Do Small-Business Exports Drive Economic Growth in Uzbekistan? Small-Sample Evidence and Forecasts to 2030

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Abstract

Small firms have become the fastest-growing segment of Uzbekistan's exports: between 2010 and 2025 their exports rose from USD 1.78 billion to USD 12.38 billion, and their share in total exports from 13.7% to 36.6%. This study asks whether that expansion has raised aggregate growth. Using official annual data for 2010–2025, it combines a Balassa-type growth regression with wild-bootstrap inference, an ARDL bounds test with simulated finite-sample critical values, Toda–Yamamoto causality tests with bootstrap p-values and a Bayesian VAR whose prior tightness is chosen by the marginal likelihood. The growth elasticity of small-business exports is close to zero (0.005; bootstrap p = 0.50), the variables share no long-run levels relationship (F = 1.71), and Granger non-causality is not rejected in either direction. The correlation of 0.43 between the two growth rates is an artifact of the 2020 shock. Small-business exports do not improve out-of-sample GDP forecasts; growth is projected at 8.3% in 2026 and about 6.9% a year in 2027–2030. Export support should be judged by the productivity and sophistication of exporting firms rather than by export volumes.

Keywords

small-business exports; export-led growth; Granger causality; ARDL bounds test; Bayesian VAR; small samples; forecasting; Uzbekistan

JEL classification: C11, C32, F14, F43, O53

1. Introduction

The export-led growth (ELG) hypothesis holds that expanding exports raise output growth through economies of scale, competitive pressure, knowledge spillovers and the easing of the foreign-exchange constraint [1]. Uzbekistan offers an unusual setting for testing it. After the trade and currency liberalization of 2017, small businesses became major exporters: their exports grew from USD 1.78 billion in 2010 to USD 12.38 billion in 2025, their share in total exports rose from 13.7% to 36.6%, and in 2025 small businesses generated 52.2% of GDP [2]. If the ELG mechanism works through this channel, the export boom of small firms should show up in aggregate growth.

The international literature offers no firm prior. ELG findings vary with the country, the period and the testing procedure [3], and plant-level evidence indicates that exporters are more productive mainly because the best firms self-select into exporting [4]. For Uzbekistan, bidirectional causality has been reported between aggregate exports and GDP per capita [5], but small-business exports have not been examined as a separate channel, and inference that relies on asymptotic critical values is unreliable in the short annual series available for the country.

This study tests four hypotheses for 2010–2025: (H_1) real growth of small-business exports raises real GDP growth; (H_2) real GDP and real small-business exports are linked by a long-run levels relationship; (H_3) small-business exports Granger-cause GDP; and (H_4) small-business exports improve GDP growth forecasts. Because only 16 annual observations are available, the tests rely on small-sample tools: an ARDL bounds test [6] with simulated critical values, Toda–Yamamoto causality tests [7] with bootstrap p-values and a Bayesian VAR with a data-driven prior [8].

2. Literature review

Balassa [1] introduced export growth as an additional input in the production

function and found that outward-oriented economies grew faster, and growth regressions augmented with exports became the standard tool of the early literature. Time-series work later showed how fragile this result is: surveying more than 150 studies, Giles and Williams [3] concluded that the verdict on ELG depends on the model specification, the integration properties of the data and the causality test used. Two procedures have since become standard because they are robust to uncertainty about the integration properties of the data: the ARDL bounds test [6], which applies whether the regressors are I (0) or I(1), and the Toda–Yamamoto test [7], which remains valid when the order of integration is uncertain. Micro data add a caution about the direction of causality. Bernard and Jensen [4] show that productive plants select themselves into export markets, while exporting does little to accelerate their productivity growth afterwards. For Uzbekistan, Nurjanov et al. [5] find causality running in both directions between aggregate exports and GDP per capita over 1992–2023. In forecasting, Minnesota-type priors whose tightness is chosen by the marginal likelihood [8] make small VARs usable even in short samples.

A recent group of time-series and panel studies applies similar small-sample tools to other macroeconomic questions in Uzbekistan. Farmonov et al. [9] trace the transmission of gold and cotton price shocks to exports and international reserves and find that the short-run response of reserves to the gold price almost doubled after 2017, a reminder that aggregate exports are dominated by commodities whose values follow world prices. Farmonov and Rakhimov [10] estimate dynamic panel models for the regions to quantify the effects of inflation and unemployment on the real growth of household incomes. Mardonova and Farmonov [11] combine an augmented Solow framework with ARDL estimation to study education expenditure, tertiary enrollment and growth, and Jidelbekova and Farmonov [12] apply ARDL models and Toda–Yamamoto tests to urbanization, economic growth and electricity consumption. These studies use much the same toolkit as the present one, but none of them separates small-business exports from

total exports or asks whether they help to predict GDP. This study addresses that gap.

3. Data and methods

The analysis uses 16 annual observations for 2010–2025 from the SIAT open-data portal of the Statistics Agency [2]: exports of goods and services by small businesses and their share in total exports, total exports, official real GDP growth, fixed investment and employment. Other exports equal total exports minus small-business exports. Dollar values are expressed in 2015 prices using the US consumer price index, and the real GDP index (2010 = 100) chains the official growth rates. Lower-case letters y, s, o, l denote the logarithms of real GDP, real small-business exports, real other exports and employment, $g_X = 100\,\Delta \ln X$ is the growth rate of a variable, I/Y is the ratio of fixed investment to GDP and D_{2020} is a pandemic dummy. Following Balassa [1], the growth equation treats small-business and other exports as separate inputs:

$$g_{Y,t} = \beta_0 + \beta_1 (I/Y)_t + \beta_2 g_{L,t} + \beta_3 g_{S,t} + \beta_4 g_{O,t} + \varphi D_{2020,t} + \varepsilon_t \quad (1)$$

where β_3 is the elasticity tested under H_1 ($\beta_3 > 0$). With $n = 15$, the t-tests are supplemented by restricted wild-bootstrap p-values (Rademacher weights, $B = 4999$), and a variant with $g_{S,t-1}$ checks for delayed effects. Levels relationships are tested in the unrestricted error-correction form of an ARDL (1,1,1) model [6]:

$$\Delta y_t = c + \pi_y y_{t-1} + \pi_s s_{t-1} + \pi_o o_{t-1} + \omega_s \Delta s_t + \omega_o \Delta o_t + \varphi D_{2020,t} + u_t \quad (2)$$

The null of no levels relationship is tested with an F-statistic and the null $\pi_y = 0$ with a t-statistic. Since the asymptotic bounds are unreliable for $n = 16$, finite-sample critical values are simulated for exactly this sample size (Case III, 10,000 replications). Causality is tested with the Toda–Yamamoto procedure [7] in a levels VAR of order $p + d_{\max}$ for $\mathbf{z}_t = (y_t, s_t)'$ and, analogously, $(y_t, o_t)'$:

$$\mathbf{z}_t = \mathbf{c} + \sum_{i=1}^{p+d_{\max}} \mathbf{A}_i \, \mathbf{z}_{t-i} + \boldsymbol{\varphi} D_{2020,t} + \mathbf{e}_t \quad (3)$$

where p is selected by the Schwarz criterion and $d_{\max} = 1$. The Wald statistic

restricts only the first p lags, and its p-value is computed with a leveraged residual bootstrap ($B = 1999$). Finally, the predictive content of small-business exports is assessed with a bivariate BVAR (1) in growth rates:

$$\mathbf{x}_t = \mathbf{c} + \mathbf{A}\mathbf{x}_{t-1} + \boldsymbol{\varphi} D_{2020,t} + \mathbf{e}_t, \qquad \mathbf{e}_t \sim N(\mathbf{0}, \boldsymbol{\Sigma}), \qquad \mathbf{x}_t = \left(g_{Y,t},\, g_{S,t}\right)' \quad (4)$$

The coefficients receive a Minnesota-type prior that is neutral with respect to ELG, and its overall tightness λ is set at the posterior mode of the marginal likelihood [8]. The BVAR is compared in a recursive pseudo out-of-sample exercise for 2018–2025 with a random walk, the historical mean, OLS-estimated AR (1) and VAR (1) models and a Bayesian AR (1) for GDP growth alone (BAR); the BVAR–BAR comparison tests H_4. The 2026 forecast is softly conditioned on the official nine-month growth estimate of 8.3% [2].

4. Results and discussion

Between 2010 and 2025, small-business exports increased 6.9-fold in nominal terms and grew by 10.9% a year at 2015 prices, whereas real other exports grew by only 1.9% a year and real GDP by 6.6%. Small-business export growth is extremely volatile: its standard deviation (31.8 percentage points) is almost twenty times that of GDP growth (1.6 points). The simple correlation between the two growth rates is 0.43, but it rests on a single year. In 2020, GDP growth fell to 1.6% and real small-business exports dropped by 35%; without that year, the correlation falls to 0.09 (Figure 1).

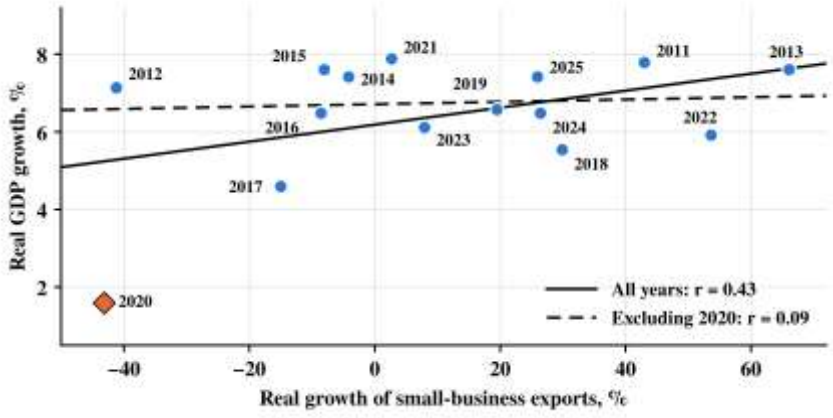


Figure 1. Real growth of small-business exports and real GDP growth in Uzbekistan, 2011–2025

Note: growth rates are $100\,\Delta\ln$; the solid line is the OLS fit for all years and the dashed line the fit without 2020.

The ADF test does not reject a unit root in the levels of any variable, while in first differences the KPSS test does not reject stationarity; no series is I(2), so the bounds and Toda–Yamamoto procedures ($d_{\max} = 1$) are applicable. In the growth regressions (Table 1), the elasticity of small-business exports is $\hat{\beta}_3 = 0.0053$ and insignificant ($p = 0.497$ by the bootstrap). Even at the upper end of its 95% confidence interval (0.025), a 10-percentage-point acceleration of small-business export growth would add only 0.25 points to GDP growth. Lagged exports add nothing ($F = 0.04$; $p = 0.963$), and other exports are also insignificant. Employment growth is the only significant regressor ($\hat{\beta}_2 = 0.46$; bootstrap $p = 0.015$), and the pandemic reduced growth by about 3.2 points. The investment ratio has no effect: it rose from 17.8% of GDP in 2011–2017 to 29.2% in 2018–2025 without any acceleration of growth. The residual diagnostics are satisfactory, and H_1 is not supported.

	(A) Baseline		(B) With lagged exports	
Regressor	**Coefficient (s.e.)**	**p / p_{boot}**	**Coefficient (s.e.)**	**p / p_{boot}**
Constant	6.00*** (1.25)	<0.001 / 0.026	5.09** (1.59)	0.015 / 0.139
I/Y	−0.0061 (0.0526)	0.910 / 0.925	0.0361 (0.0694)	0.619 / 0.634
$g_{L,t}$	0.4603** (0.1873)	0.036 / 0.015	0.4466* (0.2042)	0.065 / 0.125
$g_{S,t}$	0.0053 (0.0089)	0.564 / 0.497	−0.0015 (0.0117)	0.902 / 0.889
$g_{S,t-1}$	—	—	−0.0025 (0.0092)	0.793 / 0.778
$g_{O,t}$	−0.0280 (0.0289)	0.358 / 0.264	−0.0425 (0.0348)	0.262 / 0.214

D_{2020}	−3.15* (1.46)	0.059 / 0.061	−3.89* (1.73)	0.059 / 0.045
n	15		14	
R^2 / $\bar{R}^2$ / DW	0.814 / 0.711 / 2.21		0.829 / 0.683 / 2.26	
F (All regressors)	1.74 (0.225)		1.19 (0.402)	
F ($g_{S,t}$, $g_{S,t-1}$)	—		0.04 (0.963)	
BG (1) / BP, p	0.476 / 0.890		0.535 / 0.700	
JB / RESET, p	0.264 / 0.590		0.197 / 0.465	

Table 1. Growth regressions (dependent variable: $g_{Y,t}$)

Note: growth rates and I/Y in percent; the constant and D_{2020} in percentage points. p is the p-value of the t-statistic and p_{boot} the restricted wild-bootstrap p-value (B = 4999); ***, ** and * denote significance at the 1%, 5% and 10% levels; p-values of the F-tests are in parentheses. BG, Breusch–Godfrey LM(1); BP, Breusch–Pagan; JB, Jarque–Bera; RESET, Ramsey test.

The bounds test confirms the absence of a long-run link (Table 2). The F-statistic (1.71) is below the simulated 10% lower bound (4.04), and the t-statistic (−1.29) lies above its lower bound (−2.60), so H_2 is rejected: GDP, small-business exports and other exports are not cointegrated. The adjustment coefficient is small and insignificant ($\hat{\pi}_y = -0.023$; $p = 0.232$), and the implied long-run elasticity of small-business exports ($\hat{\theta}_s = 0.34$, standard error 0.47) is not significant either; because the RESET test ($p = 0.025$) points to some misspecification of the linear model, this result should be read with caution. The Toda–Yamamoto tests offer no support for ELG either. The Wald statistic for causality from small-business exports to GDP is 1.43 (bootstrap $p = 0.287$). In the opposite direction the statistic is larger (2.69), but its bootstrap p-value (0.133) is not significant even at the 10% level, and other exports show no causality in either direction. H_3 is therefore rejected, with at most a weak hint of growth-led exports.

Table 2. Tests for a long-run relationship and Granger causality

Test / null hypothesis	Lags	Statistic	p(asympt.)	p(bootstrap)	Conclusion
A. ARDL(1,1,1) bounds test					
F: $\pi_y = \pi_s = \pi_o = 0$	1	1.712	—	—	No cointegration
t: $\pi_y = 0$	1	−1.294	—	—	No cointegration
B. Toda–Yamamoto test					
$s \not\Rightarrow y$ (small-business exports → GDP)	1	1.433	0.231	0.287	No causality
$y \not\Rightarrow s$ (GDP → small-business exports)	1	2.694	0.101	0.133	No causality
$o \not\Rightarrow y$ (other exports → GDP)	2	4.251	0.119	0.224	No causality
$y \not\Rightarrow o$ (GDP → other exports)	2	3.798	0.150	0.259	No causality

Note: Panel A uses finite-sample critical values simulated for n = 16 and Case III (10,000 replications); the I(0)/I(1) bounds are 4.04/5.37 (10%), 5.52/7.15 (5%) and 10.05/12.83 (1%) for F and −2.60/−3.33 (10%), −3.06/−3.90 (5%) and −4.17/−5.29 (1%) for t. Panel B: lag order p selected by the Schwarz criterion, d_{max} = 1, Wald statistics distributed as $\chi^2(p)$, bootstrap p-values from 1,999 leveraged residual replications; $\not\Rightarrow$ means "does not Granger-cause".

The marginal likelihood selects strong shrinkage ($\hat{\lambda} = 0.10$), and the posterior coefficient on lagged small-business export growth in the GDP equation is practically zero. Out of sample, the BVAR lowers the root mean squared error (RMSE) of the random walk by 35%, and by 67% when 2020 is excluded, whereas the OLS-estimated AR(1) and VAR(1) models overfit (Table 3). The univariate BAR, however, is slightly more accurate than the BVAR (RMSE of 1.91 versus 1.94), so small-business exports do not improve GDP forecasts and H_4 is rejected. The BVAR intervals are, if anything, conservative: seven of the eight outcomes, all except 2020, fall within the 68% bands.

Table 3. Accuracy of one-step-ahead GDP growth forecasts, 2018–2025

	All years (N = 8)			Excluding 2020 (N = 7)		
Model	**RMSE**	**MAE**	**RMSE/RW**	**RMSE**	**MAE**	**RMSE/RW**
BVAR (GDP + small-business exports)	1.942	1.255	0.650	0.845	0.717	0.328
BAR (GDP only)	1.912	1.223	0.640	0.792	0.686	0.307
Historical mean	1.995	1.307	0.668	0.861	0.756	0.334
AR (1), OLS	2.670	1.992	0.894	2.163	1.573	0.839
VAR (1), OLS	2.861	2.136	0.958	2.415	1.731	0.937
Random walk (RW)	2.987	2.091	1.000	2.577	1.677	1.000

Note: errors in percentage points; all models are re-estimated recursively with an expanding window, and the BVAR and BAR tightness is re-selected every year.

Using information up to 2025 only, the unconditional BVAR predicted 6.9% growth for 2026, and the nine-month outturn of 8.3% lies inside its 90% band (5.1–8.7%). Conditioned on that outturn, the BVAR puts GDP growth at 8.3% in 2026 (68% band: 8.0–8.6%) and at about 6.9% a year in 2027–2030 (68% band: 5.8–8.0%), so that real GDP in 2030 is 1.41 times its 2025 level (Figure 2). The IMF's October 2026 projection of 6.5% for 2027 lies at the 36th percentile of this predictive distribution. Real small-business exports are projected to grow by 12.3% a year and to reach USD 16.3 billion at 2015 prices in 2030, but with a very wide 68% band (USD 8.1–32.9 billion).

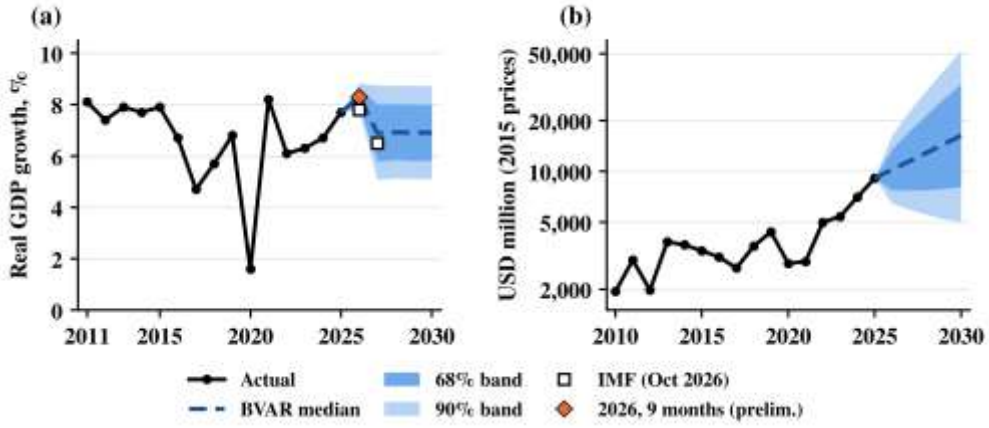


Figure 2. BVAR forecasts for 2026–2030: (a) real GDP growth, %; (b) real small-business exports, USD million at 2015 prices (log scale)

Note: the 2026 forecast is conditioned on the nine-month outturn (8.3%); the IMF points are the October 2026 projections.

Four separate pieces of evidence thus point the same way: an insignificant growth elasticity, no levels relationship, no Granger causality and no gain in forecast accuracy. The contrast with the bidirectional causality found for aggregate exports [5] is plausibly explained by the large weight of gold and other commodities in total exports, whose values follow world prices [9] and are closely linked to GDP, whereas small-business exports form a smaller and much more volatile component. Three mechanisms can account for the weak link between the small-business export boom and aggregate growth. First, firms that enter export markets are usually productive already, so higher export volumes add little new productivity [4]. Second, the rise of the small-business share coincided with stagnant real other exports, which suggests that part of export activity moved from large enterprises to small private firms after liberalization, changing the composition of exports more than their total. Third, the growth payoff of exports depends on their degree of processing and domestic value added rather than on their volume. With 16 observations the tests have limited power, yet the estimates rule out large effects: a 10-point change in small-business export growth moves GDP growth by no more than a few tenths of a percentage point in the short run.

The study has several limitations. Besides the short sample, dollar exports are deflated by US consumer prices because export price indices are not available, the statistical definition of small businesses may have changed over the period, and the data for 2025–2026 are preliminary. Firm-level customs data, regional panels and mixed-frequency models based on quarterly series would allow sharper tests of the mechanisms discussed above.

5. Conclusions

Real small-business exports in Uzbekistan grew by 10.9% a year in 2010–2025 and their share in total exports almost tripled, yet this expansion has not, by itself, raised aggregate growth. The growth elasticity is close to zero, no long-run relationship exists, causality is absent in both directions and small-business exports do not sharpen GDP forecasts. Export-promotion policy should therefore be judged not only by export volumes and shares but also by the productivity of exporting firms, the degree of processing of exported goods and the domestic value added they contain. Support for certification and quality standards, export credit and insurance, cheaper logistics and the integration of small exporters into the value chains of large firms and foreign investors is likely to matter more than volume targets. Publishing small-business export statistics by product group and at a quarterly frequency would allow these mechanisms to be tested more precisely.

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