



Article

Determinants Of Small Business Performance: An Econometric Approach Using Stata

Fayziyeva Aziza Azamat qizi

1. Termiz State University, ORCID: 0009-0001-9469-4896

*Correspondence: azizafayziyeva@gmail.com

Abstract: The performance of small businesses which are indispensable for development is determined by many economic, social and institutional forces. We employ econometric methods to provide insight into the stability and sustainable growth of small business performance. Existing literature focuses largely on factors contributing to the failures, such as accessibility to financial funds to initiate and expand business, taxation on small businesses, and market contradictions that drive small businesses towards failure; while there is a need to empirically study the interplay of these factors and their impact on sustenance at both local and regional level. Based on a cross-sectional survey of 1,299 small businesses, the study employs factor analyses and regression models using the Stata software. Household income, labor participation, access to finance, taxation, market conditions, and government support are important variables in the context of this paper. And that can have a major effect on income growth, with the analysis showing that job creation by stable small business, competitiveness, and infrastructure in a metro region have a much more salient role to play. To measure these impacts, they created the "Small Business Stability Index." Business stability had a strong, positive association with monthly income (Coef. = 0.582, $p < 0.01$). The results highlight the socio economic importance of small business resilience, despite the modest 2.4% of the variation in income that this model explains. This will require policy measures that aid small business access to financing as well as measures to provide institutional support and encourage the development of infrastructure vital for their stabilization. Model should also include wider socio-economic factors to assess contribution of households towards income dynamics in small enterprises and for strengthening the model further it is suggested for future studies.

Keywords: small business, new_vacancy, competitiveness, innovation, infrastructure, financial stability, Small Business Stability Index, *factor analysis model*, regression model, determinant.

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1. Introduction

Small businesses are the backbone of economic growth, job creation, and local development. Especially in developing economies, they are considered the main drivers of entrepreneurship, innovation, and employment. However, small businesses operate in an intricate interplay of economic, social and institutional determinants that affect their performance and sustainability [1]. Policy makers need to have a clear understanding of these determinants to enable them to promote them and leverage their resilience. The list of reasons affecting small business performance goes on, including green approaches, financial resources, taxation & market conditions, government support programs etc. which keeps on coming up in the previous studies (Mazzarol 2003; Reijonen & Komppula 2007; Ismail et al. For instance, Ayyagari et al. Small business access is represented by the work in Coleman and Cohn (2011) [2][3]. Tax and institutional or regulatory frameworks work is referenced by Storey (1994) as well [4][5]. Yet, the literature is silent about these

factors interact, and function as determinant for small business stability, especially considering the associated regional socio-economic aspects. While individual determinants have received substantial attention, the aggregate impact of these factors on the resilience of small businesses has not been adequately studied.

Given this, the present study intends to fill this gap with an econometric approach to identify the factors that are important to the performance of small enterprises, with a particular emphasis placed on their stability and growth potential for sustainable development. The paper examines the determinants of small business performance using regression models and factor analysis in Stata software based on the data collected of 1,299 small business entities [6]. Household income, labor force participation, access to financing, tax, market and state support are some of the variables we studied. The results demonstrate how important small business stability is for income growth, with new job generation, competitiveness and infrastructure acting as key drivers. While the model has a weak explanatory power ($R^2 = 0.024$), this result highlights the need for strategic policy reforms to create the conditions for small business resilience [7]. This study implies that small enterprises sustainability and regional economic growth is only achievable through improved financial access, institutional support and infrastructure investment.

Literature Review

Small enterprises are considered fundamental contributors to economic growth, innovation, and employment creation. A wide body of research has underlined their importance in fostering entrepreneurship and supporting regional development (Beck & Demirguc-Kunt; Ayyagari et al) [8]. Nevertheless, the long-term stability and performance of small businesses are heavily influenced by economic, social, and institutional determinants. Earlier studies highlight that factors such as access to finance, taxation, and market structures exert a substantial impact on entrepreneurial activity (Storey; Berger & Udell) [9][10].

Another stream of scholarship emphasizes the significance of institutional and socio-economic environments. Evidence suggests that macroeconomic stability, public support initiatives, and regional policy frameworks are decisive in determining entrepreneurial success (North; Acs & Audretsch) [11]. Additionally, several studies demonstrate the usefulness of cross-sectional survey data for building composite indicators-such as business stability indices-that can guide policymakers in strengthening small business resilience (Kaufmann et al) [12].

In conclusion, existing studies show that small enterprise operations are guided by a wide range of factors such as availability of finance, tax, labor market characteristics, institutional environments, and socio-economic environment. While there has been substantial progress in this area, more empirical work using econometric means is warranted to capture the complexity and nuance of interactions between these variables and what they imply for the stability and sustainability of small businesses in varying regions.

2. Materials and Methods

An econometric examination of the determinants of stability and sustainable small business growth: an application of the survival approach to the study of small business performance. The data was derived from a cross-sectional survey of 1,299 small business entities focusing on household income, employment, financial access, taxation policies, market situation, and government support programs as key economic, social and institutional variables [13]. The selected variables were based on their relevance to small business theory and their potential influence on business stability. That was regression models which were applied to explore how the small business stability relates to the income growth Analysis of the data was analyzed by the Stata software. Moreover, a "Small Business Stability Index" to summarize several determinants as a composite measure of business resilience was developed using factor analysis. Finally, we assessed the factor loadings, correlation matrix and p-values for the results to be statistically significant. Evaluation of KMO (Kaiser-Meyer-Olkin criterion) for the

goodness of fit of factor analysis and construction of the final stability index was obtained using the Bartlett method [14]. This method provides a strong footing for the empirical analysis of the determinants of small business performance and gives meaningful information for policy-makers using such analysis to formulate small business support strategies and policies, and ultimately help strengthen the small business sector and foster its contribution to regional economies.

3. Results and Discussion

In the framework of this study, a survey was conducted among more than 1,300 small business entities. Utilizing cross-sectional data, econometric analysis was performed by incorporating variables such as the financial stability of small enterprises, the level of competitiveness among regional firms, the number of new jobs created in recent years, the extent of innovative activities at the enterprise level, the adequacy of infrastructure development, and the degree of utilization of government support measures, see Table 1.

Table 1. Descriptive Statistics of Small Business Performance Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
New vacancy	1299	1.832	.707	1	3
Compititevness	1299	1.738	.72	1	3
Innovation	1297	1.779	.725	1	3
Infrastructure	1299	1.837	.73	1	3
State support program	1299	1.774	.716	1	3
Financial stability	1299	1.918	.692	1	3

If we focus on the results obtained after running the summarize command in Stata, it can be observed that the variables are categorical in nature.

```
. factorstest New_vacancy Compititevness Innovation Infrastructure State_support_p
> rogramm Financial_stability
```

```
Determinant of the correlation matrix
Det          =    0.920
```

```
Bartlett test of sphericity
```

```
Chi-square      =    108.242
Degrees of freedom =    15
p-value         =    0.000
H0: variables are not intercorrelated
```

```
Kaiser-Meyer-Olkin Measure of Sampling Adequacy
KMO            =    0.617
```

Factor test is a set or index formed from variables (X_n) that represent the general characteristic of an object. In this case, a single composite index is derived from several variables that express the general characteristic. In the research, indicators such as new jobs, competitiveness of small enterprises, financial stability, innovative activity, infrastructure, and the use of government support programs were combined to develop a single comprehensive "Small Business Stability Index".

In creating the composite index, attention is first paid to the p-value, correlation matrix and the KMO (Kaiser-Meyer-Olkin) criterion [15]. The KMO should be greater than 0.5 and the correlation matrix should be greater than 0.00001. In the given example, since the KMO is greater than 0.5, correlation matrix is greater than 0.00001 and the p-value is statistically significant at the 1% level, we can proceed to the next stage.

(obs=1,299)

Factor analysis/correlation	Number of obs	=	1,299
Method: principal-component factors	Retained factors	=	1
Rotation: (unrotated)	Number of params	=	6

Table 2. Eigenvalue and Proportion of Variance Explained by Each Factor

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	1.392	0.404	0.232	0.232
Factor2	0.988	0.037	0.165	0.397
Factor3	0.952	0.029	0.159	0.555
Factor4	0.923	0.041	0.154	0.709
Factor5	0.881	0.018	0.147	0.856
Factor6	0.863	.	0.144	1.000

LR test: independent vs. saturated: $\chi^2(15) = 108.33$ Prob> $\chi^2 = 0.0000$
 Factor loadings (pattern matrix) and unique variances

Table 3. Eigenvalue and Proportion of Variance Explained by Each Factor

Variable	Factor1	Uniqueness
New_vacancy	0.527	0.722
Compititevness	0.540	0.708
Innovation	0.471	0.778
Infrastructure	0.456	0.792
State_support_program	0.478	0.772
Financial_stability	0.405	0.836

Factor 1 explains 23.2% of the variance of the six variables mentioned above. When using the factor analysis model, it is necessary to select the factor whose Eigenvalue is greater than 1. In the given example, since the Eigenvalue of Factor 1 is greater than 1, we select Factor 1, see Table 2.

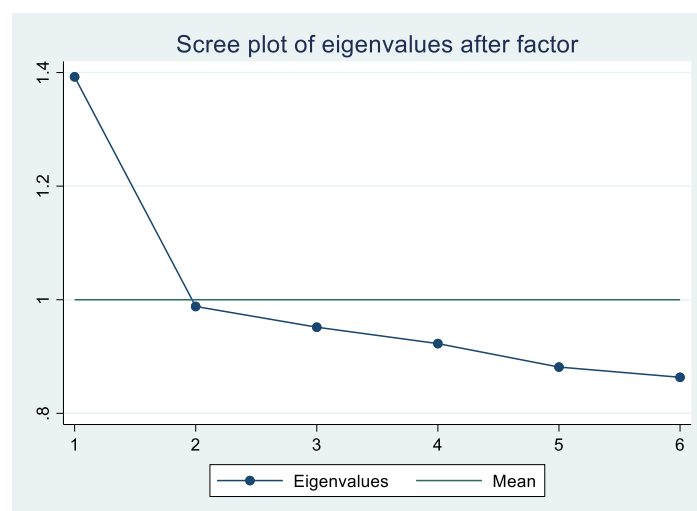


Figure 1. Scree Plot of Eigenvalues for Factor Analysis

According to the scree plot results, only the first factor (Factor 1) has an eigenvalue greater than 1 (≈ 1.4), which explains the main portion of the total variance. Since the eigenvalues of the remaining factors are less than 1, they were not included in the analysis, see Figure 1. Therefore, in this model, it is appropriate to select a single main factor to construct the Small Business Stability Index.



Figure 2: Factor Loadings Plot for Small Business Stability Index

The factor loadings plot illustrates the extent to which each variable contributes to the underlying factor. The results indicate that **new vacancy creation** and **competitiveness** exhibit the highest loadings (≈ 0.53 – 0.55), thereby representing the most significant determinants of the composite index. **Innovation** and **infrastructure** demonstrate moderate loadings (≈ 0.46 – 0.47), confirming their supportive yet meaningful role in explaining the stability construct. Similarly, the **state support program** (≈ 0.48) shows a moderate contribution to the index. Conversely, **financial stability** records the lowest loading (≈ 0.40), suggesting that its explanatory power for the underlying factor is relatively weak compared to other variables, see Figure 2.

In the next stage, the Bartlett method is used to construct the “Small Business Stability Index”, see Table 4.

```
predict Business_stability, bartlett
```

Scoring coefficients (method=Bartlett)

Table 4. Factor Loadings for Small Business Stability Index

Variable	Factor1
New_vacancy	0.39745
Competitiveness	0.41553
Innovation	0.32913
Infrastructure	0.31366
State_support_programm	0.33648
Financial_stability	0.26368

After constructing the “Small Business Stability Index” using the Bartlett method, the summarize command is executed, see Table 5.

Table 5. Descriptive Statistics for Business Stability Index

Variable	Obs	Mean	Std. Dev.	Min	Max
Business stability	1299	0	1.001	-2.322	2.997

Examining the results obtained after executing the summarize command, it is observed that the variable is expressed within the range of -2.322 to 2.997. For further analysis, it is necessary to transform this indicator into the 0–1 interval, see Table 6.

Table 6. Normalized Business Stability Index (0–1 Range)

Variable	Obs	Mean	Std. Dev.	Min	Max
Business stability	1299	0	1.001	-2.322	2.997
Business stability 100	1299	.437	.188	0	1

In the next stage, the variable was normalized to the 0–1 range using the min-max method. Finally, the 'Small Business Stability Index' was constructed using the factor analysis model and was expressed within the 0–1 range, see Table 7.

Table 7. Linear Regression Results for Business Stability and Monthly Income

Monthly income	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Business_stability 100	.582	.113	5.17	0	.361	.803	***
Constant	1.865	.052	35.78	0	1.763	1.967	***
Mean dependent var		2.112	SD dependent var			0.705	
R-squared		0.024	Number of obs			1299	
F-test		26.683	Prob > F			0.000	
Akaike crit. (AIC)		2325.705	Bayesian crit. (BIC)			2335.708	

*** $p < .01$, ** $p < .05$, * $p < .1$

According to the results, the coefficient (**Coef. = 0.582**) indicates that a one-unit increase in the small business stability index leads to an average increase of **0.582 units in monthly income**.

The t-value (**5.17**) and p-value (**0.000 < 0.01**) confirm that this effect is **highly statistically significant at the 1% level**. The 95% confidence interval [0.361; 0.803] further demonstrates the robustness of this result.

Constant (Intercept = 1.865)

When the stability index equals zero, the average monthly income is approximately **1.865 units**.

This parameter is also statistically significant (**$p < 0.01$**).

The **R-squared = 0.024**, meaning that the model explains about **2.4% of the variation in monthly income**. Although relatively small, this effect remains statistically significant.

The **F-test value (26.683) with Prob > F = 0.000** indicates that the model as a whole is statistically significant.

The **Akaike (AIC = 2325.705) and Bayesian (BIC = 2335.708) information criteria** provide benchmarks for comparing this model with alternative specifications.

4. Conclusion

The analysis shows that small business stability positively and significantly (coeff. = 0.582) affects monthly income (the higher the stability of a business, the higher the income). The relationship is significant at the 1% level; we should be promoting stability for small business SCB. This indicates that business stability, despite only explaining a small fraction of the income variation ($R^2 = 0.024$), is nevertheless an important factor driving income trajectories as well. Our results, therefore, emphasize specific reform policies that could lead to greater small firm stability, including greater access to finance, better

infrastructure, and improvement of institutional quality. Firms may also be affected by other socio-economic factors like labor market conditions or education and further research should focus on more of such features in order to generalize the model and properly account for wider determinants of small business success. Longer term panel data studies may be able to tease out some internal instability effects on economic outcomes.

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