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Original Research Article

Analyzing the Causal Relationships between Economic Growth, Income Inequality, and Transmission Channels: New Empirical Evidences from Iran

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This paper investigates causal relations between economic growth, income inequality, and transmission channels from 1972 to 2016. These channels include saving rate, investment rate, redistribution policies, human capital, and conspicuous consumption. There is no strong evidence that supports uni-directional or bi-directional causality. Besides, some of the transmission channels lead to the improvement of economic growth and equality simultaneously. It is concluded that rapid economic growth and income inequality alleviation are not necessarily conflicting objectives. Hence, the strategy of "Redistribution with growth" is a more effective and perhaps politically more acceptable approach than "growth before redistribution" or "redistribution before growth" strategies.

Keywords: Economic Growth, Income Inequality, Transmission Channels, Causality.
JEL Classification: C32, D31, O15

1 Introduction

The relationship between economic growth and income distribution is a controversial subject. On the one hand, most of the growth models and consumption theories describe that income inequality leads to rapid economic growth. On the other hand, in the development economics literature, it generally emphasizes that inequalities tend to retard rapid growth.

Piketty (2014: 25-27, 166-168) argues that slow growth rates lead to increasing inequality, but Jackson and Victor (2015) indicate that inequality does not necessarily increase due to growth's slowdowns. Piketty's hypothesis confirms under certain conditions. Furthermore, Shin (2012) shows that higher inequality retards growth in the early stages of economic development

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while encouraging growth in a near steady-state. Unlike Piketty (2014), Shin (2012) indicates that both rapid economic growth and low-income inequality can be achieved simultaneously through income redistribution by the low-income tax.

Are rapid economic growth and income inequality alleviation conflicting objectives? If so, would it not be better to postpone the income redistribution policy until attaining high per capita income? Alternatively, would it be better that income redistribution be the first step since inequality alleviation is a precondition for achieving rapid economic growth?

The purpose of this paper is to answer the above questions. The relationship between growth and inequality is dynamic and needs examination over a relatively long period. Most of the past empirical studies focused on the "effect" of inequality on growth by cross-section or panel data sets with short periods, but this paper investigates the relationship between economic growth and income inequality using a statistical causality framework and a relatively long time series. The main transmission channels between economic growth and income inequality are identified based on theoretical literature. Then Causal relations between these channels and policy goals are investigated into more detail.

Iran's economy is an interesting case study. First, it seems that the Iranian government has pursued various strategies to achieve policy goals of rapid growth and low inequality over the past four decades. For instance, the economy has experienced an average economic growth of 10 percent and an average Gini coefficient of 0.45 before the 1979 revolution, and average economic growth of 5 percent, and an average Gini coefficient of 0.40 after the war ended in 1988. Second, income inequality has seen significant changes. Iran's economy had the highest inequality, with the Gini coefficient 0.50 in 1975. Subsequently, from 1969 to 1983, the Gini coefficient fluctuated from 0.39 to 0.50, then suddenly decreasing in 1983, to a range of 0.38-0.42 until recently (Fig. 1).

In summary, section 2 will look at a theoretical literature review on the relationship between economic growth and income distribution. Section 3 attempts to explain the inconsistency of empirical studies' results. Data and method are described in Section 4, while section 5 deals with the analysis of findings. Finally, the conclusion is p in Section 6.

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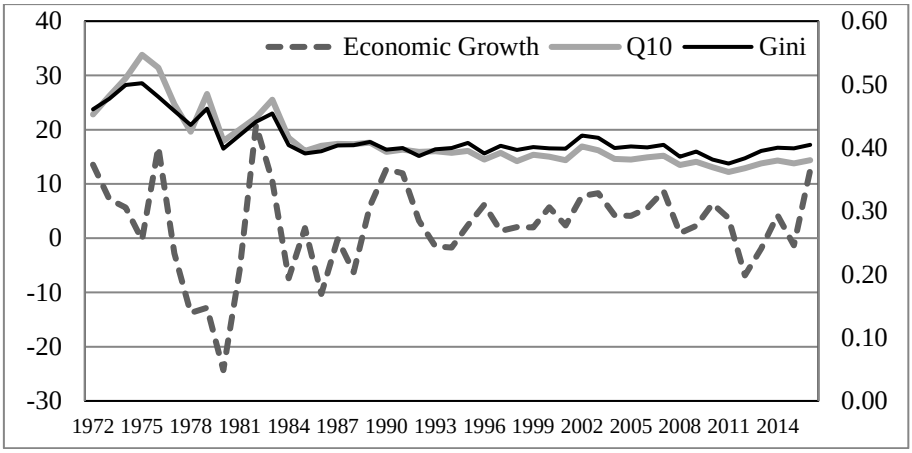

Figure 1. Economic Growth and Income Inequality during 1972-2016.

2 Theoretical Literature

In the economics literature, income distribution is important in two ways: 1) personal income distribution historically discussed by philosophers, sociologists, and economists; 2) functional income distribution considered after Adam Smith. This paper focuses on the unequal distribution of personal income influenced by the factor share distribution of income. The latter reviews the relationship between income inequality and economic growth, according to proponents and opponents' ideas. Proponents believe that income inequality can bring about rapid economic growth, while opponents describe the alleviation of income inequality as a precondition for achieving rapid economic growth.

2.1 Proponents' View: Priority on Rapid Growth

Most theories proposed and developed in the 1950s to 1970s support the priority of economic growth. Growth models and consumption theories indicate that greater income inequality is associated with higher savings, and hence economic growth increases. According to this approach, saving rates are an increasing function of inequality; therefore, resources towards individuals whose marginal propensity to save is higher, increasing aggregate savings and capital accumulation and enhancing the process of development (Lewis, 1954; Kuznets, 1955; Ram, 1988; Barro, 2000).

The role of factor share in saving and growth rates is central to the post- or neo-Keynesian growth models. Lewis (1954) divided the economy into two

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traditional (rural and agricultural) and modern (urban and industrial) sectors. He argues that most saving comes from entrepreneurial profits in the modern sector, in which saving consists of a high fraction of their incomes, while the traditional sector saves less. According to Lewis' framework, in the early stages of development, the comparison of the immigrant labour force from both the traditional sector with lower wages and lower inequality to the modern sector with higher wages shows that inequality and per capita income will rise.

In this regard, Kuznets (1955) demonstrates that the income inequality will tend to worsen in the early stages of development, but will improve with a rise in middle-class income and modernization of the whole economy at later stages. Ram (1988b), Barro (2000), Heshmati (2006), and Lessmann (2014) confirm this hump-shaped causal relation known as Kuznets' inverted U-curve. In addition, Chan et al. (2014) and Li et al. (2015) find a positive relationship between inequality and growth in China. Since China's economy is still in the early development stage, these results can be interpreted as being consistent with the Kuznets' inverted U-curve at the low-income region of the inverted U-curve.

Kaldor (1956, 1957) assume that workers and capitalists have different saving behavior. Workers spend what they earn, and hence their propensity to save is minimal (almost zero). As a result, capitalists' saving rate and profits determine aggregate savings. It means that the factor share distribution (profit vs. wage) will precisely specify personal income distribution (capitalist class vs. worker class).

Unlike Kaldor (1956, 1957), Pasinetti (1962) states that workers' saving rate is not zero because they own shares on the capital stock and receive profits. As a result, the income distribution among workers and capitalists is not similar to distribution based on wage and profit. Thus, Pasinetti (1962) considers saving rate based on capitalist and worker classes and assumes that workers saving rate is lower than the capitalists' are.

If there is a strong relationship between saving and investment, according to Kaldor (1956, 1957) and Pasinetti's (1962) models, the greater inequality leads to higher total saving rate, and subsequently, economic growth increases. Smith (2001) demonstrated that inequality has a positive impact on saving rates in developed and developing countries. A strong and positive relationship is not, however, confirmed for underdeveloped countries, which Smith (2001) believes may be due to data measurement error in underdeveloped countries. Chakrabarti (2006) confirms a positive and strong

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relationship between saving and investment for 126 countries from 1960 to 2000.

Molero-Simarro (2015) shows that Chinese growth has been profit-driven. It shows that the higher propensity to save out of profits than out of wages, as well as the response of investment to a change in profit share, is stronger than that of savings. It hence shows that economic growth is positively associated with income inequality. Furthermore, Wolff (2015) shows a shift in national income away from labor and towards capital occurring, particularly since the late 1970s in the United States. However, Wolff (2014) does not indicate that rising capital income shares are associated with increasing inequality of personal income.

As illustrated above, the neo-Keynesian growth models emphasize the role of wage and profit shares on economic growth. In contrast, in the neoclassical growth models, workers and capitalists do not necessarily differ in their saving patterns. In these models, the income distribution can influence economic growth through aggregate saving rate, the accumulation of human capital, etc. (Hebbel and Serven, 2000; Neves and Silva, 2014). For instance, in Solow's basic growth model (1956) and endogenous growth models (Barro, 1990, 1991), a higher saving rate increases short and long-term economic growth rates. Forbes (2000) and Li and Zou (1998) empirically confirm this result.

According to the consumption theories, inequality of personal income distribution has a positive effect on personal savings leading to higher economic growth. Keynes (1936) considered consumption as a function of income and concluded that the rich save relatively more than the poor. Therefore, the aggregate saving rate tends to rise with inequality, which increases economic growth[1].

Duesenberry (1949) believes that the saving rate of underdeveloped countries is low because increased income is allocated mainly to consumption[2]. In these countries, saving is generally assumed as a luxury, and saving will be zero until the consumption exceeds the subsistence level. An increase in income inequality leads to a greater gap between the poor's

[1] However, since recession is a fundamental assumption of Keynes' theory, this conclusion is not correct. On the one hand, households demand reduces with rising saving; and on the other hand, saving is not invested due to investors pessimistic. Hence, effective demand is declined, and the recession will be deeper. This is what Keynes called paradox of thrift. For this reason, Keynes (1936) suggested that the government must implement an expansionary fiscal policy.

[2] While consumption is lower than subsistence consumption, the intertemporal elasticity of substitution is zero, and hence saving is zero. This preference can be represented by Stone-Geary utility function (Triantis, 1999).

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consumption and subsistence consumption, and in return, the rich's saving increases. Smith (2001) states that, in underdeveloped countries, the elasticity of saving with respect to the interest rate is very low and about zero. Hence, greater inequality has considerable effect on the saving rate.

According to the life cycle hypothesis, presented by Modigliani and Brumberg, in the early 1950s, wealthy families had naturally higher saving rates. Lower-income classes, on the other hand, due to borrowing constraints, used their assets to buffer against income shocks, and so they had a lower saving rate (Schmidt-Hebbel and Servén, 2000). However, Paxson (1996) and Hussein and Thirlwall (1999) describe that, by eliminating simple assumptions of the life cycle hypothesis and considering uncertainties of the life cycle, the saving rates of the poor may not necessarily be lower than those of the rich.

Finally, the proponents focus on the negative effects of income redistribution policies. Anti-motive, market distortions, rent-seeking, and corruption are adverse effects of taxation and transfer payment programs (Ram, 1986; Gwartney et al., 1998; Mitchell, 2005). Wealth redistribution policies, such as land reform programs, are essential for many developing countries. Policymakers should implement these policies only if there are economic-social conditions conducive to their success. Otherwise, they may be detrimental to lower-income classes and may even be counterproductive (Deininger and Squire, 1997; Yao, 1999; Todaro and Smith, 2011).

Progressive tax may decrease investment and employment (World Bank, 2006). Schmidt-Hebbel and Servén (2000) show that increased taxation on firms limits companies' access to financial resources. The authors indicate that households and firms' decisions are made separately. Where overlap occurs, there will be an investment decrease as household savings will not be compensated by firms' savings. On the other hand, Shin (2012) shows that income redistribution by high-income tax does not always decline inequality of income, especially in the early stage of economic development. But a low-income tax can help achieve both the rapid economic growth and the lower inequality in developing economies.

2.2 Opponents' View: Priority on Inequality Reduction

Rising income and wealth inequalities positively affect poverty, leading to the neutralization of any positive effects (Deininger and Squire, 1997, 2000; Yao, 1999; Iniguez-Montiel, 2015; Luo and Xie, 2020; Islam and McGillivray, 2020). For instance, Fosu (2009) shows that the impact of economic growth

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on poverty reduction is a decreasing function of initial income inequality[1]. In addition, Willis (2015) indicates a direct relationship between worker share and personal distributions of wealth and income. Therefore, a strategy of compulsory saving will be highly effective for the reduction of poverty. According to opponents' views, income inequality tends to retard rapid economic growth through the lower level of human capital accumulation, conspicuous or luxury consumption, and socio-political unrest and instability.

First, there is a complementary relationship between physical capital, as the main determinant of economic growth in the proponents' views, and human capital. Lower human capital accumulation decreases economic growth directly and indirectly, so it is necessary to invest in human capital. However, capital markets are generally imperfect in developing countries, and lower-income classes cannot finance the cost of education due to borrowing constraints. These classes are unable to break the cycle of low income-low education, and the economy remains at a low equilibrium trap unless the government provides high quality free basic education (Griffin, 1999; Galor and Moav, 2004; Arabsheibani et al., 2005; Qin et al., 2009; Todaro and Smith, 2011; Madsen et al., 2018).

Education and health are forms of human capital that determine productivity level as well as economic growth. Workers will have relatively low productivity because they benefit less from health and education. In turn, poverty in the lower-income class is generally due in part to low productivity. Therefore, government policies for inequality reduction can aim at the reduction of vicious poverty cycles faced by poor families. For instance, an initial improvement in worker productivity resulting from investments in education raises the return on a lifesaving investment in health. In turn, better health for the poor improves nutrition and the ability of children to learn. Finally, improved health and education help the poor escape the vicious circles of poverty they are trapped (Mo, 2000; Smith, 2001; Shupp, 2002; Todaro and Smith, 2011; Luo and Xie, 2020; Breunig and Majeed, 2020).

Besides, there are linkages between income inequality, fertility, and human capital. Lower-income classes will tend to substitute high quality and high-cost educated children with high-income-earning potential for uneducated children, and hence the investment in human capital decreases (Becker et al.,

[1] Contreras (2003) shows that economy can experience a continuous decrease in poverty, while inequality remains stable. He concludes that the high inequality is not necessarily associated with a lower welfare.

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1990; Wang et al., 1994; Brander and Dowrick, 1994; Glaeser et al., 1999; Todaro and Smith, 2011).

Of course, there are several contrary opinions to this debate. Galor and Moav (2004) argue that, in the early development stages, physical capital is scarce, the saving-investment is the main engine of growth, and so a positive effect of inequality on growth is relevant. But in later stages of development, this relationship breaks down due to capital-skills complementarities. Hence Galor and Moav (2004) confirm Kuznets' hypothesis with the assumption of human-physical capital complementarities. Sylwester (2000) states that public education expenditures benefit future growth through human capital accumulation, while its current impact on economic growth is negative because financing expenditures may associate with more inefficient and distortions. In addition, the children of lower classes are reluctant to education because of the high opportunity costs. Then the economic growth may decrease, and income inequalities increase.

Second, in developing countries, high economic inequalities generally lead to the increasing demand for non-tradable goods, especially land and real estate, because of the underdeveloped nature of financial markets and conspicuous consumption. The price of non-tradable goods is determined solely by domestic supply and demand (no global price and import), and the supply of non-tradable goods is inelastic. As a result, the relative price of non-tradable goods is rising. Thus, this higher profit provides an impetus to govern a larger portion of resources. Social resources are inefficiently allocated to unproductive sectors compared with the productive sector (Lecaillon et al., 1984).

The problem above is evident, especially in the oil-net-exporting countries, as high inequality-low income is considered a natural resource curse. In these countries, there are weak linkages between the natural resource and other sectors of the economy. In addition, natural resource abundance may usually undermine the quality of institutions and hence few incentives for the development of capital. Thus, lack of economic diversification into competitive manufacturing industries is likely associating with a staple trap path with growing income inequality (Gylfason, 2001; Ploeg, 2008; Islam and McGillivray, 2020).

Finally, as Bourguignon and Verdier (2000) describe, higher income inequality decreases political participation, reducing economic growth. Rising inequality results in socio-political unrest and instability, and as a result, reduce the legal security of private property rights, increases uncertainty in productive investment, thereby decreasing the productivity of labor and

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capital (Mo, 2000; Schmidt-Hebbel and Servén, 2000; Odedokun and Round, 2004; Qin et al., 2009; Neves and Silva, 2014). In addition, the socio-political unrest can pressure the government into pursuing redistribution policies that are associated with market distortions.

However, Odedokun and Round (2004) show that the pressures can be effective, if the political system is democratic[1]. In totalitarian regimes, people's desire will lead to income redistribution only in exceptional cases. For example, in developing countries with abundant natural resources, there is no democratic government based on the majority decision. Hence, the governments feel no commitment to implement redistribution policies; instead, they intend to follow populist policies that make all groups worse off in the long run (Acemoglu et al., 2013; Matsen et al., 2015). These countries can finance infrastructure and free health and education by exporting natural resource income. But Leite and Weidmann (1999) and Mehlum et al. (2006) indicate that the positive impact of natural resources requires a high institutional quality; otherwise, more opportunities for rent-seeking and corruption result in higher income inequality and the lower economic growth.

3 Inconsistency of Empirical Studies

Empirical findings on the relationship between income inequality and economic growth are conflicting. Li and Zou (1998), Forbes (2000), Chan et al. (2014), Molero-Simarro (2015), Li et al. (2015), and Wu and Li (2017) confirm the positive impact of income inequality on economic growth; while Mo (2000), Panizza (2002), Odedokun and Round (2004), Lee (2008), Qin et al. (2009), Herzer and Vollmer (2011), Madsen et al. (2018), Aiyar and Ebeke (2020), Islam and McGillivray (2020), Luo and Xie (2020), and Breunig and Majeed (2020) confirm the negative impact.

On the other hand, Ram (1988a), Barro (2000), and Lessmann (2014) find an inverted U curve. In contrast, Bagchi and Svejnar (2015), Davis and Hopkins (2011), Knowles (2005), and Lopez (2004) conclude that there is no relationship between income inequality and economic growth. Furthermore, Herzer and Vollmer (2011) indicate that the negative relationship is confirmed in poor and rich countries, and also in the democratic and non-democratic countries, while Barro (2000) shows a negative impact on underdeveloped countries and a positive effect on rich ones.

[1] If the average income is more median income, many voters will vote to those who support income redistribution policies, and therefore ruling party will implement income redistribution policies to win elections.

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Conflicting findings can be mainly attributed to different control variables, different periods, and inconsistently measured data. As Aiyar and Ebeke (2020) mentioned, the negative impact of income inequality on growth is higher in the lower level of intergenerational mobility. Therefore, omitting intergenerational mobility leads to misspecification that it is explained why the empirical literature on income inequality and growth has been so inconclusive. Madsen et al. (2018) indicate that inequality negatively affects economic growth at a relatively low level of financial development but has little effect on growth at a high level of financial development.

Knowles (2005) believes that the effects of income inequality on economic growth are positive in the short run and harmful in the long. So the time period can have an impact on the estimated relationship. In addition, Panizza (2002) and Leigh and Posso (2009) conclude that time, functional forms, and inconsistently measured inequality data have considerable effects on the relationship between inequality and saving.

Since empirical studies often used cross-section or panel data, inconsistently measured data is another reason for the conflicting findings[1]. Inconsistency of data is attributed to the dataset used for income. The proxy of income can be different in three aspects: 1) income or expenditure, 2) individual or household, and 3) gross or net (before or after-tax). Income inequality can differ from expenditure inequality (see, for example, Krueger and Perri, 2006; Jappelli and Pistaferri, 2010; Lise et al., 2014). The family size of the upper classes is smaller than the lower classes, so that individual inequality will be different from household inequality. Moreover, gross income shows more inequality than net or disposable income (Smith, 2001; Bourne, 2009). In developing countries, Gini coefficient is generally calculated based on household expenditure because the data of expenditure and household is readily available.

Using consistent data on income inequality, Knowles (2005) indicates that the impact of inequality on economic growth is not significant. Also, Leigh and Posso (2009) conclude that income inequality does not affect saving. Furthermore, Schmidt-Hebbel and Servén (2000) state that the dubious nature of inequality indices and saving criteria result in conflicting results. Because

[1] As Fields (2007) argues, inequality has not clear meaning, and building indices and their analysis, much caution should be exercised. Lorenz (1905) provides first discussion on inequality measurement known as Lorenz curve. Then Gini presented coefficient in 1912 based on of Lorenz curve. It is given as follows $Gini = 1/(2n^2\bar{I})\sum_{k=1}^{n}\sum_{h=1}^{n}|I_k - I_h|$, where n denotes households, $\bar{I}$ is sample average of income, and I_k and I_h denote income of k-th and h-th households, respectively (Lee, 2008).

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the investment in human capital (health and education expenditure) is considered as consumption expenditures based on the System of National Accounts (SNA), so saving rate of poor individuals is underestimated, and the Gini coefficient is overestimated. It can explain why some studies found a positive relationship between income inequality and saving rate (Smith, 2001).

4 Data and Method

4.1 Data

As explained in section 2, a set of factors play a role in the relationship between economic growth and income inequality, known as transmission channels. These channels are summarised in Fig. 2. Some of the channels are measured easily, but others do not have the appropriate criteria. Thus, I use several alternative indices to obtain more reliable results.

Gini coefficient and the ratio of living cost of the richest 10 percent to the poorest 10 percent are used as indices of income inequality. They are calculated based on the cost of urban living, and so measured data is consistent. The economic growth rate can be calculated based on GDP and NI. The calculated rates are significantly different in some years, so every three measures are employed to examine the relationship between inequality and economic growth[1].

Private fixed investment is divided into capital equipment investment (PIE) and investment in construction (PIC). As illustrated in Section 2.2., the latter index as a non-tradable sector is critical in oil-exporting countries due to Dutch disease. Its impact on income inequality may be different from the impact of investment in capital equipment. Based on available data, two criteria are defined for income redistribution policies (PSS and SEC). One is the ratio of public social spending (such as education, health, social welfare, and housing), and other subsidies of essential commodities to GDP.

Albeit most of the households in the middle-income and the lower-income classes owning some automobile, empirical studies show that the income elasticity of automobile demand is larger than one. Hence, the automobile is a luxury good[2] (GAD). Besides, imported automobiles' value (GAM) works

[1] Economic growth based on market prices is very similar economic growth based on factor prices, and have no effect on the results.

[2] Buyers of automobile are three groups: households, firms, and government. According to available data, share of households demand is approximately 90 percent.

well as a measure for conspicuous consumption due to high tariffs for imported automobiles compared to other imported goods, and also propensity to import modern automobile rather than cars produced in Iran (Seyed Nourani and Javadi, 2005).

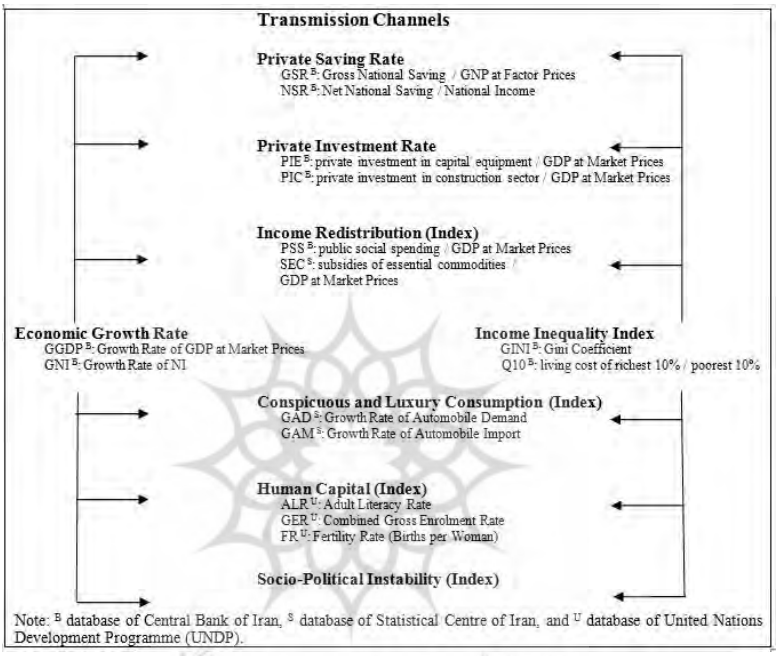

Figure 2. Relationship between Economic Growth and Income Inequality.

Human capital usually measures by adult literacy rate (ALR) and combined gross enrollment rate (GER). The adult literacy rate is defined as the number of literate adults, aged 15 and above as a percentage of the adult population. It is used in calculating the human capital stock of the working-age population (Azariadis and Drazen, 1990; Romer, 1990). The gross enrollment rate is defined as the number of students enrolled as a percentage of the total population of the corresponding age group. It is used for calculating the changes in the human capital stock (Barro, 1991; Mankiw et al., 1992; Levine and Renelt, 1992).

Finally, annual data for political instability does not exist, except after 2000, and even if it existed, presumably causality test would have been faulty

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because of the nature of qualitative and classified data. Therefore, this transmission channel is not investigated.

4.2 Causality Test

Correlation coefficients are not necessarily indicative of causality between variables. Two variables can be strongly correlated, but there would be no statistical causality between them and vice versa. For the first time, Granger (1969) suggests a method to examine statistical causality. In the Granger approach, variable y_2 will be the cause of variable y_1 If future values of y_1 can be predicted better (with a smaller forecast error variance) by employing current and past values of y_2; and vice versa. According to this definition, a vector autoregressive (VAR) model is represented as:

$$\begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} \Phi_{01} \\ \Phi_{02} \end{bmatrix} + \begin{bmatrix} \Phi_{11}^{1} & \Phi_{12}^{1} \\ \Phi_{21}^{1} & \Phi_{22}^{1} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \cdots + \begin{bmatrix} \Phi_{11}^{k} & \Phi_{12}^{k} \\ \Phi_{21}^{k} & \Phi_{22}^{k} \end{bmatrix} \begin{bmatrix} y_{1,t-k} \\ y_{2,t-k} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix}. \quad (1)$$

The null hypothesis of non-causality is defined as $H_0^{y_2 \nrightarrow y_1}: \Phi_{12}^{1} = \cdots = \Phi_{12}^{k} = 0$ can be tested by Wald statistic. Indeed, it is examined whether the lagged values of y_2 in the regression of y_1 significantly reduce the error variance. As the same way, $H_0^{y_1 \nrightarrow y_2}: \Phi_{21}^{1} = \cdots = \Phi_{21}^{k} = 0$ can be tested whether a causal relation from y_1 to y_2 exists.

However, Toda and Phillips (1993a) argue that the Wald test is not reliable for variables with an order of integration equal to one. Furthermore, for the Johnson-type ECM model as an alternative approach, Rahbek and Mosconi (1999), Toda (1995), Toda and Phillips (1993b), and Reimers (1992) indicate that if variables are not integrated in order, the robustness of the hypothesis tests significantly decrease. For this reason, Toda and Yamamoto (1995) suggest an alternative method to test the non-stationary VAR model. The Toda-Yamamoto method enjoys two general advantages. First, it is applicable regardless of the integration order of variables; second, there is no need to know whether cointegration exists or not.

According to Toda and Yamamoto approach, the degree of integration y_1 and y_2 is determined. Then d_{max} is defined as the maximal order of integration that might occur in the process. Under the assumption $k \geq d_{max}$, the $(k + d_{max})$th-order VAR model can be estimated as

$$\begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} \Phi_{01} \\ \Phi_{02} \end{bmatrix} + \begin{bmatrix} \Phi_{11}^{1} & \Phi_{12}^{1} \\ \Phi_{21}^{1} & \Phi_{22}^{1} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \cdots + \begin{bmatrix} \Phi_{11}^{k} & \Phi_{12}^{k} \\ \Phi_{21}^{k} & \Phi_{22}^{k} \end{bmatrix} \begin{bmatrix} y_{1,t-k} \\ y_{2,t-k} \end{bmatrix}$$
$$\ldots + \begin{bmatrix} \Phi_{11}^{k+d_{max}} & \Phi_{12}^{k+d_{max}} \\ \Phi_{21}^{k+d_{max}} & \Phi_{22}^{k+d_{max}} \end{bmatrix} \begin{bmatrix} y_{1,t-(k+d_{max})} \\ y_{2,t-(k+d_{max})} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \qquad (2)$$

Like what has been mentioned before, null hypotheses of non-causality are defined as $H_0^{y_2 \nrightarrow y_1}: \Phi_{12}^1 = \cdots = \Phi_{12}^k = 0$ and $H_0^{y_1 \nrightarrow y_2}: \Phi_{21}^1 = \cdots = \Phi_{21}^k = 0$. The significance of optimum lags coefficients is tested by Wald statistic that has an asymptotic chi-square distribution with k degree of freedom. If the estimated statistic is larger than the critical value, the null hypothesis is rejected, and hence it is concluded that there is a Granger causality from one variable to another variable. However, over-fit VAR decreases the robustness of the Wald statistic. Still, Toda and Yamamoto (1995) describe that whenever the number of variables is few and lag length is large, the inefficiency induced by additional lags would be small.

5 Empirical Finding

The correlations between transmission channels, income inequality, and economic growth are shown in Table 1. Income inequality is positively correlated with saving rates and fertility rate; and is also negatively correlated with subsidies of essential commodities, adult literacy rates, and combined gross enrolment. In addition, economic growth is positively correlated with saving rates; and is also negatively correlated with investment in the construction sector. Also, the result shows that there is a significant and positive correlation between income inequality and economic growth (0.26-0.37). However, the correlation coefficients of other relationships are not significant.

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Table 1
Results of pairwise correlation for the period 1972-2016.

	GGDP	**GNI**	**GINI**	**Q10**
GSR	-0.01	0.30	0.77	0.72
	(-0.06)	(2.07)	(7.85)	(6.74)
	[0.96]	[0.04] **	[0.00] ***	[0.00] ***
NSR	0.02	0.33	0.76	0.70
	(0.10)	(2.26)	(7.50)	(6.32)
	[0.92]	[0.03] **	[0.00] ***	[0.00] ***
PIE	0.31	0.14	0.02	0.03
	(2.16)	(0.94)	(0.11)	(0.21)
	[0.04] **	[0.35]	[0.91]	[0.83]
PIC	-0.50	-0.44	0.04	0.21
	(-3.78)	(-3.18)	(0.26)	(1.40)
	[0.00] ***	[0.00] ***	[0.79]	[0.17]
PSS	0.07	0.21	0.06	-0.03
	(0.45)	(1.38)	(0.42)	(-0.20)
	[0.65]	[0.18]	[0.68]	[0.84]
SEC	0.02	0.20	-0.31	-0.50
	(0.13)	(1.13)	(-1.84)	(-3.25)
	[0.90]	[0.27]	[0.08] *	[0.00] ***
GAD	0.26	0.15	0.03	0.02
	(1.77)	(1.02)	(0.21)	(0.12)
	[0.08] *	[0.31]	[0.84]	[0.91]
GAM	-0.03	0.02	-0.08	-0.02
	(-0.17)	(0.16)	(-0.50)	(-0.14)
	[0.87]	[0.88]	[0.62]	[0.89]
ALR	0.13	-0.06	-0.78	-0.85
	(0.84)	(-0.40)	(-7.87)	(-10.12)
	[0.41]	[0.69]	[0.00] ***	[0.00] ***
GER	0.06	-0.09	-0.64	-0.74
	(0.39)	(-0.61)	(-5.40)	(-7.11)
	[0.70]	[0.54]	[0.00] ***	[0.00] ***
FR	-0.19	-0.02	0.62	0.74
	(-1.28)	(-0.12)	(5.20)	(7.30)
	[0.21]	[0.91]	[0.00] ***	[0.00] ***
GINI	0.17	0.36		
	(1.10)	(2.51)		
	[0.28]	[0.02] **		
Q10	0.08	0.26		
	(0.51)	(1.79)		
	[0.61]	[0.08] *		

Notes: t-student and p-value are in parenthesis and in brackets, respectively. ***, **, and * represent the statistical significance level of 1%, 5%, and 10%, respectively.

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However, as mentioned before, the variables may be strongly correlated with each other, but there are no statistical causal relations. Therefore, causality between identified transmission channels and main variables, income inequality, or economic growth is separately investigated by the Toda-Yamamoto method.

For each pair indices (Fig. 2), that includes one of the main variables and one of the transmission channels, optimum lag (k) and the maximal order of integration (d_{max}) are determined. Then $(k + d_{max})$th-order VAR model is estimated using ordinary least squares (OLS) and seemingly unrelated regressions (SUR) methods. Summary of the main results of each VAR model is shown by blocks [.]R-[.]C in Tables 2 and 3. The left side of each block represents causality from the row variable to the column variable, and the right side represents reverse causality. Generally, the SUR results are more robust than the OLS.

Saving-investment channel: as illustrated in Section 2, according to growth models of neo-Keynesian and neo-classical and consumption theories, the greater inequality leads to a higher total saving rate. If there is a strong relationship between saving and investment, it is expected that economic growth will increases. The results indicate that there is a one-sided positive causality from income inequality to saving rates (blocks [1-2]R-[4-5]C). A negative causality from private investment in capital equipment to income inequality is confirmed so that a higher rate of investment in capital equipment leads to lower income inequality (blocks [3]R-[4-5]C).

On the other hand, there is a positive causality from economic growth to private investment in capital equipment (blocks [3]R-[1-3]C), and also a negative causality from private investment in the construction sector to economic growth (blocks [4]R-[1-3]C). The results may be related to Iran's economic dependence on oil export and the non-tradable sector due to Dutch disease. In sum, it's concluded that the transmission channel of investment in capital equipment can facilitate the causal relationship between income inequality and economic growth.

Income redistribution channel: contradictory effects of income redistribution policies are explained in Section 2. According to proponents' view, redistribution policies hurt inequality since taxation and transfer payment programs are often associating with anti-motive effects, market distortions, rent-seeking, and corruption. Hence these policies may be detrimental to lower-income classes and may even be counterproductive. But opponents' views emphasize that inequality tends to retard rapid economic

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growth through rising poverty. They claim that the redistribution policies can aim the poor escape the vicious circles of poverty in which they are trapped.

Along with the proponents' view, the results indicate a one-sided positive causality from the redistribution index to income inequality. However, this causal relation is attributed to public social spendings such as education, health, social welfare, and housing (blocks [5]R-[4-5]C), and there is no relationship between subsidies of essential commodities and income inequality (blocks [6]R-[4-5]C). Moreover, the results confirm a one-sided positive causality from income redistribution policies to economic growth (blocks [5-6]R-[1-3]C). In sum, it is concluded that redistribution policies can play a role in the relationship between inequality and growth.

Fertility rate channel: as described in Section 2, there are linkages between income inequality, fertility, and economic growth. Income inequality can lead to substitute high quality and high-cost educated children for uneducated children, and so the investment in human capital decreases in lower-income classes. The lower level of human capital accumulation decreases economic growth directly and indirectly. Therefore, the reduction of fertility rates helps the poor escape the vicious circles of poverty. As a result, the economy experiences higher economic growth and lower-income inequality in the future.

The findings show that there is a mutually causal relationship between income inequality and fertility rate (blocks [11]R-[4-5]C). Moreover, the results confirmed a one-sided negative causality from the fertility rate to economic growth (blocks [11]R-[1-3]C). An increase in fertility rate brings about lower economic growth. These results are shown that the fertility rate can simultaneously influence the objectives of economic growth and income inequality.

Other transmission channels: one-sided or mutual causal relations are not rejected for the other transmission channels. There is no causality between income inequality and human capital indices, adult literacy rate, and combined gross enrolment rate (blocks [9-10]R-[4-5]C). This result may be explained as follows. In addition, the results indicate that there is no causal relationship between income inequality and luxury consumption indices (blocks [7-8]R-[4-5]C); but a one-sided causality relationship from economic growth to luxury consumption indices is confirmed (blocks [7-8]R-[1-3]C).

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Table 2
Results of Causality Tests (OLS) for the Period 1972-2016.

Block→C ↓R	**[1] GGDP**		**[3] GNI**		**[4] GINI**		**[5] Q10**	
[1]	{1+1}		{1+1}		{1+1}		{1+1}	
GSR	1.68	0.38	1.05	0.26	0.33	2.51	0.23	3.31
	(0.19)	(0.54)	(0.31)	(0.61)	(0.56)	(0.11)	(0.63)	(0.07)*
	[-0.25]	[0.09]	[-0.66]	[0.05]	[0.00]	[99.95]	[0.03]	[0.70]
[2]	{1+1}		{1+1}		{1+1}		{1+1}	
NSR	1.83	0.76	2.16	0.46	0.10	2.19	0.08	2.72
	(0.18)	(0.38)	(0.14)	(0.50)	(0.76)	(0.14)	(0.78)	(0.10)
	[-0.17]	[0.20]	[-0.63]	[0.10]	[0.00]	[136.8]	[0.01]	[0.93]
[3]	{1+0}		{1+0}		{1+0}		{1+0}	
PIE	0.16	9.37	0.79	5.35	1.94	1.58	2.89	0.72
	(0.68)	(0.0)***	(0.38)	(0.02)**	(0.16)	(0.21)	(0.09)*	(0.40)
	[0.16]	[0.14]	[0.75]	[0.05]	[0.00]	[15.53]	[-0.22]	[0.07]
[4]	{1+1}		{1+1}		{1+1}		{1+1}	
PIC	5.35	0.36	1.91	0.00	0.07	1.01	0.06	2.53
	(0.02)**	(0.55)	(0.17)	(0.99)	(0.79)	(0.31)	(0.80)	(0.11)
	[-1.30]	[-0.03]	[-1.63]	[0.00]	[0.00]	[20.03]	[-0.05]	[0.19]
[5]	{1+0}		{1+0}		{1+0}		{1+0}	
PSS	1.20	0.12	16.25	0.49	8.47	1.51	5.22	1.96
	(0.27)	(0.72)	(0.0)***	(0.48)	(0.0)***	(0.22)	(0.02)**	(0.16)
	[0.85]	[0.01]	[6.15]	[-0.01]	[0.00]	[-7.26]	[0.59]	[-0.05]
[6]	{3+1}		{1+1}		{1+1}		{1+1}	
SEC	5.28	15.66	5.87	1.38	0.50	0.14	0.48	0.06
	(0.15)	(0.00)***	(0.02)**	(0.24)	(0.48)	(0.71)	(0.49)	(0.80)
	[2.47]	[0.05]	[19.45]	[0.00]	[0.00]	[2.01]	[0.38]	[0.01]
[7]	{1+0}		{3+0}		{1+0}		{1+0}	
GAD	0.14	6.75	5.39	15.45	1.76	0.00	0.45	0.01
	(0.71)	(0.01)**	(0.25)	(0.0)***	(0.18)	(0.95)	(0.50)	(0.91)
	[-0.01]	[3.53]	[0.10]	[0.28]	[0.00]	[23.53]	[0.00]	[-0.26]
[8]	{0+0}		{1+0}		{1+0}		{1+0}	
GAM			2.66	3.73	0.00	0.01	0.07	0.16
			(0.10)	(0.05)*	(1.00)	(0.91)	(0.79)	(0.69)
			[0.01]	[-12.1]	[0.00]	[391.3]	[0.00]	[8.82]
[9]	{1+1}		{1+1}		{1+1}		{1+1}	
ALR	1.10	0.04	0.51	0.46	0.49	0.29	0.94	1.08
	(0.30)	(0.83)	(0.48)	(0.50)	(0.48)	(0.59)	(0.33)	(0.30)
	[1.15]	[0.00]	[1.79]	[-0.01]	[0.00]	[-5.62]	[-0.37]	[-0.07]
[10]	{2+0}		{2+0}		{2+0}		{2+0}	
GER	1.23	2.39	0.02	3.08	0.94	1.53	2.71	2.60
	(0.54)	(0.30)	(0.99)	(0.21)	(0.62)	(0.47)	(0.26)	(0.27)
	[0.08]	[0.04]	[0.02]	[0.02]	[0.00]	[-10.2]	[-0.06]	[-0.09]
[11]	{4+1}		{4+1}		{4+1}		{4+1}	
FR	14.61	4.01	14.35	3.16	7.95	6.74	17.00	10.04
	(0.0)***	(0.26)	(0.0)***	(0.37)	(0.05)*	(0.08)*	(0.0)***	(0.02)**
	[-2.89]	[0.00]	[-2.59]	[0.00]	[0.00]	[0.12]	[0.00]	[0.00]
[12]	{1+0}		{1+0}					
GINI	0.85	0.24	0.30	0.00				
	(0.36)	(0.62)	(0.58)	(0.99)				
	[-34.9]	[0.00]	[49.76]	[0.00]				
[13]	{1+0}		{1+0}					
Q10	1.19	0.10	0.01	0.32				
	(0.27)	(0.75)	(0.94)	(0.57)				
	[-0.25]	[-0.02]	[0.04]	[0.01]				

Notes: The number of observations is 45 (1971 to 2016). $(k + d_{max})$ is represented in curly braces. The lag length, k, is determined by the Schwarz criterion with a five lags maximum. Within each block, the sum of significant coefficients of optimum lags, Wald statistics (in parenthesis), and p-values (in brackets) are represented, respectively.
***, **, and * represent the statistical significance level of 1%, 5%, and 10%, respectively.

Based on the above, the redistribution policies and fertility rate are only transmission channels that simultaneously influence the economic growth and income inequality, while disapproving the others. Therefore, it is expected that the causal relationship between income inequality indices and economic growth will not be confirmed. In this regard, the finding indicates that there is no causation between economic growth and income inequality indices (blocks [12-13]R-[1-3]C). Hence, it can be claimed that economic growth and income inequality are not intrinsically conflicting objectives.

The summary of the results is shown in Fig. 3. The causality tests confirm causal relations between income inequality and some transmission channels (private savings, private investment in capital equipment, redistribution indices, and fertility rate). In addition, causal relations between economic growth and several transmission channels (private investment, redistribution indices, luxury consumption indices, and fertility rate) are confirmed. But there is no strong evidence for other causal relations.

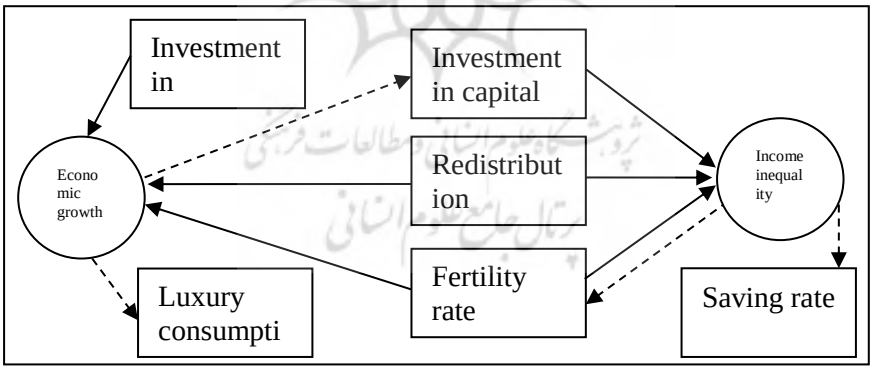

Figure 3. Summary of Causal Relations.
Notes: continuous and dotted lines show causality from transmission channels to objectives and reverse causality, respectively.

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Table 3
Results of causality tests (SUR) for the period 1972-2016.

Block→C ↓R	**[1] GGDP**		**[3] GNI**		**[4] GINI**		**[5] Q10**	
[1]	{1+1}		{1+1}		{1+1}		{1+1}	
GSR	1.96	0.35	1.17	0.26	0.38	2.85	0.26	3.76
	(0.16)	(0.55)	(0.28)	(0.61)	(0.54)	(0.09)*	(0.61)	(0.05)*
	[-0.25]	[0.09]	[-0.65]	[0.05]	[0.00]	[99.99]	[0.03]	[0.70]
[2]	{1+1}		{1+1}		{1+1}		{1+1}	
NSR	2.15	0.75	2.44	0.48	0.11	2.49	0.09	3.08
	(0.14)	(0.39)	(0.12)	(0.49)	(0.74)	(0.11)	(0.77)	(0.08)*
	[-0.18]	[0.18]	[-0.63]	[0.09]	[0.00]	[136.84]	[0.01]	[0.93]
[3]	{1+0}		{1+0}		{1+0}		{1+0}	
PIE	0.18	10.05	0.84	5.74	2.08	1.69	3.11	0.77
	(0.67)	(0.00)***	(0.36)	(0.02)**	(0.15)	(0.19)	(0.08)	(0.38)
	[0.16]	[0.14]	[0.75]	[0.05]	[0.00]	[15.53]	[-0.22]	[0.07]
[4]	{1+1}		{1+1}		{1+1}		{1+1}	
PIC	6.05	0.41	2.16	0.00	0.08	1.15	0.07	2.87
	(0.01)**	(0.52)	(0.14)	(0.99)	(0.77)	(0.28)	(0.79)	(0.09)*
	[-1.30]	[-0.03]	[-1.63]	[0.00]	[0.00]	[20.03]	[-0.05]	[0.19]
[5]	{1+0}		{1+0}		{1+0}		{1+0}	
PSS	1.30	0.15	17.43	0.54	9.09	1.63	5.60	2.11
	(0.25)	(0.70)	(0.00)	(0.46)	(0.00)***	(0.20)	(0.02)**	(0.15)
	[0.85]	[0.01]	[6.15]	[-0.01]	[0.00]	[-7.27]	[0.59]	[-0.05]
[6]	{3+1}		{1+1}		{1+1}		{1+1}	
SEC	7.43	22.43	6.91	1.61	0.57	0.17	0.58	0.07
	(0.06)*	(0.00)***	(0.01)**	(0.21)	(0.45)	(0.68)	(0.45)	(0.79)
	[6.95]	[0.05]	[19.42]	[0.00]	[0.00]	[2.06]	[0.38]	[0.01]
[7]	{1+0}		{3+0}		{1+0}		{1+0}	
GAD	0.15	7.24	6.47	18.54	1.89	0.00	0.48	0.01
	(0.70)	(0.01)**	(0.17)	(0.00)***	(0.17)	(0.95)	(0.49)	(0.91)
	[-0.01]	[3.53]	[0.10]	[1.98]	[0.00]	[23.53]	[0.00]	[-0.26]
[8]	{0+0}		{1+0}		{1+0}		{1+0}	
GAM			2.85	4.01	0.00	0.01	0.07	0.17
			(0.09)*	(0.05)*	(1.00)	(0.91)	(0.78)	(0.68)
			[0.01]	[-12.18]	[0.00]	[391.33]	[0.00]	[8.82]
[9]	{1+1}		{1+1}		{1+1}		{1+1}	
ALR	1.24	0.05	0.57	0.53	0.56	0.33	1.07	1.24
	(0.26)	(0.82)	(0.45)	(0.47)	(0.46)	(0.57)	(0.30)	(0.27)
	[1.15]	[0.00]	[1.79]	[-0.01]	[0.00]	[-5.62]	[-0.37]	[-0.07]
[10]	{2+0}		{2+0}		{2+0}		{2+0}	
GER	1.39	2.71	0.02	3.48	1.07	1.74	3.06	2.94
	(0.50)	(0.26)	(0.99)	(0.18)	(0.59)	(0.42)	(0.22)	(0.23)
	[0.08]	[0.04]	[0.02]	[0.02]	[0.00]	[-10.21]	[-0.06]	[-0.09]
[11]	{4+1}		{4+1}		{4+1}		{4+1}	
FR	20.15	5.53	19.79	4.35	10.96	9.30	23.44	13.84
	(0.00)***	(0.14)	(0.00)***	(0.23)	(0.01)**	(0.03)**	(0.00)***	(0.00)***
	[-2.89]	[0.00]	[-2.59]	[0.00]	[0.00]	[0.12]	[0.00]	[0.00]
[12]	{1+0}		{1+0}					
GINI	0.91	0.26	0.32	0.00				
	(0.34)	(0.61)	(0.57)	(0.98)				
	[-34.93]	[0.00]	[49.76]	[0.00]				
[13]	{1+0}		{1+0}					
Q10	1.28	0.11	0.01	0.34				
	(0.26)	(0.74)	(0.94)	(0.56)				
	[-0.25]	[-0.02]	[0.04]	[0.01]				

Notes: The number of observations is 45 (1971 to 2016). $(k + d_{max})$ is represented in curly braces. The lag length, k, is determined by the Schwarz criterion with a five lags maximum. Within each block, the sum of significant coefficients of optimum lags, Wald statistics (in parenthesis), and p-values (in brackets) are represented, respectively.
***, **, and * represent the statistical significance level of 1%, 5%, and 10%, respectively.

Now, I turn to the main question. Which should be a priority for policymakers, the rapid economic growth, or the income distribution

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reduction? Generally, the following three distinct strategies can be considered: 1) inequality alleviation precedes economic growth, known as "income redistribution before economic growth"; 2) economic growth precedes income inequality alleviation, known as "economic growth before income redistribution"; and, 3) aimed at economic growth and income equality simultaneously which is generally known as "redistribution with economic growth."

In the first and second strategies, it is assumed that growth and equality are conflicting. Therefore, income inequality improvement is achievable only at the necessary cost of low economic growth; conversely, the goal of rapid economic growth is achievable only at the necessary cost of greater income inequality. The third strategy assumes that rapid economic growth and income inequality alleviation are compatible objectives. So any policy towards rapid economic growth may benefit the poor as well as the rich.

In the first strategy, policymakers tend to precede income inequality alleviation. This strategy is supported by opponents' view that believe inequality of income distribution leads to lower economic growth through lower human capital accumulation, conspicuous consumption, and socio-political instability, and also supported by empirical studies Herzer and Vollmer (2011), Qin et al. (2009), Lee (2008), Knowles (2005), Odedokun and Round (2004), Panizza (2002) and Mo (2000) that confirm negative effects of income inequality on economic growth.

In Iran's economy, the strategy of income equality priority over economic growth dominated in 1980-1988 and 2005-2013. In these periods, the economy has experienced a significant improvement in income distribution. However, the economic growth was relatively low, the welfare index slowly increased, and even the purchasing power of expenditure classes was reduced at the end of the second period (Table 4).

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Table 4
Economic growth and income inequality for each development plan.

	4th P.	**5th P.**	**Rev. & War**	**1st D.P.**	**2th D.P.**	**3th D.P.**	**4th D.P.**	**5th D.P.**
	1968	1973	1978	1989	1995	2000	2005	2011
	1972	1977	1988	1994	1999	2004	2010	2016
Economic Growth	13.92	6.24	-3.51	5.95	2.56	5.78	4.75	1.73
Gini Coefficient	0.45	0.48	0.42	0.40	0.40	0.41	0.39	0.39
Q10 Ratio	22.03	29.12	19.83	16.23	15.18	15.42	14.22	13.57
Growth of ISen	8.92	3.54	-4.16	4.07	0.93	4.17	3.86	2.60
CV	-	-	1.02	0.87	0.78	0.81	0.78	0.70
GE	-	-	-7.88	2.85	7.27	5.95	0.13	-37.18
GEW	-	-	4.38	10.38	7.97	5.78	0.65	-3.65
GEAC	-	-	7.60	13.22	8.35	5.61	0.99	-3.03

Notes: The Sen welfare index (I_{Sen}) is calculated as $per\ capita\ income \times (1 - Gini)$. CV is the coefficient of variation of expenditures deciles. GE is the growth rate of the cost of urban living at constant prices. GE_W is the growth rate of cost deciles based on the weight 0.1, and GE_{AC} based on the weight 0.6 for the lowest Quintiles, and 0.4 for fourth Quintiles (Ahluwalia-Chenery Index).

After the revolution and during the first Persian Gulf war, 1979-1988, the government began to impose non-market forces and the extensive controls on the markets for income redistribution. Although this strategy was abandoned at the end of the war, income inequality reduction was again central to the government's slogans and plans from 2005 to 2013. Polices were not consistent with the Fourth (2005-2010) and Fifth (2011-2015) Development Plans, and finally, income inequality reduction accompanied by increasing poverty resulting from inflation of injecting oil revenues and also irresponsibility and profligate monetary and fiscal policies.

Unlike the first strategy, policymakers may decide that rapid economic growth precedes income inequality alleviation. The second strategy is suggested by proponents of Kuznets' curve, and empirical studies such as Li et al. (2015), Lessmann (2014), Chan et al. (2014), Barro (2000), Forbes (2000), Li and Zou (1998), and Ram (1988). The strategy of priority of economic growth over income equality dominated during the 1970s, when the fourth (1968-1972) and fifth (1973-1977) Plans made before the revolution were being implemented; and also in the early 1990s, when the First Development Plan (1989-1994) was followed based on structural adjustment and post-war reconstruction. However, because of the balance in payments crisis, structural adjustment policy was stopped in the Second Program. During these periods, Iran's economy has experienced the highest economic growth rates, but income inequality and welfare have improved slightly.

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But I concluded that there is no causal relationship between economic growth and income inequality. Therefore, the rapid economic growth and income inequality alleviation are not conflicting objectives, and policymakers can simultaneously implement them. Likely, this strategy has followed the Third Development Plan (2000-2004). However, it seems that in practice, no attempt was made to follow this strategy. Income equality, economic growth, and welfare growth in this period are relatively better than the others. The economic growth is higher than the periods with the first strategy, and income inequality is slightly lower than the periods with the second strategy. Moreover, the purchasing power of expenditure deciles is proportionally increased, and the economy has the highest growth of welfare.

Some transmission channels, such as public social spending (such as education, health, social welfare, and housing) and fertility rate, are directly and indirectly related to economic growth and income inequality. The policies need to focus on these objectives simultaneously; otherwise, they may counteract the effects of each other. Besides, the lower-income class's benefits from economic growth depend on the type of growth policies[1]. Therefore, a package of complementary and supportive policies should be implemented to lead to the synergy on economic growth and equality impacts. A few examples are mentioned below.

A family-planning policy, with a lower fertility rate and smaller family size, increases economic growth and decreases inequalities. This policy leads to more investment in the human capital of any family member. Hence, lower-income classes will be able to break the low human capital-low income cycle.

Decreasing taxes on daily consumption goods and increasing taxes on goods and services such as automobiles, petroleum, real estate, asset transaction, and speculative ventures also reduce income inequality and provide required resources for public investment (World Bank, 2006;

[1] In the interesting study, Saari et al. (2015) indicate that how sources of income growth affect income inequality across ethnic groups in Malaysia. He describe that the exports expansion and the compensation of labor and capital inputs are the main determinants economic growth. As Saari et al. (2015) argue, these two determinants affect differently between rural and urban areas, between skilled and unskilled workers, and between the major ethnic groups, and so the combination of these two determinants is a dominant factor in explaining the increase in income inequality. In addition, Huang et al. (2015) examine long-run effect of growth volatility on income inequality. They find larger growth volatility associates with higher income inequality in positive economic growth, while the volatility effect is insignificant in negative economic growth. Also Rubin and Segal (2015) show that the income of the upper-income classes is more sensitive to growth compared to the income of the lower-income classes.

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Lecaillon et al., 1984). Appropriate geographical distribution and module of public investment can improve both income distribution and economic growth. Zhang and Fan (2004) demonstrate that six modules of public investment, i.e., public transport networks, education, power utilities, telephone communications, irrigation networks, and agricultural R&D, have been most influential in poverty alleviation and higher economic growth in China[1].

In addition, foreign direct investment increases economic growth while resulting in greater income inequality due to imperfect financial markets[2]. But Madsen et al. (2018), Basu and Guariglia (2007), Zhang and Fan (2004), and Hussein and Thirlwall (1999) believe that extending the depth of financial markets and compiling regulations for improved performance of financial markets can simultaneously help to alleviate income inequality and boost economic growth.

6 Conclusion

Many theories conclude that there is a trade-off between economic growth and income inequality. Some economists, who are known as proponents of Kuznets' hypothesis, believe that income inequality leads to rapid economic growth through higher saving-investment, and thereby they laud the strategy of "income redistribution after economic growth." Nevertheless, some other economists, opponents' views emphasize that income inequality tends to retard rapid growth through the lower level of human capital accumulation, conspicuous consumption, and socio-political instability. So they support "income redistribution before economic growth."

In this regard, this paper investigated relations between income inequality, economic growth, and transmission channels determined by proponents' and opponents' views. The results indicated that there was no causal relationship between economic growth and income inequality in Iran. Hence, none of the above views is tenable. Rapid growth and inequality alleviation are not

[1] Getachew and Turnovsky (2015) investigate effect of public investment on the growth-inequality trade-off. They conclude that this effect depends on the elasticity of substitution between public and private capital.

[2] Lower classes cannot provide training cost due to imperfect financial markets, so FDI increases inequality in both traditional and modern sectors. On the one hand, FDI technologies are not adopted and are not enforceable in the traditional sectors because of low human capital or lack of infrastructure (Basu and Guariglia, 2007). On the other hand, the new technologies increases inequality in modern sector through increasing demand for skilled labour vis-à-vis unskilled labour (Lopez, 2004). Sylwester (2005) indicates that FDI is associated with higher economic growth in the developing countries, but it has no effect on income inequality.

necessarily conflicting objectives. So any policy towards rapid economic growth can benefit the lower-income classes as well as the upper-income classes.

A package of complementary and supportive policies, such as a family-planning policy and public investment of oil revenue, will be synergies to economic growth and equality. It will, in turn, increase the chances of lower-income classes' growth. In Iran's economy, the strategy of prioritizing rapid economic growth dominated in the 1970s and early 1990s. Also, the strategy of priority of inequality alleviation was dominant in the 1980s, and again, from 2005 to 2013. However, in practice, no attempt was made to follow a later strategy in the development plans from 1968 to 2013. This strategy seems that it is a more effective and perhaps politically more acceptable approach than the other strategies.

References

Acemoglu, D., Egorov, G., & Sonin, K. (2013). A Political Theory of Populism. *The Quarterly Journal of Economics*, 128(2), 771-805.

Aiyar, S., & Ebeke, C. (2020). Inequality of Opportunity, Inequality of Income, and Economic Growth. *World Development*, 136, 105115.

Azariadis, C., Drazen, A. (1990). Threshold Externalities in Economic Development. *The Quarterly Journal of Economics*, 105(2), 501-526.

Bagchi, S., Svejnar, J. (2015). Does Wealth Inequality Matter For Growth? The Effect of Billionaire Wealth, Income Distribution, and Poverty. *Journal of Comparative Economics*, 43(3), 505-530.

Barro, R. J. (2000). Inequality and Growth in a Panel of Countries. *Journal of Economic Growth*, 5(1), 5-32.

Barro, R. J. (1990). Government Spending in a Simple Model of Endogenous Growth. *Journal of Political Economy*, 98, 103-125.

Barro, R. J. (1991). Economic Growth in a Cross-Section of Countries. *The Quarterly Journal of Economics*, 106, 407-443.

Basu, P., & Guariglia, A. (2007). Foreign Direct Investment, Inequality, and Growth. *Journal of Macroeconomics*, 29, 824-839.

Becker, G. S., Murphy, K. M., & Tamura, R. (1990). Human Capital, Fertility, and Economic Growth. *Journal of Population Economics*, 98(5), 12-37

Bourguignon, F., & Verdier, T. (2000). Oligarchy, Democracy, Inequality, and Growth. *Journal of Development Economics*, 62, 285-313.

Brander, J. A., & Dowrick, S. (1994). The Role of Fertility and Population in Economic Growth: Empirical Results from Aggregate Cross-National Data. *Journal of Population Economics*, 7(1), 1-25.

Breunig, R., & Majeed, O. (2020). Inequality, Poverty, and Economic Growth. *International Economics*, 161, 83-99.

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Chakrabarti, A. (2006). The Saving-Investment Relationship Revisited: New Evidence from Multivariate Heterogeneous Panel Cointegration Analyses. *Journal of Comparative Economics*, 34, 402-419.

Chan, K. S., Zhou, X., & Panc, Z. (2014). The Growth and Inequality Nexus: The Case of China. *International Review of Economics and Finance*, 34, 230-236.

Contreras, D. (2003). Poverty and Inequality in a Rapid Growth Economy: Chile 1990-96. *Journal of Development Studies*, 39(3), 181-200.

Davis, L., & Hopkins, M. (2011). The Institutional Foundations of Inequality and Growth. *Journal of Development Studies*, 47(7), 977-997.

Deininger, K., & Olinto, P. (2000). Asset Distribution, Inequality, and Growth. *The World Bank, Policy Research Working Paper Series* 2375.

Deininger, K., Squire, L. (1997). Economic Growth and Income Inequality: Reexamining the Links. *Finance & Development*, 38-41.

Fields, G. S. (2007). How Much Should We Care About Changing Income Inequality in the Course of Economic Growth? *Journal of Policy Modeling*, 29, 577-585.

Forbes, K. J. (2000). A Reassessment of the Relationship between Inequality and Growth. *American Economic Review*, 90(4), 869-887.

Fosu, A. K. (2009). Inequality and the impact of growth on poverty: Comparative evidence for Sub-Saharan Africa. *Journal of Development Studies*, 45(5), 726-745.

Galor, O., & Moav, O. (2004). From Physical to Human Capital Accumulation: Inequality and the Process of Development. *Review of Economic Studies*, 71, 1101-1026.

Getachew, Y. Y., & Turnovsky, S. J. (2015). Productive Government Spending and Its Consequences for the Growth-Inequality Trade-Off. *Research in Economics*, 69(4), 621-640.

Glaeser, E. L., Becker, G. S., & Murphy, K. M. (1999). Population and Economic Growth. *American Economic Review*, 89(2), 145-149.

Granger, C. W. J. (1969). Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. *Econometrica*, 37(3), 424-438.

Griffin, K. (1999). Alternative Strategies for Economic Development. Macmillan Press Ltd.

Gylfason, T. (2001). Nature, Power, and Growth. *Scottish Journal of Political Economy*, 48(5), 558-588.

Herzer, D., & Vollmer, S. (2011). Inequality and Growth: Evidence from Panel Cointegration. *Journal of Economic Inequality*, DOI: 10.1007/s10888-011-9171-6.

Heshmati, A. (2006). Conditional and Unconditional Inequality and Growth Relationships. *Applied Economics Letters*, 13, 925-931.

Huang, H. C., Fang, W., Miller, S. M., & Yeh, C. C. (2015). The Effect of Growth Volatility on Income Inequality. *Economic Modelling*, 45, 212-222.

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Hussein, K. A., & Thirlwall, A. P. (1999). Explaining Differences in the Domestic Saving Ratio across Countries: A Panel Data Study. *Journal of Development Studies*, 36(1), 31-52.

Iniguez-Montiel, A. J. (2015). Growth with Equity for the Development of Mexico: Poverty, Inequality, and Economic Growth (1992–2008). *World Development*, 59, 313-326.

Islam, M. R., & McGillivray, M. (2020). Wealth Inequality, Governance, and Economic Growth. *Economic Modelling*, 88, 1-13.

Jackson, T., & Victor, P. A. (2015). Does Slow Growth Lead To Rising Inequality? Some Theoretical Reflections and Numerical Simulations. *Ecological Economics*, 121, 206-219.

Jappelli, T., & Pistaferri, L. (2010). Does Consumption Inequality Track Income Inequality in Italy? *Review of Economic Dynamics*, 13(1), 133-153.

Kaldor, N. (1955-1956). Alternative Theories of Distribution. *Review of Economic Studies*, 23(2), 83-100.

Kaldor, N. (1957). A Model of Economic Growth. *Economic Journal*, 591-624.

Keynes, J. M. (1936). The General Theory of Employment, Interest, and Money. Atlantic.

Knowles, S. (2005). Inequality and Economic Growth: The Empirical Relationship Reconsidered in the Light of Comparable Data. *Journal of Development Studies*, 41(1), 135-159.

Krueger, D., & Perri, F. (2006). Does Income Inequality Lead to Consumption Inequality? Evidence and Theory. *Review of Economic Studies*, 73, 163-193.

Kuznets, S. (1955). Economic Growth and Income Inequality. *American Economic Review*, 45(1), 1-28.

Lecaillon, J., Paukert, F., Morrison, C., & Germidis, D. (1984). *Income Distribution and Economic Development: An Analytical Survey*. Geneva, International Labour Office.

Lee, Y. F. L. (2008). Economic Growth and Income Inequality: The Modern Taiwan Experience. *Journal of Contemporary China*, 17(55), 361-374.

Leigh, A., & Posso, A. (2009). Top Incomes and National Savings. *Review of Income and Wealth*, 55(1), 57-74.

Leite, C., & Weidmann, J. (1999). Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth. *IMF working paper* wp/99/85.

Lise, J., Sudo, N., Suzuki, M., Yamada, K., & Yamada, T. (2014). Wage, Income, and Consumption Inequality in Japan, 1981-2008: From Boom to Lost Decades. *Review of Economic Dynamics*, 17(4), 582-612.

Lessmann, C. (2014). Spatial Inequality and Development-Is There an Inverted-U Relationship? *Journal of Development Economics*, 106, 35-51.

Levine, R., & Renelt, D. (1992). A Sensitivity Analysis of Cross-Country Growth Regressions. *American Economic Review*, 82(4), 942-963.

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Lewis, W. A. (1954). Economic Development with Unlimited Supplies of Labor. *The Manchester School*, 22(2), 139-191. DOI: 10.1111/j.1467-9957.1954.tb00021.x.

Li, H., & Zhang, J. (2007). Do High Birth Rates Hamper Economic Growth? *Review of Economics and Statistics*, 89(1), 110-117.

Li, H., & Zou, H. (1998). Income Inequality is not Harmful to Growth: Theory and Evidence. *Review of Development Economics*, 2(3), 318-334.

Li, T., Lai, J. T., Wang, Y., & Zhao, D. (2015). The Long-Run Relationship between Inequality and Growth in Post-Reform China: New Evidence from a Dynamic Panel Model. *International Review of Economics and Finance*, 41, 238-252.

Lopez, J. H. (2004). Pro-Growth, Pro-Poor: Is There a Tradeoff? *The World Bank, Policy Research Working Paper Series* 3378.

Lorenz, M. O. (1905). Methods of Measuring the Concentration of Wealth. *Journal American Statistic Association*, 9(70), 209-219.

Luo, W., & Xie, Y. (2020). Economic Growth, Income Inequality, and Life Expectancy in China. *Social Science & Medicine*, 113046.

Madsen, J. B., Islam, M. R., & Doucouliagos, H. (2018). Inequality, Financial Development, and Economic Growth in the OECD, 1870-2011. *European Economic Review*, 101, 605-624.

Mankiw, G. N., Romer, D., & Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 107(2), 407-437.

Matsen, E., Natvik, G. J., & Torvik, R. (2015). Petro Populism. *Journal of Development Economics*, 118, 1-12.

Mehlum, H., Moene, K., & Torvik, R. (2006). Cursed by Resources or Institutions? *World Economy*, 29(8), 1117-1131.

Mitchell, D. J. (2005). The Impact of Government Spending on Economic Growth. *Heritage Foundation Backgrounder* 1831.

Mo, P. H. (2000). Income Inequality and Economic Growth. *KYKLOS*, 53, 293-316.

Molero-Simarro, R. (2015). Functional Distribution of Income, Aggregate Demand, and Economic Growth in the Chinese Economy, 1978–2007. *International Review of Applied Economics*, 29(4), 435-454.

Neves, P. C., & Silva, S. M. T. (2014). Inequality and Growth: Uncovering the Main Conclusions from the Empirics. *Journal of Development Studies*, 50(1), 1-21.

Odedokun, M. O., & Round, J. I. (2004). Determinants of Income Inequality and Its Effects on Economic Growth: Evidence from African Countries. *African Development Bank*, 287-327.

Panizza, U. (2002). Income Inequality and Economic Growth: Evidence from American Data. *Journal of Economic Growth*, 7, 25-41.

Paxson, C. (1996). Saving and Growth: Evidence from Microdata. *European Economic Review*, 40, 255-288.

Piketty, T. (2014). *Capital in the 21st Century*. Harvard University Press, Cambridge.

Ploeg, F. (2008). Challenges and Opportunities for Resource-Rich Economies. OxCarre *Research Paper* 2008-05.

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Qin, D., Cagas, M. A., Ducanes, G., He, X., Liu, R., & Liu, S. (2009). Effects of Income Inequality on China's Economic Growth. *Journal of Policy Modeling*, 31, 69-86.

Rahbek, A., & Mosconi, R. (1999). Cointegration Rank Inference with Stationary Regressors in VAR Models. *Econometrics Journal*, 2, 76-91.

Ram, R. (1988a). Government Size and Economic Growth: A New Framework and Some Evidence from Cross-Section and Time-Series Data. *American Economic Review*, 76, 191-203.

Ram, R: (1988b). Economic Development and Income Inequality: Further Evidence on the U-Curve Hypothesis. *World Development*, 16(11), 1371-1376.

Reimers, H. E. (1992). Comparisons of Tests for Multivariate Cointegration. *Statistical Papers*, 33(1), 335-359.

Romer, P. M. (1990). Human Capital and Growth: Theory and Evidence. *In: Carnegie-Rochester Conference Series on Public Policy*, 32, 251-86.

Rubin, A., & Segal, D. (2015). The Effects of Economic Growth on Income Inequality in the US. *Journal of Macroeconomics*, 45, 2015, 258-273.

Saari, M. Y., Dietzenbacherd, E., & Los, B. (2015). Sources of Income Growth and Inequality across Ethnic Groups in Malaysia, 1970–2000. *World Development*, 76, 311-328.

Schmidt-Hebbel, K., & Servén, L. (2000). Does Income Inequality Raise Aggregate Savings? *Journal of Development Economics*, 61, 417-446.

Seyed Nourani, S. M., & Javadi, M. (2005). Investigating the Determinant Factors of the Share of the Cost of Buying a New Car in the Cost Basket of the Iranian Household. *Journal of Economic Research*, 5(16), 237-263.

Shin, I. (2012). Income Inequality and Economic Growth. *Economic Modelling*, 29(5), 2049-2057.

Shupp, F. R. (2002). Growth and Income Inequality in South Africa. *Journal of Economic Dynamics and Control*, 26, 1699-1720.

Smith, D. (2000). International Evidence on How Income Inequality and Credit Market Imperfections Affect Private Saving Rates. *Journal of Development Economics*, 64, 103-127.

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics*, 70(1), 65-94.

Sylwester, K. (2000). Income Inequality, Education Expenditures, and Growth. *Journal of Development Economics*, 63, 379-398.

Sylwester, K. (2005). Foreign Direct Investment, Growth, and Income Inequality in Less Developed Countries. *International Review of Applied Economics*, 19(3), 289-300.

Toda H. Y. (1995). Finite Sample Performance of Likelihood Ratio Tests for Cointegrating Ranks in Vector Autoregressions. *Econometric Theory*, 11(5), 1015-1032.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, 66, 225-250.

Toda. H. Y., & Phillips, P. C. B. (1993a). The Spurious Effect of Unit Roots on Vector Autoregressions: An Analytical Study. *Journal of Econometrics*, 59(3), 229-255.

Toda. H. Y., & Phillips, P. C. B. (1993b). Vector Autoregressions and Causality. *Econometrica*, 61(6), 1367-1393.

Todaro, M. P., & Smith, S. C. (2011). *Economic Development*. Pearson Education and Addison-Wesley.

Triantis, S. G. (1999). Economic Growth and Saving Theory. *KYKLOS* 52, 45-61.

Wang, P., Yip, C. K., & Scotese, C. A. (1994). Fertility Choice and Economic Growth: Theory and Evidence. *Review of Economics and Statistics*, 255-266.

Willis, G. (2015). Income Distribution and Income Shares: Wealth and Income Distributions Explained Using Generalized Lotka-Volterra SFC ABM Models. *International Review of Applied Economics*, *29*(6), 816-842.

Wolff, E. N. (2015). Inequality and Rising profitability in the United States. *International Review of Applied Economics*, *29*(6), 741-769.

World Bank (2006). *World Development Report Overview: Equity and development*.

Wu, X., & Li, J. (2017). Income Inequality, Economic Growth, and Subjective Well-Being: Evidence from China. *Research in Social Stratification and Mobility*, *52*, 49-58.

Yao, S. (1999). Economic Growth, Income Inequality, and Poverty in China under Economic Reforms. *Journal of Development Studies*, 35(6), 104-130.

Zhang, X., & Fan, S. (2004). Public Investment and Regional Inequality in Rural China. *Agricultural Economics*, *30*, 89-100.

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