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Threshold Effects of Financial Incentives and Agricultural Economic Reforms on Income Inequality in the Provinces of the Country

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ABSTRACT

Over the past centuries, perspectives on the role of the state and the rationale for its existence have undergone repeated transformations and reassessments. These shifts in perspective have led to corresponding changes in the duties and responsibilities assigned to governments, and consequently, to alterations in the size and composition of public expenditures. What remains critically important in the context of government and its economic influence is the share of government in the economy and the methodology used to measure the effects of its components on production and societal welfare. From a human development perspective, emphasis on capacity building rather than mere consumption of goods and services provides conditions for the sustainable expansion of human choices, which is achieved through the development of mental capacities, particularly through education. This study examines the threshold effects of financial incentives and economic reforms in the agricultural sector on income inequality across the provinces of the country. In terms of purpose, the research is applied, and in terms of nature, it follows a descriptive-analytical approach. The income inequality model for the provinces is estimated over the period from 2006 to 2024 using the Panel Smooth Transition Regression (PSTR) method. By employing a PSTR model in which the transition variable is government credit facilities allocated to the agricultural sector, the income inequality function across provinces is modeled. Given the confirmation of nonlinearity, the analysis proceeds with the nonlinear component of the model. According to the estimation results in the nonlinear section, the coefficient of per capita gross domestic product growth at the provincial level has a negative and statistically significant effect on income inequality at the 95% confidence level. As expected, the unemployment rate variable exhibits a positive (direct) effect on income inequality in the nonlinear model. Variables such as credit facilities allocated to the agricultural sector, development (capital) budget expenditures, and the active labor force in the agricultural sector have an inverse effect on income inequality, contributing to its reduction, and these effects are statistically significant at the 5% level. The inflation rate has a positive effect on income inequality, while the exchange rate has a negative effect. An increase in the exchange rate enhances export incentives in the agricultural sector, which in turn leads to an improvement in income distribution.

Keywords: Provinces of the country, Financial incentives, Economic reforms, Agricultural sector, Income inequality

Introduction

Income inequality remains one of the most persistent challenges in development economics because it directly affects social cohesion, poverty dynamics, political stability, and the long-run sustainability of economic growth.

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Classical development debates have long emphasized that growth alone does not guarantee equitable distribution, and that the structure of growth, the allocation of public resources, and the institutional channels through which income is generated are decisive for distributional outcomes (1, 2). More recent scholarship has reinforced this view by showing that inequality is shaped not only by aggregate macroeconomic performance, but also by the interaction between financial systems, labor markets, public policy, sectoral investment patterns, and institutional arrangements (3, 4). In developing countries, where regional disparities, uneven access to finance, and sector-specific shocks are more pronounced, the distributional effects of policy interventions are often nonlinear and strongly conditioned by local structural characteristics (5, 6). This makes the study of threshold effects particularly important, because the same policy variable may have different consequences before and after a critical level of financial support, investment intensity, or institutional reform is reached.

Within this broader context, agriculture occupies a special place in the political economy of inequality. In many developing and middle-income economies, agriculture is not merely a productive sector; it is also a social stabilizer, a generator of employment, a source of food security, and a buffer against regional deprivation. The role of agriculture in maintaining urban-rural balance and supporting socio-economic stability has been repeatedly emphasized in the Iranian context, where large parts of provincial livelihoods remain directly or indirectly connected to agricultural production and related value chains (7, 8). International evidence likewise suggests that agricultural support policies, if appropriately designed and financed, can act as an instrument for inclusive development, especially where climate vulnerability, market imperfections, and credit constraints undermine rural productivity and household resilience (5, 9). At the same time, ineffective agricultural subsidies, weak targeting of facilities, and poorly sequenced reforms can deepen disparities by disproportionately benefiting already advantaged producers or better-connected regions.

The relationship between public intervention in agriculture and income distribution is therefore neither simple nor mechanically linear. Government credit facilities, development expenditures, rural infrastructure investment, and exchange-rate-related export incentives may reduce inequality by expanding productive opportunities for disadvantaged groups. Yet these same policy tools may also generate unequal outcomes when access is selective, when implementation capacity differs across provinces, or when macroeconomic conditions such as inflation and unemployment erode the real value of support. Government support for agriculture must thus be evaluated not only in terms of output growth, but also in terms of its distributive effectiveness at both macro and micro levels (10). This perspective is especially relevant for Iran, where regional heterogeneity, dependence on public finance, and exposure to oil-linked macroeconomic instability create conditions under which agricultural policy may transmit asymmetric effects across provinces (11-13).

Iran presents a particularly important case for studying these dynamics. The economy has long been affected by oil dependency, exchange-rate volatility, inflationary pressures, and uneven regional development. These macroeconomic forces have substantial implications for agriculture, both directly through input prices, export competitiveness, and public budget capacity, and indirectly through broader demand conditions and financial sector behavior. Research on Iran has documented the asymmetric and sector-specific effects of oil shocks on output and value added, including in agriculture (14-17). Other studies have shown that oil revenues can reshape agricultural incentives and alter sectoral performance, sometimes crowding out productive activity in ways consistent with Dutch disease mechanisms (12, 13, 18). Because oil-driven macroeconomic cycles affect public expenditure, relative

prices, and credit supply, they are likely to condition the impact of financial incentives and economic reforms on inequality.

The financial channel is especially central in this regard. A growing body of literature shows that access to banking services, credit allocation patterns, and financial inclusion mechanisms are closely linked to inequality outcomes. Studies at the international level suggest that inclusive banking and well-regulated financial systems can enhance access to productive opportunities and reduce exclusion, though the magnitude and direction of effects depend on institutional quality and market structure (19-21). In low-income and structurally constrained environments, digital financial inclusion has also been found to help bridge gendered and regional financing gaps, thereby improving the distributive reach of formal finance (6). At the same time, the composition of bank credit matters greatly; when financial resources are concentrated in non-productive or privileged sectors, income distribution may worsen rather than improve (22). Evidence from Iran's provinces similarly indicates that bank deposits and facilities can significantly affect income inequality, confirming that the banking sector is not distribution-neutral (23). This is highly relevant for the agricultural sector, where public facilities often represent one of the few available instruments for easing liquidity constraints and sustaining small-scale production.

The significance of targeted lending is even more pronounced when vulnerability and social inclusion are taken into account. Credit facilitation has been shown to influence employment generation among vulnerable women, highlighting that the distributional impact of finance depends not only on sectoral allocation but also on who receives the support and under what conditions (24). This is important because inequality is shaped through overlapping layers of disadvantage, including region, occupation, gender, and access to assets. In the Iranian setting, the barriers to women's participation in economic life remain substantial, ranging from social norms and labor market constraints to institutional obstacles and unequal access to productive resources (25-27). Economic rights, labor market participation, and access to employment opportunities for women are increasingly recognized as part of the broader architecture of inclusive development (28, 29). Therefore, any study of income inequality in the provinces must also remain attentive to the way agricultural incentives and reforms may reinforce or alleviate gendered economic disparities.

Indeed, the literature on inequality and women's economic participation offers additional insight into how sectoral policy can influence distributional outcomes. Women's employment has been associated with economic growth in selected Middle Eastern countries, suggesting that broader inclusion in labor markets can support both efficiency and equity (30). Cross-country evidence from sub-Saharan Africa and Asia also indicates that gender inequality in employment and economic participation is negatively associated with equitable growth and inclusive development (31-33). Fertility dynamics, labor market structure, and trade integration further mediate these relationships (34, 35). In provincial economies where agriculture remains a major employer, policies that improve agricultural credit, investment, and value-added creation may therefore influence inequality not only through household income but also through labor absorption and the quality of participation in local economies.

Another crucial dimension is the regional structure of production and value creation. Iranian provinces differ substantially in resource endowments, productive specialization, institutional capacity, and their ability to transform public investment into local income gains. Studies ranking provinces by their capacity to create value added in economic subsectors underscore the uneven developmental landscape across the country (36). Statistical and parliamentary reports also reveal persistent interprovincial gaps in employment, infrastructure, welfare, and sectoral composition, which imply that the same agricultural policy may generate divergent results depending on the

provincial context (37, 38). Rural household welfare and the distributional consequences of income generation mechanisms are likewise shaped by local agricultural structures and market access conditions (39, 40). These regional asymmetries justify a provincial panel framework and reinforce the need for models capable of capturing heterogeneous and threshold-dependent effects.

Macroeconomic variables further complicate this relationship. Inflation, exchange rate fluctuations, and unemployment can either magnify or offset the distributive benefits of sectoral support. Exchange rate deviations influence sectoral performance across the Iranian economy and can alter the competitiveness of agricultural exports, input costs, and real farm incomes (41, 42). Oil price shocks and exchange rate volatility have also been linked to growth dynamics in oil-dependent settings more generally, illustrating how macroeconomic instability can affect sectoral transmission mechanisms (43). Meanwhile, the real interest rate and the banking environment shape how credit affects different income groups, suggesting that the distributive effect of agricultural finance may vary across income deciles and provinces (44, 45). Because of these interactions, a linear specification may fail to capture the actual mechanism through which financial incentives and reforms in agriculture influence inequality.

This is where the threshold perspective becomes analytically valuable. Theoretically, one can expect that agricultural facilities and reform measures produce limited distributive gains when they remain below a minimum effective scale, are fragmented, or are absorbed by transaction costs and structural rigidities. Once a certain threshold is crossed, however, the effect may become stronger because productive investment, employment generation, and market access begin to reinforce one another. Conversely, after another point, concentration effects or unequal absorptive capacities may reduce or reverse the equalizing role of support. Such logic is consistent with broader nonlinearities in development and distribution, where the relationship between inequality and development often changes across stages or under different institutional configurations (2, 3). In the domain of finance and public policy, threshold behavior may also arise because institutional effectiveness, market depth, and policy credibility alter the response of households and firms to incentives.

The need to investigate these nonlinearities is strengthened by contemporary transformations in the policy environment. Climate-related pressures, global market volatility, technological transitions, and new models of finance are reshaping the conditions under which agricultural systems operate. Proposals for supporting agriculture under climate stress increasingly emphasize smart financing, targeted interventions, and adaptive institutional design (9, 46). At the same time, the broader economic system is being restructured by technological change and organizational innovation, which affect how firms and sectors respond to incentives and public support (47). International investment and global financial behavior may also influence local economic opportunities and distribution, especially in regions linked to external capital flows or commodity markets (48, 49). Although these themes emerge from different strands of literature, together they suggest that the distributive effects of agricultural policy can no longer be understood in isolation from the financial, institutional, and structural environment in which they operate.

Empirical findings on poverty, inequality, and financial inclusion in Iran also point toward this multidimensionality. Financial inclusion has been found to affect poverty and income inequality in Iran, which indicates that the reach and accessibility of financial instruments are central to distributive outcomes (50). Yet not all forms of finance are equally inclusive or equally productive. The effects of facilities depend on sectoral destination, user characteristics, and provincial conditions. This is particularly important in agriculture, where support policies often combine credit, capital budgeting, employment effects, and exposure to inflation and exchange rates. Consequently, an empirical

strategy that allows policy effects to vary across regimes, rather than imposing a constant marginal effect, is better aligned with both theory and observed economic complexity.

Despite the importance of these issues, the literature still lacks a sufficiently integrated provincial analysis of how financial incentives and agricultural economic reforms affect income inequality in Iran under a nonlinear threshold structure. Existing studies have often focused on separate components such as financial inclusion, bank credit composition, women's participation, oil shocks, exchange rate movements, or agricultural growth, but fewer studies have combined these dimensions into a regime-dependent framework capable of identifying whether the distributive impact of policy changes once support crosses a critical level (22, 23, 29). Given the uneven development of Iran's provinces, the strategic role of agriculture in employment and rural welfare, and the macroeconomic volatility that shapes public support mechanisms, such an investigation is both theoretically necessary and practically relevant.

Accordingly, the present study seeks to examine the threshold effects of financial incentives and economic reforms in agriculture on income inequality across the provinces of Iran by employing a Panel Smooth Transition Regression framework that captures the nonlinear and regime-dependent nature of this relationship.

Methods and Materials

The present study is applied in terms of purpose and descriptive-analytical in nature. The income inequality model across the provinces of the country is estimated over the period 2006–2024 using the Panel Smooth Transition Regression (PSTR) method. The provinces included in the study are East Azerbaijan, West Azerbaijan, Ardabil, Isfahan, Alborz, Ilam, Bushehr, Tehran, Chaharmahal and Bakhtiari, South Khorasan, Razavi Khorasan, North Khorasan, Khuzestan, Zanjan, Semnan, Sistan and Baluchestan, Fars, Qazvin, Qom, Kurdistan, Kerman, Kermanshah, Kohgiluyeh and Boyer-Ahmad, Golestan, Gilan, Lorestan, Mazandaran, Markazi, Hormozgan, Hamedan, and Yazd.

Considering the theoretical foundations regarding the effects of financial incentives and economic reforms in agriculture on income, regional, and gender inequality in Iran, this study follows prior research such as Tang and Sun (2022) and Mezonau et al. (2022) to examine these effects. For this purpose, the Smooth Transition Autoregressive (STAR) and Panel STAR (PSTAR) models, developed by Teräsvirta and Anderson (1992) and Teräsvirta (1994), are employed. Unlike Threshold Autoregressive (TAR) models, which use an indicator function to control regime-switching processes, the STAR model utilizes exponential and logistic functions. According to van Dijk and Teräsvirta (2002), these models are highly suitable for analyzing asymmetric cycles of variables and have been widely shown to effectively capture nonlinear dynamics and regime-switching mechanisms. In essence, the STAR model uses a transition variable and a slope parameter to continuously model nonlinear relationships among variables. The general specification of the smooth transition regression model is as follows:

$$y_t = \pi' z_t + \theta' z_t F(s_t, \gamma, c) + u_t \qquad (1)$$

where $z_t$is a vector of exogenous variables, $\pi$is the vector of linear parameters, $\theta$is the vector of nonlinear parameters, and $u_t$is the error term assumed to be independently and identically distributed with zero mean and constant variance. The transition function $F(s_t, \gamma, c)$can take logistic or exponential forms as follows:

$$F(s_t, \gamma, c) = \frac{1}{1 + \exp\left(-\gamma(s_t - c)\right)} \qquad (2)$$

$$F(s_t, \gamma, c) = 1 - \exp\left[-\gamma(s_t - c)^2\right] \qquad (3)$$

In these equations, $s_t$represents the transition variable, $\gamma$is the slope parameter indicating the speed of transition between regimes, and $c$is the threshold parameter representing the location of regime change. If $\gamma \to \infty$, the STAR model converges to a TAR model; specifically, if $s_t > c$, then $F = 1$, and if $s_t < c$, then $F = 0$. Conversely, if $\gamma \to 0$, the STAR model reduces to a linear model.

The empirical model of the study is specified as follows:

$$\mathrm{INQ}_{i,t} = \alpha_0 + \beta_1 \mathrm{GDPper}_{i,t} + \beta_2 \mathrm{Unem}_{i,t} + \beta_3 \mathrm{Agri}_{i,t} + \beta_4 \mathrm{ISB}_{i,t} + \beta_5 \mathrm{INV}_{i,t} + \beta_6 \mathrm{INF}_{i,t} + \beta_7 \mathrm{EX}_{i,t}$$
$$+ \left(\theta_1 \mathrm{GDPper}_{i,t} + \theta_2 \mathrm{Unem}_{i,t} + \theta_3 \mathrm{Agri}_{i,t} + \theta_4 \mathrm{ISB}_{i,t} + \theta_5 \mathrm{INV}_{i,t} + \theta_6 \mathrm{INF}_{i,t} + \theta_7 \mathrm{EX}_{i,t}\right) F(S_t, \gamma, c) + u_t$$

Study Variables:

INQ: Gini coefficient index; a statistical dispersion measure used to represent income or wealth inequality within a population. A Gini coefficient of zero indicates perfect equality, while higher values indicate greater inequality.

GDPper: Gross Domestic Product per capita; a key macroeconomic indicator representing the total value of goods and services produced within a country over a specified period, typically one year, divided by population. It is commonly used as a proxy for economic growth (Karimi Khorasani, 2014).

Unem: Unemployment rate; the percentage of individuals actively seeking employment but unable to find jobs, calculated as the ratio of unemployed individuals to the total labor force.

To capture financial incentives and economic reforms in agriculture at the provincial level, the following variables are used:

ISB: Government credit facilities allocated to the agricultural sector.

INV: Development (capital) budget allocated to the agricultural sector.

Agri: Share of total employed labor force in the agricultural sector.

INF: Inflation rate.

EX: Real exchange rate.

Findings and Results

Initially, unit root tests are conducted to examine the stationarity of variables, followed by cointegration tests. Prior to hypothesis testing using regression models and panel data, unit root tests must be performed to ensure that variables are stationary; otherwise, non-stationary variables may lead to spurious regression results (Granger & Newbold, 1974). Traditionally, Dickey–Fuller (DF), Augmented Dickey–Fuller (ADF), and Phillips–Perron (PP) tests have been used to detect unit roots in time series data. However, since panel data include a time dimension, panel unit root tests are considered more powerful and reliable than time-series-based tests (Levin & Lin, 1992).

Compared to time-series unit root tests with complex asymptotic distributions, panel unit root tests provide statistics with standard normal distributions (Baltagi, 2005). Among these, the Levin–Lin–Chu (LLC) test and the Im–Pesaran–Shin (IPS) test are widely used (Levin et al., 2002; Im et al., 2003). The LLC test is based on the following ADF specification:

$$\Delta y_{it} = \alpha y_{it-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{it-j} + X'_{it}\delta + \varepsilon_{it} \qquad (4)$$

where $i$represents cross-sections, $t$denotes time periods, $p_i$is the number of lags, and $X_{it}$is the vector of exogenous variables. The LLC test assumes a common autoregressive coefficient across cross-sections. The null and alternative hypotheses are:

$$H_0: \alpha = 0 \text{(unit root exists)}$$

$$H_1: \alpha < 0 \text{(no unit root)}$$

The IPS test, in contrast, allows heterogeneous autoregressive coefficients:

$$\Delta y_{it} = \alpha_i y_{it-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{it-j} + \mu_{it} \qquad (5)$$

The IPS test defines its statistic as:

$$t\text{-bar}_{NT} = \frac{1}{N} \sum_{i=1}^{N} t_{iT} \qquad (6)$$

Prior to conducting panel cointegration tests, the LLC unit root test is applied to examine stationarity.

Table 1: Results of Panel Unit Root Test (LLC)

Variable	LLC W-statistic	Probability	Stationarity
AGRII	-11.5137	0.0000	I(0)
EX	-4.75433	0.0000	I(0)
GDPPER	-3.59144	0.0002	I(0)
INF	-5.26171	0.0000	I(0)
INQ	-9.47221	0.0000	I(0)
INV	-7.85555	0.0000	I(0)
ISB	-6.37363	0.0000	I(0)
UNEM	-3.49121	0.0002	I(0)

The results presented in Table 1 indicate that all variables are stationary at level form.

Most economic theories express long-term relationships among variables in level form. To confirm the existence of a long-run relationship, variables must either be stationary or integrated of the same order. Accordingly, cointegration tests are conducted. In this study, the Kao panel cointegration test is used to examine the existence of a long-term equilibrium relationship.

Table 2: Results of Kao Panel Cointegration Test

Test Type	Test Statistic	Probability
ADF	-9.033793	0.0000

As shown in Table 2, the cointegration test confirms the existence of a long-run relationship among the estimated variables. The hypotheses are defined as follows:

H_0:No cointegration

H_1:Cointegration exists

Given that the probability value is less than 0.05, the null hypothesis is rejected, confirming that the variables are cointegrated and exhibit a long-term equilibrium relationship.

To examine whether the relationship among the model variables is linear or nonlinear, it must be determined whether m(the number of regime parameters) equals one. It should be noted that, in the following tests, the null hypothesis assumes a linear model, whereas the alternative hypothesis assumes either a logistic PSTR model $(m = 1)$or an exponential PSTR model $(m = 2)$. The results of the diagnostic test reported in Table 3 indicate that the null hypothesis of linearity is rejected. Therefore, a nonlinear relationship exists between financial incentives and economic reforms in agriculture and income inequality across the provinces of the country under the smooth transition threshold framework, and accordingly, the PSTR method should be used to estimate the model parameters.

Table 3. Results of the Model Linearity Hypothesis Test (BBC Test)

Provinces of the Country	Null Hypothesis Test	F-Statistic	Significance Level
	Wald test	3.198	0.000
	Fisher test	2.008	0.001
	LRT test	2.225	0.012

As is evident from the test results reported in Table 3, the hypothesis of a linear relationship among the variables is rejected; therefore, the possibility of a linear relationship among the variables is ruled out. It should also be noted that the proposed PSTR model, based on the selected transition variable, is chosen as the optimal model for estimation in the provinces of the country. For this purpose, following González et al. (2005) and Colletaz and Hurlin (2006), the null hypothesis of a PSTR specification with one transition function is tested against the alternative hypothesis of a PSTR specification with at least two transition functions. The results are presented in Table 4. The findings show that the null hypothesis regarding the sufficiency of one transition function is not rejected under either the one-threshold or two-threshold case. Therefore, a single transition function is sufficient to specify the effect of financial incentives and economic reforms in agriculture on income inequality across the provinces of the country.

Table 4. Test for the Existence of Residual Nonlinearity

Case	LR	LMf	LMw
Two-threshold case (M = 2)	1.337 (0.423)	1.489 (0.396)	1.268 (0.559)
One-threshold case (M = 1)	1.569 (0.356)	1.378 (0.403)	1.119 (0.512)

With the confirmation of a nonlinear relationship among the variables and the sufficiency of a single transition function to specify nonlinear behavior, the next step is to determine the optimal specification between a transition function with one threshold and one with two thresholds. For this purpose, the PSTR model corresponding to each case is estimated, and based on the residual sum of squares, Schwarz criterion, and Akaike criterion, the PSTR model with one threshold is identified as the optimal model. Accordingly, a PSTR model with one transition function and one threshold is selected to examine the nonlinear behavior among the variables under study.

Using a PSTR model in which the transition variable is government credit facilities allocated to the agricultural sector, the income inequality function across the provinces of the country is modeled. Given the confirmation of the nonlinear model, the results of the nonlinear component are then analyzed. According to the estimation results for the nonlinear component, the coefficient of per capita gross domestic product growth in the province has a negative and statistically significant effect on income inequality at the 95% confidence level. As expected, the coefficient of the unemployment rate variable in the nonlinear part of the model has a positive (direct) effect on income inequality. In line with the theoretical literature, the variables of credit facilities allocated to the agricultural sector, development budget, and active labor force in the agricultural sector have an inverse effect on income inequality and contribute to improving income distribution, and these effects are statistically significant at the 5% error level. The effect of the

inflation rate on income inequality is positive, whereas the effect of the exchange rate is negative. Since an increase in the exchange rate strengthens export incentives in the agricultural sector, this leads to an improvement in income distribution.

Table 5. Estimation of the Model Using the PSTR Method

Provinces of the Country	Coefficient	Standard Error	t-Statistic	Probability
Estimation of the linear part of the model				
CONSTANT	0.329059	0.136048	2.418698	0.0234
GDPPER	-0.158886	0.075984	-2.091051	0.0419
UNEM	0.582868	0.239013	2.438644	0.0149
AGRII	-0.096233	0.026454	-3.637702	0.0003
ISB	-0.496421	0.175702	-2.825358	0.0069
INV	-0.212527	0.090308	-2.353357	0.0356
INF	0.393667	0.142781	2.757139	0.0201
EX	-0.642607	0.230948	-2.782475	0.0200
Estimation of the nonlinear part of the model				
CONSTANT	0.016839	0.006021	2.796881	0.0049
GDPPER	-0.110132	0.055542	-1.982849	0.0491
UNEM	0.016559	0.007091	2.335214	0.0355
AGRII	-0.089278	0.027937	-3.195642	0.0015
ISB	-0.235516	0.085117	-2.762255	0.0053
INV	-0.022717	0.010298	-2.205968	0.0274
INF	0.053752	0.022425	2.396934	0.0165
EX	-0.197885	0.085146	-2.324058	0.0201
Threshold (c)	0.210178	0.013521	15.54456	0.0000
Slope parameter (γ)	0.735776	0.215697	3.411155	0.0007

$$R^2_{\text{adjusted}} = 0.85$$

The comparison of coefficients across the two different regimes is made on the basis of the transition variable and its values, since the value of the transition variable can determine the transition function and, consequently, the prevailing regime. In the present estimation, the transition variable is government credit facilities allocated to the agricultural sector, and the estimated threshold value for this variable is 0.21 for the provinces of the country. Depending on the distance of credit facilities from this threshold value, the model follows two different extreme regimes. A comparison of the model coefficients across the two regimes shows that when credit facilities exceed the threshold value of 0.21 (that is, with the transition from the linear to the nonlinear part), the response of income inequality to changes in this variable increases markedly. Thus, the greater the improvement and expansion of credit facilities allocated to the agricultural sector, the stronger the response of income inequality to this effect.

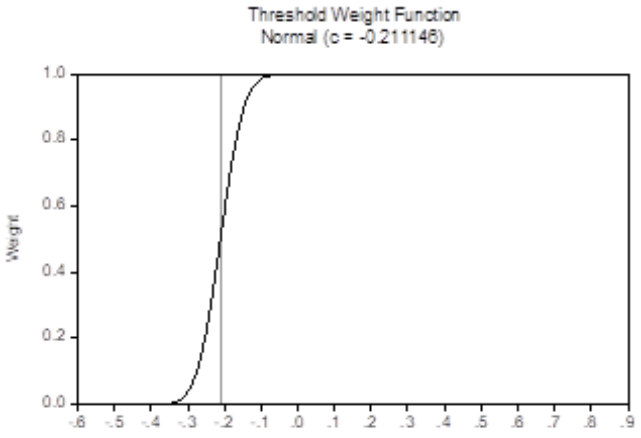

Figure 1. Relationship Between the Transition Function and the Transition Variable

In the present study, the Durbin–Watson test is used to examine autocorrelation.

Table 6. Results of the Autocorrelation Test

Provinces of the Country	F-Statistic	Prob.	Durbin–Watson
	1.235	0.69	2.236

As shown in the above table, the results of the Durbin–Watson autocorrelation test indicate that there is no correlation among the disturbance terms. Therefore, the third classical standard assumption, namely the absence of autocorrelation among error terms, is not violated. Accordingly, the estimators possess the required properties, including minimum variance and efficiency.

Another classical standard assumption is homoskedasticity. In the present study, the Breusch–Pagan–Godfrey test is used.

Table 7. Results of the Heteroskedasticity Test

Provinces of the Country	F-Statistic	Prob.	Breusch–Pagan–Godfrey
	1.298	0.578	1.442

As can be seen from the table, the test results indicate the absence of heteroskedasticity.

Another appropriate measure for evaluating the quality of the estimated model is to examine changes in coefficients across the two regimes. If the estimated model is well specified, the coefficients are expected to remain stable and unchanged when the regime shifts.

Table 8. Results of the Smooth Transition Parameter Stability Test

Provinces of the Country	Null Hypothesis	F-Statistic	Prob.
	$b_1 = b_2 = b_3 = b_4 = 0$	0.329	0.552
	$b_1 = b_2 = b_3 = 0$	0.441	0.615
	$b_1 = b_2 = 0$	0.378	0.407
	$b_1 = 0$	0.205	0.197

As is also evident from the table, the test of coefficient stability across the two regimes shows that the coefficients do not change as a result of regime switching.

Discussion and Conclusion

The findings of the present study confirmed that the relationship between financial incentives and economic reforms in the agricultural sector and income inequality across the provinces of Iran is nonlinear and regime-dependent. The rejection of the linearity hypothesis and the confirmation of a PSTR specification indicate that the distributive effects of agricultural policy instruments cannot be understood through a constant and uniform coefficient structure, because the impact of explanatory variables changes as the level of government facilities allocated to the agricultural sector crosses the estimated threshold. This result is theoretically meaningful because it shows that agricultural support does not operate in a mechanically proportional manner; rather, its effectiveness depends on the scale and regime of intervention. Such a finding is compatible with broader development arguments emphasizing that the relationship between growth, policy, and inequality is often contingent on structural and institutional conditions rather than fixed across all contexts (2, 3). It is also consistent with studies that have highlighted asymmetric and nonlinear macroeconomic responses in Iran, especially under changing monetary, oil, and sectoral conditions (15, 16, 51). Therefore, the first major contribution of the present study is to demonstrate

that the inequality effects of agricultural incentives in the provinces of Iran are conditional on the regime defined by the transition variable rather than being constant across all levels of support.

Another important result was that per capita gross domestic product growth exerted a negative and statistically significant effect on income inequality in both the linear and nonlinear parts of the model. This means that higher provincial economic growth, when associated with the productive capacity of the local economy, contributes to a more equitable distribution of income. This result suggests that growth in the provinces has not merely expanded aggregate output, but has also had some capacity to diffuse income-generating opportunities across households and productive groups, particularly when linked to agriculture and related sectors. This finding aligns with the classical literature arguing that the growth process can, under certain institutional and sectoral conditions, contribute to poverty reduction and improved distribution (1). It also resonates with more recent findings that inclusive sectoral growth and agricultural transformation can help reduce structural disparities and strengthen local resilience (5, 9). In the Iranian context, the result may further reflect the importance of agriculture in preserving social and economic balance between urban and rural areas and in supporting regionally dispersed livelihoods (7, 8). The stronger relevance of this variable under the nonlinear regime further implies that when agricultural facilities reach an effective level, the inequality-reducing impact of provincial growth becomes more pronounced because growth is more likely to be translated into broader access to employment, credit, and productive investment.

The unemployment rate, by contrast, showed a positive and statistically significant effect on income inequality, especially in the nonlinear regime. This is a fully expected result and reflects the fact that unemployment weakens household income security, reduces access to stable earnings, and intensifies disparities across social groups and regions. In provincial economies with a significant dependence on agriculture and informal employment, rising unemployment can widen the gap between households with access to assets or public support and those without such access. This finding is consistent with the broader literature on labor market exclusion and inequality, particularly studies emphasizing that unequal participation in economic activity deepens income disparities and undermines inclusive growth (31-33). It is also compatible with Iranian evidence showing that structural barriers to participation, especially for vulnerable social groups, remain a central source of unequal economic outcomes (25-27). The significance of unemployment in the present model indicates that agricultural incentives cannot reduce inequality unless they are also capable of supporting labor absorption and stabilizing employment conditions at the provincial level.

A central finding of the study is that facilities allocated to the agricultural sector have a negative and statistically significant effect on income inequality. In substantive terms, this means that greater government credit support to agriculture contributes to improving income distribution across provinces. This result is highly important because it empirically validates the argument that agricultural finance can serve as a redistributive tool when it eases liquidity constraints, sustains small producers, and expands access to productive opportunities in relatively disadvantaged areas. The finding is in line with international research demonstrating that inclusive banking and expanded access to finance can improve economic inclusion and reduce exclusionary patterns in income generation (19-21). It also supports findings from Iran suggesting that banking facilities and deposits influence income inequality at the provincial level and that the composition and direction of credit matter for distributional outcomes (22, 23). More specifically, the result suggests that when agricultural credit is directed toward productive use rather than speculative or highly concentrated channels, it can strengthen the earning capacity of rural and semi-rural households and reduce regional disparities.

The threshold interpretation of this variable is even more revealing. The estimated threshold value for government facilities to agriculture indicates that the response of income inequality intensifies once support passes a critical level. In other words, agricultural finance has an inequality-reducing effect in both regimes, but the effect becomes stronger beyond the threshold, suggesting that small or fragmented amounts of support may be insufficient to generate a meaningful distributive transformation. This is a plausible economic mechanism. Below the threshold, facilities may be too limited to finance technological upgrading, market access, irrigation improvements, or employment expansion. Above the threshold, however, support may begin to generate cumulative benefits by activating production chains, increasing labor demand, and reinforcing rural incomes. This interpretation is consistent with studies emphasizing the importance of scale and effective policy design in agricultural support systems (9, 10). It also complements Iranian evidence that the agricultural sector's performance is sensitive to the broader economic environment and to the magnitude of state support and resource allocation (12, 13). Thus, the present study suggests that the mere existence of agricultural facilities is not enough; their effectiveness depends on surpassing a minimum threshold at which support can alter actual production and income dynamics.

The development budget allocated to the agricultural sector also showed a negative and significant effect on income inequality. This finding indicates that public capital expenditure in agriculture—through infrastructure, irrigation systems, logistics, extension services, and productive assets—can reduce regional and household disparities. This result is consistent with the argument that public investment in agriculture has a wider social payoff than many other forms of expenditure because it not only raises productivity but also broadens economic opportunity in lagging regions (5, 46). In the Iranian context, where provinces differ greatly in physical infrastructure and productive capacities, agricultural development expenditures can mitigate structural disadvantages and improve access to value creation across space (36-38). The significance of this variable supports the idea that reducing inequality requires not only financial flows through credit, but also longer-term capital formation that improves the production base of rural and agricultural economies.

Similarly, the share of active labor employed in agriculture had a negative and significant effect on income inequality. This suggests that the agricultural sector continues to play an important role in absorbing labor and distributing income in a relatively broad-based way across the provinces. In contexts where industrial and advanced service sectors are unevenly developed, agriculture often remains the main channel through which lower-income households access work and sustain consumption. The present result therefore reinforces the view that agriculture contributes to social balance and rural-urban equilibrium in Iran (7). It also accords with studies emphasizing the developmental importance of the agricultural sector and its role in sectoral value creation and local welfare (8, 39, 40). At the same time, this finding should not be read as implying that any form of agricultural employment is sufficient. Rather, it suggests that when the sector remains active and linked to productive support, it can serve as an equalizing employment base in the provincial economy.

The positive effect of inflation on income inequality was another important result. Inflation reduces the real purchasing power of fixed and low incomes more rapidly than it affects those with greater asset diversification, price-setting power, or access to inflation-hedging instruments. In agricultural provinces, inflation can also raise input costs, create uncertainty in production decisions, and erode the real value of public facilities and budgets. Therefore, even when supportive agricultural policies exist, inflation may partially offset their redistributive benefits. This result is compatible with the literature on macroeconomic instability and asymmetric shocks in Iran, which has shown that volatility in key macro variables can alter sectoral performance and weaken policy transmission (15, 17,

51). The result also implies that inequality reduction cannot be pursued effectively through sector-specific support alone; it requires macroeconomic stabilization so that the real value of support measures is preserved.

By contrast, the real exchange rate showed a negative and significant effect on income inequality. This suggests that exchange rate increases, under the structure of Iran's agricultural economy, may improve income distribution by strengthening incentives for agricultural exports and enhancing the relative profitability of tradable agricultural goods. When export-oriented agricultural activities become more attractive, producer incomes can rise, especially in provinces with comparative advantages in agricultural production. This interpretation is supported by Iranian studies showing that exchange rate movements affect sectoral performance and agricultural exports, including key products such as pistachios (41, 42). It also aligns with the broader notion that sector-specific trade channels can mediate the relationship between macroeconomic variables and distributional outcomes (43). However, the beneficial effect of exchange rate movements is likely conditional on whether producers are actually able to access export markets and whether rising export incentives are not simultaneously offset by higher import-dependent input costs.

Beyond the specific coefficients, the diagnostic and stability tests strengthen confidence in the substantive interpretation of the results. The absence of autocorrelation and heteroskedasticity problems indicates that the estimated relationships are econometrically reliable, while the stability of coefficients across regimes suggests that the model captures a meaningful structural pattern rather than spurious shifts. This is particularly important in a study of provincial inequality because regional data are often vulnerable to omitted institutional heterogeneity and macroeconomic noise. The strong adjusted coefficient of determination further indicates that the selected variables collectively explain a substantial proportion of variation in provincial income inequality. In this sense, the results contribute to the growing literature that links financial structure, agricultural policy, and inclusion, while showing that provincial inequality in Iran is shaped by a complex interaction of credit, public expenditure, labor structure, inflation, exchange rate conditions, and growth performance (29, 44, 50).

Taken together, the findings suggest that agricultural policy can serve as an effective instrument for reducing income inequality in Iran, but only under conditions of sufficient scale, proper targeting, and macroeconomic coordination. The nonlinear structure of the results indicates that agricultural support becomes substantially more effective when it exceeds a critical threshold, and that the benefits of credit and public investment are reinforced when growth is inclusive and employment-generating. At the same time, rising unemployment and inflation remain serious threats to distributional justice. The broader implication is that inequality in the provinces is not merely the product of market forces, but also of how financial incentives, sectoral reforms, and macroeconomic management interact. This interpretation is consistent with the literature on inclusive development, agricultural transformation, and unequal access to finance and opportunity (4, 6, 24, 28). Therefore, the present study supports the view that a well-designed agricultural financing and reform strategy can play a central role in improving income distribution, especially when it is sensitive to provincial heterogeneity and regime-dependent policy effectiveness.

One limitation of the present study is that, although it captures important provincial nonlinearities through the PSTR framework, it relies on a restricted set of measurable macroeconomic and sectoral variables and therefore may not fully reflect institutional quality, governance efficiency, market access asymmetries, climate vulnerability, land ownership patterns, and differences in the quality of implementation across provinces. Another limitation is that the analysis is conducted at the provincial aggregate level, which prevents a direct assessment of intra-

provincial inequality and household-level heterogeneity. In addition, the use of available annual data may conceal short-run distributional shocks and policy timing effects that operate within the year.

Future research can extend this line of inquiry by incorporating more detailed indicators of institutional capacity, agricultural productivity, rural infrastructure, climate stress, and household financial access in order to examine the mechanisms through which agricultural support affects inequality. It would also be useful to compare provinces by development stage, agricultural specialization, or exposure to trade and climatic shocks. Further studies may employ spatial panel models, household survey data, or multilevel approaches to distinguish provincial spillovers from local distributional effects. Comparative studies across countries with similar structural dependence on agriculture could also clarify whether the threshold pattern observed here is specific to Iran or reflects a broader development mechanism.

From a practical standpoint, the results imply that policymakers should avoid fragmented and low-scale agricultural support programs and instead design credit and development packages that are sufficiently large and well targeted to cross the threshold at which meaningful distributive effects emerge. Public facilities to agriculture should be directed toward productive and employment-generating activities, especially in provinces with higher inequality and weaker access to finance. Development budgets in agriculture should prioritize infrastructure, productivity-enhancing investments, and support systems that strengthen the earning capacity of rural households. At the same time, agricultural support policies should be coordinated with inflation control, labor market stabilization, and export facilitation so that the equalizing effects of agricultural reform are not neutralized by macroeconomic instability.

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Authors' Contributions

All authors equally contributed to this study.

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The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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References

1. Ahluwalia MS, Carter N, Chenery H. Growth and poverty in developing countries. Journal of Development Economics. 1979;6:299-341. doi: 10.1016/0304-3878(79)90020-8.
2. Anand S, Kanbur SMR. The Kuznets process and the inequality-development relationship. Journal of Development Economics. 1993;40(1):25-52. doi: 10.1016/0304-3878(93)90103-T.
3. Acemoglu D, Egorov G, Sonin K. Dynamics and stability of constitutions, coalitions, and clubs. American Economic Review. 2012;102(4):1446-76. doi: 10.1257/aer.102.4.1446.
4. Alvaredo F, Cogneau D, Piketty T. Income inequality under colonial rule: Evidence from French Algeria, Cameroon, Tunisia, and Vietnam and comparisons with British colonies 1920-1960. Journal of Development Economics. 2021;152:102680. doi: 10.1016/j.jdeveco.2021.102680.
5. Odusola A. Africa's Agricultural Renaissance: From Paradox to Powerhouse: Palgrave Macmillan; 2021.
6. Oluoch W, Alhassan AL. Bridging the gender credit gap in low-income countries: The impact of digital financial inclusion. Emerging Markets Review. 2026;70:101389. doi: 10.1016/j.ememar.2025.101389.
7. Momeni F, Dashtbani S, Banoei AA. The Importance of the Agricultural Sector in Maintaining the Economic-Social Balance of Iran's Urban and Rural Structure. Spatial Economics and Rural Development. 2017;6(4):17-46.
8. Darabi F. Sources of Growth in Iran's Agricultural Sector: An Analysis within the Input-Output Table Framework. Iranian Journal of Agricultural Economics and Development Research. 2017;42(1).
9. de Janvry A, Sadoulet E. Seven propositions to support and finance the agricultural sector in sub-Saharan Africa in the context of climate change. Chair in International Architecture of Development Finance, 2023.
10. Larionova NP. Government support for agriculture and evaluation of its effectiveness at the macro and micro level. 2019. p. 012211.
11. Shakeri T. The Effect of Oil Price Fluctuations on Output in Iran's Agricultural Sector. Economic Research Letter. 2013(17).
12. Nasabian A. Examining the Effect of Oil Income on the Agricultural Sector. Kouye Danesh. 2017(37).
13. Mirzaei Nejad J. Examining the effects of Increased Oil Revenues on the Agricultural Sector. Journal of Agricultural Economics and Development. 2015;9(35).
14. Shirin Bakhsh S, Moghaddas Bayat M. Examining the Symmetric and Asymmetric Effects of Oil Shocks on the Value Added of Iran's Agricultural and Service Sectors. Energy Economics Studies. 2010;7(26).
15. Altajai A, Arbab Afzali M. Examining the Asymmetric Effects of Oil Price Shocks on Iran's Macroeconomic Variables. Comparative Economics. 2012;3(2).
16. Mehregan N, Mohammadzadeh P, Haghani M, Salmani Y. A Multi-Behavior Model of Economic Growth in Response to Crude Oil Price Fluctuations: An Application of GARCH and Markov-Switching Regression Models. Economic Modeling Research. 2013(12):73-101.
17. Jahadi M, Alami Z. Oil Price Shocks and Economic Growth: Evidence from OPEC Member Countries. Economic Growth and Development Research. 2011;1(2).
18. Tohid N. The Emergence of Dutch Disease in Iran's Agricultural Sector. Economic Research Letter. 2016;11(1).
19. Ahamed MM, Ho SJ, Mallick SK, Matousek R. Inclusive banking, financial regulation and bank performance: Cross-country evidence. Journal of Banking & Finance. 2021;124:106055. doi: 10.1016/j.jbankfin.2021.106055.
20. Ahamed MM, Mallick SK. Is financial inclusion good for bank stability? International evidence. Journal of Economic Behavior & Organization. 2019;157:403-27. doi: 10.1016/j.jebo.2017.07.027.
21. Morgan PJ, Pontines V. Financial stability and financial inclusion: The case of SME lending. The Singapore Economic Review. 2018;63(1):111-24. doi: 10.1142/S0217590818410035.
22. Nasiri Aghdam A, Babapour M. The Effect of the Composition of Bank Credit on Income Distribution in Developing Countries. Economic Modeling. 2022;15(56):63-82.
23. Alavirad A, Vakili Zarch MH, Totonchi J, Dehghan Tafti MA. The Effect of Bank Deposits and Facilities on Income Inequality in the Provinces of Iran. Economic Studies and Policies. 2022;9.
24. Sabah Aliwi F, Ghobadi S, Makasis S, Sharifi Renani H. Analysis of the Effect of Loan Facilitation on Vulnerable Women's Employment. Economic Development and Planning. 2024;11(2).
25. Mirhosseini Z, Abbaspour Z. Identifying Barriers and Deterrent Factors to Women's Participation in Economy and Development. Sociology of Economy and Development. 2023;12:177-203.

26. Sadeghi O, Abadi B, Boudaghi A. Identification and Ranking of Factors Affecting Women's Economic Participation in Khuzestan Province with Emphasis on Interpretive Structural Modeling. Economic Sociology and Development. 2021;10(1):1-24.
27. Zafaranchi LS. Examining the Pattern of Women's Economic Participation in the Labor Market with a Focus on Individual Characteristics and Household Characteristics. Women's Research Journal. 2021;12(36):107-31.
28. Arabikhoun B. The Role of Women's Economic Rights in the Sustainable Development of Societies with Emphasis on Iranian Society: Shahid Beheshti University, Faculty of Law; 2023.
29. Khosh Kalam M, Farahati M. Income Inequality and Women's Economic Participation in the Provinces of Iran. Iranian Demographic Association Letter. 2024;19(38):413-48.
30. Abbasi Esfajir AA, Rezaei Roshan H. Examining the Effect of Women's Employment on Economic Growth in Selected Middle Eastern Countries. Woman and Society. 2020;11(42):207-26.
31. Asongu S, Odhiambo N. Inequality and the economic participation of women in sub-Saharan Africa: An empirical investigation. African Journal of Economic and Management Studies. 2020;11(2):193-206. doi: 10.2139/ssrn.3393876.
32. Napitupulu F, Ekawaty M. Ketimpangan Gender dan Pertumbuhan Ekonomi: Studi Kasus Pada Negara-Negara Asia Timur dan Pasifik. Journal of Development Economic and Social Studies. 2022;1(1):29-43. doi: 10.21776/jdess.2022.01.1.4.
33. Rizki AM, Adiputra YS. The effect of gender inequality in employment on economic growth in Batam City. Jurnal Ilmu Sosial dan Humaniora. 2024;13(1):121-31. doi: 10.23887/jish.v13i1.74371.
34. Salatin P, Rostami Ankas S. The Effect of Fertility on Women's Participation Rate in Selected Countries. Woman and Family Studies. 2018;11(41):7-22.
35. Sahari Z, Seif Jamali L. The Effect of Gender Inequality and Global Market Development on Trade in Selected Countries. New Delhi2019.
36. Abdoli G, Kardgar R, Kazemi A, Molaei Ghalichi M. Ranking the Provinces of Iran in Terms of Creating Value Added in Economic Subsectors Based on the VIKOR Multi-Criteria Decision-Making Model. Regional Planning. 2017;7(26):1-14.
37. Statistical Center of I. Statistical Yearbook. 2015.
38. Iranian Parliament Research C. Iranian Parliament Research Center. 2016.
39. Parhizkari A, Sabouhi M. Examining Income Distribution and Its Effect on the Economy of Rural Households in Qazvin County. 2012. p. 12.
40. Hadizadeh Bazzaz M, Bouzarjomehri K, Shayan H, Noghani Dokht Bahmani M. Evaluating the Performance of Rural Cooperatives with an Agricultural Sustainable Development Approach: A Case Study of Neyshabur. Rural Research and Planning. 2015;4(2):111-25.
41. Nasrollahi K, Moghaddas Far S, Mostolizadeh SM. Determining the Equilibrium Exchange Rate and the Effect of Its Deviations from the Real Rate on the Four Sectors of Iran's Economy. Economic Journal. 2013;13(9-10).
42. Mortazavi SA, Zamani A, Nouri M, Nader H. Examining the Effect of Exchange Rate Fluctuations on Iran's Pistachio Exports. Journal of Agricultural Economics and Development. 2011;25(3).
43. Aliyu RSU. Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation. MPRA Paper. 2009. doi: 10.2139/ssrn.1346418.
44. Vakili Zarch MH. Examining the Effects of the Real Interest Rate on Inequality in Different Income Deciles: A Quantile Model Approach. Studies in Banking Management and Islamic Banking. 2023;9(23):79-98.
45. Bigdeli M, Taghavi M, Esmaeilzadeh A, Daman Keshideh M. Empirical Test of the Effect of Business Environment Risk on the Relationship Between Credit Risk and Financial Performance in the Iranian Banking Industry. Financial Economics Quarterly. 2019;13(48):1-36.
46. Ahmed M, Stockle CO. Quantification of Climate Variability, Adaptation and Mitigation for Agricultural Sustainability. Cham: Springer International Publishing; 2017.
47. Mihardjo LWW, Sasmoko, Alamsyah F, Elidjen. Boosting the firm transformation in Industry 5.0: Experience-agility innovation model. International Journal of Recent Technology and Engineering. 2019;8(2S9):737-42. doi: 10.35940/ijrte.B1154.0982S919.
48. Kurniawan M. Dampak Investasi Asing terhadap Ekonomi Masyarakat Lokal di Kota Batam Provinsi Kepulauan Riau: Institut Pemerintahan Dalam Negeri; 2023.
49. Najafi Moghaddam A, Hosseini SH, Norifard Y. Performance Analysis of Global Hedge Funds. Advances in Mathematical Finance & Applications. 2023. doi: 10.22034/AMFA.2020.1898695.1418.
50. Elyasi Bakhtiari T, Memarnezhad A, Dezhpasand F, Ghaffari F. Analysis of the Effects of Financial Inclusion on Poverty and Income Inequality in Iran: A Panel ARDL Approach. Economy and Modeling. 2023;14(2):63-90.

51. Sharifi Renani H, Ghobadi S. Asymmetric Effects of Monetary Policy Shocks on Real Output in Iran: A Markov-Switching Approach. Economic Modeling. 2012;6(3):89-108.