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GROWTH OUTCOMES OF TRANSPORT INFRASTRUCTURE INVESTMENT IN THE EU: THE ROLE OF GOVERNMENT QUALITY AND DIMINISHING MARGINAL EFFECTS

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Abstract. The research investigates the impact of transport infrastructure investment (TII) on economic growth. We applied non-linear neoclassical specification to our unbalanced panel data that covers 27 EU countries (Cyprus is excluded due to missing data and the United Kingdom is a part of the sample) for the period of 2000–2019. Our model includes a multiplicative term to evaluate if the government quality mediates the effect of TII on growth. Our research reveals the positive and statistically significant relationship between TII and economic growth but with a diminishing return. Estimation of the government quality as a possible moderator of the effect that TII has on growth shows that control of corruption plays a significant role in the TII-growth nexus. We find that in countries with a low level of control of corruption, TII has a statistically significant negative effect on growth.

Keywords: economic growth, transport infrastructure, transport infrastructure investment, government quality, control of corruption, diminishing marginal effects.

JEL Classification: O40, O43, R11, R40, R58.

Introduction

Transport infrastructure investment represents one of the key facilitators of the European Union's (EU) development and cohesion policies. According to the statistics, over 57 billion euros has been allocated from the EU budget for transport and energy infrastructure during the 2014–2020 programming period. The countries have provided an additional 12 billion euros from national budgets for this purpose. However, despite the considerable funds devoted to it, its impact on economic growth remains controversial.

The vast majority of previous research indicates that transport infrastructure has a positive impact on economic growth (Xueliang, 2008; Hong et al., 2011; Del Bo & Florio, 2012; Achour & Belloumi, 2016; Saidi et al., 2018; Cigu et al., 2019; Wang et al., 2020; Muvawala et al., 2021; Batool & Goldmann, 2021; Elburz & Cubukcu, 2021; Alotaibi et al., 2021). Some research emphasizes the importance of government quality as mediating factor of the impact of transport infrastructure investment effect on economic growth (Rodríguez-Pose & Garcilazo, 2015; Crescenzi et al., 2016; Kyriacou et al., 2019). Few studies (Xueliang, 2008; Crescenzi & Rodríguez-Pose, 2012) investigating the impact of the transport infrastructure investment on growth did not find a statistically significant effect on economic growth. However, there is a lack of research investigating the role of government quality and the non-linear effect of transport investment on economic growth. To fill this research gap, the study aims to evaluate transport infrastructure investments' linear and non-linear effect on growth, taking into consideration possible mediating effects of government quality.

Paper contributes to the previous research by estimating and justifying the existence of the non-linear effects of transport infrastructure investments on economic growth and highlighting the importance of government quality for the return on investment. This is very important in shaping the policy of allocation funds from the EU and national budgets.

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The remaining of the paper is organised as follows: a literature review on the relationship between transport infrastructure investment and its outcomes is presented in Section 1; Section 2 develops the methodology of research, i.e. model, data and estimation strategy; Section 3 provides the estimation results and discussion. The last section concludes the paper.

1. Literature review

The impact of the transport infrastructure investment on growth has been widely analysed in scientific literature. Transport infrastructure is also expected to have a significant multiplier effect on investment flows. In addition, infrastructure is thought to create a "amenity" value that contributes to well-being and the externalities of the environment (Kessides, 1993). Transport infrastructure projects can also bring significant political and managerial benefits, as they provide clearly visible and tangible forms of public spending that are easy to manage and appeal to voters. Overall, politicians and planners have important incentives to invest in transport infrastructure (Crescenzi & Rodríguez-Pose, 2012).

Numerous research found a positive impact of transport investment on economic growth. Hong et al. (2011) provide evidence that transport infrastructure contributes positively to economic growth in 31 Chinese provinces from 1998 to 2007. Del Bo and Florio (2012) confirmed the critical role of infrastructure and identified the highest rates of investment return associated with telecommunication, quality and accessibility of transportation networks, with a positive impact of roads and railways analysing data at NUTS 2 level in EU for the year 2006 using Spatial Durbin Model (SDM) with respect to likelihood ratio (LR) tests. Rodríguez-Pose and Garcilazo (2015) state that infrastructure endowment has a positive impact on regional economic growth by applying a two-way fixed effect panel regression model for a total of 169 European regions during the period 1996–2007. The authors also conclude that government quality is a direct factor for regional economic growth as well as the moderator of efficient investment. Achour and Belloumi (2016), using the Johansen multivariate cointegration approach, generalized impulse response functions and variance decomposition technique to examine the effect of transportation infrastructure on economic growth in Tunisia for the period of 1971–2012, state that road infrastructure can boost economic growth. Crescenzi et al. (2016) assess the relationship between regional quality of government and the returns of different types of road infrastructure in the 166 regions of the European Union during the period 1995–2009. The findings suggest that the effect of infrastructure investment on economic growth is mediated by the presence of adequate government quality. Cigu et al. (2019) emphasize the importance of different transport infrastructure components using Barro's production function and indicate the significant positive impact of transport infrastructure (measured as an index of transport) on economic development in EU-28 countries. Saidi et al. (2018) analysing panel data of 46 developing countries, despite the positive and significant impact of transport infrastructure on economic growth, found its positive impact on FDI attractiveness. Kyriacou et al. (2019) confirm the positive and statistically significant impact of government quality on infrastructure efficiency in 34 countries from 1996 to 2010. Wang et al. (2020) find polarized spatial spillover effect of transport infrastructure on economic growth in BRI countries, significant and positive impact in Central and Eastern Europe and, on the contrary, negative effect in East Asia-Central Asia and the Commonwealth of the Independent States and South Asia over the period from 2007 to 2016. The study by Elburz and Cubukcu (2021) estimates the effects of transport infrastructure on regional output has significant and positive spillover effects in Turkish regions using SDM. Alotaibi et al. (2021) found a one-year lagging positive and significant impact of transport investment on regional GDP in 13 regions of the Kingdom of Saudi Arabia. Batool and Goldmann (2021) distinguish public and private transport infrastructure by applying vector error correction models, Granger Causality tests, and impulse response function. Authors indicate that private capital has an impact on economic growth in Pakistan in the long run, while public capital has not influenced economic growth. Muvawala et al. (2021) indicate that there is a difference in infrastructure investment impact on economic growth in the short and long term in Uganda using the Autoregressive Distributed Lag Model (ARDL) for the period of 1983–2018. Their research shows that there is a positive and significant impact on economic growth in the long run. But in the short run, the impact is negative.

The other strand of scientific literature indicates a poor relationship between transport infrastructure and economic growth. Xueliang (2008) tests the spatial spillover effects of transport infrastructure on economic growth using provincial panel data of China from 1993 to 2004 based on neoclassical economic growth theory to analyse the contribution of transport infrastructure to the economic growth of the local province and its spatial spillover effects on the economic growth of other provinces. The study shows that despite the overall positive effect of spatial spillover effects of transport infrastructure on economic growth, transport infrastructure can have a slowing effect on backward regions' economic growth due to population migration. Crescenzi and Rodríguez-Pose (2012) using the two-way fixed-effect (static) and GMM-diff (dynamic) panel data regression estimations indicated that infrastructure endowment is a relatively poor predictor of economic growth. The authors also emphasize the importance of development policies based on human capital and innovation.

The results of previous research can differ due to various research periods because studies conduct short-term, long-term or cross-sectional data in a particular year that is only partly comparable. The other important explanation of varying results is the level of observation as previous research include cross-country, national or regional level, as well as industry or company level. The main point is that growth-boosting effects depend on country's ability to enhance economic growth, which could be explained by the role of government quality.

2. Model and data

Our examination of the impact of the transport infrastructure investment on growth is grounded on the neoclassical specification, which is conventional in the related literature (Farhadi, 2015; Meersman & Nazemzadeh, 2017; Lenz et al., 2018; Cigu et al., 2019; Elburz & Cubukcu, 2021; Muvawala et al., 2021):

$$\frac{1}{T-1}\ln\left(\frac{Y_{i,t+T}}{Y_{i,t}}\right)=\alpha+\beta\ln(Y_{i,t})+c_1gq_{i,t}+c_2\Delta\ln(pop_{i,t})+ c_3\ln(dens_{i,t})+c_4\ln(urb_{i,t})+c_5\Delta\ln(lf_{i,t})+ c_6gcf_{i,t}+c_7gcf_{i,t}^2+c_8\ln(opn_{i,t})+c_9fdi_{i,t}+ c_{10}\ln(gov_{i,t})+c_{11}\ln(r\&d_{i,t})+ c_{12}\Delta\ln(cpi_{i,t})+c_{13}\ln(hc_{i,t})+\theta_t+\mu_i+\varepsilon_{i,t}, \quad (1)$$

where i stands for the country and t for the year. The dependent variable is the average yearly growth rate of the per capita GDP (Y) from year t to T. The variables to control growth sources are included in the right-hand side of the equation: initial income level at time t, government quality, population growth and density, level of urbanisation, growth of the labour force, capital investment of a private sector, trade openness, foreign direct investment, government size, research and development, inflation and human capital are presented in Table 1. θ_t, and μ_i are time- and country-specific effects, respectively, modelled including time dummies and estimating Eq. (1) using within estimator. $\varepsilon_{i,t}$ is the idiosyncratic error term. β and $c_{(.)}$ are parameters to be estimated.

We add variable *TII* that represents transport infrastructure investment as a usual growth factor to the right-hand side of the Eq. (1):

$$\frac{1}{T-1}\ln\left(\frac{Y_{i,t+T}}{Y_{i,t}}\right)= \alpha+\beta\ln\left(Y_{i,t}\right)+\gamma_1\ln\left(TII_{i,t}\right)+c_1inst_{i,t}+\ldots+ \theta_t+\mu_i+\varepsilon_{i,t}. \quad (2)$$

If we assume that the government quality mediates the effect of transport infrastructure investment on growth, the following specifications is relevant:

$$\frac{1}{T-1}\ln\left(\frac{Y_{i,t+T}}{Y_{i,t}}\right)= \alpha+\beta\ln\left(Y_{i,t}\right)+\gamma_1\ln\left(TII_{i,t}\right)+\varphi_1\ln\left(TII_{i,t}\right)\times gq_{i,t}+c_1gq_{i,t}+\ldots+\theta_t+\mu_i+\varepsilon_{i,t}, \quad (3)$$

where multiplicative term *TII*×*gq* allows examining whether relatively better government quality lead to greater growth outcomes of transport infrastructure investment and vice versa. Eq. (3) could be slightly rearranged to show that introducing a multiplicative term, i.e. *TII*×*gq*, allows modelling the conditional relationship between *TII* and growth, which depends on the government quality:

$$\frac{1}{T-1}\ln\left(\frac{Y_{i,t+T}}{Y_{i,t}}\right)= \alpha+\beta\ln\left(Y_{i,t}\right)+\left[\gamma_1+\varphi_1\times gq_{i,t}\right]\times\ln\left(TII_{i,t}\right)+ c_1gq_{i,t}+\ldots+\theta_t+\mu_i+\varepsilon_{i,t}, \quad (4)$$

where $\gamma_1 + \varphi inst$ is the composite slope of growth on transport infrastructure investment. For the general estimations, as a proxy for government quality, we will use control of corruption.

It should be noted that government quality was measured using one of the Worldwide Governance Indicators – Control of Corruption, provided by World Bank. According to Kaufmann et al. (2010), one of the aspects of governance is "the capacity of the government to effectively formulate and implement sound policies" related to control of corruption. They defined the term "control of corruption," which mentioned perceptions of how public power is exercised for private gain. Due to private and personal gain, low-quality governments can direct resources, including EU support, through corruption schemes, to unproductive infrastructure projects. According to Van de Walle and Migchelbrink (2020), "absence of corruption is the strongest government quality determinant". It directly affects "the odds of trust in public administration" (Van de Walle & Migchelbrink, 2020).

With the introduction of the multiplicative term, not only does the slope coefficient become conditional, but also the standard error associated with the coefficient. It implies that a certain level of government quality could be needed for the positive and significant effect of the transport infrastructure investment on growth to appear. In our research, we apply formulae to calculate conditional standard errors developed by Brambor et al. (2006).

Moreover, since transport infrastructure investment can be subject to diminishing marginal effects (as investments do according to neoclassical assumptions), we will test the possible non-linear inverted U-shaped form of relationship between *TII* and growth by introducing the squared term of *TII* in growth specification:

$$\frac{1}{T-1}\ln\left(\frac{Y_{i,t+T}}{Y_{i,t}}\right)= \alpha+\beta\ln\left(Y_{i,t}\right)+\gamma_1\ln\left(TII_{i,t}\right)+\gamma_2\left[\ln\left(TII_{i,t}\right)\right]^2+ c_1gq_{i,t}+\ldots+\theta_t+\mu_i+\varepsilon_{i,t}. \quad (5)$$

If $\gamma_1 > 0$ and $\gamma_2 < 0$, then the relationship between *TII* and growth follows the form of an inverted U-shaped letter, with a turning point calculated as $\exp\{-\gamma_1/2\gamma_2\}$.

Since the squared *TII* can be considered as the interaction of *TII* with itself, the information provided about the analysis of conditional relationships and their conditional statistical significance next to Eq. (3) and (4) is relevant here as well.

Estimating our equations, we have to select the span of the growth episode (T). Research that uses $T = 1$ (i.e., annual per capita GDP growth) maximises the sample size (Saidi et al., 2018; Batool & Goldman, 2021; Wang et al., 2020; Chen et al., 2021; Muvawala et al., 2021; Nenavath, 2021). Still, this strategy might lead to estimates that are highly affected by the cyclical patterns of economic fluctuations and endogeneity (since *TII* is lagged only by one period with respect to growth). We will address these issues by setting T equal to 5, aiming to estimate the effect of the current level of transport infrastructure investment (and the other left-hand-side variables) on the 5-year forward-looking average per capita GDP growth rate. Having a relatively short period under investigation instead of non-overlapping growth episodes, as an alternative, we consider using 5-year overlapping growth periods even though the usage of overlapping growth rates as the dependent variable creates a moving average structure in the error term. Following Panizza and Presbitero (2014), we use the Huber–White Sandwich correction, which yields almost identical results as Newey and West's (1987) estimator, which allows modelling of the autocorrelation in the error term.

Our unbalanced panel data covers 27 EU countries (Cyprus is excluded due to missing data and The United Kingdom is a part of the sample) for the period of 2000–2019. Data is collected from Our World in data, World Bank and Eurostat databases. Table 1 presents summary statistics of the research variables.

3. Results

Panel diagnostics revealed that country-fixed effects are present. Thus, all estimates include country dummies along with the time effects. Specifications were estimated using fixed effects to control for countries unobserved heterogeneity. We present our main findings in Table 2.

The estimated coefficients on control variables have a theoretically justified impact on growth and are consistent with previous research. For example, other growth conditions being equal, better government quality (in our case – less corruption) are related to faster growth rates. The negative coefficient on initial per capita GDP indicates that less developed EU countries experience faster growth rates and thus catch up with more developed ones, i.e., countries are converging in terms of their development level, but at the rate below "the legendary 2 per cent" (Abreu et al., 2005). Growth of the labour force, openness to trade positively correlate with growth, whereas higher rates of population growth and government size have a negative effect on growth. We also find evidence of an inverted U-shaped form of the relationship between capital and growth, which is in line with the neoclassical assumption of the diminishing marginal growth outcomes of capital investments. The estimated threshold level lies around 19–21 per cent.

Considering the transport infrastructure investment, we find that linear specification (Eq. (2)) reveals the positive and statistically significant relationship between *TII* and growth (see estimation (2) in Table 2). However, the estimated coefficient of elasticity shows a rather small effect of TII on growth, i.e., increase of investment by 1 per cent would boost economic growth additionally by 0.003 per cent.

Table 1. Research variables and summary statistics (source: authors' calculations)

		Average	Min.	Max.	S. D.
$\frac{1}{T-1}\ln\left(\frac{Y_{i,t+T}}{Y_{i,t}}\right)$	5-year average yearly growth rate, %	1.94	–6.95	10.8	2.59
Y	GDP per capita (constant 2010 US$)	3.22×10^{4}	3.98×10^{3}	1.12×10^{5}	2.11×10^{4}
pop	Population, total	1.79×10^{7}	3.90×10^{5}	8.31×10^{7}	2.27×10^{7}
dens	Population density (people per sq. km of land area)	174	17	1.51×10^{3}	242
urb	Urban population (% of total population)	72.2	50.8	98.0	12.5
lf	Labor force, total	8.61×10^{6}	1.56×10^{5}	4.39×10^{7}	1.10×10^{7}
gcf	Gross capital formation (% of GDP)	22.9	11.9	46.0	4.56
opn	Trade (% of GDP)	117	45.4	408	64.9
fdi	Foreign direct investment, net inflows (% of GDP)	11.8	–58.3	449	38.2
gov	Total general government expenditure (% of GDP)	44.7	24.5	64.8	6.55
r&d_r	Researchers in R&D (per million people)	2.90×10^{3}	321	8.00×10^{3}	1.62×10^{3}
cpi	Consumer price index (2010 = 100)	96.8	32	124	13.5
hc	Tertiary educational attainment age group 30–34(%)	33.5	7.4	58.8	11.8
gq_cc	Control of Corruption: Estimate	1.03	–0.491	2.47	0.792
TII	Transport infrastructure investment (% of GDP)	1.07	0.576	0.00407	3.85

Table 2. Fixed effects estimates of Eq. (1), (2), (3) and (5). Dependent variable – 5-year forward-looking average per capita GDP growth rate (source: authors' calculations)

Full name of the regressor	Short name of the regressor	Parameter	(1)	(2)	(3)	(5)
Transport infrastructure investment	ln(TII)	γ_1		0.0028**	−0.0059***	0.0048**
				(0.0013)	(0.0021)	(0.0018)
Transport infrastructure investment × Government quality (Control of corruption)	ln(TII)×gq_cc	φ_1			0.0107***	
					(0.0016)	
Squared transport infrastructure investment	$[\ln(TII)]^2$	γ_2				−0.0030***
						(0.0004)
Government quality (Control of corruption)	gq_cc	c_1	0.0122**	0.0083**	0.0106**	0.0081**
			(0.0053)	(0.0041)	(0.0050)	(0.0039)
Population growth	Δln(pop)	c_2	−0.9613***	−0.6615***	−0.5472***	−0.4876**
			(0.2097)	(0.2193)	(0.2042)	(0.2033)
Population density	ln(dens)	c_3	0.0598**	0.0489*	0.0019	0.0277
			(0.0287)	(0.0293)	(0.0281)	(0.0271)
Urbanisation level	ln(urb)	c_4	0.0250	0.0204	−0.0978*	0.0199
			(0.0539)	(0.0602)	(0.0586)	(0.0554)
Growth of the labour force	Δln(lf)	c_5	0.1963***	0.2130***	0.2063***	0.1695***
			(0.0527)	(0.0513)	(0.0476)	(0.0476)
Gross capital formation	gcf	c_6	0.0042***	0.0046***	0.0042***	0.0039***
			(0.0011)	(0.0011)	(0.0011)	(0.0011)
Squared Gross capital formation	gcf^2	c_7	−0.0001***	−0.0001***	−0.0001***	−0.0001***
			(2.029e-05)	(2.135e-05)	(1.984e-05)	(1.968e-05)
Openness to trade	ln(opn)	c_8	0.0597***	0.0606***	0.0353***	0.0520***
			(0.0109)	(0.0109)	(0.0109)	(0.0102)
Foreign direct investment	fdi	c_9	−2.579e-05	1.142e-05	−8.119e-06	−6.987e-07
			(1.770e-05)	(2.061e-05)	(1.934e-05)	(1.904e-05)
Government size	ln(gov)	c_{10}	−0.0235**	−0.0219*	−0.0336***	−0.0216**
			(0.0119)	(0.0117)	(0.0110)	(0.0108)
Research and development	ln(r&d)	c_{11}	−0.0029	−0.0017	−0.0007	0.0001
			(0.0057)	(0.0057)	(0.0053)	(0.0053)
Inflation	Δln(cpi)	c_{12}	0.0076	0.0083	0.0038	−0.0007
			(0.0397)	(0.0394)	(0.0365)	(0.0362)
Human capital	ln(hc)	c_{13}	0.0076	−0.0009	0.0081	0.0075
			(0.0059)	(0.0059)	(0.0057)	(0.0056)
GDP per capita	ln(Y)	β	−0.0127***	−0.0115***	−0.0148***	−0.0132***
			(0.0015)	(0.0015)	(0.0015)	(0.0014)
Intercept		α (0.4126)	0.6846*	0.6346	1.827***	0.9182**
			(0.4321)	(0.4387)	(0.3997)	
Number of observations			342	325	325	325
Within R^2			0.7854	0.7992	0.8278	0.8306
Pesaran CD test for cross-sectional dependence(1) [p-value]			[0.1979]	[0.2113]	[0.1999]	[0.2192]
Test for differing group intercepts(2) [p-value]			[<0.001]	[<0.001]	[<0.001]	[<0.001]
Wald joint test on time dummies(3) [p-value]			[<0.001]	[<0.001]	[<0.001]	[<0.001]
Hausman test(4) [p-value]			[<0.001]	[<0.001]	[<0.001]	[<0.001]
Wooldridge test(5) [p-value]			[0.1438]	[0.154]	[0.1731]	[0.196]

Note: (1) A low p-value counts against the null hypothesis: cross-sectional independence. (2) A low p-value counts against the null hypothesis: the groups have a common intercept. (3) A low p-value counts against the null hypothesis: no time effects. (4) A low p-value counts against the GLS estimates with random effects in favour of LSDV. (5) A low p-value counts against the null hypothesis: no first-order serial correlation in error terms. Heteroscedasticity robust standard errors are presented in parentheses. All estimations include time- and country-fixed effects, and Huber-White Sandwich correction. *, **, *** indicate significant at the 10, 5 and 1 per cent level, respectively.

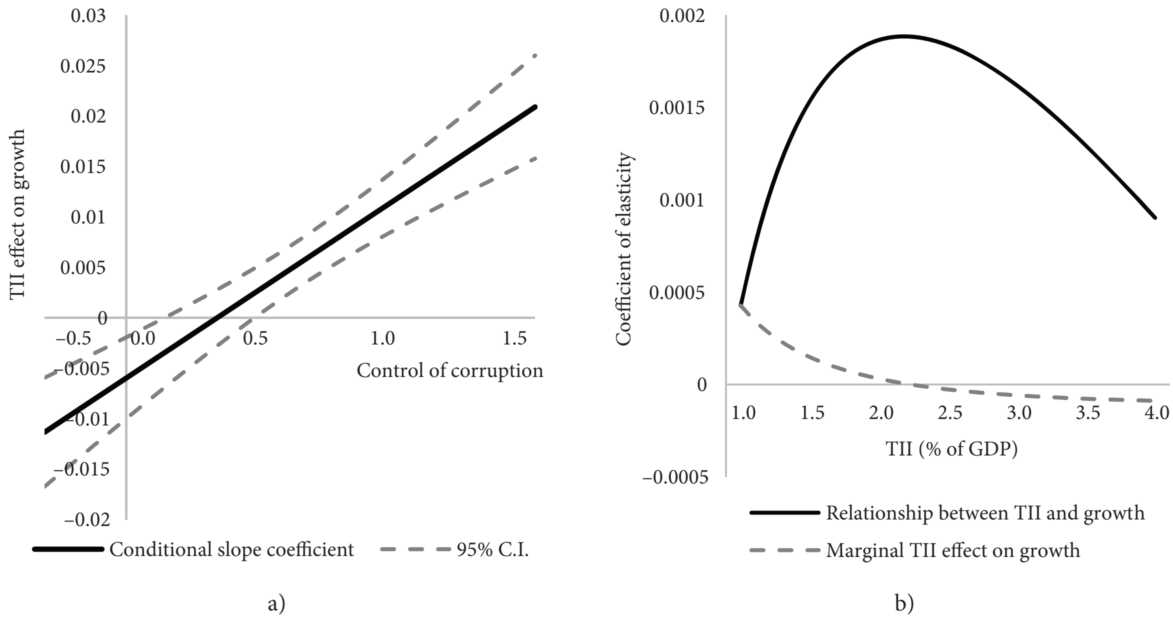

Figure 1. The relationship between transport infrastructure investment and growth: a) Effect of *TII* on growth is moderated by control of corruption. Visualization is based on Eq. (4) and estimation (3) in Table 2; b) Effect of *TII* on growth is moderated by the size of *TII*, i.e. relationship between *TII* and growth is non-linear. Visualization is based on Eq. (5) and estimation (4) in Table 2 (source: composed by the authors)

Estimation of specification, which considers the government quality as a possible moderator of the effect that *TII* has on growth (Eq. (3)), shows that control of corruption plays a significant role in *TII*-growth nexus (see estimation (3) in Table 2). Figure 1a shows that control of corruption considerably changes this relationship.

We find that in countries with a level of control of corruption below 0.2, *TII* has a negative and statistically significant effect on growth. One possible explanation is that transport infrastructure investments are spent inefficiently in relatively corrupted countries, and growth opportunities are lost. We find that such a low level of control of corruption is typical for Bulgaria, Croatia, Greece, Romania, and partially for Hungary, Italy, Latvia, Lithuania and Slovakia. If the control of corruption is above 0.2, but below 0.8, the estimated effect of *TII* on growth is insignificant. This level of control of corruption is typical to The Czech Republic, Hungary, Italy, Latvia, Lithuania, Poland, Slovakia, and partially to Spain, Slovenia, and Malta. The level of corruption equal to or above 0.8 is related to the positive and statistically significant effect of *TII* on growth. This level of control of corruption is typical for Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Ireland, Luxembourg, Malta, The Netherlands, Portugal, Slovenia, Spain, Sweden, and The United Kingdom.

Estimates of the non-linear specification in Eq. (5) revealed that the turning point of the direction of *TII*-growth nexus is at about 2.2 per cent of *TII* to GDP ratio (see estimation (4) in Table 2 and Figure 1b). The transport infrastructure investment above this level is associated with slowing down economic growth. We find that such a high level of *TII* to GDP ratio is in Croatia and Romania. This was also true for Bulgaria, The Czech Republic, Greece, Hungary, Latvia, and Poland for one or two years. After considering that in Croatia and Romania, the level of control of corruption is very low, transport infrastructure investments in these countries are indeed negatively associated with growth.

Conclusions

Analysis of previous studies reveals that: 1) results provided heterogeneous transport infrastructure investment effects on economic growth; 2) in most cases, authors investigate a linear relationship between transport infrastructure investments and growth, although non-linear effects may occur; 3) a lack of research investigates the effect of government quality on transport investment economic outcomes.

Considering the identified research gap, the paper examined linear and non-linear transport infrastructure investments' effects on EU countries' economic growth and government quality effect on those outcomes.

Linear specification reveals the positive and statistically significant relationship between transport infrastructure investment and economic growth.

Estimations using non-linear specification reveal that transport investments' effect is diminishing, i.e., when transport infrastructure investments are above a certain investment intensity, they no longer generate positive returns. Croatia, Romania, Bulgaria, Czech Republic, Greece, Hungary, Latvia, and Poland should have more control intensity of investments in transport infrastructure since the investments exceeded the threshold level.

Estimations results also reveal that transport infrastructure outcomes depend on government quality expressed by control of corruption. Low level of control of corruption associated with smaller positive or even negative transport infrastructure effects on economic growth. The focus should be on reducing corruption in Croatia and Romania.

Our study provided insights that have both theoretical and practical value. The research results can help shape transport infrastructure development policy and the allocation of national and EU structural funds. However, the study also has limitations that could be addressed in future research. We used the total amount of transport infrastructure investments, but it would make sense to examine the impact of specific transport infrastructure (road, rail, air) investments on economic growth.

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Author contributions

Conceptualization, M. B., A. M.-S. and K. M.; methodology, M. B.; formal analysis, M. B.; resources, A. M.-S. and K. M.; data collection A. M.-S., theoretical analysis, A. M.-S. and K. M.; writing – original draft preparation, M. B., A. M.-S. and K. M.; writing, review and editing, M. B., A. M.-S. and K. M.; visualization, M. B. All authors have read and agreed on the published version of the manuscript.

Disclosure statement

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