

Macroeconomic Dynamics of Poverty in Iran¹

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ARTICLE INFO

Article type:
Research

Article history

Received: 2025.03.31
Revised: 2025.08.23
Accepted: 2025.09.14
Published: 2025.10.01

Keywords:

poverty,
macroeconomics,
sanctions, system
dynamics, Iran.

JEL classification:

I32, O11, C61.

Abstract:

Poverty is one of the most challenging issues in the world, especially in developing countries. Much research has been done on poverty and its causes, but few studies have been conducted to examine the macroeconomic dynamics of poverty. The main purpose of this paper is to examine the macroeconomic dynamics of poverty in Iran, and for this purpose, a system dynamics model has been designed, simulated, and used for Iran. The simulation over the period 1990-2021 shows that, on average, at least the first four income deciles in Iran are below the international poverty line (\$6.85 per day). According to the simulation results, international sanctions against Iran, hyperinflation, exchange rate shocks, and expansionary monetary and fiscal policies have increased the poverty rate, but in comparison, the impact of international sanctions has been greater than others. Specifically, the simulation shows that international sanctions have increased the poverty rate in Iran by about 10 percent on average. Even economic growth has not been able to significantly reduce the impoverishing effects of monetary shocks and inappropriate economic policies. According to the results, in addition to lifting international sanctions, targeted policies for sustainable economic growth and development should be implemented, and the Central Bank, while maintaining its independence, should refrain from implementing monetary policies that reduce the value of the national currency.

Introduction

According to the World Bank (2022), global poverty declined between 1990 and 2019, particularly after the introduction of the Millennium Development Goals (MDGs), which committed all countries to key development objectives.² However, Iran's poverty rate fluctuated over this period, following a downward trend until 2011 (East et al., 2023), after which it began rising due to intensified

¹ I would like to thank the anonymous referees who improved the scientific quality of this article.

² For MDG and SDG see Halisçelik and Soytaş (2019).

Cite this article: S. Rasekhi (2025). Macroeconomic Dynamics of Poverty in Iran. *International Journal of Business and Development Studies*, 17 (2), 231-265. DOI: 10.22111/ijbds.2025.51556.2219.



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Publisher: University of Sistan and Baluchestan

sanctions. Simulations from this study indicate that Iran's poverty rate, based on the upper middle-income threshold of \$6.85 per day, surpassed 40% in 2021, affecting at least four income deciles. This increase stems from economic instability, unsustainable growth, and ineffective policies under sanctions.

Iran's economic growth from 1990 to 2021 was volatile due to heavy reliance on oil exports and persistent instability from domestic and international challenges. During this period, oil revenues constituted nearly 50% of government income and formed a major portion of the national budget. Severe sanctions from 2011 to 2022 significantly hindered economic growth, with temporary improvements following the 2015 easing of restrictions. However, renewed sanctions in 2018 worsened economic conditions. Chronic budget deficits, coupled with inflation, have eroded purchasing power and deepened poverty. The economic recession, along with excessive money creation to finance deficits, has driven inflation, currency devaluation, and declining real incomes. Limited economic growth has largely benefited unproductive sectors, weakening productive industries and exacerbating poverty.

Iran's persistent budget deficits and high inflation align with Sargent and Wallace (1981) argument that governments facing fiscal shortfalls resort to seigniorage—monetary expansion—to cover expenditures, fueling inflation. This phenomenon is consistent with Keynesian perspectives (Burney et al., 1989). The central bank's monetization of government debt has expanded the money supply, accelerating inflation. Central bank data indicate a rapid increase in Iran's monetary base since 2005. Although direct government borrowing from the central bank has declined since 2009, other factors—such as banking system debt to the central bank and foreign exchange sales at manipulated rates—have driven monetary expansion. Over time, liquidity growth has outpaced economic output, reinforcing inflationary pressures. The decline in banks' reserve ratios, now around 10%, has further amplified liquidity expansion.

Key monetary indicators—liquidity growth, monetary base expansion, and inflation—have closely moved together in Iran from 1990 to 2021. This pattern aligns with monetarist theory, which posits that inflation results from excessive money supply growth relative to economic output (Humphrey, 1975, Dornbusch, 1987, Hossain, 1990). The central bank's focus on monetary expansion without addressing structural economic issues has fueled inflation and, consequently, increased poverty.

Exchange rate fluctuations have also directly and indirectly influenced poverty in Iran. A depreciating currency raises import costs in local currency terms, increasing overall price levels. Higher import costs, in turn, raise production expenses for domestic goods, particularly in restricted or monopolized industries. Persistent currency devaluation has created inflationary expectations, triggering a self-reinforcing cycle of inflation and exchange rate depreciation. This study finds a strong correlation (0.98) between Iran's unofficial exchange rate (NOER)

and the Consumer Price Index (CPI), supporting the Purchasing Power Parity (PPP) hypothesis.

This research examines the dynamic impact of macroeconomic variables on poverty in Iran using a system dynamics approach over the 1990-2021 period. The study tests the following hypotheses: (1) Sanctions significantly increase the poverty rate. (2) Hyperinflation exacerbates poverty. (3) Exchange rate shocks elevate poverty. (4) Economic growth reduces poverty. (5) Expansionary monetary policies have contributed to poverty. (6) Expansionary fiscal policies have intensified poverty.

Poverty assessment in this study relies primarily on the poverty headcount ratio, complemented by expenditure coverage indices (measuring the share of expenditures covered by per capita income) and the Hanke misery index (combining interest rates, inflation, and unemployment, adjusted for per capita income growth). This research offers a novel macroeconomic perspective on poverty through its dynamic systems approach and analysis of the impact of sanctions. However, a key limitation is the inconsistency of time-series data across statistical sources, including the Central Bank of Iran (2025) and the Statistical Center of Iran (2025), leading to discrepancies in indicators.¹

The necessity of the present research lies in the combination of three key dimensions: the social and economic significance of poverty, the limitations of existing studies in Iran—particularly from a methodological perspective—and the need for evidence-based policymaking grounded in systemic analysis. Such an approach can enhance the accuracy of estimations, increase the scientific credibility of the findings, and provide more effective policy recommendations for poverty reduction in Iran.

The paper is structured as follows: Section 2 presents the theoretical framework, followed by the empirical background in Section 3. Section 4 details the methodology. Section 5 covers model simulations and data analysis. Section 6 summarizes findings and discusses policy implications. The final section provides references.

Theoretical Background

The formation and spread of poverty can be analyzed through various theoretical frameworks, ranging from orthodox economic perspectives to eclectic (economic-sociological) approaches. Classical economic theory, rooted in the

¹ The data were thoroughly cleaned and validated in several stages before being used in the system dynamics calculations. For this purpose, multiple domestic and international data sources were employed to extract reliable datasets. For example, there is substantial variance in the dollar value of Iran's GDP, partly due to differences in the use of exchange rates (official, free, and PPP-based ER). Additionally, various ratios and indicators—such as trade openness, average propensity to consume, Oil's share in government revenues, the share of government tax revenues, government size, and various poverty indices—were collected from multiple sources and cross-checked to provide a more accurate and comprehensive representation of the data. To this end, a large volume of accessible data for all variables was extracted, compared, and prepared for processing.

works of 18th- and 19th-century economists such as Adam Smith, Thomas Malthus, and David Ricardo, views poverty as a natural and inevitable feature of the capitalist system (Shaikh et al., 2023). According to this perspective, poverty results from flawed individual choices that reduce productivity. Poor decisions can lead individuals into poverty or a welfare trap (Tufekchiev, 2018). Additionally, within the classical framework, poverty perpetuates itself, as the behavioral preferences of the poor are transmitted across generations. The poverty subculture theory (or cycle of deprivation) further posits that deprivation is a personal or familial phenomenon rather than a consequence of market mechanisms. Within this view, government intervention to support the poor is considered unethical because poverty is seen as a result of individual choices. Providing subsidies, according to this perspective, not only fails to alleviate poverty but may also create incentives for others to remain in poverty. Government action is justified only to correct economic misincentives that discourage self-sufficiency (Sanchez-Martinez & Davis, 2014). However, classical theory has been criticized for overlooking the structural causes of poverty and for placing excessive emphasis on individual responsibility while ignoring systemic factors such as limited access to education and weak governance (Banerjee & Duflo, 2008). Individual decisions are often shaped by broader circumstances—market failures may constrain opportunities, unemployment may stem from insufficient aggregate demand, and class-based discrimination can restrict mobility (Sanchez-Martinez & Davis, 2014). Despite these critiques, classical poverty theory remains relevant today, particularly in discussions surrounding contemporary global economic trends and policy debates (Shaikh et al., 2023).

The ongoing competition between the market and the state has given rise to various political economy theories. Classical liberalism, as proposed by David Ricardo, emphasizes the primacy of the market over the state. However, the influence of classical liberalism began to wane, and with the establishment of the Bretton Woods System (BWS), Keynesianism emerged, advocating for state intervention to foster economic growth and address market failures (Permadi, 2011). In the liberal approach to poverty, both market distortions and widespread underdevelopment across multiple dimensions contribute to economic hardship. Within the liberal model proposed by Sachs (2023), the defining characteristic of an underdeveloped country is low levels of capital—whether human, commercial, infrastructural, natural, institutional, or technological. Sachs' approach is innovative in its clinical design of anti-poverty interventions, emphasizing adaptation to specific circumstances rather than a "one-size-fits-all" strategy. Economies, like individuals, function as complex systems in which failure in one dimension (e.g., corruption) can trigger failures in others (e.g., market inefficiencies) (Davis, 2007). The underlying causes of poverty vary across countries: in one, weak institutions and corruption may be the primary

barriers to development, while in another, geographical isolation may hinder access to essential goods and services necessary for a basic standard of living. Thus, according to this perspective, a broad set of macroeconomic factors that hinder market efficiency must be identified and analyzed. Only then can targeted and context-specific policy programs be designed to effectively combat poverty.

John Maynard Keynes, the most influential pioneer of liberal economics, argued that market forces could drive economic development (Sanchez-Martinez & Davis, 2014). However, he attributed the Great Depression to the government's failure to counteract the collapse of private investment. To address this, Keynes proposed the socialization of investment—channeling communal savings into private enterprises. He believed this approach would discourage passive wealth accumulation, incentivize investment in productive economic activities, and ultimately increase employment (Jung & Smith, 2007). According to Keynesian theory, poverty is primarily a consequence of unemployment and occurs involuntarily. At the macro level, high unemployment directly increases the likelihood of individual joblessness, while also weakening the bargaining power of wage earners, who face a greater risk of layoffs or wage reductions (Jung & Smith, 2007). Keynes regarded economic growth as the key mechanism for reducing poverty (Prasetyo & Cahyani, 2022). Assuming rational decision-making, his theory supports expansionary fiscal policies—such as increased public spending on education, unemployment benefits, and infrastructure—to combat both unemployment and poverty (Jung & Smith, 2007). Unlike classical and neoclassical economists, Keynes advocated for active state intervention in economic affairs. He argued that government involvement not only fosters economic growth by increasing investment multipliers but also mitigates poverty by addressing market failures and enhancing capabilities (Sanchez-Martinez & Davis, 2014). Furthermore, Keynes linked market failures to inflation, which he attributed to excessive consumer spending (Prasetyo & Cahyani, 2022). Within the Keynesian framework, inflation exacerbates poverty, particularly when nominal wages remain stagnant. Empirical studies have provided evidence supporting this relationship (Agénor, 2004 and Easterly & Fischer, 2001).

Marxists argue that the market is inherently inefficient (Blank, 2003) and that poverty is a direct consequence of this inefficiency, driven by the capitalist system itself. Specifically, capitalism maintains artificially low wages through the threat of unemployment, often referred to as the 'reserve army of unemployed' (Bradshaw, 2007). In this view, poverty within a capitalist economy can only be mitigated through careful market regulation (Jung & Smith, 2007). Beyond Marxist thought, broader perspectives in political economy suggest that economic and political structures contribute to poverty. Structural factors such as segmented labor markets, discrimination, and corruption are significant barriers to economic mobility. To address these challenges, scholars advocate for anti-

discrimination laws and labor market reforms to remove structural barriers to job creation and poverty reduction.

Beyond traditional economic theories, integrated approaches combining sociological and economic perspectives provide additional insights. One such perspective is social exclusion, which describes a process in which individuals or groups are wholly or partially excluded from full participation in economic, political, and social life (Deakin et al., 1995). This framework defines poverty as more than just material deprivation—it includes exclusion from consumption, production, political engagement, and social interaction (Hills & Stewart, 2005; Morazes & Pintak, 2007). Another interdisciplinary approach focuses on social capital. Initially proposed by, Loury (1976) social capital refers to the advantages derived from an individual's social position, which facilitate access to human capital resources (Johnson & Mason, 2012). Loury (1976) argued that human capital cannot be separated from its social context and origins. Putnam (2000) further defined social capital as the connections between individuals, including social networks and the norms of reciprocity and trust that emerge from them. A lack of social capital can deepen poverty, as social exclusion and weak networks limit economic opportunities. However, high levels of social capital alone are insufficient to combat poverty and must be complemented by material and socioeconomic improvements (Sanchez-Martinez & Davis, 2014). It is also important to recognize the 'dark side' of social capital, where dense social networks can be leveraged for purposes that do not serve the common good (Baycan & Öner, 2023). This complexity highlights the role of social structures and group dynamics in shaping the persistence and consequences of poverty

Poverty is shaped by multiple factors, including behavioral, structural, political, and economic influences. While economic growth is often emphasized in poverty reduction, it is not the sole determinant. Inappropriate economic policies, low productivity, ineffective social security systems, economic shocks, sanctions, and inflation all contribute to poverty. Jolliffe and Lugo (2018) identify unemployment as a primary driver, as the lack of income places individuals at greater risk of falling into poverty. However, the relationship between employment and poverty is complex; in some cases, those employed in low-wage jobs may experience worse living conditions than the unemployed. Inflation, in contrast, has a direct and regressive impact, eroding real income and disproportionately affecting the poor (Blank & Blinder, 1985, Cutler et al., 1991, Blank, 1993 and Powers, 1995). Rising prices reduce purchasing power, diminish asset values, slow economic growth, and increase structural unemployment, all of which exacerbate poverty (Hollister & Palmer, 1969, and Easterly & Fischer, 2001).

Among the factors influencing both inflation and poverty, the exchange rate plays a crucial role, particularly in developing economies. According to the purchasing power parity (PPP) hypothesis, inflation rises in proportion to

exchange rate depreciation. Governments often respond by raising public sector wages, which, along with private sector wage increases and constrained domestic production, further fuels inflation. If financial constraints, economic sanctions, and structural weaknesses prevent wages from keeping pace with inflation, real incomes decline, pushing more individuals into poverty. Exchange rate pass-through effects amplify inflation, especially in economies dominated by state monopolies and a quasi-private sector closely linked to the government. A sharp depreciation in the exchange rate also acts as a supply-side shock, increasing production costs and intensifying economic instability. This can lead to stagflation—a combination of inflation and stagnation—which further deepens poverty. At the macroeconomic level, inflation reduces household savings and capital formation, hindering long-term economic growth. Governments facing budget deficits may attempt to offset shortfalls by selling foreign currency at higher prices, reinforcing the cycle of depreciation and inflation. The resulting instability deepens poverty, particularly when fiscal policies prioritize short-term budgetary concerns over broader economic stability (Tanzi, 1977 and Patinkin, 1956).¹

International sanctions are a significant contributor to poverty, particularly in developing economies.² By restricting exports and limiting foreign exchange earnings, sanctions drive up inflation and increase unemployment. The inability to import essential goods exacerbates economic hardship, creating a vicious cycle of inflation, unemployment, and poverty. Sanctions also deter foreign investment, reducing infrastructure development and limiting long-term economic growth (Knippenberg et al., 2023). Additionally, they encourage corruption and rent-seeking behaviors, further distorting economic structures. Although sanctions are often intended to pressure political regimes, their effects disproportionately impact the general population, particularly the poor and middle classes. Rising exchange rates and inflation under sanctions exacerbate poverty, as reduced foreign reserves limit the availability of essential imports. In economies heavily dependent on a few key exports, the impact is even more severe, as global commodity price increases do not necessarily translate into higher national revenues. Sanctions also increase foreign investment costs, devalue essential goods, and foster the growth of an unproductive class, further deepening inequality and poverty. While economic growth is essential for poverty alleviation, external shocks, particularly sanctions, serve as major impediments, restricting economic expansion and reinforcing existing vulnerabilities.

¹ For Tanzi (1977) and Patinkin's hypotheses, see Fellner (1956) and Heller (1980).

² See, for example, Skrypnik and Marina (2019), Tyll et al. (2018), Smeets (2018), and Daponte and Garfield (2000).

Empirical Background

Numerous studies have investigated the determinants of poverty, employing various statistical and econometric methods. Recent empirical research highlights key macroeconomic factors influencing poverty levels across different regions and time periods. Faidiban et al. (2025) analyzed economic growth, unemployment, and population growth in Indonesia from 2009 to 2023, finding that both economic growth and unemployment significantly reduce poverty. Similarly, Brooks (2025) examined the relationship between economic growth, income inequality, and military spending, emphasizing that while economic growth aids poverty reduction, persistent inequalities and excessive military expenditure hinder sustainable development.

In sub-Saharan Africa, Olaoye et al. (2025) explored fiscal policy's impact on poverty, concluding that its effectiveness depends on economic conditions and requires coordinated government actions. Adeyemi-Tijani (2025) assessed high inflation's effect on food security in Nigeria, demonstrating that exchange rate fluctuations significantly exacerbate food price inflation, affecting poverty levels. Tiberto (2025) analyzed the role of inflation and central bank independence in income inequality and poverty, revealing that structural factors primarily drive these issues, though central bank autonomy can help mitigate inflation's adverse effects.

Several studies have examined long-term poverty trends in Europe. Franzen and Bahr (2024) used EU-SILC data to show that GDP growth does not consistently reduce long-term poverty, but male employment and social welfare spending have positive effects. Masilo (2024) argued that macroeconomic stability alone is insufficient for poverty reduction, particularly in Latin America. Infrastructure investment has been linked to poverty reduction, as demonstrated by Magolie (2024) in sub-Saharan Africa. Moreno Calva and Cruz Marcelo (2024) found that monetary policies targeting low inflation contribute to lower poverty rates and higher incomes.

Research on Nigeria highlights the roles of inequality, unemployment, and inflation. Adebayo et al. (2024) reported that unemployment and inflation significantly impact poverty, while inequality has no direct effect. External price shocks also exacerbate poverty in low-income countries, as Passadore et al. (2024) demonstrated using an open economy HANK model. In Sumatra, Suhendi et al. (2024) linked open unemployment, the Gini ratio, and the human development index to poverty levels. Studies on monetary policy, such as Abdulrahman and Oniyide (2023) in Nigeria, suggest that low-inflation policies can enhance investment and welfare.

Several researchers have examined regional and policy-driven poverty determinants. Blessing et al. (2023) investigated macroeconomic variables in the ECOWAS Franc zone, confirming the importance of fiscal balance, inflation, and exchange rates. Eke (2022) concluded that monetary policies in Nigeria have

increased unemployment and poverty. Studies by Obayelu and Edewor (2022) and Madzimure and Mbedzi (2021) highlight complex dynamics between inequality, macroeconomic indicators, and poverty across African regions. Saeed (2020) found no significant relationship between monetary policies and poverty reduction in Pakistan.

Monetary policy's role in poverty alleviation has been widely debated. Romer and Romer (2020) suggest that monetary policy influences poverty both in the short and long term but in opposite directions. Beker (2020) argued that low development levels and inequality hinder poverty reduction. Cammeraat (2020) linked social expenditure to poverty reduction in the EU, while Bosco and Poggi (2020) demonstrated that structural middle-class size and social spending impact poverty persistence.

Gábos et al. (2019) examined the relationship between employment changes and poverty in EU member states, emphasizing that poverty reduction depends on employment growth dynamics, equitable distribution, and social welfare effectiveness. Tanjung et al. (2019) found that interest rates negatively correlate with poverty in Indonesia, while Bosco (2019) highlighted the role of income distribution, public expenditure, investment, education, and labor share in poverty reduction. Ajisafe et al. (2018) concluded that financial inclusion does not necessarily improve living standards in Nigeria, as economic growth does not always translate into poverty reduction.

Goshit and Longduut (2016) assessed the impact of indirect monetary policy on poverty in Nigeria, finding that money supply significantly affects poverty levels. Ribeiro et al. (2015) studied macroeconomic determinants of poverty in 18 EU countries, emphasizing the importance of macroeconomic variables. Domonkos and Ostrihon (2015) analyzed inclusive growth in Central European countries, showing that while economic growth occurred, its benefits for poverty reduction varied. Alvaredo and Gasparini (2015) observed a decline in income poverty since the 1980s, largely driven by China's economic performance and improvements in developing regions. Duiella and Turrini (2014) identified per capita income and unemployment as key macroeconomic drivers of poverty in the EU, while Ekobena and Yannick (2014) reported a positive relationship between interest rates and poverty in the U.S.

Several studies emphasize the limitations of economic growth in addressing poverty. Cantillon (2011) found that rising employment does not always benefit unemployed households. Marx et al. (2012) concluded that employment growth does not necessarily reduce relative poverty. Said et al. (2011) suggested promoting investment in marginalized regions to alleviate poverty. Tarabini (2010) stressed the role of education in poverty reduction. Akoum (2008) and Azis (2008) argued that growth alone is insufficient, advocating for broad-based policies. Dewilde (2008) highlighted the role of institutional arrangements in

shaping poverty risks. Basu (2006) linked globalization to inequality, emphasizing the need for coordinated policies. Christiaensen et al. (2003) noted that economic growth in Africa has been pro-poor but requires market integration. Ames et al. (2001) and White and Anderson (2001) examined the role of distributional patterns and inflation in poverty outcomes. Collier and Dollar (2001), Tebaldi and Mohan (2010), and stressed the importance of institutional quality, while Kanbur (2001) asserted that economic growth is widely recognized as a necessary condition for sustainable poverty reduction. Dollar and Kraay (2000) found that the incomes of the poor rise proportionally with overall growth. Collier and Gunning (1999) highlighted trade openness and a stable business environment as essential for poverty reduction.

Overall, the literature underscores the importance of combining economic growth with effective fiscal and monetary policies, institutional reforms, and social safety nets to achieve sustainable poverty reduction. Addressing inflation, employment dynamics, and external shocks remains vital for long-term economic stability and poverty alleviation.

Methodology

This study employs the system dynamics approach to test macroeconomic hypotheses related to poverty. This mathematical method effectively captures numerous nonlinear and dynamic interactions, allowing for the identification and simulation of complex relationships with varying polarities and cyclical fluctuations. Additionally, it is widely regarded as a suitable tool for policy evaluation. These features distinguish the system dynamics approach from other methodologies.

It is worth noting that despite recent advances in econometrics, system dynamics continues to offer unique advantages in analyzing multifaceted phenomena such as poverty. First, dynamic systems allow the modeling of multilevel feedback loops and complex causal loop diagrams, which, even in advanced econometric approaches, cannot be fully represented due to the focus on statistical parameters and defined relationships among variables (Sterman, 2000). For instance, the interactions between monetary policies, exchange rate shocks, changes in per capita income, and sanctions over the long term and with time delays can be explicitly modeled and simulated within a system dynamics framework, whereas in dynamic econometrics, even with advanced statistical models, long-term and scenario-based analyses remain constrained by the data structure and model assumptions. Second, system dynamics enables the examination of multiple policy scenarios and their nonlinear and combined effects on poverty trajectories and welfare, while also facilitating sensitivity analysis and the design of resilient and sustainable interventions. This capability is particularly critical for decision-making under uncertainty and economic and political shocks, which significantly affect poverty (Meadows, 2008). Third, system dynamics models can integrate structural factors within a coherent system framework, whereas spatial or panel

econometrics primarily focus on correlations and the effects of independent variables, limiting their ability to fully capture complex interactions among system components. Therefore, although modern econometrics provides highly powerful tools for analyzing complex data, system dynamics retains practical and analytical advantages: the ability to simulate long-term behavior, analyze nonlinear and multivariate feedbacks, design robust policies, and provide a comprehensive representation of poverty dynamics, thereby enhancing the quality and effectiveness of policy decisions.

As shown in Figure 1, the system dynamics approach consists of multiple stages and iterations. It begins with forming a mental model based on theoretical and empirical literature. Next, dynamic hypotheses are developed, leading to the definition of a closed boundary. Within this framework, the problem statement is formulated, and key variables are identified. The initial model is then constructed, incorporating causal loop diagrams (CLDs) to illustrate feedback relationships. These diagrams, along with equations derived from the literature, serve as the foundation for developing the stock-flow diagram (SFD). The model is subsequently simulated, undergoing a rigorous validation process—including structural assessment, boundary adequacy, sensitivity analysis, and comparison of model behavior with real-world data. Once validated, the model is used to test dynamic hypotheses. At each stage, as understanding of the problem's dimensions deepens, both the mental model and the initial model are refined to enhance alignment with reality and theoretical foundations. All formulas, calculations, and simulations are conducted using Vensim.

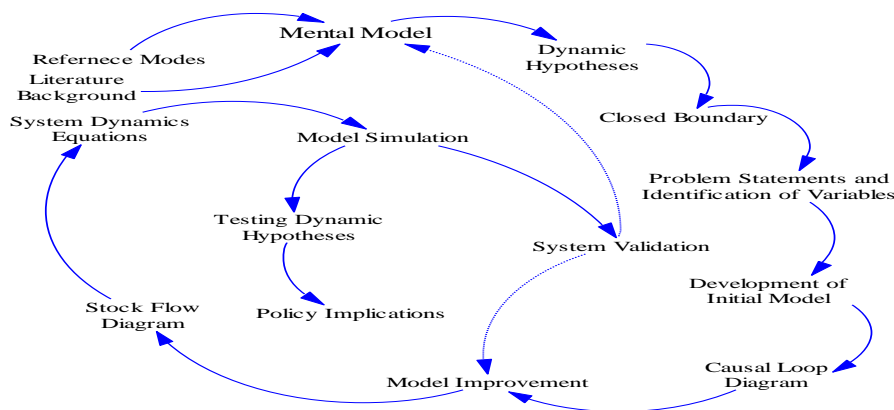


Figure (1): The Procedure of the System Dynamics Approach

Figure 2 illustrates the causal loop diagram of the macroeconomic environment influencing poverty formation in Iran. This diagram highlights key macroeconomic processes, including the formation of the monetary and liquidity

base, the general price level and inflation rate, the government budget, foreign trade, labor and capital dynamics, and economic growth. Some loops exhibit a reinforcing polarity (R), while others display a balancing polarity (B), determined by the polarity of the variable connections. For instance, the reinforcing loop R2 represents the monetary-liquidity-inflation cycle. The overall system behavior emerges from the interaction between these polarities and their corresponding loops.

Figure 2 consists of multiple subsystems, some of which are outlined below.

In the subsystem of inflation rate, consumer price index, and the nonofficial exchange rate (R1), a reinforcing feedback loop is formed. Specifically, an increase in the exchange rate raises the cost of imported goods as well as their domestic substitutes, thereby pushing the consumer price index upward and accelerating inflation. Higher inflation, in turn, strengthens inflationary expectations, prompting households and firms to purchase foreign currency in order to preserve the value of their assets. This renewed demand for foreign exchange places additional upward pressure on the nonofficial exchange rate. Consequently, a reinforcing loop emerges in which an initial shock in the foreign exchange market can trigger successive waves of inflation and broader macroeconomic instability.

In the subsystems of monetary base, liquidity growth rate, and inflation rate (R2 and R3), another reinforcing causal loop takes shape. Expansion of monetary base—primarily driven by government budget deficits or the accumulation of foreign assets by the central bank—leads to a higher liquidity in the economy. Accelerated liquidity growth increases aggregate demand and exerts upward pressure on prices, thereby raising inflation. Higher inflation, by eroding the real value of money and intensifying the government's financing needs, paves the way for further monetary expansion. This self-reinforcing process converts monetary and fiscal shocks into chronic and persistent inflationary dynamics.

In the balancing subsystems comprising GDP, the nonofficial exchange rate, non-oil exports, total exports, and the trade balance (B1 and B2), a negative feedback loop arises that plays a stabilizing role within the system. A decline in the exchange rate reduces the competitiveness of non-oil exports, leading to a contraction in total exports. Weaker export performance worsens the trade balance, which exerts downward pressure on national output and reduces GDP. However, lower GDP indirectly raises the demand for foreign currency, driving the nonofficial exchange rate upward once again. Thus, the loop functions as a self-adjusting mechanism that prevents exchange rate movements and GDP fluctuations from following a linear, unlimited trajectory, instead channeling the system toward a relative equilibrium through counteracting effects.

In the subsystem of effective employment, the misery index, productivity, and effective labor force (B3), a balancing feedback loop with negative polarity emerges. An increase in productivity raises the effective labor force, thereby

These equations are derived from both theoretical and empirical literature to ensure accuracy and consistency within the simulation.

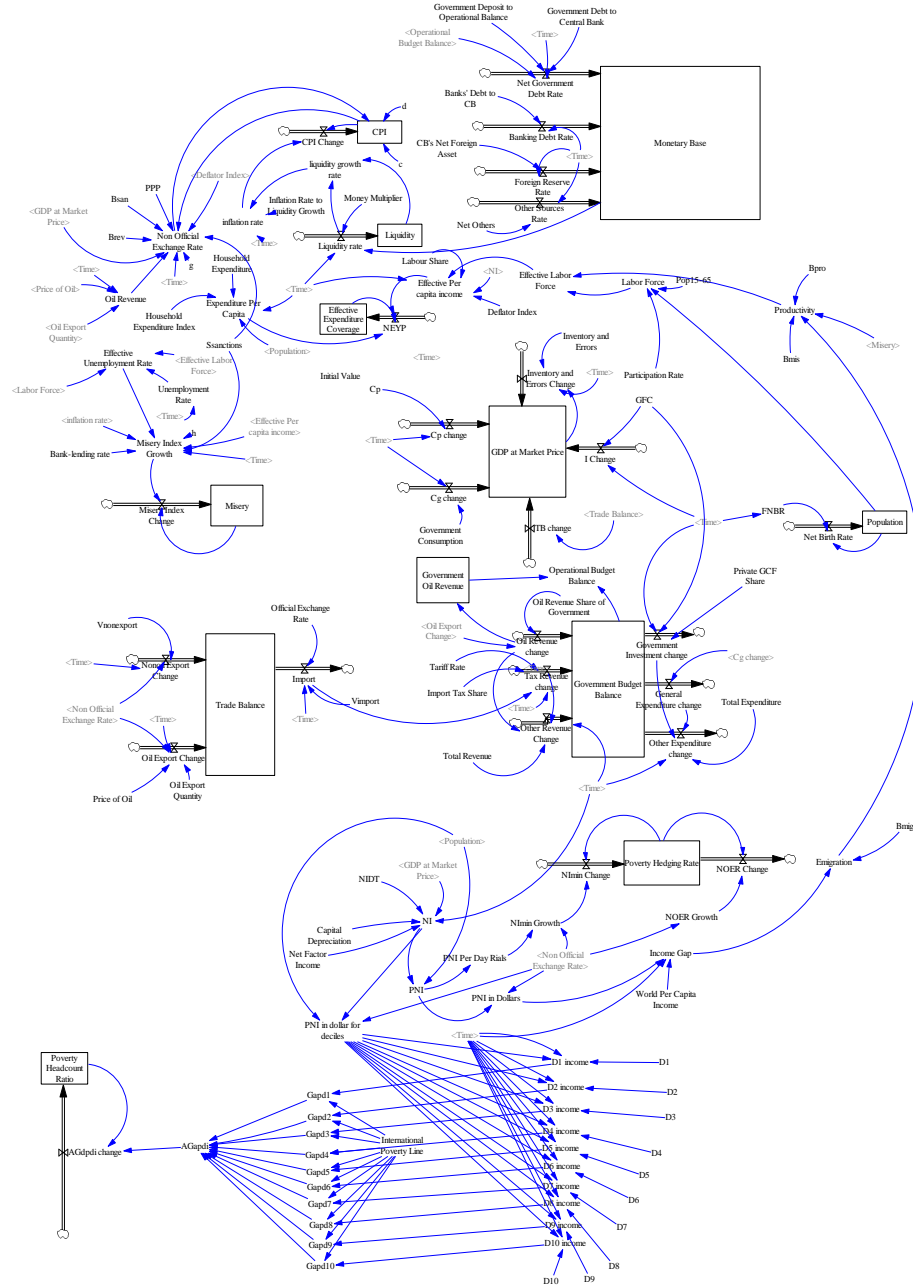


Figure (3): The Stock-Flow Diagram of the Present Research

Table (1): Introduction, Description, and Details of Selected Simulated Model Variables

Variable	Type	Unit	Measurement	Statistical source
GDP at Market Price	Stock	Billion LCU ²	$\int (Cg \text{ change} + Cp \text{ change} + I \text{ Change} + \text{Inventory and Errors Change} + TB \text{ change} + \text{Inventory and Errors Change})dt$	Based on CBI ¹
Cg change	Rate	Billion LCU/Year	Δ government expenditure	Based on SCI ³
Cp change	Rate	Billion LCU/Year	Δ private consumption	Based on SCI
I Change	Rate	Billion LCU/Year	Δ Gross Fixed Capital	Based on SCI
TB change	Rate	Billion LCU/Year	Δ trade balance	Based on SCI
Inventory and Errors Change	Rate	Billion LCU/Year	Δ Inventory and Errors	Based on SCI
Private consumption(Cp)	Constant (lookup)	Billion LCU/Year	Data collected	SCI
Government Consumption(Cg)	Constant (lookup)	Billion LCU/Year	Data collected	SCI
Inventory and Errors	Constant (lookup)	Billion LCU/Year	Data collected	SCI
Gross Fixed Capital (GFC)	Constant (lookup)	Billion LCU/Year	Data collected	SCI
Government Budget Balance	Stock	Billion LCU	$\int (\text{Oil Revenue Change} + \text{Tax Revenue Change} + \text{Other Revenue Change} - \text{General Expenditure Change} - \text{Government Investment Change} - \text{Other Expenditure Change}) dt$	Central Bank of Iran (2025)
Oil Revenue change	Rate	Billion LCU/Year	Oil Export Change*0.7	Based on CBI
Tax Revenue change	Rate	Billion LCU/Year	$\Delta(\text{Import} * \text{Tariff Rate} / \text{Import Tax Share})$	Based on CBI
Other Revenue Change	Rate	Billion LCU/Year	$\Delta(\text{Total Revenue change} - \text{Oil Revenue change} - \text{Tax Revenue change})$	Based on CBI
General Expenditure change	Rate	Billion LCU/Year	ΔCg	Based on CBI
Government Investment change	Rate	Billion LCU/Year	$\Delta(\text{GFC} * (1 - \text{Private GCF Share}))$	Based on CBI
Other Expenditure change	Rate	Billion LCU/Year	$\Delta(\text{Total Expenditure change} - \text{Government Investment change} - \text{General Expenditure change})$	Based on CBI
Monetary Base	Stock	Billion LCU	$\int (\text{Banking Debt Rate} + \text{Foreign Reserve Rate} + \text{Net Government Debt Rate} + \text{Other Source Rate})dt$	CBI

¹ Central Bank of Iran (2025)² The local currency (LCU) is the Iranian Rial.³ Statistical Center of Iran (2025)

Banking Debt Rate	Rate	Billion LCU/Year	$\Delta(\text{Banks' Debt to CB})$	Based on CBI
Foreign Reserve Rate	Rate	Billion LCU/Year	$\Delta(\text{CB's Net Foreign Asset})$	Based on CBI
Net Government Debt Rate	Rate	Billion LCU/Year	$\Delta(\text{Government Debt to Central Bank} + \text{Government Deposite to Operational Balance} * \text{Operational Budget Balance})$	Based on CBI
Government Debt to Central Bank	Constant (Lookup)	Ratio/Year	Data collected	CBI
Government Deposit	Constant (Lookup)	Billion LCU/Year	Data collected	CBI
Other Sources Rate	Rate	Billion LCU/Year	$\Delta\text{Net Others}$	Based on CBI
Banks' Debt to CB	Constant (Lookup)	Billion LCU/Year	Banks' Debt to Central Bank	CBI
CB's Net Foreign Asset	Constant (Lookup)	Billion LCU/Year	Net Foreign Asset of Central Bank	CBI
Operational Budget Balance	Billion LCU/Year	Billion LCU/Year	Government Budget Balance - Government Oil Revenue	Based on CBI
Liquidity	Stock	Billion LCU	$\int (\text{Liquidity rate}) dt$	CBI
Liquidity rate	Rate	Ratio/Year	$\Delta(\text{Monetary Base} * \text{Money Multiplier})$	Based on CBI
Money Multiplier	Constant (Lookup)	Ratio/Year	Liquidity to Money Base	CBI
CPI	Stock	Index	$\int (\text{CPI Change}) dt$	Based on CBI
CPI Change	Rate	Index/Year	CPI * inflation rate	Based on CBI
inflation rate	Auxiliary	Ratio	Inflation Rate to Liquidity Growth * liquidity growth rate	Based on CBI
liquidity growth rate	Auxiliary	Ratio	Liquidity rate / Liquidity	Based on CBI
Non-official exchange rate (NOER)	Auxiliary	Rials per dollar	$\text{CPI} * \text{PPP} + \text{Bsan} * \text{Sanctions} + \text{Brev} * \text{Oil Revenue} + \text{g} * (\text{GDP} / \text{Deflator Index})$	Based on CBI
Sanctions	Constant (Lookup)	Without scale/Year	Binary (1 for strong sanctions)	Present Research
Bsan	Constant	Rials/Year	50000	Present Research
Brev	Constant	Rials/Year	-0.015	Present Research
g	Constant	Rials/Year	-0.0001	Present Research
Trade Balance	Stock	Billion LCU	$\int (\text{Nonoil Export Change} + \text{Oil Export Change} - \text{Import}) dt$	Based on SCI
Nonoil Export Change	Rate	Billion LCU/Year	$\Delta(\text{NOER} * \text{Vnonexport} / 1000)$	Based on SCI
Oil Export Change	Rate	Billion LCU/Year	$\Delta(\text{Poil} * \text{Oil Q} * \text{NOER} / 1000)$	Based on SCI
Import	Rate	Billion LCU/Year	$\Delta(\text{Official ER} * \text{Vimport} / 1000)$	Based on SCI
Vnonexport	Constant (Lookup)	Million Dollars/Year	Value of Non-Export	Based on SCI
Price of Oil	Constant (Lookup)	Dollar per Barrel	Data collected	OPEC

Vimport	Constant (Lookup)	Million Dollars/Year	Value of import	Based on SCI
Oil Export Quantity	Constant (Lookup)	Million Barrels/Year	Data collected	OPEC
Official ER	Constant (Lookup)	Rials per Dollar	Data collected	Based on CBI
Effective Expenditure Coverage	Stock	Ratio	$\int (NEYP)dt$	Present Research
NEYP	Rate	Ratio/Year	$(\Delta \text{Effective Per capita income} / \text{Effective Per capita income} - \Delta \text{Expenditure Per Capita} / \text{Expenditure Per Capita}) * \text{Effective Expenditure Coverage}$	Based on SCI
Effective Per capita income	Auxiliary	Billion LCU/Year	$(NI/\text{Effective Labor Force}) * \text{Labour Share} / \text{Deflator Index}$	Based on SCI
Labour Share	Constant (Lookup)	Ratio/Year	Labor's Share in GDP	Based on SCI
Deflator Index	Constant (Lookup)	Ratio/Year	Implicit deflator of GDP	Based on SCI
Effective Labor Force	Auxiliary	Thousand People/Year	Productivity*Labor Force	Based on SCI
Labor Force	Auxiliary	Thousand People/Year	Participation Rate*"Pop15-65"*Population	Based on SCI
"Pop15-65"	Constant	Without scale	0.699	Based on SCI
Population	Stock	Thousand People	$\int (\text{Net Birth Rate}) dt$	Based on SCI
Net Birth Rate	Rate	Thousand People/Year	FNBR*Population	Based on SCI
FNBR	Constant (Lookup)	Ratio/Year	Fractional net birth rate	Based on SCI
Expenditure Per Capita	Auxiliary	Billion LCU/Year	$(\text{Household Expenditure}/\text{Population})/\text{Household Expenditure Index}$	Based on SCI
Household Expenditure	Auxiliary	Billion LCU/Year	Households and NPISHs Final consumption expenditure, PPP (current international \$) converted to Rials	World Bank databank
Household Expenditure Index	Auxiliary	Billion LCU/Year	Current household expenses to fixed household expenses	Based on SCI
Productivity	Auxiliary	Without scale	$B_{pro} * \text{Emigration} + B_{mis} * \text{Misery}$	Based on SCI
Bpro	Constant	Unit/per 1000 people	-0.670538	Present Research
Bmis	Constant	Unit/Percent	-0.005	Present Research
Emigration	Auxiliary	people Per 1000 Population/Year	Income Gap*0.000181	Based on WB databank
Income Gap	Auxiliary	Dollar/Year	PNI in Dollars- World Per Capita Income	Based on WB database
World Per Capita Income	Constant (Lookup)	Dollar/Year	National income, Per Capita	WB database
PNI in Dollars	Auxiliary	Dollar/Year	$(PNI/NOER)*1e+006$	Based on SCI
PNI	Auxiliary	Million	NI/Population	Based on SCI

		Rials/Year		
NI	Auxiliary	Million Rials/Year	GDP at Market Price -Capital Depreciation-NIDT+ Net Factor Income	Based on SCI
Capital Depreciation	Constant (Lookup)	Billion Rials/Year	Capital consumption	Based on SCI
NIDT	Constant (Lookup)	Billion Rials/Year	Net direct tax	Based on SCI
Net Factor Income	Constant (Lookup)	Billion Rials/Year	From NIPA	Based on SCI
Poverty Hedging Rate	Stock	Percentage Rate	$\int (N_{\text{imin}} \text{ Change} - \text{NOER Change})dt$	Based on SCI and WB
N _{imin} Change	Rate	Billion Rials/Year	N _{imin} Growth*Poverty Hedging Rate	Based on SCI and WB
N _{imin} Growth	Auxiliary	Growth rate/Year	$\frac{\Delta(\text{PNI Per Day Rials} - 6.85 * \text{NOER})}{(\text{PNI Per Day Rials} - 6.85 * \text{NOER})}$	Based on SCI and WB
NOER Change	Rate	Rials Per Dollar/Year	NOER Growth*Poverty Hedging Rate	Based on SCI and WB
NOER Growth	Rate	Growth rate/Year	Δ Non Official Exchange Rate/ Non Official Exchange Rate	Based on CBI
Poverty Headcount Ratio	Stock	Percentage	$\int (\text{AGdpdi change})dt$	Based on SCI and WB
AGdpdi change	Rate	Percentage Change/Year	$\Delta(\text{AGapdi} * \text{Poverty Headcount Ratio})$	Based on SCI and WB
AGapdi	Auxiliary	Percentage/Year	$\sum (\text{Gapdi})dt \quad i = 1, \dots, 10$	Based on SCI
Gapdi	Auxiliary	Percentage/Year	IF THEN ELSE(Di income-Poverty headcount ratio < 0, +10, 0)	Based on SCI
Poverty headcount ratio	Constant	Dollar a Day	6.85	WB
Di income	Auxiliary	Dollar a Day	$((D_i * \text{PNI in dollar for deciles}/100)/365) * 1e+006$	Based on SCI and WB
Di	Constant (Lookup)	Percentage rate/Year	Deciles income percentage	Based on SCI
PNI in dollar for deciles	Auxiliary	Billion Dollars/Year	$(\text{NI}/\text{NOER})/(\text{Population} * 0.1)$	Based on SCI, CBI and WB
Misery	Stock	Ratio	$\int (\text{HMI Change})dt$	Based on SCI, CBI and WB
HMI Change	Rate	Ratio/Year	$\frac{\Delta(\text{HMI})}{\text{HMI}} * \text{Misery}$	Based on SCI, CBI and WB
HMI	Auxiliary	Ratio/Year	Bank – lending rate + Effective Unemployment Rate + inflation rate – Δ Effective Per capita income /Effective Per capita income	Based on SCI, CBI and WB
Effective Unemployment Rate	Auxiliary	Ratio/Year	Effective Labor Force*Unemployment rate/Population	Based on SCI, CBI and WB
Unemployment Rate	Constant (Lookup)	Ratio/Year	Data collected, without scale	Based on SCI, CBI and WB
Bank-lending rate	Constant (Lookup)	Ratio/Year	Data collected, without scale	Based on CBI

Source: Present Research

Model simulation and data analysis

Model validation

Before using the model to analyze results and derive policy implications, it is essential to ensure its accuracy and reliability. To achieve this, validation tests—including structural evaluation, boundary condition assessment, sensitivity analysis, and realism testing—have been conducted. As shown in Figure 4, the simulation runs without errors, confirming the model's structural integrity.

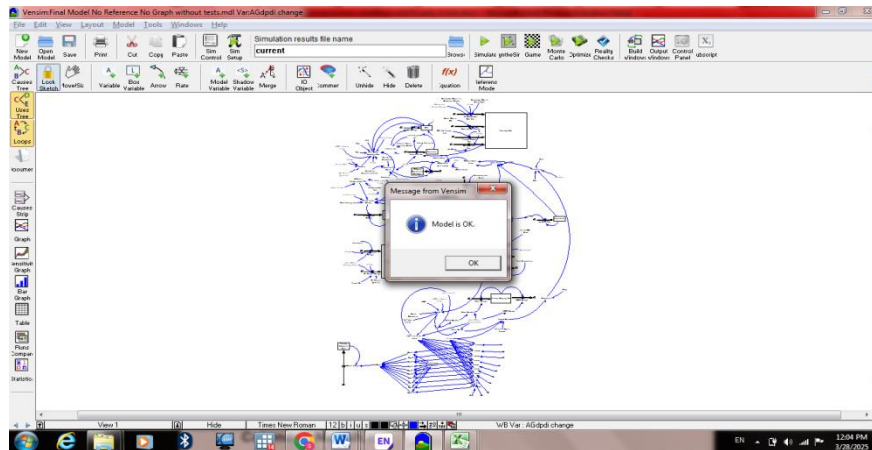


Figure (4): Structural Test for the Selected Model

After the structural test, the simulated variables must be compared with their real-world trends (reference modes). Figure 5 presents the results for the monetary base and government budget balance. As shown, the variations in these variables closely align with actual values. This test confirms that the simulated model effectively represents real-world dynamics.

To validate the accuracy of the model simulation in this study, the Normalized Root Mean Square Error (NRMSE) was calculated for the two aforementioned variables. It should be noted that RMSE is computed using the following formula (1):

$$RMSE = \sqrt{\frac{\sum_t (x_{obs,t} - x_{sim,t})^2}{n}} \quad (1)$$

Where $x_{obs,t}$ and $x_{sim,t}$ represent the observed (reference mode) and simulated values at time t , respectively, and n is the number of observations in the study period. Since the RMSE index alone does not provide a definitive conclusion regarding the goodness of fit, the following relation (2) is applied:

$$NRMSE = \frac{\sqrt{\frac{\sum_t (x_{real,t} - x_{sim,t})^2}{n}}}{\max(x_{real,t}) - \min(x_{real,t})} \quad (2)$$

If the NRMSE is less than 10 percent, the model is considered to provide a good fit to the actual values and demonstrates a high level of simulation accuracy for a nonlinear system (Demiray & Demir, 2024).

The calculations of these two indices indicate that the RMSE is 0.05 for the monetary base and 0.06 for the government budget balance. This demonstrates the high accuracy of model fitting and simulation performance under nonlinear and system dynamics conditions.

Another key validation test is the limit condition test, which evaluates whether the model behaves appropriately when its inputs are set to their highest or lowest possible values (e.g., zero). The purpose of this test is to identify any unexpected behavior or errors when parameters undergo significant changes. In this study, the limit condition test was applied to the net birth rate ($NBR = 0$) and the misery index (set to zero). As shown in Figure 6, reducing the FNBR value to zero causes the population to revert to its initial 1990 level of 50 million. Similarly, assuming a zero unemployment rate leads to an expected decline in the misery index. These results confirm the model's robustness under extreme conditions.

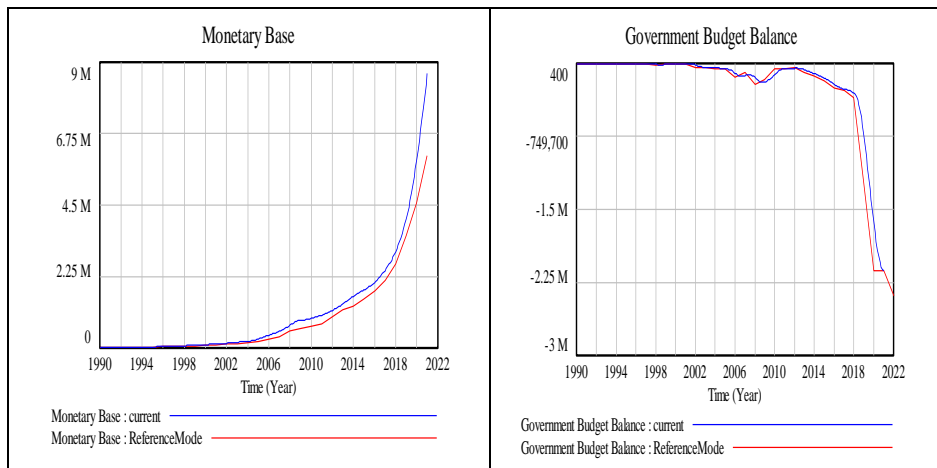


Figure (5): Reality Checks for Money Base and Budget Balance in Iran

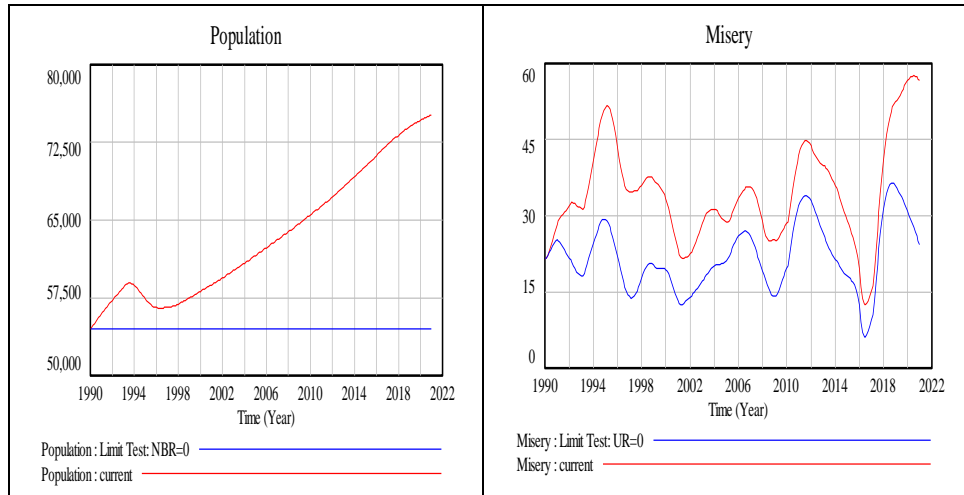


Figure (6): The Results of the Limit Tests (NBR = 0 and UR = 0)

Finally, for the sensitivity analysis, a 10% change in the inflation rate and its impact on the exchange rate is examined. As shown in Figure 7, the exchange rate's response to a 20% increase or decrease in inflation is reasonable and aligns with both economic theory and the current political economy of Iran.

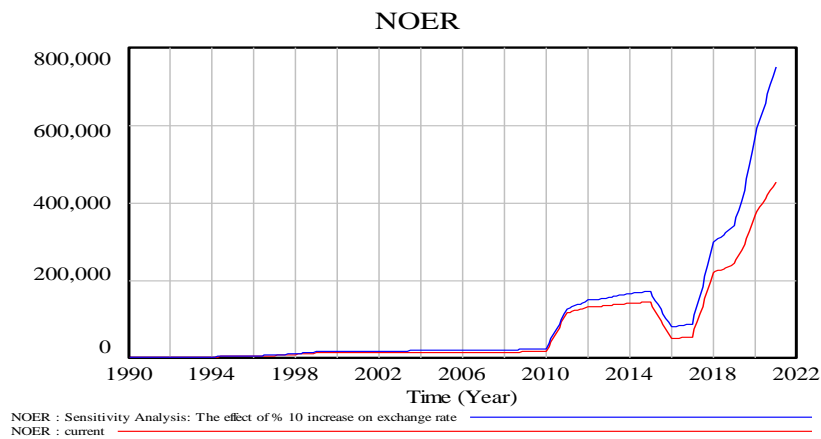


Figure (7): Sensitivity Analysis of the Exchange Rate Response to a 10% Increase in the Inflation Rate

Testing dynamic hypotheses

After conducting the validation tests on the selected model, we proceed to test and analyze the dynamic hypotheses, as well as the impact of key variables (sanctions, inflation rate, exchange rate, economic growth, and monetary and fiscal policies) on the poverty rate. Although the validation tests confirmed the accuracy of the simulated model, all calculations were further checked and statistically validated using a t-test for mean difference at the one-percent significance level to ensure greater certainty.

Hypothesis 1: Sanctions strongly increase poverty.

To test this hypothesis, we assume the absence of sanctions and examine their impact over the study period. As shown in Figure 8, without sanctions, Iran could have achieved a significantly lower poverty rate. Specifically, the poverty rate would have been 24.3 percent lower on average throughout the period. We also anticipate a decrease in the purchasing power of the domestic currency and the misery index in the absence of sanctions, as indicated in Table 2. Table 2 further reveals that international sanctions against Iran have led to an average increase of 37.5 percent in the exchange rate, 24.3 percent in the poverty headcount rate, and 22.6 percent in the misery index. This outcome, contrary to the claim that sanctions aim to alter the political regime's behavior, has primarily harmed ordinary citizens. These findings align with other studies, including Skrypnik and Marina (2019), Tyll et al. (2018), Smeets (2018), and Daponte and Garfield (2000).

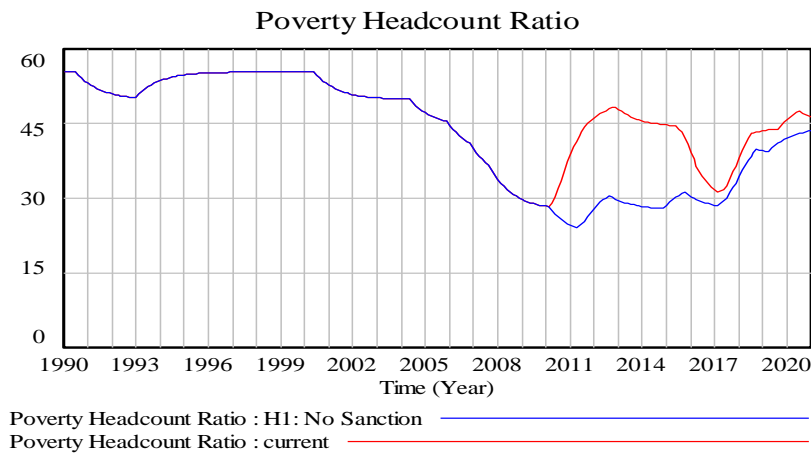


Figure (8): Test of Hypothesis 1 (Sanctions Strongly Increase Poverty)

Hypothesis 2: Hyperinflation increases poverty

A hypothetical 20 percent increase in the inflation rate has resulted in an upward shift in the poverty rate, as shown in Figure 9. As Table 2 illustrates, a 20 percent increase in inflation, on average, leads to a 79.7 percent rise in the exchange rate,

a 13.1 percent increase in the poverty rate, a 2.6 percent rise in the misery index, and a 2.2 percent decrease in household expenditure coverage in Iran. These results are expected, as hyperinflation causes a sharp decline in purchasing power. Coupled with a rising exchange rate and the increased cost of importing intermediate and capital goods—especially under international restrictions on domestic products—this situation exacerbates economic recession. These findings align with theoretical concepts such as purchasing power parity and are consistent with the results of other studies, including Adeyemi-Tijani (2025), Adebayo et al. (2024) and Madzimore and Mbedzi (2021).

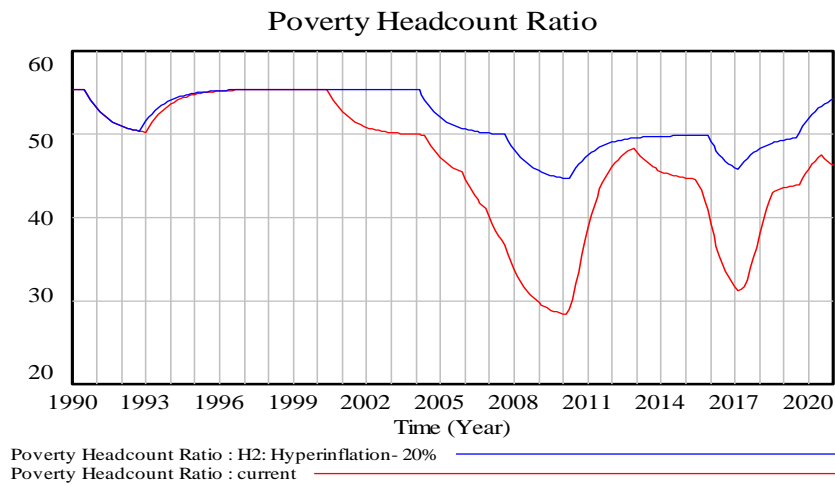


Figure (9): Test of Hypothesis 2 (Hyperinflation Increases Poverty)

Hypothesis 3: Exchange rate shocks increase poverty

As Figure 10 demonstrates, a hypothetical 50 percent increase in the exchange rate—though not uncommon for a country under sanctions and external threats—would predictably shift the poverty rate curve upward. An increase in the exchange rate leads to higher inflation, which erodes the purchasing power of the population, particularly affecting the middle and lower classes, and subsequently lowering their standard of living. Additionally, an exchange rate shock raises production costs, and if demand decreases, it can lead to an economic recession. In numerical terms, as shown in Table 2, while a 50 percent increase in the exchange rate results in a slight rise in nominal expenditure coverage, it overall causes a 10.5 percent increase in the poverty rate and a 2.4 percent rise in the misery index. The impoverishing effect of the exchange rate shock aligns with findings from studies such as Adeyemi-Tijani (2025), and Blessing et al. (2023).

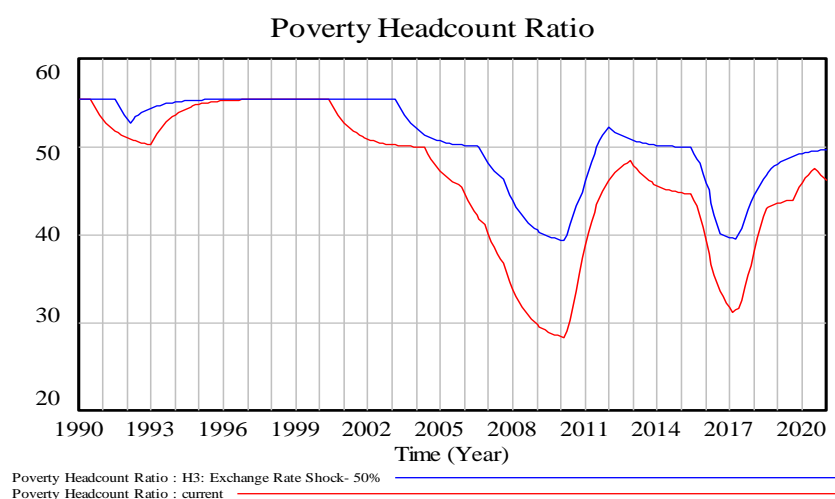
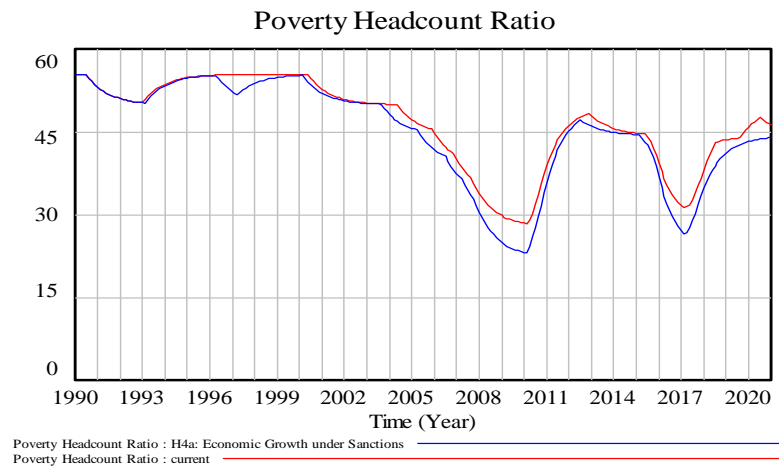


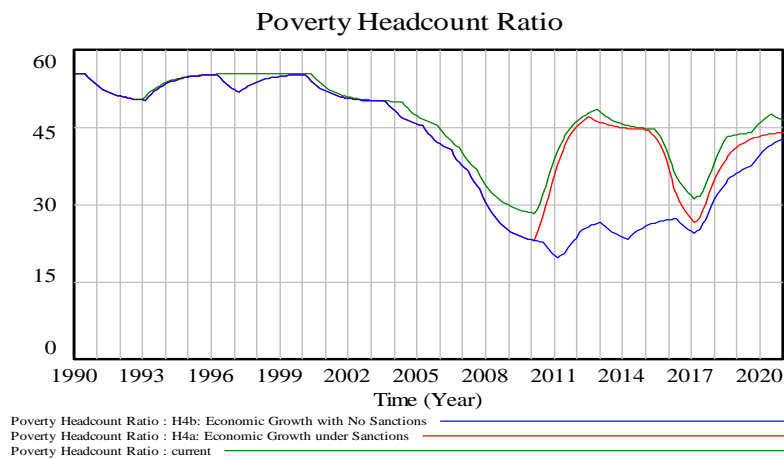
Figure (10): Result of Hypothesis 3 (Exchange Rate Shocks Increase Poverty)

Hypothesis 4: Economic growth reduces poverty.

Economic growth leads to economic expansion and shifts the production possibility frontier outward. Under conditions of economic growth, assuming other factors remain constant (including the presence of sanctions), an increase in per capita income and an improvement in living standards would be expected. As shown in Figure 11(a), a 10 percent increase in economic growth (under sanctions) results in a 4.6 percent reduction in the poverty rate. However, the impact of this growth is relatively smaller compared to the effects of sanctions and exchange rate fluctuations. Specifically, the simulation of a 10 percent increase in GDP leads to a 15.3 percent rise in cost coverage (Table 2). Interestingly, the hypothetical effect of economic growth on the exchange rate and the misery index appears minimal, which may reflect structural weaknesses in Iran's production system. Moreover, Figure 11(b) illustrates a scenario where economic growth occurs in the absence of sanctions. As observed, under such conditions, growth contributes to a more significant reduction in poverty (15.41 percent), reaffirming the decisive role of sanctions in shaping the welfare of ordinary citizens. The results regarding the positive effect of economic growth on reducing the poverty rate align with findings from studies such as Bosco (2019), Domonkos and Ostrihon (2015), Said et al. (2011), and Christiaensen et al. (2003).



a (under Sanctions)



b (No Sanctions)

Figure (11): Test of Hypothesis 4 (Economic Growth Reduces Poverty)

H5: Expansionary monetary policy in conditions of production bottlenecks increases poverty.

Monetary policies, when effectively targeted to stimulate production, can help reduce poverty. However, under conditions of sanctions and production bottlenecks, the only likely outcome of expansionary monetary policies—especially when the central bank lacks independence—is a vicious cycle of wage-inflation and the reinforcement of counterproductive structures, ultimately boosting unproductive markets. As shown in Figure 12, a 20 percent increase in the monetary base has led to an increase in poverty in Iran. Table 2 reveals that

this hypothetical 20 percent increase in the monetary base resulted in a 4 percent rise in the poverty rate, a 2.4 percent decrease in expenditure coverage, a 15.4 percent increase in the exchange rate, and a small decrease of -0.2 percent in the misery index. The findings of this study regarding the impoverishing effects of expansionary monetary policies are consistent with those of other studies, such as Passadore et al. (2024), Eke (2022), Madzimure and Mbedzi (2021), and Romer and Romer (2020).

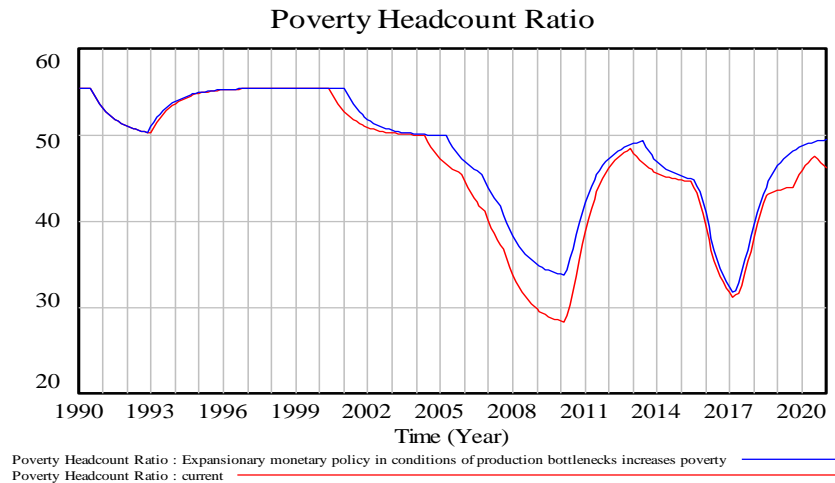


Figure (12): Result of Hypothesis 5 (Expansionary Monetary Policy Increases Poverty)

H6: Expansionary fiscal policy increases poverty.

A simulation of a 20 percent increase in total government expenditure (Figure 13) indicates that expansionary fiscal policy has contributed to an increase in poverty in Iran. However, as shown in Table 2, its impact on poverty is relatively smaller than that of expansionary monetary policy. Specifically, a 20 percent increase in government expenditure results in a 1.4 percent rise in the poverty rate, a 5.6 percent increase in the exchange rate, a 1.1 percent decrease in expenditure coverage, and a minimal impact (-0.08 percent) on the misery index. Given the chronic budget deficit, weak tax collection due to tax evasion, limited supply-side capacity, and foreign reserves constrained by sanctions, the increase in government expenditure is largely financed through borrowing from the central bank. Under these conditions, an increase in poverty is to be expected. These results are consistent with findings from studies such as Olaoye et al. (2025), and Tanjung et al. (2019).

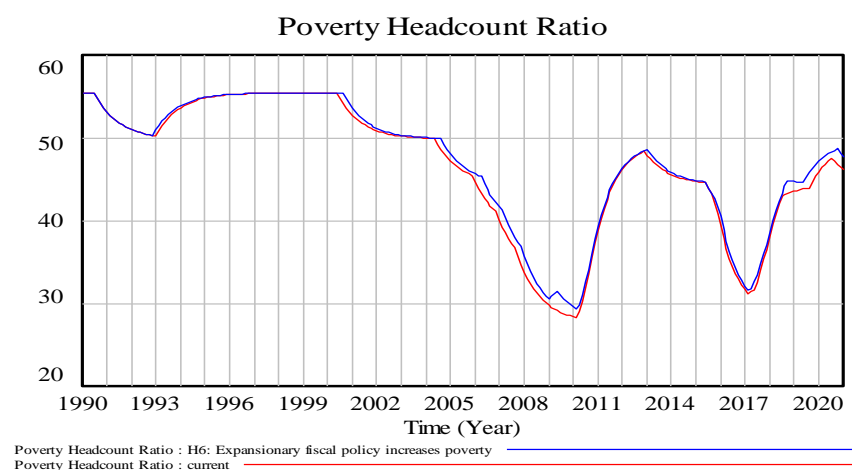


Figure (13): Result of Hypothesis 6 (Expansionary Fiscal Policy Increases Poverty)

Table (2): Impact of the Macroeconomic Environment on Poverty Indicators (Percentage Changes)

Hypothesized Variable	NOER	Misery	Expenditure Coverage	Poverty
No sanction	-37.5 (-5.48, 0.000)	-22.6 (-18.29, 0.000)	-2.2 (-5.54, 0.000)	-24.3 (-14.93, 0.000)
Inflation rate (20%)	+79.7 (-5.35, 0.000)	+2.6 (-17.58, 0.000)	-2.2 (-6.17, 0.000)	+13.1 (-28.9, 0.000)
Exchange rate shock (50%)	+50 (-6.22, 0.000)	+2.4 (-18.11, 0.000)	+3.9 (-6.11, 0.000)	+10.5 (-26.2, 0.000)
Economic growth (10%)	-0.5 (-6.15, 0.000)	+0.3 (-18.15, 0.000)	+15.3 (-5.20, 0.000)	-4.6 (-19.3, 0.000)
Expansionary monetary policy (MB20%)	+15.4 (-6.16, 0.000)	-0.2 (-18.01, 0.000)	-2.4 (-5.64, 0.000)	+4 (-23.1, 0.000)
Expansionary fiscal policy (Expenditure 20%)	+5.6 (-6.15, 0.000)	-0.08 (-18.12, 0.000)	-1.1 (-5.67, 0.000)	+1.4 (-21.8, 0.000)

Source: This research, based on simulations using Vensim.

Summary and Policy applications

The main purpose of this paper is to dynamically simulate the impact of macroeconomic variables on the poverty rate. To achieve this, a system dynamics model was designed, simulated, and applied to Iran over the period from 1990 to 2021, examining six dynamic hypotheses. Based on the simulation results, sanctions have had the most significant impact on poverty compared to other macroeconomic factors, increasing the poverty headcount rate by an average of

approximately 10 percent. Thus, international sanctions have primarily led to the impoverishment of society.

Another key finding is the impoverishing effect of monetary and foreign exchange shocks. Expansionary fiscal policies have also contributed to the rise in poverty, which is understandable given the state of the Iranian economy. According to the dynamic simulation, during the study period, sanctions increased the poverty rate by 24.3 percent on average, hyperinflation by 13.1 percent, exchange rate shocks by 10.5 percent, expansionary monetary policies by 4 percent, and expansionary fiscal policies by 1.4 percent. In contrast, economic growth reduced the poverty rate by only 4.6 percent on average and failed to offset the impoverishing effects of the other macroeconomic factors. Overall, the results support the dynamic hypotheses.

The main conclusion of this study is that international sanctions have significantly intensified and expanded poverty in Iran. Rather than exerting political pressure on the government, sanctions have exacerbated the poverty of the Iranian people. To reduce poverty, it is essential not only to seek the removal of international sanctions but also to create the conditions for sustainable development. This can be achieved by adopting appropriate targeted economic policies and structural reforms, particularly those focused on intergenerational justice and poverty alleviation.

References

1. Abdulrahman, I. A., & Oniyide, G. D. (2023). Impact of monetary policy on poverty reduction in Nigeria. *African Journal of Economic Review*, 11(1), 101-119.
2. Adebayo, A. A., Adebosin, W. G., & Michael, A. (2024). Macroeconomic Determinants of Poverty in Nigeria: Econometric Assessment of Selected Variables.
3. Adeyemi-Tijani, A. (2025). The Impact of High Inflation on Food Security and Poverty in Nigeria. *Available at SSRN 5083291*.
4. Agénor, P. R. (2004). Macroeconomic adjustment and the poor: analytical issues and cross-country evidence. *Journal of economic surveys*, 18(3), 351-408.
5. Ajisafe, R., Anyakudo, T., Ajide, F., & Akinkuotu, F. (2018). Dynamics Among Financial Inclusion, Monetary Policy, and Poverty Reduction in Nigeria. *International Journal of Social Sciences, Management and Engineering*, 2(1), 49-64.
6. Akoum, I. F. (2008). Globalization, growth, and poverty: the missing link. *International Journal of Social Economics*, 35(4), 226-238.
7. Alvaredo, F., & Gasparini, L. (2015). Recent trends in inequality and poverty in developing countries. *Handbook of income distribution*, 2, 697-805.
8. Ames, B., Brown, W., Devarajan, S., & Izquierdo, A. (2001). Macroeconomic policy and poverty reduction. In: International Monetary Fund Washington, DC.
9. Azis, I. (2008). *Macroeconomic policy and poverty*. Retrieved from
10. Banerjee, A. V., & Duflo, E. (2008). What is middle class about the middle classes around the world? *Journal of economic perspectives*, 22(2), 3-28.
11. Basu, K. (2006). Globalization, poverty, and inequality: What is the relationship? What can be done? *World development*, 34(8), 1361-1373.
12. Baycan, T., & Öner, Ö. (2023). The dark side of social capital: a contextual perspective. *The Annals of Regional Science*, 70(3), 779-798.
13. Beker, V. A. (2020). Poverty and income inequality: A complex relationship. *Real-world economics review*, 29(92), 167-185.
14. Blank, R. M. (1993). Why were Poverty Rates so High in the 1980s? In *Poverty and Prosperity in the USA in the Late Twentieth Century* (pp. 21-57): Springer.
15. Blank, R. M. (2003). Selecting among anti-poverty policies: can an economist be both critical and caring? *Review of social economy*, 61(4), 447-469.
16. Blank, R. M., & Blinder, A. S. (1985). Macroeconomics, income distribution, and poverty. In: National Bureau of Economic Research Cambridge, Mass., USA.
17. Blessing, O. O., Olusegun, A. J., & Adegbemi, O. (2023). Macroeconomic Fundamentals, Economic Growth and Poverty in Ecowas Franc Zone: Does Single Currency Matter?

18. Bosco, B. (2019). One size does not fit all: Quantile regression estimates of cross-country risk of poverty in Europe. *Economic Analysis and Policy*, 62, 280-299.
19. Bosco, B., & Poggi, A. (2020). Middle class, government effectiveness and poverty in the EU: A dynamic multilevel analysis. *Review of Income and Wealth*, 66(1), 94-125.
20. Bradshaw, T. K. (2007). Theories of poverty and anti-poverty programs in community development. *Community Development*, 38(1), 7-25.
21. Brooks, W. (2025). The linkage of economic growth, income inequality, and military expenditure.
22. Burney, N. A., Yasmeen, A., & Niazi, M. K. (1989). Government budget deficits and interest rates: An empirical analysis for Pakistan [with Comments]. *The Pakistan Development Review*, 28(4), 971-980.
23. Cammeraat, E. (2020). The relationship between different social expenditure schemes and poverty, inequality and economic growth. *International Social Security Review*, 73(2), 101-123.
24. Cantillon, B. (2011). The paradox of the social investment state: growth, employment and poverty in the Lisbon era. *Journal of European social policy*, 21(5), 432-449.
25. Central Bank of Iran, C. B. I. (2025). *Time Series Database*, various years, Available at <https://tsdview.cis.cbi.ir>.
26. Christiaensen, L., Demery, L., & Paternostro, S. (2003). *Reforms, remoteness and risk in Africa: understanding inequality and poverty during the 1990s*. Retrieved from
27. Collier, P., & Dollar, D. (2001). Can the world cut poverty in half? How policy reform and effective aid can meet international development goals. *World development*, 29(11), 1787-1802.
28. Collier, P., & Gunning, J. W. (1999). Explaining African economic performance. *Journal of economic literature*, 37(1), 64-111.
29. Cutler, D. M., Katz, L. F., Card, D., & Hall, R. E. (1991). Macroeconomic performance and the disadvantaged. *Brookings papers on economic activity*, 1991(2), 1-74.
30. Daponte, B. O., & Garfield, R. (2000). The effect of economic sanctions on the mortality of Iraqi children prior to the 1991 Persian Gulf War. *American Journal of Public Health*, 90(4), 546.
31. Davis, E. P. (2007). A confrontation of economic and theological approaches to “ending poverty” in Africa.
32. Deakin, N., Thomas, N., Living, E. F. f. t. I. o., & Conditions, W. (1995). *Public welfare services and social exclusion: The development of consumer-oriented initiatives in the European Union*: European Foundation for the Improvement of Living and Working Conditions

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33. Demiray, B. Z., & Demir, I. (2024). Towards Generalized Hydrological Forecasting using Transformer Models for 120-Hour Streamflow Prediction. *arXiv preprint arXiv:2406.07484*.
34. Dewilde, C. (2008). Individual and institutional determinants of multidimensional poverty: A European comparison. *Social Indicators Research*, 86, 233-256.
35. Dollar, D., & Kraay, A. (2000). Growth is good for the poor. development research group. *World Bank, Washington DC [online] Available from: <http://wbln0018.worldbank.org/Research/workpapers.nsf/> [Accessed: 2005 08]*.
36. Domonkos, T., & Ostrihon, F. (2015). Inclusive Growth in Selected Central European Countries 1. *Ekonomicky casopis*, 63(9), 881.
37. Dornbusch, R. (1987). *Macroeconomic*. In F. S. (Ed.): Mc Graw Hill, New York.
38. Duiella, M., & Turrini, A. (2014). Poverty developments in the EU after the crisis: a look at main drivers. *ECFIN Economic Brief*, 31, 1-10.
39. East, M., Africa, N., Gentilini, U., Hoogeveen, J., & Kazemi, M. (2023). *Poverty Global Practice*.
40. Easterly, W., & Fischer, S. (2001). Inflation and the Poor. *Journal of money, credit and banking*, 160-178.
41. Eke, P. O. (2022). An assessment of central banking on unemployment and poverty: The case of Nigeria. *Journal of Management Info*, 9(1), 20-37.
42. Ekobena, S., & Yannick, S. (2014). Does monetary policy really affect poverty. In.
43. Faidiban, A. P., Naukoko, A. T., & Tolosang, K. D. (2025). Pengaruh Pertumbuhan Ekonomi, Tingkat Pengangguran Dan Jumlah Penduduk Terhadap Kemiskinan Di Kabupaten Manokwari. *Jurnal Riset Multidisiplin Edukasi*, 2(3), 89-104.
44. Fellner, W. (1956). Patinkin's Integration of Monetary and Value Theory. In: JSTOR.
45. Franzen, A., & Bahr, S. (2024). Poverty in Europe: How long-term poverty developed following the financial crisis and what drives it. *International Journal of Social Welfare*, 33(2), 482-494.
46. Gábos, A., Branyiczki, R., Binder, B., & Tóth, I. G. (2019). Employment and poverty dynamics before, during, and after the crisis. *Decent Incomes for All. Improving Policies in Europe*. Eds.: Bea Cantillon, Tim Goedemé, and John Hills, 34.
47. Goshit, G. G., & Longduut, T. D. (2016). Indirect monetary policy instruments and poverty reduction in Nigeria: An empirical evidence from time series data. *International Journal of Academic Research in Business and Social Sciences*, 6(4), 86-101.

48. Halisçelik, E., & Soytas, M. A. (2019). Sustainable development from millennium 2015 to Sustainable Development Goals 2030. *Sustainable Development*, 27(4), 545-572.
49. Heller, P. S. (1980). Impact of Inflation on Fiscal Policy in Developing Countries (Incidence de l'inflation sur la politique budgétaire dans les pays en développement)(El impacto de la inflación en la política fiscal de los países en desarrollo). *Staff Papers-International Monetary Fund*, 712-748.
50. Hills, J., & Stewart, K. (2005). *A more equal society?: New Labour, poverty, inequality and exclusion*: Policy Press.
51. Hollister, R. G., & Palmer, J. L. (1969). *The impact of inflation on the poor*: University of Wisconsin.
52. Hossain, A. (1990). The monetarist versus the neo-Keynesian views on the acceleration of inflation: Some evidence from South Asian countries (with special emphasis on Pakistan). *The Pakistan Development Review*, 19-31.
53. Humphrey, T. M. (1975). A monetarist model of the inflationary process. *Economic Review*, 61, 13-23.
54. Johnson, C. K., & Mason, P. L. (2012). Theories of poverty: Traditional explanations and new directions.
55. Jolliffe, D., & Lugo, M. A. (2018). Piecing together the poverty puzzle. (*No Title*).
56. Jung, S. Y., & Smith, R. J. (2007). The economics of poverty: Explanatory theories to inform practice. *Journal of Human Behavior in the Social Environment*, 16(1-2), 21-39.
57. Kanbur, R. (2001). Economic policy, distribution and poverty: the nature of disagreements. *Peace Economics, Peace Science and Public Policy*, 7(2), 122-145.
58. Knippenberg, E. W. Y. L., Redaelli, S., Infanzon Guadarrama, M., Mostafavi-Dehzoeei, M. H., Hrast Essenfelder, A., Osman, E. A. M., . . . Zaidi, S. (2023). Iran poverty diagnostic-poverty and shared prosperity.
59. Loury, G. C. (1976). A dynamic theory of racial income differences. *Discussion paper, Northwestern University, Center for Mathematical Studies in Economics and Management Science*.
60. Madzimore, T., & Mbedzi, E. (2021). Determinants of poverty: a relative panel data analysis among African regional economic communities. *International Journal of Education Economics and Development*, 12(3), 294-309.
61. Magolie, J. (2024). Elevating Sub-Saharan Africa: The Effect of Infrastructure Investment in Alleviating Poverty.
62. Marx, I., Vandenbroucke, P., & Verbist, G. (2012). Can higher employment levels bring down relative income poverty in the EU? Regression-based simulations of the Europe 2020 target. *Journal of European social policy*, 22(5), 472-486.

-
- 63.Masilo, A. E. (2024). Macroeconomic stability and its relationship with economic growth and poverty reduction. *Revista Académica de*, 1.
- 64.Meadows, D. (2008). *Thinking in systems: International bestseller*: chelsea green publishing.
- 65.Morazes, J., & Pintak, I. (2007). Theories of global poverty: Comparing developed world and developing world frameworks. *Journal of Human Behavior in the Social Environment*, 16(1-2), 105-121.
- 66.Moreno Calva, M. A. M., & Cruz Marcelo, J. N. (2024). Macroeconomics and poverty: an empirical review for Mexico 2005-2022. *Problemas del desarrollo*, 55(217), 103-126.
- 67.Obayelu, A. E., & Edewor, S. E. (2022). Economic Inequality and Poverty Dynamics: What does Literature tell us? *Innovation Journal of Social Sciences and Economic Review*, 4(4), 24-35.
- 68.Olaoye, O. O., Zerihun, M. F., & Tabash, M. I. (2025). Fiscal policy and poverty reduction in sub-Saharan Africa: is the relationship influenced by the business cycle? *African Journal of Economic and Management Studies*, 16(1), 79-97.
- 69.Passadore, J., Sciacovelli, G., Unsal, F. D., & van Hombeeck, C. (2024). A Monetary Policy Framework for Developing Countries.
- 70.Patinkin, D. (1956). *Money, Interest and Prices*, Evanston: Row, Peterson and Co. In: Harper and Row New York.
- 71.Permadi, D. (2011). The decline of neo-liberalism and the rise of neo-keynesianism: a conceptual analysis. *Ciência & Trópico*, 35.
- 72.Powers, E. T. (1995). Inflation, unemployment, and poverty revisited. *Economic Review-Federal Reserve Bank Of Cleveland*, 31, 2-13.
- 73.Prasetyo, P. E., & Cahyani, E. N. (2022). Investigating Keynesian Theory in Reducing Unemployment and Poverty in Indonesia. *The Journal of Asian Finance, Economics and Business*, 9(10), 39-48.
- 74.Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Simon Schuster.
- 75.Ribeiro, A. P., Silva, S. T., & Guimarães, D. (2015). Macroeconomic fundamentals of poverty and deprivation: an empirical study for developed countries. *The European Journal of Development Research*, 27, 37-66.
- 76.Romer, C. D., & Romer, D. H. (2020). Monetary policy and the well-being of the poor. In *Handbook of monetary policy* (pp. 887-912): Routledge.
- 77.Sachs, J. D. (2023). *The End of Poverty: Economic possibilities for our time*: Penguin Random House.
- 78.Saeed, M. (2020). The effects of monetary policy on poverty alleviation in Pakistan. Available at SSRN 3693375.

- 79.Said, F., Musaddiq, T., & Mahmud, M. (2011). Macro level Determinants of Poverty: Investigation through poverty mapping of districts of Pakistan. *The Pakistan Development Review*, 895-910.
- 80.Sanchez-Martinez, M., & Davis, P. (2014). A review of the economic theories of poverty. *National Institute of Economic and Social Research (NIESR) Discussion Papers*(435).
- 81.Sargent, T. J., & Wallace, N. (1981). Some unpleasant monetarist arithmetic. *Federal reserve bank of minneapolis quarterly review*, 5(3), 1-17.
- 82.Shaikh, P. A., Rasheed, B., & Shaikh, A. A. (2023). A new perspective on historical theories of poverty. *Perennial Journal of History*, 4(1), 1-25.
- 83.Skrypnik, D., & Marina, S. (2019). *Counter sanctions and well-being population of Russia: econometric analyses*. Retrieved from
- 84.Smeets, M. (2018). Can economic sanctions be effective?
- 85.Statistical Center of Iran, S. C. I. (2025). *Statistical Database*, various years, Available at <https://amar.org.ir>.
- 86.Sterman, J. D. (2000). Business Dynamics: Systems thinking and modeling for a complex world. *MacGraw-Hill Company*.
- 87.Suhendi, S., Zulfa, A., & Nasution, L. N. (2024). Macroeconomic Analysis of the Poverty Levels on Sumatra Island. *PKM-P*, 8(1), 214-227.
- 88.Tanjung, A. A., Daulay, M., Irsad, I., & Ruslan, D. (2019). The impact of monetary and fiscal policy on poverty in Indonesia.
- 89.Tanzi, V. (1977). Inflation, Lags in Collection, and the Real Value of Tax Revenue (L'inflation, les retards de recouvrement et la valeur réelle des recettes fiscales)(Inflación, desfases en la recaudación y valor real de los ingresos tributarios). *Staff Papers-International Monetary Fund*, 154-167.
- 90.Tarabini, A. (2010). Education and poverty in the global development agenda: Emergence, evolution and consolidation. *International Journal of Educational Development*, 30(2), 204-212.
- 91.Tebaldi, E., & Mohan, R. (2010). Institutions and poverty. *The journal of development studies*, 46(6), 1047-1066.
- 92.Tiberto, B. P. (2025). *How Does Central Bank Independence Influence the Relationship Between Inflation, Income Inequality and Poverty?* Retrieved from
- 93.Tufekchiev, T. (2018). SOCIO-ECONOMIC THEORETICAL APPROACHES IN EXPLAINING POVERTY. *Journal of Sustainable Development*, 8(20), 50-58.
- 94.Tyll, L., Pernica, K., & Arltová, M. (2018). The impact of economic sanctions on Russian economy and the RUB/USD exchange rate. *Journal of International Studies*, 11(1).
- 95.White, H., & Anderson, E. (2001). Growth versus distribution: does the pattern of growth matter? *Development Policy Review*, 19(3), 267-289.
96. World Bank, W. (2022). *Poverty and shared prosperity 2022*. Washington , DC, USA.

پویایی‌های کلان اقتصادی فقر در ایران

چکیده:

فقر یکی از چالش برانگیزترین مسائل در جهان، به‌ویژه در کشورهای در حال توسعه است. تحقیقات زیادی در مورد فقر و علل آن انجام شده است، اما مطالعات کمی برای بررسی پویایی‌های کلان اقتصادی فقر انجام شده است. هدف اصلی این مقاله بررسی پویایی‌های کلان اقتصادی فقر در ایران است و برای این منظور، یک مدل پویایی‌شناسی سیستم برای ایران طراحی، شبیه‌سازی و استفاده شده است. شبیه‌سازی در دوره ۱۹۹۰-۲۰۲۱ نشان می‌دهد که به‌طور متوسط، حداقل چهار دهک اول درآمدی در ایران زیر خط فقر بین‌المللی (۸۵٫۶ دلار در روز) هستند. طبق نتایج شبیه‌سازی، تحریم‌های بین‌المللی علیه ایران، تورم شدید، شوک‌های نرخ ارز و سیاست‌های پولی و مالی انبساطی، نرخ فقر را افزایش داده‌اند، اما در مقایسه، تأثیر تحریم‌های بین‌المللی بیشتر از سایرین بوده است. به‌طور خاص، شبیه‌سازی نشان می‌دهد که تحریم‌های بین‌المللی به‌طور متوسط حدود ۱۰ درصد نرخ فقر در ایران را افزایش داده‌اند. حتی رشد اقتصادی نیز نتوانسته است اثرات فقرزای شوک‌های پولی و سیاست‌های اقتصادی نامناسب را به‌طور قابل توجهی کاهش دهد. بر اساس نتایج، علاوه بر لغو تحریم‌های بین‌المللی، باید سیاست‌های هدفمند برای رشد و توسعه اقتصادی پایدار اجرا شود و بانک مرکزی ضمن حفظ استقلال خود، از اجرای سیاست‌های پولی که باعث کاهش ارزش پول ملی می‌شود، خودداری کند.

کلمات کلیدی: فقر، اقتصاد کلان، تحریم‌ها، پویایی‌شناسی سیستم، ایران.