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Is the grass really greener on the other side? Decomposing Urban-Rural Inequality in the Philippines

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Abstract: This paper aims to decompose the welfare gap urban and rural households in the Philippines due to the differences in their characteristics and differences in the returns of their endowments. To fulfill such objective, the researchers applied the Oaxaca-Blinder (1973), Machado-Mata (2005), and Re-centered Influence Function (2009) decomposition methods on the obtained household-level data given by the Family Income and Expenditure Survey for the years 2006, 2009, and 2012 to compare the evolution of such gap. The mean results of the decompositions show that 60.18% of the total welfare differential is due to endowments effect and 39.82% is due to the returns effect, which implies the big weight of a household's characteristics between urban and rural areas. For all of the three years observed, total inequality, endowments effect and returns effect are positive which verifies that welfare inequality is biased towards the urban areas in the Philippines. Large portions of the endowments effect are attributed to mostly education, geographic then occupation characteristics, respectively.

Key Words: welfare; inequality; Oaxaca-Blinder; Machado-Mata; Re-centered Influence Function

1. INTRODUCTION

With the aid of positive financial and economic indicators, the Philippines has grown to be one of the "most dynamic economies" in East Asia (World Bank, 2015). However, this growth does not necessarily trickle down to all sectors of the economy particularly in rural areas. Regional development is often centralized in its advanced cities and municipalities while rural areas experience a lack in economic productivity and opportunities. Of all the poor households in the country, 75% reside in rural areas (ADB, 2009).

Inequality can be defined as the differences in the standards of living of each individual or groups of individuals. In this case, inequality is between urban and rural regions in the Philippines. The main purpose of this paper is to decompose inequality into to portions: the *endowments effect (explained inequality)* or the inequality explained by the differences in the characteristics of the households between urban and rural, and the *returns effect (unexplained)* or the

inequality due to discrimination brought by the systemic differences between the two sectors.

To illustrate the two effects, consider households A and B where the former lives in the urban and the latter in the rural. Household A's head obtained college education while household B's only acquired primary education, and because of this Household A consumes more than B. The difference between their consumption because of their educational characteristic is the portion of the total inequality known as the *endowments effect.* However, total inequality does not only compose of this. Consider the scenario where Household A who lives in the urban and Household B who resides in the rural both obtained college education. Even if they both have the same attributes, A still consumes more than B. This welfare inequality that could not be explained by the differences in their characteristic is called the *returns effect.*

2. LITERATURE REVIEW

Inequality: Urban-Rural Gap

Inequality is considered multidimensional in nature. To capture this multidimensionality, Ray (1998) defined inequality as the fundamental disparity between individuals or groups of individuals that allows some to freely do what they choose to do while refusing others to make that exact same choice.

Expenditure as a Measurement of Welfare

This study will use consumption expenditure instead of income as a measure of welfare, similar to the study of Nguyen, et. al. (2007) about the urban-wage gap in Vietnam. They argued that income is commonly misstated or underreported. The identification of a household's true welfare for example, will be misstated if their job is seasonal. For instance, farmers may earn less during droughts and calamities but this lessened income does not correspond to a decrease in their overall welfare. They may utilize their savings or other financial sources to fund their daily necessities and other expenses. Therefore, household expenditure is a more reliable measure of welfare especially for a country with abundant agriculture.

3. FRAMEWORK

Urban Bias Theory

Lipton (1978) defines urban bias as the systematic shifting of policies that deviates from a better or optimal one, which is unbiased between urban and rural areas. He claims that legislators are already biased as soon as they create these policies. This is because as authorities think of solutions to address the problems of a specific area, they are excluding other areas in the process, making such policies limited and thus, inapplicable to other regions. The targeted area being described here is the urban and the excluded area is the rural. Lipton proposes two features of a 'best' policy – efficiency and equity – and claims that an efficient policy is rarely the fairest. Efficiency is defined to be the maximization of resources to be able to acquire the most benefits in the long run while equity means being fair and impartial in making decisions. The graph below suggests a scenario in which efficiency and equity are weighed into policies.

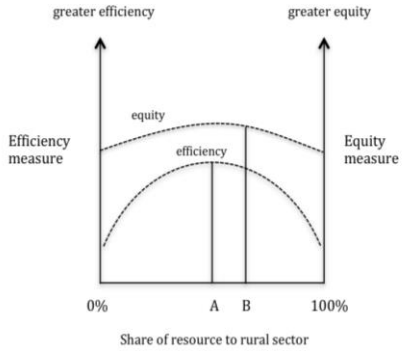

Fig. 1. Intersectoral bias and ambivalence.

Point A is where efficiency is at peak and equity at point B. Lipton argues that urban bias is not only the tendency to decide on the allocation between efficiency and equity that are generally efficient, instead, it also creates changes that deprives development from the rural sector. Points A and B indicate that resources are difficult to allocate between being efficient and equal. An allocation to the left of A gives less to the rural sector thus, is urban-biased while an allocation to the right of B is rural biased. Not all policies that are efficient promote equity between the urban and rural sector and not all policies that advocate equity are efficient. In relation to the Oaxaca-Blinder decomposition, the model implies that the efficiency norm corresponds to endowments coefficient and the equity norm represents the returns coefficient.

4. METHODOLOGY

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In determining the urban – rural inequalities, the Oaxaca-Blinder (1973), Machado and Mata (2005), and Re-centered Influence Function (2009) decomposition techniques are used. The variables used are categorized in their respective groups: Demographics, Education, Occupation and Geography.

Oaxaca-Blinder Decomposition

The Oaxaca Blinder (1973) decomposition method is used to explain gaps in the means of the welfare between groups such as the urban and rural sectors. Consumption could be expressed in a linear form and be separated into observable and unobservable characteristics. The vector X represents the various determinants of real per capita expenditure while ß is the vector of parameters comprised of slopes and intercepts. The sectors will be indicated by a dummy variable "rural" which will have a corresponding value of 1 if it is rural and 0 if it is urban. In pursuit of cleaner equations, it will be represented by subscripts R and U respectively.

$$C_\ell = \mathrm{X'}_\ell \beta_\ell + \epsilon_\ell \; where \; E(\epsilon_\ell) = 0 \; and \; \ell \in \{U, R\} \quad (1)$$

It can also be expressed in terms of the difference in expected values between the two sectors which are E(Cu) and E(Cr) which is considered as the mean outcome difference that will be denoted as D.

$$D = E(C_U) - E(C_R) \quad (2)$$

Transforming equation (1) with respect to its expected value, it will be expressed as:

$$E(C_\ell) = E(\mathrm{X'}_\ell \beta_\ell + \epsilon_\ell) = E(\mathrm{X'}_\ell \beta_\ell) + E(\epsilon_\ell)$$

Adopting the work of Jan (2008), an alternative form of decomposition can result from the introduction of a non-discriminatory coefficients vector that is represented by β^*

$$D = \underbrace{[E(\mathrm{X}_U) - E(X_R)]'\beta^*}_{\text{Endowments Effect}} + \underbrace{[E(\mathrm{X}_U)'(\beta_U - \beta^*) + E(X_R)'(\beta^* - \beta_R)]}_{\text{Coefficient Returns Effect}}$$

Machado-Mata Decomposition

The Machado Mata is a quantile decomposition that focuses on a conditional joint distribution of $F_{C_\ell|X_\ell}(\cdot,\cdot)$ that is observed between C_ℓ and X.

$$F_{C_\ell|\,X_\ell} = \int_0^1 F_{C_\ell|X_\ell}(c|X = x) \cdot d\, F_{X|\ell}(x)$$

This process intends to produce two counterfactual densities where the urban had the same endowments with rural but maintains its consumption density and where the urban had the returns of the rural (Albrecht et al., 2003). The procedure starts arbitrarily by choosing a τ^{th} quantile/s that would be simulated in the study from a distribution of (0,1) of τ. Using the chosen τ^{th} quantile, estimate a linear quantile regression for C_R^C and C_U for these are the two counterfactual densities of interest. C_R^C possesses an inverse conditional F distribution function $F^{-1}_{C_R|X_R}(\cdot,\cdot)$ which represents the transformation of the observations in C_{Ui} into a counterfactual C_{Ri}^C (Fortin et al., 2010). On the other hand, C_U possesses an inverse conditional F distribution function $F^{-1}_{C_U|X_U}(\cdot,\cdot)$ which represents the transformation of the returns in C_{Ri} into a counterfactual C_U.

$$C_R^C = F^{-1}_{C_R|X_R}\left(F_{C_U|X_U}, X_R\right) \text{ and } C_U = F^{-1}_{C_U|X_U}\left(F_{C_R|X_R}, X_U\right)$$

If $\tau_U(C|X_i) = F_{C_U|X_U}(C|X)$ has a uniform distribution, then we can rewrite (14) into the conditional quantile functions:

$$C_{Rs}^C = F^{-1}_{C_R|X_R}(\tau_s, X) \; and \; C_{Us} = F^{-1}_{C_U|X_U}(\tau_s, X)$$

The two equations are compared with each other to establish the consumption structure effect. The conditional quantile regression model is shown below:

$$Q_{\ell,\tau}(C_\ell|X) = F^{-1}_{C_\ell|X_\ell}(\tau|X) = X'\beta_{\ell,\tau}$$

where $\hat{\beta}_{\ell,\tau}$ can be computed using the following equation below. The concept of the equation is to look for the possible value β at which the function is minimized. It also contains the condition that $(Ci - X_i'\beta)$ can only obtain zero and positive values.

$$\hat{\beta}_{\ell,\tau} = \arg\min \beta_{\ell,\tau\epsilon\mathbb{R}} \{ \sum_{i\in\{i|C_i \geq X_i'\beta_{\ell,\tau}\}} \tau|Ci - X_i'\beta + \sum_{i\in\{i|C_i \geq X_i'\beta_{\ell,\tau}\}} 1-\tau|Ci - X_i'\beta \}$$

This is done over a number of quantiles to see the differences across the consumption distribution. 100 iterations is used for the computation of the standard errors by bootstrapping (Fang & Sakellariou, 2013).

Re-centered Influence Function (RIF) Decomposition

The Re-centered Influence Function (RIF) method (Firpo, Fortin, and Lemiux, 2009) further decomposes the distribution within covariates in the characteristics effects and returns effect (Salardi, 2012). It measures the change of the nth percentile's consumption distribution given a unit change in the individual variable, which the Machado-Mata decomposition do not allow and makes the results more intuitive to interpret.

The core of the RIF regression, as it is applied in our study, is the Influence Function for expenditure (C), denoted as $IF(C;v)$, which represents the effect of an individual observation on a distributional characteristic $v(\mathrm{F}_C)$. In this study, this $v(\mathrm{F}_C)$ is expressed as quantile and will be considered later. *RIF* is obtained by adding $v(\mathrm{F}_C)$ to the initial $\mathrm{IF}(C;v)$. Therefore, it is defined as $RIF(C;v) = v(F_C) + IF(C;v)$. RIF assumes a linear specification with OLS using the following regression,

$$E[RIF(C;v)|X] = X\beta_i \; E[RIF(C;v)|X] = X\beta_i$$

where β represents the marginal contributions in response to a change in X. Combining the distributional characteristics as quantiles q_τ into the equation, the influence function $IF(C;q_\tau)$ is defined by $(\tau - \Pi\{Y \leq q_\tau\})/f_C(q_\tau)$, where $\Pi\{\cdot\}$ represents the indicator, $f_C(\cdot)$ connotes the marginal distribution of C, and q_τ signifies the sample τ-quantile of the consumption C distribution. Similar to the preceding equation, the RIF is defined as,

$$RIF(C;q_\tau) = q_\tau + IF(C,q_\tau)$$
$$RIF(C,q_\tau) = q_\tau + \frac{\tau - \Pi\{Y \leq q_\tau\}}{f_C(q_\tau)}$$

where the indicator function $\Pi\{Y \leq q_\tau\}$ expresses whether or not the resulting variable is lower or equal to quantile q_τ. For the estimation, the proponents of the RIF firstly determined the sample quantile q_τ and its kernel density as it is comprehensively discussed in their paper. $\widehat{RIF}(C,q_\tau)$ is obtained by substituting $\widehat{q_\tau}$ and $\widehat{f_C}(\widehat{q_\tau})$ into equation (2). With the coefficients of unconditional quantile regressions for urban U and rural R being

$$\beta_{U,\tau} = (\textstyle\sum_{i\subseteq U} X_i \cdot X_i^\tau)^{-1} \cdot \sum_{i\subseteq U} \widehat{RIF}\left(C_{Ui}, q_{Ui,\tau}\right) \cdot X_i$$
$$\beta_{R,\tau} = (\textstyle\sum_{i\subseteq R} X_i \cdot X_i^\tau)^{-1} \cdot \sum_{i\subseteq R} \widehat{RIF}\left(C_{Ri}, q_{Ri,\tau}\right) \cdot X_i$$

Using the estimates obtained from the above equations, the decomposition follows that of Oaxaca-Blinder such that,

$$\widehat{q_\tau}(Y_U) - \widehat{q_\tau}(Y_R) = \{\bar{X}_R(\widehat{\beta_C} - \widehat{\beta_R})\} + \{\bar{X}_U\widehat{\beta_U} - \bar{X}_R\widehat{\beta_C}\}$$

where $\widehat{q_\tau}(Y_U) - \widehat{q_\tau}(Y_R)$ signifies the raw difference between the consumption of urban and rural households, $\bar{X}$ represents the covariate averages, $\widehat{\beta_C}$ is the counterfactual marginal distribution wherein urban returns for the rural household characteristics. Similar to the OB, $\{\bar{X}_R(\widehat{\beta_C} - \widehat{\beta_R})\}$ represents the *returns effect* and $\{\bar{X}_U\widehat{\beta_U} - \bar{X}_R\widehat{\beta_C}\}$ signifies the *characteristics effect*.

5. RESULTS AND DISCUSSION

Oaxaca Blinder Decomposition Method

For 2012, the average gap in consumption between urban and rural areas is worth 85,772.81 pesos. The *explained effect* compromises the majority of the inequality for all three years (63%, 63%, and 60% respectively). This means that the welfare inequality of the Philippines is mostly because rural households are not endowed as many resources as the urban areas. On the other hand, the returns effect shoots up during 2012. Its increasing trend through the years posits that given the same characteristics, there has been an increasing share of rural households that are consuming less than urban households.

Table 1. Oaxaca-Blinder Summary Differential

	2006		2009		2012	
	Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error
Differential						
Prediction for Urban	6.7629***	0.0059	6.7753***	0.0059	6.8873***	0.0062
Prediction for Rural	6.0263***	0.0051	6.0711***	0.0052	6.2335***	0.0048
Urban-Rural Gap	0.7367***	0.0079	0.7043***	0.0079	0.6539***	0.0078
Decomposition						
Endowments	0.4665***	0.0066	0.4457***	0.0066	0.3935***	0.0068
Explained Percentage	**63.32%**		**63.29%**		**60.18%**	
Returns (Discrimination)	0.2702***	0.0073	0.2585***	0.0071	0.2604***	0.0073
Unexplained Percentage	**36.68%**		**36.71%**		**39.82%**	

The categories with the highest share in the endowments effect are education (26.34%, 29.14%, and 21.13%,) and geography (22.10%, 23.19%, and 24.73%), suggesting that household consumption is highly explained by the region it is situated in. For the returns effect, the negative geographic return estimate means that the marginal benefit of rural households that are located in regions outside NCR (reference region) are higher than the marginal benefits of urban households that are also outside of NCR.

The inequality due to education is mostly dominated by its endowments effect (21.13% vs 4.85%) in 2012 (Table 2 and 3). Interestingly in 2009, if all the urban and rural households had the same education level, the urban-rural inequality could have been reduced by 29.14%. This means that obtaining education is important in uplifting household welfare

as it significantly determines the urban-rural consumption gap, and not mainly on the bias that occurs within it. However, urban household heads that have finished high school consume 4.24% more than rural high school graduates due to the structural biases between the sectors.

Table 2. Oaxaca-Blinder Decomposition for Endowments Effect (Categorical Variables)

Considered Factors	2006		2009		2012	
	Estimate	Share	Estimate	Share	Estimate	Share
Demographics	-0.014	-1.87%	-0.0172	-2.44%	-0.0111	-1.70%
Education	0.194	26.34%	0.2052	29.14%	0.1382	21.13%
Occupation	0.123	16.75%	0.0944	13.40%	0.1048	16.02%
Geographic	0.163	22.10%	0.1633	23.19%	0.1617	24.73%
Total	0.466	**63.32%**	0.4457	**63.29%**	0.3935	**60.18%**
Total	0.3935	**60.18%**	0.4457	**63.29%**	0.466	**63.32%**

Table 3. Oaxaca-Blinder Decomposition for Returns Effect (Categorical Variables)

Considered Factors	2006		2009		2012	
	Estimate	Share	Estimate	Share	Estimate	Share
Demographics	-0.4499	-61.07%	-0.5611	-79.67%	-0.2644	-40.44%
Education	-0.0108	-1.47%	-0.0176	-2.50%	0.0317	4.85%
Occupation	-0.0381	-5.18%	-0.0867	-12.31%	-0.0777	-11.88%
Geographic	-0.4351	-59.07%	-0.6109	-86.74%	-0.8303	-126.99%
Constant	1.2042	163.46%	1.5349	217.93%	1.4011	214.28%
Total	0.2702	**36.67%**	0.2585	**36.71%**	0.2604	**39.82%**

Note. ***indicates significance at the 1%, **at 5% and *at 10%. Rural households expected mean consumption in a world without discrimination should be 6.4939 (6.2335+0.2604) in 2012, 6.3296 (6.0711+0.2585) in 2009, and 6.2965 (6.0263+0.2709) in 2006.

Machado-Mata Decomposition

In 2012, the gap increases steadily through each quantile, except for the 75th quantile to the 90th quantile. This shows that as the consumption increases on both household sectors, the urban-rural inequality also increases. Similar to the Oaxaca-Blinder decomposition, the endowments effect is higher than returns effect. The significant increase in the endowments effect from the 75th percentile to its 90th suggests that as welfare increases, the differences due to having different levels of education or geographic region favor rich households.

The returns effect, on the other hand, decrease throughout the percentiles, most especially for the 90th percentile. This implies that the richest rural households are slightly more protected from the urban bias. Comparing the consumption between the richest rural and urban households (90th percentile), the rural rich are consuming 34% less in 2006, 31% less in 2009 and 29% less in 2012 than that of an urban rich. Similarly, comparing the poorest urban and rural households (10th percentile) would show that the rural poor are consuming 42% less in 2006, 41.5% less in 2009, and 35.5% less in 2012 than that of the urban poor. It also reveals a significant trend existing throughout all three years. The urban rural gap slightly closes for all quantiles as the years go by. Endowments effect increases while returns effect decreases for all quantiles throughout the years.

RIF- OLS Decomposition

For all of the three years observed, total inequality, total endowments effect and total returns effect is biased towards the urban areas in the Philippines. Similar to the previous decompositions, the endowments effects are greater than the returns effect. As seen from the graphs, large portions of the endowments effect are attributed to the mostly education, geographic then occupation characteristics, respectively.

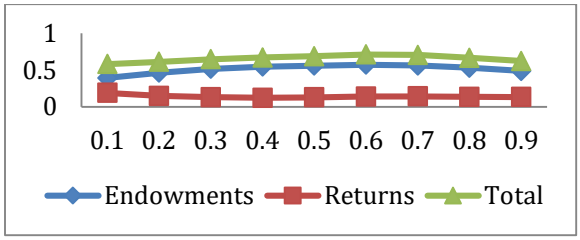

Fig. 2. Total Inequality for 2012

For all years and quantiles, urban areas have more educated household heads. This inequality due to education is more evident for the well-off households. If a rural household head acquired primary education, this would decrease their gap by 17.8% to 35.9% depending on their welfare. Similarly, if they graduated from high school, they will also achieve higher consumption especially for high-income households. The returns of rural primary and secondary education mostly benefit upper (or richer) urban classes. Meanwhile, tertiary and vocational education seems to benefit rural households more in both returns and endowments effect.

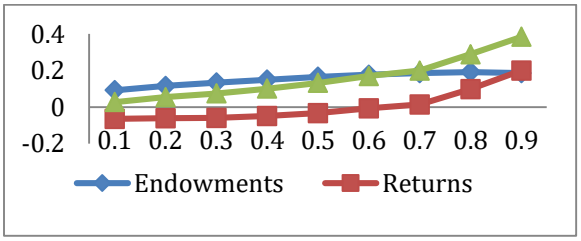

Fig. 3. Education Endowments and Return Effects for 2012

The effects of inequality resulting from the geographic category generally exhibit the same trends

for all of the regions as that exhibited in Figure 4. Contrary to common belief, a region's rural area generally benefits more from its endowments and resources than an urban area. Although the observed urban-rural inequality could arise from the difference in their endowments, only four out of all the regions in the country do not have urban bias in their endowments effect, namely Central Luzon, CALABARZON, Davao, and SOCCSKARGEN.

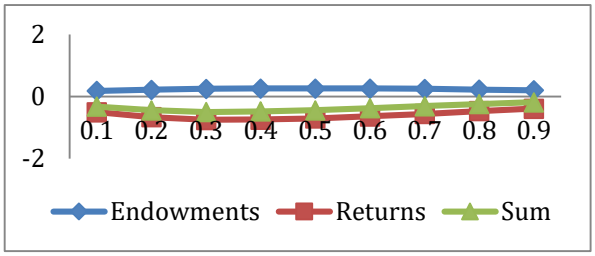

Fig. 4. Geographic Endowments and Return Effects

6.CONCLUSION & RECOMMENDATIONS

As seen in Oaxaca-Blinder, Machado-Mata, and RIF decomposition methods, it is evident that urban-rural inequality is primarily due to the differences in their characteristics, which comprises 60% to 70% of the urban bias. The role of the government in this effect is to ensure that the relative cost of education must not outweigh its benefits at hindsight. Increased government spending to such factors may complement the poor households' capacity to invest in obtaining the characteristics or to readily acquire public goods.

A current policy being adopted throughout the country is the 4Ps or the *Pantawid Pamilyang Pilipino Program*. This is in the perspective that it would be a program that improves the endowments of a household such as education, health, and family size. If efforts are focused mostly on rural areas, particularly the poor, this can be a vehicle to decrease the consumption gap. This, however, calls for the government to invest in their education and encourage professionals to locate in rural areas seeing that there is no bias in their returns. Though returns may be the same, there is a need to provide more opportunities for professionals in rural areas because lack of which probably caused them to migrate to the urban areas for work.

Although policies that aim to lessen endowments effect have a direct approach in closing the gap, these could be accompanied by other initiatives that may also improve the returns to these characteristics such as providing better infrastructure and enhancing labor flexibilities. The key behind improving the returns of the households as a complement in enhancing their endowments is providing them more avenues to freely transport their goods, productive capitals, and services to rural and urban areas.

This study confirms that urban bias is a reality in the Philippines. It is a complex issue that is not easily be dealt with unsustainable and ineffective solutions. Sound policies with proper justifications must be implemented to address the core of the problem. This study serves as a scientific basis that strongly emphasizes the sources of welfare inequality and the methods to mitigate such.

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