A Microsimulation of the Impact of Free Tuition Law on Income Inequality and Poverty Among Philippine Households

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Abstract

This study was conducted to provide an ex-ante analysis of the impact of Free Tuition Law (FTL) using microsimulation modelling. Microdata from the 2018 Family Income and Expenditure Survey (FIES) was used to simulate the changes in total income, poverty, and income inequality at the household level. It was found out that households whose head are engaged in non-farming activities combined with having more years of education and being professional/technical workers have the highest total household income in the 2018 FIES. In the microsimulation model, it was found out that total household income increased among FTL recipient and non-recipient households. Due to the implementation of FTL, poverty declined as seen in Head Count Poverty, Poverty Gap, Severity of Poverty, and Sen-Shorrocks-Thon indices. Moreover, the gap between the rich and the poor has declined as seen in the Gini Index. This study recommends the expansion of the Tertiary Education Subsidy program under the FTL to bolster the confidence of low- and middle-income households to send their members into higher education.

Index Terms—free tuition law, income inequality, microsimulation, poverty

Introduction

Poverty stagnation characterizes Philippines from 1991 to 2009 with an average of 27.7% in poverty incidence. [1] Meanwhile, since 1961 [2] until 2009 [3], income inequality in the country steadily fluctuates with high average Gini coefficient of 0.45. Thus, sustained increase in income inequality and laggard decline in poverty for the past five decades are evident.

The Philippines reached a milestone of reducing disparities in education and basic services between 2000 and 2010. [4] The government even capitalized on education with the recent legislation concerning higher education. The Universal Access to Quality Tertiary Education Act of 2017, widely known as "Free Tuition Law" (FTL), was enacted with the primary purpose of providing adequate government funding to increase the participation rate among all socioeconomic classes in tertiary education especially those who belong to the poorest group.

FTL was fully implemented during Academic Year 2018-2019 across the country with a budget allocation of 40 billion pesos. [5] This bold move by the government could be seen as its commitment to level the playing field in so far as human capital is concerned. In the recent news, as of the second quarter of 2021 roughly 1.6 million Filipino students are no longer paying tuition and miscellaneous fees according to the Commission on Higher Education. [6]

This policy is totally bizarre amidst the trend worldwide for government to practice cost-sharing in higher education with students and their families. [7]-[11] Rather, income-targeted free tuition scheme could be adopted to enhance benefit transfer to the poorest among the population. [7] [12] [38]

Given the conflicting views on whether government must fully subsidize higher education, this study determined the ex-ante effect, at the household level, of Free Tuition Law to income inequality and poverty situations in the country using microsimulation modelling. FTL is treated as government subsidy to all individuals probable to be in higher education.

Literature Review

A. Human Capital Theory: Link between Education and Income

Occupations differ in the amount of training they require as well as the costs they incur. [13] These costs depend upon the length of the training period in two ways: (1) deferral of earnings during the period of training and (2) education equipment such as tuition and books but not living expenses. Consequently, people with more training command higher annual pay.

Treating education as an investment decision, wealthier families would tend to invest more than the poorer because internal funding for additional years of schooling is necessary since human capital cannot be offered as collateral to bank loans. [14]

Uncertainty in assessing innate talents among individuals causes underinvestment in human capital particularly higher education. The logical basis for treating public investment in human capital is grounded in the idea of welfare. A strong welfare goal of a community is to reduce the unequal distribution of personal income among individuals and families. [15]

B. Income Inequality and its Relation to Education in the Philippines

Urban households were generally better off during 1961 to 2012 than rural households and families in farming communities. [2] [3] In addition, the rise in property income concentration among urban households during 1961-1991 resulted to a sudden rise in income inequality. [2] Social welfare function whereas social welfare levels improved overtime favoring the urban and non-agricultural households than their rural and non-agricultural counterparts. [3]

In terms of source of income, households whose main income source is from wages benefited from higher welfare levels compared with those from entrepreneurial activities. Wage income, among other sources, was the largest contributor of discrepancy with around 41%-50% of the total income. [2] However, in the recent years, this pattern has changed due to income from remittances. [3]

Reference [2] and [3] also have the same observation on the effect of education in income inequality. The former found out that total inequality increased for about 20%-30% in 1985 to 1991 when relative income position of college graduate household heads improves

significantly. The latter noted that higher welfare levels were associated with those who had more years of education.

Since income from wages is crucial to inequality levels, employment status is also of great concern. During 1997 to 2003 employment of household members who have acquired secondary and tertiary education increased compared to those who completed primary education suggesting that higher education is a determinant of entry to the Philippine labor force. [16] In addition, from a microeconomic perspective, education increases the probability of being employed as well as improved earnings capacity. Thus, it is noteworthy to look into the disparity in education. [17]

C. Education Characteristics of the Poor in the Philippines

During 1996 and found out that more than 50% of the households whose head is an elementary graduate live below the poverty line. [18] In 2008, it increased to 70% suggesting that primary education completion of the head is related to poverty situation of a household. [16] Other than higher dependency ratio among households, having younger and less educated head makes a household vulnerable to chronic poverty using a three-level longitudinal random coefficient model during 2003-2009. [19]

Poverty is most severe and persistent among households with low human capital in contrast to households with more college graduates as in the case of regions IV-A and VII. [20] Moreover, only 6-7% among households, whose head is a college graduate, have poverty incidence of about 18-20% along three survey years 2004, 2007, and 2008. In separate studies by [21] [1] [19], poverty was found to be associated to agricultural activities and lack of access to irrigation hence, a rural phenomenon. During 2010 poverty situation continues to vary widely across regions noting ARMM, Bicol, MIMAROPA, and the Visayan regions to have worst situations. Moreover, being in rural areas and low education are found to be associated to being poor. [22] Geographic isolation was recommended by [20] among areas where poverty has been persistent necessitating the need for regional analysis in determining the extent of effect of education to poverty.

This phenomenon is a result of government spending pattern on education being not geared towards pro-poor policies. [23] In addition, the cost of higher education is beyond reach of poor families in many countries just like the Philippines. [24] Bulk of the students in public HEIs are mostly belonging to higher income groups during 1999 and 2014. [9] Without access to credit or to government subsidy, children from poor families are less likely to reach tertiary level. [25]

Children of poor tend to remain poor. [25] This observation by [25] is parallel to [26] using microsimulation of 1996 micro-census data, who found that daughters of university graduates in cities have thirty times higher likelihood of obtaining a university diploma that the sons of parents who completed basic education in rural areas in Austria. Focusing on microsimulation as a technique in analyzing ex-ante the effect of higher education to households, [27] using micro data from 2007 Moroccan Household Living Standards Survey found that free tuition policy encourages families to invest massively in higher education leading to increased income and consequently reducing poverty.

Methodology

This study implemented a two-tiered procedure in determining the effect of the FTL to total income distribution, and poverty. The two-tiered procedure, as shown in figure 1 involves: (1) the determination of FTL specifications; (2) integration of FTL to microsimulation that determines the effect of the policy to income distribution and poverty.

The actual total household income in the 2018 FIES was used to represent the income in the base period. In the second stage of the two-tiered procedure, total household income was estimated after the implementation of the FTL. This study assumed that total income is an aggregation of income from wage and income from entrepreneurial activity.

The estimation of income from wage equation utilized the Heckman two-step selection model. The first step is to estimate the FTL Recipient Status either recipient or non-recipient by performing a probit logistic regression given by the equations:

$$s_i^* = \gamma Z_i + u_i \tag{1}$$

$$s_i \begin{cases} 1 & if & s_i^* > 0 \\ 0 & if & s_i^* < 0 \end{cases} \tag{2}$$

Where, s_i^* refers to the selection of an individual to be recipient (1) or non-recipient (0) given a suitable selection based from the tuition spending for higher education and number of household members probable to be in higher education.
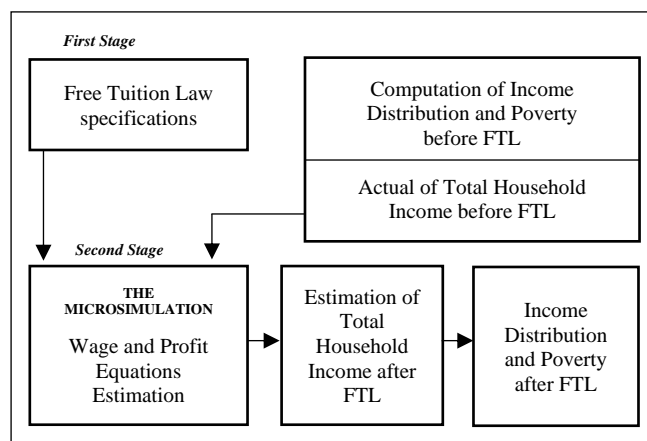

Figure 1: The Microsimulation Model

The second step of the Heckman procedure involves the estimation of natural logarithm of wage as a function of region, urbanization, sex, age, marital status, highest grade completed, and occupation. Moreover, this study used an Inverse Mill Ratio [28] to account for the selection bias in the model. This is given by the equation:

$$log\, w_{mi} = a_{g(mi)} + x_{mi}\beta_{g(mi)} + v_{mi} \tag{3}$$

The log of wage, $log\, w_{mi}$ of member i of household m is a function of personal characteristics x *i.e.* age, sex, marital status, region, urban classification, and number of

children.

Simultaneously, income from entrepreneurial activity (both farming and non-farming activities) was estimated using the independent variables: area classification (whether urban or rural), household education, household sex, and number of household member directly involved in either agricultural or non-agricultural self-employment. Since the number of household member could possibly cause an endogeneity with the family size, Instrumental Variables (IV) Regression was utilized given by the equation:

$$logy_{profit} = b_{f(m)} + \delta_{f(m)}SE_m + \phi_{f(m)}N_m + \varepsilon_m \tag{4}$$

Where $f(m)$ refers to the region, N_m is the number of households involved in self-employment SE_m refers to the household characteristics, δ is the elasticity of household income with respect to household characteristics, ϕ is the elasticity of household income with respect to number of households involved in self-employment, and ε_m is the error components of the model.

The estimated natural logarithm of wage and the estimated income from entrepreneurial activity were aggregated to determine the total household income.

The second stage was the integration of the estimates above to the specifications of the FTL. Specifically, the FTL as a subsidy provides tuition and miscellaneous fees among students in public higher education institutions (HEIs). Hence, The amount spent by the household for tuition in tertiary education will be added to the estimated total household income before FTL to generate the estimated changes in total household income during the simulated period. Distributional analysis of income is possible and poverty estimation could be drawn from the total household income after the implementation of Free Tuition Law. Total household income during the simulated period is given by the equation:

$$Y_h = \sum_{i=1}^{N} w_i^{fr} + \sum_{i=1}^{N} w_i^{fn} + \sum_{i=1}^{N} \Pi_i + \sum_{i=1}^{N} teduc_i \tag{5}$$

Where Y_h represents the total household income and i is the individual household as the sum of total income from wages among FTL recipient, w_i^{fr}, total income from wages among FTL non-recipient, w_i^{fn}, total income from profit, Π_i, and total amount spent for tuition in tertiary education, $teduc_i$.

The estimated total income from the base period was utilized to estimate poverty and distribution of income estimates before the implementation of FTL. The poverty and income distribution indices were calculated using the Distributive Analysis Stata Package (DASP) module.

Results And Discussion

D. Wage Equation Estimates

The coefficients in table 1 are based on the estimated wage equation (equation 3). All variables in the wage equation among FTL recipient individuals have p-values of 0.000 indicating statistical significance hence, interpretation drawn from the coefficients is meaningful. Region, urbanization, sex, marital status, highest grade completed, and occupation all have negative effects on the logarithm of wage.

In terms of geographical location, wage decreases when an individual resides in ARMM, regions IX, XII, XIII, V, XI, and IV-B. These regions are characterized by having the lowest share of income from wage from non-agricultural activities as their source vis-à-vis being at top when agricultural activities is considered as source. This could be interpreted considering urbanization. Being in the rural areas characterizes lower wages consistent with [2] [3] in their separate studies covering 1961 to 2012 FIES. Hence, as more households engage in agricultural activities as their source of wage, the lower their income would be.

Meanwhile, females have lower wages than their male counterparts. In literature, women have always been involved in low-wage work resulting to lower income that men. This pattern is still prevalent in the country as observed by the [29] during 2004 to 2011. Moreover, women's economic activities are being constrained by family responsibilities, unpaid domestic care and work, and even discrimination in the labor market. The findings on gender disparity in income in this study is consistent with the case of Indonesia where being female is associated to having low income. [30]

On the other hand, those who are married, and other marital statuses have lower wages than single individuals. Since single individuals have more flexibility when looking for job opportunities, the likelihood of landing on a better paying job increases and in return increasing income from wage as observed by [31] in an income mobility study in the Philippines. Moreover, married and other statuses could be tied in a low paying job due to fear of unemployment and failure to sustain their families/dependents.

Table 1: *The Estimation of Individual Wage for FTL Recipient*

	Coefficient	Standard Error
Dependent Variable: Logarithm of Wage		
Region	-322.7493***	120.1957
Urbanization	-73852.31***	1163.91
Sex	-38042.27***	1593.103
Age	1709.711***	45.1188
Marital Status	-4638.552***	1267.612
Education	-23001.15***	224.2404
Occupation	-2948.08***	192.9645
Constant	399656.5***	3876.894
Dependent Variable: FTL Recipient		
Spending in HE	0.0000701***	1.39E-06
HH Member 7-15 y/o	0.8649421***	0.0046428
Constant	-0.3217959***	0.0053196
Inverse Mill (lambda)	-4091.844**	1797.745
rho	-0.02295	Wald Chi-square:
sigma	178273.98	20192.74***

Note: *** denotes p-value<0.01; ** denotes p-value<0.05; * denotes p-value<0.1
Source: *Author's calculation based on 2018 FIES from PSA*

Moreover, individuals who have no grade completed or less years of education such as elementary and high school have lower wages compared to those who had 12 or more years of education like college and post-secondary graduates. This could be explained by numerous studies but the human capital theories of [13]-[15] would encapsulate this phenomenon of individuals being able to command higher wages due to higher productivity signaled by education and training.

Lastly, Individuals who have no occupation and those belonging to elementary occupations, trade, and assembly have lower wage compared to those who are managers, professionals, and technicians. High skilled labor earns higher wages that those requiring little to no set of technical and supervisory skills. [13] Hence, more years of schooling and trainings would increase the likelihood of landing on a high skill occupation with higher wages entailed.

The variable age however showed positive effect to wage. It could be inferred that older individuals earn higher pay from wages due to more years of being into the labor force. In addition, the Life Cycle Hypothesis explains how an individual, through natural course of ageing, accumulates income (including wealth) during the start of working life and tends to increase then fall during retirement. [32]

Table 2: The Estimation of Household Profit

	Coefficient	Standard Error
Dependent Variable: Logarithm of Profit		
Members employed for profit	105092.3***	5865.976
Region	-159.2515	165.0575
Urbanization	-27121.24***	2113.34
Sex	-8700.061***	2175.589
Education	-8142.633***	321.493
No. of Children	-541.8894	507.3881
Marital Status	1955.923	1484.499
Constant	94013.08***	4919.938
Instrumented: HH members employed for profit		Wald Chi-square:
Instruments: Region Urbanization Sex Highest Grade Completed Children Marital Status Member 5 to 7 years old		882.92***

Note: *** *denotes p-value<0.01; ** denotes p-value<0.05; * denotes p-value<0.1*
Source: *Author's calculation based on 2018 FIES from PSA*

The above pattern in wages among FTL recipients is the same for FTL non-recipients except for the variables age and marital status as seen in table 2. Among FTL non-recipient households, individuals who are older have lower wages. On the other hand, individuals who are married and other status have higher wages than those single individuals. The behaviors of both variables could be attributed to the household's pooled decision of not investing in higher education. [25] At the base period, before the simulation of the effect of FTL, households identified to be FTL non-recipients have either not spending for tuition and/or other school related expenses for higher education.

The choice of variables in the FTL recipient status equation was based on [27] simulation of poverty and distributional impacts of free higher education in Morocco. From the maximizing income equation the variables (i) share of the unit cost of higher education financed by the household and (ii) share of adult's active adult life time that must be spent in higher education are approximated in this study to be (i) total household spending in higher education

and (ii) household members 7 to 15 years old, respectively.

Interpretation of the equation for FTL recipient is just a converse of the FTL non-recipient. For convenience, the recipient status equation for FTL recipient will be discussed. In table 1, both p-values for total household spending in higher education and household members 7 to 15 years old are statistically significant (p=0.000). The probability of being FTL non-recipient increases by 0.0000701 as total household spending in higher education increases by a peso. Moreover, the chances of being FTL non-recipient increases by 0.8649421 among households with more members 7 to 15 years old.

E. Profit Equation Estimates

In equation 4, the Instrumental Variable (IV) Regression method of estimation was used in estimating individual household profit from both farming and non-farming activities. This method of estimation was used in [28] [33] due to its ability to suppress possible problem of endogeneity between the number of household members employed for profit and the number of household members 5 to 17 years old. The natural logarithm of household profit from both farming and non-farming activities was estimated using the variables members employed for profit, region, urbanization, sex, highest grade completed, number of children, and marital status. Among these variables the members employed for profit, urbanization, sex, and highest grade completed have p-value of 0.000—all indicating statistical significance. However, the variables region, number of children, and marital status are statistically insignificant.

The profit equation estimates seen in table 2 revealed that households with more members employed for profit have higher profit from both farming and non-farming activities. In terms of location, being in the rural areas reflect lower profit than being in urban areas. In addition, households whose head is female have lower profit compared to those headed by male.

Moreover, individuals who have no grade completed or less years of education such as elementary and high school have lower profit compared to those who had 12 or more years of education like college and post-secondary graduates. The behavior of all mentioned variables in the estimation of profit from entrepreneurial activities could also be explained by the discussion in the wage estimation from farming and non-farming activities.

F. Total Household Income Estimates after FTL

Total household income during the simulated period is consistent with the expected signs and pattern in the wage and profit equations (equations 3 and 4, respectively) as seen in table 4. Both FTL recipient and non-recipient households have increased total income in regions I, V, VII, VIII, IX, X, XI, XII, ARMM, XIII, and IV-B. Increase in income is relatively higher among FTL non-recipients ranging from 10% to almost 60% among the mentioned regions while FTL recipient households have 6% to 46% increase.

The abovementioned regions are characterized as low-income regions based on the 2018 FIES. After the incorporation of Free Tuition Law specifications to the microsimulation, these regions have increased total income dramatically especially among the FTL non-recipients.

Table 3: Total Household Income Before and After FTL

Region	Base Period	Simulated Period	Change
I- Ilocos	1,058,326,868	1,249,412,451	18%
II- Cagayan Valley	991,411,879	1,052,199,498	6%
III- Central Luzon	2,707,242,549	2,626,790,695	-3%
IV A- CALABARZON	1,573,871,919	1,484,969,878	-6%
V- Bicol	1,915,875,037	2,298,108,633	20%
VI- Western Visayas	1,747,886,290	1,804,147,613	3%
VII- Central Visayas	1,471,172,920	1,717,790,258	17%
VIII- Eastern Visayas	854,917,501	1,109,592,843	30%
IX- Zamboanga Peninsula	1,218,404,298	1,535,975,265	26%
X- Northern Mindanao	1,548,251,942	1,966,027,532	27%
XI- Davao	1,439,941,247	1,703,116,090	18%
XII- SOCCSKSARGEN	1,247,889,882	1,578,575,164	26%
CAR	5,808,155,541	4,823,606,693	-17%
NCR	1,896,492,388	1,801,839,706	-5%
ARMM	897,054,623	1,346,033,249	50%
XIII- Caraga	1,277,008,719	1,520,822,915	19%
IV B- MIMAROPA	1,394,615,852	1,547,535,781	11%
Total Household Income	**29,048,519,455**	**31,166,544,262**	**7%**
FTL Recipient Status			
Non-recipient	7,712,300,533	9,121,112,130	18%
Recipient	21,336,218,922	22,045,432,132	3%

Source: *Author's calculation based on 2018 FIES from PSA*

This could be attributed to the members of the household probable to be in higher education in $t+i$, where i=1, 2, 3…n, years. Since the FTL is a subsidy, the costs of higher education will no longer be deducted from the household's income hence, being into public HEIs would mean consuming education with little amount being paid. The FTL covers the entire tuition and miscellaneous costs shouldered by the household. However, allowance of each member in higher education as well as other expenses such as uniform, computer rent, and school supplies are not covered by the FTL.

Despite being non-recipient at the base period, FTL non-recipient households with members 5 to 17 years old (members probable to enter higher education) would rationally choose to send these individuals since tuition and miscellaneous fees would not diminish the total household income. This is supported by [11] saying that due to free tuition, households are more willing to send their children to public universities and colleges. Hence, the long run effect of the Free Tuition Law is a nation with more educated population.

The cases of regions III, VI, and CAR revealed an increase in total income among FTL non-recipients while FTL recipients have decreased income of about 8% to 10%. Hence, FTL non-recipients are better off after the implementation of Free Tuition Law in these regions. Moreover, regions II, IV-A, and NCR have decreased income of about 7% to 22% both among FTL recipient and non-recipient households. The impact of FTL among these regions is inconsistent with the anticipated effect in income using the wage and profit estimation equations.

It is worth noting that these regions all belong to the top regions in terms of total household income in the base period. When analyzed based on the total members probable to

be in higher education vis-à-vis total spending in higher education, these three regions registered the least ratio of less than 0.041, the average members: spending ratio in the whole population of 2018 FIES, while all the rest of the regions (except VII and XIII) are above the average. The members: spending ratio could be operationalized in this study as the share of each member probable to be in higher education to the total amount spent for higher education. Hence, the lower the value of the members: spending ratio the higher the amount is spent in higher education. Thus, this amount is deducted to the total household income which tends to lower household income despite receiving subsidy from the FTL.

Overall, aggregate income across the regions improved as shown in table 3. The improvement is evident among FTL non-recipient households with an average increase of 18% compared to FTL recipient households with just 3% increase after the implementation of the Free Tuition Law as described in table 3.

Hence, welfare improvement is evident. In a Rawlsian perspective, the pattern of having higher income among non-recipients (note that this was based on the probit model that identified household to be "non-recipient" if there is no spending in higher education at all) is a welfare transfer. [34] In addition, Those who could not afford spending in higher education were benefited by the FTL by motivating the household to send its members to public higher education institutions.

G. Poverty Estimates after FTL

The Foster-Greer-Thorbecke (FGT) measures of poverty include headcount poverty, poverty gap, and severity of poverty. Each measure distinctly give meaning to the poverty situation in country with respect to a chosen poverty line. The

Philippine Statistics Authority (PSA) sets the official poverty line by using income data from FIES. In this study, poverty line is set to 50% relative to the total income in a given period. During the base period, poverty line is at 100,856.72 pesos while the simulated period is pegged at 108,210.41 pesos.

Headcount Poverty is the proportion of the population that is considered poor. This measure is easy to comprehend however not so sensitive in the degree of poverty and the distribution of income among the poor. It was found out in this study that headcount poverty declined both for FTL recipient and non-recipient of about 36% and 53%, respectively.

As noticed in table 4, among the FTL non-recipients, 46.20% are poor during the base period then declined to 21.79% after simulated period. The same pattern is seen among FTL recipients with headcount poverty of 32.1% initially then declined to 20.39%.

Generally, the Headcount Poverty measures the impact of FTL (when seen as poverty-eliminating rather than alleviating policy) to household income. [36] Hence, Headcount Poverty index tells who the poor are.

On the other hand, Poverty Gap, defined in equation 10, measures the extent to which individual fall below the poverty line (the poverty gaps). The aggregation of these poverty gaps gives the minimum costs of eliminating poverty, if transfers were perfectly targeted. [37] On the average, the poor among FTL non-recipients in the base period have income shortfall of 25.10% of the poverty line. This situation improved after the implementation of FTL when

poverty gap declined to 11.76%. The same pattern is seen among FTL recipients with percentage decline of 22%. Since Poverty Gap accounts for the depth of poverty, the effect of FTL suggests that poor households became less poor after its implementation.

Table 4: Foster-Greer-Thorbecke Measures of Poverty before and after FTL

Grouping	FGT Indices before FTL			FGT Indices after FTL			Change in FGT		
	Head Count Poverty	Poverty Gap	Severity of Poverty	Head Count Poverty	Poverty Gap	Severity of Poverty	Head Count Poverty	Poverty Gap	Severity of Poverty
FTL Recipient Status									
Non-recipient	0.461989	0.251059	0.183627	0.217865	0.117623	0.093537	-53%	-53%	-49%
Recipient	0.32098	0.13477	0.08987	0.20385	0.105415	0.083137	-36%	-22%	-7%
Population	0.363304	0.169674	0.118011	0.208056	0.109079	0.086258	-43%	-36%	-27%

Source: *Author's calculation based on 2018 FIES from PSA*

Lastly, the Severity of Poverty index (also called Squared Poverty Gap) averages the squares of the poverty gaps relative to the poverty line as seen in equation 11. Among FTL non-recipients, Severity of Poverty improved during the simulated period from 0.183 down to 0.094. A decline of about 7% in Severity of Poverty is seen among FTL recipients is shown in table 4.

After the implementation of Free Tuition Law, all regions have declined Sen-Shorrocks-Thon (SST) index with a national average value of 0.204640 or an equivalent of 32% decline compared to the base period. The SST index measures the incidence, depth, and inequality, jointly.

Overall, an improvement in poverty across the population (for both FTL recipient and non-recipient) is evident and is magnified among FTL non-recipients households. The implementation of Free Tuition Law significantly reduced poverty using all indices in FGT. In other themes of study, it was found that education is a determinant of poverty. [18] [16] [19] [20] This study simulated the impact of free higher education among Philippine households and found that subsidizing tuition and miscellaneous fees among FTL recipient households improved poverty conditions. Moreover, FTL non-recipients households benefited from FTL by being rationally inclined in sending its members to public higher education institutions

Table 5: *Gini Index Before and After FTL*

Grouping	Gini index		
	Before FTL	**After FTL**	**Change**
Population	**0.499499**	**0.335731**	**-33%**
Region			
I- Ilocos	0.505872	0.331692	-34%
II- Cagayan Valley	0.493781	0.320427	-35%
III- Central Luzon	0.458148	0.312388	-32%
IV A- CALABARZON	0.465315	0.294336	-37%
IX- Zamboanga Peninsula	0.497264	0.372752	-25%
V- Bicol	0.509948	0.343234	-33%
VI- Western Visayas	0.505654	0.317411	-37%
VII- Central Visayas	0.538040	0.393765	-27%
VIII- Eastern Visayas	0.503743	0.371401	-26%
X- Northern Mindanao	0.459873	0.351735	-24%
XI- Davao	0.471831	0.365204	-23%
XII- SOCCSKSARGEN	0.507408	0.350541	-31%
CAR	0.401704	0.231937	-42%
NCR	0.538837	0.341924	-37%
ARMM	0.336743	0.360269	7%
XIII- Caraga	0.508452	0.372664	-27%
IV B- MIMAROPA	0.514639	0.362750	-30%
FTL Recipient Status			
Non-recipient	0.548210	0.339579	-38%
Recipient	0.477964	0.333978	-30%

Source: *Author's calculation based on 2018 FIES from PSA*

H. *Income Inequality Estimates after FTL*

The gini coefficient measures the extent to which the distribution of income deviates from a perfect equal distribution (gini=1 means perfect equality). This is in nature a measure of relative position of households across the population. According to [2] gini coefficient is a good measure of inequality since it holds the four assumptions of a well-calibrated inequality index: (i) the Pigou-Dalton condition, (ii) mean independence, (iii) population-size independence, and (iv) decomposability. Among these assumptions, the Pigou-Dalton condition prescribes the most important aspect of inequality studies—income transfer from a wealthier to a poorer person decreases the value of gini coefficient.

All regions, except ARMM, have decreased gini from the base period to the simulated period. The FTL could be seen as an effective measure to redistribute income due to a 33% decline of gini at the national level.

Table 5 showed that CAR had the highest improvement in terms of cutting the gap between the rich and the poor with a gini of 0.231937, a 42% decline from the base period gini of 0.401704. Meanwhile, ARMM had a 7% increase after the implementation of the FTL which could be translated to having larger gap between the rich and poor households within the region.

When the population is decomposed according to FTL recipient status, cutting the gap between the rich and the in terms of income is not so different among recipient and non-recipient since they both have declined gini by 30% and 38%, respectively.

Overall, the incorporation of FTL to the microsimulation showed an improvement in income inequality among the population relative to the base period using FIES 2018. Hence,

Free Tuition Law has an anticipated redistributive effect on income as supported by the association of education to inequality. [2] [35] [3]

Conclusions

Households whose head are engaged in non-farming activities combined with having more years of education and being professional/technical workers have the highest total household income in the 2018 FIES. In addition, private spending in higher education is highest among these households combined with the characteristic of having more members 5 to 17 years old. Meanwhile, public spending in higher education is highest among regions characterized of being at top of the total household income distribution.

From the Income Estimation module of the microsimulation model, number of members probable of being in higher education played a crucial role in the overall increase in the total household income. Despite not being recipient of free higher education before the implementation of Free Tuition Law, households with more members 5 to 17 years old were greatly benefited from the subsidy mechanism of FTL. With some outlier regions, overall income increased by 1% among FTL recipients and 15% among FTL non-recipients.

The Distribution of Income and Poverty module of the microsimulation model revealed that the implementation of Free Tuition Law resulted to a 43% decline in the number of poor, 36% decline in income shortfall from the poverty line, and severity of poverty was down by 27%. The poor have moved out of poverty and have income above the poverty line due to a 34% decrease in SST index. Moreover, the gap between the rich and the poor was down by 33%.

Given the positive results of the ex-ante analysis of the impact of Free Tuition Law, both private and public investments in higher education are beneficial to households and the labor force of the country. Private investment is lowest in regions associated with low income such as ARMM, Zamboanga Peninsula, SOCCKSKSARGEN, Davao Region, MIMAROPA, and Ilocos Region. Public investment is also lowest among the said regions as reflected in the FTL Budget Utilization report from the UniFAST. Strategic campaign and information drives could be conducted to make the population, especially in these regions, more aware that higher education is now free. SUCs could update their admission policies to cater more students from low-income and middle-income households.

The Commission on Higher Education could strengthen its Tertiary Education Subsidy program to further bolster the confidence of the low-income and middle-income households to send their children to college because even tuition and miscellaneous fees are covered by the Free Tuition Law, other costs of higher education such as allowance, computer rent, and school supplies might probably reduce their constrained income.

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