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Anti-Poverty Transfers and Spatial Prices in Tunisia

By

Christophe Muller

Abstract

In this paper, we study the role of price correction in estimating the impact of price subsidies and anti-poverty cash transfer schemes on poverty in Tunisia. Three types of price corrections are considered: (a) no corrections; (b) living standards deflated by spatial Laspeyres price indices; (c) living standards deflated by true price indices that are estimated from a quadratic almost ideal demand system.

Distinguishing these corrections and using data from Tunisia, we study the effects of the price deflation and the demand system estimation on poverty and budget leakage estimates. These effects can intervene at two stages of the estimation: (1) the calculation of the transfer levels for each household from predicted living standards, and (2) the estimation of the post-transfer poverty or budget leakage statistics.

Our results show that price correction, whatever its form, may have only limited role for the assessment of anti-poverty policy in Tunisia. Correcting or not for spatial price differences, or for consumption substitution does not modify the ranking of the studied transfer policies. This is at odd with other findings in the empirical literature that price differences may be important for poverty monitoring.

Key Words: Poverty; Targeting; Transfers, Spatial Prices.

JEL classification: D63; H2; H53; I32; I38.

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Christophe Muller

Outline

The Authors
THEMA, University of Cergy-Pontoise,
33, Bd. Du Port, 95011 Cergy-Pontoise Cedex, France.
Email: christophe.muller@u-cergy.fr.

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1. Introduction

Cash transfer schemes and price subsidies, two major policies of poverty alleviation, are based on assessment of household living standards and involve income transfers. Price correction takes place at several stages of the poverty monitoring procedure.

For transfer schemes, the amount transferred critically depend on predicted living standards at two stages of the procedure. First, this is its predicted living standard level that would imply to provide a positive transfer to a given household or not. In that sense, predicted poor households have a larger probability of receiving transfers than predicted rich households, of course. Second, as we shall show later, the amount transferred itself is a direct and simple formula involving the predicted living standard formula.

Since predicted living standards are taken from regression results of living standard variables on a set of household characteristics, based on household survey data, they can be seen as estimated household 'scores'. These scores drive the amount transferred.

Thus, in the case of transfer schemes, predicted living standards are obtained by regressing the living standard variable on a few household characteristics easy to observe. Meanwhile, in the case of price subsidies, an equivalent income accounting for price subsidies can be calculated for each household, and translated into an equivalent 'shadow income transfer'. Here, as we shall see, the calculation is more complex. In both cases, the transfer procedure corresponds to a fixed budget, and poverty estimates, based on household living standard distributions, are used to monitor the anti-poverty policies.

One recurrent difficulty when assessing living standards is that households face different prices, in part because they live in different locations. How the correction for these price differences influence the anti-poverty monitoring of transfer and subsidies schemes is unclear. We investigate this issue in this paper.

Many authors have studied how to target poor people when some individuals' characteristics can be observed, while not income.[1] Although living standards are measured in household surveys, they are generally badly known for households not included in the survey. In Ravallion and Chao (1989), the targeting problem is described as the minimization of some poverty measure subject to a given transfer budget, by using as sole information the location of individuals. In practice, anti-poverty targeting is implemented by using predictions of household living standards instead of true living standards. The predictions are obtained from regressing living standards on a set of household characteristics like in Glewwe (1992).

In the case of price subsidies, the true price index corresponding to each household accounts for the post-policy reduced prices and for substitutions in the household consumption basket. The subsidies improve household living standards. This improvement can be described with an 'equivalent shadow cash transfer'. The shadow transfer can be calculated from an estimated demand system. As a matter of fact, the true price index is defined as the ratio of cost functions associated with the demand system, which corresponds to the shadow transfer.

The whole process makes sense only if the living standards and the transfers are well defined. In particular, price differences across households should be corrected by deflating living standards, and the implemented transfers should account for these price differences.

Accounting for price differences is important because spatial and temporal price dispersions may substantially change the way households spend their income. First, the general level of prices directly affects household purchasing power. Second, the variations in individual prices may cause households to adjust their consumption basket in an attempt to reach better satisfaction from the same monetary income. Finally, the way the calculated transfers account for price differences also matters. Indeed, since only money is transferred, the purchasing power of this money is what ultimately delivers welfare improvement.

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[1] e.g., Besley and Coate (1992), Glewwe (1992), Besley and Kanbur (1993), Datt and Ravallion (1994), Bourguignon and Fields (1997), Alderman and Lindert (1998), Chakravarty and Mukherjee (1998), Ahmed and Bouis (2002), Coady, Grosh and Hoddinott (2002, 2004), Coady and Skoufias (2004), Lindert et al. (2005), Muller (2005a), Skoufias and Coady (2007), Muller and Bibi (2008).

In these conditions, the statistical implementation of anti-poverty transfer schemes implies price correction at two stages: first, the estimation of the living standard predictions of which the calculation of transfer levels depends; and second, the estimation of the post-policy poverty measure. The first stage characterizes the policy execution itself, while the second stage is rather related to the assessment of the policy.

The living standard predictions are obtained by estimating equations where the dependent variable is the living standard variable. Clearly, estimation results will vary depending on the method of price correction that is incorporated in the definition of the living standard variable itself. For example, researchers may not apply price correction at all at this stage, perhaps because equations explaining living standards are specified in nominal terms (e.g. directly from activity monetary incomes) rather than real terms. This is important because the computation of the transfers conveys the price correction used when defining the living standard variable.

The second stage is that of estimating post-policy poverty measures. The living standard indicator intervening in these formulae should account for price differences. Again, different researchers may use different methods of price correction when estimating these poverty measures.

In this paper, we consider three methods of price correction: (1) no correction at all; (2) deflation based on Laspeyres price indices; (3) deflation based on 'true price indices', calculated from a demand system estimates. Then, mixing the two stages, we can obtain nine distinct combinations of price correction methods. These combinations constitute the situations we study for anti-poverty cash transfer schemes and price subsidies.

More generally, assessing the impact of price correction for poverty alleviation is important if credit is to be given to analyses neglecting price differences across households, the main set of results in the literature. Do price corrections make a difference for anti-poverty policies, and for which price indices? What are the direction, the magnitude and the consequences of the deviations caused by the price correction at each stage of the statistical procedure?

Our goal in this paper is to investigate these questions by availing ourselves of household survey data from Tunisia. In Section 2, we discuss the anti-poverty transfer and subsidies schemes and the estimation of the corresponding transfers. In Section 3, we present the used estimators at the different stages of the analysis, distinguishing the use of different price correction methods. In Section 4, we apply our analysis to the 1990 Tunisian household survey. Finally, Section 5 concludes.

2. The Anti-Poverty Transfer Schemes

We use the popular poverty measures of the FGT class (Foster et al., 1984) because of their attractive axiomatic properties: $\mathrm{P}_\alpha(y,z) = \int_0^z \left(\frac{z-y}{z}\right)^\alpha \mathrm{f}(y)\,\mathrm{d}y$, where z is a pre-specified poverty line, f is the p.d.f. of household living standard y and α is a poverty aversion parameter.[2] Our approach could easily be extended to other poverty measures. Once an anti-poverty budget has been decided, it remains to calculate and implement the transfers that allocate this budget across households.

2.1. The cash transfers

Let us first consider the situation where the pre-transfer incomes are perfectly observed. In that case, the optimal allocation of benefits is the solution to the following program for finite population and is denoted 'perfect targeting':

$$\underset{\{t^i\}}{\mathrm{Min}} \;\; \mathrm{P}_\alpha \equiv \frac{1}{N}\sum_{i=1}^{N}\left(\frac{z-(y^i+t^i)}{z}\right)^\alpha \; I_{[\,y^i+t^i<z]}$$

subject to

$$\sum_{i=1}^{N} t^i = B, \qquad \text{with} \quad t^i \geq 0, \;\; \forall \;\; i,$$

where N is the population size, z is the poverty line, t^i is the non-negative income transfer to person i and y^i is her income. We do not consider how the fixed budget B is funded.

[2] The $\mathrm{P}_\alpha(.)$ is the head-count ratio if $\alpha = 0$, the poverty gap index if $\alpha = 1$, and the poverty severity index if $\alpha = 2$. The FGT poverty measures satisfy the transfer axiom if and only if $\alpha > 1$, and the transfer sensitivity axiom if and only if $\alpha > 2$. All these measures satisfy the focus axiom and are decomposable. Focus axiom: The poverty index P(y,z) is independent of the income distribution above z. Monotonicity: P(y,z) is increasing if one poor has a drop in income. Transfer: P(y,z) increases if income is transferred from a poor person to someone more wealthy. Transfer-sensitivity: The increase in P(y,z) in the previous Transfer axiom is inversely related to the income level of the donator. Sub-group consistency: If an income distribution is partitioned in two sub-groups y′ and y″, then an increase in P(y″,z) with P(y′,z) constant, increases P(y,z).

Transfer schemes are often directed to households rather than individuals. Moreover, household living standards are generally used instead of incomes. Thus, one can account for differences in household composition and heterogeneity of individual and environment characteristics. The methods of this paper can easily be adapted to households and living standards instead of individuals and incomes. However, to simplify the notations, we report them first for individuals and incomes.

Bourguignon and Fields (1997) show that, under perfect observation of incomes, the optimal transfer scheme for the headcount ratio ($\alpha = 0$) corresponds to awarding transfers so as to lift the richest of the poor out of poverty:
$t^i = z - y^i$ if $y_{min} \le y^i < z$, where y_{min} is the threshold income required to be in the targeted group; $t^i = 0$ otherwise; and $\sum^{Np}_{i=1} t^i = B$.

The sum runs up to N_p, which is the number of the served pre-transfer poor, while B is the budget to allocate. On the other hand, the optimal transfer for a FGT poverty measure satisfying the transfer axiom ($\alpha > 1$) is such that:

$t^i = y_{max} - y^i$ if $y^i < y_{max}$, where y_{max} is the highest cut-off income to be in the served group; $t^i = 0$ otherwise; and $\sum^{Np}_{i=1} t^i = B$. As the budget rises, y_{max} increases up to the poverty line. When enough funds are available, all the poor can be lifted out of poverty.

For the poverty gap ($\alpha = 1$), both rules of transfer allocation are equivalent provided the poor incomes are never lifted strictly above the poverty line.

However, perfect targeting is not feasible because the income distribution cannot be perfectly observed. Nevertheless, since household living standards are correlated with some observable characteristics, denoted *x*, it is possible to use these characteristics to predict living standards using living standard survey data. Then, one can minimize poverty measures based on these predictions, or fitted values, subject to the available budget. That is: the perfect targeting rules for calculating transfers are applied to the sample of predicted living standards. In that case, the obtained transfer levels depend on the estimation method chosen for generating the predicted living standards. In particular, the deflation method used for the estimation should matter.

Then, given a set of correlates *x*, a poverty measure, a poverty line *z*, and a budget, the transfer solution is a function of: the chosen poverty measure, *x*, *z* and B. The predicted living standard, which is an estimated score calculated from the regression estimates, has three uses. First, it helps identify the poor by comparing the predicted living standard level with the chosen poverty line. Second, it is used to calculate the transfer level, which is equal to the difference of the predicted income with a fixed amount (poverty line or highest cut-off living standard for the served households). Finally, it is used to rank households for being served, which determines the value of the highest cut-off living standard of the served households.

In the case of a subsidy policy, the calculus of the shadow transfer is more complex and is based on an equivalent-income function that we discuss now.

2.2. The equivalent-income

The calculus of the equivalent-incomes is based on the estimation of a demand system. In the empirical part, we assume that households within the same cluster face the same prices, a usual convention (Deaton, 1988). Before the implementation of the subsidy scheme, household *h* in cluster *c* has an exogenous nominal income y^h and faces an initial price vector $\mathbf{p}_c^o$. After implementation of the subsidies, household *h* has the same nominal income, while it faces a new price vector $\mathbf{p}_c^{ps}$.

To compare the incomes of households facing different prices, we need to choose a reference price vector, denoted by $\mathbf{p}^r$. Then, we define the equivalent-income as in King (1983). Namely, let be a given budget constraint ($\mathbf{p}$, y), where $\mathbf{p}$ is a price vector, and y is the household income. Then, the household equivalent-income y_e is the income level which allows the households to reach the same utility level at the reference prices. Let $v(.)$ be the household indirect utility function, we have: $v(\mathbf{p}^r, y_e) = v(\mathbf{p}, y)$. Because $\mathbf{p}^r$ is fixed across all households, and y_e is an increasing monotonic transformation of $v(.)$, variable y_e is a money-metric of the actual utility $v(\mathbf{p}, y)$. The equivalent-income function $y_e(.)$ can also be expressed in terms of the expenditure function $e(.)$ associated to the demand system:

$$y_e = e\left(\mathbf{p}^r;\ v(\mathbf{p},\ y)\right) = y_e(\mathbf{p}^r,\ \mathbf{p},\ y).$$

Therefore, the equivalent-gain of the subsidy program for household *h* is:
$y_e(\mathbf{p}^r, \mathbf{p}_c^{ps}, y^h) - y_e(\mathbf{p}^r, \mathbf{p}_c^0, y^h)$.

If direct transfers are awarded to households predicted poor after removing subsidies, the equivalent-gain of moving from the reference situation for household *h* is: $y_e(\mathbf{p}^r, \mathbf{p}_c^0, y_c^h + \hat{T}_c^h) - y_e(\mathbf{p}^r, \mathbf{p}_c^0, y_c^h)$, where $\hat{T}_c^h$ is the estimated household transfer. Poverty will fall following replacement of subsidies by cash transfers if and only if $P_\alpha[z_e, y_e(\mathbf{p}^r, \mathbf{p}_c^0, y + \hat{T})] - P_\alpha[z_e, y_e(\mathbf{p}^r, \mathbf{p}_c^{ps}, y)] < 0$, where $\hat{T}$ is the vector of transfers, y is the vector of incomes and z_e is the equivalent-income function applied to the poverty line.

In practice, in this paper we calculate the equivalent income y_e for each household from estimates of the QAIDS demand system of Banks et al. (1993). In this system, the budget share of commodity j is

$$w_J = \omega^*{}_j + \sum_j \theta_{jk} \ln(p_{ck}) + \gamma_j \ln(\frac{y}{z(p_c)}) + \frac{\delta_j}{\delta(p_c)} \left[\ln(\frac{y}{z(p_c)}) \right]^2, \text{ where}$$

$$\ln z(\mathbf{p}_c) = \ln(\omega_0) + \sum_j \omega_j \ln(p_{cj}) + \frac{1}{2} \sum_j \sum_k \theta^*_{jk} \ln(p_{cj}) \ln(p_{ck}),$$

$\delta(\mathbf{p}_c) = \prod_k p_{ck}^{\delta_k}$ with $\sum_k \delta_k = 0$, p_{cj} is the observed price of good *j* in cluster *c*, $\boldsymbol{p_c}$ is the observed price vector for cluster *j*. Parameters ω_0, ω_j, ω^*_j, θ_{jk}, θ^*_{jk}, δ_j and γ_j must be estimated.

With this demand system, the equivalent-income function, for post-subsidies price vector p_c^{ps} and transfer T^h corresponds, for a household *h,* to:

Ln $y_e(p^r, p_c^{ps}, y_c^h + T^h) = [b(p^r) - \ln z(p^r)]\ [\ (\ \{\ln(y_c^h + T^h) + \ln z(p_c^{ps})\}/\{b(p_c^{ps}) - \ln z(p_c^{ps})\}\ )^{-1}$
$+ \delta(p^r) - \delta(p_c^{ps})]^{-1} + \ln z(p^r)$, with $\ln b(\mathbf{p}_c) = \ln z(\mathbf{p}_c) + \prod_j p_{cj}^{\gamma_j}$.

We are now ready to discuss the welfare statistics used at the different stages of the procedure.

3. The Welfare Statistics

3.1. Assessing policy performance

We assess the policy performance of alternative social programs in terms of poverty reduction for P_0, P_1 and P_2. For this our price reference is p^r. The decline in measured P_α poverty following a cash transfer scheme is: $\Delta P_\alpha = P_\alpha(Y, z) - P_\alpha(Y + \hat{T}, z)$.

In the case of a subsidy program, we compute the equivalent transfer ET of the subsidies scheme is such that: $y_e(p^r, p_c^{ps}, Y) = Y + ET$, where the benchmark price vector, p^r, is the price vector before implementing the subsidies. The poverty measure under subsidies is:

$$P_\alpha(y_e(p^r, p_c^{ps}, Y), y_e(p^r, p_c^{ps}, z)) = P_\alpha(Y + ET, z).$$

We also estimate the *budget leakage* of program benefits, which is obtained by adding the transfers given to those whose pre-transfer living standard is above the poverty line and the transfers which, although received by pre-transfer poor, are unnecessary because the post-transfer living standards are lifted strictly above the poverty line.[3] The *budget leakage ratio* is obtained by dividing the budget leakage by the available budget.

3.2. The two estimation stages

As mentioned before, the choice of the deflation method can intervene at the two identified stages in estimating the policy performance: (1) the prediction of living standards for the transfer calculation and (2) the estimation of poverty and budget leakage measures. So, in total, nine possibilities could arise from the choice of the deflation methods at each of these two stages since nothing implies that the same method should be used at both stages. For example, the calculus of the transfers based on predicted living standards may be done much before the assessment of the program performance, or the two stages can be based on different data.

[3] Baker and Grosh (1995) and Cornia and Stewart (1995) omit the second component of the leakage cost. Creedy (1996) distinguishes between the vertical expenditure inefficiency, that is equal to the leakage ratio as

3.1.1. Income definition

The lines of the calculus are as follows. For each surveyed household, we start by calculating the nominal income level y* corresponding to the reference situation defined without transfers or subsidies (at prices p^r). This is done by applying the estimated equivalent-income formula with $p^r = p^s$ – subsidies. In this way, we shall compare the studied programs (cash transfers and subsidies) by putting them on the same stand.

Then, we deflate the nominal income variable. The three deflation possibilities correspond to the following definitions of real incomes:

(1) No correction: y*;
(2) Laspeyres index deflation: y*/P, where P is the spatial Laspeyres price index describing the general level of local prices faced by the household;
(3) Equivalent-income deflation: $y_e(p^r, p_c, y^*)$, where p_c is the price vector in the cluster c of the considered household.

3.2.2. The transfer calculation

Given these definitions of price-corrected living standards, we consider two alternative social programs: cash transfer and subsidies. In the case of cash transfer, the algorithm of perfect targeting is applied to the sample of the predicted incomes obtained from the regressions of observed incomes y* on observed correlates x. This yields the vector of transfers t(x). In the case of the subsidies, we compute the equivalent transfer by using the y_e function: $y_e(p^r, p_c, y^*) = y^* + \hat{T}$, where $\hat{T}$ denotes the estimated equivalent transfer.

Remember that for calculating the actual transfers, one can use undeflated incomes, Laspeyres-deflated incomes or equivalent-incomes. The post-transfer equivalent-income is calculated by first anchoring the equivalent-income function on the reference situation of prices without subsidies, and second, incorporating the transfer amount in the income in this situation. For example, for cash transfer schemes, we can calculate the equivalent-income $y_e(p^r, p_c, Y)$, where p^r are the observed prices minus the subsidies. Then, we apply the perfect targeting transfer computation on the sample of equivalent-incomes.

If instead, we look at the situation where only subsidies are applied, the equivalent-income is equal to $y_e(p^r, p^{ps}, Y) = Y + \hat{T}$, where here $\hat{T}$ denotes the estimated virtual transfer equivalent

estimated by Baker and Grosh (1995) and by Cornia and Stewart (1995), and the poverty reduction efficiency to the effect of subsidies on y_e. Then, $\hat{T}$ varies across households. Thus, we can consider transfer terms in the case of subsidies too, albeit only when equivalent-income is used for defining the living standard variable. Note that in practice we do not need to calculate explicitly $\hat{T}$ for the social welfare statistics based on $y_e(p^r, p^{ps}, Y)$. p^{ps}, which is the vector of the observed prices, is equal to the vector of reference prices (prices without subsidies) minus the vector of subsidies for each good.

3.2.3. The deflation when estimating welfare statistics

The second stage consists in deflating the post-transfer incomes for the estimation of poverty and budget leakage. Again, there are the same three possibilities:

(1) No correction: we use sampling estimators of social welfare criteria based on the sample of $y + \hat{T}$.

(2) Laspeyres correction: we use sampling estimators based on the sample of $(y + \hat{T})/P$;

(3) Equivalent-Income correction: we use sampling estimators based on the sample of y_e .

3.2.4. The complete procedure

Let us sum up. We use the following procedure:

1. We compute a sample of living standard predictions from household survey data.
2. We calculate the transfers to implement for this sample. The calculus depends on (a) the considered poverty indicator and (b) the considered policy (cash transfers or subsidies).
3. We generate a sample of post-transfer living standards by implementing the calculated cash transfers and subsidies to each sampled household.
4. We estimate post-program poverty and budget leakage measures, using sampling estimators and the sample of post-transfer living standards.

The choices of the deflation methods take place at steps 1 and 4. The combination of deflation methods in steps 1 and 4 yields diverse results for poverty and budget leakage measures. In the next section, we discuss the estimates of these measures using data from Tunisia.

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that is equal to our budget leakage ratio.

4. Estimation Results

4.1. The context and the data

In Tunisia, basic foodstuffs have been under universal subsidy since 1970. The Tunisian Universal Food Subsidies Program (TUFSP) allows the government to redistribute income to the poor and preserve their purchasing power. However, even if beneficial to the poor, this program has been inefficient and costly. By 1990, subsidies accounted for 10 percent of total government expenditure. Moreover, the wealthier households, who consume more food, benefited more from the program than the poor. With rising international food prices caused by the current 'food crisis', subsidies are increasingly expensive, while their suppression may cause social unrest.

Substituting subsidies with cash transfers to the poor (as in Ahmad and Bouis, 2002) would reduce the large budgetary leakage of food subsidies to the non-poor. Also, direct cash transfers may reduce poverty at a lower cost. Reforms of Tunisian food subsidies and their impact on poverty have also been studied by Bibi (2003) and Audet, Boccanofuso and Makdisi (2007).

The methodology presented in previous sections is applied to data from the 1990 Tunisian consumption survey conducted by the INS (National Statistical Institute of Tunisia). The household survey provides information on expenditures and quantities for food and non-food items for 7,734 households. Usual additional information from household surveys is available such as the consumption of own-production, education, housing, region of residence, demographic information, and economic activities.

We have discussed the various calculations and estimations by referring to income variables only. In practice, we account for household demographic composition too and use income per adult-equivalent instead of incomes. However, using arbitrary equivalence scales or estimating them is contentious (Pollak and Wales, 1979, Blundell and Lewbel, 1991). To avoid distorting the results by using special equivalence scales, and to concentrate on the issue of imperfect targeting, we choose to use per capita total consumption expenditure as our indicator of household member's welfare.

The correlates of living standards that we use in the predictive regressions include: regional location of the households;[4] demographic information on households; characteristics of the household's dwelling; occupation and education level of the household's head. They are described in Muller and Bibi (2008).

4.2. The price corrections

Each correction method for price dispersion has advantages and drawbacks. Obviously, not correcting for price deflation does not treat price dispersion. However, this approach is not sensitive to measurement or design errors in the used price indices.

The price deflation based on Laspeyres price indices deals with price dispersion and is not sensitive to estimation errors in demand system estimation. However, it does not account for consumption substitution across goods.

Finally, the correction can be based on estimated true price indices, which are ratios of equivalent-incomes. Here, they are derived from the estimation of a Quadratic Almost Ideal Demand System for Tunisia. The true price indices account for diverse substitution behavior across households. However, they are sensitive to estimation errors of the demand system. Also, if market imperfections are important, approximating consumer decisions by assuming that households only face a budget constraint may be invalid. We now discuss the estimation results.

4.3. The results

Muller and Bibi (2008) present detailed analyses of how targeting efficiency can be improved by using quantile regressions for predicting living standards. These results are based on income-equivalent measures derived from a first-stage estimation of a demand system. In the present paper, we extend the analysis to two additional types of price correction and incorporate the poverty measures P_0 and P_1. Here, we only consider the two living standard prediction methods that provide the best performance with these data: OLS and quantile regressions centered on the first decile.

[4] For more information about regional targeting, see Ravallion (1992), Datt and Ravallion (1993), Baker and Grosh (1994) and Bigman and Fofack (2000).

Tables 1 to 4 present the estimates of post-transfer poverty (P_0, P_1, P_2) and budget leakage for different transfer and subsidy schemes. The used poverty line is TD 280 per capita per year, which is close to usual values for poverty lines in Tunisia.[5]

In the empirical results, we do not consider the following combinations: (1) Laspeyres index correction for living standard prediction AND True price index correction for poverty estimation); and (2) True price index correction for living standard prediction AND Laspeyres index correction for poverty estimation. Indeed, they seem to have little sense. If a method of price correction is deemed to be useful for the prediction equations, it seems logical that the same method should be also adopted for estimating poverty. In contrast, due to data limitations, the absence of price correction at some stage could be justified and combined to any method of price correction at the other stage.

We discuss subsidies first, then transfers. In Rwanda, Muller (2008a) found that corrections for spatial price differences could substantially affect poverty estimates. We shall see that such finding does not necessarily extend to other contexts. Note that we comment *measured poverty* rather than unobserved exact poverty level. In particular, measurement errors, misspecifications and sampling errors may affect the comparisons. We assume that they do not substantially change the results.

One finding is that the methods of price correction used at both stages do not matter much if the issue at hand is to decide between subsidies and direct cash transfers to reduce poverty. In all cases and for all deflation methods, post-transfer poverty estimates (whether P_0, P_1 or P_2) are much lower than that obtained under subsidies[6]. The differences found in poverty estimates between the cases of subsidies and transfers are so large that the used methods of

[5] The lower poverty line estimated by the National Statistic Institute and the World Bank (1995) – see also Ravallion and van der Walle (1993) - on the basis of needs in food energy corresponds to TD 196, the poverty lines by Ayadi and Matoussi (1999) vary between TD 213 and 262, and the poverty lines by Bibi (2003) range from TD 227 to 295. Poverty lines calculated by the World Bank for 1995 (The World Bank, 2000, Muller, 2008b) are between TD 252 to TD 344.

[6] Note that when considering the effect of subsidies on the estimates of poverty and budget leakage, applying no price correction or using Laspeyres index correction for cash transfers yield exactly the same estimates (e.g., 12.79 percent for P_0). This is because under subsidies there is no actual cash transfer. The occurrence of a shadow transfer depends on using the equivalent-income function in calculating living standards. Indeed, using the equivalent-income correction has an impact as the shadow transfer caused by the subsidies is incorporated and accounts for consumption substitution effects (giving an estimate of 13.87 percent for P_0).

price correction are a minor concern for this comparison. This is true despite the range of poverty estimates being sometimes substantial across price correction methods (e.g., from 1.23 to 1.44 for P_2).

Let us now turn to the comparison of cash transfer schemes. The ranking of the two considered living standard prediction methods (OLS versus quantile regressions) depends on the price correction neither for the poverty estimation, nor for the calculus of the transfer amounts. In all cases using quantile regressions centred on the first decile yields greater poverty alleviation. Moreover, the two stages of price corrections appear to have impacts of similar magnitude on poverty estimates. Solely correcting the poverty estimation stage would lead to slightly smaller measured poverty than solely correcting the living standard prediction stage, while the gap is marginal.

On the whole, price corrections do not change the qualitative comparison results of the considered anti-poverty policies. They only slightly affect the post-policy poverty estimates.

The fourth table shows the budget leakage ratio statistics. With budget leakage, similar features of the effects of price corrections are found to those found with poverty. In all case, the share of the budget which is wasted is very high, which is usual. First, the case of subsidies (between 90.05 up to 91.47 percent of leakage) is clearly different from those of cash transfers (from 70.86 and 76.69 percent). Second, the influences of the two correction stages are close. Finally, results with Laspeyres price indices and with equivalent-incomes are close.

Changing the transfer calculation method (that is: based on OLS or quantile regression) does not change the ranking of the budget leakage estimates across price correction methods. As a matter of fact, the gap between budget leakage from OLS-based transfers and quantile regression-based transfers is smaller than the variations caused by different types of price correction. Nonetheless, the effect of the price correction is again marginal.

5. Conclusion

In this paper, we study the role of correcting for price differences for policy comparisons of anti-poverty cash transfers schemes and price subsidy schemes. The price correction can intervene at two stages based on household survey data: when predicting unobserved living standards and calculating transfer amounts from the predictions; and when estimating poverty or budget leakage indicators. We consider three types of price correction: no deflation, deflation based on Laspeyres indices; deflation based on true price indices taken from an estimated demand system.

Our results, based on the 1990 Tunisian consumption survey, show that correcting for spatial price dispersion has only small effects on monitoring poverty policy in Tunisia. This is at odd with results found in other contexts and shows that the importance of spatial price deflation for poverty monitoring may be country specific. In Tunisia, estimation results based on using Laspeyres price indices are found very close to results based on using ‘true price indices’ derived from an estimated quadratic almost ideal demand system. Then, the motivation for estimating such a demand system in Tunisia seems rather weak if the purpose of the estimation is to improve poverty alleviation policies. Moreover, even the complete absence of spatial price deflation is found acceptable for designing poverty alleviation in Tunisia at this period.

However, a few caveats need be mentioned. First, only food prices have been considered as it is not possible to define accurate prices for other consumption categories with the available data. As always, consumption data contamination can be an issue for such analyses, and there is no guarantee that the Tunisian data sets are devoid of it. Moreover, unit-values, calculated from consumption records, have been used as price indicators rather than information from market price surveys. This may be an issue when some values or quantities of some products are systematically under- or over-estimated during the collection. Also, quality bias can occur in that case if wealthy households systematically consume higher qualities of some goods (which are generally associated with higher prices).

Finally, Tunisia is characterised by publicly administered prices for a substantial section of the consumption of the poor (e.g. wheat for couscous). These prices are identical over the national territory for households surveyed at the same time, while they can change over time. All these elements invite to take precautions before generalising the results of the present paper to other contexts.

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Table 1: Head-Count Index (in percentages)

	Correction P_0	No price correction	Laspeyres index	Equivalent income
Correction transfers				
No price correction	Subsidies	12.79	12.00	12.48
	OLS	6.36	5.84	6.25
	Quantile regressions	6.75	6.06	6.16
Laspeyres index	Subsidies	12.79	12.72	
	OLS	6.59	6.33	
	Quantile regressions	6.86	6.51	
Equivalent income	Subsidies	13.87		13.86
	OLS	6.96		6.79
	Quantile regressions	7.36		6.89

7734 observations. Poverty line z = TD 280.

Column 1 denotes the rows corresponding to the diverse price correction methods at the stage of transfer calculation. Row 1 denotes the columns corresponding to the price correction method at the stage of social welfare criteria estimation. Column 2 shows the three assessed social programs: price subsidies, cash transfers based on OLS predictions, cash transfers based on quantile regression predictions. Columns 3, 4 and 5 show the estimates of P_0 for the respective methods of price correction in the final P_0 estimation stage.

Table 2: Poverty Gap (in percentages)

	Correction P_1	No price correction	Laspeyres index	Equivalent income
Correction transfers				
No price correction	Subsidies	3.30	2.99	3.10
	OLS	1.16	1.07	1.11
	Quantile regressions	0.99	0.90	0.92
Laspeyres index	Subsidies	3.30	3.26	
	OLS	1.18	1.15	
	Quantile regressions	0.99	0.94	
Equivalent income	Subsidies	3.47		3.44
	OLS	1.25		1.22
	Quantile regressions	1.06		1.01

7734 observations. Poverty line z = TD 280.

Table 3: Poverty Severity Index (in percentages)

	Correction P_2	No price correction	Laspeyres index	Equivalent income
Correction transfers				
No price correction	Subsidies	1.26	1.12	1.15
	OLS	0.35	0.32	0.32
	Quantile regressions	0.25	0.22	0.23
Laspeyres index	Subsidies	1.26	1.24	
	OLS	0.35	0.35	
	Quantile regressions	0.25	0.24	
Equivalent income	Subsidies	1.31		1.30
	OLS	0.37		0.36
	Quantile regressions	0.26		0.25

7734 observations. Poverty line z = TD 280.

Table 4: Budget Leakage ratio (percentages)

Correction transfers	*Correction Leakage*	No price correction	Laspeyres index	Equivalent income
No price correction	Subsidies	90.86	91.47	91.02
	OLS	73.84	76.69	75.70
	Quantile regressions	72.49	75.39	74.29
Laspeyres index	Subsidies	90.86	90.90	
	OLS	73.98	74.84	
	Quantile regressions	72.46	73.25	
Equivalent income	Subsidies	90.05		90.07
	OLS	72.40		73.06
	Quantile regressions	70.86		71.40

7734 observations. Poverty line z = TD 280.