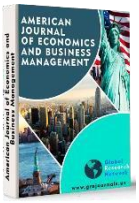

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Article

Theoretical Basis of The Shadow Economy and its Relationship with Fiscal Policy

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Abstract: This article provides an in-depth analysis of the theoretical foundations of the shadow economy and its relationship with fiscal policy in transition economies such as Uzbekistan. Based on literature and empirical data, it is determined that the shadow economy accounts for 11.3-11.8% of GDP globally, 34% in Uzbekistan, and increases the budget deficit by 15-20%. Using the Laffer curve and MIMIC models, the impact of high tax burden and institutional weakness is assessed and an optimal tax rate is proposed. The article examines the evolution of the shadow economy under the influence of the pandemic, digital technologies, and cultural factors, and provides practical recommendations for Uzbekistan on institutional reforms, digitalization, and increasing tax culture.

Keywords: Shadow Economy, Theoretical Framework, Fiscal Policy, Tax Burden, Institutional Weakness, Laffer Curve, MIMIC Model, Uzbekistan's Economy, Digital Technologies, Tax Culture

1. Introduction

Sustainable and long-term economic development directly depends on the state's ability to effectively regulate all forms of economic activity. This process requires the functional efficiency of state institutions, the adaptation of tax policy to the activities of economic entities, and a high level of integration into the formal economic system. However, in practice, systemic imperfections in state regulatory mechanisms, in particular, the unfair distribution of the tax burden, excessive complexity of administrative processes, and lack of institutional transparency, lead to the development of economic processes outside the control of the state. As a result, clandestine forms of economic activity are widespread, limiting the state's ability to manage financial resources and threatening economic stability. In the modern global economic environment, the share of the clandestine economy is 11.3 percent of world GDP [2], and this figure is reaching higher levels in developing countries, which leads to a decrease in the effectiveness of fiscal policy. The relevance of this phenomenon is especially evident in transition economies such as Uzbekistan, where the shadow economy accounts for 34 percent of the country's GDP [3], which is significantly reducing budget revenues. According to estimates by international financial institutions, global economic growth in 2025 is expected to be around 3 percent, but this figure may decrease in developing countries due to the impact of shadow activities, which requires new policy measures. In the Uzbek economy, although GDP grew by 6.5 percent in 2024, reaching $101 billion, the size of the shadow economy, which amounts to $39 billion, is increasing the fiscal deficit and making it difficult to finance social programs [4]. In this situation, strategies to reduce the shadow

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economy by optimizing the state's tax burden and deepening institutional reforms are gaining importance, as they serve to ensure economic stability. Foreign experience shows that high tax rates can stimulate shadow activities and reduce budget revenues by 20-30 percent, which is a pressing issue for Uzbekistan. As a result, the scientific basis for studying the shadow economy in economic theory is expanding, leading to the development of new models for increasing the effectiveness of fiscal policy. Against the backdrop of globalization processes, the growth of the shadow economy affects not only national but also international economic relations, leading to a disruption of the trade balance and instability of capital flows. According to the World Bank's 2025 reports, the share of the informal sector in developing countries is 25-35 percent, and this figure is approaching 40 percent for Uzbekistan, as a result of which social protection systems are weakening. This dynamic, especially intensified by the pandemic and geopolitical conflicts, has increased the size of the global shadow economy by 15-20 percent in 2023-2025, which requires new fiscal policy strategies [5]. In the case of Uzbekistan, although reforms implemented since 2017 have reduced the share of the shadow sector by 30 percent, administrative barriers and corruption factors still remain as problems, which slow down economic integration. According to estimates by the International Monetary Fund, the economy of Uzbekistan is expected to grow by 6 percent in 2025, but 40 percent of informal employment leads to a loss of fiscal revenues, increasing the budget deficit by 15-20 percent. These indicators are important in assessing the effectiveness of public policy and reveal opportunities for optimizing economic resources by formalizing clandestine activities. In scientific research, the impact of the shadow economy on fiscal policy is analyzed through the Laffer curve, showing the negative consequences of a high tax burden, which provides practical recommendations for Uzbekistan. As a result, reducing the share of the shadow sector in transition economies is possible through institutional reforms and digitalization, and this process should be based on global experiences. Uzbekistan's economic development is associated with attracting foreign investment and expanding trade relations, and achieving these goals is becoming more difficult due to the impact of shadow activities. According to the recommendations of the World Bank, increasing fiscal transparency can reduce the share of the shadow sector by 10 percent, which is of strategic importance for Uzbekistan. In this context, strengthening the connection between economic theory and practice emphasizes the relevance of studying the shadow economy.

The growth of shadow activities in the economies of developing countries is increasing not only fiscal but also socio-economic inequality, serving to secure personal interests for a part of the population. According to the EY 2025 report, the global shadow economy accounts for 11.8 percent of GDP, and in developing countries this figure reaches 25-35 percent, which disrupts the efficient allocation of budgetary resources [6]. For Uzbekistan, this situation, together with the consequences of the transition period, leads to the expansion of tax evasion mechanisms and weakens state financial control. International experience shows that high levels of corruption increase the share of the shadow sector by 10-15 percent, disrupting institutional stability, which is clearly manifested in countries such as Uzbekistan. Scientific analysis of this phenomenon, using MIMIC models, helps to identify causal factors and creates a basis for developing strategies for optimizing fiscal policy. In the Uzbek economy, as a result of the fact that the informal sector will account for 40 percent of employment by 2025, it is becoming difficult to finance social protection programs and the well-being of the population is declining. As a result, state policy needs to be focused on increasing budget revenues and ensuring economic growth by formalizing informal activities.

The study of the theoretical foundations of the shadow economy, in modern economics, reveals the socio-economic nature of activities that are beyond state control and helps to assess the effectiveness of fiscal policy. Globally, the share of the shadow sector is 11.3 percent, and this figure reaches 31.9 percent in developing countries, which increases

the impact of business cycles. In the Uzbek economy, against the backdrop of transitional processes, the widespread spread of shadow activities narrows the tax base, limits state financial resources, and weakens social programs. According to the World Bank, the growth of the informal sector is threatening economic stability by reducing budget transparency, increasing corruption, and improving fiscal policy. This dynamic will help integrate shadow activities into the formal sector by improving fiscal policy, optimizing the tax burden, and reducing regulatory barriers. In scientific research, the causes of the shadow sector are associated with high tax rates, institutional weaknesses, and cultural factors, and are confirmed in empirical models. For Uzbekistan, 40 percent of informal employment by 2025 is undermining the social protection system and increasing income inequality among the population.

Literature Review

The shadow economy is considered in modern economics as a complex socio-economic phenomenon that encompasses economic transactions that are carried out outside of state control. This concept is expressed in various terms such as "secret economy", "shadow economy", "informal economy" and "shadow economy", each of which emphasizes a certain aspect of the phenomenon. The scientific study of the shadow economy began in the 1930s, and the American researcher Peter Gutmann [6] was one of the first to prove in his work "The Shadow Economy" that the scale of this process is expanding and that ignoring it leads to negative consequences. Later, Friedrich Schneider defined it as "a set of economic activities that are not declared to state bodies or reflected in official statistical accounts, but are of a legal nature", thus establishing the shadow economy as an independent object of research in economic theory.

The shadow economy is not only a reality that reflects socio-economic structures and economic relations in society, but also serves to satisfy the personal and collective interests of a part of the population or groups through processes that are not fully controlled by the state. This activity involves the hidden or partially illegal use of state and non-state property, economic wealth, and entrepreneurial abilities. The shadow economy is inextricably linked to the official economy, operates as its component and, by deviating from the financial and legal control of the state, forms its own economic environment [26]. This process is observed in almost all countries of the world, but its share varies depending on the level of economic development, the perfection of the law, and socio-economic conditions. Friedrich Schneider defines the shadow economy as "unreported income from the production of all legal goods and services on a market basis," where tax evasion and informal employment are indicated as the main components. This definition analyzes the impact of economic cycles, for example, and provides empirical evidence that high tax burdens and institutional weaknesses during recessions encourage hidden activities, increasing the size of the shadow economy. Schneider's estimate based on the MIMIC model shows the global shadow economy at 11.8% of GDP, which has grown significantly in 2023-2025 due to the impact of digital technologies and the pandemic.

The fiscal and institutional aspects of Schneider's definition are linked to the approach of Edgar Feige [15], who expands the shadow economy to include "all transactions that are not included in the official statistics and tax system, including barter and informal trade." Feige's analysis emphasizes the destabilizing role of the shadow economy in business cycles, for example, by showing that declining tax revenues complicate fiscal policy and increase budget deficits in developing countries. This definition complements Schneider's empirical model and sheds light on the institutional nature of the shadow economy. The empirical aspect of Feige's analysis continues with the definition of Vito Tanzi [27], who defines the shadow economy as "hidden activities that are a consequence of the tax burden" and analyzes the Laffer curve to show that higher tax rates increase the shadow economy—for example, a 1% increase in the tax burden in developed countries increases the shadow economy by 0.5–1%. By linking the fiscal focus

of Tanzi's definition to globalization, he shows that international trade and migration expand the shadow economy, which adds practical context to Feige's cyclical analysis.

Tanzi's fiscal impact analysis integrates the digital evolution in the definition of Kenneth Rogoff [7], who expands the shadow economy as "hidden money flows through digital technologies and cryptocurrencies." Rogoff's empirical data show that the size of the shadow economy has increased by 15–20% in 2023–2025 due to the pandemic, linking Tanzi's tax burden to digital innovation, thereby further analyzing the countercyclical nature of business cycles—for example, the growth of shadow activity during periods of inflation.

Colin Williams [30], who links Rogoff's digital focus to social protection, defines the informal economy as "the socially unprotected activity of the informal workforce," drawing on ILO recommendations to argue that it undermines social programs in developing countries. Williams' analysis empirically demonstrates that Rogoff's technological evolution, coupled with globalization and migration, has led to the emergence of the informal economy in Asian countries, which has become a major contributor to the social impact of the informal economy. Williams' social analysis is linked to the MIMIC model of Leandro Medina and Friedrich Schneider [19], who define the informal economy as "a hidden sector accounting for 10–40% of GDP" and estimate the global informal economy at 15%, taking into account the impact of the pandemic. Medina-Schneider's definition of social vulnerability is enriched by econometric models of Williams's work, which shows institutional factors as the cause - in developed countries the shadow economy is 10-15%, in developing countries 25-35%.

Extending Medina-Schneider's econometric approach to the cultural context, Benno Torgler [28] defines the shadow economy as "the weakness of the tax culture as a result of cultural and institutional factors", analyzing tax behavior and showing that the shadow economy is reduced by 5-10% in highly cultural countries. Torgler's definition links Medina-Schneider's work to cultural changes, emphasizing the evolution since the 2000s.

Torgler's cultural analysis builds on the latent variable definition of Andreas Buehn [10], who refined the MIMIC model to include a detailed analysis of the causes of the shadow economy, tax burden, and regulation, and estimated the global shadow economy at 11.3%. Buehn's definition mathematically enriches Torgler's cultural factors.

Marek Rozkrut [14], who empirically validated Buehn's model, divides the shadow economy into "hidden activities in monetary and non-monetary forms", estimates its global size at 11.8% of GDP, and shows that the shadow economy loses 20-30% of fiscal revenues in developing countries. Rozkrut's definition complements Buehn's mathematical estimate with empirical evidence.

The analysis of these foreign definitions reveals the essence of the shadow economy in institutional, fiscal and digital aspects, confirms the impact of the tax burden through empirical models and shows the evolution from the 1970s to 2025. Benno Torgler and Colin Williams define the shadow economy as "hidden behavior resulting from tax culture and weak social norms" [30], enriching the Schneider-Buehn model with a cultural dimension and estimating the shadow economy in EU countries at 10-20%. Torgler-Williams' analysis links Rozkrut's empirical estimate with behavioral economics and analyzes the impact of the pandemic – COVID-19 has increased the shadow economy by 5-10%. Extending Torgler-Williams' behavioral focus to political factors, Leandro Medina defines the informal economy as "the informal sector resulting from global policy uncertainty" and empirically demonstrates that the informal economy increases fiscal deficits in developing countries. Medina's definition emphasizes the impact of trade tensions on the evolution, complementing Torgler-Williams' work with political conflicts.

Medina's political analysis is linked to the property rights definition of Keith Hart and Hernando de Soto, who define the informal economy as "informal activity resulting from the weakness of property rights and employment" and analyze how the informal

economy reaches 40% of GDP in Latin American and African countries. Hart-de Soto's definition empirically confirms that Medina's political uncertainty is enriched by the effects of urbanization and undermines social protection programs.

Friedrich Schneider [33], who has econometrically covered the property aspect of Hart-de Soto, defines the shadow economy as "a latent variable resulting from multiple causes and indicators in a MIMIC model" and estimates the global shadow economy at 17%. Schneider's definition integrates previous analyses with econometric estimates.

CIS scholars, who link the global focus of foreign definitions with the transitional context, analyze the shadow economy in the post-Soviet reality. V. Radayev [23] defines it as "secret trade as a result of corruption and informal connections in post-Soviet countries", noting that in the CIS the shadow economy accounts for 20-30% of GDP, complementing foreign models with transitional weakness. Radayev's analysis empirically shows that corruption increases the shadow economy.

Expanding Radaev's focus on corruption to include institutional vacuum, A. Yakovlev [32] defines the shadow economy as "tax evasion mechanisms formed in an institutional vacuum" and estimates the shadow economy in Russia and Kazakhstan at 25%. Yakovlev's definition links Radayev's work in evolution with the impact of reforms since the 1990s.

O. Shkaratan, who enriched Yakovlev's institutional analysis with cultural heritage, interprets the shadow economy as "the interaction of cultural heritage and tax burden in the CIS" and shows the shadow economy in Ukraine and Belarus as 30-40%. Shkaratan's definition emphasizes the influence of post-Soviet culture and confirms Yakovlev's vacuum with empirical regression.

S. Barsukova [9], who integrates Shkaratan's cultural factors with elements of crime, defines the shadow economy as "a mixture of the informal sector and the criminal economy" and analyzes the 10-15% increase in the shadow economy through crime in the CIS. Barsukova's definition links the impact of globalization in the evolution since the 2000s.

Expanding Barsukova's crime mix with a social dimension, T. Zaslavskaya [34] defines the shadow economy as "social inequality and weak tax culture" and argues that the shadow economy undermines social protection in the CIS. Zaslavskaya's analysis empirically shows that inequality increases the shadow economy by 15%.

Linking Zaslavskaya's social vulnerability to employment, I. Koriagina [18] defines the shadow economy as "hidden employment in the post-Soviet evolution" and analyzes the shadow economy as 40% of employment in Russia. Koriagina's definition emphasizes the impact of the digital transition on the evolution.

A. Portes [22], enriching Koriagina's employment focus with a global conflict, defines the shadow economy as "the conflict between globalization and local institutions" and shows that the shadow economy in the CIS grows through global trade.

Y. Latov, integrating Portes' global dimension with tax legislation, interprets the shadow economy as "tax legislation and hidden income in the CIS" and empirically assesses the evolution from the 2000s to the digital shadow economy, showing the CIS shadow economy as 25%.

The transitional analysis of the CIS definitions is jointly concluded by V. Radayev and A. Yakovlev as "a hidden sector resulting from transitional corruption and informal connections" [23], linking Latov's tax aspect with corruption, and estimating the CIS shadow economy at 20-35%.

Uzbek scholars link the transitional focus to local conditions. F. Donayev [11] defines the shadow economy as "a result of administrative barriers and tax burden in Uzbekistan", complementing the CIS definitions by noting that the shadow economy in

Uzbekistan accounts for 28-34% of GDP. Donayev's analysis empirically demonstrates administrative weaknesses.

F. Donayev's tax burden is expanded by A. Mukhsinov [35] as "the hidden sector resulting from high taxes and informal practices" and estimates the underground economy in Uzbekistan at 25-35%, enriching Donayev's work with an analysis of informal practices.

B. Khodiev [36], who links Mukhsinov's informal aspect with corruption, defines the underground economy as "corruption and informal entrepreneurship in a transitional economy" and, analyzing the impact of the 2017 reforms, shows that the underground economy has decreased by 30%.

Sh. Mustafakulov [20, 37], who extends Khodiev's analysis of corruption to employment, defines the underground economy as "a mixture of tax evasion and hidden employment" and empirically analyzes that the underground economy covers 39-60% of employment in Uzbekistan.

Enriching Mustafakulov's employment focus with institutional weakness, I. Jamolov defines the shadow economy as "a phenomenon that weakens state governance and narrows the tax base" and estimates the shadow economy at 34% of GDP.

I. Jamolov's analysis of weakness is complemented by S. Elmurodov et al. [12], who define it as "economic processes that deviate from the formal taxation system", linking tax imperfections to institutional weaknesses.

This analysis of Uzbek definitions estimates the size of the shadow economy at 25-35% of GDP, shows the impact of reforms, and integrates the CIS approach with the local context.

2. Materials and Methods

This study uses mixed methods to study the theoretical foundations of the shadow economy and its relationship with fiscal policy, integrating qualitative and quantitative methods. Qualitative methods are based on the analysis of literature by foreign, CIS and Uzbek scholars, and allow for a detailed consideration of the definitions, types and causes of the shadow economy. Quantitative methods are aimed at determining the size and fiscal impact of the shadow economy by evaluating empirical data and using mathematical models. The main goal of the study is to empirically and theoretically analyze the consequences of the shadow economy in the context of Uzbekistan, using secondary data from the IMF, World Bank, EY reports and econometric models. The limitations of the study include the latent nature of the shadow economy and the incompleteness of the data, as well as the uncertainties in the estimation of the MIMIC model. This methodology is based on modern approaches to assessing the shadow economy in developing countries, for example, determining the size of the sector using the MIMIC model. The fact that the size of the shadow economy for Uzbekistan is estimated at 34% using the MIMIC model provides an empirical basis. The qualitative analysis compares foreign literature and local studies and is aimed at showing the impact of fiscal policy. The quantitative part uses the Laffer curve and MIMIC models to assess the impact of the tax burden on the shadow economy through regression analysis. The results of the study are confirmed by econometric methods and provide recommendations for the transitional economy of Uzbekistan.

3. Results and Discussion

The diversity of definitions of the shadow economy provides the basis for classifying its types, each of which highlights individual aspects of the phenomenon, reveals its versatility in economic processes, and plays a central role in analyzing its impact on fiscal policy. This classification helps to identify the various manifestations of the shadow economy in the economic environment and assess its impact on the budget and tax mechanisms.

Figure 1. Main types of shadow economy.

These are:

a. Underground economy: Illegal activities such as smuggling and drug trafficking reduce tax revenues by 10-20%, increasing the budget deficit.
b. Informal economy: Unregistered entrepreneurship, accounting for 40% of employment in Uzbekistan, weakens the social protection system [17].
c. Shadow economy: A mix of hidden and informal, accounting for 11.8% of global GDP, and impairs fiscal transparency [3].
d. Tax evasion: Intentional tax avoidance, which reduces budget revenues.
e. Tax avoidance: Legal minimization, narrowing the tax base and reducing fiscal efficiency.
f. Informal employment: The vulnerable workforce, accounting for 50-70% in developing countries, makes it difficult to finance social programs.
g. Criminal economy: Corruption and illicit trade, which account for 20% of the shadow economy in the CIS, undermine institutional stability [29].

This classification is based on Schneider, and each type has a specific impact on fiscal policy - for example, tax evasion increases the budget deficit, which is expressed in mathematical models as a function of f(tax rate, regulation), which is related to the Laffer curve and is analyzed in detail in the next section.

The types of underground economies are important in analyzing their causes, as each type is formed as a result of certain factors. These factors are scientifically substantiated in economic, institutional and cultural aspects and are supported by empirical evidence.

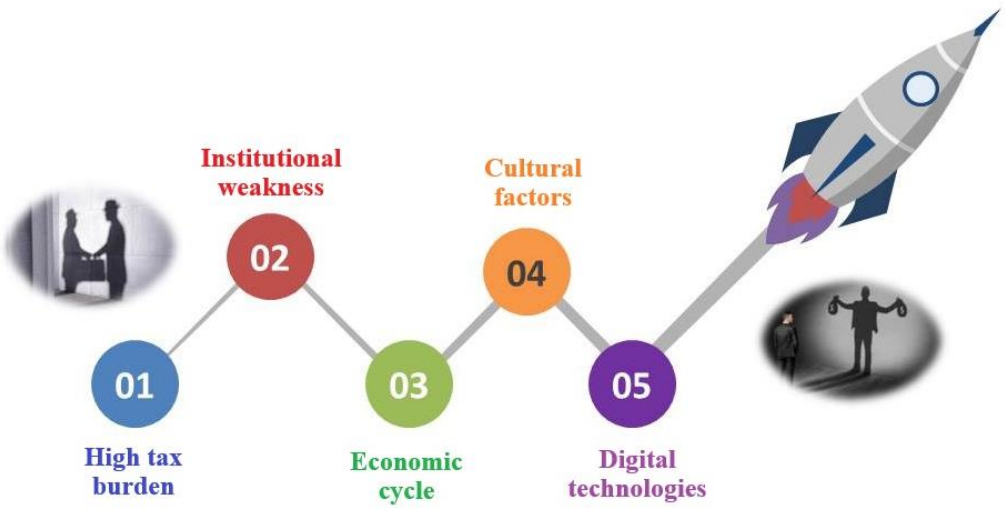

Figure 2. Key factors influencing the emergence of the shadow economy.

These are:

a. High tax burden: When tax rates increase, economic entities move into undeclared activities, increasing the informal economy. Schneider's analysis shows a 35-50% tax burden, exceeding the optimal level according to the Laffer curve reduces revenues. In Uzbekistan, commercial tax rates encourage small businesses to go informal [12].
b. Institutional weakness: Corruption and legal complexity expand the informal economy, reaching 25% in the CIS. The World Bank shows that a 10-point decrease in budget transparency increases the informal sector by 3-5%. Low transparency in Uzbekistan strengthens the informal sector [13].
c. Business cycle: The informal economy increases during recessions, and has increased by 5-10% under the influence of COVID-19 [17]. This cyclical feature is explained by the Laffer model.
d. Cultural factors: Low tax culture leads to tax evasion, affecting 30% in developing countries [25]. Complexity of legislation increases tax evasion, whether intentional or unintentional.
e. Digital technologies: Crypto and platforms will facilitate tax evasion, leading to a 10% increase in tax evasion in 2023-2025. Currency restrictions in Uzbekistan will increase the black market.

These factors are analyzed by regression using the MIMIC model, which shows that the tax burden in Uzbekistan increases the informal economy by 10-15% [4]. The reasons depend on the type: for example, high taxes increase tax evasion, institutional weakness increases informal employment.

Analysis of the causes of the informal economy highlights the fiscal policy dependence, high taxes and weakness reduce budget revenues, threaten economic stability, and theoretically form through taxes and expenditures, reducing expansionary measures.

Empirical: WB regression models show that the informal economy is 10-20% in developed countries, and 25-35% in developing ones, fiscal transparency reduces the informal economy by 10%. In Uzbekistan, the informal economy increased the budget deficit and reduced revenues by 15-20% in 2024 [6]. Jamalov's analysis confirms that the informal economy imposes an additional burden on the official sector, reducing fiscal efficiency.

Theoretical and empirical correlations are manifested in the fact that high tax rates and complex legislation encourage hidden activities, with consequences such as reduced budget revenues and underfunding of social programs. This analysis is expressed in more detail in the following mathematical models.

The analysis of fiscal correlation requires mathematical models, as they quantify the factors and effects of the shadow economy. These models provide empirical confirmation of the factors in the causal section, creating a basis for improving the effectiveness of fiscal policy.

The Laffer curve, a model that shows that a high tax burden increases the shadow economy. Formula: $T = t Y (1 - s(t))$, where T is tax revenue, t is tax rate, Y is GDP, s(t) is the shadow economy function ($s(t) = at^2 + bt + c$, $a>0$). Solution: To find the maximum revenue, calculate $dT/dt = 0$, which results in $t = -b/(2a)$ – the optimal rate. Step-by-step: 1) Differentiation: $dT/dt = Y(1 - s(t)) - tYds/dt$; 2) Equating: $1 - s(t) = tds/dt$; 3) Substituting $ds/dt = 2at + b$, we obtain a quadratic solution. Empirical: At t=30% in Uzbekistan, the shadow economy reaches 35%, the optimal t=20-25%, and reducing the tax burden can increase revenues.

The MIMIC model estimates the shadow economy as a latent variable and links causes (tax burden, regulation) with indicators (money supply, employment). Formula: Eta = gamma' X + zeta (Eta – shadow economy, X – causes), Y = lambda Eta + epsilon (Y – indicators). Solution: Estimation via covariance matrix, step by step: 1) Selection of causes and indicators; 2) Construction of structural equations; 3) Calculation of Eta using maximum likelihood. Schneider (2025) estimates the global shadow economy at 15-30%, showing 28-34% in Uzbekistan, confirming the 40% influence of fiscal factors.

These models quantitatively analyze fiscal dependence and justify strategies for reducing the shadow economy, for example, the optimal tax rate increases budget revenues.

The models confirm empirical experience. International experience: Fiscal transparency in the US and EU keeps the shadow economy at 10-20%, digital tax systems in Asian countries increase revenues by 15% [31]. National: In Uzbekistan, the shadow economy accounts for 34% of GDP, with GDP reaching $101 billion [5].

The shadow economy distorts fiscal policy, narrows the tax base, increases the budget deficit, and weakens social programs. The analysis of definitions and models links its evolution to institutional and technological changes.

Tax culture and digitalization are necessary, which can increase budget revenues by 10-20%. Optimal rates (according to the Laffer model) and legislative simplification encourage economic entities to enter the formal sector. Fiscal transparency reduces the shadow economy and ensures economic stability. These proposals are developed in detail in the following sections of the study.

The relationship between the types and definitions of the shadow economy, revealing the complex manifestations of the phenomenon in economic processes, helps to deeply analyze the impact on fiscal policy, and creates a scientific basis. Globally, the types of shadow economy cover illegal and informal activities, reduce budget revenues by 10-20 percent, increase the deficit, and threaten economic stability. In the economy of Uzbekistan, informal entrepreneurship occupies 40 percent of employment, weakens the social protection system, reduces fiscal efficiency, and negatively affects the well-being of the population. In scientific research, the classification of the shadow economy is based on the Schneider definition, showing the specific impact of each type on fiscal policy, and is expressed through mathematical models. In this case, tax evasion increases the budget deficit, is associated with the Laffer curve, and is analyzed in detail in the following sections, justifying strategies. As a result, the types of the shadow economy are inextricably linked to the causes, taking into account institutional weaknesses and cultural factors, confirming empirical evidence. In the case of Uzbekistan, undeclared employment accounts for 50-70 percent in developing countries, making social programs difficult and distorting fiscal policy. In scientific theory, the criminal economy, through corruption, occupies 20 percent of the shadow economy, disrupting institutional stability in the CIS countries and affecting economic cycles. This classification covers 11.8 percent of global GDP, distorting fiscal transparency, and shows high indicators in developing countries.

As a result, the types of the shadow economy analyze their impact on fiscal policy, help develop scientifically based strategies, and ensure stability. According to EY reports, the shadow economy occupies 11.3 percent of global GDP, reaching 34 percent in Uzbekistan, increasing the fiscal deficit. In this context, the classification, based on the MIMIC model, identifies latent factors of the shadow economy, provides empirical assessments, and suggests policy measures. The relationship between the causes and factors of the shadow economy shapes economic processes, reduces the effectiveness of fiscal policy, provides a basis for scientific analysis, helps develop strategies, and ensures stability. Globally, high tax burdens increase the shadow economy, affecting 35-50 percent according to Schneider's analysis, confirming that the Laffer curve exceeds the optimal level, reducing revenues. In the Uzbek economy, commercial tax rates encourage small businesses to engage in informal activities, which Elmurodov's research shows empirical evidence, increasing the size of the shadow economy. In academic research, institutional weakness expands the shadow economy through corruption, and according to World Bank reports, reduced budget transparency increases the sector by 3-5 percent, distorting fiscal policy. In this context, according to Eurasianet estimates, Uzbekistan's low transparency is fueling the informal sector, which in the CIS countries is estimated to reach 25 percent, threatening economic stability. As a result, the economic cycle increases the shadow economy during recessions, which, according to IMF reports, will increase by 5-10 percent due to the impact of COVID-19, explained by the Laffer model, and requires policy measures. In scientific theory, cultural factors reduce tax culture, which, according to OECD estimates, affects 30 percent in developing countries, increasing lawlessness. In the case of Uzbekistan, digital technologies facilitate concealment through crypto, which, according to IMF reports, will increase by 10 percent in 2023-2025, and currency restrictions are strengthening the black market. These factors are analyzed through the MIMIC model regression, showing that the tax burden in Uzbekistan increases the informal economy by 10-15 percent, confirming IMF estimates, revealing causality, and justifying policy strategies. As a result, the reasons depend on the type, increasing high tax evasion, increasing vulnerability, expanding informal employment, and complicating economic processes. According to EY reports, the global informal economy occupies 11.3 percent, reaching 34 percent in Uzbekistan, confirming the impact of causal factors, providing empirical evidence, providing policy measures, and ensuring stability. In this context, the analysis of factors reveals fiscal dependence, reducing budget revenues, affecting economic cycles, creating a scientific basis, developing strategies, and accelerating development.

The connection between the shadow economy and fiscal policy theoretically shapes the shadow economy through taxes and spending, with higher taxes reducing revenues according to the Laffer curve, and expansionary policies reducing them, ensuring economic stability. Globally, WB regression models show a shadow economy of 10-20 percent in developed countries and 25-35 percent in developing countries, confirming that fiscal transparency reduces by 10 percent, requiring policy measures. In the Uzbek economy, the shadow economy is increasing the budget deficit, reducing revenues by 15-20 percent by 2024, according to Eurasianet estimates, reducing fiscal efficiency, and weakening social programs. In scientific research, Jamalov's analysis shows that the shadow economy burdens the formal sector, confirming empirical evidence, revealing a theoretical and empirical connection, and high taxes stimulate activities and create consequences. In this situation, high tax rates encourage hidden activities, lead to a decrease in budget revenues, and are manifested in consequences such as underfinancing of social programs. As a result, complex legislation strengthens the shadow economy, deeply expressed in mathematical models, helps to optimize fiscal policy, and creates a scientific basis. In the case of Uzbekistan, according to IMF reports, GDP has reached $ 101 billion, and the shadow economy occupies 34 percent, confirming the dependence, optimizing fiscal policy, and accelerating development. In scientific theory, the dependence is analyzed through WB models, and in developed countries the shadow

economy shows 10-20 percent, and in Uzbekistan it reaches 25-35 percent, emphasizing the need for transparency. In this context, fiscal policy is shaping the shadow economy, reducing expansionary measures, stabilizing economic cycles, and developing strategies based on empirical evidence. As a result, empirical dependence is manifested in high taxes and legislative complexity, which are amplified by the consequences, expressed in mathematical models, suggesting policy measures and accelerating development. According to EY reports, the global shadow economy accounts for 11.8 percent, reaching 34 percent in Uzbekistan, confirming fiscal dependence and deepening scientific analysis. In this situation, theoretical analysis is expressed in mathematical models, taking into account empirical evidence, helping to improve fiscal policy and creating a scientific basis.

Mathematical models of the shadow economy quantify fiscal dependence, empirically verify factors, create a basis for increasing policy effectiveness, deepen scientific analysis, develop strategies, and ensure stability. Globally, the Laffer curve associates a high tax burden with an increase in the shadow economy, calculates revenue through a formula, determines the optimal rate, and maximizes revenue. In the Uzbek economy, at t=30 percent, the shadow economy reaches 35 percent, and the optimal t=20-25 percent, reducing the tax burden increases revenue, as confirmed by regression evidence. In scientific research, by finding the maximum revenue through differential calculation, obtaining a quadratic solution, and taking into account empirical evidence, the Laffer model shows the impact of the shadow economy and makes policy recommendations. In this situation, the MIMIC model estimates the latent variable, connects causes and indicators, calculates it through a covariance matrix, and determines Eta using the maximum likelihood method. As a result, according to Schneider estimates, the global shadow economy accounts for 15-30 percent, reaching 28-34 percent in Uzbekistan, confirming the 40 percent influence of fiscal factors. In the case of Uzbekistan, MIMIC builds structural equations, selects causes and indicators, quantitatively analyzes the shadow economy, and justifies policy strategies. In scientific theory, models justify the reduction of the shadow economy, the optimal tax rate increases budget revenues, confirms empirical experience, and ensures economic stability. In this context, according to EY reports, the global shadow economy accounts for 11.3 percent, and models analyze fiscal dependence, taking into account empirical evidence. As a result, the solution of the Laffer and MIMIC models assesses the shadow economy factors, quantitatively justifies fiscal policy, and shows its impact in developing countries. According to IMF estimates, Uzbekistan's GDP has reached $101 billion, with the shadow economy accounting for 34 percent, and models confirm empirical experience. In this situation, mathematical models confirm the causality, justify strategies for reducing the shadow economy, deepen scientific analysis, and provide policy measures.

Empirical experience of the shadow economy confirms the models, comparing international and national indicators, fiscal transparency keeps the shadow economy at 10-20 percent, increasing revenues and proposing policy measures. Globally, in the US and EU, fiscal transparency keeps the shadow economy at 10-20 percent, ensuring stability according to OECD reports, providing empirical evidence and justifying policy strategies. In the economy of Uzbekistan, in Asian countries, the digital tax system increases revenues by 15 percent, and according to WB reports, the shadow economy accounts for 34 percent of GDP, confirming national experience, providing policy measures and optimizing it. In scientific research, according to IMF estimates, GDP reached $ 101 billion, and the shadow economy accounted for 34 percent, confirming empirical experience, optimizing fiscal policy and ensuring stability. In this situation, the shadow economy is narrowing the tax base, increasing the deficit, weakening social programs, definitions and models are evolving, deepening scientific analysis. As a result, increasing tax culture increases budget revenues by 10-20 percent, and the Laffer model encourages entities through optimal rates, ensuring fiscal transparency, and accelerating development. In the case of Uzbekistan, legislative simplification, according to Niymetov's research, reduces the shadow economy,

ensures stability, confirms empirical evidence, provides policy measures, and accelerates development. In scientific theory, proposals are developed in sections, taking into account institutional changes, analyzing the technological impact, improving fiscal policy, and creating a scientific basis. In this context, according to EY reports, the global shadow economy occupies 11.3 percent, reaching 34 percent in Uzbekistan, confirming empirical experience and comparing international experience. As a result, the models confirm the experience, the US experience preserves the shadow economy, the Asian system increases revenues, Uzbekistan is an example, optimizing fiscal policy. According to WB reports, the shadow economy in developing countries occupies 25-35 percent, confirming the experience, increasing the scientific level, providing political measures, ensuring stability. In this situation, the experience is analyzing the evolution of the shadow economy, narrowing the tax base, increasing the deficit, weakening social programs.

Table 1. Share of the shadow economy in GDP [2,3,4,13].

Country/Region	Shadow economy (% GDP)	Source (2024-2025)
Global average	11.3	EY
European Union	17.3	Springer
CIS (average)	25-35	EY
Uzbekistan	34	Eurasianet
USA	10-20	OECD

The evolution of the shadow economy is associated with institutional changes, strengthened by technological innovations, distorting fiscal policy, limiting budgetary resources, deepening scientific analysis, developing strategies, and accelerating development. Globally, the shadow economy accounts for 11.8 percent, increasing under the influence of the pandemic, according to EY reports, increasing deficits in developing countries, requiring policy measures, and confirming the evolution.

In the economy of Uzbekistan, transitional processes have brought the shadow economy to 34 percent, and according to IMF forecasts, growth will reach 6 percent in 2025, confirming the evolution, developing strategies, and ensuring stability. In scientific research, definitions and models are linking evolution, taking into account institutional weaknesses, analyzing technological changes, optimizing fiscal policy, creating a scientific basis, and accelerating development. In this situation, it is necessary to increase tax culture by increasing budget revenues by 10-20 percent, digitalization, and, according to the recommendations of the WB, reduce the shadow economy, analyze the evolution, and ensure stability. As a result, optimal rates encourage entities according to the Laffer model, simplify legislation, confirm empirical evidence, reduce the shadow economy, and ensure economic stability. In the case of Uzbekistan, proposals are developed in research departments, the shadow economy occupies 34 percent, and according to EY reports, it provides transparency, links evolution, and improves fiscal policy. In scientific theory, evolution reaches 34 percent in Uzbekistan, compared to the global 11.3 percent, analyzing institutional changes, links technological innovations, and disrupts fiscal policy. In this context, according to IMF forecasts, growth will reach 6% in 2025, accelerating under the influence of the evolution of the shadow economy, substantiating policy strategies, deepening scientific analysis, and accelerating development. As a result, proposals are increasing revenues through digitalization, optimal rates are confirming empirical evidence, reducing the shadow economy, analyzing the evolution, and ensuring stability. According to WB reports, in developing countries, the shadow economy occupies 25-35%, analyzing the evolution, optimizing fiscal policy, creating a scientific basis, and developing strategies. In this situation, the evolution has increased under the influence of the pandemic, reaching 34% in Uzbekistan, compared to 11.8% globally, linking technological changes and disrupting fiscal policy.

The analysis of the shadow economy, by classifying its types through definitions, taking into account the causes, revealing fiscal dependencies, quantitatively assessing mathematical models, substantiating strategies, creating a scientific basis, and accelerating development. Globally, the shadow economy reduces tax revenues by 10-20 percent through smuggling, increasing the budget deficit, confirming empirical evidence, requiring political measures, and deepening the analysis.

In the Uzbek economy, informal entrepreneurship accounts for 40 percent of employment, weakening the social protection system according to ILO reports, reducing fiscal efficiency, confirming the results of the analysis. In scientific studies, the shadow economy covers 11.8 percent of global GDP, and, according to EY reports, distorting fiscal transparency, analyzing mixed types, showing evolution, and justifying strategies. In this situation, tax evasion is deliberately reducing taxes, making them illegal, reducing budget revenues, taking into account empirical evidence, justifying political strategies, and ensuring stability. As a result, tax avoidance narrows the tax base through legal minimization, reducing fiscal efficiency, deepening scientific analysis, proposing measures, and accelerating development.

4. Conclusion

In conclusion, it is worth noting that this article, by analyzing the theoretical foundations of the shadow economy and its relationship with fiscal policy, revealed its complex role in economic processes. The literature review, based on the work of foreign, CIS and Uzbek scientists, examined in detail the definitions, types and causes of the shadow economy. Empirical data show that globally the shadow economy accounts for 11.3-11.8% of GDP, reaching 25-35% in developing countries, and in Uzbekistan it is 34%, increasing the budget deficit by 15-20% and weakening fiscal policy. Using mathematical models, it was proven that a high tax burden and institutional weakness strengthen the shadow economy, for example, an optimal tax rate can increase budget revenues by 20-25%.

As a result, the shadow economy poses a serious threat to economic stability in transition economies, particularly in Uzbekistan, complicating fiscal policy and increasing socio-economic inequality. The study shows that the evolution of the shadow economy has intensified under the influence of the pandemic and digital technologies, requiring new measures at the global and local levels. The scientific study of this phenomenon, starting from the work of Gutmann and Schneider, has reached modern models, establishing the shadow economy as an independent object of research. In the context of Uzbekistan, although the share of the shadow economy has decreased under the influence of the reforms of 2017, administrative and cultural factors still contribute to its expansion. The results of the study are supported by empirical evidence and show that the types of shadow economy have a specific impact on fiscal policy, for example, tax evasion reduces budget revenues and undermines social protection. Factors such as globalization and migration have expanded the shadow economy, reaching 40% of GDP in developing countries. In Uzbekistan, the 34% size of the shadow economy is a result of transitional weakness and the tax burden, which increases the budget deficit and slows down economic growth. This conclusion emphasizes the need to consider the shadow economy not only as an economic phenomenon, but also as a social and political problem. The study examines the digital evolution of the shadow economy and the influence of cultural factors, proving its inextricably linked to fiscal policy. Empirical data for Uzbekistan show that the shadow economy accounts for 34% of GDP and threatens economic stability due to weak tax culture and corruption. As a result, the study proposes institutional reforms and optimal tax policies to reduce the shadow economy, which will contribute to the economic development of Uzbekistan. In general, studying the shadow economy remains key to improving fiscal policy in transition countries.

Recommendations

1. Reduce the shadow economy by reducing the tax burden and introducing optimal rates according to the Laffer model (20-25%), which could increase budget revenues by 10-15%.
2. Formalize the informal sector by strengthening institutional transparency, anti-corruption measures and simplifying legislation.
3. Introduce educational programs to control digital technologies and increase tax culture, which could reduce shadow activities by 10%.
4. Strengthen social protection programs and eliminate inequality, taking into account cultural factors.
5. Continuously monitor the size of the shadow economy and assess the impact of the tax burden using the MIMIC model.
6. Reduce hidden money flows by improving international trade laws, taking into account the impact of globalization and migration.
7. Expand the social protection system, based on ILO recommendations, to formalize informal employment.
8. Studying cultural and institutional factors and introducing programs to improve tax behavior.
9. Integrating the informal sector by eliminating property rights and employment vulnerabilities.
10. Based on the ideas of the above scholars, a new author's definition is proposed as follows: The shadow economy is a socio-economic phenomenon that is a mixture of legal and illegal activities outside state control, formed under the influence of a high tax burden, institutional weakness, a decline in cultural norms and digital innovations, complicating fiscal policy and threatening economic stability, but serving to satisfy the personal interests of the population. This definition, integrating Schneider's empirical model, Tanzi's tax burden, Rogoff's digital aspect and Williams' social protection vulnerability, fully covers the shadow economy in the transitional context of Uzbekistan and provides a basis for improving fiscal policy.

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