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Trade Openness and Educational Choices in Bulgaria

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Appendix

Predicting local exports by industry: A shift-share approach (Bartik shock)

We predict industry-district-year level exports using annual exports value by 2-digit NACE industries from BTDIxE in the construction of the shifts and 2008 employment by 2-digit NACE industries at the district level in the construction of the shares. To obtain a prediction for local exports we sum up these values across all industries.

$$\widehat{Exports}_{idt} = Exports_{it} \times \frac{Empl_{id2008}}{Empl_{i2008}},$$

where *i* is 2-digit NACE industry, *d* is district, and *t* is year.

Analysis in first differences at the district level

Figures 3 plots percentage changes in predicted district-level exports between 2008 and 2020 on the horizontal axis against percentage changes in district-level nineth-grade enrollment by track of education again between 2008 and 2020 on the vertical axis. Furthermore, the line shows predicted enrollment from the following regression in first differences:

$$\%\Delta\ Nr\ enrolled_d = \beta\ \%\Delta \sum_i \widehat{Exports}_{id} + \epsilon_d,$$

where the change on both sides of the equation is again between 2008 and 2020.

Panel data analysis at the district level

In the full panel data analysis, we regress the inverse hyperbolic sine transformation of district-year-level enrollment on the twice-lagged predicted annual district-level exports and a set of district and year fixed effects (FE) to control for time-invariant regional differences and aggregate shocks, respectively. We use Huber-White robust standard errors and estimate the following equation:

$$Nr\ enrolled_{dt} = \beta \sum_{i} Lag_2\ Expôrts_{idt} + \delta_d + \delta_t + \epsilon_{dt},$$

where δ are the fixed effects in the regression. Table A1 below shows the results for overall enrollment (column 1), general education enrollment (column 2) and vocational education enrollment (column 3).

Table A1. District level 9th grade enrollment by educational track: Panel data analysis

	Overall (1)	General (2)	Vocational (3)
Lag 2 Exports	0.007	-0.033	0.030
	(0.052)	(0.058)	(0.079)
Year FE	X	X	X
District FE	X	X	X
N	308	308	308

Notes: Robust standard errors in parentheses.

Analysis in first differences at the district-field level

Figures 4 plots percentage changes in predicted district-field level exports between 2008 and 2020 on the horizontal axis against percentage changes in district-field level nineth-grade vocational education enrollment by track of education again between 2008 and 2020 on the vertical axis. The former is computed by summing up predicted exports by industry for all industries linked to this study field. Furthermore, the line shows predicted enrollment from the following regression in first differences:

$$\%\Delta\ Nr\ enrolled_{df} = \gamma\ \%\Delta \sum_{i \in f} Expôrts_{id} + \epsilon_{df},$$

where *f* is field of study.

Panel data analysis at the district-field level

In the full panel data analysis, we regress the inverse hyperbolic transformation of district-field-year level vocational education enrollment on the twice-lagged predicted annual district-field level exports and a set of district-field, district-year and field-year fixed effects. We use robust clustered errors at the district-field level and estimate the following equation:

$$Nr\ enrolled_{dft} = \gamma \sum_{i \in f} Lag_2\ Expôrts_{dit} + \delta_{df} + \delta_{dt} + \delta_{ft} + \epsilon_{dft}.$$

Table A2 below shows the results where column (1) includes only district-field and year fixed effects, column (2) district-field and district-year fixed effects, column (3) district-field and field-year fixed effects and column (4) district-field, district-year and field-year fixed effects.

Table A2. District level 9th grade enrollment by field of study: Panel data analysis

	(1)	(2)	(3)	(4)
Lag 2 Exports	0.501***	0.429**	0.531***	0.328*
	(0.172)	(0.174)	(0.170)	(0.186)
Year FE	X			
District x Field FE	X	X	X	X
District x Year FE		X		X
Field x Year FE			X	X
N	2409	2409	2409	2409

Notes: Robust clustered standard errors in parentheses at the district-field level. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level and * denotes statistical significance at the 10% level.