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Analyzing the impact of drug price liberalization on poverty and inequality and proposing a new framework for supporting vulnerable groups in Iran's economy on health reform

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Abstract

Improving income distribution is considered as one of the components of economic development in the Iranian economy, especially in the years after the Islamic Revolution. Due to the dependence of the government budget on oil revenues (40%) and the high share of subsidies in the annual budget (10%) of the Iranian economy, fluctuations in the global oil market, sanctions imposed in this area and the subsequent uncertainty in the realization of Oil revenues can affect government budgets and revenue distribution. In this study, to study the effect of drug price liberalization on inequality and income distribution using the Gini coefficient index, the integrated data model in the period 2010: 1 to 2019: 4 has been used. The results show that drug price liberalization has a negative and significant effect on the level of income distribution in the short run.

Keywords: drug price liberalization, revenue distribution, integrated data
2020 MSC: 91B24

1 Introduction

Income distribution is one of the economic variables in the field of macroeconomics and maintaining it at the desired level (reducing inequality) is always a concern of governments. Income distribution shows the share of each member of society in national income. One of the most important adverse effects of increasing income inequality is increasing rent and corruption [9], reducing the entrepreneurial rate in society [1] and increasing the size of government [27]. Also, the existence of a large traditional sector with less potential for modernization and low and volatile economic growth rates are other features of economies with high inequality in income distribution.

In general, all economies face some kind of macroeconomic shocks, but the dependence of oil-exporting countries on foreign exchange earnings from oil sales made changes in oil revenues one of the most important causes of economic fluctuations in these countries. With 10% of the world's proven oil reserves, Iran is the second largest oil producer in OPEC. Exports (60%) and government budgets (40%) are heavily dependent on oil revenues so any move to the global oil market severely affects government budgets and the structure of the economy [26]. Thus, the prominent role of oil revenues in the structure of government budgets and social security programs distinguishes the Iranian economy from

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other economies. Studies show that countries where natural resource sales account for a large share of their exports experience two to three times more fluctuations in their foreign trade than other countries [6]. Oil wealth harms the poor and increases income inequality by creating economic fluctuations in exporting countries through two channels: creating economic shocks and destabilizing government revenues [23].

The trend of changes in revenue distribution index and oil revenue growth during the period 1979-2019 in Figure 1 shows that despite the passage of four decades since the Islamic Revolution, policies based on improving revenue distribution have been very successful.

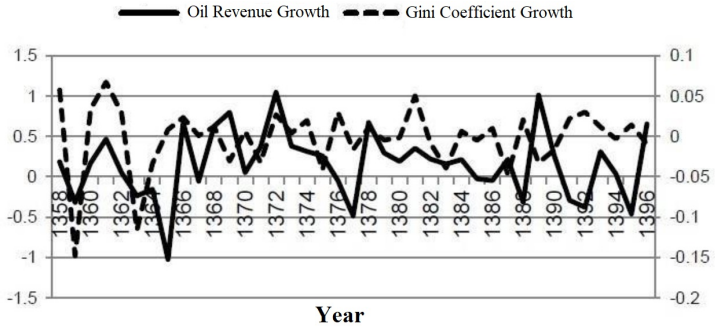

Figure 1: Growth trend of income distribution index (Gini coefficient) along with the growth of oil revenue during the period 1979-2019. (Gini coefficient is one of the important indicators for measuring income inequality, which is between zero and one.)

According to statistics published by the [30], the level of income distribution inequality in 64% of countries is lower than in Iran. Also, high-income households (first and second deciles) account for about 45% of the total income of the country; While the total share of the four lower-income deciles (low-income households) of national income is only 17.3%. The ratio of the 10% of the poorest households to the number of the 10% of the richest in Iran is equal to 6.11 units, which has the lowest rank among the countries in the region after Turkey (7.15 units).

The average share of total subsidies in the annual government budget, which is part of revenue redistribution programs, is about 10%; Therefore, oil price fluctuations seem to have a strong impact on government welfare programs. Despite the view of many economic thinkers that one of the main causes of poverty and income inequality is lack of capital and lack of accumulation, the experiences of many oil exporting countries, including Iran, given the availability of significant oil revenues, on the contrary, shows the order. In this regard, we can refer to the relatively poor performance of a large number of countries with rich natural resources in the development process compared to countries without natural resources [22].

Studies by many researchers such as show that despite the abundance of oil resources and increased government revenues from its revenues in countries with oil reserves, due to the lack of attention of these governments to tax revenues due to overreliance on oil revenues, lack of strong links between oil-related industries and other economic sectors, the lack of proper influence of this sector on employment and the orientation of public spending towards the wealthy classes, income inequality is intensifying in these societies. In contrast, studies by [12] in developed countries suggest that reducing inequality and improving income distribution by increasing transfer costs and targeted subsidies from source sources. Energy revenue has improved health and education indicators. Also, despite the prominent role of oil in the Iranian economy, the revenue generated is not due to the efforts of various sectors of production and services active in society, but the main part of activities in this area is exclusively in the hands of the government. In the years after the Islamic Revolution, except some special years when oil prices fell sharply, the share of oil production costs in the price of this product has been less than ten percent [1]; Because significant amounts are transferred to the treasury annually from the revenues, so these resources are distributed in different ways based on the attitude of governments, which can reduce or increase income inequality.

Hausman and Gavin [19] emphasized that the intensity of income distribution inequality is higher in economies with larger fluctuations compared to other economies; Also, according to the International Monetary Fund, oil revenues are the main source of financial aid and subsidies in the Iranian economy. On the other hand, the occurrence of any shocks and fluctuations in this area can cause shocks and create uncertainty in government spending and money supply in the economy, so examining the impact of these types of shocks will enable economic agents and the government. Adopt the necessary measures to control the adverse effects of these changes on income distribution. In addition, in the years after the Islamic Revolution, oil revenues have been affected by several sanctions, so the role of sanctions in the occurrence of fluctuations in oil revenues and the impact of these fluctuations on the inequality of income distribution is important.

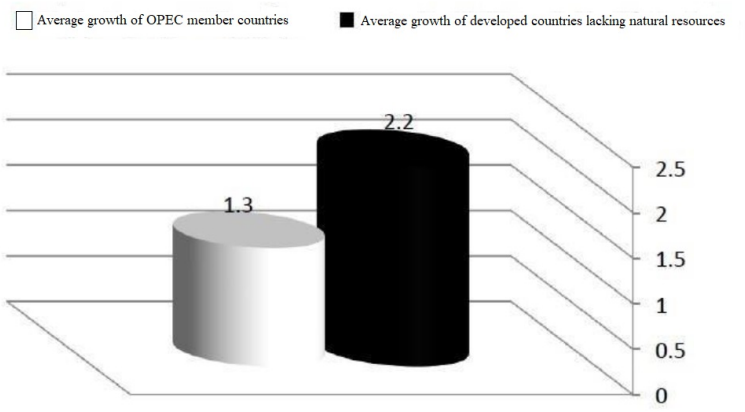

Figure 2: Average growth of countries with oil reserves and developed countries without natural resources in the period 1965-2016.

Oil sanctions push the exchange rate upward by restricting oil sales and revenues, which in turn increases production costs due to rising prices for imported raw materials and capital goods. Which leads to pressure on non-oil production and exports. Also, sanctions on the supply of certain goods and sanctions on interbank and financial transactions, etc., restrict access to capital goods and put pressure on the market for the sale of export products, and in the long run, the negative effects of these sanctions and uncertainty. As a result, it spreads to various economic sectors.

If the sanctioned economy compensates for the decline in revenue (for example, oil revenues in Iran) by raising tax rates and reforming the subsidy system in the short term, such policies will severely undermine the distribution of income, especially in the short term [22].

Most studies in the field of determining the effects of shocks to foreign exchange earnings from oil exports and its derivatives (due to fluctuations and shocks in oil prices) on GDP as a macroeconomic indicator and economic growth in the form of a model Single equations are limited and the effects of these shocks on variables such as income distribution are less discussed. Among the first studies in this field, we can mention the studies. However, everyone agrees that the abundance of natural resources is usually one of the important factors in the low and volatile economic growth of rich countries with these resources and one of the reasons for the increase in income inequality in their distribution. Also, in oil-exporting countries, both positive and negative oil shocks initially increase income inequality [17].

The required information in this article has been collected from the World Bank and www.worldbank.org. Then, after reviewing the theoretical foundations, research background and trend trends of other variables and Gini coefficient in the group of selected countries, the structure of the model is introduced and estimated, and finally, policy conclusions and recommendations are presented.

2 Research background

2.1 Theoretical background

The founder of the study is the relationship between macroeconomic income distribution. In his pivotal study, he emphasizes the role of economic growth on changes in income distribution in society and points out that in the early stages of economic growth, income distribution becomes more unequal, while in the long run, the severity of inequality will decrease. This issue was later criticized or confirmed by other scholars, and with the expansion of the literature on the subject, the central role of the government in the distribution of income in society was emphasized. Rising oil revenues lead to higher levels of government spending. The government can influence the gap between revenue groups by changing the level of expenditures (current and construction expenditures) as well as the level of revenues (through taxes and transfer revenues) [2]. Also, The money supply is increasing due to the increase in the central bank's net foreign reserves. Increasing government money supply and spending will push the demand curve upward. Also, due to the strong dependence of domestic industries on imports of intermediate goods and raw materials, with the increase in foreign exchange earnings, the volume of domestic production increases and the supply curve is directed to the right. However, despite the limited capacity of domestic industries and the inefficiency of production technology, which prevents the rapid regulation of the supply sector with demand pressure, it has limited the transfer of the supply curve, which will provide conditions for price increases [8].

The view of classical economists' early studies on income distribution was exclusively focused on the stage of production and the factors involved in it and was limited to the question of how income was distributed among different segments of the population. Factors of production are discussed. According to them, any factor that leads to instability in production leads to changes in income levels and, in turn, leads to inequality developments by affecting demand. On the other hand, since Keynes views economics in terms of effective demand; Effective demand is the main factor in determining the volume of employment, production and income of the owners of the factors and in fact the main factor in determining how income is distributed among the factors of production; Therefore, unlike the classics and neo-classics, how economic units decide on production is not considered an effective factor in income distribution, but the demand of economic units for consumption, savings and investment is a factor determining the level of income and distribution [6].

In most countries with energy resources, due to the strengthening of the role and position of the government in the economy, along with the existence of institutions with weak legal infrastructure, corruption and rent-seeking opportunities to obtain income from these resources, income distribution in these countries towards unequal distribution [6]. If revenues are properly distributed and target lower-income groups, an increase in oil revenues can lead to a reduction in income inequality [31].

From a theoretical point of view, in the Iranian economy, the effect of wealth caused by the oil price shock on household consumption was greater than the effect of increasing living expenses, so after a positive (increasing) oil price shock, household consumption increased The economy is growing internally [4]. On the other hand, from a macro perspective, falling oil prices and revenues cause the government, due to the inflexibility of current expenditures (the major part of which is related to the salaries and wages of government employees), to divert part of the resources of construction credits to expenditure credits. This leads to the emergence of a multitude of semi-finished projects in the construction sector and causes stagnation and unemployment, especially in industries where the employment of unskilled workers is high; Therefore, in the end, instability from the economic sphere spreads to the social and political spheres [3].

- Studies focusing on the relationship between economic growth and income distribution

  There is a lot of literature on the relationship between economic growth and income distribution, which according to the assumptions of the subject in different economic systems, the findings in this field are different and sometimes contradictory; But with a general look at this classification, it can be seen that most studies emphasize the two-way relationship between these two variables. For example argue that greater class differences will lead to socio-political unrest; As a result, the performance of financial markets weakens and economic growth slows down. Van et al. [13] subsequently found plausible empirical evidence to support this view. On the other hand, Kaldor [20] showed that increasing income inequality leads to more savings and investment, and ultimately to higher economic growth.

  They are followed by Lundberg and Squire [25] and Frank [14] on the direct relationship between income inequality and economic growth; Also in line with Kuznets' [24] idea, studies by Galor and Tsiddon [15] and Hasani and Jalalabadi [18] confirm the direct link between economic growth and income inequality, provided that economic growth is formed as a result of the accumulation of physical capital. Be done. In the opposite direction, Bruno et al. [7] presented evidence that economic growth hurts income distribution. The results of Rougoor and Van Marrewijk [34] study, which was conducted among 17 different countries with different demographic characteristics, indicate that inequality has decreased with increasing economic growth resulting from improved natural resource export earnings; This view has been confirmed in the study of Molaei and Golkhandan [28].

- Studies focusing on the effect of impulses of macroeconomic variables on income distribution

  These studies study the importance of the effects of impulses on macroeconomic variables such as government spending [35], inflation [1], and Oil shocks [10] have confirmed the state of income distribution.

  All studies that focus on the effects of economic crises and shocks on income distribution fall methodologically into one of two categories; In group (1), models with a unique relationship are used to study the inequality of income distribution and the factors affecting it, and in group (2), studies on interaction and sometimes asymmetric effects using the system of equations are used. The family of GARCH patterns or vector autoregression (VAR) models is discussed.

- Studies in the field of oil revenue uncertainty or oil prices

  Trading in the oil market is based on the price expectations of the parties to the transaction from the future price trend of this product. Uncertainty in the global oil market, in addition to uncertainty in economic policy-making

and planning in oil-exporting countries, causes economic plans to deviate from the set targets, and the government accurately forecasts oil revenues with Problems arise and the budget is always faced with an imbalance. First Hamilton [16] and then researchers such as Mork [29], Pindyck [32], and Rotemberg and Woodford [33] on the relationship between oil price fluctuations and macroeconomic variables such as economic growth, index They studied the stock market, monetary variables, production, wages, employment, and so on. However, very few studies have focused on examining the effects of oil market uncertainty on income distribution, the results of which acknowledge the negative effect (worsening) of increasing oil uncertainty on revenue distribution [13].

One of the important channels of overflow of the effects of oil price shocks on the economic activities of oil exporting countries is the channel of creating uncertainty of these shocks in the economic environment so that oil price turmoil in international markets exposes the decisions of market players. [21] was among the first researchers to report this phenomenon.

Continuous fluctuations in oil prices will lead to changes in the level of oil revenues of the countries exporting this product and will cause uncertainty in the macroeconomic environment, which will reduce domestic and foreign investment and weaken production incentives in the sector. Brings with it different [36]. Examples of sharp oil price volatility include price changes in 2008 at 148 a barrel in July and 40 a barrel in December of that year. Increased risk in various markets and the impact of revenues and economic policies of oil-dependent countries are the consequences of these sharp price fluctuations.

3 Article method

3.0.1 Advantage of panel models

Using panel data (when the number of sections in the panel data exceeds the time series, the method used is called pooling data) has advantages that distinguish it from other methods. The following are some of the benefits:

Cross-sectional data and time series alone do not take into account individual inequalities, so they may generate biased estimates. While in the panel data, these inequalities can be considered by considering specific individual variables. Panel data has more information, more variability, less alignment, higher degree of freedom and higher efficiency than time series and cross-sectional data. Especially that one of the methods to reduce alignment is to combine cross-sectional and temporal data in the form of panels.

In calculating the variance of the population according to the time series observations, the variance obtained from the observations is divided by the number of data minus the number of parameters

$$\hat{\delta}_t^2 = \frac{\hat{u}'\hat{u}}{n-k}. \tag{3.1}$$

While in the panel data, equation (3.2) is obtained:

$$\hat{\delta}_t^2 = \frac{\hat{u}'\hat{u}}{nt-n-k}. \tag{3.2}$$

In this case, the denominator is usually larger and therefore the calculated variance is smaller than the variance obtained from the time series data and thus the estimation efficiency increases. For this reason, if the test (test of the significance of the whole regression) is compared in two cases, namely time series and panel, relations (3.3) and (3.4) are obtained:

$$F = \frac{(\bar{e}'\bar{e} - e'e)/(n-1)}{e'e/(n-k)} \tag{3.3}$$

$$F = \frac{(\bar{e}'\bar{e} - e'e)/(n-1)}{e'e/(nt-n-k)}. \tag{3.4}$$

The value in the panel model can be larger than the time series model, so the probability that the whole regression is significant, ie the existence of explanatory variables in the panel model will be higher. Studying observations in the form of data panels is in a better position to study and study the dynamics of changes than time series and cross-sectional data. Panel models can measure effects that are not easily detected by time series and cross-sectional data. These models also allow the study of the most complex behavioural models. For example, economic savings and better technical changes can be examined and tested by the data panel. Panel models also reduce bias by providing large amounts of data (several thousand) [5].

3.1 General model of panel data

In this section, with a general example, we explain the panel data, assuming that there is a separate decision unit that is numbered from index 1 to index, and there is a consecutive time period that is numbered from index 1 to index. So there is a total of observations. The variables are:

Y_{it} The value of the dependent variable for the i unit in the t period.

X_{jit} The value of the explanatory variable j for the i unit in the period t.

$$i = 1, \ldots, p, \quad t = 1, \ldots, m, \quad j = 1, \ldots, k.$$

The linear regression of this panel is:

$$Y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + ... + \beta_k X_{kit} + e_{it}. \tag{3.5}$$

In this general system regression, the parameters of all units at all times are expressed. One of the most common forms of data organization in (3.5) is based on decision units. Thus (3.5) is obtained:

$$Y = [Y_1 \ldots Y_p]^t, X = [X_1 \ldots X_p]^t, e = [e_1 \ldots e_p]^t. \tag{3.6}$$

So that Y has a rank of $1 \times n$, X has a rank of $k \times n$ and e has a rank of $1 \times n$. (3.5) may also be expressed as (3.7)

$$Y = [i \quad X].[\alpha \quad \beta]^t + e. \tag{3.7}$$

So that i is a $1 \times n$ vector of units, scalar and $\beta = [\beta_1, \beta 2, \ldots, \beta_k]^t$ The difference between sections (firms, countries, routes, provinces, etc.) α_i is shown and assumed to be constant over time. If it is assumed to be fixed α_i for all firms, the OLS method will provide efficient and consistent estimates. However, if it is assumed that there is a difference between the different sections, other methods should be used for estimation.

If the observations related to each section are in the same and fixed periods (ie the number of observations of each of them are equal) in this case the panel will be equilibrium. However, if the observations related to each section are different and in different periods, although the number of observations may be the same, but because they are in different periods, there is an unbalanced panel.

3.2 Fixed and random effects model

Estimating relationships that use panel data (cross-sectional-time series) is often complex. It is assumed that it e the disorder disorder has a mean of zero ($E[e_{it}] = 0$) and a constant variance ($E[e_{it}^2] = \sigma_e^2$). The β_{kit} unknown parameters are the model that measures the response of the dependent variable to the changes of the k independent variable in the i-th section at time t. In general, it is assumed that these coefficients are different among all different cross-sectional and temporal units, but in many research studies, the variability of these coefficients is limiting for both sections and all times, and the researcher must determine the nature of the subject and Other conditions determine the appropriate assumptions about the parameters.

The linear model of the panel can be divided into five modes:

All coefficients are constant and it is assumed that the perturbation sentence is able to receive and explain all the differences between cross-sectional units and time.

$$Y_{it} = \alpha + \Sigma_{j=1}^{J} \beta_j X_{jit} + e_{it} \tag{3.8}$$

The coefficients related to the variables (slopes) are constant and only the width of the origin is different for different cross-sectional units.

$$Y_{it} = \alpha_i + \Sigma_{j=1}^{J} \beta_j X_{jit} + e_{it} \tag{3.9}$$

The coefficients related to the variables (slopes) are constant and only the width of the origin changes at different times and units.

$$Y_{it} = \alpha_{it} + \Sigma_{j=1}^{J} \beta_j X_{jit} + e_{it} \tag{3.10}$$

All coefficients are different for all cross-sectional units.

$$Y_{it} = \alpha_i + \Sigma_{j=1}^{J} \beta_{ji} X_{jit} + e_{it} \tag{3.11}$$

The whole coefficient is different for both time and cross-sectional units.

$$Y_{it} = \alpha_{it} + \Sigma_{j=1}^{J} \beta_{jit} X_{jit} + e_{it} \tag{3.12}$$

These five cases can be expressed and examined in two general formats of fixed effects models and random effects. In general, the first type of models (fixed effects) assumes that the difference between the units can show the width of its origin. Therefore, each unit can have a width component of the origin that is estimated. But in the second type models (random effects), unlike the first type models, which assume that the difference between the units causes the transfer of the regression function and do not pay attention to the elements outside the model, the width component of the origin has a random distribution. Of course, the sample size must be large enough to make such an assumption. Therefore, the width component of the origin in this model has a fixed part and a random part, and the assumptions governing this random component are similar to the assumptions governing the disruption component, and these two create a new disruption component.

3.3 F test

What is generally suggested in panel models is that there are supposedly separate decision units numbered from 1 to n , and that there is a consecutive time period in which there is a total $N = nt$ observation. If the panel linear regression is in relation (3.13)

$$Y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + ... + \beta_k X_{kit} + e_{it} \tag{3.13}$$

the variables are:

Y_{it} : The value of the dependent variable for the i unit in the t period.

X_{jit} : The value of the explanatory variable j for the i unit in the period t.

$$i = 1, \ldots, n$$

$$t = 1, \ldots, t$$

$$j = 1, \ldots, k$$

In this general system regression, the parameters of all units at all times are expressed. The difference between sections (firms, countries, routes, provinces, etc.) is shown and assumed to be constant over time. If it is assumed to α_i be constant for all firms, the OLS method α ,β will lose efficient and consistent estimates. However, if it is assumed that there is a difference between the different sections, the Panel Data method is used for estimation.

The following statistics are used to determine the existence (or non-existence) of latitude from a separate origin for each country. Hypothesis zero states that it is α_i fixed for all firms and the OLS method can be used:

$$H_0 : \alpha_0 = \alpha_1 = \cdots = \alpha_n = \alpha$$

$$H_1 : \alpha_i \neq \alpha_j$$

$$F(n-1, nt-n-k) = \frac{(RSS_{UR} - RSS_R)/(n-1)}{(1 - RSS_{UR})/(nt-n-k)} \tag{3.14}$$

in the above relation, the UR indicates the non-bound model and the R symbol indicates the bound model with a fixed expression for all groups. The number of explanatory variables included in the model, n the number of countries, and $N = nt$ the total number of observations and (the desired time period). If it is calculated from the table with $(n-1)$ a $(nt-n-k)$ degree of freedom and greater then the hypothesis zero is rejected and therefore the bound regression is not valid and the width of different sources should be considered in the estimation.

3.4 Hausman test: choosing between fixed or random effects

If the hypothesis H_0 versus H_1 is rejected after performing the F test, the question now is what is the correct specification? And the model in the form of which of the models of fixed effects and randomeffects can be expressed and examined. To test whether the model is estimated using the fixed effects method or random effects, the Hausman test is used as follows:

$$H_0 \text{ :Random Effects}$$

$$H_1 \text{ :Fixed Effects}$$

$$H \equiv n\hat{q}(Avar(\hat{q}))^{-1}\hat{q} \tag{3.15}$$

where in:

$\hat{q}$: The difference between the estimated coefficients for the explanatory variables included in the fixed and random effects method $\hat{q} = \hat{\beta}_{FE} - \hat{\beta}_{RE}$

$Avar(\hat{q})$: Asymptotic variance $\hat{q}$

n : Number of observations.

Hypothesis 0 is that the estimates of the random effects model and the fixed effects are not fundamentally different from each other. If the null hypothesis is rejected, the random effects method is not suitable and it is better to use the fixed effects method. Hausmann statistic has a chi-square distribution with a degree of freedom equal to the number of coefficients estimated in the model. If the calculated statistic is greater than the chi-square distribution at a given probability level, then the null hypothesis is rejected.

4 Summary of modeling results

Now in the next step for modeling, using the study [21], and considering the various variables affecting income distribution to examine the impact of drug release on income distribution in the group of countries selected from the model (4.1) has been used.

$$GINI_{it} = \alpha_0 + \alpha_1 P_{it} + \alpha_2 GDP_{it} + \alpha_3 HI_{it} + \alpha_4 HE_{it} + \alpha_5 INF_{it} + \alpha_6 CO_{it} + U_{it} \tag{4.1}$$

U_{it} is an error. The Index of Justice in Health Participation, as an index of income inequality in the field of health, indicates that each household should contribute to the provision of health care in proportion to its financial capacity and income, and the closer this index is to number one, the more The financial resources of the health sector are fairer, and the greater the distance, the more unfair the financing of the health sector.

P_{it}: drug price liberalization in year t; when the system becomes subsidized and subsidized, it increases because of attractiveness, violations and rents, which is why the government is forced to increase oversight, and smuggling becomes more widespread in such a system, which is currently one-third of the cost of medicine in neighboring countries. The subsidy that is intended for the consumption of medicine for the Iranian people should go to Pakistan, Iraq, and so on. This causes a shortage of some drugs. The release of subsidies for the health sector in medicine is gradual. Where Pt is the rate of drug price liberalization as an independent variable. To measure this effect, we define "surplus price" as the proportional subsidy percentage measured by inflation, which is consistent with Decoralis et al. [11] whose data are extracted from WDI.

HI_{it}: The index of back-breaking expenses includes the total health expenses paid out of pocket equal to or more than 40% of the household payment capacity.. Based on this statistical index, it is possible to calculate the share or percentage of people who have been pushed below the poverty line due to the payment of devastating health expenses. Finally, by calculating these two, we can calculate the justice index in health financial participation.

HE_{it}: Per capita health expenditures in year t; Total per capita health expenditure, which is measured in terms of purchasing power parity at a fixed price in 2005, extracted from the WDI site.

GDP_{it}: Gross domestic product from the sale of oil and its derivatives in oil exporting countries in year t; GDP per capita oil, which is measured at current prices and extracted from the WDI site.

INF_{it}: : Inflation rate of constantly rising prices, in year t; Which is extracted from the World Bank data site.

$CO_{i,t}$: Corruption control index in year t is extracted from the World Bank website in the data section related to the good governance index. Because this variable is one of the sub-indices of good governance index.

In order to avoid false regression and to ensure the accuracy of the estimated coefficients of the model, it is necessary to test the significance of all variables used in the model. Evidence from the unit root test based on the generalized DickeyFuller (ADF) statistics in Table 1 indicates the significance of the variables.

In order to estimate Equation (4.1), the static panel method first needs to determine the type of estimation method for a specific type of integrated data. Therefore, to determine the presence (or absence) of latitude from a separate source, F statistic was used and Hussman test was used to reject hypothesis H_0. The results of F and Hausman tests show that in the group of selected countries, estimation by fixed effects method is more appropriate, based on this, estimates are made by fixed effects method.

As the results in Table 1 show, the null hypothesis that there is a single root is rejected. Also, the results of Table 2 indicate that there is a long-run relationship between the variables used in the model.

Table 1: Results of variability test of variables using generalized Dickey-Fuller test.

Maneuver status	**Probability level**	**Test statistics**	**Variables**
Mana	0.0000	-10.03444	CO
Mana	0.0000	-5.064304	INF
Mana	0.0000	-9.527277	LGDP
Mana	0.0000	-5.542981	HE
Mana	0.0001	-6.42924	HI
Mana	0.0026	-3.996281	P
Mana	0.0000	-11.301774	GINI

Table 2: Investigation of static and unstable variables in the group of selected countries.

HE	**INF**	**CO**	**HI**	**GDP**	**P**	**Type of regression**
0.7068	0.6657	-2.68484	-2.62832	0.1256	-1.48459	
(0.6899)	(0.4512)	(0.0036)	(0.0043)	(0.7433)	(0.0688)	
-1.73751	-6.26927			0.4312		Boys and Shin test at the level
(0.0411)	(0.0000)		(0.3345)			
				-3.42847		
				(0.0003)		Boys and Shin test in the first order difference
I_1	I_1	I_0	I_0	I_2	I_0	

Table 3: The results of the co-integration test in the group of selected countries.

Kao Residual Cointegration Test		
Series: ADF	t-Statistic	Prob.
	-1.30345	0.0962

5 Discussion and conclusion

The results of GLS estimation of Equation (4.1) in the group of selected countries in Table 4 in the period 2010-2019 show:

- Liberalization of drug prices has a negative and significant effect on the Gini coefficient as an indicator of income distribution in the group of selected OPEC member countries.
- GDP from oil or in the term oil revenue has a positive and significant effect on the Gini coefficient in the group of selected countries. In other words, increasing the share of exports of oil goods and services from GDP increases the Gini coefficient and worsens the income distribution in the group of selected countries.
- The index of back-breaking medical expenses has a positive and significant effect on the Gini coefficient in the group of selected countries. In other words, the increase in health expenditures will increase the Gini coefficient and worsen the income distribution in the group of selected OPEC member countries.
- Corruption control index has a negative and significant effect on the Gini coefficient in the group of selected OPEC member countries. In other words, increasing the corruption control index reduces the Gini coefficient and more equality in income distribution in the group of selected countries.
- Per capita health expenditure does not have a significant effect on the Gini coefficient in the group of selected countries.
- Inflation has a positive and significant effect on the income distribution index, that is, the higher the inflation rate, the more inequality society leads to and the higher the income distribution index.
- The value of the adjusted coefficient indicates that more than ninety-nine percent of the dependent variable changes in the group of selected countries are explained by the model independent variables.

In this article, based on theoretical foundations and empirical evidence, the effect of drug price liberalisation on the income distribution index as an indicator of income distribution in the group of selected countries was investigated. The general results of the hypothesis test in the group of selected countries using the fixed effects method in the period 2010-2019 show: According to the results of this article, the efforts and planning of governments to improve pricing indicators in the pharmaceutical system of countries can have a significant impact on reducing income inequality. The following suggestions are also made to improve income distribution:

Table 4: Model estimation results (dependent variable: Gini coefficient). (Note: * and ** are significant at the level of 1% and 10%, respectively.)

INF	HE^*	CO^*	HI^{**}	GDP	P^*	Variables
1.22735	-1.47134	0.359921	2.32165	0.008748	-0.13535	SPD
(4.52963)	(-1.25829)	(3.799759)	(1.85048)	(0.381261)	(-3.31554)	
	0.997164					R-squared
	1.579302					Durbin-Watson Statistics
	53.45536					F test
	(0.0000)					
	12.52708					Hausman test
	(0.0282)					

- Expand social support (unemployment insurance, equal employment opportunities for men and women)
- Provide the minimum medical and health needs of low-income groups, including access to public health, public education, and a minimum of acceptable shelter and food security.
- Development of entrepreneurship and empowerment of the poor and low-income groups
- Create equal social opportunities for training and skills and access to financial and physical capital through appropriate markets
- Creating new job opportunities, increasing employment and reducing unemployment.

References

[1] E. Abounoori and M. Shahrazi, *Estimation of absolute poverty line based on food poverty line using mathematical programming: A case study of urban areas in Mazandaran province*, Iran. J. Econ. Res. **22** (2017), no. 71, 65–80.

[2] N. Arzeroum Chiler, *Various dimensions of poverty in Iran*, Trend J. (Econ. Res. Trends) (2006), no. 27.

[3] H. Asghapour and A. Mehdiloo, *The impact of inflationary environment on exchange rate pass-through on import prices in Iran: Markov-Switching approach*, Quart. J. Econ. Res. Policies, **22** (2014), no. 70, 75–102.

[4] F. Bagheri and H. Kavand, *Measurement of poverty intensity in Iran: Applying sen-Horrocks-thon (SST) index*, Soc. Welfare Quart. **5** (2006), no. 20, 181–192.

[5] B.H. Baltagi, *Econometric Analysis of Panel Data*, Chichester: Wiley, 2008.

[6] F. Bazzazan, A. Ghasemi, H. Raghfar, and S. Hasanvand, *Investigating the effectiveness of government policies in reducing poverty in Iran*, Econ. Dev. Policy **3** (2015), no. 3.

[7] M. Bruno, M. Ravallion, and L. Squire, *Equity and Growth in Developing Countries: Old and New Perspectives on the Policy Issues*, World Bank Publications, 1996.

[8] V.A. Dang, M. Kim, and Y. Shin, *Asymmetric capital structure adjustments: New evidence from dynamic panel threshold models*, J. Empir. Finance, **19** (2012), no. 4, 465–482.

[9] G. Datt and M. Ravallion, *Growth and redistribution components of changes in poverty measures: A decomposition with applications to Brazil and India in the 1980s*, J. Dev. Econ. **38** (1992), no. 2, 275–295.

[10] C. de Miguel, B. Manzano, and J.M. Martín-Moreno, *Oil price shocks and aggregate fluctuations*, Energy J. **24** (2003), 47–62.

[11] F. Decarolis, M. Polyakova, and S.P. Ryan, *The Welfare Effects of Supply-Side Regulations in Medicare Part D*, National Bureau of Economic Research, 2015.

[12] N. Dehmordeh, M. Safdari and M. Shahiki Tash, *The effect of macroeconomic indices on income distribution in Iran*, Iran. J. Trade Stud. **14** (2010), no. 54, 25–55.

[13] J. Foster, *Notes and comments: A class of decomposable poverty measures*, Econometrica **52** (1984), no. 3.

[14] M.W. Frank, *Inequality and growth in the United States: Evidence from a new state-level panel of income inequality measures*, Econ. Inq. **47** (2009), no. 1, 55–68.

[15] O. Galor and D. Tsiddon, *The distribution of human capital and economic growth*, J. Econ. Growth **2** (1997), no. 1, 93–124.

[16] J.D. Hamilton, *Oil and the macroeconomy since World War II*, J. Politic. Econ. **91** (1983), no. 2, 228–248.

[17] B.E. Hansen, *Sample splitting and threshold estimation*, Econometrica **68** (2000), no. 3, 575–603.

[18] M.H. Hasani Sadrabadi and A. Jalalabadi, *The effect of labor market policies and determinants of economic growth on income inequality*, Econ. Res. J. (2008), no. 3.

[19] R. Hausmann and M. Gavin, *Securing stability and growth in a shock prone region: the policy challenges for Latin America*, R. Hausmann and H. Reisen (eds.), Securing stability and growth in Latin America, OECD, Paris, 1996.

[20] N. Kaldor, *A model of economic growth*, Econ. J. **67** (1957), no. 268, 591–624.

[21] M.H. Khan, *Governance, growth and poverty reduction*, Poor Poverty **61** (2009).

[22] A.A. Khosravinezhad, *Estimation of poverty indices in Iranian urban and rural households*, J. Econ. Model. **6** (2012), no. 2, 39–60.

[23] A. Koochakzadeh and S.A. Jalaei Esfandabadi, *Effect of exchange rate uncertainty on non-oil exports in Iran*, J. Agric. Econ. Res. **19** (2013), 121–135.

[24] S. Kuznets, *Economic growth and income inequality*, The gap between rich and poor, Routledge, 2019, 25–37.

[25] M. Lundberg and L. Squire, *The simultaneous evolution of growth and inequality*, Econ. J. **113** (2003), no. 487, 326–344.

[26] H.-G. Min, S.-O. Shin, and J.A. McDonald, *Income inequality and the real exchange rate: linkages and evidence*, Annal. Econ. Finance, **16** (2015), no. 1.

[27] A.K. Mohammadlou and H. Khodaveisi, *Investigating the relationship between exchange rate, inflation rate and interest rate under the approach of Fisher's theories in Iran's economy*, Appl. Econ. Stud. Iran **6** (2016), 199–221.

[28] M. Molaei and A. Golkhandan, *The effect of the government's external debt on Iran's economic growth*, Econ. Res. J. **14** (2014), no. 53.

[29] K.A. Mork, *Oil and the macroeconomy when prices go up and down: an extension of Hamilton's results*, J. Politic. Econ. **97** (1989), no. 3, 740–744.

[30] D.K. Mundaand W. Odhiamb, *Urban poverty and labour force participation in Kenya Institute for Public Policy Research Symposium*, Washington DC, 2003.

[31] T.H.H. Pham, *Income inequality and foreign aid*, Laboratoire d'Economie et de Management Nantes-Atlantique (LEMMA) Working Paper, 2015.

[32] R.S. Pindyck, *The present value model of rational commodity pricing*, Econ. J. **103** (1993), no. 418, 511–530.

[33] J.J. Rotemberg and M. Woodford, *Imperfect competition and the effects of energy price increases on economic activity*, National Bureau of Economic Research, Working Paper 5634, (1996).

[34] W. Rougoor and C. Van Marrewijk, *Demography, growth, and global income inequality*, World Dev. **74** (2015), 220–232.

[35] M.N. Sherafat Jahromi and Z. Negin Taji, *The impact of macroeconomic policies on income distribution in Iran*, J. Econ. Model. **1** (2010), no. 2.

[36] Z. Xiaobin, Z. Li, and S.T.O. Kelvin, *Income inequalities under economic restructuring in Hong Kong*, Asian Survey **44** (2004), no. 3, 442–473.