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# EXPORT DIVERSIFICATION AS A FACTOR IN OVERCOMING THE MIDDLE-INCOME TRAP IN UZBEKISTAN

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**Abstract.** Overcoming the middle-income trap is one of the central challenges facing developing economies undergoing structural transformation. For Uzbekistan, this question has become particularly pressing amid the liberalization of foreign trade, the expansion of export potential, and the transition away from a predominantly resource-based model toward higher value-added production.

This study assesses the role of export diversification in reducing the risk of the middle-income trap in Uzbekistan. It applies comparative and statistical analysis of export-structure dynamics together with econometric time-series modelling of merchandise exports and the export concentration index over 1995–2022. Of seven models tested (linear and parabolic trend, moving-average and exponential smoothing, AR(1), MA, and ARIMA(0,1,0)), the parabolic trend model produced the best fit by RMSE and MAE ($R^2 \approx 80\%$) and was used to generate forecasts through 2030.

The analysis took the data from the World Bank, UNCTAD, the World Trade Organization, the Statistics Agency under the President of the Republic of Uzbekistan, the Central Bank of Uzbekistan and other national and international sources. The analysis is based on the data of the World Bank, UNCTAD, the World Trade Organization, the Statistics Agency under the President of the Republic of Uzbekistan, the Central Bank of Uzbekistan and other national and international sources. The results indicate that structural diversification remains limited, despite a significant increase in export volumes since the beginning of economic reforms. The UNCTAD export diversification index was 0.729 in 2022, compared to 0.8 in 2019, and the econometric forecast for the Herfindahl–Hirschman-type concentration index points to a further increase, to 0.474 by 2030, implying continued commodity concentration if current trends continue. These results

**Keywords:** middle-income trap; export diversification; Uzbekistan; export concentration; economic growth; technological upgrading; industrial policy; foreign trade.

## 1. Introduction

### 1.1 Background and problem statement

Moving from a middle-income economy to a high-income economy is a complex and long process. Countries that have experienced rapid growth tend to face a slowdown in productivity growth, waning effectiveness of traditional growth drivers, and increased international competition.

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Under the contemporary understanding of the middle-income trap, capital accumulation and investment are the principal sources of growth at early stages of development. As income levels rise, however, the importance of these factors declines and the role of technological upgrading, human capital, and innovation increases.

The structure of foreign trade is of particular importance in this process. An economy dependent on a narrow commodity base or low-technology goods is vulnerable to swings in world prices and foreign demand. In contrast, a more diversified export product portfolio and a larger share of higher value-added products contribute to the development of new production capacities. Therefore, export diversification can be viewed not only as an outcome of economic development but also as one of the processes that can facilitate its acceleration.

This question is especially relevant for Uzbekistan. According to World Bank data, exports of goods and services grew by 79.1% over 2013–2023, reaching USD 24.4 billion, while imports rose by 119%, from USD 17.37 billion to USD 38.1 billion; the most pronounced acceleration of foreign trade occurred after 2017. At the same time, according to the Central Bank of the Republic of Uzbekistan, structural diversification of exports has proceeded slowly: although exports grew by 23.8% in 2023, this growth was driven mainly by gold exports, with non-gold exports increasing by only 4.2%.

This motivates the study's central research question: to what extent do the observed changes in Uzbekistan's foreign trade genuinely reflect diversification of the export structure, and are they capable of reducing the risk of the middle-income trap?

**1.2 Literature review**

The relationship between export diversification and economic development has been widely studied in the literature on economic growth, structural transformation, and international trade (Krugman, 1980; Newfarmer, Shaw and Walkenhorst, 2009; Parteka and Tamberi, 2008).

Evidence exists that countries that are able to expand exports of technologically sophisticated, higher value-added goods are more likely to successfully exit the middle-income trap. Chile is often cited in the literature as an illustrative example (Salinas, 2021). The accumulation of human capital is also regarded as an important precondition, allowing an economy to move from simple manufacturing to more complex activities.

The mechanism can be summarized as follows: export diversification → new industry development → technological upgrading → productivity growth → higher value added → sustainable economic growth.

**1.3 Aim, objectives, and hypothesis**

The aim of this study is to determine the role of export diversification in reducing the risk of the middle-income trap in Uzbekistan.

To this end, the study pursues the following objectives:

1. analyse the dynamics and structure of Uzbekistan's exports;
2. assess the level of export diversification and forecast its trajectory;

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3. identify the principal factors constraining diversification;
4. evaluate the effect of trade liberalization on export structure;
5. examine the prospects for further diversification;
6. identify policy directions conducive to a more complex export structure.

Hypothesis: an increase in the level of export diversification contributes to a more resilient growth model and reduces Uzbekistan's dependence on traditional export commodities, thereby lowering the risk of the middle-income trap.

## 2. Materials and Methods

### 2.1 Data

The study is based on statistical data on foreign trade of Uzbekistan: export volumes, structure of merchandise exports, indicators of export concentration / diversification, geographic structure of exports, as well as data on industrial production and economic development. The period 2013-2023 is used for the analysis of overall trade dynamics. For the econometric modeling of the concentration index and merchandise export volume an annual series for 1995-2022 is used (28 observations).

The principal data sources are the World Bank, UNCTAD (UNCTADstat), the WTO, the Statistics Agency under the President of the Republic of Uzbekistan, the Central Bank of the Republic of Uzbekistan and the Ministry of Investment, Industry and Trade. For the policy analysis, the study draws on the 2017–2021 Action Strategy, the 2022–2026 New Uzbekistan Development Strategy, foreign-trade legislation and export-development policy documents.

### 2.2 Measuring export diversification and concentration

The study uses two complementary but methodologically distinct indicators, which should not be conflated.

(a) For cross-country and cross-period comparisons at certain points in time, the UNCTAD export diversification index (based on the Theil index) is utilized (Section 3.2). It measures how far a nation's export commodity structure deviates from the global average; values nearer 1 denote a structure that deviates more from the global average, i.e., higher concentration and lower diversity. This is the indicator that stood at 0.729 in 2022, compared with 0.8 in 2019 (UNCTAD, n.d.).

(b) A Herfindahl–Hirschman-type export concentration index, employed as the dependent variable in the time-series econometric model (Section 2.3):

$HHI = \Sigma s_i^2$

where $s_i$ is the share of commodity (group) i in total exports, i = 1, …, n. This index is likewise normalized to the [0, 1] interval: higher values indicate greater dependence on a limited number of export commodities.

The analysis also compares the commodity structure of exports before and after the onset of economic liberalization in 2017.

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**2.3 Econometric modelling**

To forecast merchandise export volumes and the HHI-type concentration index (indicator (b)) over the 1995–2022 annual series, seven time-series models were estimated and compared: linear trend, parabolic trend, moving-average smoothing, simple exponential smoothing (α = 0.9), a first-order autoregressive model (AR(1)), a moving-average model (MA), and ARIMA(0,1,0). All estimations were carried out in R.

Component analysis of the series revealed a persistent positive trend (T) with no pronounced seasonality (S) or cyclicality (C); analysis of the autocorrelation function confirmed that both series are non-stationary.

Models were compared using root mean squared error (RMSE) and mean absolute error (MAE) for each series separately. The comparison results are reported in Table 1.

**Table 1. Comparison of time-series models for merchandise export volume and the export concentration index (1995–2022 data)**

| **Model** | **Equation** | **RMSE (export / index)** | **MAE (export / index)** |
|---|---|---|---|
| Linear trend | Y(export) = 1355.1 + 473.1·t; Y(index) = 0.4233 − 0.006911·t | 1854.18 / 0.0564 | 1635.89 / 0.0456 |
| **Parabolic trend (selected)** | Y(export) = 1498.47 + 444.45·t + 0.989·t²; Y(index) = 0.5327 − 0.0288·t + 0.0560·t² | 1202.86 / 0.0353 | 952.28 / 0.0279 |
| Moving-average smoothing | X(t) = Ft + 0.693·Et−1 (export); X(t) = Ft + 0.390·Et (index) | 1283.98 / 0.041 | 919.43 / 0.030 |
| Exponential smoothing (α = 0.9) | Ft−1 = 0.1Ft + 0.9Xt + Et | 1369.50 / 0.042 | 1047.36 / 0.029 |
| AR(1) | Xt = 0.9648·Xt−1 + 8980.03 (export); Xt = 0.8747·Xt−1 + 0.338 (index) | 1361.49 / 0.042 | 1084.99 / 0.030 |
| MA | Xt = 8351.64 + Et − 1.403·Et−1 − … (export) | 1279.20 / 0.047 | 1075.39 / 0.035 |
| ARIMA(0,1,0) | ΔXt = Et | 1344.82 / 0.042 | 1024.73 / 0.029 |

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Source: author's calculations in RStudio.

The parabolic trend model achieved the lowest RMSE and MAE values for both series ($R^2 \approx 80\%$) and was therefore used to generate forecasts for 2023–2030, reported in Section 3.2.

## 3. Results

### 3.1 Export dynamics

The analysis points to a substantial increase in Uzbekistan's foreign trade following the start of reforms. According to World Bank data, exports grew by 79.1% over 2013–2023, while imports rose by 119%. The acceleration of foreign trade was particularly pronounced after 2017, associated with liberalization and broader economic reforms. However, an increase in aggregate exports does not automatically imply greater diversification.

### 3.2 Export concentration: current state and forecast

One of the most important results concerns the dynamics of the UNCTAD export diversification index (indicator (a), Section 2.2). It stood at 0.729 in 2022, compared with 0.8 in 2019, with the 2022 value lower than in any year since 2012. On its face, this suggests a narrowing of the gap between Uzbekistan's export structure and the world average; however, interpreting this as an unambiguous improvement in diversification would be premature (see the note in Section 2.2), since it should be reconciled with primary UNCTAD data and appears inconsistent with the growing reliance on gold exports over the same period (Section 3.3).

A clearer picture emerges from the econometric forecast of the HHI-type concentration index (indicator (b)), based on the parabolic trend model (Section 2.3). Forecast values for merchandise export volume and the concentration index for 2023–2030 are presented in Table 2.

**Table 2. Forecast merchandise export volume and export concentration index, Uzbekistan, 2023–2030**

| Year | Merchandise exports, USD million* | Export concentration index |
|---|---|---|
| 2023 | 15,643 | 0.332 |
| 2024 | 16,037 | 0.348 |
| 2025 | 16,462 | 0.365 |
| 2026 | 16,908 | 0.384 |
| 2027 | 17,373 | 0.404 |

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| Year | Merchandise exports, USD million* | Export concentration index |
|---|---|---|
| 2028 | 17,850 | 0.426 |
| 2029 | 18,338 | 0.449 |
| 2030 | 18,834 | 0.474 |

* Values are expressed in USD million, based on the underlying UNCTADstat series (see the note on units in the concluding section). Forecast values are based on the parabolic trend model. Source: author's calculations in RStudio.

The estimate forecasts to sustained development in merchandise exports, from USD 15.6 billion in 2023 to USD 18.8 billion in 2030, backed by a parallel rise in the concentration index from 0.332 to 0.474. To put it another way, if current trends continue, export growth will be accompanied by increasing concentration, mostly driven by gold and other primary commodities, rather than diversification of the commodity structure. This suggests increased vulnerability to external shocks, such as changes in global prices and demand, and validates the main hypothesis of the study: export growth by itself is not sufficient in the absence of a conscious diversification strategy.

**3.3 Commodity structure**

The data confirm the continued importance of a small number of commodity groups. In 2022, exports of precious metals amounted to approximately USD 4.31 billion, cotton to approximately USD 1.61 billion, mineral fuels to approximately USD 1.22 billion, and copper to approximately USD 1.11 billion. A substantial share of export revenue therefore continues to be generated by a relatively narrow set of commodity categories.

**3.4 Positive structural changes**

These results should not be interpreted solely in negative terms. Exports of textile products increased from around 432 kinds sent to 59 countries in early 2019 to 639 varieties shipped to 65 nations by 2023, demonstrating the textile industry's growing product and geographic footprint. In line with the structural change necessary to break out from the middle-income trap, this illustrates the progression from raw material → processing → final product → export to new markets.

**3.5 Geographic diversity of geographic diversity**

Additionally, there is some expansion in the geographic distribution of exports. Russia continued to be Uzbekistan's top export market in 2023 (about USD 3.3 billion), followed by China and Kazakhstan.At the same time, the country's presence in the European market has grown: following Uzbekistan's designation as a GSP+ beneficiary in 2021, the EU's share of total exports rose from

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1.2% in 2021 to 3.8% in 2022. This indicates that diversification should be understood not only in commodity terms but also geographically.

**4. Discussion**

The findings point to a dual pattern in the development of Uzbekistan's export sector. On the one hand, reforms since 2017 have substantially expanded foreign trade, introduced new export goods and markets, supported growth in processing industries, and broadened firms' export potential. On the other hand, dependence on a limited number of export commodities remains significant, and the forecast points to its further intensification by 2030 if the current structural-policy stance persists.

This matters for the middle-income trap: an economy can post rapid export growth while remaining exposed if export revenue stays concentrated in primary and other traditional commodities, limiting the scope for sustained productivity gains. Uzbekistan's challenge is thus less about the volume of exports than about improving their quality and complexity.

**4.1 Why export diversification matters for the middle-income trap**

The relationship can be explained through three mechanisms.

The first is productivity: producing more sophisticated goods requires higher labour productivity, modern equipment, and skilled workers.

The second is technology transfer: export-oriented firms face stronger incentives to adopt international standards and technologies. At present, fewer than 10% of Uzbekistan's small and medium-sized enterprises have access to modern technologies, and about 30% of industrial enterprises report obstacles to technology transfer.

The third is human capital: producing complex export goods requires engineers, technologists, IT specialists, and managerial and marketing expertise.

**4.2 Policy implications**

**1. Deepening processing.** Priority should shift from expanding raw-material output toward developing downstream stages of the value chain — cotton → yarn → fabric → garments → branded product.

**2. Supporting technology transfer.** Mechanisms are needed to help firms acquire and adapt modern technologies.

**3. Building innovation infrastructure.** International experience in supporting innovative firms and technology projects could usefully be adapted.

**4. Developing human capital.** Particular attention should be paid to engineering, technical, digital, and vocational education.

**5. Reducing administrative barriers.** Simplifying regulation and digitalizing government services could create a more favourable environment for new exporting firms.

**6. Developing transport infrastructure.** As a landlocked country, Uzbekistan faces high trade costs, underscoring the importance of developing transport corridors toward China, South Asia, and Europe.

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**7. Managing commodity-dependence risk.** Given the projected rise in the concentration index to 0.474 by 2030 (Section 3.2), mechanisms to smooth the impact of gold exports on macroeconomic stability — such as a stabilization fund or a fiscal rule — merit consideration, reducing the economy's vulnerability to world-price swings while structural diversification gathers pace.

**5. Conclusion**

This study set out to determine the role of export diversification in reducing the risk of the middle-income trap in Uzbekistan.

The results show that economic reforms and trade liberalization after 2017 have substantially boosted export flows, broadened the geography of foreign trade, and supported the emergence of new export industries. However, this growth in export volumes has not yet been matched by a sustained increase in commodity diversification: the UNCTAD export diversification index declined from 0.8 in 2019 to 0.729 in 2022 (a trend that requires further verification — see Section 2.2), while the econometric forecast based on 1995–2022 data points to a rise in the HHI-type concentration index from 0.332 in 2023 to 0.474 in 2030 — that is, further commodity concentration if current trends continue.

At the same time, growth in the textile industry, a widening range of exported products, and an expanding number of export markets point to genuine positive structural transformation.

The hypothesis is thus partially confirmed: export diversification does generate mechanisms that strengthen economic resilience and support new production capabilities, but the current level of diversification remains insufficient, and, absent a change in economic policy, the forecast trajectory points to further concentration rather than its reduction.

To reduce the risk of the middle-income trap, Uzbekistan needs to move from a strategy centred on expanding export volumes to one focused on raising the technological complexity, value added, and productivity of its export sector.

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