ECONOMETRIC MODELING OF RISK FACTORS IN UZUM MARKET'S OPERATIONS

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Abstract. *The rapid development of e-commerce has transformed digital marketplaces into an important component of modern economic systems. As intermediaries connecting buyers and sellers, marketplace platforms generate significant network effects and facilitate large-scale commercial interactions. At the same time, the expansion of marketplace activities increases exposure to operational, financial, reputational, competitive, and other forms of risk. This study aims to identify and empirically evaluate the key risk factors affecting marketplace stability using Uzum Market as a case study. Particular attention is given to cyclical risk arising from the interdependence of marketplace participants. The study examines the relationships between seller inflows, seller exits, sales volume, revenue, and revenue per seller using correlation and regression analysis. The findings provide empirical support for the existence of cyclical risk mechanisms within marketplace ecosystems and highlight the strategic importance of monitoring seller inflows and retention.*

Keywords: *e-commerce, marketplace, risk management, cyclical risk, network effects, Uzum Market, econometric modeling, regression analysis, seller dynamics.*

1. Introduction

The rapid development of e-commerce has made digital marketplaces an increasingly important component of modern economies. Marketplace platforms act as intermediaries between buyers and sellers, facilitating transactions, expanding product availability, and creating network effects among platform participants. However, the expansion of marketplace operations is accompanied by increasing exposure to operational, financial, reputational, competitive, technological, and logistical risks.

Effective risk management in internet commerce has therefore become an important academic and practical issue. Unlike traditional businesses, marketplace platforms operate as multi-sided ecosystems in which the behavior of one group of participants may directly affect the behavior and performance of other groups. Changes in the number of sellers, sales activity, prices, and revenues can consequently generate interconnected effects throughout the platform.

This study focuses on a specific form of strategic risk referred to as cyclical risk. The central assumption is that the major strategic risk in a marketplace ecosystem may not arise exclusively from operational or financial factors but from the interdependence of platform participants created by network effects. Such interdependence may generate self-reinforcing negative cycles. For example, an increase in competition may reduce individual sellers' revenue, which may encourage some sellers to leave the platform. Seller exits may subsequently reduce product variety and sales activity, potentially creating additional pressure on the remaining sellers and the platform as a whole.

The purpose of this study is to develop scientific and practical recommendations for improving risk management in internet commerce and to empirically evaluate the major risk factors affecting marketplace operations using Uzum Market as a case study.

The study pursues several objectives:

To examine the theoretical foundations of risk management in internet commerce;

To examine marketplace platforms as a form of e-commerce;

To analyze the major operational indicators of Uzum Market;

To identify the mechanisms through which systemic and cyclical risks emerge in marketplace operations;

To evaluate the relationships between the number of sellers, prices, sales volume, and revenue;

To assess risk factors using correlation and regression analysis;

To develop practical recommendations for improving marketplace stability.

2. Literature Review

Risk management in marketplaces and digital platforms has been examined from several theoretical perspectives. General risk-management research traces the evolution of approaches to managing risks in the business environment and the development of risk-management theory (Ivanova, 2022; Maksimova & Shmal, 2022). Subsequent studies have proposed classifications and systematizations of enterprise risks (Kazakov, 2024), examined the risks of business processes (Vasiltsov et al., 2024), and analyzed financial risks and the management of financial assets under uncertainty (Galazova, 2024; Gomonovskaya, 2023). Risk management has also been discussed in the context of business and innovation projects (Karimova, 2025; Popovichenko, 2022), business continuity in retail enterprises (Olifirov, 2020), and strategy implementation under digital transformation (Shabaeva & Shabaev, 2023).

Research focusing specifically on marketplaces has emerged more recently. Torpishev (2023) considers the marketplace as a form of entrepreneurial activity in a two-sided market, and Torpishev (2024) proposes a hierarchical structure of the risks of a modern Russian marketplace, emphasizing the need to assess risks according to their significance and potential impact on platform performance. Zargaryan (2025a, 2026) develops methodological and strategic approaches to managing risks in marketplace operations, including operational risks and sellers' dependence on the platform, while Zargaryan (2025b) examines strategies for managing reputational risks on marketplaces. Aleksandrova and Beznosov (2022) link the economic security of marketplaces to strategic marketing, and Eriashvili (2023) shows how digital platforms can use network effects to establish a dominant market position.

These studies suggest that risk-management systems for digital platforms should account for the characteristics of two-sided and multi-sided markets, in which changes affecting one group of participants may be transmitted to other groups and generate feedback effects. However, marketplace risks have predominantly been examined from operational, financial, reputational, and strategic perspectives, and the empirical assessment of cyclical risks generated by the interaction between seller numbers, prices, sales volume, and revenue remains insufficiently developed. Therefore, this study focuses specifically on the econometric identification and assessment of cyclical risk mechanisms within a marketplace ecosystem.

3. Data and Methodology

3.1. Data Description

The empirical object of the study is Uzum Market, a marketplace platform operating in Uzbekistan (Uzum Market, 2026). The dataset covers all regions of Uzbekistan and is therefore not restricted to a particular city or region. This allows the analysis to characterize the overall activity of the platform.

The data were collected from publicly available analytical platforms, including DaData (2026) and ZoomSelling (2026), as well as publicly available statistical information and seller-support systems associated with Uzum Market.

The analysis covers a 12-month period including observations from 2025 and the first months of 2026. Six product categories were selected in order to capture different segments of marketplace activity. The resulting dataset contains 72 observations and seven variables.

The variables included in the analysis are:

Active Sellers — the number of active sellers on the platform;

New Sellers — the number of newly registered or newly active sellers;

Exited Sellers — the number of sellers leaving the platform;

Average Price — the average price of products;

Sales — sales volume;

Revenue — total revenue;

Revenue per Seller — revenue attributable to an individual seller on average.

These variables were selected because they allow the relationships between seller dynamics and marketplace performance to be examined and provide a basis for evaluating the mechanism of cyclical risk.

3.2. Preliminary Data Analysis

Before estimating the econometric models, the dataset was subjected to preliminary descriptive analysis in order to identify its structure, major patterns, and potentially anomalous observations.

The descriptive statistics demonstrate substantial differences in the scale and distribution of the variables. Revenue and Revenue per Seller have considerably larger numerical values than New Sellers and Exited Sellers. The data also demonstrate right-skewed distributions and several relatively extreme observations.

For example, Revenue ranges from approximately 508.3 million to 7.955 billion, while Revenue per Seller ranges from approximately 1.0 million to 236.3 million. Active Sellers range from 16 to 1,569 observations, while New Sellers range from 0 to 153.

Because extreme values may affect the stability and reliability of regression estimates, logarithmic transformations were applied to the relevant variables. The transformation reduces the scale differences between variables, decreases the influence of extreme observations, and makes the distributions more suitable for regression analysis.

Importantly, extreme observations were not removed because they may represent genuine economic characteristics of the marketplace rather than data errors.

3.3. Correlation Analysis

Correlation analysis was conducted before regression modeling to examine the direction and strength of relationships between the variables and to identify potential multicollinearity among explanatory variables.

The correlation analysis revealed statistically meaningful relationships between several variables. In particular, a strong positive relationship was observed between Revenue and Average Price. A

negative relationship was also identified between Average Price and Active Sellers, suggesting that increasing seller participation may be associated with greater competitive pressure and lower average prices.

However, correlation analysis does not establish causal relationships. Therefore, regression analysis was subsequently employed to examine the proposed mechanisms of cyclical risk.

4. Econometric Analysis

4.1. First Regression Model: New Sellers and Revenue per Seller

The first hypothesis examines whether the entry of new sellers affects the average revenue generated per seller.

$H1_0$: The number of New Sellers has no statistically significant effect on Revenue per Seller.

$H1_1$: An increase in the number of New Sellers leads to a decrease in Revenue per Seller.

Model specification:

$$log(Revenue\ per\ Seller_i) = \beta_0 + \beta_1\ log(Sales_i) + \beta_2\ log(New\ Sellers_i + 1) + \varepsilon_i$$

The logarithmic transformation of New Sellers includes the value +1 to allow observations with zero new sellers to remain in the dataset.

Estimated results:

Variable	Coefficient	Std. Error	t-value	p-value
Intercept	11.706	0.889	13.172	<0.001
log(Sales)	0.765	0.105	7.294	<0.001
log(New Sellers + 1)	-1.197	0.081	-14.825	<0.001

The model is statistically significant overall, with an F-statistic of 110.5 and a p-value below 0.001. The adjusted R^2 is 0.802, indicating that approximately 80.2% of the variation in the logarithm of Revenue per Seller is explained by the variables included in the model.

The coefficient for Sales is positive and statistically significant ($\beta = 0.765$; $p < 0.001$). This indicates that higher sales volume is associated with higher revenue per seller.

In contrast, the coefficient for New Sellers is negative and statistically significant ($\beta = -1.197$; $p < 0.001$). The result indicates that an increase in the number of new sellers is associated with a reduction in revenue per seller.

From an economic perspective, this relationship may reflect increasing competitive pressure. As more sellers enter the marketplace, existing sellers compete for the same consumer demand, potentially reducing the average revenue generated by each seller.

Thus, the empirical results support $H1_1$ and provide initial evidence of a mechanism through which seller inflows may contribute to cyclical risk.

4.2. Second Regression Model: Seller Exits

The second model examines whether marketplace activity and the inflow of new sellers are associated with seller exits.

$H2_0$: Sales volume and the number of New Sellers have no statistically significant effect on Exited Sellers.

$H2_1$: Higher Sales volume and a greater number of New Sellers are associated with an increase in Exited Sellers.

Model specification:

$$log(Exited\ Sellers_i + 1) = \beta_0 + \beta_1\ log(Sales_i) + \beta_2\ log(New\ Sellers_i + 1) + \varepsilon_i$$

Estimated results:

Variable	Coefficient	Std. Error	t-value	p-value
Intercept	−1.916	0.655	−2.923	0.005
log(Sales)	0.183	0.077	2.367	0.022
log(New Sellers + 1)	0.548	0.060	9.207	<0.001

The model is statistically significant overall (F-statistic = 82.48; $p < 0.001$), with an adjusted R^2 of 0.751. Thus, approximately 75.1% of the variation in the transformed number of Exited Sellers is explained by the explanatory variables included in the model.
Sales has a positive and statistically significant coefficient ($\beta = 0.183$; $p = 0.022$), indicating that higher sales volume is associated with a higher number of seller exits.
The coefficient of New Sellers is also positive and statistically significant ($\beta = 0.548$; $p < 0.001$). This suggests that periods characterized by a greater inflow of new sellers are also associated with a greater number of sellers leaving the platform.
The findings therefore indicate that seller flows have a two-sided character: the marketplace may simultaneously experience the entry of new sellers and the exit of existing sellers. This dynamic is consistent with the proposed mechanism of cyclical risk.

5. Model Diagnostics

Several diagnostic procedures were conducted to assess the reliability of the estimated regression models.
First, variance inflation factor (VIF) values were calculated to assess multicollinearity. The obtained values were below the commonly accepted critical threshold of 5, indicating that severe multicollinearity was not present in the models.
Second, the Breusch–Pagan test was applied to assess heteroskedasticity. For the first model, the test produced BP = 4.0863 with $p = 0.1296$. For the second model, BP = 1.6832 with $p = 0.431$. Since both p-values exceed 0.05, the null hypothesis of homoskedasticity was not rejected.

Residual-versus-fitted-value plots also did not reveal a pronounced systematic pattern. The residuals were distributed approximately randomly around zero, providing additional support for the absence of a strong heteroskedasticity problem.
The normality of residuals was evaluated using the Shapiro–Wilk test. For the first model, W = 0.98083 and $p = 0.5243$, while for the second model W = 0.97346 and $p = 0.262$. In both cases, the null hypothesis of normally distributed residuals was not rejected at the 5% significance level.
Finally, Cook's Distance was examined to identify potentially influential observations. The Cook's Distance values remained substantially below 1, suggesting that no individual observation exerted an excessive influence on the estimated regression coefficients. Consequently, there was no statistical basis for excluding these observations from the analysis.
Overall, the diagnostic tests provide evidence that the estimated models do not suffer from major violations of the principal assumptions examined in this study.

6. Discussion

The empirical findings provide evidence that seller dynamics are closely associated with marketplace performance and may constitute an important component of cyclical risk.
The first regression demonstrates a statistically significant negative relationship between new seller inflows and revenue per seller. This finding suggests that rapid growth in the seller base may intensify competition and reduce the average economic return received by individual sellers.

The second regression demonstrates that both sales volume and new seller inflows are positively associated with seller exits. Taken together, the two models suggest a potentially interconnected mechanism.

A simplified cyclical-risk mechanism can therefore be represented as:

Increase in new sellers → stronger competition → lower revenue per seller → increased pressure on existing sellers → seller exits → reduction in seller base and product diversity → potential changes in sales activity.

This mechanism is particularly important for marketplace platforms because the platform's performance depends not only on the number of sellers but also on the interactions between sellers, consumers, and the platform itself.

The findings therefore support the broader hypothesis that cyclical risk may emerge from network effects and the interdependence of marketplace participants. Rather than treating seller entry and seller exit as isolated operational indicators, marketplace management should consider them as interconnected components of platform stability.

7. Conclusion

The correlation and regression analyses conducted in this study confirm that seller dynamics are significantly associated with the stability and performance of Uzum Market.

The first regression model demonstrates a statistically significant negative relationship between the number of new sellers and revenue per seller. At the same time, sales volume has a positive and statistically significant relationship with revenue per seller.

The second regression model shows statistically significant positive relationships between both sales volume and new seller inflows and the number of sellers leaving the platform.

Taken together, these results indicate the presence of interconnected seller-flow dynamics that may contribute to the formation of cyclical risk within the marketplace ecosystem. The findings suggest that marketplace stability cannot be evaluated solely through traditional financial or operational risk indicators. The interaction between seller entry, seller profitability, competition, and seller exit should also be considered.

From a managerial perspective, marketplace operators should establish continuous monitoring of seller inflows and exits, identify early warning indicators of deteriorating seller performance, and develop targeted seller-retention and support programs. Such mechanisms could help identify potentially destabilizing cyclical processes at an early stage.

The findings therefore have practical implications for the development of risk-management systems in digital marketplaces and for improving the long-term sustainability of marketplace ecosystems.

8. Limitations and Future Research

This study has several limitations.

First, seller exits may be influenced by a considerably larger number of factors than those included in the current models. Variables such as pricing policy, advertising expenditure, logistics quality, commission rates, competitive conditions, and other platform-specific factors were not included in the present analysis.

Second, product categories within a marketplace may differ substantially in terms of demand, competition, seller behavior, and price dynamics. The present study primarily relies on categories characterized by relatively high trading activity and a relatively large number of sellers. Therefore, the results may not be fully generalizable to less active or highly specialized categories.

Future research should incorporate additional explanatory variables, conduct separate analyses by product category, and develop dynamic econometric models capable of capturing the evolution of cyclical risk over time. Panel-data methods may also provide an opportunity to distinguish category-specific and time-specific effects and to obtain more robust estimates of the relationships identified in this study.

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