

Stimulating Avenues: EIB Loans and Returns to Public Infrastructure

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- public spending on infrastructure has also been included in policy discussions as a tool for short-term economic stimulus
- Infrastructure Investment and Jobs Act 550 b\$ in the US in 2021, and 383b€EU Recovery Fund to public investment are two recent policy examples
- Mario Draghi's recent report on EU competitiveness (Sep. 2024):
 - calls for greater investments in innovation, infrastructure and green technology
 - additional investment of 800b€per year is needed

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- main challenges in the empirical studies to estimate investment multipliers:
 - endogeneity of public investment w.r.t business cycles
 - long implementation lag of investment projects
- announcements of public investment projects exogenous to internal fiscal policies could help address these issues

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- the appraisal process of these loans is carried out by EIB teams of engineers, economists, financial analyst
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- using IV-LP, we compare multipliers in countries with different governance quality and financial conditions

Introduction

Main findings:

- a sustained increase in public investment which boosts output, employment, and private investment without inflationary pressures
- short-run output elasticity (multiplier) of 0.03 (0.84) and elasticity of 0.12 (3.5) after five years
- countries with lower governance quality and higher public debt ratio experience a higher multiplier for their infrastructural investment
- the effect on private investment plays a key role in explaining state-dependencies

Literature

- small (negative) effect of public (infrastructural) investment in the short-run
 - Leeper et al. 2010, Dupor 2017, Garin 2019, Ramey 2021
- and bigger (higher than one) multipliers in the medium to long run
 - Leduc and Wilson 2017, Boehm 2020, Leff Yaffe 2020, Ramey 2021, Peri et al. 2024
- multipliers depend on the state of the economy (recessions, ZLB, local authority, exchange rate regimes)
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- **contributions:** suggesting an instrument for public infrastructural investment in the EU; exploring the importance of governance quality and financial indicators

Data

European Investment Bank Loans

EIB loans

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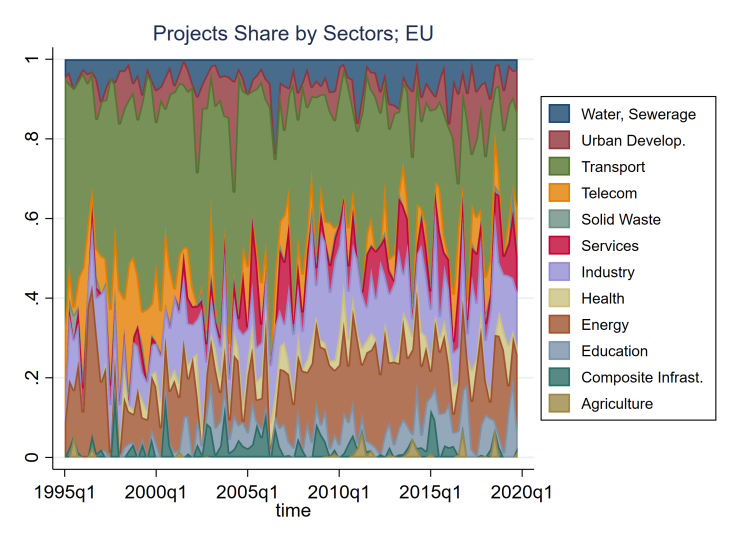
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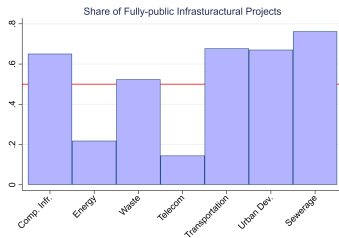
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- excluding credit lines: 8699 distinct projects from 1995q1 to 2020q1, 3722 to fully public promoters

Composition of EIB loans



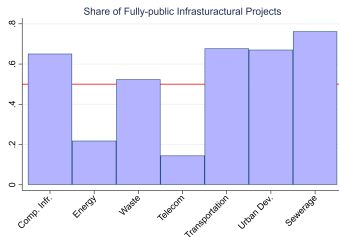
EIB infrastructural loans

- we use the EIB loans to public infrastructural projects as an instrument for public investment



EIB infrastructural loans

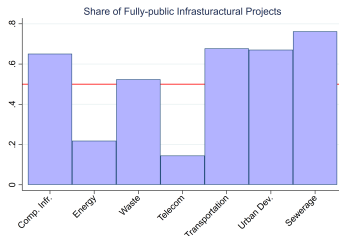
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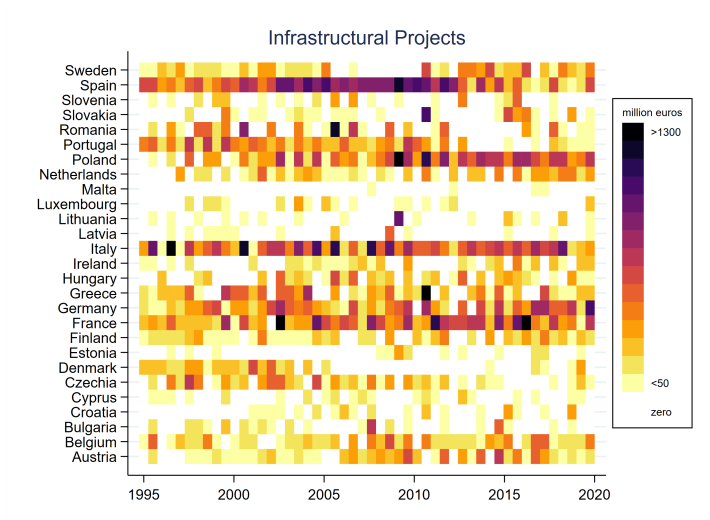
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	Mean	SD	Min	Max	N
Infrastructural Projects (million euros)	146.5	295.9	0	3103.6	2703
Infrastructural to Public Investment	6.3	17.8	0	329.3	2703

EIB infrastructural loans



Empirical Strategy

Econometrics Specification

panel IV local Projection specification:

$$y_{i,t+h} - y_{i,t-1} = \alpha_{i,h} + \gamma_{t,h} + \beta_h \hat{l}_{i,t}^{\hat{g}} + \sum_{k=1}^2 \Theta_{k,h} X_{i,t-k} + \varepsilon_{i,t+h}, \quad h = 0, 1, 2, \dots$$

- $y_{i,t+h}$: log of the variable of interest at time $t + h$ and in country i
- $\alpha_{i,h}, \gamma_{t,h}$: country and time fixed effects
- $\hat{l}_{i,t}^{\hat{g}}$: public investment instrumented by the EIB infrastructural loans
- Controls: lags of GDP, public and private investment, government expenditure, inflation, and loans
- SEs are corrected for heteroskedasticity and serial correlation.

Predictability Concern

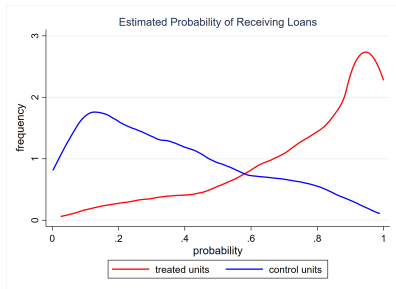
- certain variables, not included in the controls, could influence the allocation of EIB loans to various projects
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- the propensity score is calculated from a saturated probit model, the inverse probability of receiving loans is used as regression weights

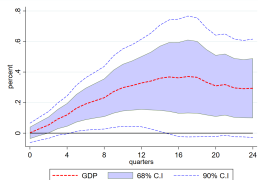
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- distribution of the propensity score for the control and treated units:

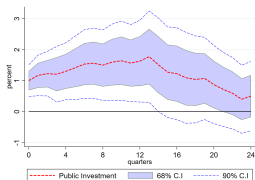


IV-LP Estimation Results

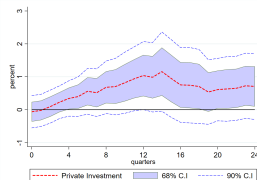
one percent increase in public investment instrumented by EIB infrastructural loans



a) GDP



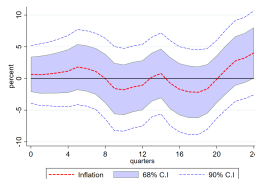
b) public investment



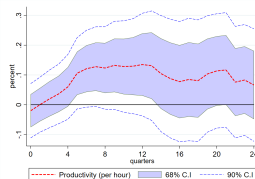
c) private investment



d) employment



e) inflation

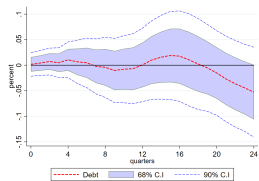


f) productivity

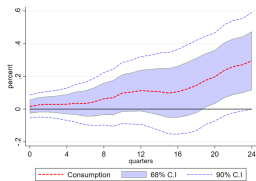
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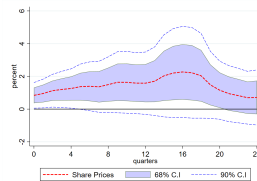
- no crowding out effect on private consumption
- significant response of stock market to the news



a) debt to GDP



b) consumption



c) share prices

Cumulative multiplier

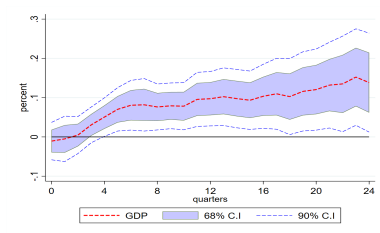
$$\sum_{j=0}^h y_{i,t+j} = \alpha_{i,h} + \gamma_{t,h} + \beta_h \sum_{j=0}^h I_{i,t+j}^g + \sum_{k=1}^2 \Theta_{k,h} X_{i,t-k} + \varepsilon_{i,t+h}, \quad h = 0, 1, 2, \dots$$

- TSLS where $\sum_{j=0}^h I_{i,t+j}^g$ is instrumented using $loan_{i,t}$; cumulative multiplier: $\beta_h \times \frac{\bar{Y}}{\bar{I}^g}$

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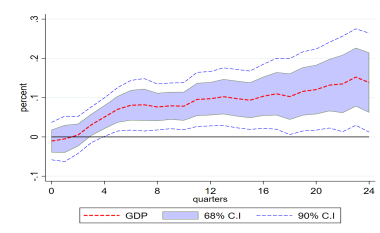
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	Horizon			
	t=0	1-year	3-years	5-years
Elasticity	-0.01 (0.03)	0.03 (0.03)	0.10 (0.04)	0.12 (0.06)
Multiplier	-0.32 (0.85)	0.84 (0.83)	2.83 (1.25)	3.52 (1.81)

Infrastructural Investment Multiplier

Our estimation suggests a higher multiplier than many existing studies:

- selection of high-quality infrastructure projects
 - projects that undergo a detailed evaluation process

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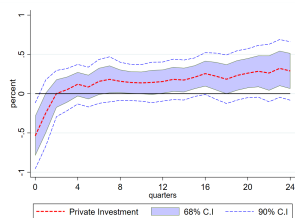
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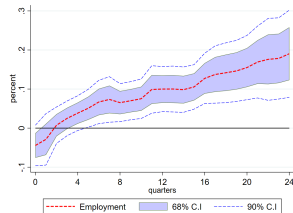
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- very persistent shocks, bigger effects on output
 - Dupaigne & Fève (2016), Alloza et al. (2024)

Cumulative multiplier

private investment, total employment



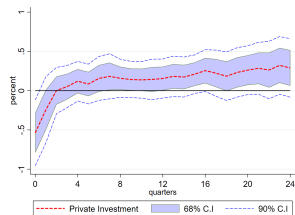
a) private investment



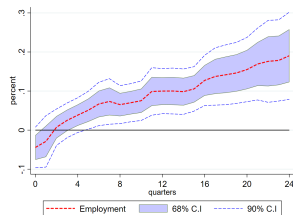
b) employment

Cumulative multiplier

private investment, total employment



a) private investment



b) employment

		Horizon			
		t=0	1-year	3-years	5-years
Private Investment	elasticity	-0.56 (0.27)	0.04 (0.17)	0.14 (0.16)	0.24 (0.20)
	multiplier	-3.12 (1.49)	0.20 (0.95)	0.77 (0.90)	1.36 (1.10)
Employment	elasticity	-0.04 (0.03)	0.03 (0.03)	0.10 (0.04)	0.15 (0.05)
	multiplier	-0.08 (0.06)	0.06 (0.06)	0.20 (0.08)	0.30 (0.10)

Heterogeneity Analysis

State-dependency

$$\sum_{j=0}^h y_{i,t+j} = \alpha_{i,h} + \gamma_{t,h} + \beta_h \sum_{j=0}^h I_{i,t+j}^g + \zeta_h \left(\sum_{j=0}^h I_{i,t+j}^g \times \text{State}_{t-1} \right) + \xi_h \text{State}_{t-1} + \sum_{k=1}^2 \Theta_{k,h} X_{i,t-k} + \varepsilon_{i,t+h}$$

State_t : a variable reflecting governance quality or financial condition at time t

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1 Governance Indicators data

- voice and accountability
- political stability and absence of violence/terrorism
- government effectiveness
- regulatory quality
- rule of law
- control of corruption

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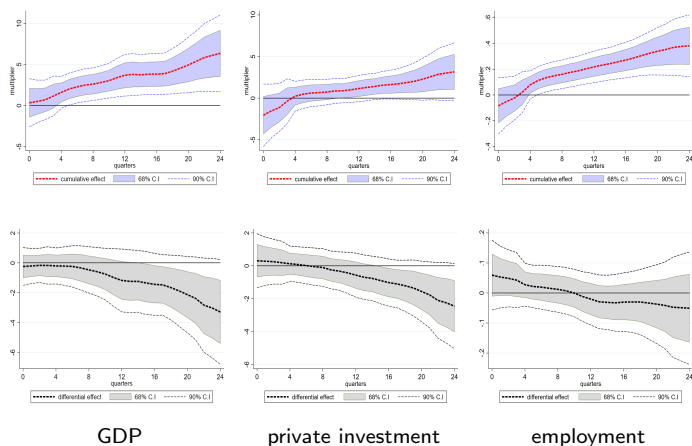
2 Macroeconomic and Financial Indicators

- recessions/expansions
- public debt to GDP

State-dependency

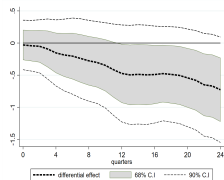
governing quality

public investment multiplier for different groups of countries

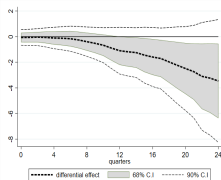


State-dependency

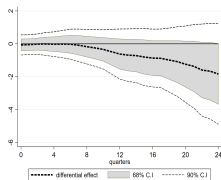
GDP multiplier based on different indicators



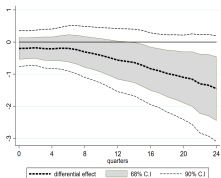
accountability



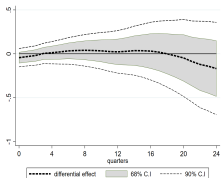
effectiveness



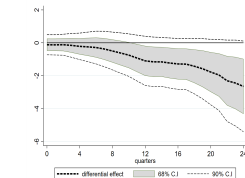
rule of law



regulation



stability

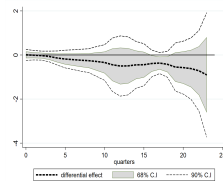
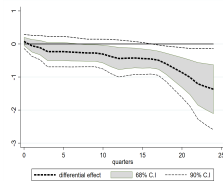
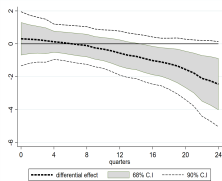
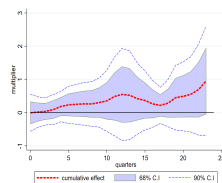
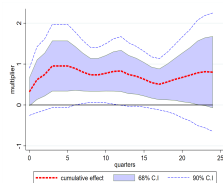
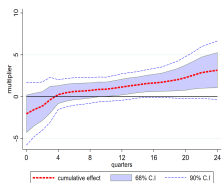


corruption

State-dependency

factors affecting private investment

private sector is affected differently in these countries; cumulative effect:



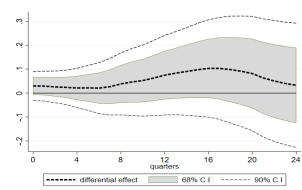
private investment

share prices

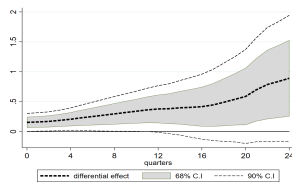
economic sentiments

macro and financial indicators

GDP:



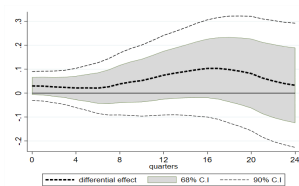
a) recessions



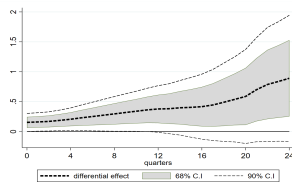
b) public debt to GDP

macro and financial indicators

GDP:

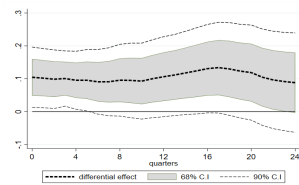


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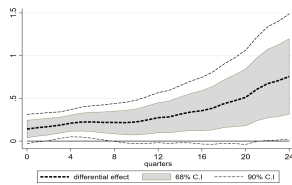


b) public debt to GDP

Private Investment:



a) recessions



b) public debt to GDP

Robustness checks

- dynamic heterogeneity: average value of individual-country estimations
- excluding outlier observations/countries
- time-varying threshold interaction/ dummy variable indicator
- controlling for variables correlated with the state variable
- running regression for poor/rich countries separately (based on GDP per capita)

Conclusion

- we analyze the economic impact of public infrastructure investment using EIB loans to publicly owned projects as an instrument
- infrastructure investment boosts employment, output, and private investment in the medium term without causing significant inflation
- five years after the shock the output multiplier peaks at 3.5, with larger effects in countries with higher debt-to-GDP ratios and poor governance
- a stronger crowding-in effect on private investment amplifies the overall impact in these countries

Thank you for your attention!

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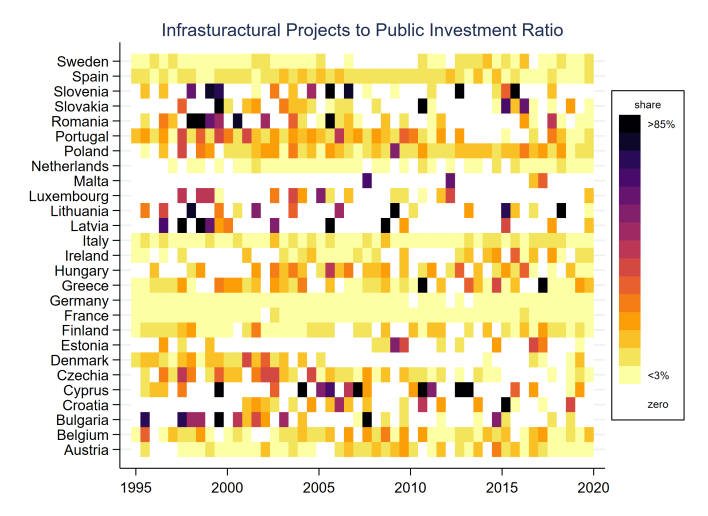
Appendix

Appendix

Number of loans by country and firm ownership

Country	Fully public	Other	Total	Share (percent)
Austria	117	386	503	4.08
Belgium	92	271	363	2.94
Bulgaria	25	75	100	0.81
Croatia	31	65	96	0.78
Cyprus	28	94	122	0.99
Czechia	56	234	290	2.35
Denmark	89	159	248	2.01
Estonia	41	37	78	0.63
Finland	143	201	344	2.79
France	419	797	1,216	9.85
Germany	471	1,399	1,870	15.15
Greece	100	284	384	3.11
Hungary	83	202	285	2.31
Ireland	76	90	166	1.35
Italy	301	1,510	1,811	14.67
Latvia	32	42	74	0.60
Lithuania	30	52	82	0.66
Luxembourg	8	81	89	0.72
Malta	14	11	25	0.20
Netherlands	88	182	270	2.19
Poland	393	362	755	6.12
Portugal	145	394	539	4.37
Romania	80	124	204	1.65
Slovakia	21	165	186	1.51
Slovenia	17	94	111	0.90
Spain	685	1,089	1,774	14.37
Sweden	158	199	357	2.89
Total	3,743	8599	12,342	100

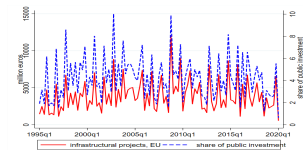
Appendix



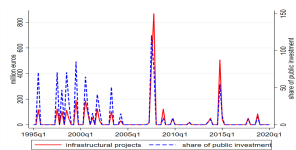
Appendix

EIB infrastructural loans

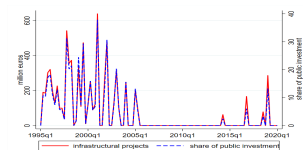
financed infrastructural projects and their contribution in public investment



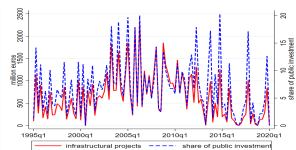
EU



Bulgaria



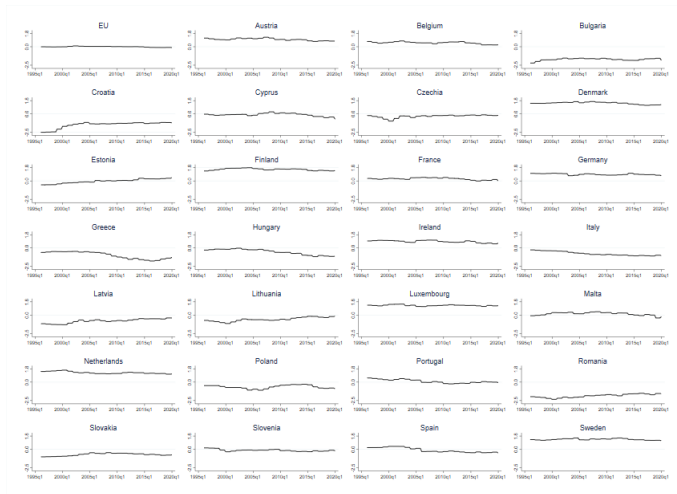
Denmark



Spain

Appendix

WGI data



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Appendix: pooled probit regressions

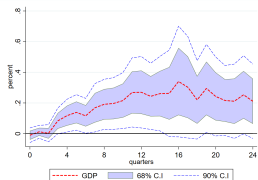
Estimating the effect of macroeconomic variables on receiving EIB loans at time t+1, Pooled Probit Estimators

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	(1)	(2)	(3)	(4)
Debt to GDP	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)
Openness	-0.027* (0.016)	-0.026 (0.017)	-0.025 (0.018)	-0.022 (0.018)
Private Consumption	0.145*** (0.008)	0.147*** (0.008)	0.146*** (0.008)	0.148*** (0.009)
EU Accession	0.097*** (0.030)	0.094** (0.037)	0.079*** (0.030)	0.089** (0.037)
Loan at t	-0.005 (0.019)	-0.009 (0.020)	-0.008 (0.019)	-0.010 (0.020)
Stock Market growth		0.025 (0.080)		0.030 (0.081)
Credit Spread		-0.002 (0.005)		-0.000 (0.005)
Tax Rate			0.495 (0.320)	0.402 (0.324)
Unemployment Rate			-0.001 (0.002)	-0.002 (0.003)
Observations	2315	2128	2296	2128
Model AUC s.e.	0.825 0.009	0.829 0.009	0.824 0.009	0.830 0.009

IV-LP Estimation Results

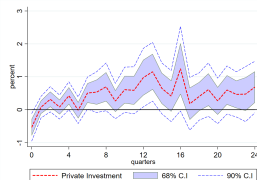
one percent increase in public investment instrumented by EIB infrastructural loans



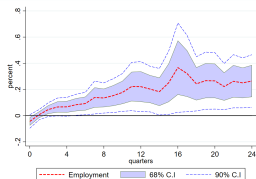
a) GDP



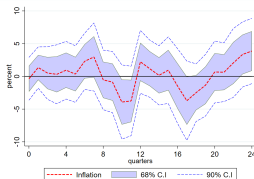
b) public investment



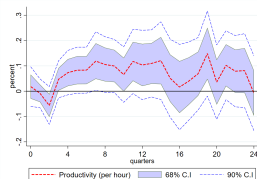
c) private investment



d) employment



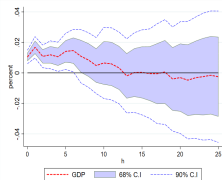
e) inflation



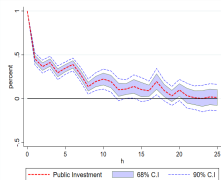
f) productivity

Appendix

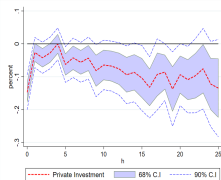
BP shocks



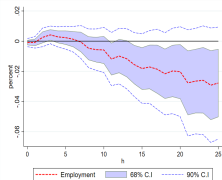
GDP



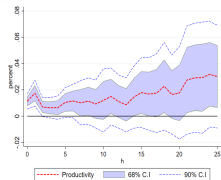
public investment



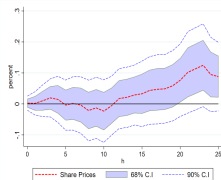
private investment



employment



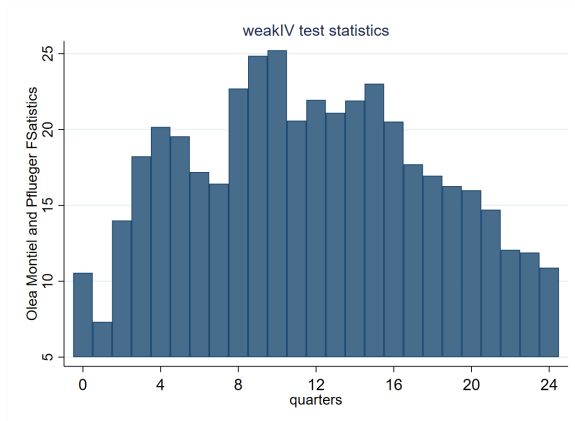
productivity



share prices

Appendix

F-Statistics

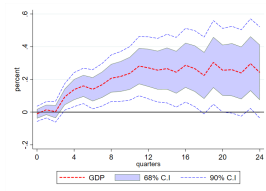


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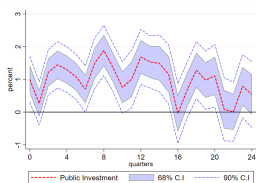
Appendix

original IRFs

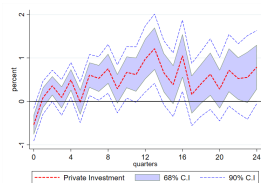
one percent increase in public investment instrumented by EIB loans



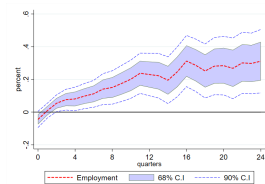
a) GDP



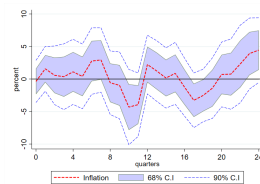
b) public investment



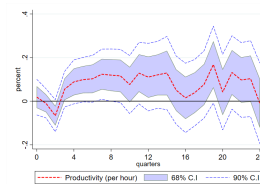
c) private investment



d) employment



e) CPI

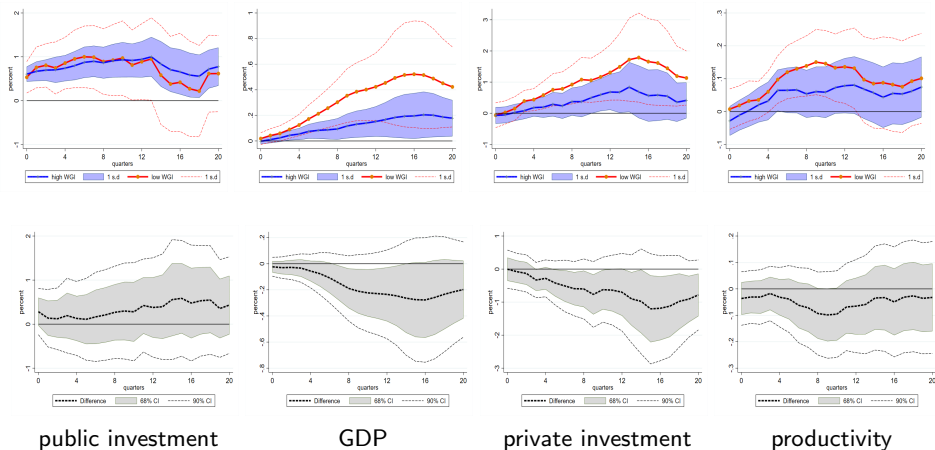


f) productivity

State-dependency

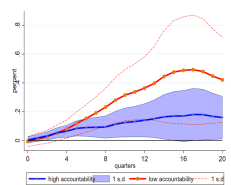
governing quality

public investment multiplier for different groups of countries

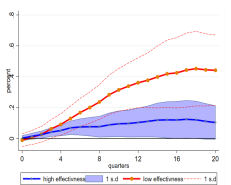


State-dependency

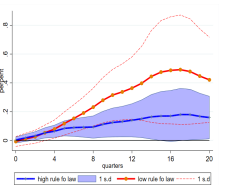
GDP responses based on different indicators



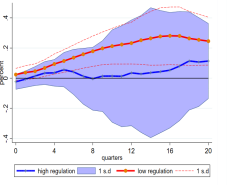
accountability



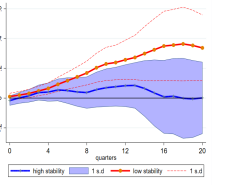
effectiveness



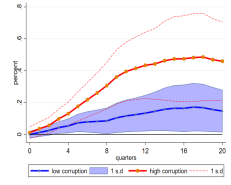
rule of law



regulation



stability

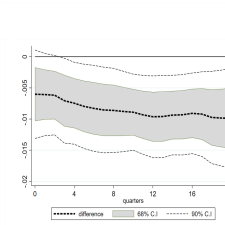
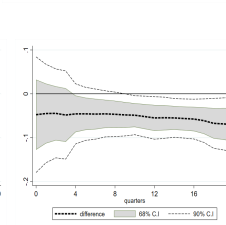
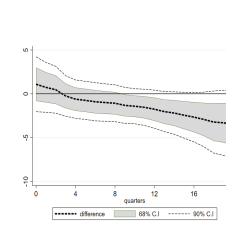
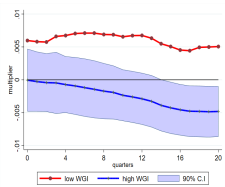
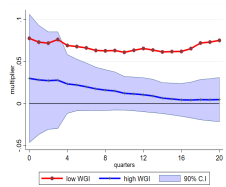
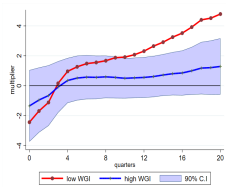


corruption

State-dependency

factors affecting private investment

private sector is affected differently in these countries; cumulative effect:



private investment

share prices

economic sentiments

References