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The Optimal Capital Gains Tax Rate under Rent-Seeking Behavior: An Optimal Control Approach with Evidence from Iran

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ABSTRACT

One of the emerging tax bases worldwide is the capital gains tax, which has been proposed in Iran as a measure to curb speculative activities. Taxes and their rates can significantly influence individuals' economic status, overall societal growth, and social welfare. Consequently, setting appropriate tax rates has long been a complex and debated issue globally. Various factors influence tax rates and the extent to which they achieve their intended objectives, one of the most important being rent seeking. This study investigates the optimal rate of capital gains tax under rent-seeking conditions in Iran. Since this tax is a relatively new concept in the Iranian economy and has not yet been implemented, no empirical data are available for direct analysis. Therefore, the Pontryagin maximum principle is applied in this research. First, a model of an economy characterized by imperfect competition and rent-seeking behavior is developed. The model is then solved theoretically and calibrated using parameters relevant to the Iranian economy. The results indicate that a higher share of capital involved in rent-seeking activities increases the optimal capital gains tax rate. Additionally, an increase in the inflation-adjusted net return on unproductive activities also leads to a higher optimal tax rate.

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1. Introduction

The optimal tax rate is determined based on a balance between two primary objectives: first, generating revenue for the government, and second, maintaining investment incentives. Excessively high tax rates may discourage investment, potentially slowing economic growth. Conversely, overly low tax rates may result in insufficient government revenue to provide public goods (Smith, 2024). Therefore, identifying the optimal tax rate requires careful consideration of this trade-off. Non-optimal tax rates can lead to multiple issues, including resource misallocation and strong reactions from economic agents (Farhi & Gabaix, 2020), making the determination of optimal taxation a central concern in any country's fiscal policy. One potential measure to mitigate rent-seeking activities is the imposition of a capital gains tax. While it may not fully eliminate speculative or rent-seeking behavior on its own, it serves as an effective tool to curb such practices (Jeffers, 2022). Historically, capital gains tax rates have shown an upward trend in countries like the United States, where rates increased from near 0% to 20–30%, and Sweden, where rates rose from below 5% prior to World War I to peaks exceeding 100% in the 1970s–80s before declining to 15–40% (Protopapadakis, 1983; Agersnap & Zidar, 2020). Examining capital gains taxation in a rent-seeking environment is particularly important, yet underexplored. This issue is especially relevant for Iran, where few studies have addressed the intersection of rent-seeking and taxation, and none have focused specifically on capital gains tax as a tool for controlling unproductive activities. A key question that remains largely unanswered is: *What is the optimal capital gains tax rate under rent-seeking conditions compared to a scenario without rent-seeking?* This paper seeks to address this gap using *optimal control theory.* The main objective of this study is to calculate the optimal rate of capital gains tax in an economy characterized by significant unproductive activities and entrenched rent-seeking. In such an economy, unproductive activities dominate productive ones. To achieve this objective, an optimal control model has been developed and solved using the *Pontryagin maximum principle*. To the best of the authors' knowledge, this is the first study to approach the issue in this manner.

The primary contribution of this research lies in the calculation of the capital gains tax rate by distinguishing between different market sectors within the Iranian economy, providing a more nuanced and policy-relevant analysis.

This paper is structured into six sections. Section 2 provides a comprehensive review of the literature on capital gains taxation, tracing its historical evolution, key concepts, and both theoretical and empirical evidence. In Section 3, we develop an endogenous growth model to compute the optimal capital gains tax (CGT) rate and to examine its main determinants in the presence of rent-seeking behavior within the economy. Section 4 presents a theoretical analysis of the determinants of the optimal capital gains tax rate and discusses the direction and magnitude of their potential impacts. Section 5 presents the calibration of this extended model using data specific to Iran. Finally, Section 6 summarizes the key findings and discusses potential avenues for future research.

2. Literature Review

Capital gains tax refers to a tax on income or profits derived from unproductive activities that aim to increase an individual's share of existing wealth without generating new wealth. Rent-seeking typically involves manipulating the social or political environment in which economic activities take place, without contributing to overall economic productivity.

2.1 History of Capital Gains Tax in Iran

The *history of capital gains taxation (CGT)* reflects a complex interplay of economic theory, political compromise, and social considerations. Originally conceptualized under the Haig-Simons framework, CGT aimed to tax real gains annually as they accrued. Practical difficulties, however, led to a realization-based taxation system, which remains debated in terms of fairness and economic impact (Auten, 1999).The evolution of CGT in the U.S., from the Revenue Act of 1921 to the Tax Reform Act of 1986, illustrates the influence of political interests, often benefiting high-income individuals disproportionately (Lee, 2005). Early reforms sought to stimulate investment but largely favored the wealthy, while subsequent reforms attempted to align capital gains and ordinary income tax rates, reflecting shifts in economic theory and political coalitions (Mehrotra & Ott, 2015). Historically, Iran did not have a comprehensive capital gains tax. This changed in 2025 with the enactment of a new law targeting capital gains and speculative transactions. Efforts to tax capital gains date back to the 1980s, but prior initiatives on assets such as property, vehicles, and gold were either not legislated or not implemented in practice. Until recently, capital gains from real estate and other assets were generally untaxed, as confirmed as late as 2020. In *August 2025,* Iran officially enacted the "*Law on Speculation and Rent-Seeking Taxation*", marking a major shift in fiscal policy. This law aims to curb speculation, reduce unproductive investments, and help close budget gaps exacerbated by sanctions and economic pressures.

Key Provisions of the 2025 Law are (Iranian National Tax Administration, 2025):

- Applies to gains from the sale of real estate, vehicles, gold, jewelry, foreign currency, and cryptocurrencies.
- Implements a *tiered tax rate*: assets sold within one year are taxed up to 40%; held one to two years, 10–15%; held longer than two years, lower rates or exemptions apply.
- Provides significant exemptions: first home and first car per household, agricultural and production assets, inheritances, and family transfers.
- For the first two years, taxation applies to *both the profit and half the asset value increase attributable to inflation.*
- Enforcement involves a *digital transaction-tracking system*, with strict penalties for tax evasion, including fines and restrictions on future transactions.

2.2 Capital Gain (Loss)

A capital gain refers to an increase, whereas a capital loss refers to a decrease in the value of a capital asset between the time of its purchase and its sale. Capital assets generally include any items owned and used for personal, enjoyment, or investment purposes, such as stocks, bonds, houses, cars, jewelry, and works of art. When an asset is sold at a price higher than its purchase price, a capital gain occurs; conversely, when an asset is sold at a price lower than its purchase price, a capital loss is realized (York, 2019). This relationship can be expressed as follows:

$$Cg = s\text{-}p \tag{1}$$

where (Cg) denotes the capital gain, (s) represents the selling price, and (p) represents the purchase price. The value of an asset is typically determined by three key components: (1) the expected future income it is likely to generate, (2) the estimated disposal value at the time of sale, and (3) the discount rate used to convert the future income stream and disposal value into present value. Consequently, when an asset is sold, the sale price reflects both the seller's and buyer's assessment of the asset's expected future income. If the forecasts of the asset's future income at the time of sale align with the initial forecasts made at the time of purchase, the sale price will equal the original purchase price. However, if new forecasts indicate a decline in expected income—for example, due to a shorter asset lifespan than initially anticipated—the asset owner may incur a loss upon sale. Conversely, if the new forecasts suggest an increase in expected future income, the asset owner may realize a gain. In essence, a capital gain arises when the expected income at the time of sale exceeds the previously estimated income at the time of purchase. Put differently, capital gain or loss represents the difference between the present value of the asset's expected income at the time of sale and the present value of its expected income at the time of purchase. In simple terms, capital gains or losses result from changes in expectations regarding the asset's potential productive capacity—that is, its potential to generate income (Taqavi, Darvishi et al., 2010). In other words:

$$c_g = e^{-\rho t} E\left(y_{(t+1)}\right) - E\left(y_{(t-1)}\right) \quad (2)$$

Where Cg denotes the capital gain at time t, $e^{-\rho t}E(y_{t+1})$ represents the present value of the expected income from selling the asset at time $t+1$, $E(y_{t-1})$ represents the present value of the expected income at the time of purchase, and $e^{-\rho t}$is the discount factor.

2.3 Capital Gains Tax

The distinction between capital gains and capital income is fundamental in taxation and economic analysis. Capital gains refer to profits realized from the sale of capital assets, such as real estate or stocks, which are not part of the seller's regular business operations. In contrast, capital income encompasses earnings generated from investments or business activities, such as dividends or interest. Understanding these differences is essential for evaluating tax implications and economic outcomes. Capital gains arise from the increase in value of assets that are not regularly sold, including real estate or stocks. They are typically taxed upon realization, meaning the tax is applied when the asset is sold rather than as it appreciates in value (Garrett, 2013). Capital income includes earnings from ongoing investments, such as dividends from stocks or interest from bonds (Olivier, 2012). This type of income is generally subject to income tax, reflecting regular earnings rather than one-time profits from asset sales (Wilkinson & Tooley, 1998). Capital gains are often taxed at rates different from ordinary income, sparking debates over fairness and economic impact (Garrett, 2013). Some jurisdictions provide exemptions or preferential rates for capital gains, which further complicates the tax landscape (Lee, 2023). While capital gains and capital income are commonly treated differently in tax systems, some argue that both should be taxed similarly to promote equity and reduce distortions in economic behavior (Wilkinson & Tooley, 1998). The capital gains tax (CGT) is a crucial element of the tax system, particularly in the context of wealth distribution and economic behavior. It primarily taxes profits from the sale of assets, which can significantly influence investment decisions and overall economic growth.

2.4 Capital Gains Tax and Rent-Seeking

Capital gains tax and rent-seeking are closely related, as taxation influences both economic behavior and resource allocation. Rent-seeking, which involves expending resources to gain economic advantage without productive output, can be shaped by capital taxation policies. In an imperfectly competitive economy characterized by prevalent rent-seeking, the optimal capital income tax rate is designed to reconcile differences between the marginal social and private returns to capital, as well as disparities between pre-tax interest rates and the marginal productivity of capital. Interestingly, this optimal tax rate is numerically close to zero and largely independent of other tax rates or the overall tax burden (Arefyev & Baron, 2019).

Rent-seeking refers to the behavior of individuals or firms attempting to obtain economic gains without contributing to productivity, often through political or economic manipulation. Such behavior can create significant inefficiencies and perpetuate inequality, as resources are diverted from productive activities to unproductive rent-seeking endeavors. Corporate taxes can play a significant role in mitigating rent-seeking activities. Tax policies often favor established firms while disadvantaging new or zero-profit entrants, potentially preventing new firms from engaging in rent-seeking altogether (Katz & Rosenberg, 2000). Such regulations can foster an oligopolistic market structure within rent-seeking competitions, dominated by a small number of profitable, well-established firms (Katz & Rosenberg, 2000).

The overall performance of an economy is strongly influenced by the efficiency of its institutions. Interestingly, an economy dominated by a monopolistic rent-seeker may perform better than one characterized by a competitive rent-seeking industry, highlighting the critical role of institutional frameworks in shaping economic outcomes (Barelli & Pessôa, 2002). While capital gains taxation can influence rent-seeking behavior, its broader economic impact is contingent upon institutional efficiency and market structure. For example, the presence of monopolistic rent-seekers may result in superior economic performance compared to a competitive rent-seeking environment, suggesting that the structure of rent-seeking markets and the effectiveness of institutions are key determinants of the overall consequences of capital taxation on rent-seeking activities.

2.5 Optimal Capital Gains Tax Rate

Optimal taxation refers to the design of tax systems that maximize social welfare while meeting government revenue requirements. This concept encompasses various models and approaches, addressing critical questions regarding the types of taxes to implement, their rates, and the overall structure of the tax system. Debates in optimal taxation often focus on whether to prioritize income taxes or commodity taxes, with significant implications for both equity and efficiency (Gentry, 1999). The degree of progressivity in the tax system is also crucial, as it affects income distribution and social welfare outcomes (Gentry, 1999). While optimal taxation aims to balance efficiency and equity, some argue that the complexity of human behavior and market dynamics may challenge the practical application of these theoretical models. This underscores the need for ongoing research and adaptation in tax policy design. Determining the *optimal capital gains tax rate* is complex, influenced by multiple economic factors, including innovation, fiscal constraints, and market structures. The determination of an optimal tax rate is a complex and vital issue in economics. This rate is typically defined by balancing two fundamental objectives: ensuring sufficient government revenue and preserving investment incentives. When the tax rate is set too high, investors may lose the motivation to invest, which can, in turn, hinder economic growth. Conversely, when the tax rate is too low, the government may be unable to generate adequate revenue to finance essential public services. Hence, identifying the optimal capital gains tax rate requires a careful assessment of this trade-off. Only a few studies have explored this issue in depth, and a summary of their findings is presented in Table 1.

Table 1. Studies on Optimal Taxation of Capital and Capital Gains

Researcher(s)	Topic	Country	Key Findings
Chamley (1986)	Optimal taxation of capital	United States	The optimal long-run tax rate on capital is zero.
Aiyagari (1995)	Optimal capital income taxation with incomplete markets	United States	The optimal tax rate on capital income remains positive even in the long run.
Jones et al. (1997)	Optimal capital taxation	United States	The optimal long-run capital income tax rate depends on the tax code structure.
Piketty & Saez (2012)	Theoretical framework of optimal capital taxation	United States	Under certain conditions, the optimal capital tax rate may reach 50–60 percent.
Min Dai et al. (2015)	Timing of optimal taxation with capital gains taxes	United States	An increase in short-term *capital gains tax rates* leads to lower effective tax rates.
Ben-Gad (2017)	Optimal taxation of capital gains when government consumption is endogenous	United States	A zero optimal tax rate is a special case; in practice, the effective capital income tax rate in the U.S. is relatively high.
Sanchirico (2021)	Revisiting extremes in optimal capital taxation	United States	Judd's findings of a zero optimal capital tax rate stem from ambiguities in the mathematical formulation of taxation.
Badawi & Spiritus (2021)	Optimal taxation of risk-free and excess capital gains with heterogeneous rates of return	United States	Optimal tax rates are sensitive to the inclusion of risky assets.
Chen et al. (2024)	Optimal taxation of capital income in an innovation-driven growth economy	United States	The optimal capital income tax rate in the United States is estimated at approximately 11.9 percent.

Source: Authors' compilation based on prior research.

As shown in Table 1, most studies in the field of capital taxation have primarily focused on capital income taxation rather than capital gains taxation. Among the limited research on capital gains taxes, the majority has examined the effects of such taxes on various economic domains—including stock markets, agents' behavioral responses, housing markets, and rent-seeking activities—while relatively few have analyzed the optimal capital gains tax rate itself.

Addressing capital gains taxation within a rent-seeking environment is particularly important, yet this issue has received little attention in the literature. There remains a clear need to investigate the determination of the optimal capital gains tax rate under rent-seeking conditions, especially in the context of Iran's economy. In the limited studies conducted on taxation and rent-seeking in Iran, capital gains taxation has been largely overlooked. A critical gap in the Iranian economic literature concerns the question: *What is the optimal capital gains tax rate in a rent-seeking economy?* The present study aims to fill this gap- main contribution- by applying the optimal control theory framework. The model developed in this study incorporates three agents: the representative household, the firm, and the government. The objective functions of all three agents are inspired by the framework of Arefyev & Baron (2019), who analyzed the optimal tax on capital income. However, the focus of this study is the optimal tax rate on capital gains under rent-seeking conditions. To the best of our knowledge, this is the first model designed to calculate the optimal capital gains tax rate under such conditions in Iran.

3. Model

The overall structure of the proposed model is illustrated in Figure 1.

Figure 1 summarizes the key components of the model and the interactions among the representative household, firms, and the government. The representative household possesses both labor and wealth, which it uses to generate income. Specifically, the household allocates a portion of its labor (productive labor) and a portion of its wealth (productive assets) to firms.

Firms require factors of production, including labor and capital, to convert intermediate goods into final goods. Firms receive labor and a portion of capital from the representative household. In return, firms pay wages for labor and provide output for the capital supplied. Additionally, firms pay profit taxes to the government. The representative household contributes to government revenue by paying income tax and taxes on unproductive activities, such as the capital gains tax. In exchange, the household receives public goods and services provided by the government. Thus, the household's income tax comprises both wage tax and capital gains tax.

3.1. The Representative Household Problem

The *representative household* seeks to maximize its utility. Its behavior is modeled under the following assumptions:

1. The number of households is normalized to one (the representative household).
2. Household wealth (A) consists of physical capital (K) and government debt holdings (B).
3. A portion of household assets is allocated to productive investments to earn income, while the remainder is used for unproductive activities (capital gains or rent-seeking). Rents are assumed to arise due to government policies, and the household participates in unproductive activities alongside productive activities. Specifically, the household invests (θ) percent of its wealth in productive activities and (1- θ) percent in unproductive activities.
4. Household wealth evolves through several channels, including returns on productive investments, returns on unproductive activities, wages, and consumption.
5. The household pays income tax, consumption tax, and capital gains tax on unproductive activities to the government.

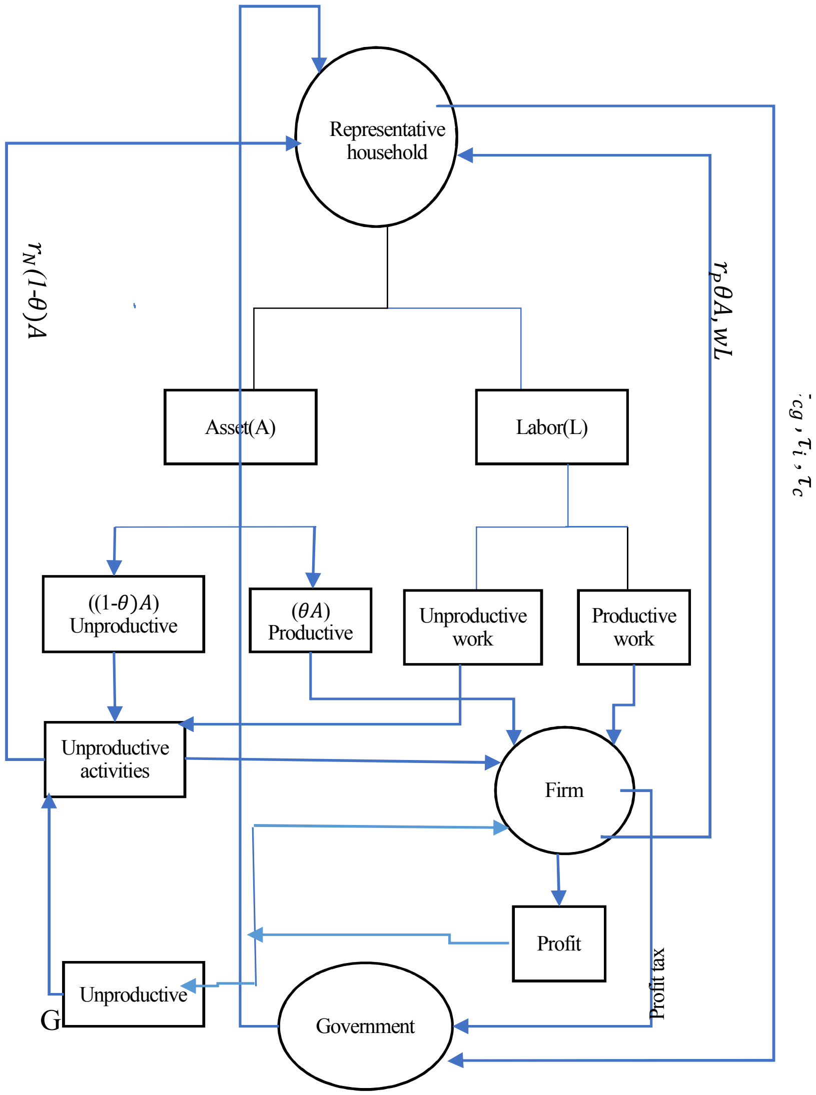

Figure 1. Relationships between Agents

Source: Research findings

Based on these assumptions, the ***representative household's problem*** can be formally expressed using equations (3) and (4).

$$\max_{c,l} \int_0^\infty e^{-\rho t} u(c,l)d(t) \qquad (3)$$

s.t: $\dot{A}=r_P\theta A + (1-\theta)Ar_N + wl - p_cC$ (4)

In these expressions, C, l, ρ, and A represent consumption, labor, the subjective discount rate, and household wealth, respectively. Additionally, p, c, w, r_P, θ, and r_N denote the price of the final good, the after-tax wage, the net return on productive capital, the share of wealth invested in productive activities, and the net return on capital income from unproductive activities, respectively. The number of households is normalized to one, and the producer price of the final good is taken as 1, such that $p_c = 1+\tau_c$, where τ_c represents the consumption tax. The maximization problem for the representative household is formalized in equations (5) - (9).

$$\begin{cases} \frac{\partial H}{\partial c} = 0 \rightarrow e^{-\rho t}u_c - e^{-\rho t}\gamma p_c = 0 \rightarrow u_c = \gamma p_c & (5) \\ \frac{\partial H}{\partial l} = 0 \rightarrow e^{-\rho t}u_l + e^{-\rho t}w\gamma = 0 \rightarrow u_l = -w\gamma & (6) \end{cases}$$

$$\frac{\partial H}{\partial \lambda} = \dot{A} \rightarrow \dot{A} = r_P\theta A + (1-\theta)Ar_N + wl - p_cC \quad (7)$$

$$\frac{\partial H}{\partial A} = -\dot{\lambda} \rightarrow -\dot{\lambda} = \gamma r_P\theta(1-\tau_i)e^{-\rho t} + \gamma(1-\theta)r_N(1-\tau_{cg})e^{-\rho t} \rightarrow (8)$$

$$\rightarrow \dot{\gamma} = \gamma[\rho - (r_P\theta + (1-\theta)r_N)]$$

$$\gamma = \gamma_{(0)}e^{\rho t - \theta\int_0^t r_P(z)dz - (1-\theta)\int_0^t r_N dz} \quad (9)$$

3.2. The Firm Problem

Firms in the model aim to maximize their gross profits. Their behavior is characterized by the following assumptions:

1. Firms transform intermediate goods into final goods by combining capital provided by the representative household and a portion of profits from previous periods with labor supplied by the household.
2. Firms pay the representative household a return on capital and wages for labor services.
3. Firms pay profit taxes to the government.
4. In equilibrium, firms allocate all profits to marketing and competition

efforts to sell their products.

5. The representative firm's capital stock, k, originates from two sources: the capital supplied by the household and retained profits from prior activities. The firm allocates this capital between productive and unproductive activities, denoted $k^p$and k^r, respectively, such that:

$$k = k^p + k^r$$

6. Capital used in both productive and unproductive activities depreciates at the same rate, δ.
7. In equilibrium, it is assumed that all of the firm's profits are ultimately spent on unproductive activities, including rent-seeking and activities influenced by government policies.

$$(\hat{r} + \delta)K^r + \widehat{w}L^r = \pi \qquad (10)$$

The final output, Y, is produced by firms according to the production function specified in equation (11):

$$\text{Y}=(\int_0^1 (y_i)^{1-\sigma} di)^{\frac{1}{1-\sigma}} \qquad (11)$$

In this framework, y_i represents the output of firm i in the intermediate goods sector, and $\sigma(0 \leq \sigma < 1)$ denotes the inverse elasticity of substitution between intermediate goods. The inverse demand function for y_i is given by:

$$p_{y_i} = (\frac{Y}{y_i})^\sigma$$

where $y_i = F(k_i^p, l_i^p)$, k_i^p is the capital used in production, and l_i^p is the labor employed in production. The superscript p indicates production activities. The production function $F(k, l)$ may exhibit constant, increasing, or decreasing returns to scale.

Under these assumptions, the gross profit function of firm i from production is formulated, leading to the firm's objective function, as expressed in equation (12).

$$\pi_i = p_{y_i} y_i - (\hat{r} + \delta) k^p{}_i - \hat{w} l_i^p \quad (12)$$

In these expressions, $\hat{r}$, $\hat{w}$, and δ denote the interest rate, wage rate, and depreciation rate, respectively. The first-order conditions for the firm's profit maximization problem are presented in equations (13) through (15):

$$p_{yi} = \left(\frac{Y}{y_i}\right)^{\sigma} = Y^{\sigma} y_i^{-\sigma} \rightarrow$$

$$\pi = Y^{\sigma} y_i^{-\sigma} y_i - (\hat{r} + \delta) k_i - \hat{w} l_i^p \rightarrow \pi = Y^{\sigma} y_i^{1-\sigma} - (\hat{r} + \delta) k_i - \hat{w} l_i^p \quad (13)$$

$$\frac{\partial \pi}{\partial k} = 0 \rightarrow (1 - \sigma)\, Y^{\sigma} y_i^{-\sigma} F_1\left(k_i^p, l_i^p\right) = (\hat{r} + \delta) \quad (14)$$

$$\frac{\partial \pi}{\partial l} = 0 \rightarrow (1 - \sigma)\, Y^{\sigma} y_i^{-\sigma} F_2\left(k_i^p, l_i^p\right) = \hat{w} \quad (15)$$

In these expressions, F_1 and F_2 denote the partial derivatives of the production function with respect to capital (k) and labor (l), respectively. The total capital and total labor used in production are defined as $K^p = \int_0^1 k_i^p di$ and $L^P = \int_0^1 l_i^p di$ respectively. In equilibrium, all intermediate goods firms utilize identical amounts of capital and labor and produce the same quantity of intermediate goods. Therefore, we have:

$$K^p = k_i^p \quad (16)$$

$$L^p = l_i^p \quad (17)$$

$$Y = F(K^p, L^p) \quad (18)$$

Substituting $y_i = Y$ into equations (14) and (15) yields the equilibrium relations presented in equations (19) and (20):

$$(1 - \sigma)\, Y^{\sigma} y_i^{-\sigma} F_1\left(k_i^p, l_i^p\right) = (\hat{r} + \delta) \rightarrow F_1 = \frac{(\hat{r} + \delta)}{(1 - \sigma)} \quad (19)$$

$$(1 - \sigma)\, Y^{\sigma} y_i^{-\sigma} F_2\left(k_i^p, l_i^p\right) = \hat{w} \rightarrow F_2 = \frac{\hat{w}}{(1 - \sigma)} \quad (20)$$

where F_i represents the derivative of F with respect to its i^{th} component. Under equilibrium conditions, the total profit relation reduces to equation (21):

$$\pi = \int_0^1 \pi_i di = \pi_i = Y - (\hat{r} + \delta)K^p - \hat{w}L^p \quad (21)$$

Rent seekers compete to obtain rents arising from the government's misguided policies, expending their own resources in this competition. The amount of profit and rent gained in this process depends on the capital and labor employed. If we denote the profit earned from unproductive activities by Q, then $Q(k^r, l^r)$ is a function of the capital and labor used in the unproductive activity. The winner of the competition is the one who achieves the maximum value of the function Q. Using the definitions of the production and profit functions for unproductive activities, along with their maximization and minimization conditions, we have:

$$\frac{F_1}{F_2} = \frac{Q_1}{Q_2} \quad (22)$$

$$\frac{Q_1}{Q_2} = \frac{(\hat{r}+\delta)}{\hat{w}} \quad (23)$$

where K^r and L^r are the amounts of capital and labor that firms employ to seek rents in the entire economy. The remaining part of the market-clearing condition is given in equation (24):

$$Y = C + G + \dot{K} + \delta K \rightarrow \dot{K} = Y - C - G - \delta K \quad (24)$$

3.3. Feasible Allocation Set

The resource constraint ensures that the allocation aligns with firms' optimization. When the resource constraint is satisfied for a given allocation, there exists a producer price vector such that the allocation meets the firms' budget constraints and first-order conditions. Similarly, the executive constraint ensures that the allocation aligns with household optimization. If an allocation satisfies both constraints, there exist prices at which consumers and producers would choose this allocation, and the government budget constraint for this allocation and these prices is satisfied under Walras's law (Arefyev & Baron, 2019). We consider household wealth measured in units of the utility function:

$$a = \gamma A \tag{25}$$

We differentiate equation (25) with respect to time and then substitute the first-order conditions (5), (6), and (8), along with the household budget constraint (4).

$$\dot{a} = A\dot{\gamma} + \gamma\dot{A} \rightarrow \dot{a} = a\rho - Lu_l - Cu_c \tag{26}$$

To derive the resource constraint, we need to specify how K^p and L^p depend on K and L. The strategy is to determine the contributions of K^p, L^p, K, and L to the income Y, and then obtain the ratios K^p/K and L^p/L from these contributions. The elasticity of the final product with respect to the labor and capital used in production (α and β) can be expressed as relations (27) and (28):

$$\alpha(K^p, L^p) = \frac{F_1(K^p, L^p).K^p}{F(K^p, L^p)} \tag{27}$$

$$\beta\,(K^p, L^p) = \frac{F_2(K^p, L^p).L^p}{F(K^p, L^p)} \tag{28}$$

The elasticity of Q with respect to K^r and L^r can be expressed as relations (29) and (30), respectively:

$$\varphi\,(K^r, L^r) = \frac{Q_1(K^r, L^r).K^r}{Q(K^r, L^r)} \tag{29}$$

$$1 - \varphi(K^r, L^r) = \frac{Q_2(K^r, L^r).L^r}{Q(K^r, L^r)} \tag{30}$$

φ denotes the elasticity of $Q(K^r, L^r)$ with respect to K^r, given the assumption that the function Q is scale-invariant. Accordingly, ϕ also denotes the elasticity of Q with respect to L^r. For simplicity, the parentheses for the functions α, β, and ϕ are omitted from this point onward.

The share of capital used in production in total income can be derived as equation (31):

$$\frac{K^p}{Y} = \frac{\alpha(1-\sigma)}{(\hat{r}+\delta)} \tag{31}$$

Similarly, the share of labor used in production in total income can be obtained:

$$\frac{L^p}{Y} = \frac{\beta.(1-\sigma)}{\hat{w}} \tag{32}$$

The share of profit in total income can be derived from equation (21) as equation (33):

$$\frac{\pi}{Y} = 1-(\alpha+\beta)(1-\sigma) \tag{33}$$

The share of capital used in rent-seeking from profits can also be derived as equation (34):

$$\frac{K^r}{\pi} = \frac{\varphi}{(\hat{r}+\delta)} \tag{34}$$

To obtain the share of labor used in rent-seeking from profits, we use equations (10) and (34):

$$\frac{L^r}{\pi} = \frac{1-\varphi}{\hat{w}} \tag{35}$$

To find the ratio of capital used in production to total capital, we divide the share of capital used in production in total income by the sum of capital used in production and rent-seeking in total income, yielding:

$$\frac{K^p}{K} = \frac{\frac{K^p}{Y}}{\frac{K^p}{Y}+\frac{K^r}{Y}} = \frac{\frac{\alpha(1-\sigma)}{(\hat{r}+\delta)}}{\frac{\alpha(1-\sigma)}{(\hat{r}+\delta)}+\frac{K^r}{Y}} = \frac{\frac{\alpha(1-\sigma)}{(\hat{r}+\delta)}}{\frac{\alpha(1-\sigma)}{(\hat{r}+\delta)}+\frac{K^r}{\pi}\times\frac{\pi}{Y}} = \rightarrow \frac{K^p}{K} = \frac{\alpha(1-\sigma)}{\alpha(1-\sigma)+\varphi(1-(\alpha+\beta)(1-\sigma))} \tag{36}$$

Similarly, the share of labor used in production relative to total labor is given by equation (37):

$$\frac{L^p}{L} = \frac{\beta(1-\sigma)}{\beta(1-\sigma)+[(1-\varphi)(1-(\alpha+\beta)(1-\sigma))]} \quad (37)$$

In the case of the Cobb-Douglas function, α, β, and ϕ are fixed, so the ratios K^p/K and L^p/L are also constant. In more general cases, α and β depend on K^p and L^p, and ϕ depends on K^r and L^r. Nevertheless, relations (36) and (37) still hold and form a system of two equations that implicitly determine K^p and L^p as functions of K and L. The solution to this system can be expressed as relations (38) and (39):

$$K^p=\xi(K,L) \quad (38)$$

$$L^p=\eta(K,L) \quad (39)$$

By substituting relations (38), (39), and (17) into equation (24), the resource constraint is transformed into equation (40):

$$\dot{K}=Y\text{-}C\text{-}G\text{-}\delta K \xrightarrow{Y=F(K^P,L^P),K^p=\xi(K,L),L^p=\eta(K,L)} \dot{K}=F(\xi(K,L),\eta(K,L))-C-G-\delta \quad (40)$$

3.4. The Government Problem

The government's assumptions are as follows:

1. The government collects taxes from representative households and firms to provide a specified level of public goods.
2. Through its misguided decisions and policies, the government creates a platform for rent-seeking and unproductive activities.

The government problem is described by relations (41) - (45):

$$max_{c,l} \int_0^\infty e^{-\rho t}u(C,L)dt \quad (41)$$

$$\dot{a} = \rho a - Lu_l - Cu_c \quad (42)$$

$$\dot{K}=F(\xi(K,L),\eta(K,L))-C-G-\delta K \quad (43)$$

$$a(0)=a_0 \quad (44)$$

$K(0)=k_0$ (45)

Here, L, ρ, $\eta(K,L)$, $\xi(K,L)$, C, G, δ, a, and k denote labor, the subjective discount rate, the labor share in production, the capital share in production, consumption, government expenditure, the capital depreciation rate, the present value of household assets, and capital, respectively.

In this case, based on the maximization principle, we obtain relations (46) to (53).

$$1)\ \frac{\partial H}{\partial C} = 0 \rightarrow u_1 + \lambda(-Lu_{21} - u_1 - Cu_{11}) = \mu \rightarrow u_1 - \lambda u_1\left(1 + \frac{Lu_{21} + Cu_{11}}{u_1}\right) = \mu \quad (46)$$

Here, u_1 is the derivative of the utility function with respect to consumption, u_2 is the derivative with respect to labor, u_{11} is the second-order derivative with respect to consumption, and u_{21} is the derivative with respect to labor and then consumption. Here, c denotes the first component and u the second component. If we define $H_c = \frac{Lu_{21} + Cu_{11}}{u_1}$, equation (46) can be written as equation (47):

$$u_1 - \lambda u_1(1 + H_c) = \mu \rightarrow u_1[1 - \lambda(1 + H_c)] = \mu \quad (47)$$

$$2)\ \frac{\partial H}{\partial L} = 0 \rightarrow u_2 + \lambda(-u_2 - Lu_{22} - Cu_{12}) + \mu(F_1\xi_L + F_2\eta_L) = 0 \rightarrow$$

$$u_2 - \lambda u_2\left(1 + \frac{Lu_{22} + Cu_{12}}{u_2}\right) = -(F_1\xi_L + F_2\eta_L) \quad (48)$$

If we define $H_l = \frac{Lu_{22} + Cu_{12}}{u_2}$, in equation (48), the equation can then be written in the form of equation (49):

$$u_2 - \lambda u_2\left(1 + \frac{Lu_{22} + Cu_{12}}{u_2}\right) = -(F_1\xi_L + F_2\eta_L) \rightarrow u_2 - \lambda u_2(1 + H_l) = -(F_1\xi_L + F_2\eta_L) \rightarrow$$

$$u_2\,[1 - \lambda(1 + H_l)] = -(F_1\xi_L + F_2\eta_L \quad (49)$$

The remaining conditions are given by relations (50) to (52):

$$\frac{\partial H}{\partial \lambda} = \dot{a} \rightarrow \rho a \text{ -}Lu_l - Cu_c = \dot{a} \quad (50)$$

This corresponds to the execution, or implementation, constraint.

$$\frac{\partial H}{\partial a} = -(\dot{\lambda}e^{-\rho t} - \rho\lambda e^{-\rho t}) \rightarrow (-\dot{\lambda} + \rho\lambda)e^{-\rho t} = \lambda\rho e^{-\rho t} \rightarrow \dot{\lambda} = 0 \quad (51)$$

$$\frac{\partial H}{\partial k} = -(\dot{\mu}e^{-\rho t} - \mu\rho e^{-\rho t}) \rightarrow \text{-}\dot{\mu} + \rho\mu)\, e^{-\rho t} = \mu[F_1\xi_k + F_2\eta_k - \delta]\, e^{-\rho t}$$

$$\rightarrow \dot{\mu} = \rho\mu\text{-}\,\mu[F_1\xi_k + F_2\eta_k - \delta] \rightarrow \dot{\mu} = \rho\mu\text{-}\,\mu[F_1\xi_k + F_2\eta_k - \delta] \quad (52)$$

Equation (52) is a first-order differential equation, the solution of which yields equation (53).

$$\mu = \mu_{(0)} e^{\rho t - \int_0^t (F_1\xi_k + F_2\eta_k - \delta)dz} \quad (53)$$

3.5. Optimal Capital Gains Tax Rate

Let $p_c^{pv}(t)$ denote the present value of the consumer price at time t, and $\hat{p}_c^{pv}(t)$ denote the present value of the producer price at time t. Assuming, moreover, that the producer price is normalized to one, we then have:

$$p_c^{pv}(t) = p_c(t) e^{-(\int_0^t (\theta(1-\tau_i)r_p(z) + (1-\theta)(1-\tau_{cg})r_N(z))dz} \quad (54)$$

$$\hat{p}_c^{pv}(t) = e^{-\int_0^t \hat{r}(z)dz} \quad (55)$$

We define cumulative tax as equation (56):

$$T\frac{C(t)}{c(0)} = \frac{p_c^{pv}(t)/p_c^{pv}(0)}{\hat{p}_c^{pv}(t)/\hat{p}_c^{pv}(0)} = \frac{p_c(t)}{p_c(0)} e^{\int_0^t (\hat{r}(z) - \theta r_p(z) - (1-\theta)r_N)dz} \quad (56)$$

To obtain the optimal value of the cumulative tax, and considering equation (47) while substituting equations (9) and (53), we obtain equation (57):

$$p_c[1 - \lambda(1 + H_c)] = \frac{\mu(0)}{\gamma(0)} e^{\int_0^t [\theta r_P(z) + (1-\theta)r_N(z) - (F_1\xi_k + F_2\eta_k - \delta)]dz} \quad (57)$$

From equation (57), we extract $\frac{p_c(t)}{p_c(0)} e^{-\int_0^t (\theta r_p(z) + (1-\theta) r_N) dz}$ and substitute it into equation (56):

$$T^* \frac{C(t)}{c(0)} = \frac{[1-\lambda(1+H_c(0))]}{[1-\lambda(1+H_c(t))]} e^{\int_0^t [(1-\sigma)F_1 - (F_1\xi_k + F_2\eta_k)] dz} \quad (58)$$

T^* denotes the optimal value of the cumulative tax. There are multiple policies capable of implementing the optimal cumulative tax and achieving a decentralized optimal allocation. To implement a specific policy, it is necessary to normalize the financial system in some way.

$$\frac{p_c(t)}{p_c(0)} \cdot \frac{[1-\lambda(1+H_c(t))]}{[1-\lambda(1+H_c(0))]} = e^{\int_0^t [\theta r_P(Z) + (1-\theta) r_N - \sigma F_1 - \hat{r}(z) + F_1 - (F_1\xi_k + F_2\eta_k)] dz} \quad (59)$$

In equation (59), F_1 represents the private marginal return to capital from the production path, while $F_1\xi_k + F_2\eta_k$ represents the social marginal return to capital. That is:

$$\text{MPPK} = \frac{\partial F(K^P, L^P)}{\partial K} = F_1 \quad , \quad \text{MSPK} = \frac{\partial F(\xi(K,L), \eta(K,L))}{\partial K} = F_1\xi_k + F_2\eta_k$$

The term $F_1 - (F_1\xi_k + F_2\eta_k)$ represents the difference between the social marginal return and the private marginal return to capital. Equation (19) shows that $(1-\sigma)$ of the private marginal product of capital is used to repay capital and cover depreciation, while the remainder, σF_1, represents the increase in the private marginal return to capital.

The optimal tax policy serves to reduce the gap between the social marginal return and the private marginal return to capital. We assume that the tax on productive activities functions as a Pigouvian tax, which mitigates market externalities. In this context, the Pigouvian tax addresses the gap between the marginal return to capital from unproductive activities and the increase in the private return from productive activities, as well as the increase in the interest rate, thereby minimizing these gaps.

$$[\theta r_P + (1-\theta) r_N] - [\hat{r} + \sigma F_1] + [F_1 - (F_1\xi_k + F_2\eta_k)] = 0 \rightarrow$$

$$\hat{r} - r_N = \theta(r_P - r_N) + (1-\sigma)F_1 - (F_1\xi_k + F_2\eta_k) \quad (60)$$

Equation (60) implicitly defines the optimal tax rate on capital gains. Let the net rate of return on unproductive activities (return on capital) after tax be r_N, and let the capital depreciation rate be δ. Under rent-seeking conditions, the optimal capital gains tax rate can be expressed in terms of the gross rate of return on unproductive activities ($\hat{r}_N$). To do this, we assume that a unit of capital is rented at an interest rate ($\hat{r}$) to be invested in unproductive activities. Equation (61) then shows the net rate of return on unproductive activities after tax:

$$r_N = (\hat{r}_N - \hat{r} - \delta)(1 - \tau_{cg}) \quad (61)$$

We assume that, in equilibrium, the net returns of productive and unproductive activities are equal ($r_P = r_N$). By substituting equation (61) into equation (60), we obtain equation (62):

$$\tau_{cg} = 1 - \frac{1}{(\hat{r}_N - \hat{r} - \delta)}(-\delta + (F_1\xi_k + F_2\eta_k)) \quad (62)$$

We assume that F and Q are Cobb-Douglas functions. Consequently, the shares of capital used in production, capital used in rent-seeking, labor used in production, labor used in rent-seeking, and profit in marginal income are all constant. From relations (36), (38), and (39), we have:

$$\xi_k = \frac{\alpha(1-\sigma)}{\alpha(1-\sigma)+\varphi(1-(\alpha+\beta)(1-\sigma))} \quad (63)$$

$$\eta_k = 0 \quad (64)$$

Here, ξ_k denotes the derivative of $\xi(K,L)$ with respect to K, and η_k denotes the derivative of $\eta(K,L)$ with respect to K. By substituting equations (63) and (64) into equation (62), we obtain equation (65):

$$\tau_{cg} = 1 - \frac{1}{(\hat{r}_N - \hat{r} - \delta)}\left(-\delta + \left(\frac{\alpha(\hat{r}+\delta)}{\alpha(1-\sigma)+\varphi(1-(\alpha+\beta)(1-\sigma))}\right)\right) \quad (65)$$

Assuming the production function is Cobb-Douglas, $\alpha + \beta = 1$; therefore, equation (65) can be rewritten as equation (66):

$$\tau_{cg} = 1 - \frac{1}{(\hat{r}_N - \hat{r} - \delta)}\left(-\delta + \frac{\alpha(\hat{r}+\delta)}{\alpha(1-\sigma)+\varphi\sigma}\right) \quad (66)$$

Equation (66) illustrates the *optimal capital gains tax rate under rent-seeking conditions* and its determining factors.

4. Discussion

Equation (66) provides the optimal capital gains tax rate under rent-seeking conditions. In this equation, parameters such as the return on unproductive activities ($\hat{r}_N$), the interest rate ($\hat{r}$), the capital depreciation rate (δ), the share of capital in production, the inverse elasticity of substitution of intermediate goods (σ), and the share of capital in rent-seeking (ϕ) influence the optimal capital gains tax rate. Under conditions of perfect competition, the inverse elasticity of substitution of intermediate goods approaches zero ($\sigma = 0$) and, assuming no rent-seeking ($\phi = 0$), the optimal capital gains tax rate simplifies to $\tau_{cg} = 1 - \frac{\hat{r}}{\hat{r}_N - \hat{r} - \delta}$.

In this scenario, the optimal capital gains tax rate is positively related to the net rate of return on unproductive activities ($\hat{r}_N - \hat{r} - \delta$). Its relationship with the interest rate or bank profit ($\hat{r}$) depends on the sign of $\hat{r}_N - \delta$. Under conditions of imperfect competition, the elasticity of substitution is non-zero and rent-seeking may exist. Consequently, the relationship between the optimal capital gains tax rate and its determinants is summarized in Table 1.

Table 1: Analysis of parameters affecting the optimal capital gains tax rate under rent-seeking conditions

symbol	Parameter definition	$\frac{\partial \tau_{cg}}{\partial x_i}$	Analysis
$\hat{r}_N$	Gross return on unproductive	$\frac{1}{(\hat{r}_N - \hat{r} - \delta)^2}\left(-\delta + \frac{\alpha(\hat{r}+\delta)}{\alpha(1-\sigma)+\varphi\sigma}\right) \geq 0$	The relationship between the gross rate of return on unproductive activities and the

symbol	Parameter definition	$\frac{\partial \tau_{cg}}{\partial x_i}$	Analysis
	activities		capital gains tax is positive.
α	Capital share in production	$-\frac{1}{(\hat{r}_N-\hat{r}-\delta)}\left(\frac{(\hat{r}+\delta)\varphi\sigma}{(\alpha(1-\sigma)+\varphi\sigma)^2}\right)$	If the net rate of return ($\hat{r}_N - \hat{r} - \delta$) on unproductive activities is positive, the overall sign of the expression is negative; if it is negative, the overall sign of the expression is positive.
φ	Capital share in rent seeking	$\frac{1}{(\hat{r}_N-\hat{r}-\delta)}\left(\frac{(\hat{r}+\delta)\alpha\sigma}{(\alpha(1-\sigma)+\varphi\sigma)^2}\right)$	If $\hat{r}_N - \hat{r} - \delta$is positive, the relationship between rent-seeking and the capital gains tax is also positive. Conversely, if $\hat{r}_N - \hat{r} - \delta$is negative, the relationship between rent-seeking and the capital gains tax is negative..
$\hat{r}$	Interest rate	$\frac{-1}{(\hat{r}_N-\hat{r}-\delta)^2}\left(-\delta+\frac{\alpha(\hat{r}+\delta)}{\alpha(1-\sigma)+\varphi\sigma}\right)-\frac{\alpha}{\alpha(1-\sigma)+\varphi\sigma}\frac{1}{(\hat{r}_N-\hat{r}-\delta)}$	This must be examined empirically
σ	Inverse elasticity of substitution of intermediate inputs	$-\frac{(\varphi-\alpha)\alpha}{(\alpha(1-\sigma)+\varphi\sigma)^2}$	The sign of the numerator is ambiguous and must be verified empirically.
δ	Capital depreciation	$\frac{-1}{(\hat{r}_N-\hat{r}-\delta)^2}\left(-\delta+\frac{\alpha(\hat{r}+\delta)}{\alpha(1-\sigma)+\varphi\sigma}\right)+\frac{1}{(\hat{r}_N-\hat{r}-\delta)}\left(1-\frac{\alpha}{\alpha(1-\sigma)+\varphi\sigma}\right)$	It must be examined empirically

5. Optimal Capital Gains Tax Rate under Rent-Seeking Conditions in Iran

To calculate the optimal capital gains tax rate[1] in Iran under rent-seeking conditions, we use equation (66) (as described in Table 1), which requires specific parameter values. The values of these parameters, along with their sources, are presented in Table 2.

Table (2): Model parameters based on the Iranian economy

parameter	δ	α	φ	$\hat{r}_N - \hat{r} - \delta$	σ	$\hat{r}$
quantity	0.05	0.35	0-1	Variable	0.23	Variable
Source	Feizpour and Esfandabadi (2016)	Motavasli (2022)	-	According to table (3)	Parvin et al. (2014)	-

Some of the parameters in this table have not been calculated or are difficult to determine. For these parameters and variables, two strategies can be applied. The first strategy is to introduce a proxy variable for certain parameters. The second strategy is to define a specific range for them. Based on these approaches, the optimal capital gains tax rate can be computed. One of the parameters for which no empirical value exists in Iran is the share of capital in rent-seeking profits (φ). Accurately determining the share of capital in rent-seeking efficiency is challenging, so we consider multiple scenarios for this parameter. Our approach is to define a range from 0 to 100% (0–1) (Table 2).

Feyzpour and Esfandabadi (2016) estimated the depreciation rate of fixed capital in the manufacturing industries of Iranian provinces to be between 4.41% and 5.80%. Therefore, the average depreciation rate of capital can be assumed to be 5%. Assuming that capital in both the production and rent-seeking sectors depreciates at the same rate (this assumption is made for

1. All calculations were performed using MATLAB software.

simplicity due to lack of data), the depreciation rate of capital in the rent-seeking sector is also considered to be 5%. Motavaseli (2022) showed that the maximum capital elasticity of production in Iran between 1986 and 2016 ranged from 0.35 to 0.59, while the minimum capital elasticity ranged from 0.15 to 0.34. The arithmetic mean of these values, 0.35, is used in this study. Given the assumption of a Cobb-Douglas production function, the corresponding labor share in production is therefore 0.65. The elasticity of substitution of intermediate goods, estimated by Parvin et al. (2014), is 4.33. Therefore, the inverse of this elasticity, which is required for our calculations, is taken as 0.23.

Regarding the rate of return on capital gains, we consider the return on capital for activities in the capital market, housing, foreign exchange, gold, and automobiles over the period 2017–2022.

Table (3): Average net real rate of return on capital gains (percent)

year / **market**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Stock	-3.5	30.8	122.8	78.9	-66.2	-31.5
Housing	3.5	25.8	-34.2	12.9	-49.2	-37.5
Currency	2.5	108.8	-38.2	-9.1	-60.2	10.5
Gold	4.5	125.8	-9.8	2.9	-51.2	38.5
Car	-7.5	33.8	-18.8	18.9	-28.2	-67.5
Average	-0.1	65	4.36	20.9	-51	-17.5

Source: Research findings

It is important to note that capital gains tax is levied only when an investment generates a positive return; otherwise, the tax is not applicable. To calculate the net rate of return on unproductive activities, the interest rate and the capital depreciation rate must be subtracted from the gross return of these activities. Assuming the interest rate equals the bank interest rate and the capital depreciation rate is 5%, the net return on unproductive activities (i.e., net capital gain or loss) is presented in Table 4. According to equation

(66), the minimum net return subject to capital gains taxation is shown in Table 4. If the net return is below the values listed in the table, the optimal capital gains tax rate is zero.

Table 4 – Minimum Net Rate of Return on Capital Subject to Taxation (percent)[1]

	Minimum net return subject to capital gains tax	
φ	$\hat{r}=18$	$\hat{r}=23$
0	24.6	31.2
0.1	22.3	28.4
0.2	20.3	26
0.3	18.6	23.9
0.4	17.1	22
0.5	15.7	20.4
0.6	14.6	19
0.7	13.4	17.7
0.8	12.6	16.5
0.9	11.7	15.5
1	11	14.6

Source: Research calculations

An analysis of the figures in Table 4 indicates that an increase in the interest rate raises the minimum return subject to capital gains taxation. Conversely, a higher share of capital allocated to rent-seeking reduces the minimum taxable return.

Based on these considerations, the capital gains tax rates for the stock market, housing, foreign exchange, gold, automobiles, and bank deposits can be calculated for the period 2017–2022. The results of these calculations are presented in Tables 5–9. It is important to note that our strategy for the rent-seeking elasticity with respect to capital is to consider values ranging from 0 to 1. Additionally, if the net return on unproductive activities is negative, the

1. For this purpose, we set equation (66) greater than zero and assign it a specific value.

tax is assumed to be zero regardless of the level of rent-seeking. The findings from Tables 5–9 indicate the following:

- In 2017, 2021, and 2022, because the net return on the stock market was negative, this market should not be subject to capital gains tax, and the optimal tax rate is therefore zero. The results also show that higher net returns correspond to higher optimal capital gains tax rates. Moreover, an increase in the share of capital in rent-seeking leads to a higher optimal capital gains tax rate.
- The inflation-adjusted (real) net return in the housing market was negative in 2019, 2021, and 2022. Therefore, capital gains tax in the housing market is not applicable in these years. In 2017 and 2020, although the inflation-adjusted net return was positive, it remained below the minimum taxable threshold and thus is not subject to capital gains taxation.
- The optimal capital gains tax rate in the foreign exchange market is zero for all years except 2018, because in most years the real net return falls below the minimum taxable threshold.
- The optimal capital gains tax rate for the gold market is positive in 2018 and 2022, while in other years it is not applicable.
- The optimal capital gains tax rate in the automobile market was positive and exceeded 70% in 2018. In 2020, returns were not taxable for rent-seeking levels up to 0.2, but for higher levels, the optimal tax rate was positive and increasing. In 2019, 2021, and 2022, because the real net return was below the minimum taxable rate (Tables 4–5), automobiles were not subject to capital gains taxation.

Table (5): Optimal capital gains tax rate for the stock market (2017-2022) - percent

year / φ	2017	2018	2019	2020	2021	2022
0	0	21	80	68.9	0	0
0.1	0	28.6	82.1	71.8	0	0
0.2	0	36.9	83.7	74.4	0	0
0.3	0	40	85.1	76.5	0	0
0.4	0	45.2	86.3	78.4	0	0
0.5	0	49.5	87.3	80.1	0	0
0.6	0	49.5	88.3	81.5	0	0
0.7	0	53.2	89.1	82.9	0	0
0.8	0	56.6	89.9	84	0	0
0.9	0	59.6	90.5	85.1	0	0
1	0	64.8	91.2	86.1	0	0

Source: Research calculations

Table 6. Optimal Capital Gains Tax Rate for the Housing Market (2017–2022)

year / φ	2017	2018	2019	2020	2021	2022
0	0	4	0	0	0	0
0.1	0	13.6	0	0	0	0
0.2	0	21.3	0	0	0	0
0.3	0	28	0	0	0	0
0.4	0	33.7	0	0	0	0
0.5	0	38.9	0	0	0	0
0.6	0	43.4	0	0	0	0
0.7	0	47.5	0	0	0	0
0.8	0	51.1	0	0	0	0
0.9	0	54.4	0	0	0	0
1	0	57.4	0	0	0	0

Source: Research calculations

Table 7. Optimal Capital Gains Tax Rate in the Foreign Exchange Market (2017–2022)

year / φ	2017	2018	2019	2020	2021	2022
0	0	77.3	0	0	0	0
0.1	0	79.4	0	0	0	0
0.2	0	81.3	0	0	0	0
0.3	0	82.8	0	0	0	0
0.4	0	84.2	0	0	0	0
0.5	0	85.4	0	0	0	0
0.5	0	86.5	0	0	0	0
0.7	0	87.5	0	0	0	0
0.8	0	87.3	0	0	0	0
0.9	0	83.2	0	0	0	0
1	0	89.8	0	0	0	0

Source: Research calculations

Table 8. Optimal Capital Gains Tax Rate for the Gold Market (2017–2022)

year / φ	2017	2018	2019	2020	2021	2022
0	0	80.3	0	0	0	18.6
0.1	0	82.1	0	0	0	26
0.2	0	83.7	0	0	0	32.3
0.3	0	85.1	0	0	0	83.6
0.4	0	86.3	0	0	0	42.6
0.5	0	87.3	0	0	0	46.8
0.6	0	88.3	0	0	0	50.5
0.7	0	89.1	0	0	0	53.8
0.8	0	89.9	0	0	0	56.8
0.9	0	90.5	0	0	0	59.9
1	0	91.2	0	0	0	62

Source: Research calculations

Table 9. Optimal Capital Gains Tax Rate for the Automobile Market (2017–2022) – Percentages

year / φ	2017	2018	2019	2020	2021	2022
0	0	77.3	0	0	0	0
0.1	0	79.4	0	0	0	0
0.2	0	81.3	0	0	0	0
0.3	0	82.8	0	1	0	0
0.4	0	84.2	0	9.3	0	0
0.5	0	85.4	0	16.3	0	0
0.6	0	86.5	0	22.5	0	0
0.7	0	87.5	0	22.8	0	0
0.8	0	87.3	0	33.7	0	0
0.9	0	83.2	0	37.6	0	0
1	0	89.8	0	41.7	0	0

Source: Research calculations

As shown in Tables 5 to 9, in most cases the optimal capital gains tax rate is zero, while in some instances it is extremely high. This may be because, in many cases, the returns in these markets are below the minimum taxable threshold, or because they exhibit unusually high returns due to the inflow of large volumes of liquidity.

6. Concluding and policy recommendation

Based on the empirical results obtained from the model and their analysis, it was determined that the optimal capital gains tax rate under rent-seeking conditions varies across economies and depends on economy-specific parameters. Moreover, the optimal rate fluctuates over time and differs from year to year. Capital gains taxation is one of the most challenging fiscal debates, not only in Iran but globally. Implementing a capital gains tax base significantly affects investor behavior—for example, by reducing transaction volume through a lock-in effect—which makes achieving policy objectives, such as increasing government revenue, difficult.

The key findings of this study are summarized as follows:

1. The empirical results in Tables 5 to 9 indicate that increasing the share of capital allocated to rent-seeking activities raises the optimal capital gains tax rate. In other words, rent-seeking intensifies the optimal tax on capital gains.
2. The gross rate of return on unproductive activities is positively correlated with the optimal capital gains tax rate. As the gross return on unproductive activities rises, so does the optimal capital gains tax rate.
3. The calculations in Table 4 show that rent-seeking lowers the minimum rate of return on unproductive taxable activities. This means that as rent-seeking intensifies, lower levels of income become subject to the capital gains tax.
4. The results in Tables 4 and 5 indicate that an increase in the interest rate raises the minimum net rate of return on unproductive activities subject to capital gains taxation.

Rather than using capital gains taxes as a tool to regulate capital markets—including housing, automobiles, and foreign exchange—attention should focus on the underlying causes that drive capital into these sectors instead of the productive economy. Adjusting nominal income for inflation reveals that, in most cases (2017–2022), the market has experienced capital losses. Consequently, individuals often engage in speculative activities to protect themselves from rampant inflation. Deflation may serve as a more effective tool to curb speculation. However, excessive use of deflation can reduce transaction volumes via the lock-in effect and, by constraining supply, drive up prices and inflation. Speculative activity is, therefore, a consequence of inflation rather than its cause, contrary to the views held by some policymakers, including certain Egyptian representatives, regarding the implementation of this tax. Another concern is the mechanism for enforcing such a tax, which, according to the parliament's plan, appears resource-intensive and likely to generate limited revenue, making it economically inefficient compared to its cost to the capital market.

Regarding rent-seeking, because it raises the optimal capital gains tax rate—and higher rates negatively affect transactions—policy should focus on promoting production through institutional reforms and rent control. Many rents arise from government interventions and governance failures. Government policies have created rents, making production and the capitalization of consumer goods unattractive, while attempting to control housing, automobile, inflation, and foreign exchange markets through capital gains taxation. This approach risks backfiring: reduced transactions and the lock-in effect may prevent policy goals from being achieved and may exacerbate inflation by reducing the supply of goods.

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