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## Statistical Assessment and Dynamics of the Shadow Economy in Uzbekistan: Trends, Challenges, and Policy Measures

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**Abstract:** The shadow economy represents a significant component of the economic landscape in many developing countries, including Uzbekistan. This study provides a comprehensive statistical assessment of the informal and shadow sectors in Uzbekistan, based on national data, international methodological frameworks, and the results of sample surveys conducted between 2017 and 2023. The paper outlines direct and indirect methods of measuring unregistered economic activity, including the MIMIC model, household expenditure analysis, and administrative data integration. Special attention is paid to the impact of unobserved economic activity on GDP estimates, with new statistical calculations indicating a substantial upward revision of GDP figures. The study also reviews government measures aimed at reducing the shadow economy, including recent presidential decrees and collaboration with the IMF and World Bank. Findings show a persistent presence of informal and shadow activity, especially in the construction and services sectors, underscoring the need for continued methodological refinement and policy action

**Keywords:** shadow economy, informal sector, statistical assessment, GDP revision, Uzbekistan, MIMIC model, economic policy

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### 1. Introduction

Economic discourse in Uzbekistan has been expanded by leaps and bounds over the past few years, with citizens and politicians discussing fundamental topics of macroeconomics such as inflation, interest rates, exports and imports, and neither is fiscal regulation left out of the discussions. As a result, this new economic consciousness also emphasizes on the less well-known aspects of national economies: the informal, black, and tax evading economic sectors [1]. Though interchangeably used in popular discourse, these terms can indicate different instances of unrecorded economic activity and thus possess different implications for economic planning and governance. The shadow economy, often used as a tacit approach, focused squeeze. Literature identifies the shadow economy comprising both the informal and illegal economy as a continuous impediment of both transitional and developing economies. It includes various forms of unobserved or underscored activity such as tax avoidance, informal enterprises, and illegal trade, that lie beyond the parameters of regulatory information (Schneider & Enste). The System of National Accounts (SNA 2008), authored by a consortium of international institutions that comprise the UN, the IMF and

the OECD, places strong emphasis on including all economic activity within production boundaries irrespective of registration, legality or data availability (United Nations et al).

Measuring the shadow economy allows mapping an important source of miscalculation of macroeconomic indicators (e.g., GDP, employment, investment). This sector has poor statistical coverage, and ultimately, that means underestimated national output, misallocation of resources, ineffective fiscal, and social policies (Feige). Additionally, neglecting unrecorded economic activity undermines cross-country comparability and reduces the reliability of a country's economic data. Medina & Schneider (2018): From a policy perspective, the shadow economy undermines public finance by decreasing tax revenues, distorting competition between formal and informal enterprises, and constraining the government ability to finance infrastructure, social protection and development policies [2]. As a result of fighting against the shadow economy has turned into a priority strategy for the Republic of Uzbekistan.

The aforementioned commitment can be seen in a range of high-level policy reforms and legal instruments. In particular, these are: Presidential Decree No. UP-6098 (October 30, 2020) "On organizational measures to reduce the shadow economy and improve the efficiency of tax authorities," Presidential Resolution No. PP-178 (March 24, 2022) "On measures to implement the Tax Administration Reform project with the participation of the World Bank", Presidential Decree No. UP-99 (July 8, 2024) "On additional measures for the effective organization of activities to combat the shadow economy;

This study aims to deliver an in-depth statistical analysis of the informal and shadow economies of Uzbekistan. Based on international approaches, sample surveys and new administrative data spanning between 2017 and 2023, it explores the size and evolution of unobserved economic activity and its contribution to official macroeconomic aggregates [3]. It advances a methodological discussion and policy implications in an ongoing effort to render the national economy more statistically visible.

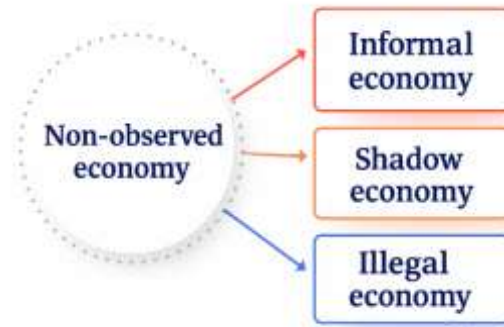
## 2. Materials and Methods

Grounded on a multi-method statistical approach, this study analyzes the size and the structure of informal and shadow economies in Uzbekistan for the 2017-2023 years. The methodology relies on direct and indirect measurement methods promoted by international institutions like the International Monetary Fund (IMF), the World Bank and the Organisation for Economic Co-operation and Development (OECD).

## 3. Results

Following the guidelines in the *System of National Accounts 2008 (SNA 2008)*, the shadow economy is considered part of the broader non-observed economy (NOE), which includes informal, hidden, and illegal economic activities (United Nations) [4]. These are activities that are either not covered by regular statistical reporting systems or are intentionally concealed to evade regulation or taxation.

The study distinguishes between (Figure 1): The informal economy covers legal but unregistered work, the shadow economy hides legal activity to avoid taxes, and the illegal economy includes banned activities such as smuggling or unauthorized production.



**Figure 1.** The visual diagram of the Non-Observed Economy structure.

Source: Author's elaboration based on the System of National Accounts (SNA 2008). The research incorporates both direct and indirect estimation methods to quantify the size of the informal and shadow sectors:

- **Direct methods** involve specially designed sample statistical surveys, including household and enterprise-level questionnaires targeting unregistered or hidden economic activity.
- **Indirect methods** utilize proxy indicators such as discrepancies in labor statistics, electricity consumption, cash flows, and household expenditure patterns (Schneider & Enste).

### 2.3. Application of the MIMIC Model in Uzbekistan

Multiple Indicators Multiple Causes (MIMIC) model is a statistical tool that examines the underlying causes and observable effects to estimate an unobservable phenomenon, in our case the size of the shadow economy [5]. It belongs to the family of structural equation modeling (SEM) based on the theory of latent variables (Schneider & Enste; Medina & Schneider). The MIMIC model was used as an indirect measurement approach to generate time-series estimates of shadow economic activity in Uzbekistan. This was particularly beneficial in highlighting structural secular trends across regions and sectors that surveys would not have been able to.

The MIMIC model used in this study is built on two primary equations:

1. Structural Equation (Causes of the Shadow Economy):

$$\eta = \gamma_1 x_1 + \gamma_2 x_2 + \dots + \gamma_k x_k + \zeta$$

where:

- $\eta$ : latent variable representing the shadow economy
- $x_k$ : observable causes (e.g., tax burden, regulation intensity, unemployment)
- $\gamma_k$ : structural coefficients
- $\zeta$ : structural disturbance term

2. Measurement Equation (Indicators of the Shadow Economy):

$$y_j = \lambda_j \eta + \varepsilon_j$$

where:

- $y_j$ : observable indicators (e.g., currency demand, labor force discrepancy, electricity consumption)
- $\lambda_j$ : factor loadings
- $\varepsilon_j$ : measurement error term

The MIMIC (Multiple Indicators Multiple Causes) model is a statistical approach for estimating unobservable phenomena which in this case is the size of the shadow economy by specifying the causes and observable effects of it. It is a type of SEM, rooted in latent variable theory (Schneider & Enste, 2013; Medina & Schneider, 2018).

Using the MIMIC model within the framework of Uzbekistan. The MIMIC model has been used to supplement the direct measurement methods by providing time-series estimates of shadow economic activity. Based on recommendations from the IMF and World Bank and drawing on models applied in Germany, Georgia, and Canada the Uzbek MIMIC model included several key causal factors: the tax burden relative to GDP, employment regulations, informal employment levels, and corruption perception indicators [6]. To measure observable results, the model selected proxies such as discrepancies among labor force surveys and tax records, disparities between household physical cash outlays and individuals' reported incomes, anomalous behaviors in the utilization of power, and driving unregistered cars for business purposes.

Weights were assigned by the principal component and covariance based calibration method, using models with data from 2017–2023. It then compared these estimates to survey data and administrative records to check their reliability.

Results from the MIMIC model facilitated the compilation of a time series for the development of the shadow economy, determination of the sectors (construction, services and trade) that most contributed to hidden activity, and the adjustment of GDP to include unreported output [7]. Those insights also contributed to the formulation of policies that sought to reduce informality.

The results of the model also served as an analytical basis for discussions with international partners, such as IMF missions and World Bank workshops, which have set the tone for the future direction of economic reforms and statistical development in Uzbekistan. surveys alone.

Nationwide surveys were undertaken by the Statistics Agency of Uzbekistan on individual entrepreneurs, household spending on construction, informal and self-employment in services, market trading, and agricultural or home-based production between 2020 and 2023. Administrative data on businesses and household incomes from the Tax Committee were used in conjunction with Ministry of Internal Affairs and Ministry of Transport data to corroborate and refine the estimates.

Drawing on this patchy information, statisticians re-estimated GDP to account for transactions that had been excluded from the books [8]. It allowed to estimate how much the informal and shadow economies contributed in various sectors and regions, providing a finer and more accurate image of the economic structure of the country.

The concept of the shadow economy has been extensively studied in the context of both developed and developing economies. According to Schneider and Enste (2013), the shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities to avoid payment of taxes, compliance with regulations, or meeting labor standards. The System of National Accounts 2008 (SNA 2008), developed by the United Nations, IMF, OECD, and the World Bank, provides a broader classification that includes informal, hidden, and illegal activities under the term 'non-observed economy' (United Nations) [9]. Feige and Dell'Anno and Solomon also emphasize the importance of clear definitions to improve measurement consistency and cross-country comparisons.

The size of the shadow economy varies widely across countries and regions. Medina and Schneider (2018) found that the shadow economy accounts for an average of 30–50% of GDP in CIS countries, 5–20% in European countries, and 5–15% in developed economies. Friedman, Johnson, Kaufmann, and Zoido-Lobaton highlight how weak institutions and high tax burdens contribute to a larger informal sector. Loayza and Torgler and Schneider support these findings, noting that institutional quality and enforcement capabilities are critical determinants.

Measuring the shadow economy remains a complex task. Direct methods include household and enterprise surveys, while indirect methods rely on macroeconomic indicators such as electricity consumption, labor discrepancies, and cash usage (Feige; Schneider & Enste). OECD guidelines stress the importance of triangulating data from multiple sources for accuracy. Dell'Anno and Buehn and Schneider argue that combining methodologies often yields more reliable estimates.

The Multiple Indicators Multiple Causes (MIMIC) model is widely used to estimate the size of the shadow economy indirectly. Schneider and Enste (2013) describe it as a structural equation model linking observable causes (e.g., tax burden, regulation) to indicators (e.g., currency demand, labor participation gaps). Medina and Schneider (2018) applied the MIMIC model across 158 countries, demonstrating its flexibility [10]. Applications in Canada (Giles, 1999), Georgia (IMF, 2022), and Germany (Dell'Anno & Schneider, 2003) show its adaptability to different data contexts. However, critics such as Breusch (2005) and Kazemier (2006) caution against overreliance due to its sensitivity to variable selection and calibration.

Despite growing interest, academic research on the shadow economy in Uzbekistan remains limited. Recent efforts by the Agency of Statistics under the President of the Republic of Uzbekistan have sought to align national practices with international standards through partnerships with the IMF and the World Bank. Government reforms, such as Presidential Decrees No. UP-6098 (2020), UP-11 (2024), and UP-99 (2024), aim to enhance transparency and reduce informality. Studies by Begalov, Zhukovskaya, Mamadzhanov, and Gulboyev (2022–2024) provide preliminary insights into informal production, household consumption, and unregistered service provision in Uzbekistan. These efforts are complemented by regional surveys and administrative data analyses aimed at refining GDP estimates and informing policy decisions.

#### 4. Discussion

A visual representation of Uzbekistan's economy from the statistical perspective for the years 2017 through 2023 shows that the relative size of the non-observed economy, albeit with increasing absolute values has been gradually decreasing. The consolidated GDP of Uzbekistan increased from 356,5 trillion soums in 2017 to 1 trillion 192,2 trillion soums in 2023, as represented in Table 1.

In 2017, 45.1% of GDP was ascribed to unobserved economic activity comprising a 37.8% contribution from the informal sector and 7.3% from shadow activity. In 2023, the unobserved economy represented only 35.5%, while the shadow economy, which is the share of informal labor that incurs taxes, slightly increased compared to our last report to 8.4% of GDP, suggesting increased formalization of that type of informal labor, along with a continued problem of tax-evading enterprises.

The formal economy boomed and its size increased from 54.9% of GDP in 2017 to 64.5% in 2023 [11]. This underscores the government goal of formalizing the economy by instituting reforms and modernizing tax practices (Table 1).

**Table 1. Gross Added Value in the Republic of Uzbekistan (2017–2023)**  
(in trillion soums and as a percentage of GDP)

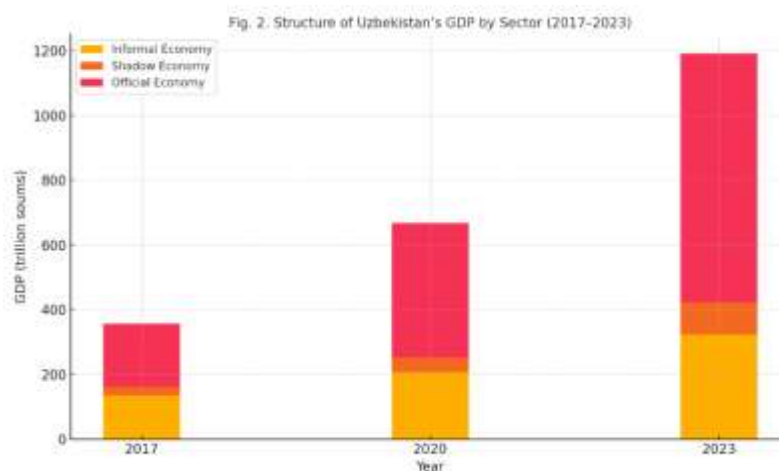
Year	Total GDP	Official Economy	Unobserved Economy	Informal Economy	Shadow Economy
	(trillion soums)	(trillion soums / %)	(trillion soums / %)	(trillion soums / %)	(trillion soums / %)

2017	356.5	195.7 / 54.9%	160.7 / 45.1%	134.8 / 37.8%	25.9 / 7.3%
2020	668.0	414.9 / 62.1%	253.2 / 37.9%	206.9 / 31.0%	46.3 / 6.9%
2023	1192.2	769.3 / 64.5%	422.9 / 35.5%	323.3 / 27.1%	99.6 / 8.4%

Source: Author's calculations based on data from the Agency of Statistics under the President of the Republic of Uzbekistan

This was discreetly followed by methodical recalculations of the country's GDP, considering statistical data on informal and shadow economies, leading to astronomical upward shifts in Uzbek GDP data. The new estimates have led to GDP for 2023 increasing from 1,066.6 trillion soums to 1,192.2 trillion soums (+125.6 trillion soums), reflecting previously unobserved economic activity (see Fig. 2).

It was reflected at the per capita level: according to the calculations, GDP per capita increased from 29.3 million soums to 32.7 million soums in 2023 (an increase of 3.4 million



soums). In the same vein, the USD value of GDP was increased from \$90.9 billion to \$101.6 billion for a revision of \$10.7 billion. US\$ per capita income increased by \$294 - from \$2,496 to \$2,789).

Source: Author's calculations based on national statistics.

The breakdown of adjusted gross value added (GVA) in 2023 reveals that informal economic activity is particularly prevalent in three key sectors:

- **Services:** Adjusted by +6.7 trillion soums (from 119.3 to 126.0 trillion soums)
- **Construction:** Adjusted by +14.3 trillion soums (from 12.8 to 27.1 trillion soums)
- **Industry:** Adjusted by +4.9 trillion soums (from 9.7 to 14.6 trillion soums)

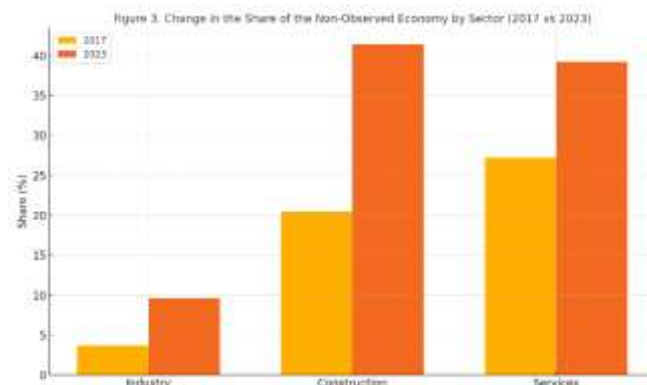
In the same year, the shadow economy contributed a total of **99.6 trillion soums**, distributed as follows:

- Services: **79.3 trillion soums**
- Construction: **8.1 trillion soums**
- Industry: **12.3 trillion soums**

These findings illustrate that the **services sector remains the dominant source of unregistered economic activity**, both in terms of informal employment and shadow enterprise output. The results of these adjustments led to a moderate but notable increase in **real GDP growth rates**. Between 2018 and 2023, the recalculated average annual growth rate increased by **0.3 percentage points [13]**. The effect was smallest in 2018 (+0.1%) and highest in 2019 (+0.8%), showing that the structural composition of informal economic activity can significantly impact macroeconomic trend analysis [12]. Additionally, sectoral analysis showed that:

- The **share of the non-observed economy in industry** rose from 3.7% to 9.6%
- In **construction**, it increased dramatically from 20.5% to 41.4%

- In the **service sector**, the share rose from 27.2% to 39.2% (see Fig. 3)
- Source: Author's calculations based on statistical survey data.



Source: Author's calculations based on statistical survey data.

As Uzbekistan enhances its statistical systems and the conduct of economic reform, the shadow and informal economies remain part and parcel of economic activity (both legal and illegal) in the country, the study reveals. In 2023, when GDP was calculated on the basis of survey data, administrative records, and using the MIMIC model, national income was increased by more than 125 trillion soums – more than 10 percent of GDP. Had such a big revision, affects fiscal planning, international comparison, and is reflected on the accuracy of economic indicators used by policy makers. The proportion of informal economy reduced from 37.8 to 27.1 percent between 2017-2023. The drop-off indicates that a number of small businesses and households have been incentivized into the formal sector by recent reforms simplified registration, easier licensing, automated public services. Nevertheless, the shadow economy increased from 7.3 to 8.4 percent means that enterprises still hide their activities to avoid taxes or regulations. Informality is diminished by better incentives; shadow activity indicates more profound governance issues like underreporting and cash dependence [14].

The sectors most affected are construction and services Unobserved construction activity accounted for over 40 per cent of construction activity and almost 40 per cent of services in 2023. Monetary payments are the backbone of these industries, and the use of short-term labor, decentralized operations, and other defining features make them harder to keep track of. Statistical coverage is complicated further by the rise of self-employment, freelancing, and microbusinesses in services. In absence of unobserved activity, adjusted Uzbekistan per capita GDP would have been 10–12 percent lower than observed [15]. The changed path of growth, specifically the 0.8 point or more annual increase in some years, are rates of economic activity that reflect more robust output than previously measured.

Uzbekistan can improve transparency by regularly surveying the informal economy, deploying more digital tax instruments, and increasing data sharing between government agencies, all complemented by continued collaborations with international partners and the use of instruments that provide voluntary compliance incentives for citizens and businesses.

## 5. Conclusion

Using a combination of information from surveys and administrative records, and employing the MIMIC model, this paper presents a comprehensive measurement of the shadow and informal economies of Uzbekistan. The results indicate that despite the decline seen in informal activity over recent decades the shadow economy remains a persistent problem especially in the fields of services and construction. For the period from

2017 to 2023 the major upwards GDP adjustment was made due to change in data collection and methodology more than 125 trillion soums, which boosted total and per-capita income by economy. It also illustrates the importance of correctly measuring non-observed activity, especially for fiscal planning, development policies, and comparisons across countries and time.

It also highlights the importance of improving statistical approaches, administration systems, and regulatory coordination in order to target shadow activity effectively. It also reinforces tailored support measures for vulnerable sectors, such as streamlined reporting by construction companies, online modalities for self-employed service providers and benefits which promote the transition of informal workers to the formal economy. The cooperation with the international institutions (IMF and World Bank) will continue, which will assist in the capacity building and harmonization of national practices with international standards.

The findings offer useful proof for policymakers, and highlight the need for future economic statistics and policy to be designed with a focus on the dynamics of unobserved economic activity.

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