7. INVESTIGATING THE RELATIONSHIP BETWEEN NATURAL CAPITAL AND SUSTAINABLE ECONOMIC GROWTH USING THE GENERAL EQUILIBRIUM MODEL

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Abstract

Countries with natural resources are always more affluent in terms of natural resources than other countries. The essential and primary point in these countries is the manner and extent of positive exploitation of these resources. These countries are striving to achieve a high level of economic growth and prosperity. How and how much positive use of these resources is used to achieve this goal is very important. In these countries, public investment is used as a driving force for long-term growth. In the present study, we investigated the impact of public investment policies on macroeconomic variables using a general equilibrium model. The results show that, during the time, if institute and management exercises improve, public investment as an efficient capacity reduces the need for constraints. Also, if better selected, organized, and implemented investment projects, the average real return on investment will increase and, as a result, without increasing the level of debt, will have a positive effect on stock growth and income. In other words, choosing the right project will increase investment efficiency, and as a result, capital growth and macroeconomic stability will be ahead. To better examine and ensure the accuracy of the results, we look at the variables of public debt and commercial debt with further and long-term reductions in prices. Due to the decrease in the price of total public debt, foreign trade debt has increased by more than what was mentioned in the previous case. This finding confirms the economic reasoning at the efficiency level: "Public investment in low-income countries turns half of the cost of public investment into effective public investment." The initial level is in motion, and only with the policy of financial integration can the amount of capital be increased to some extent in the

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forecast horizon. The research findings generally emphasize prudent fiscal policies to reform infrastructure investment and increase productivity rather than a sudden increase in public investment. Long-term economic growth is also possible through increased productivity and financial stability.

Keywords: economic growth, sustainability, structural model, Dutch disease

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1. Introduction

Developing countries with abundant resources are growing and flourishing by exploiting existing resources. The infrastructure gap in most developing countries uses the potential of public investment for long-term growth. Prudent fiscal policy, especially infrastructure investment management and optimization of return on investment, is essential to maintaining economic stability and also fosters sustainable economic growth in developing countries. Development is a multifaceted concept, and any change and prosperity in social, economic, and political subsystems are considered examples of development. In other words, economic growth is accompanied by technical, value, and institutional changes. According to studies, one of the main factors in the development of industrialized and wealthy countries such as Canada, the United States, Australia, and the Scandinavian countries is natural resources or, in other words, national wealth. Theoretically, the abundance of natural resources improved economic growth or did not hinder it (Behboodi et al., 2009).

The existence of natural resources in any country is considered one of the primary sources of national wealth. Therefore, we expect countries with natural resources to have better economic performance. In other words, in such countries, revenues from natural resources provide growth and development of investment, development of infrastructure, and ultimately economic growth. But evidence shows that by the end of the twentieth century, the best financial performance from these newly industrialized countries was South Asia, South Korea, and Hong Kong. Countries such as Nigeria and Venezuela were in a hopeless situation (Sachs and Warner, 1997). Evidence of this finding was developing countries that had lower economic growth despite having rich natural resources than countries without resources. Because, theoretically, on the one hand, the abundance of natural resources directly and inherently can't cause economic backwardness because it is a vast source of income and a special privilege for countries with it, compared to the cost of access to it. Has a very high income; On the other hand, wealth, of which natural resources are the best example, is a decisive and essential factor in the lubrication of the economic system and wheels, which is the main factor of economic growth and prosperity of countries. (Gylfason, 2002).

Some researchers noted that all countries with natural resources don't do well in capital diversification, development, and economic growth. For example, countries such as Norway, the United States, Malaysia, and Botswana have natural resources in their economies. They have not acted as a deterrent; even with the proper management of resources and the inflow of incomes, they have achieved the expansion of the capital market and significant economic progress. Some economists believe that natural resources are inherently a divine blessing and can be a way forward for countries. In other words, how to use these resources for the benefit or scarcity of natural resources is an essential factor (Stinger, 2005). Natural

resource countries are among the most influential countries in the world. In addition to influencing the international arena, these countries generate significant revenue from sales or exports. Gains outside the scope of industry and economy of the country and, if properly managed and scientifically, can cause high economic growth (Bastan, 1390). The abundance of natural resources leads to the adoption of sometimes incorrect and contradictory policies by governments. They paved the way for the diversion of relative prices to the detriment of knowledge-based components such as innovation and R&D. In addition, in countries with abundant natural resources, education and human capital are pairing less attention. It is one of the main factors of economic development and growth today, and the mechanism of the balance of the human capital market (supply and demand balance) is not market-based. In addition, the price fluctuation of Natural resources should note that due to the affordability of countries with significant natural resources such as oil from world markets and the global price of these resources, producers of resource-based products, which are the main exports to countries with abundant resources. They face uncertainty and high operational risk. Tension will reduce the motivation of economic actors and minimize capital accumulation and, therefore, will lead to lower economic growth (Shahabadi and Sadeghi, 2013). Prices and exports of natural resources are affected by global markets. Through two channels of uncertainty and resource allocation, revenues from natural resources affect macroeconomic variables such as investment (Samadi et al., 2013). Most developing countries with abundant resources are exploiting them for broader growth and prosperity. The infrastructure gap in most developing countries uses the potential of public investment for long-term growth. Prudent fiscal policy, especially in managing infrastructure investment and optimizing return on investment, is necessary to preserve economic consistency and sustainable economic growth in developing countries. (Grisley et al., 2017). Utilizing the wealth of natural resources and other resources has had many opportunities and challenges for developed countries. Simultaneously, developing countries are suffering from a lack of access to international capital markets and domestic capital due to existing infrastructure gaps. (Plow, 2011 and 2013). Domestic savings cannot cover the gap between investment and protection in developing countries, and stock markets are in their infancy (Taybi et al., 2013). Spending proceeds from the sale of natural resources to expand infrastructure can reduce the cost of private-sector economic activities, other ways of financing capital formation (foreign debt, domestic savings, and direct investment Strengthen). As we know, achieving sustainable economic growth in natural resource-exporting countries requires a correct harvest and optimal allocation of foreign exchange earnings on the one hand and an optimal combination of investable funds between other sectors on the other. "In economic planning in the form of growth models to achieve sustainability and development, the optimal path of extraction from natural resources is examined regardless of its interaction with other economic sectors. Given this and financial planning patterns for growth models, the realization of this path is considered by determining investment and capital accumulation. At the same time, a well-codified and planned financial system has a significant impact on the stability of a country's economy and, as a result, the strength of the overall price level. The result is an increase in economic growth and development through increased production in the economic system. In other words, a sound financial plan and optimal allocation of resources could achieve high economic growth and development levels. According to studies conducted by Hassan et al. (2011) and Rosa and Vatipadoren (2005) with the growth and development of financial and monetary systems, a higher economic growth rate and access to financial markets are the key to this growth was increased.

We need to make international decisions to know how much we can borrow from available resources and how much we can save. Income fluctuations lead to the restoration of appropriate financial laws and potential savings to prevent consumption—the cost of flexibility and deviation. Given the limitations of borrowing resources and infrastructure needs, revenue from resources can be adequate in providing the investment needed for public infrastructure for inclusive growth and continuous improvement of intergenerational welfare. Also, income from natural resources can lead to Dutch disease or the curse of resources, which is a contradictory factor for lower economic growth in countries with abundant natural resources. Therefore, the goal of researchers and policymakers to manage revenue from natural resources is to accelerate the development and diversification of the economy. It was at this time that the term curse was first used by the famous English economist Auti in 1993 and by Sachs and Warner (1995, 1997 and 2001), Gylfason (1998, 1999, 2001, 2004, and 2008), Salah Martin and Sobramanian (2003) and Papyrax and Gerlf (2004 and 2006) were examined. The term refers to the failure of countries with natural resources to achieve continuous and stable economic growth.

Rosenstein (1943), in his concept model entitled "Great Pressure," argues that growth-based investment enables the economy to set many constraints to reach economic scale and create the required demand. This proposal was later supported by other researchers, including Sachs (2005). On the other hand, the lack of capital indicates that the return on investment is probably higher than the world interest rate. Domestic investment in physical and human capital will undoubtedly guarantee a much higher return on savings abroad. In addition, because resource income helps alleviate borrowing constraints, for example, as collateral, developing countries with natural resource wealth can develop investment and household consumption. To provide for themselves. However, Plough (2011) and Vanbels (2013) explain that public investment does not necessarily always lead to growth. Less diversity can jeopardize Dutch disease or resource curses, leading to trade and development. The vast of natural resources have a positive effect on economic growth in economies that can create a relatively large production sector, allowing them to prevent the impact of Dutch disease (Gerelmaa and Kotani, 2016). Natural capital consists of natural resources that can provide a substantial and profitable circulation of goods and services. These include renewable resources such as forests and non-renewable resources such as oil and minerals (Daily, 1997; Repto *et al*., 1989). Most countries rely on natural capital because measuring GDP is seen as a measure of economic growth. Therefore, a nation's production and consumption patterns have a direct and indirect impact on the sustainability of that country's natural capital. The production cycle between the economy and the environment is noteworthy (World Bank, 2012). Exploiting these resources and allocating revenues from them are examined with two goals and approaches.

- Using revenue from sources with a consumer approach
- Using sources of income with a savings approach

The consumerist view is that the government can use these resources to cover government spending, which has led the government to a significant share of the firms and natural resources. An additional point in this regard is the number of resources used by the government. The size of the government is based on subdivisions such as government spending, tax rates, government investment, and subsidies. These indicators are the basis for countries' decisions on the allocation of revenues from natural resources. Better to say, the lower the share of government spending, the number of subsidies paid, and the tax rate paid to entrepreneurs, the lower the allocation of resources based on market mechanisms. On the other hand, some agree. Proponents believe that revenue from these resources will

be spent on public affairs, health, education, and infrastructure development. Commenting on the optimal pattern of exploitation and revenue allocation of oil and gas resources requires consideration of several variables. If the distribution of natural resource revenue to consumer needs drives rent expansion, the cost-effectiveness of the reduced costs and expected benefits will not be realized. Also, if this allocation increases class distances, the social costs may offset the benefits of bringing in resources into the country. On the other hand, when the country needs to expand infrastructure and improve education and health, investing in natural resource revenues may lead to a prolonged development process and a widening gap with advanced countries. Therefore, it is not generally possible to recommend or reject the policy of saving income or allocating it to consumer spending. The recommendation or rejection of any policy will vary depending on the circumstances of each country (Haqiqi *et al*., 2013). The purpose of this study is to evaluate macroeconomic developments, such as debt growth and its sustainability in terms of different public investment strategies, for a developing country with natural resources - Iran. In other words, using a dynamic general equilibrium model, we want to explain the macroeconomic issues related to the sustainability of economic growth and the prosperity of natural resources. Countries like Iran often suffer from low capital and limited absorption capacity.

These characteristics often pose vital challenges in balancing investment expansion, debt retention, and macroeconomic stability. To conduct this study in Iran, we first examined its conditions in terms of global trade. Based on the information obtained from the Comtrade site, we concluded that Iran is a commodity-dependent country. This is while the situation of Iran is wealthy in terms of natural resources and can meet all the needs of itself and other countries. We use a CGE[4] model to answer the questions and questions. This model is a quantitative analysis method for examining various policy issues to analyze their effects in a comprehensive model.

Time is one of the main assumptions of this model. In other words, the time should be long enough for the significant effects of resource revenues to clear all markets. Also, the length of time is dependent on market factors and inputs. The general equilibrium is the Walras competitive equilibrium in which firms are priced and maximize their profit or utility until prices are adjusted to total market liquidation. The result of this framework will be the equilibrium of supply and demand. Accordingly, CGE models integrate the relationships between production structure, demand, and earnings of different firms. These models are also referred to as exogenous price models (Tayebi & Misrinjad, 2006).

2. Model Structure

The CGE model is a computer-based simulation that describes all economic interactions with an equation system. A multi-part model is based on real-world data from a country or group of national economies. This simulation usually begins with a review of the general equilibrium situation and a policy shock (for example, a carbon tax or a greenhouse gas trade reduction plan). By doing so, it creates a new general equilibrium model (Kazim Alasirin 2017). Given the variety of analyzes and applications available, it is possible to provide more flexibility for the overall economics analysis platform by implementing integrated accounts, further expanding the analysis through the CGE modeling framework. We use a computable common equilibrium model to answer and carefully examine the issues and questions raised. This model is a quantitative analysis method for analyzing a variety of policy issues

[4] *Computable General Equilibrium*

that is able to investigate their effects in the form of a comprehensive model. Time is one of the main assumptions of this model. In other words, the time should be long enough to examine the significant effects of revenue from resources and to settle all markets. The length of time also depends on market factors and input elasticities. Over the past few years, computable general equilibrium (CGE) models have been widely used in national and regional policy analysis. An available equilibrium model considers all sectors of the economy or a region and all the interactions of these sectors. The word "computable" means that, unlike textbook theory, detailed data is used, and the model computed a solution. The term "general equilibrium" indicates that a shock in one part of the economy, such as a change in government policy, affects both consumers and producers throughout the economy.

In general, the general equilibrium is the Walrasian competitive equilibrium. Firms are price-seeking and seek to maximize their profitability or utility until prices are adjusted, and the market is fully settled. The result of this framework will be equality of supply and demand. Accordingly, CGE models integrate the links between the production structure, demand, and revenue of different firms. These models present exogenous price models (Taybi and Masri Nejad, 2006). Due to budget constraints, market settlement conditions, or Wallace's law, ensure that all requirements are economically reasonable and compatible. Change in one part of the economy can sometimes make other parts of the economy in significant and surprising ways. Affect.

When general equilibrium models are placed in specific real-world settings, they are usually called a computable available equilibrium model (CGE) or a functional general equilibrium model. For a long time, input and output models have been the most common method for examining and estimating economic impacts in policy analysis. The advent of the CGE framework has been a significant response to the weaknesses of input-output models (Avalwapati et al., 1998; Burke & Hoffman, 2002; Gillespie et al., 2001; Rickman, 1992; Robinson & Roland Holst, 1988). Examples of economic impact models that use financial data in the form of (IOT / SAM) to estimate how the economy responds to changes in policies, markets, technologies, or other React factors are rooted in the early stages (Johansen,1960; Miller and Spencer, 1977; and Shawn and Wally, 1972). Jones introduced the simple structure of the CGE model in 1965. This model is a three-part model of an open economy involving households, companies, and governments. The producing country provides a set of commercial and non-tradable sectors using capital (K), labor (L), and government infrastructure (KG). This model uses different types of public debt instruments, other tax and cost variables, and independent fund assets. The government can use different types of debt (commercial, domestic and foreign) and resource balances to finance public investment programs. The Independent Wealth Fund can also serve as a buffer for balancing financial projections for revenue sources and public investment programs. When the fund reaches its minimum value, a combination of domestic and foreign loans can cover the short to the medium-term financial gap. Tax rates and government non-capital expenditures made financial adjustments, which may be restricted by ceiling and floor to maintain debt sustainability. We first describe the economy's main sectors (households, firms, and government) and how government spending (expenditure) is linked to the sustainability of our debt in this sector.

Households

There are usually two types of households: households that reach for their mouths and households that have a desirable life that lives for an unlimited horizon. There is a fraction of ω households that can access a variety of markets, including capital markets, where they

provide corporate securities. These types of families are often referred to as record optimization families and are defined by the following OPTs. Residual Fraction 1- ω refers to poor or restricted households or in other words households with mouths and is indicated by the HTM index. Households do not have access to the capital and financial markets and consume any period of usable income. Both types of consumer basket are cumulative in the CES equation in which $c^i_{T,t}$ traded or buyable goods and $c^i_{N,t}$traded or non-tradable goods are shopping. Thus, the post-CES consumption basket in Equation (1) is shown for both the Ricardian family and the oral family.

$$c_t^i = \left[\varphi^{\frac{1}{x}}(c_{N,t}^i)^{\frac{x-1}{x}} + (1-\varphi)^{\frac{1}{x}}(c_{T,t}^i)^{\frac{x-1}{x}}\right]^{\frac{x}{x-1}}, \qquad i = OPT, HTM \tag{1}$$

Where φ is the degree of commodity imbalance in the basket, and χ> 0 is the internal flexibility over time. Suppose that PN, T and ST are the relationship between the relative price of non-traded and traded goods according to the basket. It is assumed that the price law is a commodity for the traded goods St, as well as the actual exchange rate, which is defined as the price of an external basket unit in the domestic basket unit. Both types of households show($L^i_{T,t}$ و $L^i_{N,t}$, i = OPT, HTM) business services, i = OPT, HTM, to the traded and indirect sectors, with T and N indices. The entire L^i_t workforce also does not have the CES specifications of the complete two-part replacement work (Equation 2).

$$L_t^i = \left[\delta^{-\frac{1}{p}}(L_{N,t}^i)^{\frac{1+p}{p}} + (1-\delta)^{-\frac{1}{p}}(L_{T,t}^i)^{\frac{1+p}{p}}\right]^{\frac{p}{1+p}}, \qquad i = OPT, HTM \tag{2}$$

Where δ is the share of the stable labor force in the non-performing sector, and ρ> 0 is the internal elasticity over time. Assume $w_{N,t}$ و $w_{T,t}$ to be the actual wage rates paid in each segment. For both types of households, the main difference is their financial accessibility. OPTs or prosperous households can maximize their utility (Equation 3) with budget constraints (Equation 4) by purchasing bonds. For elasticity, we assume that affluent households can only buy domestic bonds or foreign bonds at their own adjusted costs. Assume utility is calculated.

$$\sum_{t=0}^{\infty}\beta^t U(c_t^{OPT}, L_t^{OPT}) = \sum_{t=0}^{\infty}\beta^t\left[\frac{1}{1-\sigma}(c_t^{OPT})^{1-\sigma} - \frac{K^{OPT}}{1+\psi}(L_t^{OPT})^{1+\psi}\right], \tag{3}$$

According to the limitations of the composite unit budget line, the following is stated:

$$(1+\tau_t^c)c_t^{OPT} + b_t^{OPT} - s_t b_t^{OPT*} = (1-\tau_t^l)w_t l_t^{OPT} + R_{t-1}b_{t-1}^{OPT} - R_{t-1}^* s_t b_t^{OPT*} + \Omega_{T,t} + \Omega_{N,t} + \vartheta^k\tau^k\left(r_{T,t}^k k_{T,t-1} + r_{N,t}^k k_{N,t-1}\right) + s_t r m_t^* + z_t - \mu k_{G,t-1} - \Theta_t^{OPT*} \tag{4}$$

Here β is the discount factor, ψ and σ are the inverse of the internal elasticity between labor consumption and supply. In addition, households must pay effective tax on consumption τct and income tax on τlt. b_t^{OPT}Are domestic government bonds where Rt b_t^{OPT}payments in the basket at time t + 1 and b_t^{OPT*} are debt to the rest of the world requiring repayment of Rt* b_t^{OPT*}units from the basket are foreign consumption. We assume that the private sector pays a premium u for the interest rate that the government pays foreign trade debt, R_ (dc, t) such that:

$$R^*t = Rdc, t+u \tag{5}$$

Households with their hands to their mouths like HTM has the same performance can be optimized households.

$$(c_t^{HTM}, L_t^{HTM}) = \frac{1}{1-\sigma}(c_t^{HTM})^{1-\sigma} - \frac{K^{HTM}}{1+\psi}(L_t^{HTM})^{1+\psi} \tag{6}$$

In the meantime, the amount of consumption is determined according to the budget constraint.

$$(1+\tau_t^c)c_t^{HTM} = (1-\tau_t^L)w_t L_t^{HTM} + s_t rm_t^* + z_t - \mu k_{G,t-1} \quad (7)$$

Finally, with two types of households calculating total consumption, labor, government and private bonds, foreign debt is as follows.

$$c_t = wc_t^{OPT} + (1-w)c_t^{HTM}, \quad (8)$$

$$L_t = wL_t^{OPT} + (1-w)L_t^{HTM}, \quad (9)$$

$$b_t = wb_t^{OPT}; \quad b_t^* = wb_t^{OPT*} \quad (10)$$

Companies

The economy has three manufacturing sectors: (i) the non-traded sector with the index N; (ii) a (non-resourced) sector traded with the T index; Since developing countries tend to export more resources, we assume that total resource output is easily exported to non-commercial production companies ($y_{N,t}$) with technology.

$$y_{N,t} = z_n\left(k_{N,t-1}\right)^{1-\alpha_N}\left(L_{N,t}\right)^{\alpha_N}(K_{G,t-1})^{\alpha_G} \quad (11)$$

z_n That total productivity of the factors of production, $K_{N,t}$ private end-of-period investment,K_G t total end-of-period capital, or part of labor income and α_G output elasticity relative to public capital. The unused capital in the non-traded goods sector is calculated by the following equation.

$$i_{n,t}, \quad K_{N,t} = (1-\delta_N)K_{N,t-1} + \left[1 - \frac{K_N}{2}\left(\frac{i_{N,t}}{i_{N,t-1}} - 1\right)^2\right] \quad (12)$$

Where$i_{N,t}$ represent investment expenditure, δ_N capital depreciation rate and KN the cost adjustment cost parameter. Selected representatives of corporate non-commercial goods include labor (L), capital (K) and investment (I).

We are working to maximize the weighted benefit of the non-recurring period by optimizing the final utility of household consumption.

$$\Omega_{T,o} = \sum_{t=0}^{\infty}\beta^t\lambda_t\left[p_{N,t}y_{N,t} - W_{N,t}L_{N,t} - i_{N,t} - \tau^k r_{N,t}^k k_{N,t-1}\right] \quad (13)$$

That $r_{N,t}^k$ the period of return on capital.

Similar to the non-commercial goods sector, there are companies that produce technology-related commercial goods.

$$y_{T,t} = y_{T,t}(K_{T,t})^{1-\alpha_T}(L_{T,t})^{\alpha_T}(K_{G,t-1})^{\alpha_G} \quad (14)$$

To eliminate the Dutch disease that comes with the proceeds of the finances, we assume that the factor benefit,$Z_{T,t}$ is the subject of learning by doing:

$$\frac{Z_{T,t}}{Z_T} = \left(\frac{Z_{T,t-1}}{Z_T}\right)^{\rho_{zT}} + \left(\frac{y_{T,t-1}}{y_T}\right)^{\rho_{yT}} \quad (15)$$

That ρ_{zT}, $\rho_{yT} \in [0, 1]$ control the severity of the Dutch disease. The law of movement of private capital is:

$$K_{T,t} = (1-\delta_T)K_{T,t-1} + \left[1 - \frac{K_T}{2}\left(\frac{i_{T,t}}{i_{T,t-1}} - 1\right)^2\right] i_{T,t} \quad (16)$$

Like companies that have non-commercial goods such as $L_{T,t}$ labor, $K_{T,t}$ capital, and $i_{T,t}$ capital to maximize their profits over time:

$$\Omega_{T,0} = \sum_{t=0}^{\infty} \beta^t \lambda_t \left[y_{T,t} - w_{T,t} L_{T,t} - i_{T,t} - \tau^k r_{T,t}^k K_{T,t-1} \right] \quad (17)$$

Since most natural resource production is through large investment, the natural resource sector is financed through foreign direct investment in developing countries, natural resource production is simplified in this model. GDP resources $y_{0,t}$ are the unit of consumption of the portfolio of domestic consumption.

$$y_{0,t} = s_t p_{o,t}^* \tilde{y}_{0,t} \quad (18)$$

We assume that resource production is $\tilde{y}_{0,t}$ less than world production, hence the price of international goods (To external basket) as $p_{o,t}^*$ in our segmentation, we consider the production and price of international commodities (relative to the basket of external consumption) as the extrinsic ways to drive the dynamics of the model.

Government

Here $\tau_t^0$is the royalties on production, and the revenue of resources in each period collected is:

$$t_t^0 = s_t \tau_t^0 p_{o,t}^* \tilde{y}_{0,t} \quad (19)$$

The state budget constraint flow equals:

$$\tau_t^c c_t + \tau_t^L w_t L_t + t_{0,t} + (1 - \vartheta^K)\tau^K \left(r_{T,t}^K K_{T,t-1} + r_{N,t-1}^K \right) + b_t + s_t d_t + s_t d_{c,t} + s_t R^{RF} f_{t-1}^* + \mu K_{G,t-1} = p_t^G (g_t^c + g_t^I) + Z_t - s_t g r_t^* + R_{t-1} b_{t-1} + s_t R_{dc,t-1} d_{c,t-1} + s_t f_t^* \quad (20)$$

Which is gr_t^*international aid. The user fee for public capital f is calculated as a fraction of the ordinary costs: μ ≡ $f p_t^G \delta_G$

The government has three debt instruments: external conditional debt, (DT) foreign trade debt (DC), and domestic debt (BT). Loans developed by official creditors are included as exogenous agents in the model.

R_d , $R_{dc,t}$ are the real gross interest rates paid on accruals and foreign trade debt, which include the risk premium depending on the total deviation of foreign trade debt to GDP ratio. Steady state is initialized.

$$R_{dc,t-1} = R^f + v_{dc} exp \left[\eta_{dc} \left(\frac{d_t + d_{c,t}}{y_t} - \frac{d + d_c}{y} \right) \right], \quad (21)$$

Where R^f is a global (fixed) risk-free rate, y_t of total GDP, and v_{dc} and η_{dc} are structural parameters. Government investment routes (as a share of gross domestic product) are calculated outside the model and are used as extrinsic factors. Except for the financial approach that increases transmission, all other approaches consider continuous transmission as a share of GDP. In all simulations, government consumption is kept constant as a level of growth. Government spending includes government expenditure g_t^c and government investmentg_t^I. As with private consumption, government spending is equal to$g_t \equiv g_t^c + g_t^I$, and also the CES function is equal to the sum of traded domestic goods and non-traded domestic goods. Thus,

$$g_t = \left[v_t^{\frac{1}{x}} (g_{N,t})^{\frac{x-1}{x}} + (1 - v_t)^{\frac{1}{x}} (g_{T,t})^{\frac{x-1}{x}} \right]^{\frac{x}{x-1}}, \quad (22)$$

Where υ_t the weight given to illegal goods in government purchases. Government spending has the same internal elasticity of substituting χ> 0 as private consumption. P_t^G The government consumer price index in terms of unit of consumer goods. It should be noted that υ_t is a time variable. As we emphasize the effects of government spending on public investment, the weight given to non-government goods for consumption of government spending $\upsilon_g$can vary with the constant value of government υ. The characteristics of public investment are inefficiencies and limitations on absorption capacity. For better reflection, we assume that the return on investment of additional investment above the threshold level decreases from the steady-state efficiency value of ε to a value of less$\tilde{\varepsilon}$. Here we want to determine the effect of $\tilde{g}_t^I$on public investment and $S_t^{GI} \equiv \frac{g_t^I}{y_t}$on the ratio of investment to production against(y_t), which is real GDP.

$$\tilde{g}_t^I = \begin{cases} \epsilon \tilde{g}_t^I & when\ S_t^{GI} \geq \bar{s}^{GI} \\ (\epsilon \bar{s}^{GI} y_t) + \tilde{\epsilon}(g_t^I - \bar{s}^{GI} y_t), & when\ S_t^{GI} \geq \bar{s}^{GI} \end{cases} \quad (24)$$

$\bar{S}^{GI}$The threshold value that results in efficiency costs associated with absorption capacity constraints. The law of movement of public capital is:

$$K_{G,t} = (1 - \delta_G) K_{G,t-1} + \tilde{g}_t^I \quad (25)$$

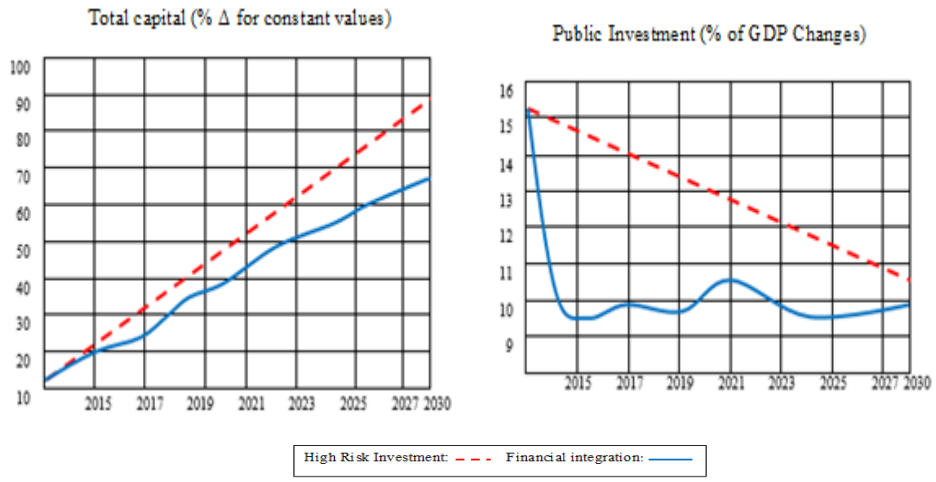
In cases δ_G where the amount of depreciation of government public capital is provided, public investment is made through taxes, debt or commodity income. The reserve of income in the reserve fund is the time when the government remains stable with the production of goods and the fixed price of its income. However, when the price of a commodity is not commensurate or when a shock strikes and taxes reach their peak, increasing public investment can raise issues of debt sustainability before investment grows. Calibrate the model A complete description of the calibration is provided in the appendices in this section, we show the investment paths and income of natural resources and the effects of implementing decisions on Iran's macroeconomic outlook. The analysis specifically examined two alternative public investment pathways. Figure 1 shows that public investment pathways are related to GDP share and public capital accumulation as deviations from the initial steady state level.

In this hypothesis, we consider two policies of high-risk financial integration and investment (aggressive investment). As you can see in Figure 1, the government begins to integrate financial debt to reduce public debt by reducing public investment. The plan represents a reduction in public investment by about 5 percent of GDP from the base year. Due to the financial integration of public capital accumulation, it is less aggressive than investing. The next hypothesis is the increase in the amount of public capital that, in this alternative program, the government maintains its current level of public investment for infrastructure development and growth. Figure 1 shows an 80% increase in public capital from initial steady state. In the following, we examine the macroeconomic implications of lowering prices and decreasing the production of natural resources in the Iranian oil field with respect to the two aforementioned investment routes and scenario design. Our forecasting and analysis are generally based on three scenarios, in which all the scenarios assume that the government is doing only foreign trade. Due to political constraints, it is not possible to borrow to balance the payments and balance it by increasing consumption or labor taxes. The scenarios are as follows:

1- The first scenario of oil revenues without affecting forecasting hypotheses
2- The second scenario is the decline in oil prices
3- Third scenario of price reduction along with production decline

Figure 1

Hypotheses of Investment Paths



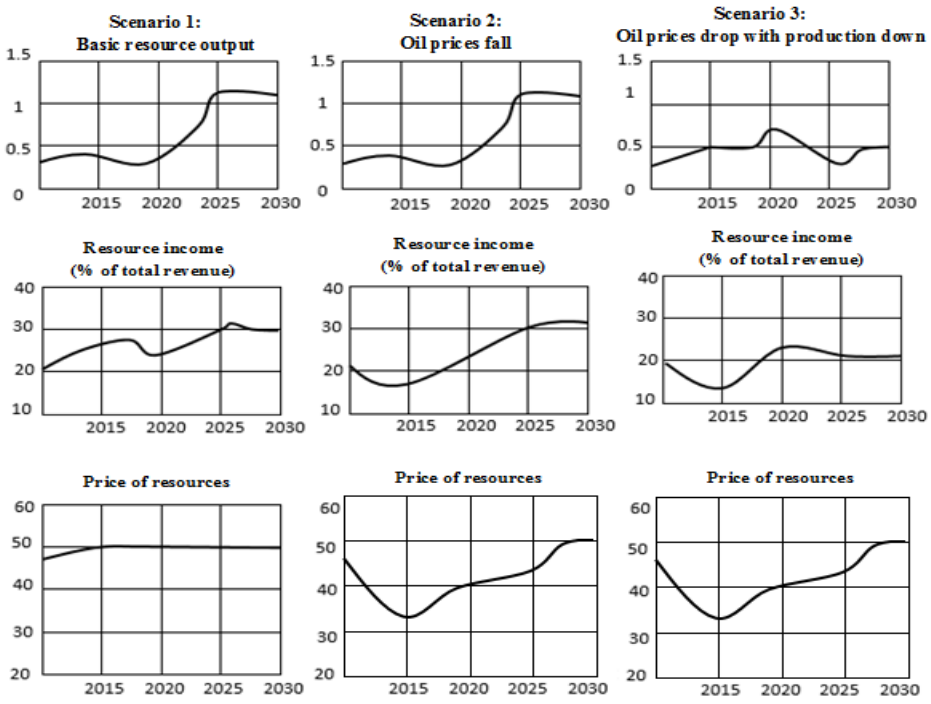
This section shows steady-state and advanced scenarios.

Scenario One: Commodity prices (oil in the present study) are steady at about $ 48.52 a barrel, with forecasts given production growth from current levels of 2.7 million barrels to about 1.1 million barrels. The barrel should increase by 2030. This increase in growth could be attributed to the expansion of oil reserves through investment rather than the income from these resources. As you can see in the graphs, the increase in earnings from 2020 onwards is fully evident. Scenario two: In this scenario we are assuming a short-term drop in oil prices. The situation is already there, but it is forecast to be short term and is expected to return to its original level by mid-2019. In addition, after applying this scenario, revenue and resource fluctuations also fluctuate so that, in the short run, both price and revenue (a decrease in prices leads to a decrease in production and consequently a decrease in revenue), sources are strongly It drops, but as you can see in the long run, it reaches a level of stability higher than the initial level.

Scenario Three: In this scenario, we are assuming a decrease in prices and a decrease in production. Simulation Results and Implementation This policy, based on natural resource assumptions, places the simulation in different investment paths. This is one of the worst-case scenarios in which price declines and reduced production lead to lower earnings, and in the forecast horizon after sustainability, the level of stability is much lower than the initial level.

Figure 2

Scenarios designed with alternative assumptions



3. Results of policy simulation and implementation

In this section, considering the scenarios presented, we attempt to combine them with the aforementioned fiscal policies. In general, we want to examine the dynamic contribution of macroeconomics to the variables studied. The results of financial integration are shown in Figure 3. In each graph, we plot the dynamics of variables in both the merger (blue line) and the public investment path (red line). The first scenario of oil revenues without influencing forecasts with the development of oil resources and the improvement of infrastructure in the forecast horizon, we will increase oil production and extraction with price stability. Drawing on the graphs, we find that total public debt and foreign trade debt are initially growing at a significant rate, then intermediate at a declining rate and almost stable and finally stabilizing.

Given the high-risk investment policy, both public debt and foreign trade debt (each as a percentage of GDP) will be about 23 times higher than the financial integration policy. In both investment paths, fixed capital is initially moving with relative stability and raising funds.

But as you can see, the policy of financial integration is gradually able to attract higher levels of capital than the policy of high-risk investment. As public investment increases domestic demand, the real exchange rate is overshadowed by both investment paths. Given the

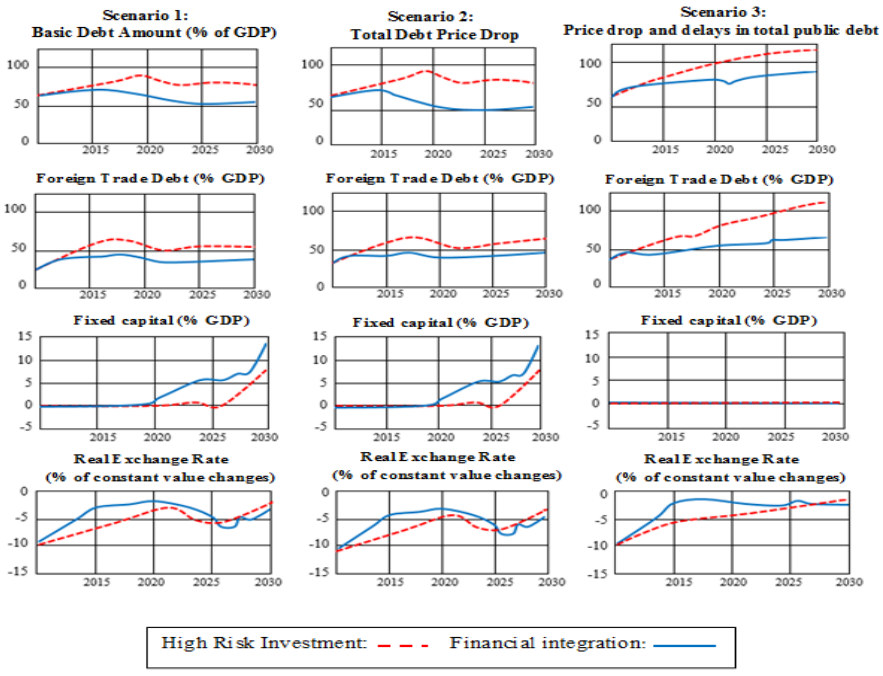
output, it can be concluded that high-risk investment policy will ensure long-term exchange rate stability. The second scenario is the decline in oil prices this scenario starts with the decline in oil prices. As the results show, the comparison of this scenario with the first one shows and increase in both public debt and foreign trade debt than before. This is only due to lower commodity prices and higher debt levels than before. Fixed capital behaves the same as before, except that the amount of savings is slightly lower than before. The same applies to the exchange rate.

The third scenario is a price drop along with a decline in production in the third scenario, as shown, the decline in prices and the decline in production lead to a significant increase in public and external debt. In this scenario, fixed capital has maintained its basic state under both fiscal policies without any growth. Under this scenario, there has been no growth in the long run of capital. Also, high-risk investment overshadows the real exchange rate. In other words, increasing the exchange rate under high-risk investment policy allows us to reduce the exchange rate, which results in a current account deficit relative to the initial steady state.

In this scenario, the policy of high risk investment (aggressive investment) would not succeed, but the policy of financial integration would be more flexible in the short run. In other words, it will boost economic growth by lowering interest rates and maintaining debt stability in the forecast horizon. In addition, the stability of public debt and the cost of payments reduce the value of the exchange rate, increase competition with other countries, and ultimately prevent the phenomenon of the Dutch disease.

Figure 3

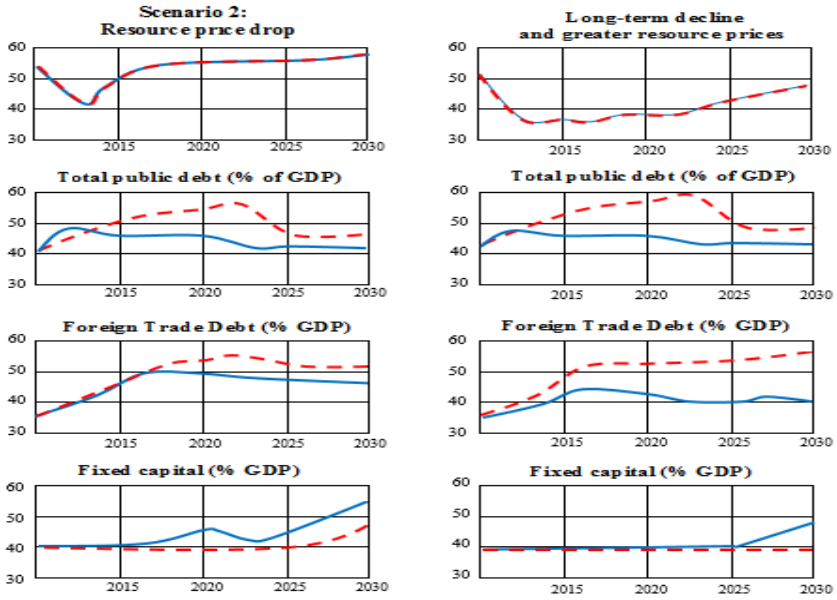
Examination of macroeconomic variables under designed fiscal policies



In the following, we examine the variables of public debt and trade debt with a longer and longer-term decline in prices in order to better verify the results. At this point we will only look at the price shown in Figure 4. Due to the decline in the total price of public debt and foreign trade debt, it has increased more than previously mentioned.

Figure 4

Long-term decline in prices under the scenarios and fiscal policies in question

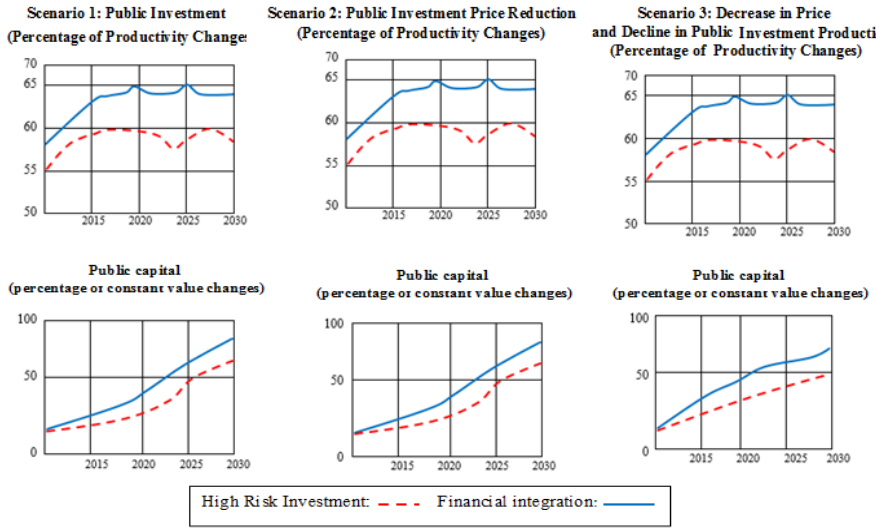


According to the literature[5] on the level of efficiency, "public investment for low-income countries only makes up about half of the cost of public investment into effective public investment (ie, investment that enhances public equity stocks)."That means $ 1 for public investment in the public equity formula turns into $ 0.5. “In this case, fixed capital flows are in line with the trend of maintaining the initial level of stability, and only with the policy of financial integration can the capital increase to some extent in the forecast horizon. But to analyze and analyze the policies that have been set and the effectiveness of these policies as a percentage of productivity, we have analyzed this area. As shown in Figure 5, in the case of high-risk (aggressive) investment of public capital compared to financial integration, the return on investment is reduced in the short run. If institutions, and management practices improve over time, public investment as an efficient capacity reduces the need for constraints. In addition, if investment projects are better selected, organized and executed, the average real return on investment will increase and thus have a positive impact on equity growth and earnings without increasing debt levels. In other words, the right choice of a project will increase the efficiency of the investment and thus the growth of capital and stability of the economist

[5] *Berg et al. 2013 & van der Ploeg. 2012*

Figure 5

Investing in the Effectiveness of Investments under Financial Policies



4. Conclusion and discussion

In general, analyzed macroeconomic variables such as public capital, total public debt, foreign trade debt, real exchange rate, etc. with the two types of policies proposed for investment, offensive investment and financial integration. How variables were affected under three scenarios were analyzed. Given the large share of the natural resources sector, it is important to take a close look at the process and method of investing. If long-term debt sustainability dominates the economy, the financial risks of investing in projects will increase, thereby reducing the likelihood of investment and reaching higher levels of growth.

As you can see, there was a difference in investment feedback between the financial integration policy and the high-risk investment policy. In general, the first priority of any economy in the world is to achieve a level of economic stability and financial stability that can only be achieved through structural adjustments and financial adjustments. In Iran, due to the rich capacities of natural resources, paying attention to the right investment tools with high speed of return is of special importance. While an irrational and ambitious increase in public investment can lead to higher unusual growth. As a result, problems such as foreign debt stability and macro-financial risks associated with investment benefits and further growth, lack of financial adjustment, increase public debt. If an aggressive investment decision is made, the formation of government capital, or in other words, the government's revenue development fund, will be delayed. On the other hand, changes in commodity prices will be in line with the government's economic vision document to develop and increase production. There is a big gap between investment productivity through aggressive investment and financial integration. A wrong or unfavorable policy greatly increases the likelihood of irreparable economic risks. At the same time, our goal is to maintain major macro priorities and financial issues with economic progress and achieving a level of stability. This sustainability is made possible through financial adjustments and structural reforms. The results and findings of this study in confirmation of the findings of other

researchers show that one of the key measures in this regard is to reduce the government budget deficit. In other words, reducing public spending, such as precisely targeting subsidies as a public investment strategy to increase productivity to facilitate growth potential and economic diversification, is a principle in controlling the budget deficit. In order to complete the results and to examine the situation in the country more closely, library studies on the status of Iran and its management methods on the use of oil revenues were obtained. Based on this information, libraries have found that Iran has enjoyed strong economic growth and most of the growth and prosperity has been in the years 40-51 with growth of about 12.5%. This high growth has been influenced by factors such as infrastructure development, macroeconomic stability, technology transfer and accelerated growth of the industrial sector. But the country's economic growth has been unstable in the years 56-52, the most important of which can be attributed to policy instability, macroeconomic instability and the phenomenon of Dutch disease. Economic growth continued to be slower in the years 57-67, but in the years 68-86 we had relatively successful periods of economic growth, with average annual economic growth of about 5%. Since the beginning of the year, in terms of the economic growth performance of the period of instability and recession, the most important causes of this recession can be the reduction of investment rates, the turbulence of policies and the instability of economists. During this period, the Dutch disease reappeared as oil revenues increased due to inadequate management of these revenues. During these years, the increase in the share of planning institutions, the instability of markets, and the decline in investment in infrastructure have led to economic growth. Iran's economy was in deep recession as sanctions intensified in the years 1991-92. But from the year 93 to 96, with the improvement of expectations and the activation of empty capacities in the economy, there was an increase in the unstable economic growth in the country, which has continued to this day. The most important causes include lower investment rates, foreign sanctions, uncertainty and risk, macroeconomic instability, weakening private firms, weak financial markets and resource constraints. Surveys show that the common point in all countries benefiting from natural resources is to have a strong, coherent and lawful institutional structure, but it should be noted that the number of countries due to poor structure their legal and institutional failures to manage the income from these resources are greater (Ploeg, 2006). Actually, the optimal use of natural resources depends on the existence of quality institutions, and efficient and well-managed institutions can turn natural resource revenues into opportunities rather than threats. In fact, the government can use the management tools in place to finance the development of other firms and use the revenues and profits generated by them to develop the infrastructure of the oil industry. In other words, it can be said that with the proper interaction between the economic sectors (households, corporations and government) and the proper distribution of resources, both the social welfare and the economic prosperity of the country will be achieved. In fact, with the proper interaction between the economic sectors (households, corporations and the government) and the proper distribution of resources, both social welfare and economic prosperity are achieved. In this way, both economic growth is ensured by increased prosperity and employment, and we keep the country safe from Dutch disease. Overall, according to the citation, it can be stated that in order to achieve the ideal level of economic growth and prosperity, we use investment strategies that improve productivity and increase growth potential in the economy. Countries that enjoy natural resources are one of the best models of optimal financial investment.

Finally, according to the results and studies, designing a correct and scientific financial framework in the long run can increase investme\nt income, reduce financial distortions and

ultimately economic growth by controlling the amount of debt. Examining this claim raises other questions and ambiguities that require further research in the future.

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Appendix

According to the available information, we calibrated this model for Iran. Calibration was performed based on a wide range of data. In Iran, the productive sectors include agriculture, industry, services and oil as a source of energy production. On the other hand, we know that general equilibrium models can be calculated in a competitive equilibrium market. In this situation, the government has a key role in the economy. As mentioned earlier, the government is the owner of revenues from oil resources. Which sectors of the economy the revenues of these resources are spent on depends on the opinion and size of the government. In other words, the government draws long-term dynamic patterns by maximizing the inter-temporal social welfare function relative to available resources based on current and future prices, capital accumulation adjustment costs, and existing equilibrium constraints. The government shows different behaviors according to the resources available and based on time conditions. In other words, in the short term, the government, like other manufacturing enterprises, tries to maximize profits in order to manage this sector. In the long run, the government determines the amount of available capital and the optimal amount of withdrawal. In addition, the government affects household savings rates due to the management tools at its disposal, such as taxes and subsidies. Of course, this impact must be such that social welfare is maximized. To achieve high social welfare, private savings rates must be properly determined. As we know, the total savings rate or the government savings rate is determined based on the social savings rate. But the main question and the issue that is very important for the people in the country these days, is how to allocate the revenues from the implementation of management tools? How and in which sectors is the investment from oil revenues invested? In which sectors should oil revenues be invested in order to have more economic growth and social welfare?

In general, and according to the logic of economic sciences, the government should invest the revenues and investable revenues from management policies in non-oil sectors. This investment should have a higher rate in the more profitable and productive sectors of the economy. But for the government in Iran to make the right investment in order to save the country from this economic trap requires time, careful and expert studies and the use of specialized forces. As we know, general equilibrium models are defined in both static and dynamic modes.

The static model is reviewed over a period of time and is the best option for reviewing economic policies. Dynamic or multi-period models are suitable for analyzing the effects of savings, investment and capital accumulation policies. In fact, the dynamic general equilibrium model is the same as Wallace's competitive equilibrium model. In these markets, the goal is to maximize profits or utility. In other words, the general and final goal in this

model is to integrate the relationship between production structure, demand and income in different firms (Taybi and Masri Nejad 2006).

In other words, the level of performance of producers should be such that with a constant return to the scale of production can achieve one of the two principles of maximizing profits or minimizing costs. The model equilibrium system includes optimal conditions for households, firms, market clearing conditions, and balance of payments terms. In this analysis, we used prediction and general analysis of the model using diner software. In order to investigate the above-mentioned sensitivities and predictions regarding production, we considered two variables of public investment and price as exogenous variables. Required data were collected from the following sources for 2015 and simulated to horizon 2030.

1. WEO Global Information Banks

2. IFS International Financial Statistics

3. Time series of the central bank

According to available data, the share of exports to GDP as well as the share of imports to GDP according to the average of the last few years are calibrated to be 58% and 43%, respectively. The share of government spending in GDP is about 23.7%, of which 17.2% is in the government consumption sector and 6.5% in government spending. Regarding the assets, donations and debts, according to the data obtained from the results of the research, it can be stated that the amount of domestic debt to GDP ratio is about 19.2%, and debt to GDP ratio is about 31%. The percentage and the amount of debt on foreign loans is about 14%.

In the manufacturing sector, similar studies of low- and middle-income countries were used to examine the parameters of the share of labor income[6] in the traded goods sector α_T and the non-traded goods sectorα_N. The statistics for each of these parameters are α_T = 0.5 and α_N = 0.5.The parameters of δ_N and δ_T are related to the annual depreciation rate of the public investment[7] whose estimated values according to the studies for both parameters are δ_N and δ_T = 0.10. Other parameters such as adjustment and investment costs[8]K_N, K_T= 25 that learning and doing parameters[9] are ρ_{YT} and ρ_{ZT}= 0.10, respectively.

The value of σ parameter in the household preferences[10] discussion according to LIC method from similar studies is σ = 2.94 and represents 34% substitution elasticity. According to Goldberg's study[11], the value of the elasticity parameter is ψ = 10 and the substitution elasticity between trading and non-trading[12] goods is χ = 0.44.

Also, in order to access the international capital[13] markets, we consider its statistic according to baffle studies equal to η = 1.

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[6] *Buffle et al.2012*
[7] *Buffle et al.2012*
[8] *Berg et al.2013*
[9] *Buffle et al.2012*
[10] *Ogaki et al.1996*
[11] *Goldberg. 2011*
[12] *Stockman & Tesar.1995*
[13] *Buffle et al.2012*