners, using its predicted value coming from an hedonic regression (this methodology will be further explained in the following annex). For some countries, where the real estate market is well developed, the former method would be the preferred candidate, as imputation methods are based on the value of the declared rent by tenants: using the rent may result into an overestimation of the use-value of the dwelling, as those who rent their dwelling are better-off urban households, generally speaking. Before making a decision, we conducted few tests.

First, we compared the use-value coming from the two methods, as illustrated in the table 12 below.

Table 11 Comparison imputed rent versus declared value for homeowners

	Difference			
	Number of observations	Minimum	Average	Maximum
Imputed rent<declared value	2756	-716107	-38830.47	-.0585938
Imputed rent>declared value	1122	.8481445	6302.501	65427.62
Jointly defined	3,878	-716107	-25772.4	65427.62
Rent missing only	121			
Total	3,999			

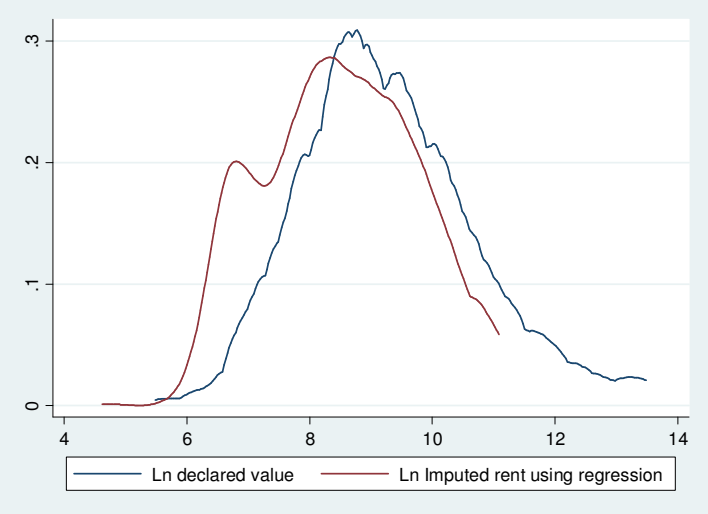
Note: This comparison is done using the declared value for the homeowners, already correcting for outliers and taking into account the currency associated with the amount. The former procedure is done following the same methodology as in the other components of the aggregate. Presented values are in gourdes and are on an annual-basis. 121 missing value for the declared value.

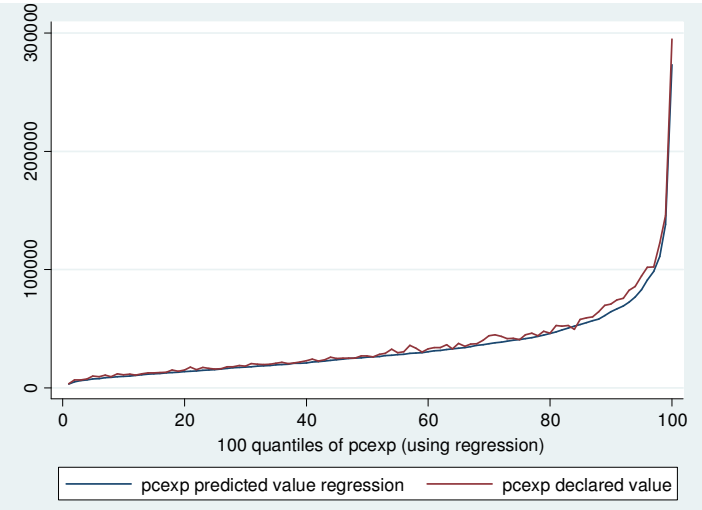
[20] Question C8: *Si vous devriez louer pour vous-même ce logement, quel est le montant du loger que vous devriez payer*

From the table, it stands that households' estimates are above the imputed value using the model, contrary to what is generally expected. The T-test confirms that the mean imputed rent is significantly lower than the declared value[21]. On the other hand, although these two values differ in magnitude, they are significantly correlated (with 95% of confidence level): 0.46.

Graph 17 allows visualizing the distribution of both variables. It is possible to see how the declare value is higher than the imputed rent. Likewise, the imputed value—using the regression-- shows two modes along the distribution, reflecting two subsets of households.

Graphs 17 and 18 Distribution of imputed rent for homeowners and distribution of the change in per capita expenditure using two methodologies of imputed rent





[21] With an average difference of 25,772.4 and a standard error of 1,424.258. With 95% of condifence, this difference is between -28564.77 and -22980.04

In light of these tests, three arguments allow us to be confident of the use of the latter. On the one hand, both amounts are significantly and rather highly correlated, meaning that the specification of the model is consistent with the expected outcomes. Secondly, graph 18 shows that when using the declared value, the increase in the annual per capita consumption is randomly allocated along all centiles of the distribution; this means we are not biasing the data for specific groups (either punishing or rewarding) when we impute the value using the prediction of the model instead of the declared amount. Thirdly, the data seem to indicate that self-declaration may result into an over-estimation of the use-value of the dwelling, probably due to home-owners the limited knowledge of real-estate.

In conclusion, this series of tests makes us feel confident that, when using the model to predict the implicit rent for homeowners we are not introducing any noise or bias in the estimate of the consumption aggregate.

Annex 6. Further information on imputations and other technical assumptions.

1. On the exchange rate Gourdes to Haitian dollars

The Haitian dollar is not an official currency in Haiti. Instead, it is another way Haitians use to measure the monetary value of products. Because it is commonly used among the population in general, ECVMAS includes it as an option when expressing monetary amounts regarding income, wage, expenses, among others.

Haitians started using the *Haitian dollar* when one American dollar was worth 5 gourdes. Although today's exchange rate is around 1 USD=43 HTG, Haitians still use the initial exchange rate calling *Haitian dollar* what used to be the American dollar.

Since it is an informal/inexistent currency, there is no record of it and not formal exchange rate monitoring exchange rates' series. Furthermore, this fictive exchange rate is *fixed* in time.

Nevertheless, for analytical purposes, it may be useful to know that 1 Haitian Dollar = 5 HTG (Haitian gourdes). We express all amounts and the final annual consumption aggregate in gourdes.

2. On food-consumption[22]

Annualizing food-consumption

Since the reference period is the last 7 days, we divide the sum of monetary food consumption, non-monetary food consumption and meal taken outside by 7 in order to obtain a daily measure. Then, we multiply this amount by 366 (the total number of days in 2012) and, as such, we obtain an annual estimation of food-consumption.

3. On non-food consumption

Current expenses

For this type of expenses (Q15-Q17c) we take into account the frequency of the household expenditure on each product. When this variable is missing, we use its mode, i.e. the weekly

[22] Including Tobacco and alcoholic beverages, although but we sum their values in a different scrip file (i.e. we do not count those products as food consumption).

frequency. We then multiply[23] it by the amount purchased and declared by the household to obtain the annualized non-food current expenditure.

4. On rent and imputed rent

As explained before, we include in the aggregate both the rent tenant households have to pay and an imputed rent for all rent-free and for home owner households:

For Tenants: We use the rent declared by the household in question C7 and we multiply it by the frequency reported in question C6.

Owners and rent-free households[24]: We estimate a model by an Ordinary Least Squares hedonic regression. The dependent variable is the natural logarithm of the rent declared by renting households. As independent variables we included the following characteristics of the dwelling:

- Department
- Urban/rural
- Number of rooms (QC4)
- Camp/non-camp
- Materials of walls (QC1)
- Materials of the roof (QC2)
- Materials of the floor (QC3)
- Type of dwelling (QB16)
- Electricity source of dwelling (QC9a)
- Electricity source in neighborhood (QC9b)
- Water supply in the dwelling (presence of absence) (QC10a)
- Waste water (QC11)
- Sanitation (QC12)

We use the coefficients of the estimation to predict the rent for rent-free and home owner households.

[23] For daily frequency, we multiply by 366; for every two days, we multiply by 183; for every three of four days, we multiply by 104.6; for weekly frequency, we multiply by 52; for fortnightly frequency, we multiply by 24; for monthly frequency, we multiply by 12; for bimonthly frequency, we multiply by 6; for trimestral frequency, we multiply by 4, for biannually frequency, we multiply by 2; for annually frequency, we multiply by 1.
[24] We also imputed this value for 5 households who are renting but who did not declare the paid amount.

5. On use-value of durables:

As explained earlier, in order to calculate use-value for durables we implement a two-phase process: 1) first, we calculate the median depreciation rate, then 2) we calculate the use-value by multiplying the depreciation rate times the acquisition value. In phase 1 (calculation of the depreciation rate), in case the acquisition price or the acquisition year are missing, we impute the median price/year per product. Alternative simulations (only imputing in phase 2 the median value per product in case the acquisition rate was missing, and using exclusively observations for which we have all values for all variables in phase 1), give results that are not statistically different.

6. Outliers

In all cases, we consider an observation as an *outlier* when its value is greater than the mean plus three *(3)* times the standard deviation of the (per capita in the case or food) consumption of each item. If the value is an outlier, we impute the maximum (per capita in the case of food) consumption of the specific product.

Once the outliers identified, we treat them by imputing the maximum value for that item, the maximum value being the highest value below the outlier value.

Before choosing this method of imputation we ran simulations and tests, by using various alternative methodologies and verifying the consequences of each choice on inequality numbers.

Aggregate	**MeanCons**	**MinCons**	**MaxCons**	**Gini**
Median + 3sd	32,374	1,740	839,639	0.39
Max + 3sd	34,667	1,742	1,039,897	0.41
Trim 1% per component	34,510	1,749	781,486	0.41
Trim 1% overall	35,444	1,749	1,128,909	0.42
No imputations	37,881	1,749	2,205,250	0.46

Source: ECVMAS 1, authors' calculations

Annex 6. Haiti's monthly CPI 2011-2012

Year	Month	General Index	Food, beverages, and tobacco	Clothing and Textiles, Footwear	Rent, Energy and Water	Construction, Equipment. et Maintenance of dwelling	Health	Transport	Leisure, Entertainment, Teaching and Culture.	Other goods and services
2011	Jan	177.20	182.90	169.40	199.50	193.80	178.10	142.20	184.60	149.20
	Feb	179.40	187.10	169.90	200.40	193.60	178.50	142.40	184.60	149.50
	Mar	181.72	189.47	171.34	204.07	194.55	180.41	145.54	184.95	150.05
	Apr	183.50	190.51	171.90	211.51	194.83	181.64	147.78	185.24	150.51
	May	184.72	191.76	173.29	213.50	195.68	184.53	148.25	185.27	152.35
	Jun	186.66	193.93	176.93	215.65	196.27	187.85	148.69	185.29	156.34
	Jul	186.79	193.46	178.19	216.70	197.27	189.17	148.93	185.40	157.15
	Aug	186.99	193.41	178.35	218.33	197.04	189.76	149.11	185.40	157.28
	Sep	188.24	194.82	179.13	220.22	197.68	192.03	149.13	187.66	158.28
	Oct	188.83	194.65	179.22	220.61	198.05	194.74	149.02	195.95	159.46
	Nov	189.24	195.30	179.63	220.68	198.15	195.09	149.04	196.00	160.05
	Dec	189.70	196.00	179.95	220.95	198.80	195.69	149.21	195.66	160.21
2012	Jan	190.85	197.87	180.72	221.32	199.23	196.75	149.39	196.12	160.54
	Feb	191.40	198.58	181.01	221.87	199.49	197.85	149.49	196.21	161.61
	Mar	192.06	199.48	181.45	222.18	199.88	198.07	150.16	196.35	162.00
	Apr	193.44	200.92	182.67	225.26	200.54	199.23	150.84	196.53	163.16
	May	194.30	201.63	184.24	226.28	202.47	199.96	151.94	196.87	163.33
	Jun	195.92	203.39	186.62	228.27	203.88	203.05	152.92	196.89	164.62
	Jul	196.69	203.84	188.46	229.99	204.61	204.17	153.40	197.90	165.42
	Aug	198.42	206.50	189.53	231.18	205.75	205.27	153.99	198.14	165.42
	Sep	200.35	208.58	191.56	234.72	206.55	207.11	154.54	200.14	167.00
	Oct	201.70	209.50	191.66	234.85	206.74	207.70	154.76	213.89	167.18
	Nov	203.33	212.35	191.84	235.66	207.37	207.55	154.83	214.11	167.99
	Dec	204.09	213.27	192.35	236.82	208.42	209.30	154.89	214.52	168.08

Source: IHSI. August 2004 = 100