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Consumption Inequality in the Rural Households of Iran

Alireza Keikha [a,*] *and Mohammadjavad Khosrosereshki* [b]

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Abstract

This study aims to assess the inequality in consumption among rural households in Iran and identify the contributing factors. Initially, we gauge consumption inequality using household income and expenditure statistics published by the Statistics Center of Iran in 2019. Subsequently, we analyze the impact of significant demographic factors within households, including gender, education, and the generational status of household heads, on consumption inequality. We accomplish this through Gini coefficient analysis and quantile regression. The analysis of the Gini coefficient reveals that age groups and the generational status of household heads provide a more effective representation of the observed inequality within the studied households compared to other demographic features. Employing quantile regression to investigate the asymmetric effects of the mentioned demographic factors on the distribution of households' per capita consumption indicates that various segments of consumption expenditure distribution exhibit asymmetric responses to these factors. Household income has a positive influence on the distribution of household consumption expenditures. However, its impact is 60 percent greater on the right side of the distribution than on the left side. In cases where the household head is female, per capita expenditures are reduced by one million and three hundred thousand Tomans. Notably, the sign of this coefficient consistently remains negative across different quantiles, albeit with varying magnitudes. Ultimately, households with higher education levels or belonging to older age categories demonstrate greater average per capita expenditures compared to households with lower education levels or younger household heads.

Keywords:
Gini coefficient, Inequality, Quantile regression

[a] *Assistant Professor, Agricultural Economic Department, University of Zabol, Zabol, Iran*
[b] *Ph.D in economics, Department of Economics, Faculty of Management and Economics, Tarbiat Modares University, Tehran, Iran*

** Corresponding author's email: alirezakeikha@uoz.ac.ir*

INTRODUCTION

In developing countries, there exist significant inequalities in the quality of life among people, and in many cases, these inequalities are escalating. One of the paramount objectives of socio-economic plans in Iran has been the reduction of deprivation, poverty, and the eradication of inequality. To attain this objective, it is imperative to conduct further research aimed at identifying and understanding society through diverse economic, social, and environmental indicators (Yu et al., 2010). Simultaneously, governmental initiatives and practices, including targeted subsidies over the last decade, necessitate economic and social researchers to scrutinize changes in poverty and inequality. This scrutiny is essential to evaluate the effectiveness of these policies. This topic has assumed a pivotal role in recent economic development discussions. Consequently, achieving a balanced distribution of household income and expenditures is regarded as one of the foremost objectives for governments in the realm macroeconomic policymaking.

Inequality in various forms, such as income, wages, and consumption, can impact economic and social variables. It can affect economic growth in diverse ways (Arsalan Bod, 2012). Inequality encompasses several dimensions, but the inequality among individuals, households, or individual expenditure distribution is directly tied to justice and social welfare. This issue is regarded as one of the most important in public policy. The regional distribution of income and expenditures also holds significant importance in terms of justice and efficiency. A substantial portion of Iran's population resides in rural areas across the country. Consequently, the distribution of income and expenditures among these regions, as well as their changes, largely determine the level of inequality (Parhizkari et al., 2011).

In general, empirical and historical evidence from different countries worldwide in the realm of inequality suggests that various factors contribute to the illustration of inequality and the absence of a balanced distribution of income and expenditures in rural areas. Some of these factors include poor business conditions, a lack of suitable job opportunities, limited income diversity, and the underdevelopment of rural and agricultural entrepreneurship. Other contributing factors involve unfavorable economic development conditions, inappropriate economic policies, adverse family circumstances, and varying household characteristics. Cutler and Katz (1992) demonstrated that, in light of these factors, recent decades have witnessed various efforts, such as price controls, subsidies, and the redistribution of production resources, aimed at reducing income and expenditure inequality in rural areas. Currently, inequality in income and expenditure distribution, particularly within the economically disadvantaged rural areas, is a primary concern for policymakers. Given the significance of this issue, our study seeks to assess and analyze consumption inequality among Iranian rural households while elucidating the factors that influence it. The key question this research endeavors to answer is whether the demographic characteristics of household heads play a major role in explaining the observed consumption inequality within the analyzed families.

The subsequent sections of this study are structured as follows: Part Two presents the literature review. Part Three describes the data and empirical methodology. Section Four elucidates the results, and the final section offers the conclusion.

Literature Review

An essential aspect of studies pertaining to inequality involves the analysis of long-term trends in wages, income, and consumption inequality. The number of studies concerning income inequality is notably higher compared to those concerning consumption inequality, both within Iran and other countries. One reason for this disparity is the availability of observations such as wages, salaries, and income, which possess globally

recognized definitions (Attanasio and Pistaferri, 2014). However, delving into trends in consumption inequality yields more comprehensive insights into welfare. This is because consumer utility is defined based on consumption rather than earned income. Furthermore, substantial shifts in income inequality may reflect temporary alterations, which might only result in minor welfare effects if consumers can adjust their consumption in response to transient shocks. In essence, consumption can serve as a viable substitute for permanent income (Najarzadeh et al., 2021). Consequently, consumption inequality can offer a more robust measure of inequality in long-term living standards compared to income inequality.

There is a substantial body of research on inequality in Iran. Hosseini and Najafi (2009) examined income distribution in Iranian rural and urban areas from 2008 to 2009, utilizing key economic indicators. The findings indicated that income distribution in rural regions displayed greater inequality and fluctuations compared to urban areas during the study period. However, overall income inequality decreased when compared to previous periods. Mardani and Karami (2013) explored income inequality in Iranian rural areas between 2013 and 2014, employing household income and expenditure data alongside the Gini coefficient. The outcomes suggested a general reduction in income inequality among rural households. Jamshidi (2014) investigated the income distribution of urban and rural households in the Khorasan Razavi province, employing significant inequality measures. The results underscored a notable disparity in income distribution between urban and rural areas in both the Khorasan Razavi province and the entire country. They also highlighted consistently lower social welfare indices for rural areas. Sepehrdoost and Zamanishabkhaneh (2014) delved into the factors influencing income distribution in rural areas, emphasizing information and communication technology through a panel data approach. The outcomes revealed that the advancement of information technology significantly impacts income distribution. Furthermore, the study unveiled an escalation in unemployment rates within rural areas in recent years. Arabi and KhodaparastMashhadi (2016) explored income distribution and poverty in rural households in North Khorasan province between 2016 and 2017. The findings indicated that, akin to the nation at large, social welfare indices decreased in rural regions of North Khorasan province, whereas the poverty line increased. Najarzadeh et al. (2020) scrutinized consumption inequality in urban households in Iran, utilizing urban household expenditure-consumption data from 2018. Their study employed Gini coefficient analysis and identified the education level of household heads as the most prominent factor contributing to observed inequality.

The review of several significant foreign studies on inequality follows. Harding and Grinol (2002), using data from the Australian Centre for Household-Expenditure Studies and the Gini coefficient concept, examined trends in rural income and expenditure inequality measures. They noted that income inequality in rural regions grew between 2003 and 2005, while expenditure inequality remained unchanged. Hayashi et al. (2014) employed various analytical methods to study consumption inequality in Indonesia. Their findings revealed an increase in inequality from 2008 to 2010, with urban inequality significantly surpassing rural inequality. Additionally, they demonstrated the significant role played by differences in the educational levels of household heads in consumption inequality. Thu Le and Booth (2014) investigated income distribution in rural and urban areas of China from 2014 to 2015. Their results highlighted an increase in income inequality within rural areas, and the expanding income gap between rural and urban regions over the past two decades has contributed to the overall growth of inequality. Liu (2016), utilizing a factor analysis method, studied changes in rural inequality

in Canada. The results indicated an enlargement of rural inequality in Canada, with income inequality trends aligning with economic inequality within rural areas.

Previous studies have primarily concentrated on identifying income inequality indicators in Iran. In this study, we not only formulate several consumption inequality measures for Iranian rural households but also investigate the factors influencing inequality using Gini coefficient decomposition and quantile regression methods.

METHODOLOGY

Utilizing Household Income and Expenditure Statistics (HIES) provided by the Statistics Center of Iran (SCI), this study calculates key consumption inequality measures (Gini coefficient, Palma ratio, and Theil index) for Iranian rural households in 2020. Furthermore, we investigate the influence of household head's education level, age group, and gender on inequality through Gini coefficient decomposition and quantile regression methods.

The Gini decomposition method introduced by Mussard et al. (2003) is employed to discern the sources of consumption inequality. This approach segregates observed inequality into two components: within-group and between-group. This division enables the identification of the impact of diverse demographic attributes on the observed inequality. When dissecting consumption inequality into two elements based on household characteristics, such as gender, a higher proportion in the between-group component suggests the need for economic and social policies to mitigate between-group inequalities (e.g., policies ensuring equal pay for men and women).

To conduct the decomposition based on gender, educational attainment level, and age group, a preliminary classification of observations is necessary. Drawing from the study by Najarzadeh et al. (2021), four education categories are established. The first group encompasses households with an illiterate head or a completion of only a few elementary classes. The second group includes households with heads possessing educational attainment beyond primary school but less than a diploma. The third group consists of households with heads holding a diploma or some years of college education. Lastly, the fourth group comprises households with heads who possess a bachelor's degree or higher. For age group classification, households with heads under the age of 30 are categorized in the first group, those aged between 30 and 45 fall into the second group, households with heads aged 45 to 60 are placed in the third category, and those with heads over 60 years old are included in the fourth category.

Finally, quantile regression was employed to investigate the heterogeneity in the impact of the aforementioned demographic characteristic of households on consumption distribution. The primary rationale for opting for quantile regression is its ability to provide a model for assessing the influence of independent variables on the dependent variable not only in the central tendency of consumption distribution, but across all segments of the distribution. Additionally, this method avoids encountering the assumptions, heterogeneity, and outlier data limitations associated with the ordinary least squares method.

Quantile regression employs the minimization of the absolute value of residuals to estimate the model's parameters. This differs from the approach in normal regression, where the minimization of deviations' absolute values is referred to as the absolute minimum value. The quantile model's specification is as follows:

$$y_i = x_i'\beta_q + e_i \quad (1)$$

Where β_q is the parameter's vector related to the β^{th} quantile. The estimated parameters ($\hat{\beta}_q$) are obtained by minimizing the following equation with respect to the β_q:

$$Q(\beta_q) = \sum_{i:y_i \geq x_i'\beta}^{N} q\,|y_i - x_i'\beta_q| + \sum_{i:y_i \leq x_i'\beta}^{N} (1-q)|y_i - x_i'\beta_q| \quad (2)$$

Where is the equivalence per capita consumption of the household and is the vector of explanatory variables; income, gender, age group, and the educational level of household heads. Also, can be any arbitrary number between 0 and 1 (Keshavarzhadad, 2017). However, equation (2) is estimated for 0.25, 0.5 and 0.75 quantiles because there is not any significant difference in the estimated coefficients among lower categories such as deciles. Indeed, when we estimated equation (2) at deciles level the result showed that there is not significant difference among the coefficient of close deciles such as the first and the second deciles or the ninth decile and Tenth and etc.

RESULTS

This study utilizes data from 18,430 collected questionnaires issued by the Statistical Center of Iran in 2020. The four panels of Figure 1 illustrate some of the most significant characteristics of the surveyed rural households.

The top-left panel displays the relative frequency of gender distribution. As observed, just over 84 percent of the surveyed households have male heads. The top-right panel illustrates the relative frequency of the four educational categories introduced in the subsequent section. As anticipated, a significant proportion of households have illiterate heads (67%), whereas only 3 percent of households have heads with bachelor's degrees or higher educational attainment.

The bottom-left panel presents the relative frequency of four age groups. The percentage of households with heads under the age of 30 (5%) is lower than the other three age groups. The bottom-right panel showcases the average per-equivalence consumption of different consumption deciles in million Rials. When calculating the per-equivalence consumption of a household, the consumption expenditures are divided by the square root of its size. This differs from per capita consumption, where consumption is divided by the household size. The average per-equivalence consumption of the 10th decile is approximately 7 times higher than the first decile.

Table 1 highlights crucial inequality indicators. The Palma ratio signifies the relative average consumption of the 10th decile compared to the combined average con-

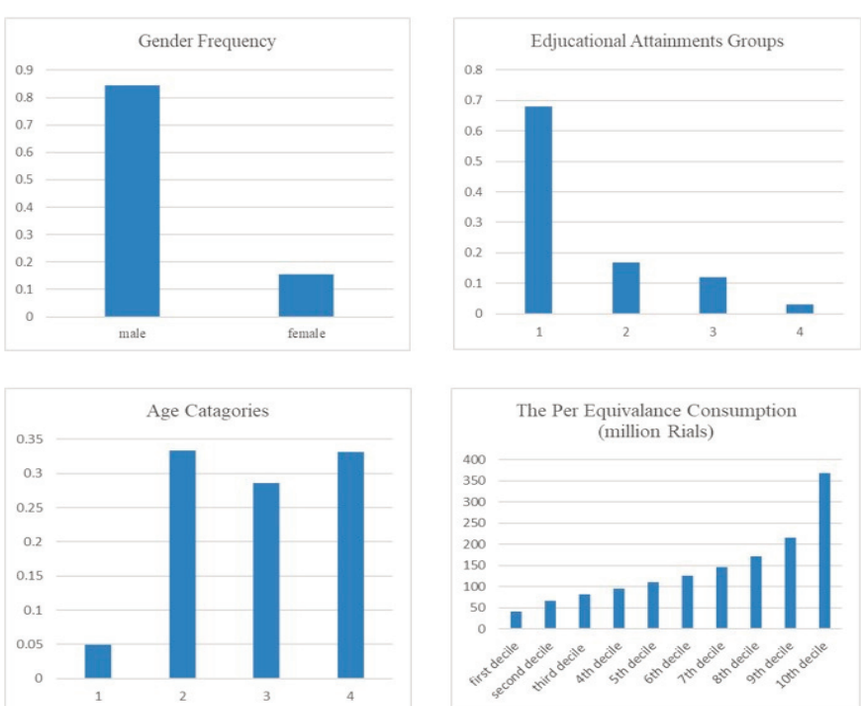

Figure 1. Demographic Characteristic of Iranian Rural Households

Table 1
The Inequality Indicators

Inequality index	10^{th} to the first ratio	Palma Ratioo	Theil Index	Gini Coefficient
value	8.9	1.28	0.2	0.34

Table 2
Gini Coefficient Decomposition. source: research findings.

Contribution of within-group and between-group component to the overall inequality					
Educational Group		Age Group		Gender Group	
% of within-group component	% of between-group component	% of within-group component	% of between-group component	% of within-group component	% of between-group component
17	83	10	90	25	75

sumption of the first four deciles. It stands at 1.28, underscoring a substantial disparity in the average consumption between households in the highest and lowest deciles. Moreover, the ratio of average consumption between the 10th and 1st deciles is slightly under 9, confirming a significant divergence in the distribution of consumption. Furthermore, the Gini coefficient and Theil index are 0.34 and 0.2, respectively. It's noteworthy that the Gini coefficient for Iranian urban households in 2020 is 0.38, indicating a more pronounced inequality issue in urban areas compared to rural areas.

Next, the Gini coefficient was decomposed based on three demographic characteristics of the studied households (gender, age group, and education categories). Table 2 presents the results of the Gini coefficient decomposition. When we conducted the Gini coefficient decomposition based on the gender of the household heads, the findings revealed that 75 percent of the observed inequality stems from the between-group component (between female and male heads), while 25 percent is attributed to the within-group component (inequalities within the male or female groups). Gini coefficient decomposition based on age group showed that 90 and 83 percent of the observed inequality shares are associated with the between-group and within-group components, respectively. Overall, this section of the study demonstrates that when we analyze consumption inequality based on household demographic characteristics, the age group emerges as a primary driver of the observed inequality. In other words, the age of the household heads provides a more comprehensive explanation of consumption inequality compared to their gender and educational attainment.

Finally, by employing quantile regression, our objective is to examine the asymmetric effects of the demographic factors mentioned in the previous section on the distribution of consumption. The key advantage of utilizing this method lies in its ability to explore variations among households across different segments of the consumption distribution. Additionally, it serves as a robustness analysis for the subsequent section. The results of the ordinary and quantile regression estimations are presented in Table 3. Appendix A provides the regression outcomes obtained through STATA 17 software.

As Table 3 reports, the impact of per capita income on the per equivalence consumption is significantly positive in all quantiles as like as the OLS regression. In addition, the middle quantile and 0.75 quantile estimated coefficients are different from the OLS estimated coefficients at the 95 percent confidence

Table 3
Quantile Regression Results.

Dependent variable: per equivalence consumption	OLS regression	Quantile regression (0.25 quantile)	Quantile regression (0.5 quantile)	Quantile regression (0.75 quantile)
per capita income	0.482** (0.00)	0.389** (0.00)	0.535**^ (0.00)	0.714**^ (0.00)
Gender	-1.38e+07** (0.00)	-7474082**^ (0.00)	-8801762**^ (0.00)	-1.18e+07**^ (0.00)
Age categories	4520995** (0.00)	75872.14^ (0.883)	3364489.2^ (0.552)	1572954^ (0.07)
Educational Attainments	1.38e+07** (0.00)	6667092**^ (0.00)	6312215**^ (0.00)	5487289**^ (0.00)
Constant	4.70e+07** (0.00)	3.48e+07**^ (0.00)	4.18e+07**^ (0.00)	5.22e+07** (0.00)

, ** and * indicate significant levels at the 10%, 5% and 1% respectively. ^ Significantly different quantile regression coefficients from OLS coefficients at the 5% significance level, when the OLS coefficient is outside of the quantile regression coefficient confidence interval. Source: research findings.*

level. one-unit increase of the per capita income rises the per equivalence consumption of households that are located on the right side of the consumption distribution by 0.714. It is 60 percent more than the rise in per equivalence consumption of the households on the left side of consumption distribution.

The impact of gender on the per equivalence consumption is considerably negative and the estimated quantiles coefficients are significantly different from the OLS coefficients. In other words, for households in the first quantile, being a female heads reduces their consumption expenditures by more than 700,000 Tomans[1]. The size of the gender's coefficients will increase in the upper quantiles, and for the OLS regression being a female head means a reduction of one million and three hundred thousand Tomans per equivalence consumption. The aging of household's heads has a significant positive impact on the per equivalence consumption. The coefficient of the age group is 450 thousand Tomans in OLS regression means younger household's heads have worse economic condition than elders. However, the estimated quantile regression coefficients for the age group are not significant. The education level of heads of household has positive and significant impact on their average per equivalence consumption. The estimated coefficient of the education level is one million and three hundred and eighty thousand Tomans means a higher level of education is associated with an increase of more than one million Tomans in the average household consumption. Quantile regression coefficients are also significant, and their difference from the OLS regression is significant.

Figure 2 simultaneously shows the estimation of the OLS regression and the quantile regression. In other words, these diagrams are a graphical representation of the results summarized in Table 3. The horizontal axis in the different panels of diagram shows the different quantiles of the dependent variable (per equivalence consumption). The vertical axis of the five panels represents the magnitude of the estimated coefficients for different quantiles and OLS regression. The OLS regression coefficients and their 95 percent confidence interval were indicated by dash line and round dot line respectively. As can be observed, the OLS regression coefficients are

[1] It should be noted that each Toman equal to 10 Rials (the common currency in Iran).

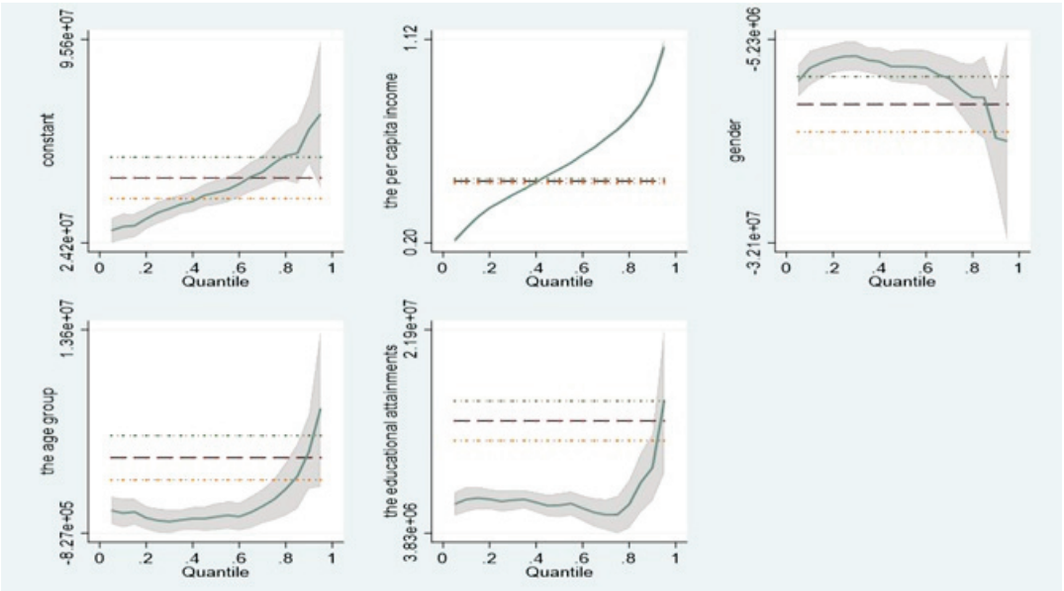

Figure 2. The OLS and Quantile Regression Results. The solid black line depicts the quantile regression coefficients, while the 95% confidence interval is indicated by the shaded area around these coefficients. The black dashed line represents the OLS regression coefficient, while the blue and red round dotted lines signify the 95 percent confidence interval.

Table 4
Breusch–Pagan/Cook–Weisberg Test

Heteroscedasticity test	**chi²**	**Prob > chi² = 0.0000**
Test statistic	1256**	000/0

constant across quantiles, which is consistent with the conventional regression characteristics that disregard the variation between quantiles. Quantile regression coefficients were represented as solid lines that change along different quantiles. The 95 percent confidence interval of quantiles regression coefficients are shown as dark areas around the lines related to the estimated coefficients. If the estimated quantile regression coefficients are outside the confidence interval of OLS regression coefficients; then, it can be said that there is a significant difference between the estimated coefficients of OLS and quantile regressions.

To employ quantile regression, the assumption of variance heterogeneity must be validated. Table 4 presents the results of the Breusch–Pagan/Cook–Weisberg test. The calculated test statistic significantly deviates from zero, leading to the rejection of the null hypothesis of homoscedasticity. This confirms the utilization of quantile regression.

Najarzadeh et al. (2021), De Giorgi and Gambetti (2017), and Hayashi et al. (2014) have shown that the level of education compared to other demographic characteristics of household is a better explainer of inequality. Education has numerous indirect and side impacts on family income, therefore it's not surprising that it plays such a large role in explaining consumption inequality. Higher education, for example, leads to more diverse career choices, fewer births, or increased female participation in the labor market. However, in this study, which examined the status of inequality in Iranian rural household, although the level of education is a good explanation for the observed inequality in rural

households, the age group of household's heads has a more significant impact than other characteristics. In other words, this result may reflect the fact that, firstly, the young generation of Iranian households, both in cities and in the countryside, are struggling with greater welfare problems than previous generations. Second, in rural areas, unlike in cities, the educational attainments of heads of household have less effect on their welfare than their cohort, although it is one of the most important factors explaining inequality in all Iranian households.

CONCLUSION

This study investigated consumption inequality in rural areas of Iran in 2020 and then gaged the impact of some important household demographic characteristics such as gender, level of education, and age cohort of heads of household on inequality by applying Gini decomposition and quantile regression methods using household income and expenditure statistics published by SCI. The Gini decomposition showed that the age group of the household heads explain consumption inequality better than other factors. In other words, the between-group component in the Gini decomposition based on age cohort is the highest among that of other factors. In other words, when inequality in consumption expenditures is decomposed separately for each household's demographic profile, the age group of the head of household ascribes the greatest importance to the intergroup component. The result of the quantile regression showed that different parts of the consumption distribution asymmetrically respond to the demographic characteristics of the household.

First, according to the results of this study besides other researches in this scope studies, it is suggested to make larger government investments in providing basic education and strengthen the motivation to go to school in rural area. In addition, we showed that, as the most important findings of the research, the age cohort is the main reason of observed inequality in Iranian rural area. So, young families should be given more attention to the policies against poverty and inequality. Finally, it is suggested that future studies examine and compare the effects of the cash subsidy scheme and other government policies, such as the livelihood assistance package, on the poverty and inequality in the various income and consumption distribution in urban and rural area in Iran.

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CONFLICT OF INTEREST

All authors declare that they have no conflicts of interest.

AUTHORS' CONTRIBUTIONS

Each of the authors contributed to the development of the paper.

REFERENCE

Arabi, M. & KhodaparastMashhadi, M. (2016). Distribution of income and poverty of rural households in North Khorasan Province and the country. *Journal of Rural Development Strategies*, 2(1),35-51.

Arsalan bod, M. R. (2012). Income distribution in the rural area of Iran in 2002. *Agricultural and Development Journal, 48*,141-148.

Attanasio, O., & Pistaferri, L. (2014). Consumption inequality over the last half century: Some evidence using the new PSID consumption measure. *The American Economic Review*, *104*(5), 122–126.

Cutler, D. M. & Katz, L. F. (1992). Rising inequality? Changes in the distribution of income and consumption in the 1980's. *American Economic Review, 82(2),* 546-551.

De Giorgi, G., & Gambetti, L. (2017). Business

cycle fluctuations and the distribution of consumption. *Review of Economic Dynamics*, *23*, 19–41.

Harding, T. & Greenol, H. (2002). Trends in income and expenditure inequality in the 1980s and 1990's. *Discussion Paper no. 57, National Centre for Social and Economic Modelling, University of Canberra. https://apo.org.au/sites/default/files/resource-files/2002-05/apo-nid5677.pdf*

Hayashi, M., Kataoka, M., & Akita, T. (2014). Expenditure inequality in Indonesia, 2008–2010: A spatial decomposition analysis and the role of education. *Asian Economic Journal*, *28*(4), 389–411.

Hosseini, M. & Najafi, S. A. (2009). Income distribution in the rural and urban areas of Iran. *Agricultural Economic Research Journal, 1(3): 145-167.*

Jamshidi, J. (2014). *The Determination of Developed Degree in the Rural Area of Khorasan Razavi Province* (Master's Thesis, Allameh Tabatabaei University, Tehran).

Keshavarz hadad, G. R. (2017). *Econometrics for Micro-Data and Policy Evaluation*. Tehran: Nei Publication.

Liu, k. (2016). Changes in canadian family income and family consumption inequality between 2009 and 2014. *Review of Income and Wealth, 44(2)*, 259-283.

Mardani, Y. & Karami, A. A. (2013). The investigation of Income Inequality in the Rural Area of Iran. *Agricultural Economic Research Journal, 5(1), 47-63.*

Mussard, S., Seyte, F., & Terraza, M. (2003). Decomposition of gini and the generalized entropy inequality measures. *Economics Bulletin*, *4*(7), 1–6.

Najarzadeh, R., Keikha, A., Heidari, H. (2020). Poverty risk, inequality decomposition and educational level of household heads. *Iranian Economic Review*, 26(1), 147-159. doi: 10.22059/ier.2020.77211

Najarzadeh, R., Keikha, A., Heidari, H. (2021). Dynamics of consumption distribution and economic fluctuations. *Econ Change Restruct 54, 847–876*.

Parhizkari, A., Sabouhi, M., & Salarpour, M. (2011). Investigating of income distribution and how it affect on economic condition of rural household in Qazvin City. *Rural Development Conference*, University of Guilan, Iran.

Sepehrdoost, H. & Zamanishabkhaneh, S. (2014). Study the factors that have effect on income distribution in rural area with emphasize on information and communication technology. *Journal of Rural Development Strategies, 1(1), 29-39*

Thu Le, H., & Booth, A. L. (2014). Inequality in Vietnamese urban–rural living standards, 1993–2006. *Review of Income and Wealth*, *60*(4), 862–886.

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