

Delays in Public Investment Projects

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Motivation

- Even before the pandemic crisis, developing countries were facing pressing demands for additional public investment to promote inclusive and sustainable growth as outlined in the 2030 Development Agenda
- It is crucial to design viable and realistic investment plans to maximize the growth dividend of public investment and lower the risks of undermining debt sustainability
- This is especially important in the current macroeconomic context, in which several developing countries already have to deal with high public debts and weak fiscal positions (with the COVID19 pandemic further exacerbating fiscal vulnerabilities) and face large investment gaps (IMF 2020)

Absorptive capacity, costs overruns, and project delays

- Absorptive capacity constraints could reduce the benefits of public investment (Isham & Kaufmann 1999; Presbitero 2016)
- When public investment is scaled up too much or too fast, government officials may face capacity constraints—in terms of skills, institutions, and management—to select good projects or manage them well, leading to cost inflation and delays in project implementation and completion
- While there are studies on cost escalation, especially in infrastructures (Flyvbjerg 2009; Collier et al. 2016; Gurara et al. 2021), time overruns have received less attention

Research question and contribution

- We exploit a large dataset of investment projects to study the project- and country-level drivers of time overruns
- We bring new data on project characteristics—extracted from project reports through a text search analysis—which allow us to look at the drivers of time delays, an important aspect of project outcomes
- Our results provide micro-level evidence which could explain the macro findings of low returns to public investment booms and small fiscal multipliers when investment efficiency is low (Cavallo & Daude 2011; Abiad et al. 2016; Arezki et al. 2017)

Data and sample

- Sources: World Bank's investment projects, matched with the IEG project evaluation data and macro and institutional variables from the IMF WEO and the WB WGI
- Sample: 4,010 investment projects approved since 1990 in 135 emerging markets and developing countries
- A set of project-specific variables—including project delays—is computed using text search analysis tools on individual project documents

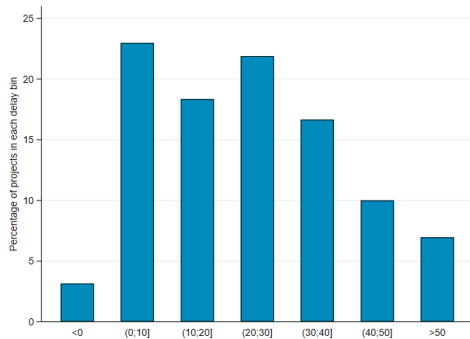
Time delays: validation

Time delays—a measure of the extra time needed to complete a project—is defined as the difference between the actual project completion date and the one estimated at the beginning of the project, scaled by project length (all measured in days)

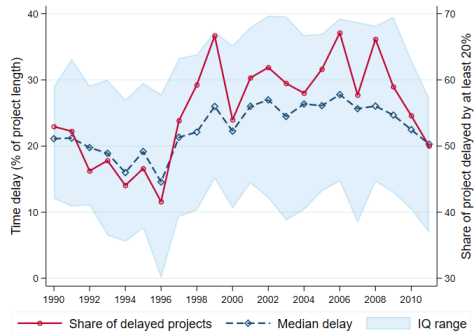
Dependent variable: Project delay	(1)	(2)
Words count ('on schedule')	-2.3045*** (0.144)	-2.2103*** (0.161)
Words count ('delayed')	0.3244*** (0.033)	0.2980*** (0.034)
Observations	4,010	4,006
Adjusted- R^2	0.058	0.141
Country FE	No	Yes
Year FE	No	Yes
Sector FE	No	Yes

Stylized Facts

Stylized facts on project delays /1

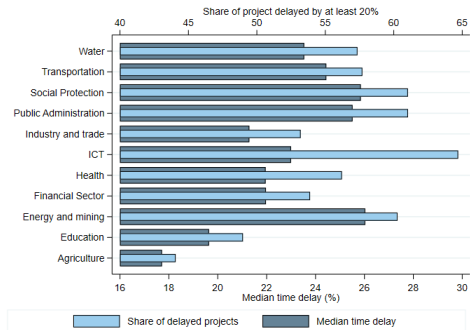


(a) Project delays

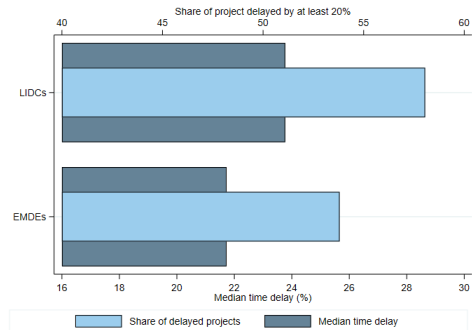


(b) Project Delays over Time

Stylized facts on project delays /2



(c) Across sectors



(d) Across country income

Time delays translate into cost inflation

Time delays spillover into cost inflation (Cavallo et al. 2020 on IDB projects). In the World Bank sample, a 10 percent increase in the time overrun is associated with almost a 5 percent increase in the project cost

Dependent variable: Cost overrun	(1)	(2)
Project delay	0.5088*** (0.039)	0.4713*** (0.040)
Observations	3,772	3,768
R^2	0.058	0.175
Adjusted- R^2	0.058	0.137
Country FE	No	Yes
Year FE	No	Yes
Sector FE	No	Yes

Empirical analysis

Research design /1

We estimate a model in which time delays are a function of project-specific characteristics, country-level variables and a large set of fixed effects (FEs):

$$\textit{Project delay}_{jct} = \textit{Project}_{jt}\alpha + \textit{Macro}_{ct}\beta + \tau_t + \gamma_c + \epsilon_{jct}, \quad (1)$$

The set of project-level characteristics, measured in the year of project approval, includes:

1. project cost, measured by the logarithm of the dollar amount of the total cost
2. project cost in percent of GDP
3. project length, computed as the difference between the end and approval dates
4. the length of the project document, measured by the logarithm of the number of words
5. the cost share of the largest sector in the project
6. the share of the project cost financed by the World Bank and
7. a dummy identifying projects that have received an estimated rate of return at appraisal

Research design /2

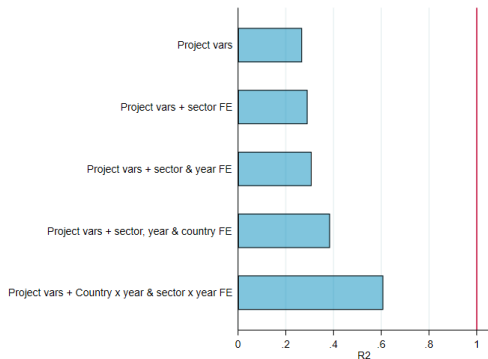
The set of country-level variables includes:

1. public investment scaling up, measured by the difference between the public investment-to-GDP ratio and its past 10-year average
2. project cost in percent of GDP
3. the logarithm of real per capita GDP and
4. the World Governance Indicator of government effectiveness¹

To minimize the endogeneity coming from omitted variables, we augment the model with a rich set of fixed effects, that include year, sectors, regions (or sector \times year and region \times year) and country group fixed effects

Standard errors are clustered at the country level

The role of observable and unobservable factors



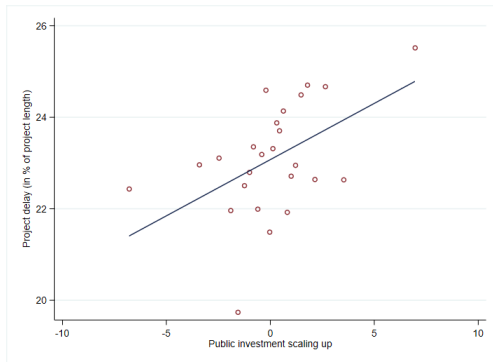
Notes: the chart plots the R^2 from a set of OLS regressions of the measure of project delay on project-level characteristics and then augmented adding sector, year and country fixed effects. The last specification (bottom bar) includes project-level characteristics and sector \times year and country \times year fixed effects.

- Most of the variation in project outcomes is project-specific (and often unobservable)
- Almost 40 percent of the variation in project delays is unexplained
- However, the role played by project-specific characteristics and time varying country-level factors is not trivial and leaves room to design public investment plans in a way that minimizes delays

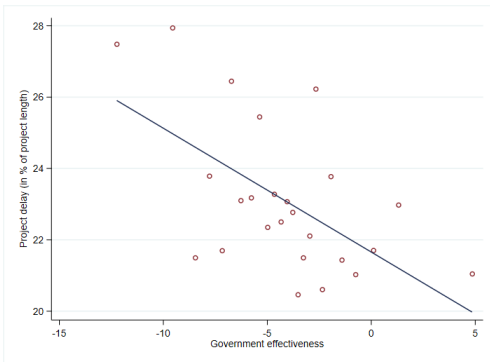
Baseline results: project-level evidence

Dependent variable: Project delay	(1)	(2)	(3)	(4)	(5)
Project cost	-2.2657*** (0.428)	-2.0707*** (0.351)	-1.4781*** (0.323)	-1.4098*** (0.308)	-1.4491*** (0.389)
Project cost (% GDP)	0.0209 (0.069)	-0.0022 (0.055)	-0.0220 (0.047)	-0.0322 (0.047)	0.1846 (0.216)
Project length	0.0114*** (0.001)	0.0115*** (0.001)	0.0116*** (0.001)	0.0115*** (0.001)	0.0112*** (0.001)
Project document length	3.1537*** (0.938)	3.0935*** (0.975)	3.1877*** (0.984)	3.1968*** (0.972)	2.5530** (1.090)
Share of largest sector	1.5426 (0.937)	1.6283* (0.948)	2.0392** (0.879)	2.0318** (0.976)	2.0782 (1.273)
World Bank financing (%)	-0.0529*** (0.016)	-0.0582*** (0.014)	-0.0508*** (0.011)	-0.0488*** (0.011)	-0.0387** (0.016)
Expected rate or return at appraisal (0/1)	-2.5477*** (0.662)	-2.5217*** (0.648)	-2.3898*** (0.608)	-2.6843*** (0.665)	-2.8509*** (0.946)
Observations	3,939	3,939	3,933	3,919	3,174
R^2	0.312	0.320	0.378	0.418	0.608
Country FE	No	No	Yes	Yes	-
Year FE	Yes	Yes	Yes	Yes	-
Sector FE	Yes	Yes	Yes	Yes	-
Sector \times Year FE	No	No	No	Yes	Yes
Country \times Year FE	No	No	No	No	Yes
Region & LIDC FE	No	Yes	-	-	-

Project delay, investment scale up and governance effectiveness



(e) Time delays and investment scale up



(f) Time delays and government effectiveness

Baseline results: macro-level evidence

Dependent variable: Project delay	(1)	(2)	(3)	(4)	(5)
GDP per capita	0.2196 (0.164)	0.2429 (0.163)	0.2177 (0.160)	0.2367 (0.159)	0.1922 (0.152)
Real GDP growth	0.0053 (0.081)	-0.0164 (0.079)	-0.0139 (0.073)	-0.0305 (0.072)	-0.0198 (0.067)
Public investment scale up		0.2458** (0.108)		0.1990* (0.111)	0.5437*** (0.194)
Government effectiveness			-0.3471*** (0.100)	-0.3320*** (0.101)	-0.3537*** (0.099)
Public investment scale up \times government effectiveness					0.0510*** (0.019)
Observations	2,875	2,875	2,875	2,875	2,875
R^2	0.411	0.412	0.416	0.416	0.418
Country FE	No	No	No	No	No
Project-level controls	Yes	Yes	Yes	Yes	Yes
Sector \times Year FE	Yes	Yes	Yes	Yes	Yes
Region \times Year FE	Yes	Yes	Yes	Yes	Yes
LIDC FE	Yes	Yes	Yes	Yes	Yes

Economic magnitudes

- Ex-ante project design and planning matter for project outcomes:
 - Projects with the expected rate of return at appraisal have an average delay which is 3 pps lower than the average project
 - 1 SD increase in the share of World Bank financing is associated with a 1.2 pps decline in project delay
- The macro, cross-sectional, results show that:
 - 1 SD increase in the public investment-to-GDP ratio with respect to its average in the previous 10-year period (equal to 3.3 pps) is associated with an increase in time overruns of almost 0.9 percentage point
 - 1 SD increase in government effectiveness is associated with a decline in time overruns of about 1.8 pps

Extensions and robustness

Dependent variable: Project delay	(1)	(2)	(3)	(4)	(5)	(6)
Government effectiveness	-0.3396*** (0.101)	-0.2987*** (0.100)	-0.3156*** (0.112)	-0.3337*** (0.102)	-0.3278*** (0.099)	
Public investment scale up, EMDEs	0.3736** (0.166)					
Public investment scale up, LDCs	0.0430 (0.123)					
Public investment scale up, high public capital stock		0.2524* (0.142)				
Public investment scale up, low public capital stock		-0.0163 (0.236)				
Public investment scale up			0.1893* (0.106)			0.2302** (0.111)
Public investment scale up (5-year)				0.2185* (0.118)		
Public investment scale up (average)					0.3320* (0.171)	
Control of corruption						-0.1867** (0.082)
Observations	2,875	2,799	2,613	2,875	2,875	2,875
R ²	0.417	0.419	0.412	0.416	0.417	0.414
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector × Year, Region × Year, LIDC FEs	Yes	Yes	Yes	Yes	Yes	Yes
Sample	All	All	up to 2010	All	All	All

Discussion

Summary

- Our analysis looks at the time overrun of investment projects, which can be accurately measured, is often associated with increases in costs and a reduction in the return of the investment, and is a good metric of problems with project implementation
- Sound planning and preparation matter for the timing of project completion
- Country characteristics also play a role:
 1. Projects undertaken in countries with weaker institutions and in periods of public investment scaling up are completed with longer delays
 2. Large scaling up of public investment are more likely to result in delayed projects, especially in high public capital stock countries

Policy implications

- In an environment characterized by low global interest rates and large infrastructure needs the case for scaling up public investment is strong
- Time overruns are pervasive, often large, could contribute to cost inflation, and reduce the growth dividend of public investment
- As delays vary across projects and countries there is scope to design public investment plans (i.e. how much spending is front loaded) in a way that minimizes the consequences of capacity constraints on project implementation
- A sound institutional and regulatory environment and a plan that does not scale public investment too much and too fast can help project preparation and implementation, leading to shorter delays, and potentially higher returns