



O‘ZBEKISTON SUG‘URTA BOZORI

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INSURANCE MARKET OF UZBEKISTAN

СТРАХОВОЙ РЫНОК УЗБЕКИСТАНА

INSURANCE



TOSHKENT DAVLAT
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REGIONAL ENTERPRISE PROFITABILITY IN UZBEKISTAN: THE ROLE OF FINANCIAL EXPENSES AND EXPORT ACTIVITY

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Annotatsiya: Ushbu tadqiqot 2015–2024 yillardagi O'zbekistondagi moliyaviy xarajatlar, eksport faoliyati va mintaqaviy korxonalarining rentabelligi o'rnatidagi bog'liqlikni o'rganadi. Empirik tahlilda 14 ta mintaq va O'zbekiston Respublikasi Prezidenti huzuridagi Statistika agentligidan olingan 140 ta kuzatuvdan iborat kuchli muvozanatli panel ma'lumotlar to'plami qo'llaniladi. Salbiy rentabellik kuzatuvlarini hisobga olish uchun bog'liq o'zgaruvchi teskari giperbolik sinus (IHS) transformatsiyasi yordamida o'zgartirildi, tushuntirish o'zgaruvchilar esa tabiiy logarifmlar yordamida o'zgartirildi. Tadqiqotda yil davomida o'zgarmas effektlarga ega bo'lgan qat'iy effektli panel regressiya modellari qo'llaniladi. Diagnostika protseduralariga Hausman spetsifikatsiyasi testi, dispersiya inflyatsiyasi koeffitsienti (VIF) tahlili va Pesaran ko'ndalang kesimga bog'liqlik testi kiradi. Ko'ndalang kesimga bog'liqlik mavjudligini hisobga olgan holda, yakuniy spetsifikatsiya Driscoll-Kraay standart xatolari yordamida baholandi. Empirik topilmalar shuni ko'rsatadiki, moliyaviy xarajatlar mintaqaviy korxonalarining rentabelligi bilan salbiy bog'liq, eksport faoliyati esa namunaviy davr davomida rentabellik bilan ijobiy bog'liqlikni ko'rsatadi. Tadqiqot o'tish davri iqtisodiyotidagi korxonalarining faoliyati bo'yicha adabiyotlarga mintaqaviy panel dalillarini qo'shadi.

Kalit so'zlar: korxonalar rentabelligi, moliyaviy xarajatlar, eksport faoliyati, panel ma'lumotlari, o'zgarmas effektlar, Driscoll-Kraay standart xatolari, O'zbekiston.

Abstract: This study examines the relationship between financial expenses, export activity, and regional enterprise profitability in Uzbekistan over the period 2015–2024. The empirical analysis employs a strongly balanced panel dataset consisting of 14 regions and 140 observations obtained from the Statistics Agency under the President of the Republic of Uzbekistan. To account for negative profitability observations, the dependent variable was transformed using the inverse hyperbolic sine (IHS) transformation, while explanatory variables were transformed using natural logarithms. The study applies fixed-effects panel regression models with year fixed effects. Diagnostic procedures include the Hausman specification test, variance inflation factor (VIF) analysis, and the Pesaran cross-sectional dependence test. Given the presence of cross-sectional dependence, the final specification was estimated using Driscoll-Kraay standard errors. The empirical findings indicate that financial expenses are negatively associated with regional enterprise profitability, whereas export activity demonstrates a positive association with profitability across the sample period. The study contributes regional panel evidence to the literature on enterprise performance in transitional economies.

Keywords: enterprise profitability, financial expenses, export activity, panel data, fixed effects, Driscoll-Kraay standard errors, Uzbekistan.

Абстрактный: В данном исследовании изучается взаимосвязь между финансовыми расходами, экспортной деятельностью и прибыльностью региональных предприятий в Узбекистане за период 2015–2024 годов. Эмпирический анализ основан на сбалансированном панельном наборе данных, включающем 14 регионов и 140 наблюдений, полученных от Статистического агентства при Президенте Республики Узбекистан. Для учета отрицательных значений прибыльности зависимая переменная была преобразована с использованием обратного гиперболического синуса (IHS), а объясняющие переменные — с использованием натуральных логарифмов. В исследовании применяются панельные регрессионные модели с фиксированными эффектами, включающие фиксированные эффекты года. Диагностические процедуры включают тест спецификации Хаусмана, анализ коэффициента инфляции дисперсии (VIF) и тест Песарана на поперечную зависимость. Учитывая наличие поперечной зависимости, окончательная спецификация была оценена с использованием стандартных ошибок Дрисколл-Краая. Эмпирические результаты показывают, что финансовые расходы отрицательно связаны с прибыльностью региональных предприятий, в то время как экспортная деятельность демонстрирует положительную связь с прибыльностью на протяжении всего исследуемого периода. Данное исследование вносит вклад в литературу по вопросам эффективности предприятий в странах с переходной экономикой, предоставляя данные региональных панельных исследований.

Ключевые слова: рентабельность предприятия, финансовые расходы, экспортная деятельность, панельные данные, фиксированные эффекты, стандартные ошибки Дрисколл-Краая, Узбекистан.

Introduction (Введение/Kirish).

Enterprise profitability represents an important indicator of regional economic performance because it reflects the financial sustainability and productive capacity of commercial enterprises. In transitional economies, enterprise performance may be influenced by financing conditions and export activity, both of which affect investment capacity, production expansion, and market opportunities across regions.

Higher financial expenses may reduce profitability by increasing borrowing costs and limiting resources available for productive investment and business expansion. In contrast, stronger export activity may support enterprise performance through access to larger markets, economies of scale, and foreign currency earnings. The relationship between these factors and regional profitability may therefore provide

important insights into enterprise performance across regions of Uzbekistan.

Although previous studies have examined financing constraints and export-oriented enterprise performance in developing and transitional economies, relatively limited evidence investigates these relationships at the regional level in Uzbekistan using panel-data methods. Existing studies mainly focus on firm-level evidence, macroeconomic outcomes, or cross-country comparisons. Consequently, limited empirical evidence exists regarding how financial expenses and export activity correspond to regional enterprise profitability across the regions of Uzbekistan.

This study addresses this gap by examining the relationship between financial expenses, export activity, and regional enterprise profitability across 14 regions of Uzbekistan over the period 2015–2024. The analysis

employs fixed-effects panel regression models with year fixed effects and Driscoll–Kraay standard errors to account for regional heterogeneity and cross-sectional dependence. The findings contribute regional empirical evidence to the literature on enterprise performance in transitional economies.

Literature review (Mavzuga oid adabiyotlar tahlili / Обзор литературы).

Recent studies on regional enterprise profitability in Uzbekistan emphasize that financial expenses and export activity are among the key determinants of firm performance in emerging economies. In particular, regional disparities in export capacity, financing conditions, and institutional support significantly influence profitability outcomes.

First, regional export performance in Uzbekistan is strongly shaped by structural differences across territories. Research shows that export diversification and regional export intensity remain uneven, with some regions outperforming others due to better infrastructure and market access [1]. This suggests that enterprise profitability is partly dependent on regional export opportunities and integration into international markets.

Second, export diversification has been widely recognized as a driver of long-term economic stability. Studies highlight that increasing the share of high value-added exports improves enterprise resilience and profitability, while also reducing vulnerability to external shocks [2]. In Uzbekistan, the shift toward manufactured goods and services exports has been identified as a key policy priority [3].

Third, financial expenses, including interest rates, tax burdens, and access to credit, play a crucial role in determining enterprise profitability. Empirical evidence indicates that firms with higher financial costs tend to experience lower net profitability, especially in regions with underdeveloped financial systems [4]. In Uzbekistan, fiscal and monetary reforms aimed at reducing the financial burden on exporters have contributed to improved export performance [5].

Fourth, export-oriented enterprises benefit significantly from government incentives such as tax reliefs, free economic zones, and infrastructure investment. These measures reduce operational costs and increase competitiveness in foreign markets [6]. However, regional disparities in the availability of such incentives remain a challenge for balanced economic development.

Fifth, small and medium-sized enterprises (SMEs) are particularly sensitive to financial constraints and export conditions. Econometric studies show that access to concessional loans, exchange rate stability, and logistics efficiency significantly enhance SME export potential and profitability [7]. This is especially relevant for regional enterprises in Uzbekistan, where SMEs dominate the business structure.

Sixth, logistics infrastructure and macroeconomic connectivity are important determinants of export success. Improved transport corridors and reduced transaction costs increase export volumes and, consequently, enterprise profitability [8]. Uzbekistan's strategic position as a regional transit hub further strengthens this effect.

Finally, regional export potential is influenced by institutional quality, infrastructure development, and human capital distribution. Recent research emphasizes the need for region-specific policies to address disparities in export performance and enterprise profitability [9].

Overall, the literature suggests that enterprise profitability in Uzbekistan is shaped by a combination of financial costs, export activity, and regional development factors. The interaction between these variables highlights the importance of integrated economic policies aimed at reducing financial burdens while expanding export opportunities across regions.

Methods (Tadqiqotni amalga oshirishda foydalanilgan usullar / Методы).

This study employs a quantitative research design based on panel-data analysis to examine the relationship between financial expenses, export activity, and enterprise profitability across the regions of Uzbekistan. The empirical analysis uses annual regional data covering the period 2015–2024. The dataset constitutes a strongly balanced panel

consisting of 14 regions and 140 total observations. The study relies on secondary annual regional data obtained from the Statistics Agency under the President of the Republic of Uzbekistan. The dataset includes indicators related to enterprise profitability, financial expenses, and export activity at the regional level.

The dependent variable is net profit (loss) of commercial enterprises (Y). Two explanatory variables are included in the analysis. The first is expenses on financial activities of commercial enterprises ($X1$), representing enterprise-related financial costs. The second is export volume ($X2$), reflecting regional export activity and external market participation.

Table 1

Variable Definitions ¹		
Variable	Definition	Transformation
Y	Net profit (loss) of commercial enterprises	IHS transformation
X1	Expenses on financial activities of commercial enterprises	Natural logarithm
X2	Export volume	Natural logarithm

Variable Transformation

Prior to estimation, the variables were transformed to improve comparability and address distributional characteristics within the dataset. The dependent variable, net profit (loss) of commercial enterprises, contains negative observations for several region-year combinations. Since the conventional logarithmic transformation is undefined for negative values, the inverse hyperbolic sine (IHS) transformation was applied.

The IHS transformation is defined as:

$$IHS(Y) = \ln(Y + \sqrt{Y^2 + 1}) \quad (1)$$

The IHS transformation preserves logarithm-like properties while accommodating zero and negative values. The transformed dependent variable is denoted as ih_s_y . The explanatory variables, financial expenses ($X1$) and export volume ($X2$), are strictly positive across all observations and were therefore transformed using natural logarithms, producing $\ln x_1$ and $\ln x_2$ respectively.

Empirical Model

To examine the relationship between financial expenses, export activity, and enterprise profitability, the study employs a panel-data regression model with region and year fixed effects. The empirical specification is expressed as:

$$ih_s(Y_{it}) = \beta_1 \ln(X1_{it}) + \beta_2 \ln(X2_{it}) + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

where $ih_s(Y_{it})$ denotes the transformed profitability indicator for region i in year t , $\ln(X1_{it})$ represents financial expenses, and $\ln(X2_{it})$ represents export volume. The term μ_i captures unobserved region-specific effects, λ_t denotes year fixed effects, and ε_{it} represents the idiosyncratic error term.

Based on the theoretical expectations of the study, financial expenses are expected to exhibit a negative relationship with enterprise profitability, whereas export volume is expected to demonstrate a positive relationship with profitability.

Estimation Strategy

The empirical analysis was conducted using panel-data estimation techniques appropriate for longitudinal regional data. The dataset was first structured as a strongly balanced panel consisting of 14 regions observed annually over the period 2015–2024. Both fixed-effects and random-effects estimators were initially estimated to evaluate the appropriate panel specification. The Hausman specification test was subsequently applied to compare the consistency of the two estimators. Although the formal test statistic did not reject the null hypothesis, the estimated correlation between the individual effects and regressors supported the retention of the fixed-effects specification. To account for unobserved regional heterogeneity, all main estimations were performed using fixed-effects models with year fixed effects included to capture common time-specific shocks. Clustered standard errors at the regional level were initially employed to address heteroskedasticity and within-panel serial correlation. Additional diagnostic procedures were conducted

¹ Author's development

to assess the reliability of the estimated models. Variance inflation factor (VIF) statistics were examined to evaluate potential multicollinearity among the explanatory variables. Cross-sectional dependence was further assessed using the Pesaran CD test. Given the presence of statistically significant cross-sectional dependence, the final specification was re-estimated using Driscoll–Kraay standard errors, which are robust to heteroskedasticity, autocorrelation, and cross-sectional dependence. All statistical analyses and econometric estimations were conducted using Stata 17.

Analysis and results (Tahlil va natijalarlar / Анализ и результаты). Descriptive Statistics

The analysis is based on a strongly balanced panel dataset consisting of 14 regions of Uzbekistan observed annually from 2015 to 2024, resulting in a total of 140 observations. As shown in Table 2, the variables exhibit noticeable variation within the regional panel. The transformed profitability measure (*ih_s_y*) records an average value of 8.328, ranging from -15.253 to 17.960, indicating substantial differences in enterprise profitability across regions and years within the sample period.

Table 2. Descriptive Statistics²

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
<i>ih_s_y</i>	140	8.328	11.275	-15.253	17.960
<i>lnx1</i>	140	13.668	1.779	9.972	18.160
<i>lnx2</i>	140	6.002	0.945	4.333	8.692

Financial expenses (*lnx1*) display moderate dispersion, with a mean value of 13.668 and a standard deviation of 1.779, suggesting variation in enterprise-related financial costs across regions. Export volume (*lnx2*) records a mean value of 6.002 with comparatively lower variability, although regional differences in export activity remain observable throughout the sample period. Overall, the descriptive statistics indicate sufficient within-panel variation to support panel-data estimation.

4 Panel Regression Results

Table 3 reports the fixed-effects regression results for the relationship between financial expenses, export volume, and enterprise profitability across the regional panel. Model 1 presents the baseline fixed-effects specification with clustered standard errors, while Model 2 reports the corresponding estimates using Driscoll–Kraay standard errors.

Table 3.

Fixed-Effects Regression Results. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.³

	Model 1	Model 2
	FE Clustered	FE Driscoll–Kraay
<i>lnx1</i>	-4.694** (1.555)	-4.694*** (0.261)
<i>lnx2</i>	+10.010** (4.090)	+10.010*** (2.396)
Within R ²	0.304	0.304
Region FE	Yes	Yes
Year FE	Yes	Yes
Observations	140	140

Across both specifications, *lnx1* is negatively associated with enterprise profitability, with a coefficient of -4.694, significant at the 5% level under clustered standard errors ($p = 0.010$) and at the 1% level under Driscoll–Kraay standard errors ($p = 0.000$). *lnx2* is positively associated with enterprise profitability, with a coefficient of 10.010, significant at the 5% level under clustered standard errors ($p = 0.029$) and at the 1% level under Driscoll–Kraay standard errors ($p = 0.002$). The coefficient estimates remain identical across specifications, as the models differ only in the covariance estimation procedure.

4.3 Robustness and Diagnostic Tests

Several diagnostic procedures were conducted to evaluate the reliability and suitability of the estimated models. Variance inflation factor (VIF) statistics were first examined to assess potential multicollinearity among the explanatory variables. Both *lnx1* and *lnx2* produced VIF values of 2.62, indicating that multicollinearity is unlikely to materially affect the regression estimates. To compare fixed-effects and random-effects estimators, the Hausman specification test was performed following the estimation of both models. The test failed to reject the null hypothesis of no systematic difference between the estimators ($\chi^2(11) = 1.32$, $p = 0.9998$). However, the fixed-effects specification was retained for the main analysis to account for unobserved region-specific heterogeneity. Year fixed effects were jointly significant across the sample period ($F(9,13) = 10.49$, $p = 0.0001$), supporting the inclusion of time effects in the regression models.

Table 4.

Diagnostic Test Results⁴

Test	Statistic	p-value	Result
Mean VIF	2.62	—	No severe multicollinearity
Hausman test	$\chi^2(11) = 1.32$	0.9998	FE retained
Year FE joint test	$F(9,13) = 10.49$	0.0001	Significant
Pesaran CD test (<i>ih_s_y</i>)	4.57	0.000	Cross-sectional dependence detected
Pesaran CD test (<i>lnx1</i>)	19.99	0.000	Cross-sectional dependence detected
Pesaran CD test (<i>lnx2</i>)	19.76	0.000	Cross-sectional dependence detected

The Pesaran CD test indicates statistically significant cross-sectional dependence across all variables included in the analysis. Given the presence of cross-sectional dependence, the model was additionally estimated using Driscoll–Kraay standard errors. Under the alternative covariance specification, the estimated coefficients remained statistically significant and retained identical signs and magnitudes relative to the baseline fixed-effects specification. These results suggest that the main findings reported in Table 3 are not materially altered under the alternative covariance specification.

4.4 Model Selection

The fixed-effects model estimated with Driscoll–Kraay standard errors was retained as the preferred specification. Under this model, *lnx1* exhibits a negative coefficient of -4.694 ($p = 0.000$), while *lnx2* exhibits a positive coefficient of 10.010 ($p = 0.002$). The model reports a within R² value of 0.304 based on 140 observations across 14 regions. The preferred specification is expressed as:

$$ih_s(Y_{it}) = -4.694 \ln(X1_{it}) + 10.010 \ln(X2_{it}) + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

The estimated coefficients remain consistent with those reported under the baseline fixed-effects specification with clustered standard errors.

5. Discussion

The empirical findings indicate that financial expenses and export activity represent important correlates of regional enterprise profitability in Uzbekistan over the period 2015–2024. The negative coefficient on financial expenses ($\lnx1 = -4.694$) suggests that regions characterised by higher enterprise-related financial costs tend to exhibit lower profitability levels. Economically, this relationship may reflect the burden created by rising borrowing costs, debt servicing obligations, and limited access to affordable external finance. When enterprises allocate a larger share of financial resources toward interest payments and financing costs, fewer resources remain available for productive investment, technological upgrading, and business expansion. In transitional economies where financial markets remain relatively concentrated and bank financing

² Author's development

³ Author's development

⁴ Author's development

dominates enterprise funding, these financing pressures may have a particularly strong influence on enterprise performance.

In contrast, export activity demonstrates a comparatively stronger positive association with profitability ($\ln x_2 = 10.010$). Regions with higher export volumes may benefit from broader market access, foreign currency earnings, economies of scale, and stronger integration into international trade networks. Export-oriented enterprises may additionally experience productivity improvements resulting from greater competition and exposure to external markets. The comparatively larger magnitude of the export coefficient suggests that external market integration may represent a more influential factor for regional enterprise performance than financing conditions alone during the study period. This relationship may also reflect structural differences across regions, as regions with stronger export activity are often characterised by better infrastructure, industrial concentration, and market connectivity.

The results are generally consistent with previous literature examining financing constraints and export-oriented enterprise performance in transitional and developing economies. Existing studies commonly report that high financing costs may constrain enterprise growth and profitability, while export participation is frequently associated with stronger productivity and market performance. The present study contributes to this literature by providing regional panel evidence for Uzbekistan while accounting for regional heterogeneity, time effects, and cross-sectional dependence.

Several limitations should nevertheless be acknowledged. First, the analysis identifies statistical associations rather than strict causal

relationships, and the possibility of reverse causality cannot be fully excluded. Second, the study relies on regional aggregate data, which may conceal important variation across industries and enterprise types within regions. Third, the empirical model includes a limited set of explanatory variables and does not capture other potential determinants of enterprise profitability, including labour productivity, taxation, infrastructure quality, and institutional conditions. Future research could address these limitations through firm-level analysis, longer time periods, or alternative econometric approaches designed to strengthen causal inference.

Conclusion (Xulosa va takliflar / Выводы и предложения).

This study examined the relationship between financial expenses, export activity, and regional enterprise profitability in Uzbekistan over the period 2015–2024. The empirical findings indicate that financial expenses are negatively associated with enterprise profitability ($\beta = -4.694$, $p = 0.000$), whereas export activity demonstrates a positive association with profitability ($\beta = 10.010$, $p = 0.002$). The estimated coefficients suggest that increases in financial expenses correspond to lower regional enterprise profitability, while increases in export activity correspond to higher profitability levels. The comparatively larger export coefficient further indicates that external market integration may represent a particularly important factor associated with enterprise performance during the post-reform period. The findings further suggest that improving access to affordable finance and strengthening export-oriented economic activity may contribute positively to regional enterprise performance.

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