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IMPACT OF DISPOSABLE INCOME AND INVESTMENTS ON REGIONAL MARKET SERVICE GROWTH IN UZBEKISTAN

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Abstract: This study examines the determinants of regional market service growth in Uzbekistan using annual panel data for 14 regions covering the period 2011–2024. The analysis employs fixed-effects, random-effects, and Driscoll–Kraay estimation techniques to evaluate the impact of disposable income growth and investments in fixed assets on market service growth. The empirical results indicate that disposable income growth had a positive and statistically significant effect, while the contemporaneous effect of investments remained statistically insignificant. However, the dynamic specification revealed positive and statistically significant delayed effects of investments in fixed assets on the service sector. Overall, the findings highlight the importance of household income and delayed investment effects in regional service-sector development in Uzbekistan.

Keywords: market services, panel data, fixed effects, disposable income, investments, Uzbekistan.

1. Introduction

The service sector plays an important role in economic development by contributing to employment, income generation, and regional economic activity. In Uzbekistan, the importance of market services has increased in recent years due to economic reforms, rising household incomes, and expanding business activity.

Regional market service growth is influenced by various economic factors, particularly disposable income growth and investment activity. Higher household income may increase demand for transportation, trade, communication, financial, and other market services, while investments in fixed assets may support infrastructure development and long-term expansion of the service sector.

Despite the growing importance of the service sector in Uzbekistan, empirical studies examining the determinants of regional market service growth remain limited. Therefore, this study investigates the impact of disposable income growth and investments in fixed assets on regional market service growth in Uzbekistan using annual panel data for 14 regions covering the period 2011–2024. The study employs fixed-effects, random-effects, and Driscoll–Kraay estimation techniques to evaluate the relationship between the variables and examine delayed investment effects.

2. Literature Review

Previous studies suggest that income growth and investment activity are important determinants of service-sector development. Kongsamut, Rebelo, and Xie (2001) showed that rising household income increases demand for services through structural transformation processes. Similarly, Buera and Kaboski (2012) found that the expansion of the service economy is largely driven by income-related demand growth.

Regarding the investment channel, Calderón and Servén (2004) provided evidence that infrastructure investment positively contributes to economic growth in developing economies. Pereira (2000) additionally showed that investment effects may emerge gradually over time due

to implementation and adjustment processes, supporting the inclusion of lagged investment variables in empirical models.

Methodologically, Wooldridge (2010) emphasized the importance of fixed-effects estimation for controlling unobserved heterogeneity in panel data, while Driscoll and Kraay (1998) developed robust standard errors for panel models with heteroskedasticity, autocorrelation, and cross-sectional dependence.

Despite the growing importance of the service sector in Uzbekistan, empirical studies examining the regional determinants of market service growth using panel-data approaches remain limited. Therefore, this study investigates the impact of disposable income growth and investments in fixed assets on regional market service growth in Uzbekistan using annual regional panel data for 2011–2024.

3. Methodology

3.1 Data and Variables

This study employs annual regional panel data for Uzbekistan covering the period 2011–2024. The analysis is based on official statistical indicators obtained from the National Statistics Committee of the Republic of Uzbekistan and includes 14 regional units observed over time in a balanced panel framework. As shown in Table 1, the study employs one dependent variable and two independent variables in the econometric analysis.

Table 1. Description of Variables

Variable	Description	Type
Y	Growth rate of market services provided	Dependent variable
X1	Real growth rates of disposable total income of the population	Independent variable
X2	Growth rates of investments in fixed assets	Independent variable

All variables are expressed as annual growth rates relative to the previous year. For econometric estimation and clearer interpretation of the regression coefficients, the original indicators were transformed by subtracting 100 from the reported values. Therefore, the transformed variables represent percentage-point changes relative to the base level.

3.2 Econometric Methodology

To examine the determinants of regional market service growth in Uzbekistan, panel data econometric techniques were employed in the study. The analysis was conducted using annual regional data for 2011–2024. Since the dataset contains both cross-sectional and time-series dimensions, panel estimation methods allow controlling for unobserved regional heterogeneity and time-specific effects simultaneously.

The baseline econometric specification of the study is expressed as follows:

$$Y_{it}=\beta_0+\beta_1 X1_{it}+\beta_2 X2_{it}+\gamma_t+\mu_i+\varepsilon_{it}$$

where Y_{it} denotes the growth rate of market services provided in region i during period t, $X1_{it}$ represents real growth rates of disposable total income of the population, and $X2_{it}$ indicates growth rates of investments in fixed assets. In addition, γ_t captures year-specific effects, μ_i reflects unobserved regional effects, and ε_{it} is the error term.

Year dummy variables were incorporated into the model to control for common macroeconomic shocks and nationwide structural changes affecting all regions during the study period, including economic reforms and the COVID-19 pandemic.

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Initially, both fixed-effects and random-effects models were estimated, and the Hausman specification test was applied during the model selection process. Although the Hausman test indicated that the random-effects model could be acceptable, the fixed-effects specification was preferred due to its ability to control for unobserved region-specific characteristics potentially correlated with the explanatory variables. In addition, year fixed effects were included to account for common macroeconomic shocks and time-specific factors affecting all regions during the study period.

Furthermore, an additional dynamic specification including a two-year lag of investments in fixed assets was estimated to evaluate delayed investment effects on regional market service growth. The dynamic model is presented below:

$$Y_{it}=\beta_0+\beta_1 X1_{it}+\beta_2 X2_{i,t-2}+\gamma_t+\mu_i+\varepsilon_{it}$$

The inclusion of lagged investment variables is based on the assumption that the effects of investments on the service sector may emerge gradually through infrastructure expansion, business adaptation, and delayed economic adjustment processes. To ensure the robustness of the empirical results, Driscoll–Kraay standard errors were applied in the final estimations in order to address potential heteroskedasticity, autocorrelation, and cross-sectional dependence in the panel dataset. The empirical analysis was conducted using Stata software.

4. Empirical Results

4.1 Descriptive Statistics and Diagnostic Tests

This subsection presents the descriptive statistics and diagnostic tests of the variables used in the empirical analysis. In addition, graphical analysis is provided to illustrate the general dynamics of the main indicators during the study period.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Y	196	14.06	6.54	-6.30	27.50
X1	196	10.73	7.56	-3.40	42.00
X2	196	15.59	26.03	-43.80	161.20

Source: Author's calculations based on National Statistics Committee data.

Table 2 shows that investment growth demonstrated substantially higher volatility compared to the other variables, with a standard deviation of 26.03 percentage points and values ranging from -43.80% to 161.20%. In contrast, market service growth and disposable income growth showed relatively more stable dynamics during the study period.

Figure 1. Trends of Main Variables

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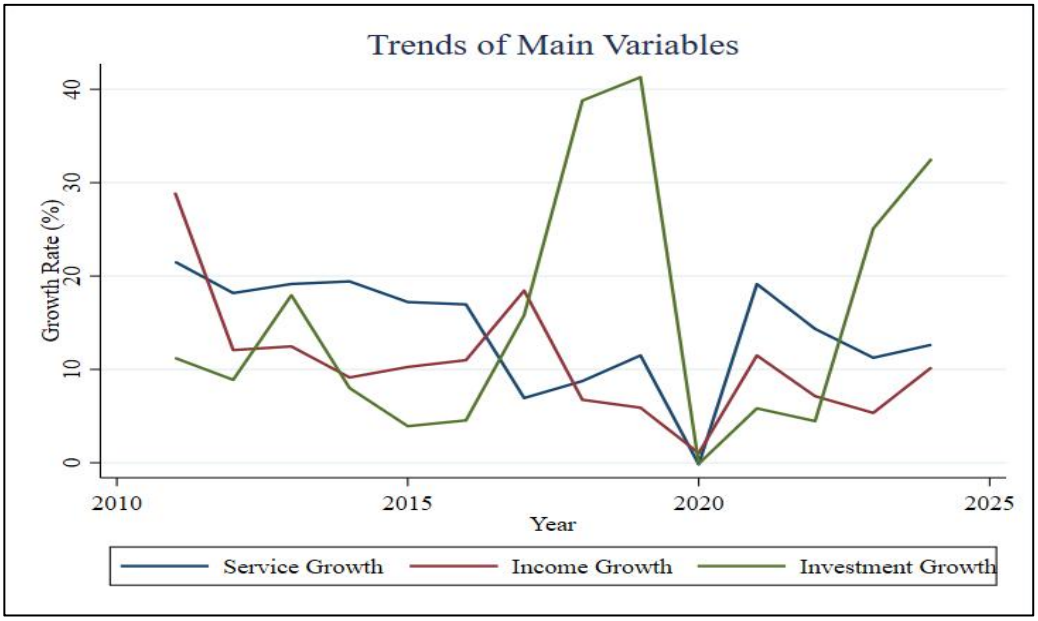

Source: Author's calculations based on National Statistics Committee data.

Figure 1 illustrates the dynamics of the main variables over the study period. The graph indicates noticeable fluctuations in investment growth rates, particularly around 2018–2019 and during the COVID-19 period in 2020, while market services and disposable income growth remained relatively more stable.

Diagnostic analysis indicated the absence of severe multicollinearity among the explanatory variables. The VIF values for both independent variables equaled 1.01, which is substantially below the commonly accepted threshold level.

4.2 Panel Regression Results

Initially, fixed-effects and random-effects models were estimated. The Hausman test results (p=0.9277) indicated that the random-effects model could also be appropriate. However, the final estimations were conducted using fixed effects with year dummy variables in order to control for unobserved regional heterogeneity and common time effects.

Table 3. Fixed-Effects and Random-Effects Estimation Results

Variables	FE	RE
X1	0.376***	0.380***
	(0.057)	(0.056)
X2	-0.010	-0.008
	(0.017)	(0.016)
Constant	10.173***	10.118***
	(0.809)	(0.793)
Observations	196	196
Regions	14	14
Within (R^2)	0.1996	0.1996
Hausman (p)-value	**0.9277**	

Note: Standard errors are reported in parentheses. *** denotes significance at the 1% level.

Source: Author's calculations based on National Statistics Committee data.

To improve the robustness of the estimations, fixed-effects models with year dummy variables and Driscoll–Kraay standard errors were additionally estimated.

Table 4. Fixed-Effects Model with Driscoll–Kraay Standard Errors

Variables	FE-DK
X1	0.104*** (0.034)
Constant	18.514*** (0.990)
Year fixed effects	Yes
Observations	196
Regions	14
Within (R^2)	0.8253

Note: Driscoll–Kraay standard errors are reported in parentheses. *** denotes significance at the 1% level.

Source: Author's calculations based on National Statistics Committee data.

Since the contemporaneous effect of investments remained statistically insignificant in the baseline estimations, an additional dynamic specification was estimated to examine potential delayed effects.

4.3 Dynamic Specification and Robustness Analysis

In addition to the baseline estimations, a dynamic specification including a two-year lag of investments in fixed assets was estimated to examine whether the effects of investments emerge over time.

Table 5. Dynamic Fixed-Effects Model with Lagged Investment Variable

Variables	FE-DK Dynamic Model
X1	0.069 (0.045)
L2.X2	0.017** (0.007)
Constant	5.593*** (0.837)
Year fixed effects	Yes
Observations	168
Regions	14
Within (R^2)	0.8227

Note: Driscoll–Kraay standard errors are reported in parentheses. *** and ** denote significance at the 1% and 5% levels, respectively. Source: Author's calculations based on National Statistics Committee data.

The results indicate that the two-year lag of investments in fixed assets had a positive and statistically significant effect on regional market service growth. Specifically, a one percentage-point increase in lagged investment growth increased market service growth by approximately 0.017 percentage points (p=0.026).

5. Discussion

The empirical results indicate that disposable income growth represents an important factor influencing regional market service growth in Uzbekistan. In the baseline fixed-effects model, a one percentage-point increase in disposable income growth increased market service growth by approximately 0.38 percentage points. In the preferred specification with Driscoll–Kraay standard errors, the coefficient remained positive and statistically significant at 0.10 (p=0.009). These findings suggest that increases in household income contribute to higher demand for transportation, trade, financial, communication, and other market services across regions.

At the same time, the contemporaneous effect of investments in fixed assets remained statistically insignificant in the baseline estimations. Economically, this may indicate that investments do not immediately translate into service-sector expansion within the same period. In many cases, investment projects require time for implementation, infrastructure development, and business adaptation before their effects become visible in regional economic activity. The dynamic specification provided additional evidence supporting this interpretation. The coefficient of the two-year lag of investments in fixed assets was positive and statistically significant at 0.017 (p=0.026), indicating that investment effects emerged gradually over time. This finding is consistent with the long-term nature of investment processes, where infrastructure expansion and business development contribute to service-sector growth with a time lag.

The inclusion of year fixed effects substantially improved the explanatory power of the model, as the within R^2 increased from 0.1996 in the baseline specification to 0.8253 in the preferred model. Several year effects were also statistically significant, particularly during 2017–2020, reflecting the influence of economic reforms, structural adjustments, and the COVID-19 pandemic on regional market service dynamics.

Overall, the findings suggest that household income growth acted as the primary short-term driver of regional market service growth in Uzbekistan, while investments in fixed assets exerted more gradual and delayed effects.

6. Conclusion

This study examined the impact of disposable income growth and investments in fixed assets on regional market service growth in Uzbekistan using annual panel data for 14 regions during 2011–2024. The empirical results showed that disposable income growth had a positive and statistically significant effect on regional market service growth. In contrast, the contemporaneous effect of investments remained statistically insignificant. However, the dynamic specification revealed that lagged investments in fixed assets positively affected regional market service growth, indicating delayed investment effects on the service sector. Overall, the findings suggest that household income growth and investment activity are important factors influencing the development of regional market services in Uzbekistan. Future studies may extend the analysis by including additional economic and institutional variables.

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