What drive Regional Economic Inequalities in Tunisia? Evidence from Unconditional Quantile Decomposition Analysis

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Abstract
This paper analyzes the level and main drivers of economic inequality among rural–urban, littoral-inland and nonmetropolitan-metropolitan households in Tunisia using nationally representative data set. On average and across the welfare distribution, households living in privileged regions, mainly in urban and metropolitan areas, are found to be wealthier than their counterparts in rural and nonmetropolitan areas. Using the newly developed methods of decomposition, we endeavour to decompose the distributional welfare differentials among households into endowment effects, explained by differences in households' characteristics, including the head's educational and employment characteristics, and unexplained effects attributable to unequal returns to these covariates. We find that the endowment effects dominate the return effects and contribute more to the overall gap throughout the welfare distribution. General household's characteristics and educational level of the head appear as the main and common drivers of different regional consumption differentials.

Keywords: Regional Inequalities; Unconditional quantile regression decomposition; Tunisia.

1. Introduction
The growing regional disparities coupled with deteriorating standards of living and increasing perceptions of exclusion in lagging areas were among the main reasons that prompted people to revolt against the uneven distribution of wealth, seeking a new model of economic, political, and social participation and development. Deep analysis of the main drivers of such regional disparities, which is the main objective of the current paper, can improve understanding of the economic mechanisms underpinning inequality and thus inform policymakers to implement a broad array of appropriate policy instruments and strategies that reduce poverty and inequality traps and foster growth with equity.

There is an extensive theoretical and empirical works on inequality measurement that helps to achieve a better comprehension of the economic processes behind the spatial and temporal variation of suggested indexes at both national and international scales. Reviewing this affluent and expanding literature is daunting and in this section, we will just try to briefly summarize the main recent results of studies focusing on the analysis of inequality in Arab countries. Among the most recent and comprehensive works includes Bibi and Nabli (2009, 2010), Bibi, et al. (2011), Ncube and Anyanwu (2012) and Belhaj Hassine (2015). One of the common findings of these studies is that income and expenditure distributions in most Arab countries show signs of improvement in the early 2000s but it's still far off the level of middle and upper-income countries in the world. The other issue revealed in these recent studies, more specifically in Belhaj Hassine (2015), which is of serious concern for social cohesion and inclusive growth prospects in the region is the persistence of the interregional disparities. These regional and urban–rural locations of households are found to considerably contribute to welfare gap and their magnitude seems to rise over time in several Arab countries.

For a better understanding of economic inequality in the Arab countries, a variety of approaches to decompose inequality among different groups/regions have been suggested by the recent methodological literature. The well-known approach consists of decomposing the overall inequality into within-group and between-group components using the classic measures of inequality such as the Gini coefficient and the Generalized Entropy (GE) inequality indices. Using such approach in decomposing inequality in the Arab region, Bibi and Nabli (2010) found a significant within-region inequality. Otherwise, using micro-data from different surveys, El-Laithy et al. (2003) reveals that economic inequality is explained mainly by within-region disparities at the national level, whilst only

13 percent to 18 percent can be attributed to lack of fairness between different regions. In this vein, Shahateet (2006), by means of raw data from two Jordanian national household surveys on expenditure and income conducted in 1997 and 2002, found severe regional economic inequality and called then for a more specific space-balanced approach for inequality alleviation.

A new approach that fills in the gaps of classic decomposition methods is the regression-based inequality decomposition using the commonly known Oaxaca-Blinder decomposition. As this standard decomposition method provides only an estimate of the mean effect of a given variable while that the effects of covariates may differ along the income and expenditure distribution, an improvement of the current technique that takes account this gap is suggested in the empirical literature. The novel technique, called the RIF unconditional quantile regression, proposed by Firpo et al. (2009) and Fortin et al. (2010) allows estimating the impact of explanatory variables at different points on the welfare aggregate distribution. Using this new method of decomposition, Belhaj Hassine (2015) illustrates that metropolitan-nonmetropolitan and urban–rural differences appear to significantly contribute to welfare disparity in many Arab countries, including Tunisia, and their importance seems to augment over time in several countries. She suggests that the urban–rural and regional disparities in returns to household features, especially returns to human capital, could be best addressed by improved education quality and higher flexibility of the labour market and public investments.

On the other side, considerable work has been undertaken on economic inequality and poverty in Tunisia (see for instance Ayadi et al. 2003, 2007). Most commonly, these studies reveal that there has been a significant reduction in the level of poverty and inequality in Tunisia during the last decade, in line with the official statistics of the National Institute of Statistics (NSI). However, when compared to its peers in the middle-income class countries for example, it appears that poverty rate, expenditure inequality and unemployment rate remained at higher level. Similar to other Arab countries, Tunisia still have a long path to achieving social justice and prosperity among people. Economic growth and equality of outcomes are the essential keys to attain such social justice and fairness for Arab countries. Furthermore, Western regions, particularly the rural areas, have been found in the aforementioned studies, focusing on Tunisia, to contribute broadly to the overall poverty and inequality. It's noteworthy that the majority of these studies are based on the monetary approach that considers income as the sole relevant indicator of welfare, while others authors like Ayadi, et al. (2007) have used a non-monetary composite asset index as a proxy of the household wealth. Despite the different approaches used to assess the welfare, the agreement among the previous studies is the obvious disparity between urban and rural as well as between littoral and inland areas.

Though the contribution of these studies is immense in advancing awareness on inequality in Tunisia and its peers, little is done to identify the key drivers affecting the extent and direction of change of inequality. Notwithstanding the efforts of Tunisian policy makers to keep the national inequality indicators at a moderate level, severe regional disparities and inter-group inequalities have persisted since the 1990s. All the aforementioned studies have raised attention on these disparities within the country, but few have deeply scrutinized them, in cases where they have, the majority of studies, focusing on the Tunisian context, are limited to a simple analysis and description of the phenomenon without diving into the analysis of the main drivers of these disparities and the investigation of their different effects on different points of the welfare distribution. In this line, in this paper, we attempt to assesses the levels and determinants of economic inequality in Tunisia among rural–urban, inland-littoral as well as metropolitan–nonmetropolitan divides, using two household surveys micro-data and unconditional quantile decomposition approach.

2. Methodology and Data

To analyze deeply the sources of inequality between various regions, we use the well know decomposition methods: the basic Oaxaca and Blinder decomposition technique and the unconditional quantile regression method developed by Firpo, et al. (2009). It is worth to note that the RIF-regression model is called unconditional quantile regression when applied to the quantiles. This method consists, as we will explain below, of decomposing the consumption gaps at different quantiles of the unconditional distribution into differences in household and head endowment

characteristics like education, age, employment etc., and differences in the returns to these characteristics to identify the specific covariates or group of covariates which contribute to the widening or narrowing the regional economic inequality in the country.

Suppose the mean log per capita consumption function for each group (6 groups) is described by the subsequent equation:

$$E(Y_G|X_G) = X_G\beta_G \tag{1}$$

where Y denotes the logarithmic real per capita yearly household expenditures, X is the vector of household and geographical characteristics (including the constant term), β is the vector of coefficients and G the group of population living in a given region (rural, urban, inland, littoral, nonmetropolitan and nonmetropolitan regions). Then the OLS estimate of β_G assesses the impact of X on the conditional or unconditional mean of Y for group G. It is noteworthy in this regard that the Oaxaca–Blinder decomposition has been used to decompose initially the mean gender wage gap into a composition effect explained by differences in productivity features and an unexplained wage structure effect (called discrimination effect) due to different returns to covariates. Same methodology will be used in the current study to decompose, as noted above, the welfare gap into endowment and return effects.

Accordingly, the mean log welfare gap between households living in opposed regions R and $\bar{R}$, for instance rural and urban regions, can be written as follows:

$$\bar{Y}_R - \bar{Y}_{\bar{R}} = (\bar{X}_R - \bar{X}_{\bar{R}})\hat{\beta}_G + \bar{X}_{\bar{R}}(\hat{\beta}_R - \hat{\beta}_{\bar{R}}) \tag{2}$$

Where $(\bar{X}_R - \bar{X}_{\bar{R}})\hat{\beta}_G$ is then the endowment effects that represents the contribution of the differences in distributions of household characteristics to inequality at the average and $\bar{X}_{\bar{R}}(\hat{\beta}_R - \hat{\beta}_{\bar{R}})$, denoted returns effect, represents the inequality due to differences (or discrimination) in returns to the household characteristics.

Notwithstanding its usefulness in explaining welfare differences between different population sub-groups due to variations in characteristics between them or alternatively due to discrimination, the Oaxaca/Blinder decomposition method is recently criticized for considering only the decomposition of the mean outcome variable differences, yielding an incomplete representation of the inequality sources. Accordingly, other conventional methods have extended the decomposition beyond the mean and allow the investigation of the entire distribution. Yet these methods share the same weaknesses in that they entail a set of assumptions and computational issues (Fortin, Lemieux, & Firpo, 2010). In this regard, the Recentered Influence Function (RIF) regression approach recently suggested by Firpo, Fortin, and Lemieux (2009) addresses these weaknesses and provides a straightforward regression-based method for performing a detailed decomposition of some distributional statistics such as quantiles, variance, and others statistics. The RIF is the key concept of the unconditional quantile regression, the widely used method of decomposition in the recent literature.

For our case, we can model $RIF(Y, q_\tau)$ as the function of explanatory variables:

$$E(\text{RIF}(Y,q_\tau)|X) = X\beta_\tau \tag{3}$$

Where q_τ is the τth quantile and β_τ the vector of parameters associated to the q_τ. Since the $RIF(Y, q_\tau)$ could not be observed in the practice, we will use in our application the following formula of estimation, used widely in the literature:

$$\widehat{RIF}(Y_G, \hat{q}_\tau) = \hat{q}_\tau + \frac{\tau - I(Y_G \le \hat{q}_\tau)}{\hat{f}_Y(\hat{q}_\tau)} \tag{4}$$

Where $\hat{f}_Y$ is the estimated marginal density function of Y and I is an indicator function.

After estimating the model in Eq (3) for the 10th (lowest percentile) to 90th (highest percentile) quantiles of the population, we use the obtained unconditional quantile regression estimates to decompose the different gaps into a component attributable to differences in the distribution of characteristics (*endowment effect*) and a component due to differences in the distribution of returns (*returns effect*) as follows:

$$\hat{q}_{R,\tau} - \hat{q}_{\bar{R},\tau} = \overline{RIF}(Y_R, \hat{q}_{R,\tau}) - \overline{RIF}(Y_{\bar{R}}, \hat{q}_{\bar{R},\tau}) = (\bar{X}_G - \bar{X}_{\bar{R}})\hat{\beta}_{G,\tau} + \bar{X}_{\bar{R}}(\hat{\beta}_{R,\tau} - \hat{\beta}_{\bar{R},\tau}) \tag{5}$$

The data used in the current study are drawn from the two waves of the National Survey on Households' Budget, Consumption and Standard of Living (HBCLS) conducted by the National Institute of Statistics (NIS) in 2005 and 2010 . The aim of the two surveys is to determine the level of living standards of households through their food consumption and total expenditure in the two considered years. The surveys are concerned as well with investigating different aspects of the households' living conditions and the extent of their benefit from the collective and basic services such as basic housing services (Water, Sanitation, Electricity), education and health.

The calculations will be made, thereafter, basing on an outcome variable, the log of the real and yearly per capita household total expenditure, and a set of key explanatory variables including family attributes such as gender, age, marital status, educational attainment, and employment and activity status of the head and its sector of activity. It includes as well some household's characteristics such as the demographic composition of household, access to core basic services and the geographical location.

The covariates used in regressions and decomposition analysis are: Gender of Household head, Age and squared age of household head; Marital status of the household head; Head educational attainment; Head activity status: Head employment status; Main sector of head employment; Industry classification for the main job of the head; Demographic composition of household; Access to core basic services (water and sewage); Geographical location.

3. Results and Discussion

The distributional regional consumption differentials $\hat{q}_{G,\tau} - \hat{q}_{G',\tau}$ is decomposed into endowment and return effects explained, respectively, by differences in household and head of household characteristics $(\bar{X}_R - \bar{X}_{\bar{R}})\hat{\beta}_{R,\tau}$ and differences (or discrimination) in returns to the these characteristics $\bar{X}_{\bar{R}}(\hat{\beta}_{R,\tau} - \hat{\beta}_{\bar{R},\tau})$ at the τth unconditional quantile. The approximation errors obtained as $\hat{q}_{R,\tau} - \hat{q}_{\bar{R},\tau} - (\bar{X}_R - \bar{X}_{\bar{R}})\hat{\beta}_{R,\tau} + \bar{X}_{\bar{R}}(\hat{\beta}_{R,\tau} - \hat{\beta}_{\bar{R},\tau})$ are all insignificant and small in magnitude, indicating that the RIF-based decompositions provide consistent approximations to the consumption differentials among households.

The empirical analysis reveal some important and common findings. [1] First, on average and at different quantiles, households living in privileged regions $\bar{R}$ consume more than their peers in unprivileged regions (R). For instance urban households in 2005 are found to consume 18.6% more than rural ones; The average consumption gap after netting out the effects of endowment differences in household and heads' characteristics is about -18.1% indicating the importance of the explained part in the rural/urban consumption gap. When looking on the dynamics of the overall average gap, we find that a significant raise of the gap has occurred over the considered period between rural and urban households and nonmetropolitan/metropolitan (23.6 percentage point in rural/urban gap, and 5.3 points in nonmetropolitan/metropolitan gap). The welfare gap between rural and urban regions is then largely widened, while a slight increase of about 0.2 percentage point is found between inland and littoral regions. Such increase in rural/urban gap leads to conclude that rural households, have lower expenditures than urban households across all considered population percentiles and for the two years. Accordingly, it's worth to conclude that such group of population are the most affected by the deterioration of the economic situation.

Second, results reveal that consumption differentials are much larger at higher percentiles than at the bottom and middle parts of consumption distribution; the lower gap is found at the middle percentile (median). It is gleaned from these results that endowment effects is found to contribute more to the consumption differential than the return effects at the considered percentiles of the consumption distribution. This means that after netting out the effects of regional difference in characteristics, no significant part of consumption differentials exist at the considered percentiles of

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[1] The results of the empirical analysis are available for request; Tables showing these results are omitted for space reasons

consumption distribution. Giving that all the endowment effects dominates the return effects, we may state that households living in privileged regions over the considered period are better off because they have superior characteristics than their counterparts in unprivileged regions. This corresponds somewhat to the findings by Belhaj Hassine (2015) who focused on the rural-urban and nonmetropolitan-metropolitan gaps.

One of the main advantages of the unconditional quantile decomposition is that it allows to investigate the impacts of different covariates along the distribution of an outcome. In this regard, the results show that all the endowment effects follow the same U-shape as the overall gap and tend to be larger at very low and very high percentile of households' welfare distribution except the endowment effect which follow an inverted U-shape. Results show for the two years same U-shape variation of endowment effects and overall gap across the three percentiles.

Third, it is worth to note that the effect of each dichotomous variable is obtained by summing up the contributions of all the dummy variables generated from that variable. A significant and negative sign suggests that the relevant variable contributes significantly and positively to the corresponding endowment or return effect and vice versa. The findings across the two years reveal that differences in the distribution of general household demographic characteristics including access to core basic services matter the most for inequality between rural and urban, inland and littoral and nonmetropolitan and metropolitan households at the mean, median and lower end and the top of the welfare distribution. The household human capital, evaluated by the educational level of the head, is found to be the most important factor accounting for the gaps among rural–urban better-off households in the two years, while the returns to these group of variables appear to be the dominant factor accounting for rural–urban differences in returns to household characteristics at the top end of consumption distribution in 2010 (10.6%). The decomposition results reveal, as well, that geographical location is playing a significant role in explained and unexplained parts of rural-urban gap at lower percentile of the consumption distribution over the considered period.

The investigation of the dynamics of the distribution of household and head education covariates over time reveals a slight decline of the contribution of these covariates to the different welfare gaps in Tunisia. Yet, differences in households' human capital, between rural and urban regions, appear to have widened over the period in Tunisia particularly at higher percentiles. The effect of the returns to this group of variable is found to raise substantially for better-off households implying as expected that in Tunisia urban markets are recently paying more for educational attributes than rural markets would. These finding suggest that development policies in Tunisia failed to narrow the gaps between rural and urban household driven mainly by difference in endowments between the two groups of population, at the median and higher percentile of the distribution, in Egypt mainly through improvement of human capital and of access to basic services. These policies do not seem to have been effective in Syria, Tunisia, and Yemen where the endowment gaps increased strikingly, particularly for poor and middle-class households.

5. Conclusions and Policy implications

The current study devotes a special focus on the analysis of rural–urban, inland-littoral as well as metropolitan–nonmetropolitan welfare gaps across the entire distribution of household yearly real per capita total consumption expenditures. To help a better investigation of the main drivers of inequality in log monthly real per capita total expenditure across the entire distribution between different regions of location, we use in the current paper the unconditional quantile decomposition of inequality based on RIF regressions. Using this well developed method in the literature, the welfare gap is decomposed at each quantile into the contribution of differences in the distributions of observed household and head characteristics cand geographical locations and the contribution of differences in the distributions of returns to these characteristics. The main results of the decomposition analysis reveal that endowment effects dominate returns effects and that these effects are larger at higher quantiles in most cases, indicating higher welfare gaps between better-off rural and urban, inland and littoral and nonmetropolitan and metropolitan households. Despite rural development being a very important part

of policies and strategies adopted by the Tunisian government since the dependence, urban households remain to be much better endowed than their rural counterparts and this contribute massively to the welfare gap between the two areas. The endowment effects are found to more strongly dominate at the higher tails of the distributions, suggesting that differences in household and head characteristics have proportionately the obvious and significant effects on welfare gap.

The decomposition results show as well that households' demographic composition, access to core basic services, education of the head, and geographical location are the most important drivers of regional inequality in Tunisia mainly between urban and rural households. For instance, families at the top end of consumption distribution headed by postgraduate men are found to be more comfortable than their peers who may face severe hardships. It is noteworthy in this regard that persistence of the interregional divides is of serious concern for social cohesion and inclusive growth prospects in Tunisia as stated Belhaj Hassine (2015).

Giving these findings, we suggest that strategies of development to be addressed for the alleviation of the regional welfare inequalities in Tunisia, as well as in other Arab countries, should focus mainly on the improvement of the rural and nonmetropolitan households' demographic and educational endowments through a set of relevant family planning and awareness programs particularly for the disenfranchised population in these regions. We suggest as well that policy interventions should also include initiatives to develop and enhance the infrastructure for the provision of public core services such as education and healthcare, and skills development programs in rural areas and unprivileged regions aiming to narrow the gap between different regions. It is worth to note in this regard that most of development and education strategies implemented in Tunisia during the last decades were biased toward urban and metropolitan regions, which has contributed in widening regional inequalities for a long time. Therefore, It is time for policy makers in Tunisia to develop and implement a relevant positive discrimination policy in order to overcome to reduce regional imbalances and bridge the transformation between the turmoil of the recent revolution revolts and the promise for better future.

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